CITY COUNCIL AGENDA

April 15, 2024 at 7:00 PM

Wilsonville City Hall & Remote Video Conferencing

PARTICIPANTS MAY ATTEND THE MEETING AT:
City Hall, 29799 SW Town Center Loop East, Wilsonville, Oregon
YouTube:*https://youtube.com/c/cityofwilsonvilleor*
Zoom: *https://us02web.zoom.us/j/81536056468*

TO PARTICIPATE REMOTELY OR PROVIDE PUBLIC COMMENT:
Register with the City Recorder:
CityRecorder@ci.wilsonville.or.us or 503-570-1506
Individuals may submit comments online at: *https://www.ci.wilsonville.or.us/SpeakerCard*,
via email to the address above, or may mail written comments to:
City Recorder - Wilsonville City Hall
29799 SW Town Center Loop East, Wilsonville, OR 97070

CITY COUNCIL MISSION STATEMENT

To protect and enhance Wilsonville's livability by providing quality service to ensure a safe, attractive, economically vital community while preserving our natural environment and heritage.

REVIEW OF AGENDA AND ITEMS ON CONSENT [5:00 PM]

COUNCILORS' CONCERNS [5:05 PM]

PRE-COUNCIL WORK SESSION [5:10 PM]

A. Frog Pond East and South Master Plan Development Code (*Pauly*) [45 min.]

ADJOURN [5:55 PM]

CITY COUNCIL MEETING

The following is a summary of the legislative and other matters to come before the Wilsonville City Council a regular session to be held, April 15, 2024 at City Hall. Legislative matters must have been filed in the office of the City Recorder by 10:00 a.m. on April 2, 2024. Remonstrances and other documents pertaining to any matters listed in said summary filed at or prior to the time of the meeting may be considered there with except where a time limit for filing has been fixed.

CALL TO ORDER [7:00 PM]

1. Roll Call
2. Pledge of Allegiance
3. Motion to approve the following order of the agenda.

MAYOR'S BUSINESS [7:05 PM]

4. Upcoming Meetings
5. Child Abuse Prevention Month Proclamation

COMMUNICATIONS [7:20 PM]

CITIZEN INPUT AND COMMUNITY ANNOUNCEMENTS [7:20 PM]

This is an opportunity for visitors to address the City Council on any matter concerning City's Business or any matter over which the Council has control. It is also the time to address items not on the agenda. It is also the time to address items that are on the agenda but not scheduled for a public hearing. Staff and the City Council will make every effort to respond to questions raised during citizen input before tonight's meeting ends or as quickly as possible thereafter. Please limit your comments to three minutes.

6. Citizens Input

COUNCILOR COMMENTS, LIAISON REPORTS AND MEETING ANNOUNCEMENTS [7:35 PM]

7. Council President Akervall
8. Councilor Linville
9. Councilor Berry
10. Councilor Dunwell

CONSENT AGENDA [7:55 PM]

11. **Resolution No. 3122**

    A Resolution Of The City Of Wilsonville Authorizing The City Manager To Enter Into And Execute A Cooperative Maintenance Agreement And Accept The Relinquishment Of A Portion Of SW Elligsen Road With The State Of Oregon Department Of Transportation. (*Weigel*)

12. **Resolution No. 3138**

A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Construction Contract With Flow Line Construction, LLC., Inc. To Construct The Park At Merryfield And Boones Ferry Park Trails Project. (*Schull*)

13. Minutes of the April 1, 2024 City Council Meeting. *(City Recorder)*

14. Minutes of the April 3, 2024 Special City Council Meeting. *(City Recorder)*

NEW BUSINESS [8:00 PM]

CONTINUING BUSINESS [8:00 PM]

15. **Ordinance No. 890** - *2nd Reading (Legislative Land Use)*

    An Ordinance Of The City Of Wilsonville To Adopt The 2024 Stormwater Master Plan As A Sub-Element To The City Of Wilsonville Comprehensive Plan And The Stormwater Capital Improvement Project List. (*Rappold*)

16. Appeal of DRB Resolution No. 429, A Resolution Affirming the Planning Director's Determination of Non-Conformance in Case File ADMN23-0029 and Denying the Applicant's Appeal DB24-0002. (Bateschell/Davidson)

PUBLIC HEARING [8:30 PM]

CITY MANAGER'S BUSINESS [8:30 PM]

LEGAL BUSINESS [8:35 PM]

ADJOURN [8:40 PM]

INFORMATIONAL ITEMS – No Council Action Necessary

Earth Day Proclamation

City Manager Reports

Time frames for agenda items are not time certain (i.e. agenda items may be considered earlier than indicated). The City will endeavor to provide the following services, without cost, if requested at least 48 hours prior to the meeting by contacting the City Recorder at 503-570-1506 or CityRecorder@ci.wilsonville.or.us: assistive listening devices (ALD), sign language interpreter, and/or bilingual interpreter. Those who need accessibility assistance can contact the City by phone through the Federal Information Relay Service at 1-800-877-8339 for TTY/Voice communication.

Habrá intérpretes disponibles para aquéllas personas que no hablan Inglés, previo acuerdo. Comuníquese al 503-570-1506.

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: April 15, 2024	**Subject:** Frog Pond East and South Master Plan Development Code **Staff Member:** Daniel Pauly, Planning Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☐ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☒ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** The Planning Commission held a number of work sessions starting in January 2023. The Commissions input and guidance are reflected in the draft Development Code amendments.
Staff Recommendation: Provide requested input on draft Development Code amendments for Frog Pond East and South Implementation.	
Recommended Language for Motion: N/A	
Project / Issue Relates To:	

☒Council Goals/Priorities: Expand home ownership	☒Adopted Master Plan(s): Frog Pond East and South Master Plan	☐Not Applicable

ISSUE BEFORE COUNCIL

An important next step in realizing the vision of the Frog Pond East and South Master Plan adopted in December 2022 is to write implementing Development Code amendments. This effort has been ongoing since early 2023. As the project moves towards adoption this summer, the work session will provide Council the opportunity to ask any additional outstanding questions on proposed Code amendments not specific to Frog Pond zoning (Section 4.127). This work session will also discuss updates to design standards for Frog Pond East and South since the Council's December work sessions, including addressing Council concerns about usability and maintenance of narrow side yards.

EXECUTIVE SUMMARY:
The Frog Pond East and South Master Plan, adopted by City Council in December 2022, provides clear policy direction and guidance for future development in Frog Pond East and South. An important implementation step is to develop a detailed set of Development Code standards consistent with the Master Plan. These standards will be relied on by developers to plan and design development. These standards will also be relied on by City reviewers to ensure development meets City expectations.

While a good portion of the implementing development code language is within Section 4.127, which is the Frog Pond-specific zoning language, other code sections are also impacted. Many of the code amendments in these other sections will apply throughout the City. Attachments 1 and 2 contain these "other" code amendments which reflect feedback to date from both the Planning Commission and City Council. These amendments have come before the Council in work sessions in pieces over the last year plus. **These amendments focus on removing barriers to the development of a variety of housing, especially those housing types that can provide lower-cost housing opportunities, including for ownership.** This work session gives the Council an opportunity to review these "other" code amendments in whole and ask any additional questions or provide any additional input prior to these amendments being finalized for the adoption hearing before Council (see Attachments 1 and 2).

This is the final work session planned to focus on these "other" code amendments prior to the public hearing. The final work session for the project will focus on the Frog Pond-specific Section 4.127.

Highlights of the proposed "other" code amendments are as follows:

- Establishing clear and objective design standards for multi-family residential development and allowing the review of multi-family buildings, based on the new design standards, through the administrative review process consistent with other residential building types including detached single-family and middle housing.
- Removing additional regulatory barriers to development of Accessory Development Units (ADUs) following recommendations from the Frog Pond East and South Master Plan. Changes include allowing ADUs for all townhouses, not just those with larger lots; exempting ADUs from maximum lot coverage, one of the most common barriers to their development; and removing any additional review process making the ADU review process the same as detached single-family or middle housing.
- Prohibiting deed restrictions and private covenants, such as subdivision covenants, conditions, and restrictions (CC&Rs), from limiting housing types allowed by zoning. This reflects State law adopted during the 2019 legislative session as part of House Bill 2001.
- Establishing Residential Stormwater Design Standards to reflect current City policy and practice, to provide additional clarity to development partners as they design residential projects.

In addition, to the "other" code amendments, this work session will update the Council on refinements to design standards specific to Frog Pond East and South that have occurred since Council's December work session on the standards. The updated design standards are in Table 8B from Subsection 4.127 (.08), along with related footnotes, with the refinements highlighted in yellow (Attachment 3). These refinements are based on feedback from the Council, as well as the Planning Commission, development partners, and City staff. The specific refinements are as follows:

- Adding language regarding the required lot size in Frog Pond East and South. This update reflects input from the Council and Planning Commission that there is a minimum lot size, it is just defined by building and lot standards rather than having an independent defined value.
- Refining the maximum height to allow four-story buildings in Urban Form Type 1, and three-story buildings in Urban Form Types 2 and 3. In addition, slightly increased maximum height (in feet) to allow flexibility for taller floor heights. A new footnote clarifies that while three-story buildings are allowed in Urban Form Type 3, they have an additional required setback to better blend with what is planned as primarily a one and two-story area.
- Slightly increasing the allowed building width for Urban Form Types 2 and 3 to allow additional flexibility for building design. The increase is, respectively, from 120 to 125 feet, and from 90 to 100 feet.
- For Urban Form Type 2, adding the ability to use additional building articulation in lieu of minimum building width in Urban Form Type 2. Building width between articulations would still be limited to 125 feet with the articulation being allowed instead of building separation. This provision is primarily anticipated to apply to multi-family buildings, but could be used for townhouse buildings as well.
- Establishing five feet as the minimum side yard setback in all Urban Form Types, with special provisions for reduced side yard setbacks relative to building width in Urban Form Types 1 and 2.
- Removing footnotes about special fence or side yard maintenance requirements for small areas specific to Frog Pond East and South. See additional discussion below.
- Establishing 80 percent as the maximum lot coverage for Frog Pond East and South. Based on prior feedback and for simplicity and consistency with other residential zones in the City, staff have proposed maintaining the use of lot coverage rather than Floor-to-Area Ratio (FAR). 80 percent provides a clear backstop while not standing as a barrier to development of desired housing types.

Finally, Council has previously expressed concerns about fenced narrow side yards and their usability and maintenance. While these fenced areas will occur due to setbacks and a desire to screen and secure areas, staff does have a couple citywide recommendations that can limit the concerns. First, require that whenever a side yard area less than five-feet wide is enclosed by fencing, a gate or gates will allow through access to a rear yard or alley. The notion is that through-access will increase usability, and if there is use there is a greater tendency to maintain to allow for the use. Second, add specific language to the nuisance language in Chapter 6 of the City Code that side yards are to be kept clear of vegetation, rubbish, junk, and other materials

that would prevent the required through-access. Together this language can, with minimal additional regulation, meaningfully address the concerns about use and maintenance of side yards expressed by Council.

Discussion Questions
The following would be helpful feedback from the City Council at this work session:

- What, if any, additional questions, comments, or input does the Council have on proposed "other" Development Code amendments in Attachments 1 and 2 prior to them being finalized for adoption?

- What feedback does the Council have on the refinements to the proposed design standards for Frog Pond East and South in Attachment 3?

EXPECTED RESULTS:
Feedback from meeting will guide completion of a package of Development Code amendments for adoption.

TIMELINE:
A final work session to discuss other Frog Pond-specific amendment in Section 4.127 and provide follow up from this work session is planned for May. A Planning Commission public hearing is subsequently planned for June, with a Council public hearing in July.

CURRENT YEAR BUDGET IMPACTS:
The Development Code implementation work is funded by remaining funds from the $350,000 Metro grant for the Frog Pond East and South Master Plan and matching City funds in the form of staff time.

COMMUNITY INVOLVEMENT PROCESS:
During this implementation phase the primary focus is on honoring past input. However, the project team continues to engage key stakeholders for input on draft Development Code amendments.

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
Realization of the policy objectives set out in the Frog Pond East and South Master Plan to create Wilsonville's next great neighborhoods. This includes furthering of the City's Equitable Housing Strategic Plan and Council's goal of affordable home ownership.

ALTERNATIVES:
The project team prepared draft amendments to help implement the Frog Pond East and South Master Plan. A number of alternative amendments can be considered to meet the same intent.

CITY MANAGER COMMENT:
N/A

ATTACHMENTS:

1. Draft Development Code Amendments, except for Sections 4.113 and 4.127, with Supporting Information (March 18, 2024)
2. Draft Development Code Amendments, Sections 4.113, Standards Applying to Residential Development in Any Zone, with Supporting Information (March 18, 2024)
3. Updated Table 8B of the proposed Development Code Amendments and related footnotes (April 3, 2024)

Attachment 1 Frog Pond East and South City Council Work Session April 15, 2024 Draft Development Code Amendments Except for 4.113 and 4.127

Removed language ~~struckthrough~~. Added language **bold underlined.**

1. Define Net Development Area

Intent: To clearly define net development area as it relates to standards for Frog Pond East and South.
Applicability: Citywide, but primarily applicable to Frog Pond East and South at this time.
Additional Explanation: The Development Code currently defines "Gross Development Area", but not "Net Development Area". The proposal is to define net by defining what is removed from gross to get to net. The Net Development Area is proposed as an important measure in determining compliance with Frog Pond East and South variety standards.

4.001 Definitions

(.XXX) Development Area, Net: For residential development, the portion of Gross Development Area that is used for off-street parking, alleyways and off-street circulation areas, areas covered by primary and accessory structures, private and semi-private yard space and landscaping, and hardscape not otherwise excluded as follows: required open space in tracts, stormwater facilities in tracts, other similar common-use tracts, and public right-of-way.

2. Clean up and clarify definitions regarding lots, lot lines, and yards

Intent: To clean up and clarify certain definitions around lots, lot lines, and yards based on questions that have arisen in implementation of the current code. No policy change intended.
Applicability: Citywide
Additional Explanation: none

4.001 Definitions

(.XXX) **Lot, Corner: A lot either (1) where two intersecting lot lines both abut a street or private drive or (2) where the shortest lot line abuts an alley or tract with a non-vehicular pathway and an intersecting lot line abuts a street or private drive.**

(.XXX) Lot, Through: **A lot with two non-intersecting lot lines each abutting a street or private drive.** ~~Any lot, except a corner lot, that abuts two or more streets or private drives other than a freeway.~~ Private drives which are bound on two sides by a single lot shall not be considered in determining if a lot is a through lot.

~~*(.XXX)* Lot, Front: The boundary line of a lot abutting a street, other than a boundary line along a side or rear yard. If the lot does not abut a street, the narrowest boundary line shall be considered to be the front.~~

(.XXX) Lot Line, Front: Except for Corner Lots and Through Lots, **the** ~~The~~ boundary line of a lot abutting a street or private drive~~,~~ ~~other than a boundary line along a side or rear yard~~. **If no boundary lines of a lot abut a street or private drive, but do abut a tract with a non-vehicular pathway with vehicle access to the lot provided via an alley, the boundary line abutting the tract with the pathway.** ~~the narrowest boundary line shall be considered to be the front. In the Village zone:the case of an interior lot, the lot line separating the lot from the public space, street or private drive, other than an alley~~. ~~in~~ In the case of a ~~corner lot~~ **Corner Lot**, the shortest lot line along a ~~public space~~ **tract with a pathway**, street or private drive~~, other than an alley~~. **In the case of a Through Lot, the shortest lot line abutting a street or private drive, and if multiple boundary lines abutting a street or private drive are of the same length, the boundary line on the lower classification street, and if both equal length and same street classification, the boundary line indicated as the front on a final plat.** ~~A private drive bounded on two sides by a single lot shall not be considered in determining if a lot is a through lot.~~

(.XXX) Lot Line, Rear: Any boundary line opposite and most distant from a front line and not intersecting a front lot line, except in the case of a **C**orner **L**ot.

(.XXX) Yard, Front: Any yard abutting a ~~street or private drive~~ **Front Lot Line**, unless one side is determined to meet the definition of a side yard, below. Private drives which are bounded on two sides by a single lot shall not be considered in determining if a yard is a front yard.

3. Clarify which type of residential structures can be approved through a Class I Administrative Review and which are a Class II Administrative Review.

Intent: Provide clarity that all residential buildings are subject to administrative review. The primary policy change is making multi-family housing (apartments) throughout the City subject to administrative review consistent with other residential structures rather than subject to Site Design Review like commercial and industrial buildings. Of note, and as previously guided by the Planning Commission and Council, only smaller multi-family buildings similar in size to middle housing (five or six unit) are proposed to not require public notice. Multi-family buildings with

seven or more units would require Class II Administrative Review as drafted, which requires public notice.
Applicability: Citywide
Additional Explanation: The new process applies only to the building and the immediately surrounding site improvements like landscaping. Site design and layout for apartment complexes remains subject to Development Review Board review.

Section 4.030 Jurisdiction and Powers of Planning Director and Community Development Director

(.01) *Authority of Planning Director.* The Planning Director shall have authority over the daily administration and enforcement of the provisions of this Chapter, including dealing with non-discretionary matters, and shall have specific authority as follows:

A. A Class I application shall be processed as a ministerial action without public hearing, shall not require public notice, and shall not be subject to appeal or call-up, except as noted below. Pursuant to Class I procedures set forth in Section 4.035, and upon finding that a proposal is consistent with the provisions of this Code and any applicable Conditions of Approval, shall approve the following, with or without conditions:

4. Building permits for **residential structures in residential zones not subject to Site Design Review, except for multi-family structures with seven or more units,** ~~single family dwellings, middle housing, and in the Village zone, row houses or apartments~~, meeting clear and objective zoning, siting, and design ~~requirements~~ standards and located on lots that have been legally created. The Planning Director's approval of such plans shall apply only to Development Code requirements and shall not alter the authority of the Building Official or City Engineer on these matters.

B. A Class II application shall be processed as an administrative action, with or without a public hearing, shall require public notice, and shall be subject to appeal or call-up, as noted below. Pursuant to Class II procedures set forth in Section 4.035, the Director shall approve, approve with conditions, deny, or refer the application to the Development Review Board for a hearing:

12. **Architectural and site plans, including modifications and remodels, for multi-family residential structures in residential zones with seven or more units not subject to Site Design Review and meeting clear and objective zoning, siting, and design standards and located on lots that have been legally created. This does not include review of Stage I and Stage II Planned Development Master Plans and Site Design Review of open space and**

other common improvements, which is subject to review by the Development Review Board.

4. Clarify that all residential building types, including multi-family (apartments) are not subject to DRB review under Site Design Review

Intent: Provide clarity that review of residential structures under clear and objective residential design standards are not subject to Site Design Review by the Development Review Board. Besides providing additional clarity for single-family and middle housing, this draft amendment supports the proposed change allowing administrative review of multi-family buildings (apartments). Site Design Review will continue to apply to commercial and industrial buildings, mixed-use residential buildings, and required open space landscaping. The language also allows the option for residential developers to seek Site Design Review as an alternative to following the clear and objective residential design standards.
Applicability: Citywide
Additional Explanation: none

Section 4.420. ~~Jurisdiction and Powers of the Board~~ **Review Authority for Site Design Review**

(.01) *Application of Section.* ~~Except for single-family and middle housing dwellings in any residential zoning district, and apartments in the Village zone,~~

A. **Unless exempt as noted in 1.-2. below,** no building permit shall be issued for a new building or major exterior remodeling of an existing building **unless the building architecture and siting is approved by the Development Review Board (Board) through Site Design Review**.

1. **Residential structures in residential zones are exempt from Site Design Review as long as they meet established clear and objective design and siting standards or any allowed adjustments. This exemption does not apply to mixed-use residential structures. An applicant may elect to have residential structures approved by the Board through Site Design Review in association with waivers from specific standards.**

2. **Minor building modifications to non-residential structures reviewed under the authority of the Planning Director as established is Section 4.030.**

B. **Unless exempt as noted in 1.-2. below, no building permit within an area covered by a Stage II Planned Development, or PDP in the Village Zone, shall be granted unless landscaping plans are reviewed and approved by**

the Board through Site Design Review, or FDP in the Village Zone.

1. **Landscaping on residential lots in residential zones is exempt from Site Design Review unless it is part of the open space required under Subsection 4.113 (.01).**

2. **Minor modifications to landscape plans subject to Site Design Review reviewed by the Planning Director as established in Section 4.030.**

C. No Sign Permit, except as permitted in Sections 4.156.02 and 4.156.05, shall be issued for the erection or construction of a sign relating to such new building or major remodeling, until the plans, drawings, sketches and other documents required for a Sign Permit application have been reviewed and approved by the Board.

5. Clarify that residential design standards are among the architectural design standards subject to waiver

Intent: Residential design standards did not exist in the way they do now when this code language was created. This provides clarity that an applicant can apply for a waiver for residential design standards. This is not a policy change.
Applicability: Citywide
Additional Explanation: none

4.118 Standards Applying to all Planned Development Zones

(.03) Notwithstanding the provisions of Section 4.140 to the contrary, the Development Review Board, in order to implement the purposes and objectives of Section 4.140, and based on findings of fact supported by the record may:

A. Waive the following typical development standards:

. . .

13. Architectural design standards**, including residential design standards**;

6. Clarify, providing consistency across the City, that ADUs are subject to 10 foot setbacks rather than larger setbacks

Intent: To ensure setbacks allowed for ADUs is consistent across the City and removing additional barriers to their development.
Applicability: Citywide
Additional Explanation: none

Section 4.120 (.05) FDA-H Dimensional Standards

E. Accessory buildings and uses shall conform to front and side yard setback requirements. If the accessory buildings and uses do not exceed 120 square feet or ten feet in height, and they are detached and located behind the rear-most line of the main buildings, the side and rear yard setbacks may be reduced to three feet. **Minimum front and rear setbacks for ADUs is 10 feet.**

Old Town Residential Design Standards footnote (noted by *) on page 19

For cottage clusters **and ADUs**, minimum front and rear setbacks are 10'.

7. Remove buffering language between multi-family and other residential development

Intent: Frog Pond East and South focuses on a mix of residential types throughout, rather than segregation of residential types. This legacy language reflects a development era dominated by separated single-family and multi-family areas without middle housing. Removing this language better reflects the Master Plan policy directive and current approach of integration of housing types.
Applicability: Citywide
Additional Explanation: While screening of multi-family development is not required, screening applying more broadly to parking lots still applies.

Subsection 4.176 (.04) Buffering and Screening

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. ~~Multi-family developments shall be screened and buffered from single-family areas.~~

8. Add language that no new deed restrictions shall restrict housing types

Intent: House Bill 2001 (2019) established that from January 1, 2020 private deed restrictions and covenants, including CC&Rs, could not be written to exclude middle housing. This language reflects this law and further clarifies that any housing type allowed under City zoning cannot be limited by private deed restrictions and covenants.
Applicability: Citywide
Additional Explanation: none

Section 4.210 Application Procedure (Tentative Plat)

(.01) C. 4.

Limitations on Deed Restrictions. ~~Board~~ **The City** may limit content of deed restrictions **or covenants** in order to promote local, regional and state interests in affordable housing **and/or comply with applicable statute, rules, and policies**~~, the Board may limit the content that will be accepted within proposed deed restrictions or covenants~~. In adopting conditions of approval for a residential ~~subdivision or condominium development~~ **land division**, the Board **or Planning Director may** prohibit such things as mandatory minimum construction costs, minimum unit sizes, prohibitions of manufactured housing, etc. **The City shall in all cases ensure no deed restrictions or covenants limit construction of any housing allowed by City zoning for the subject land.**

Section 4.220. Final Plat Review

(.02) C.

Deed restrictions. A copy of all protective deed restrictions proposed for the area shall accompany the final Plat and specifications of all easements and dedications as required by the Development Review Board. The Planning Director shall not sign the final plat if the proposed deed restrictions fail to provide for the on-going maintenance of common areas ~~or,~~ violate established conditions of approval for the development**, or violate other statutes, rules, or standards the City has responsibility to enforce, including deeds or covenants that would limit housing types allowed by the City's zoning for a given property(s).**

Section 4.113. Standards Applying to Residential Developments in any Zone.

Areas with change highlighted. Removed language ~~struckthrough~~. Added language **bold underlined.**

1. Clarify exceptions to Open Space Requirements for multi-family development

Intent: To avoid applying open space requirements to multi-family development twice, once when a subdivision or complex is approved, and once when a building permit is applied for. The new Subsection 2.c. makes clear than no additional open space requirements are applicable when a multi-family building is proposed in a previously approved subdivision or complex.
Applicability: Citywide
Additional Explanation: None

(.01) *Open Space:*

A. *Purpose.* The purposes of the following standards for open space are to provide adequate light, air, open space and usable recreational facilities to occupants of each residential development.

B. *Applicability.*

1. The open space standards of this subsection shall apply to the following:

a. Subdivisions.

b. Planned Developments.

c. Multi-family Development**, except as noted in 2. c. below.**

2. These standards do not apply to the following:

a. Partitions for non-Multi-family development. However, serial or adjacent partitions shall not be used to avoid the requirements.

b. Middle Housing Land Divisions.

c. Development of a multi-family building(s) on a lot within a subdivision where the open space requirements are otherwise met in the subdivision, as acknowledged in a prior land use approval.

C. *Area Required.* The minimum open space area required in a development is an area equal to 25 percent of the size of the Gross Development Area except if reduced for shared parking pursuant to Subsection 4.155(.03)S.

D. *Required Open Space Characteristics:*

1. *Size of Individual Open Spaces.* For developments with ten or more lots buildable with dwelling units (or ten or more multi-family units) an

open space area must be at least 2,000 square feet to be counted towards the 25 percent open space requirement. For developments with less than ten lots buildable with dwelling units (or less than ten multi-family units) an open space area must be at least 1,000 square feet to be counted towards the 25 percent open space requirement.

2. *Types of Open Space and Ownership.* The following types of areas count towards the minimum open space requirement if they are or will be owned by the City, a homeowners' association or similar joint ownership entity, or the property owner for Multi-family Development.
    a. Preserved wetlands and their buffers, natural and/or treed areas, including those within the SROZ
    b. New natural/wildlife habitat areas

2. Minor clarification that stormwater facilities in the right-of-way do not count as required open space.

Intent: Be clear that stormwater facilities in the right-of-way do not count as required open space, which is the same approach to other landscaped areas within the public right-of-way.
Applicability: Citywide
Additional Explanation: none

    c. Non-fenced vegetated stormwater features **outside the public right-of-way**
    d. Play areas and play structures
    e. Open grass area for recreational play
    f. Swimming and wading areas
    g. Other areas similar to a. through f. that are [publicly] accessible
    h. Walking paths besides required sidewalks in the public right-of-way or along a private drive.
3. *Usable open space requirements.* Half of the minimum open space area, an area equal to 12.5 percent of the size of the Gross Development Area, shall be located outside the SROZ and be usable open space programmed for active recreational use. Any open space considered usable open space programmed for active recreation use shall meet the following requirements.
    a. Be designed by a registered professional landscape architect with experience designing residential park areas. An affidavit of such professional's credentials shall be included in the development application material.
    b. Be designed and programmed for a variety of age groups or other user groups.

4. *Enhancing Existing Wildlife Habitat through Design of Open Space:*

    a. Open space designed, as wildlife habitat shall be placed adjacent to and connect to existing, preserved wildlife habitat to the extent feasible.

    b. To the extent feasible, open space shall create or enhance connections between existing wildlife habitat.

E. Any dedication of land as public park land must meet City parks standards. The square footage of any open space land outside the SROZ and BPA easements, whether dedicated to the public or not, shall be considered part of the Gross Development Area.

F. Approval of open space must ensure the long-term protection and maintenance of open space and/or recreational areas. Where such protection or maintenance are the responsibility of a private party or homeowners' association, the City Attorney shall review any pertinent bylaws, covenants, or agreements prior to recordation.

G. The open space requirements of this subjection are subject to adjustments in PDR zones pursuant to Subsection 4.124(.08).

3. Clarify, providing consistency across the City, that ADUs are subject to 10 foot setbacks rather than larger setbacks

Intent: To ensure setbacks allowed for ADUs is consistent across the City and removing additional barriers to their development.
Applicability: Citywide
Additional Explanation: none

(.02) *Building Setbacks* (for Fence Setbacks, see subsection .08). The following provisions apply unless otherwise provided for by the Code or a legislative master plan.

A. *For lots over 10,000 square feet:*

1. Minimum front yard setback: 20 feet.

2. Minimum side yard setback: Ten feet. In the case of a corner lot less than 100 feet in width, abutting more than one street or tract with a private drive, the side yard on the street or private drive side of such lot shall be not less than 20 percent of the width of the lot, but not less than ten feet.

3. In the case of a key lot, the front setback shall equal one-half the sum of depth of the required yard on the adjacent corner lot along the street or tract with a private drive upon which the key lot faces and the setback required on the adjacent interior lot.

4. No structure shall be erected within the required setback for any future street shown within the City's adopted Transportation Master Plan or Transportation Systems Plan.
5. Minimum setback to garage door or carport entry: 20 feet. Except, however, in the case of an alley where garages or carports may be located no less than four feet from the property line adjoining the alley.
6. Minimum rear yard setback: 20 feet. Accessory buildings on corner lots must observe the same rear setbacks as the required side yard of the abutting lot.
7. Cottage Cluster **and ADU** Setbacks: Setbacks in 1.—3. and 6. above do not apply to cottage clusters **and ADUs**. For cottage clusters **and ADUs**, minimum front, rear, and side setbacks are ten (10) feet.
8. Townhouse Setbacks: No setback is required along property lines where townhouses are attached.

B. *For lots not exceeding 10,000 square feet:*

1. Minimum front yard setback: 15 feet, with open porches allowed to extend to within ten feet of the property line.
2. Minimum side yard setback: One story: five feet; Two or more stories: seven feet. In the case of a corner lot, abutting more than one street or tract with a private drive, the side yard on the street side of such lot shall be not less than ten feet.
3. In the case of a key lot, the front setback shall equal one-half the sum of depth of the required yard on the adjacent corner lot along the street or tract with a private drive upon which the key lot faces and the setback required on the adjacent interior lot.
4. No structure shall be erected within the required setback for any future street shown within the City's adopted Transportation Master Plan or Transportation Systems Plan.
5. Minimum setback to garage door or carport entry: 20 feet. Wall above the garage door may project to within 15 feet of property line, provided that clearance to garage door is maintained. Where access is taken from an alley, garages or carports may be located no less than four feet from the property line adjoining the alley.
6. Minimum rear yard setback: One story: 15 feet. Two or more stories: 20 feet. Accessory buildings on corner lots must observe the same rear setbacks as the required side yard of the abutting lot.
7. Cottage Cluster **and ADU** Setbacks: Any minimum setback in 1.—3. or 6. above that would exceed ten feet for a cottage cluster **or ADU** shall be ten feet.

8. Townhouse Setbacks: No setback is required along property lines where townhouses are attached.

(.03) *Height Guidelines.* The Development Review Board may regulate heights as follows:

A. Restrict or regulate the height or building design consistent with adequate provision of fire protection and fire-fighting apparatus height limitations.

B. To provide buffering of low density developments by requiring the placement of buildings more than two stories in height away from the property lines abutting a low density zone.

C. To regulate building height or design to protect scenic vistas of Mt. Hood or the Willamette River from greater encroachments than would occur if developed conventionally.

(.04) *Residential uses for treatment or training:*

A. Residential Homes, as defined in Section 4.001, shall be permitted in any location where a single-family dwelling is permitted.

B. Residential Facilities, as defined in Section 4.001, shall be permitted in any location where multiple-family dwelling units are permitted.

4. Remove duplicative reference to parking standards

Intent: Remove the unnecessarily duplicative reference to 4.155 in subsection (.05) (see below), as applicable standards in Section 4.155 would apply regardless of reference.
Applicability: Citywide
Additional Explanation: None

5. Establish residential stormwater design standards in the Development Code

Intent: To clearly express the City's stormwater design requirements within the Development Code to provide greater clarity to the development community on City's stormwater policy and how it interacts with residential development. This does not represent a change to the City's current policies as implemented through the Public Works standards, but rather provides clarification at the early end of development review.
Applicability: Citywide
Additional Explanation: As the City has moved to low-impact development stormwater infrastructure the facilities have more interaction with other uses of land and it makes sense to acknowledge them in the Development Code to ensure they are clearly among the considerations as designers look to allocate land to different uses within a residential development.

(.05) ~~*Off Street Parking.* Off-street parking shall be provided as specified in Section 4.155~~ ***Residential Stormwater Design Standards:***

A. *Purpose.* The purpose of these standards is to protect the public health and welfare by appropriate management of stormwater to prevent flooding and property damage, and the pollution of streams, groundwater, wetlands, and other natural water features through the use of low impact development design and decentralized stormwater treatment and flow control as required by the City's NPDES MS4 permit. The purpose of these standards, further, is to thoughtfully integrate the design of stormwater management facilities into the overall design of neighborhoods.

B. *Low Impact Development*. All stormwater management facilities for treatment and flow control shall follow low impact development design standards.

C. *Stormwater facility sizing.* Stormwater management facility sizing requirements shall be determined in accordance with the City's Public Works Standards. Use of impervious area reduction strategies in the Standards, including pervious hard surfaces and green roofs and tree credits, is encouraged.

D. *Areas where stormwater management facilities are required to be integrated.* Stormwater management facilities shall be located in the following areas of a residential development unless conflicting uses have locational priority as outlined in standard E. The location of stormwater management facilities shall be prioritized in the following order, with 1. (a.-f.) being the highest priority, and 2. (a.-b.) being the lowest priority. High priority locations shall be used to the maximum extent practicable, as determined by the City Engineer or their authorized representative, prior to considering lower priority locations.

1. High Priority:

a. Collector and arterial street medians and planter strips where parallel on-street parking is not permitted;

b. Curb extensions on local streets and other local street curb areas greater than 6 feet in width;

c. Unpaved areas within five feet of an alley curb;

d. Shoulder areas along midblock bike and pedestrian connections, and other off-street trails not otherwise part of larger green spaces and parks;

e. Edges and buffers around parks and open space; and

f. Landscape areas between buildings and the right-of-way that's owned by a homeowners association or similar entity (e.g., common areas, courtyards, pocket parks).

2. Lower priority:

a. **Landscaped areas within five feet of building foundations, not including detached single-family homes, middle housing and their accessory structures; and**

b. **Separate landscape tracts for stormwater facilities.**

E. *Conflicting Uses Prioritized Over Stormwater Management Facilities.* The placement of one or more of the following uses shall be prioritized over stormwater management facilities required under D. when a feasible alternative location for the conflicting use is not available.

1. **Street trees or other required landscape trees meeting the spacing standards in Section 4.176, including area for root growth of at least 40 square feet per tree;**
2. **Street lights and other required lighting, including a buffer around the base of the light as required by Portland General Electric;**
3. **Fire hydrants and FDCs;**
4. **Manholes, clean outs, pedestals and vaults for public and franchise utilities;**
5. **Pedestrian walkways and bicycle paths;**
6. **Public Utility Easements for gas, electricity, and communication; and**
7. **Minimum area of usable open space required under Subsection (.01) above. While small stormwater management facilities may be integrated into these spaces, they shall not represent more than 10% of the required usable open space and shall have a secondary purpose beyond just stormwater management (e.g. boundary between two different active uses, an intermittent play/storm stream, design element at the entrance or edge of the active open space, etc.).**

F. *Typically Prohibited Design Elements.* The following design elements are a barrier to integrated design and prohibited as part of stormwater facilities unless their inclusion is approved by the City Engineer, or authorized representative, as part of a waiver request;

1. **Fences.**
2. **Retaining walls over two feet in height.**

G. *Standards for Waivers to the Standards of this Subsection.* The City Engineer, or their authorized representative, may waive the requirements in Subsection B., D., or F. above subject to substantial evidence being available in the record to support the following findings:

1. **To the extent practicable, the design continues to provide for decentralized treatment and flow control.**
2. **If a proprietary stormwater management system is proposed, such use is necessary and the minimal necessary to address technical issues and/or a site constraint (e.g., high groundwater level, contaminated soil, steep slopes).**
3. **If a fee in lieu is proposed, it is in support of a City stormwater project within the same sub-basin.**

(.06) *Signs.* Signs shall be governed by the provisions of Sections 4.156.01—4.156.11.

(.07) *Fences:*

A. The maximum height of a sight-obscuring fence located in the required front yard of a residential development shall not exceed four feet.

B. The maximum height of a sight-obscuring fence located in the side yard of a residential lot shall not exceed four feet forward of the building line and shall not exceed six feet in height in the rear yard, except as approved by the Development Review Board. Except, however, that a fence in the side yard of residential corner lot may be up to six feet in height, unless a greater restriction is imposed by the Development Review Board acting on an application. A fence of up to six feet in height may be constructed with no setback along the side, the rear, and in the front yard of a residential lot adjoining the rear of a corner lot as shown in the attached Figure.

C. Notwithstanding the provisions of Section 4.122(10)(a) and (b), the Development Review Board may require such fencing as shall be deemed necessary to promote and provide traffic safety, noise mitigation, and nuisance abatement, and the compatibility of different uses permitted on adjacent lots of the same zone and on adjacent lots of different zones.

D. Fences in residential zones shall not include barbed wire, razor wire, electrically charged wire, or be constructed of sheathing material such as plywood or flakeboard.

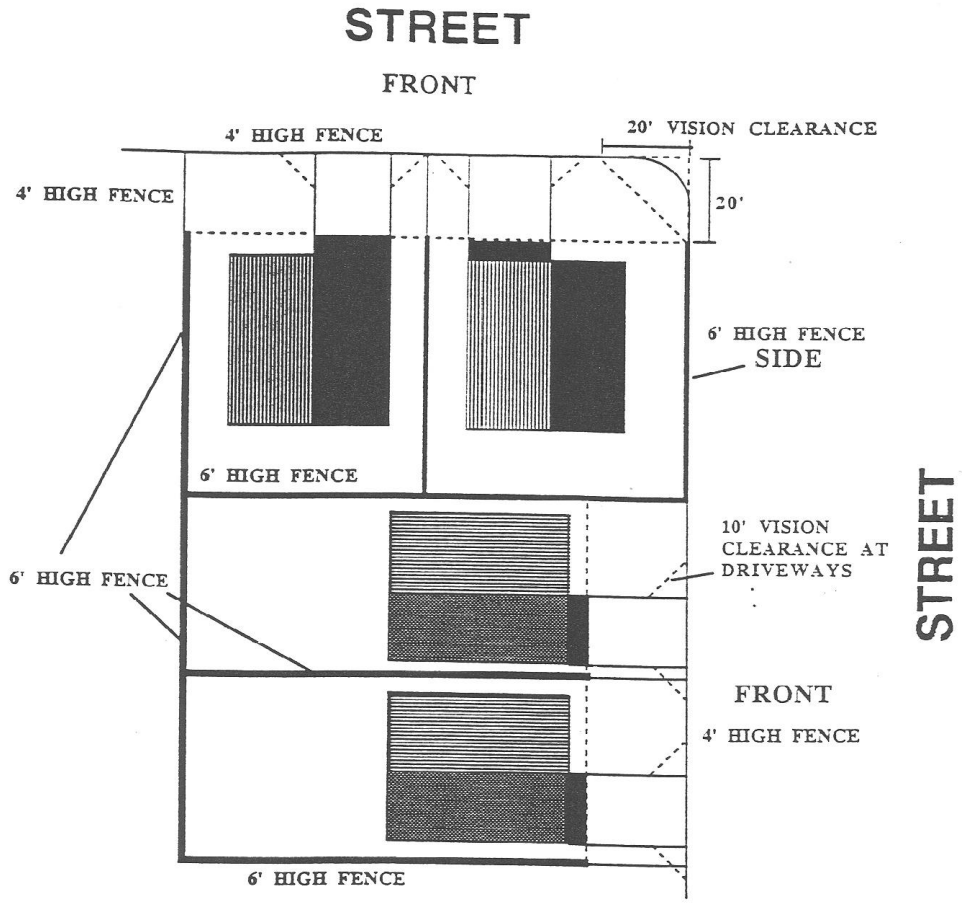

Figure 1 Fence Standards for Residential Development

(.08) *Corner Vision.* Vision clearance shall be provided as specified in Section 4.177, or such additional requirements as specified by the City Engineer.

(.09) *Prohibited Uses:*

A. Uses of structures and land not specifically permitted in the applicable zoning districts.

B. The use of a trailer, travel trailer or mobile coach as a residence, except as specifically permitted in an approved RV park.

C. Outdoor advertising displays, advertising signs, or advertising structures except as provided in Sections 4.156.05, 4.156.07, 4.156.09, and 4.156.10.

6. Remove additional regulatory barriers to development of Accessory Dwelling Units (ADUs)

Intent: To remove additional barriers to the development of ADUs, as identified in the Frog Pond East and South ADU-focused work, and to better facilitate construction of these units that can provide a

lower cost housing alternative throughout the City. The specific changes include: allowing ADUs for all townhouses, not just those on larger lots; exempting ADUs from minimum lot coverage requirements, which is a common regulatory barrier; and removing any special review process, making their review the same as detached homes or middle housing.
Applicability: Citywide
Additional Explanation: Removing these barriers, together with the housing variety requirement in Frog Pond East and South, will make ADU development more feasible and likely to be built than elsewhere in the City.

(.10) *Accessory Dwelling Units:*

A. Accessory Dwelling Units, are permitted subject to standards and requirements of this Subsection.

B. *Standards:*

1. Number Allowed.

a. For detached single-family dwelling units and for townhouses ~~on lots meeting the minimum lot size for detached single-family in the zone~~: One per dwelling unit.

b. For all other dwelling units: None.

2. Maximum Floor Area: per definition in Section 4.001, 800 square feet of habitable floor area. Per Subsection 4.138(.04)C.1., in the Old Town Overlay Zone the maximum is 600 square feet of habitable floor area. Larger units shall be subject to standards applied to duplex housing.

3. Accessory dwelling units shall be on the same lot as the dwelling unit to which they are subordinate.

4. Accessory Dwelling Units may be either attached or detached, but are subject to ~~all zone~~ standards for **the underlying zone except that ADUs are exempt from lot coverage maximum** ~~setbacks, height, and lot coverage, unless those requirements are specifically waived through the Planned Development waiver or Variance approval processes~~.

5. *Design Standards:*

a. Roof pitch shall be 4:12 to 12:12. No flat roofs allowed.

i. Where the primary dwelling unit has a roof pitch of less than 4:12 the minimum roof pitch does not apply.

b. Roof and siding materials shall match the respective material of one or more of the following: (1) the primary dwelling unit on the same lot, (2) a primary dwelling unit on an immediately adjacent lot, or (3) a primary dwelling unit within the same subdivision.

i. For the purpose of the requirement to match material, fiber cement siding made to appear like wood, stucco, or

masonry may be used to match wood, stucco, or masonry respectively.

c. Where design standards established for a zone or overlay zone are more restrictive and/or extensive than a. and b. above the more restrictive and/or extensive design standards shall apply. This includes design standards for the Village (V) Zone, the Residential Neighborhood (RN) Zone, and the Old Town Overlay Zone.

6. ~~Where an Accessory Dwelling Unit is proposed to be added to an existing residence and no discretionary land use approval is being sought (e.g., Planned Development approval, Conditional Use Permit approval, etc.) the application shall require the approval of a Class I Administrative Review permit.~~ **ADU review process is the same as for single-family units and middle housing.**

7. Authorization to develop Accessory Dwelling Units does not waive Building Code requirements. Increased firewalls or building separation may be required as a means of assuring adequate fire separation from one unit to the next. Applicants are encouraged to contact, and work closely with, the Building Division of the City's Community Development Department to assure that Building Code requirements are adequately addressed.

8. Each accessory dwelling unit shall provide complete, independent permanent facilities for living, sleeping, eating, cooking, bathing and sanitation purposes, and shall have its own separate secure entrance.

9. Reserved.

10. Accessory dwelling units may be short-term rentals, but the owner/local operator must maintain an active business license with the City of Wilsonville for a short-term rental business and pay all applicable lodging and other taxes.

Note: No proposed amendments to Subsections (.11) through (.13), they are excluded from this document for brevity

. . .

7. Clarify applicability of certain residential design standards by zone

Intent: Provide clarity that when certain area-specific design standards apply, the general citywide design standards do not apply, avoiding having conflicting standards. The language specifically clarifies that certain citywide standards, such as façade variety, apply in Frog Pond East and South but not Frog Pond West.
Applicability: Citywide
Additional Explanation: None

(.14) Design Standards for Detached Single-family and Middle Housing.

A. The standards in this subsection apply in all zones, except as indicated in 1.—~~2~~ **3**. below:

1. The Façade Variety standards in Subsection C.1. do not apply in the Village Zone or **the Frog Pond West neighborhood in the** Residential Neighborhood Zone, as these zones**/areas** have their own variety standards, except that the standards do apply within middle housing development with multiple detached units on a single lot which the standards of these zones do not address.

2. The entry orientation and window standards for triplexes, quadplexes, and townhouses in Subsections D.1-2. and E. 2-3. do not apply in the Village Zone or Residential Neighborhood Zone as these zones have their own related standards applicable to all single-family and middle housing.

3. The window standards for triplexes, quadplexes, and townhouses in Subsection D. 2. And E. 3. do not apply in the Village Zone or the Frog Pond West neighborhood in the Residential Neighborhood Zone as these zones have their own related standards applicable to all single-family and middle housing.

Note: No proposed amendments to Subsections (.14) B. through I., they are excluded from this document for brevity

. . .

8. Clarify role of Master Plan for optional discretionary review by the Development Review Board in lieu of meeting residential design standards.

Intent: Clarify that when optional review is requested in an area covered by a legislative master plan, such as Frog Pond East and South, the review must consider consistency with the master plan.
Applicability: Citywide
Additional Explanation: None

J. Alternative Discretionary Review: As an alternative to meeting one or more design standards of this subsection an applicant may request Site Design Review by the Development Review Board of a proposed design. In addition to the Site Design Review Standards, affirmative findings shall be made that the following standards are met:

1. The request is compatible with existing surrounding development in terms of placement of buildings, scale of buildings, and architectural design;

2. The request is due to special conditions or circumstances that make it difficult to comply with the applicable Design Standards, or the request

would achieve a design that is superior to the design that could be achieved by complying with the applicable Design Standards; ~~and~~

3. The request continues to comply with and be consistent with State statute and rules related to Middle Housing, including being consistent with State definitions of different Middle Housing types~~.~~ **and**

4. The request remains substantially consistent with any legislative master plan the property is included within.

9. Establish clear and objective design standards for multi-family housing

Intent: Currently, citywide, both detached single-family structures and middle housing have clear and objective design standards applied during administrative review of their building design. Multi-family does not currently have these design standards. This establishes design standards for multi-family buildings based on middle housing standards, especially townhouse buildings which can be a similar bulk. Specific attention is also paid to parking orientation. With these new standards in place multi-family structures can be reviewed administratively consistent with other residential building types in the City.
Applicability: Citywide
Additional Explanation: Special attention is given to apply similar design standards as other type of housing to allow for enhanced compatibility of different residential building types within an area with housing variety.

(.15) *Design Standards for Multi-Family Housing:*

A. *Purpose and Intent.* The purpose of the multi-family design standards is to create and maintain street frontages that are varied and attractive, create an environment that is conducive to walking, and provide natural surveillance of public spaces. The standards will also promote building details in multi-family development that provide visual interest, contribute to a high-quality living environment for residents, give a sense of quality and permanence, and enhance compatibility with the surrounding community. The design standards also aim to create consistency with design standards for other residential unit types that multi-family housing may be built adjacent to.

B. *Entrance Orientation*.

1. At least one main entrance for each multi-family structure must either meet the standards in subsections a. and b. below, or must meet the alternative standard in subsection B.2.

a. The entrance must be within eight feet of the longest street-facing exterior wall of the structure; and

b. The entrance must either:

i. Face the street;

ii. Be at an angle of up to 45 degrees from the street; or

iii. Open onto a porch. The porch must:

a. Be at least 25 square feet in area; and
b. Have at least one entrance facing the street or have a roof.

2. Alternative standard. As an alternative to subsection 1., a main entrance to a multi-family structure may face a courtyard if the courtyard-facing entrance is located within 60 feet of a street and the courtyard meets the following standards:
a. The courtyard must be at least 15 feet in width;
b. The courtyard must abut a street; and
c. The courtyard must be landscaped or hard-surfaced for use by pedestrians.

C. ***Windows***. A minimum of 15 percent of the area of all public-facing façades must include windows or entrance doors. Façades separated from the street or public space by a dwelling are exempt from meeting this standard. Required windows shall be clear glass and not mirrored or frosted, except for bathrooms.

D. ***Articulation.***

1. ***Minimum Articulation.*** All public-facing façades shall incorporate one or more of the following design elements at a minimum interval of every 30 feet. The minimum number of design elements is determined by dividing the façade length (in feet) by 30 and rounding up to the nearest whole number.
a. Varying rooflines.
b. Offsets of at least 12 inches.
c. Balconies.
d. Projections of at least 12 inches and width of at least three feet.
e. Porches.
f. Entrances that are recessed at least 24 inches or covered.
g. Dormers at least three feet wide.

2. ***Articulation Element Variety.*** Different articulation elements shall be used as provided below, based on the length of the facade. For the purpose of this standard, a "different element" is defined as one of the following: a completely different element from the list in subsection D.1. above; the same type of element but at least 50 percent larger; or for varying rooflines, vertically offset by at least three feet.
a. Where two to four elements are required on a façade, at least two different elements shall be used.
b. Where more than four elements are required on a façade, at least three different elements shall be used.

F. ***Pedestrian Access and Circulation***. The following standards are intended to ensure safe and efficient circulation for pedestrians within multi-family development.

1. Each multi-family development shall contain an internal pedestrian circulation system that makes connections between individual units and parking areas, green focal points and other

common open space areas, children's play areas, and public rights-of-way. All pedestrian connections (walkways) shall meet the following standards:

a. Except as required for crosswalks, per subsection 3., where a walkway abuts a vehicle circulation area, it shall be physically separated by a curb that is raised at least six inches or by bollards.

b. Walkways shall be constructed of concrete, asphalt, brick or masonry pavers, or other hard surface, and not less than five feet wide.

2. All walkways shall comply with the requirements of the Americans with Disabilities Act.

3. In order to provide safe crossings of driveways and parking areas, crossings shall be clearly marked with either contrasting paving materials (such as pavers, light-color concrete inlay between asphalt, or similar contrasting material) or reflective striping that emphasizes the crossing under low light and inclement weather conditions.

4. Pedestrian connections shall be provided between buildings within the development, and between the development and adjacent rights-of-way, transit stops, parks, schools, and commercial developments. At least one connection shall be made to each adjacent street and sidewalk for every 200 linear feet of street frontage. Sites with less than 200 linear feet of street frontage shall provide at least one connection to the street and/or sidewalk.

F. *Off-Street Parking Location and Design.* The following standards are intended to support a pedestrian-friendly street environment and to minimizing the visual impacts of parking areas and garages.

1. Off-street parking spaces and vehicle maneuvering areas shall not be located between the front building plane of the building closest to the street and a street property line (except alleys).

2. Off-street parking areas shall not occupy more than 50% of the total length of each street frontage as measured 20 feet from the street property line. Drive aisles without adjacent parking spaces do not count as parking areas for the purposes of this standard.

3. Off-street parking spaces shall not be located within ten feet of any property line, except alley property lines. Driveways and drive aisles are permitted within ten feet of property lines.

4. Landscaping, fencing, or walls at least three feet tall shall separate parking areas from useable open space, green focal points, and public streets (except alleys).

5. If garages are attached to a street-facing facade, they may not be located closer to the street property line than the building facade.

6. Driveways associated with attached garages that take direct individual access from a public or private street must meet the townhouse driveway and access standards in Subsection 4.113 (.14) 5. For the purpose of those standards, each individual multi-family garage shall meet the standards applicable to a townhouse or townhouse lot.

Table 8B. Frog Pond East and South Neighborhoods Development Standards

Land Use Map Urban Form Type Designation	Lot size requirements	Min. lot width/ street frontage per lot (ft.)	Max height (ft.)	Front Setbacks	Maximum Building Width Facing Street, or park when front of lot faces a park (ft)	Rear Min. (ft.)	Garages (note)	Side Min. (ft.) [A] [B]	Min. distance Between multiple Buildings on same lot along street frontages and public viewsheds	Max. Lot Coverage (percent) [C] [D]
Urban Form Type 1	Lots sized to accommodate at least a one-unit residential building meeting building code requirements and the other development standards in this subsection.	10	50-4 story	See Table 8C.	None[K]	10	[G] [E]	5[F]	Double the min. side yard setback that would be required for the larger of the two building on its own lot	80
Urban Form Type 2		15	40, 3-story[H]		125 except that buildings over 100 feet cannot occupy entire block face.[G] [I]	10		5[F]		
Urban Form Type 3		15			100[I]	15[I]		5		

Notes:

A. On corner lots, minimum side setbacks facing the street are the same as minimum front setback. Maximum setbacks equivalent to front maximums also apply. See Table 8C.

B. Side setbacks do not apply to shared walls at property lines between townhouse units

C. Cottage clusters and ADUs are exempt from maximum lot coverage standards.

D. For townhouses maximum lot coverage is calculated for the combined lots on which a single townhouse building sits rather than for each townhouse lot.

E. Setbacks for residential garages are as follows:

1. Front (street loaded): minimum 20 feet.
2. Alley loaded with exterior driveway: minimum 18 feet or as necessary to create a 18 foot deep parking space not including alley curb.
3. Alley loaded without exterior driveway: minimum 3 feet and maximum 5 feet.

F. For Urban Form Type 1 and 2, side setbacks may be reduced as follows: (1) down to 3.5 feet for residential structures less than 70 feet wide (2) down to five percent of the building width at the front building line for buildings greater than 70 feet and less than 100 feet wide.

G. For Urban Form Type 2, in lieu of meeting the maximum building width, an applicant may elect to articulate the facade and roof in a manner to create architectural separation of building masses. Such articulation shall include a minimum 2-foot setback of the wall from the primary façade as well as interruption of the roof plane. The setback articulation shall, at a minimum, be equal in width to the building separation required. The depth, width of articulation is not adjustable or subject to waiver or administrative relief under local or state law as it is an optional compliance method in lieu of meeting the standard maximum building width and separation standards. For the purpose of applying other articulation standards in Section 4.113, the portions of a building on either side of the articulation in lieu of building separation shall be considered separate buildings.

H. In Urban Form Type 3, buildings greater than either two-stories or twenty-five feet in height shall have a minimum front setback of 20 feet.

I. The minimum rear setback for a cottage cluster and Accessory Dwelling Unit (ADU) is 10 feet.

K. Except as limited to meet connectivity and block length standards.

CITY COUNCIL ROLLING SCHEDULE
Board and Commission Meetings
Items known as of 04/09/24

APRIL

4/16	Tuesday	6:30 pm	Wilsonville-Metro Community Enhancement Committee CANCELLED	Council Chambers
4/17	Wednesday	5:00 pm	Arts, Culture, and Heritage Commission	Council Chambers
4/22	Monday	6:30 pm	DRB – Panel A	Council Chambers
4/23	Tuesday	6:30 pm	Wilsonville-Metro Community Enhancement Committee CANCELLED	Council Chambers
4/24	Wednesday	6:30 pm	Library Board	Library

MAY

5/1	Wednesday	1:00 pm	Tourism Committee	Council Chambers
5/2	Thursday	6:00 pm	Park & Rec Advisory Board	Council Chambers
5/6	Monday	6:00 pm	City Council & State of the City	Council Chambers
5/8	Wednesday	6:00 pm	Kitakata Sister City Advisory Board	Parks & Rec Admin Bldg
5/8	Wednesday	6:00 pm	Planning Commission	Council Chambers
5/9	Thursday	6:00 pm	Budget Committee	Council Chambers
5/13	Monday	6:30 pm	DRB – Panel A	Council Chambers
5/14	Tuesday	6:00 pm	DEI Committee	Council Chambers
5/15	Wednesday	6:00 pm	City & URA Budget Committee	Council Chambers
5/16	Thursday	6:00 pm	City & URA Budget Committee (If Needed)	Council Chambers
5/20	Monday	6:00 pm	City Council	Council Chambers
5/22	Wednesday	5:00 pm	Arts, Culture, and Heritage Commission	Council Chambers
5/22	Wednesday	6:30 pm	Library Board	Library
5/27	Monday	6:30 pm	DRB – Panel B - CANCELLED	Council Chambers

Community Events:

April
Deaf Heritage Month
Arab American Heritage Month

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

4/16 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
AARP Smart Driver, 9:00 am, Community Center
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:30 am, Library

4/16 Baby & Toddler Time, 10:30 am, Library
Baby & Toddler Time, 11:15 am, Library
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center
Beginning Tai Chi, 2:00 pm, Community Center
Tai Chi Continuing, 3:00 pm, Community Center
Soul Flow Yoga, 7:15 pm, Community Center

4/17 Healthy Bones and Balance, 8:30 am, Community Center
Advanced Healthy Bones and Balance, 9:30 am, Community Center
Digital Photography Club, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Pinochle/Cribbage, 1:00 pm, Community Center
Bingo, 1:00 pm, Community Center
Teen Afterschool Drop-In Activities, 3:00 pm, Library

4/18 Gentle Yoga (Morning), 8:30 am, Community Center
I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Travel Training: Washington Square Mall, 10:45 am
Walking Book Club, 1:00 pm, Library
Ladies Afternoon Out, 1:00 pm, Community Center
Beginning Tai Chi, 2:00 pm, Community Center
Tai Chi Continuing, 3:00 pm, Community Center
Restorative Yoga, 7:15 pm, Community Center

4/19 Healthy Bones and Balance, 8:30 am, Community Center
Advance Healthy Bones and Balance, 9:30 am, Community Center
Play Group, 10:30 am, Library
Bridge for Intermediate Lessons, 10:30 am, Community Center
Stand, Sit and Be Fit, 11:00 am, Community Center
Bridge Group Play, 10:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

4/20 Murase Arboretum Grand Opening, 9:30 am, Murase Plaza Pollinator Garden
Earth Day Celebration, 10:00 am, CREST 11265 SW Wilsonville Road
Spanish Storytime, 11:00 am, Library
Soccer Shots Spring 2024, 2:00 pm, Memorial Park
Wilsonville Choral Arts Society Concert, 3:00 pm, Library

4/22 Healthy Bones and Balance, 8:30 am, Community Center
Advanced Healthy Bones and Balance, 9:30 am, Community Center
Beginning English Class, 11:00 am, Library
Sit, Stand and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Weight Loss Support Group, 12:30 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Bridge Group Play, 1:00 pm, Community Center
TAB meeting, 4:15 pm, Library
Beginning Spanish Class, 6:00 pm, Library

4/23 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:30 am, Library
Baby & Toddler Time, 10:30 am, Library
Baby & Toddler Time, 11:15 am, Library
Stand, Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center
Beginning Tai Chi, 2:00 pm, Community Center
Tai Chi Continuing, 3:00 pm, Community Center
Soul Flow Yoga, 7:15 pm, Community Center

4/24 Healthy Bones and Balance, 8:30 am, Community Center
Advanced Healthy Bones and Balance, 9:30 am, Community Center
Digital Photography Club, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Learn-to-Ride Bike Clinic, High School students, Transit Center
STEAM Stuff, 1:00 pm, Library
Pinochle/Cribbage, 1:00 pm, Community Center
Teen Afterschool Drop-In Activities, 3:00 pm, Library

4/25 Gentle Yoga (Morning), 8:30 am, Community Center
I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Travel Training: Villebois Story Walk, 10:40
Ladies Afternoon Out, 1:00 pm, Community Center

4/25 Beginning Tai Chi, 2:00 pm, Community Center
Tai Chi Continuing, 3:00 pm, Community Center
Restorative Yoga, 7:15 pm, Community Center
Volunteer Appreciation Event, 6:00 pm Wilsonville High School

4/26 Healthy Bones and Balance, 8:30 am, Community Center
Advance Healthy Bones and Balance, 9:30 am, Community Center
Play Group, 10:30 am, Library
Bridge for Intermediate Lessons, 10:30 am, Community Center
Blood Drive, 11:00 am, Library
Sit, Stand and Be Fit, 11:10 am, Community Center
Bridge Group Play, 10:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center

4/27 Repair Fair, 10:00 am, Library
Soccer Shots Spring 2024, 2:00 pm, Memorial Park

4/29 Healthy Bones and Balance, 8:30 am, Community Center
Advanced Healthy Bones and Balance, 9:30 am, Community Center
Beginning English Class, 11:00 am, Library
Sit, Stand and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Weight Loss Support Group, 12:30 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Bridge Group Play, 1:00 pm, Community Center
Nutritious (and Delicious!) Foods with Sam-All Things Cinnamon, 6:00 pm, CC
Beginning Spanish Class, 6:00 pm, Library

4/30 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:30 am, Library
Baby & Toddler Time, 10:30 am, Library
Baby & Toddler Time, 11:15 am, Library
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

4/30 Virtual Reality Fitness, 1:00 pm, Community Center
Soul Flow Yoga, 7:15 pm, Community Center

May

5/1 Digital Photography Club, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Conversational Spanish Group, 10:30 am, Community Center
PROFILE (online), 11:00 am, Library
Sit and Be Fit, 11:15 am, Community Center
5/1 Walk at Lunch – Pearl Bakery
Lunch at the Community Center, 12:00 pm, Community Center
Pinochle/Cribbage, 1:00 pm, Community Center
Bingo, 1:00 pm, Community Center
Teen Afterschool Drop-In Activities, 3:00 pm, Library

5/2 Gentle Yoga (Morning), 8:30 am, Community Center
I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Ladies Afternoon Out, 1:00 pm, Community Center
Restorative Yoga, 7:15 pm, Community Center

5/3 Play Group, 10:30 am, Library
Bridge for Intermediate Lessons, 10:30 am, Community Center
Stand, Sit and Be Fit, 11:00 am, Community Center
Bridge Group Play, 10:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
First Friday Films, 3:00 pm, Library

5/4 Space Talks, 11:00 am, Library
Soccer Shots Spring 2024, 2:00 pm, Memorial Park

5/6 Beginning English Class, 11:00 am, Library
Sit, Stand and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Weight Loss Support Group, 12:30 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Bridge Group Play, 1:00 pm, Community Center
Beginning Spanish Class, 6:00 pm, Library

5/7 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:00 am, Library
Baby & Toddler Time, 10:30 am, Library

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

5/7 Baby & Toddler Time, 11:15 am, Library
Stand, Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
Poetry Club, 1:00 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center
Beginning Tai Chi, 2:00 pm, Community Center
Oil Painting with Judy Stubb-Storm on the Horizon, 5:30 pm, Parks & Rec

5/8 Walk+Roll May Challenge (all day)
Digital Photography Club, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
Walk at Lunch – Academy Mortgage
Lunch at the Community Center, 12:00 pm, Community Center
STEAM Stuff, 1:00 pm, Library
Pinochle/Cribbage, 1:00 pm, Community Center
Teen Afterschool Drop-In Activities, 3:00 pm, Library

5/9 I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Art Club, 1:00 pm, Community Center
Ladies Afternoon Out, 1:00 pm, Community Center

5/10 Play Group, 10:30 am, Library
Bridge for Intermediate Lessons, 10:30 am, Community Center
Stand, Sit and Be Fit, 11:00 am, Community Center
Bridge Group Play, 10:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center

5/11 Bulky Waste Day, 9:00 am, Republic Services
Oil Painting with Judy Stubb-Ginger Blossoms, 10:00 am, Parks & Rec
Book Notes Concert, 2:00 pm, Library
Soccer Shots Spring 2024, 2:00 pm, Memorial Park

5/13 Beginning English Class, 11:00 am, Library
Sit, Stand and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Weight Loss Support Group, 12:30 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Bridge Group Play, 1:00 pm, Community Center
Learn to Ride a Bike Clinic, 3:30 pm, SMART

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

5/13 TAB Meeting, 4:15 pm, Library

5/14 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:30 am, Library
Baby & Toddler Time, 10:30 am, Library
Medicare 101, 10:30 am, Community Center
Baby & Toddler Time, 11:15 am, Library
Stand, Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
Caregiver/Alzheimer's Support Group, 1:00 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center
Learn to Ride a Bike Clinic, 3:30 pm, SMART

5/15 Digital Photography Club, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
5/1 Walk at Lunch – Edwards Jones
Lunch at the Community Center, 12:00 pm, Community Center
Pinochle/Cribbage, 1:00 pm, Community Center
Bingo, 1:00 pm, Community Center
Teen Afterschool Drop-In Activities, 3:00 pm, Library
Learn to Ride a Bike Clinic, 3:30 pm, SMART

5/16 I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Family Storytime, 10:30 am, Library
Walking Book Club, 1:00 pm, Library
Ladies Afternoon Out, 1:00 pm, Community Center
Learn to Ride a Bike Clinic, 3:30 pm, SMART

5/17 Play Group, 10:30 am, Library
Bridge for Intermediate Lessons, 10:30 am, Community Center
Stand, Sit and Be Fit, 11:00 am, Community Center
Bridge Group Play, 10:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Learn to Ride a Bike Clinic, 3:30 pm, SMART

5/18 WERK Day 2024, 8:00 am, Community Center
Metro Household Hazardous Waste Disposal, 9:00 am, Transit Center
Bike Repair 101, 10:30 am, SMART

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

5/18 Soccer Shots Spring 2024, 2:00 pm, Memorial Park

5/20 Beginning English Class, 11:00 am, Library
Sit, Stand and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Weight Loss Support Group, 12:30 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center
Bridge Group Play, 1:00 pm, Community Center
Genealogy Club, 1:00 pm, Library

5/21 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:00 am, Library
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center
ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center

5/22 Digital Photography Club, 10:00 am, Community Center
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Pinochle/Cribbage, 1:00 pm, Community Center

5/23 I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Ladies Afternoon Out, 1:00 pm, Community Center

5/24 Bridge for Intermediate Lessons, 10:30 am, Community Center
Stand, Sit and Be Fit, 11:15 am, Community Center
Bridge Group Play, 11:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center

5/25 Spanish Storytime, 11:00 am, Library

5/27 Office Closed – Memorial Day

5/28 Ukulele Jam, 9:00 am, Parks & Rec
Piecemakers Quilters, 9:00 am, Tauchman House
ODHS Drop-In Assistance 10:00 am, Library
Intermediate English Class, 10:00 am, Library
Stand, Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Partners Bridge, 12:30 pm, Community Center

All dates and times are tentative; check the City's online calendar for schedule changes at www.ci.wilsonville.or.us.

5/28 ODHS Drop-In Assistance, 1:00 pm, Library
Virtual Reality Fitness, 1:00 pm, Community Center

5/29 Digital Photography Club, 10:00 am, Community Center
Conversational Spanish Group, 10:30 am, Community Center
Sit and Be Fit, 11:15 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Pinochle/Cribbage, 1:00 pm, Community Center

5/30 I-5 Connection Chorus Group, 10:00 am, Community Center
Bridge for Beginners Lessons, 10:00 am, Community Center
Ladies Afternoon Out, 1:00 pm, Community Center
DEI Speaker Series: Building Community Through Culture, 6:00 pm, Library

5/31 Bridge for Intermediate Lessons, 10:30 am, Community Center
Blood Drive, 11:00 am, Library
Stand, Sit and Be Fit, 11:15 am, Community Center
Bridge Group Play, 11:30 am, Community Center
Lunch at the Community Center, 12:00 pm, Community Center
Mexican Train Dominoes, 1:00 pm, Community Center

Child Abuse Prevention Month
Proclamation

WHEREAS, children are vital to our city's future success and prosperity, and represent our most vulnerable resources; and

WHEREAS, all children deserve to have safe, stable, nurturing homes and communities needed to foster healthy growth and development; and

WHEREAS, child abuse is a tragedy that impacts the well-being of many; and

WHEREAS, child abuse prevention requires a public commitment to create safe and nurturing environments for parents and caregivers to raise children; and

WHEREAS, effective child abuse prevention strategies succeed because of partnerships created among citizens, human service agencies, schools, faith communities, health care providers, civic organizations, law enforcement agencies, and the business community; and

WHEREAS, by providing a healthy environment for our children, free of violence, abuse and neglect, we can help ensure that Wilsonville's children will grow to their full potential.

NOW, THEREFORE, BE IT RESOLVED, I, Julie Fitzgerald, Mayor of the City of Wilsonville, a municipal corporation in the County of Clackamas and the County of Washington County, in the State of Oregon, do hereby proclaim April 2024 as Child Abuse Prevention Month in Wilsonville and call upon all citizens to work to prevent child abuse.

IN WITNESS WHEREOF, and with the consent of the City Council of the City of Wilsonville, I have hereunto set my hand on this 15th day of April 2024.

_____

Julie Fitzgerald, Mayor

Child Abuse Prevention Month
Proclamation

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Julie Fitzgerald, Mayor

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: April 15, 2024	**Subject: Resolution No. 3122** Authorize the City Manager to Enter Into and Execute a Cooperative Maintenance Agreement and Accept the Relinquishment of a Portion of SW Elligsen Road with the State of Oregon Department of Transportation. **Staff Member:** Zach Weigel, P.E., City Engineer **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☒ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☒ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Staff recommends Council adopt the Consent Agenda.	
Recommended Language for Motion: I move to adopt the Consent Agenda.	
Project / Issue Relates To:	
☐Council Goals/Priorities:	☐Adopted Master Plan(s): ☒Not Applicable

ISSUE BEFORE COUNCIL:

A City of Wilsonville resolution accepting the relinquishment of a portion of Elligsen Road by the State of Oregon Department of Transportation (State) and approving a Cooperative Maintenance Agreement (CMA) between the City of Wilsonville and the State for the portion of Elligsen Road to be relinquished.

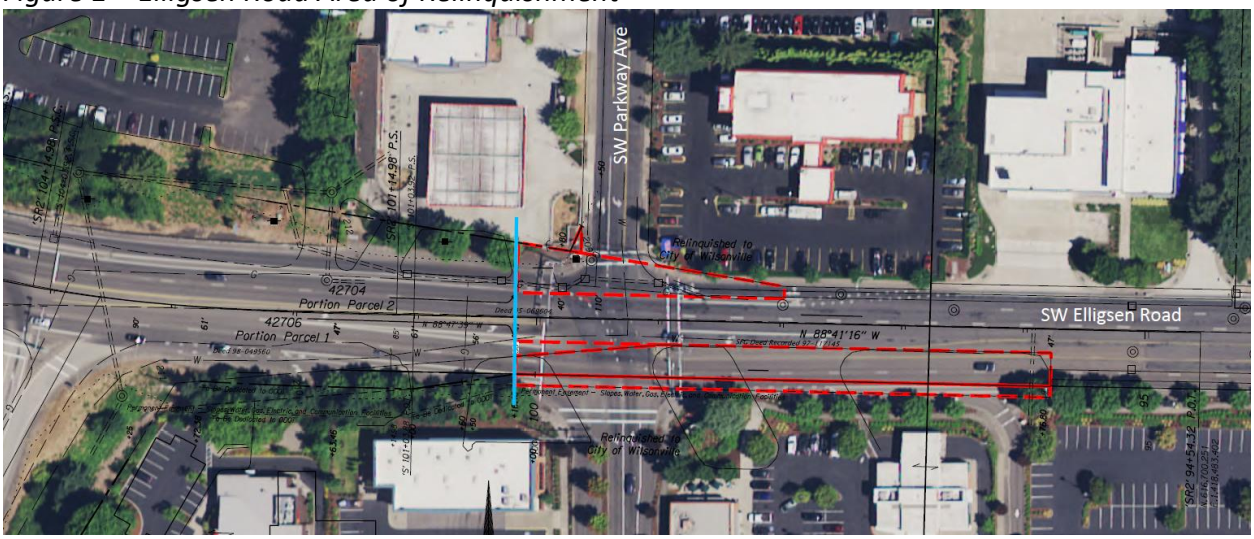
EXECUTIVE SUMMARY:

In January 2020, the City began design of a planned street maintenance project on Elligsen Road, including pedestrian signal improvements, sidewalk curb ramp upgrades, and roadway resurfacing with new striping and signage. The project limits extend from Parkway Avenue to the Wilsonville eastern city limits at Canyon Creek Road. Due to the proximity of Parkway Avenue to the Interstate 5 Elligsen Road Interchange (Exit 286), the City coordinated the street maintenance design and construction work with the State.

During project design, the City began to run into challenges due to the existing irregular Elligsen Road jurisdictional boundary between the State and the City, as shown in the red dashed lines in Figure 1. Further complicating the project design, the existing Elligsen/Parkway traffic signal is under City jurisdiction, while the roadway jurisdiction at the traffic signal is under the State.

Due to the shape of the boundary and location of the traffic signal, the City determined it was not feasible to construct the needed street maintenance improvements without obtaining a State permit. The sections of roadway, sidewalk curb ramp, and pedestrian signals under State jurisdiction have slightly different design and construction standards than the areas under City jurisdiction. The project team estimated up to a year of project delay to work through the design and construction requirements and obtain the required State permits.

Figure 1 – Elligsen Road Area of Relinquishment



In an effort to keep the Elligsen Road project on schedule and to both clarify and simplify the Elligsen Road jurisdiction boundaries and maintenance responsibilities for future work, the City proposed establishment of a clear jurisdictional boundary separation represented by the blue line on Figure 1. Under the proposal, all Elligsen Road roadway, sidewalk, and storm drainage infrastructure east of the blue line, represented by the red dashed lines, would transfer to City responsibility, while west of the blue line would remain under State jurisdiction. The State agreed with this proposal and the City accepted the State's tentative relinquishment of the Elligsen Road right-of-way on August 12, 2020 as an interim measure while documents were prepared and

State approvals were obtained for the final relinquishment. The City's street maintenance project proceeded on schedule in accordance with Wilsonville design and construction requirements and was completed on November 10, 2021.

As of December 5, 2023, the State has prepared and approved a Relinquishment Deed for the Elligsen Road right-of-way (**Exhibit A**) for City approval. In addition to the Relinquishment Deed, a Cooperative Maintenance Agreement (**Exhibit B**) between the City and State is needed to outline maintenance responsibilities for the portion of Elligsen Road to be relinquished to the City. City Council authorization is required to accept the State relinquishment of the Elligsen Road right-of-way and enter into a Cooperative Maintenance Agreement (CMA) with the State.

EXPECTED RESULTS:
Acceptance of the State relinquishment of a portion of Elligsen Road and approval of the CMA will complete transfer of right-of-way and maintenance responsibilities for roadway, sidewalk, and traffic signal infrastructure at the intersection of Elligsen Road and Parkway Avenue to the City of Wilsonville. This will provide for more expedient and consistent infrastructure replacement and maintenance in the future, resulting in better communication and less impact to roadway users and nearby businesses.

TIMELINE:
Transfer of a portion of the Elligsen Road right-of-way and infrastructure maintenance responsibilities to the City will be completed upon City Council acceptance of the Relinquishment Deed and approval of the CMA.

CURRENT YEAR BUDGET IMPACTS:
There are no current year budgetary impacts that will result from acceptance of the State relinquishment of a portion of Elligsen Road right-of-way or approval of the CMA.

COMMUNITY INVOLVEMENT PROCESS:
N/A

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
Transfer of the portion of Elligsen Road right-of-way and infrastructure maintenance responsibilities near Parkway Avenue to Wilsonville will allow the City to have authority over design and construction standards of the subject roadway areas, ensuring the roadway will comply with Wilsonville standards and the Wilsonville Transportation System Plan. Acceptance of the Relinquishment Deed and CMA will clarify road maintenance responsibilities and ensure efficient and consistent road maintenance activities along this portion of Elligsen Road.

ALTERNATIVES:
Acceptance of the Relinquishment Deed for a portion of Elligsen Road and approval of the CMA is necessary to establish more straightforward jurisdictional responsibilities on Elligsen Road at Parkway Avenue, near the Interstate 5 Elligsen Road Interchange (Exit 286). If the Relinquishment Deed is not accepted or the CMA is not approved, the irregular Elligsen Road jurisdiction

boundary between the State and the City will be left in place and continue to create infrastructure rehabilitation and maintenance challenges, resulting in extended time frames, additional costs, and traffic impacts to the Wilsonville community. In addition, the State may require the City to redesign and reconstruct the areas under State jurisdiction, previously completed in November 2021, in accordance with State requirements instead of the City standards.

CITY MANAGER COMMENT:

ATTACHMENTS:

1. Resolution No. 3122
    A. Relinquishment Deed – Stafford Interchange & Interstate 5 Pavement Section
    B. Cooperative Maintenance Agreement – SW Elligsen Rd: SW Parkway Ave Relinquishment and Maintenance

RESOLUTION NO. 3122

A RESOLUTION OF THE CITY OF WILSONVILLE AUTHORIZING THE CITY MANAGER TO ENTER INTO AND EXECUTE A COOPERATIVE MAINTENANCE AGREEMENT AND ACCEPT THE RELINQUISHMENT OF A PORTION OF SW ELLIGSEN ROAD WITH THE STATE OF OREGON DEPARTMENT OF TRANSPORTATION.

WHEREAS, SW Elligsen Road is a roadway under the control and jurisdiction of the City of Wilsonville (City) except for a portion of SW Elligsen Road, approximately from mile point 12.9 – 12.95, that is part of the state highway system under the jurisdiction and control of the Oregon Transportation Commission (OTC); and

WHEREAS, City desires right, title, and interest in a portion of SW Elligsen Road as described in **EXHIBIT A** attached herein (Roadway) under the jurisdiction and control of the OTC to apply City design and construction standards in accordance with Wilsonville Public Works Standards and Wilsonville Transportation System Plan; and

WHEREAS, State of Oregon, by and through its Department of Transportation (State) agrees to relinquish unto the City, all of the State's right, title, and interest in Roadway through a Relinquishment Deed (**Exhibit A**); and

WHEREAS, a Cooperative Maintenance Agreement (**Exhibit B**) between State and City is required to delineate maintenance responsibilities pertaining to the Roadway to be relinquished to City; and

WHEREAS, Oregon Revised Statutes (ORS) 190.110, 366,572, and 366.576 authorizes the State to enter into cooperative agreements with cities for the performance of work on certain types of improvement projects.

NOW, THEREFORE, THE CITY OF WILSONVILLE RESOLVES AS FOLLOWS:

Section 1. The City Council authorizes the City Manager to sign, on behalf of the City of Wilsonville, the Relinquishment Deed accepting a portion of SW Elligsen Road from the State of Oregon Department of Transportation, substantially in the form attached as **Exhibit A**.

Section 2. The City Council authorizes the City Manager to enter into and execute, on behalf of the City of Wilsonville, the Cooperative Maintenance Agreement for SW Elligsen Road:

SW Parkway Ave Relinquishment and Maintenance, substantially in the form attached as **Exhibit B**.

Section 3. The City Manager is authorized to sign the Cooperative Maintenance Agreement in substantially the form attached hereto, but with latitude to make minor revisions, as determined by the City Engineer, to reflect needed variances and clarifications.

Section4. Effective Date. This Resolution is effective upon adoption.

ADOPTED by the Wilsonville City Council at a regular meeting thereof this 15th day of April, 2024, and filed with the Wilsonville City Recorder this date.

_____

JULIE FITZGERALD, MAYOR

ATTEST:

_____

Kimberly Veliz, City Recorder

SUMMARY OF VOTES:

Mayor Fitzgerald

Council President Akervall

Councilor Linville

Councilor Berry

Councilor Dunwell

EXHIBITS:

A. Relinquishment Deed – Stafford Interchange & Interstate 5 Pavement Section
B. Cooperative Maintenance Agreement – SW Elligsen Rd: SW Parkway Ave Relinquishment and Maintenance

Relinquishment No. 6349000A
PM910-193
Stafford Interchange & I5 Pvmt. Section
Pacific Highway (I-5) Highway
Washington County

Relinquishment Deed

STATE OF OREGON, by and through its Department of Transportation, hereinafter called "State", does hereby relinquish unto **CITY OF WILSONVILLE, a municipal corporation of the State of Oregon, by and through its Elected Officials**, hereinafter called "City", all of State's right, title and interest in the connecting streets or portions thereof as described in the legal description and accompanying map, marked Exhibit "A" and Exhibit "B", attached hereto and by this reference made a part hereof. Any right-of-way being conveyed in which State has any title shall be vested in City ONLY SO LONG AS USED FOR PUBLIC ROAD PURPOSES. IF SAID RIGHT OF WAY IS NO LONGER USED FOR PUBLIC ROAD PURPOSES, IT SHALL AUTOMATICALLY REVERT TO STATE.

AS SHOWN ON THE ATTACHED EXHIBIT MAP, HEREIN AND MADE A PART OF THIS DOCUMENT AS SET FORTH ABOVE, THAT IN THE EVENT OF A CONFLICT OR DISCREPANCY BETWEEN THE EXHIBIT MAP AS SHOWN AND THE WRITTEN LEGAL DESCRIPTION EXHIBIT "A", THE WRITTEN LEGAL DESCRIPTION EXHIBIT "A" SHALL PREVAIL.

The property above described is transferred subject to the rights of any utilities located within said property and further subject to the rights of the owners of said existing facilities if any there be, to operate, reconstruct, and maintain their utility facilities presently located within said property.

AFTER RECORDING RETURN TO:
OREGON DEPARTMENT OF TRANSPORTATION
RIGHT OF WAY SECTION
4040 FAIRVIEW INDUSTRIAL DRIVE SE MS#2
SALEM OR 97302-1142

Relinquishment No. 6349000A
PM910-193
Stafford Interchange & I5 Pvmt. Section
Pacific Highway (I-5) Highway
Washington County

The City, Grantee, for themselves, their heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree as a covenant running with the land that in the event facilities are constructed, maintained, or otherwise operated on the property described in this deed for any activity, facility or program, the City, Grantee will maintain and operate such facilities and services in compliance with all federal and state requirements such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.

The Oregon Transportation Commission, by a duly adopted Delegation Order OTC – 01, dated July 1, 2019; Delegation Order No. DD 03, Item No. 19, dated July 1, 2019; Delegation Order No. HWY 04, Paragraph No. B-4, dated April 1, 2018; and Delegation Order No. EB-05, Paragraph No. B-2, dated April 1, 2018, authorize the State Right of Way Manager to sign this Relinquishment Deed for and on behalf of the Commission.

Dated this 5th day of December, 2023.

STATE OF OREGON, by and through its DEPARTMENT OF TRANSPORTATION

By _____
Georgine Gleason, State Right of Way Manager

STATE OF OREGON, County of Marion

Dated December 5, 2023. Personally appeared Georgine Gleason, who stated that she is the State Right of Way Manager for the State of Oregon, Department of Transportation, and that this document was voluntarily signed on behalf of the State of Oregon by authority delegated to her. Before me:

OFFICIAL STAMP
DAHLIA ESTELA CEDILLO RODRIGUEZ
NOTARY PUBLIC - OREGON
COMMISSION NO. 1026433
MY COMMISSION EXPIRES AUGUST 03, 2026

_____
Notary Public for Oregon
My Commission expires 8.3.2026

Relinquishment No. 6349000A
PM910-193
Stafford Interchange & I5 Pvmt. Section
Pacific Highway (I-5) Highway
Washington County

Title as hereinabove relinquished and as shown on accompanying legal description and map, Exhibit "A" and Exhibit "B", is hereby accepted by City of Wilsonville.

Accepted on behalf of the City of Wilsonville

By _____

Date_____

EXHIBIT A - Page 1 of 1

File 6349000A
Drawings 1A-22-26 & 5B-34-16
8/10/2020

Relinquish To the City of Wilsonville

A parcel of land lying in the SE¼ of Section 2 and SW¼ of Section 1, Township 3 South, Range 1 West, Willamette Meridian, Washington County, Oregon and being a portion of that property designated as Parcel 2 and described in that Warranty Deed to State of Oregon, by and through its State Highway Commission recorded May 21, 1969 in Book 744, Page 151 of Washington County Book of Records and a portion of that property designated as Parcel 1 and acquired by the State of Oregon, by and through its State Highway Commission in that Final Judgement dated March 12, 1970 as Circuit Court of Oregon Case 30-925 in the County of Washington, said parcel being that portion of said property lying Easterly of a line at right angles to the "SR2" center line at Engineer's Center Line Station 100+16.46.

AND ALSO a portion of that property designated as Parcel 1 and a portion of that Permanent Easement for Slopes, Water, Gas, Electric and Communication Service Lines, Fixtures and Facilities, designated as Parcel 3 and acquired by the State of Oregon, by and through its Department of Transportation in that Stipulated Final Judgement dated October 2, 1997 as Circuit Court of Oregon Case C95-1421CV in the County of Washington and recorded December 16, 1997 as Instrument No. 97-117145 of Washington County Book of Records, said parcel being that portion of said property and permanent easement lying Easterly of a line at right angles to the "SR2" center line at Engineer's Center Line Station 100+16.46.

AND ALSO that property described in that Warranty Deed to State of Oregon, by and through its Department of Transportation recorded September 28, 1995 as Instrument No. 95-069604 of Washington County Book of Records.

The "SR2" center line is described in the aforementioned Stipulated Final Judgement.

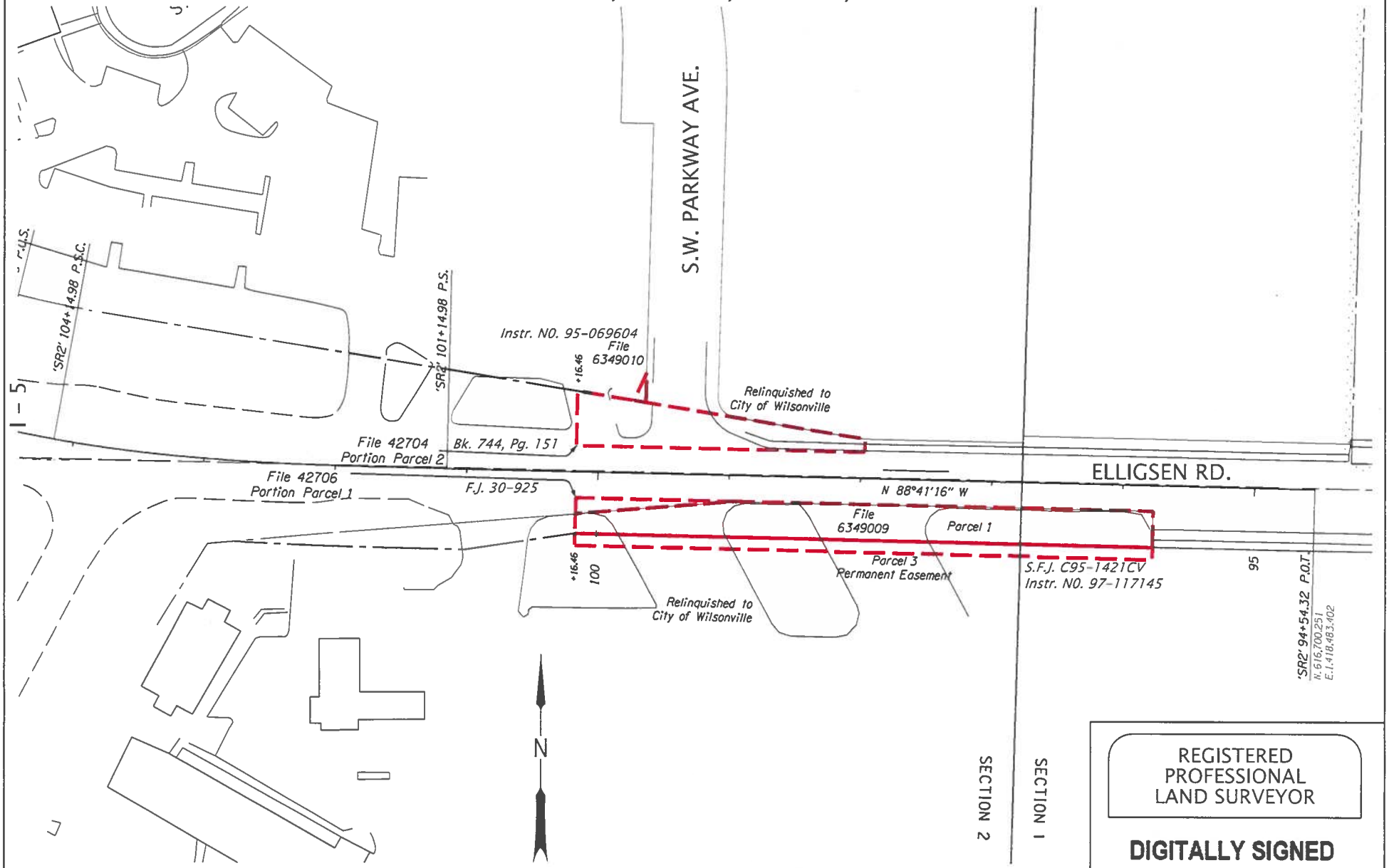
REGISTERED
PROFESSIONAL
LAND SURVEYOR

DIGITALLY SIGNED

OREGON
JUNE 13, 2008
MICHAEL RAEY FALLERT
78960

RENEWS: 12-31-2021

SEC. 1 & 2, T. 3 S., R. 1 W., W.M.



OREGON DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY RELINQUISHMENT

EXHIBIT B SHEET 1 OF 1

SECTION	STAFFORD INTERCHANGE & I5 PVMT.				
HIGHWAY	PACIFIC				
COUNTY	WASHINGTON	DRG. NO.	1A-22-26, 5B-34-16		
FILE	6349000A	SCALE	1" = 100'	DATE	AUG., 2020

REGISTERED PROFESSIONAL LAND SURVEYOR

DIGITALLY SIGNED

OREGON
JUNE 13, 2008
MICHAEL RAEY FALLERT
78960

RENEWS: 12-31-2021

COOPERATIVE MAINTENANCE AGREEMENT
SW Elligsen Rd: SW Parkway Ave Relinquishment and Maintenance
City of Wilsonville

THIS AGREEMENT is made and entered into by and between the STATE OF OREGON, acting by and through its Department of Transportation, hereinafter referred to as "State," and the CITY OF WILSONVILLE, hereinafter referred to as "Agency," both herein referred to individually as a "Party" and collectively as the "Parties."

RECITALS

1. SW Elligsen Road is a city street under the control and jurisdiction of the City of Wilsonville except for a portion of SW Elligsen Road, approximately from mile point 12.9 – 12.95, that is a part of the state highway system under the jurisdiction and control of the Oregon Transportation Commission (OTC).

2. By the authority granted in Oregon Revised Statutes (ORS) 190.110, 366.572 and 366.576, State may enter into cooperative agreements with counties, cities and units of local governments for the performance of work on certain types of improvement projects with the allocation of costs on terms and conditions mutually agreeable to the contracting parties.

3. State, by ORS 366.220, is vested with complete jurisdiction and control over the roadways of other jurisdictions taken for state highway purposes.

4. State and Agency are entering into this Agreement to delineate maintenance responsibilities pertaining to the portion of SW Elligsen Road that will be relinquished to Agency.

NOW, THEREFORE, the premises being in general as stated in the foregoing Recitals, it is agreed by and between the Parties hereto as follows:

TERMS OF AGREEMENT

1. State and Agency agree that the State will relinquish by Relinquishment Deed a portion of right of way along SW Elligsen Road to Agency, and Agency shall accept said property, as shown in detail in Exhibit A, attached hereto and by this reference made a part hereof. Upon relinquishment to Agency, Agency shall be responsible for maintenance of those portions of right of way as set forth in the map attached hereto as Exhibit B.

2. This Agreement becomes effective upon the later of the date all required signatures are obtained and the date of execution of the Project Agreement. If the Parties do not enter into the Project Agreement, this Agreement shall be considered null and void. This Agreement shall remain in effect for twenty (20) calendar years unless otherwise agreed to by the parties.

AGENCY OBLIGATIONS

1. Agency shall accept all right, title, and interest to the property described and shown in Exhibit A.

2. Agency shall maintain all elements of the relinquished area shown in Exhibit B, including any ADA elements and improvements and the stormwater drainage system within the area.

3. Agency shall notify State in advance of any work Agency may do that would impact the State Highway System with the exception of regular infrastructure maintenance activities. Agency shall schedule regular infrastructure maintenance activities to minimize impacts to the State Highway System.

4. All employers, including Agency, that employ subject workers who work under this Agreement in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage unless such employers are exempt under ORS 656.126. Employers Liability insurance with coverage limits of not less than $500,000 must be included. Agency shall ensure that each of its contractors complies with these requirements.

5. Agency shall perform the service under this Agreement as an independent contractor and shall be exclusively responsible for all costs and expenses related to its employment of individuals to perform the work under this Agreement including, but not limited to, retirement contributions, workers' compensation, unemployment taxes, and state and federal income tax withholdings.

6. Agency acknowledges and agrees that State, the Oregon Secretary of State's Office, the federal government, and their duly authorized representatives shall have access to the books, documents, papers, and records of Agency which are directly pertinent to the specific Agreement for the purpose of making audit, examination, excerpts, and transcripts for a period of six (6) years after final payment. Copies of applicable records shall be made available upon request.

7. Agency grants State the right to enter onto Agency right of way for the performance of duties set forth in this Agreement.

8. Agency certifies and represents that each individual signing this Agreement has been authorized to enter into and execute this Agreement on behalf of Agency, under the direction or approval of its governing body, commission, board, officers, members or representatives, and to legally bind Agency.

9. Agency's contact for this Agreement is Zach Weigel, City of Wilsonville City Engineer, 29799 SW Town Center Loop East, Wilsonville, OR 97070, (503)570-1565, weigel@ci.wilsonville.or.us, or assigned designee upon individual's absence. Agency

shall notify the other Party in writing of any contact information changes during the term of this Agreement.

STATE OBLIGATIONS

1. Upon execution of this Agreement, State shall complete the relinquishment process of the property subject to this Agreement to Agency by Relinquishment Deed.

2. State shall have maintenance responsibilities for all elements of the area shown in Exhibit B.

3. State's contact for this Agreement is Cory Hamilton, District 2B Manager, 9200 SE Lawnfield Rd, Clackamas, OR 97015, 971-673-6200, cory.d.hamilton@odot.oregon.gov, or assigned designee upon individual's absence. State shall notify the other Party in writing of any contact information changes during the term of this Agreement.

GENERAL PROVISIONS

1. This Agreement may be terminated by mutual written consent of both Parties.

2. State may terminate this Agreement, effective upon delivery of written notice to Agency or at such later date as may be established by State, under any of the following conditions:

   a. If Agency fails to provide services called for by this Agreement within the time specified herein or any extension thereof;

   b. If Agency fails to perform any of the other provisions of this Agreement, or so fails to pursue the work as to endanger performance of this Agreement in accordance with its terms, and after receipt of written notice from State fails to correct such failures within ten (10) days or such longer period as State may authorize;

   c. If Agency fails to provide payment of its share of the cost of activities performed under this Agreement;

   d. If State fails to receive funding, appropriations, limitations or other expenditure authority sufficient to allow State, in the exercise of its reasonable administrative discretion, to continue to make payments for performance of this Agreement;

   e. If federal or state laws, regulations or guidelines are modified or interpreted in such a way that either the work under this Agreement is prohibited or State is prohibited from paying for such work from the planned funding source.

3. Any termination of this Agreement shall not prejudice any rights or obligations accrued to the Parties prior to termination.

4. If any third party makes any claim or brings any action, suit or proceeding alleging a tort as now or hereafter defined in ORS 30.260 ("Third Party Claim") against State or Agency with respect to which the other Party may have liability, the notified Party must promptly notify the other Party in writing of the Third Party Claim and deliver to the other Party a copy of the claim, process, and all legal pleadings with respect to the Third Party Claim. Each Party is entitled to participate in the defense of a Third Party Claim, and to defend a Third Party Claim with counsel of its own choosing. Receipt by a Party of the notice and copies required in this paragraph and meaningful opportunity for the Party to participate in the investigation, defense and settlement of the Third Party Claim with counsel of its own choosing are conditions precedent to that Party's liability with respect to the Third Party Claim.

5. With respect to a Third Party Claim for which State is jointly liable with Agency (or would be if joined in the Third Party Claim), State shall contribute to the amount of expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred and paid or payable by Agency in such proportion as is appropriate to reflect the relative fault of State on the one hand and of Agency on the other hand in connection with the events which resulted in such expenses, judgments, fines or settlement amounts, as well as any other relevant equitable considerations. The relative fault of State on the one hand and of Agency on the other hand shall be determined by reference to, among other things, the Parties' relative intent, knowledge, access to information and opportunity to correct or prevent the circumstances resulting in such expenses, judgments, fines or settlement amounts. State’s contribution amount in any instance is capped to the same extent it would have been capped under Oregon law, including the Oregon Tort Claims Act, ORS 30.260 to 30.300, if State had sole liability in the proceeding.

6. With respect to a Third Party Claim for which Agency is jointly liable with State (or would be if joined in the Third Party Claim), Agency shall contribute to the amount of expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred and paid or payable by State in such proportion as is appropriate to reflect the relative fault of Agency on the one hand and of State on the other hand in connection with the events which resulted in such expenses, judgments, fines or settlement amounts, as well as any other relevant equitable considerations. The relative fault of Agency on the one hand and of State on the other hand shall be determined by reference to, among other things, the Parties' relative intent, knowledge, access to information and opportunity to correct or prevent the circumstances resulting in such expenses, judgments, fines or settlement amounts. Agency's contribution amount in any instance is capped to the same extent it would have been capped under Oregon law, including the Oregon Tort Claims Act, ORS 30.260 to 30.300, if it had sole liability in the proceeding.

7. The Parties shall attempt in good faith to resolve any dispute arising out of this Agreement. In addition, the Parties may agree to utilize a jointly selected mediator or arbitrator (for non-binding arbitration) to resolve the dispute short of litigation.

8. This Agreement may be executed in several counterparts (facsimile or otherwise) all of which when taken together shall constitute one agreement binding on all Parties, notwithstanding that all Parties are not signatories to the same counterpart. Each copy of this Agreement so executed shall constitute an original.

9. This Agreement and attached exhibits constitute the entire agreement between the Parties on the subject matter hereof. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this Agreement. No waiver, consent, modification or change of terms of this Agreement shall bind either Party unless in writing and signed by both Parties and all necessary approvals have been obtained. Such waiver, consent, modification or change, if made, shall be effective only in the specific instance and for the specific purpose given. The failure of State to enforce any provision of this Agreement shall not constitute a waiver by State of that or any other provision.

Signature Page to Follow

Agency/State
Agreement No. 73000-00011232

THE PARTIES, by execution of this Agreement, hereby acknowledge that their signing representatives have read this Agreement, understand it, and agree to be bound by its terms and conditions.

CITY OF WILSONVILLE, by and through its elected officials

By _____

Date _____

By _____
Counsel

Date _____

Agency Contact:
Zach Weigel
City Engineer
29799 SW Town Center Loop East
Wilsonville, OR 97070
503-570-1565

STATE OF OREGON, by and through its Department of Transportation

By _____
Region 1 Maintenance and Operations Manager

Date _____

APPROVAL RECOMMENDED

By _____
Region 1 Right of Way Manager

Date _____

By _____
State Right of Way Manager

Date _____

By _____
Cory Hamilton, District 2B Manager

Date _____

State Contact:
Cory Hamilton, District 2B Manager
9200 SE Lawnfield Rd
Clackamas, OR 97015
971-673-6200
cory.d.hamilton@odot.oregon.gov

EXHIBIT A - Page **1** of **1**

File 6349000A
Drawings 1A-22-26 & 5B-34-16
8/10/2020

Relinquish To the City of Wilsonville

A parcel of land lying in the SE¼ of Section 2 and SW¼ of Section 1, Township 3 South, Range 1 West, Willamette Meridian, Washington County, Oregon and being a portion of that property designated as Parcel 2 and described in that Warranty Deed to State of Oregon, by and through its State Highway Commission recorded May 21, 1969 in Book 744, Page 151 of Washington County Book of Records and a portion of that property designated as Parcel 1 and acquired by the State of Oregon, by and through its State Highway Commission in that Final Judgement dated March 12, 1970 as Circuit Court of Oregon Case 30-925 in the County of Washington, said parcel being that portion of said property lying Easterly of a line at right angles to the “SR2” center line at Engineer’s Center Line Station 100+16.46.

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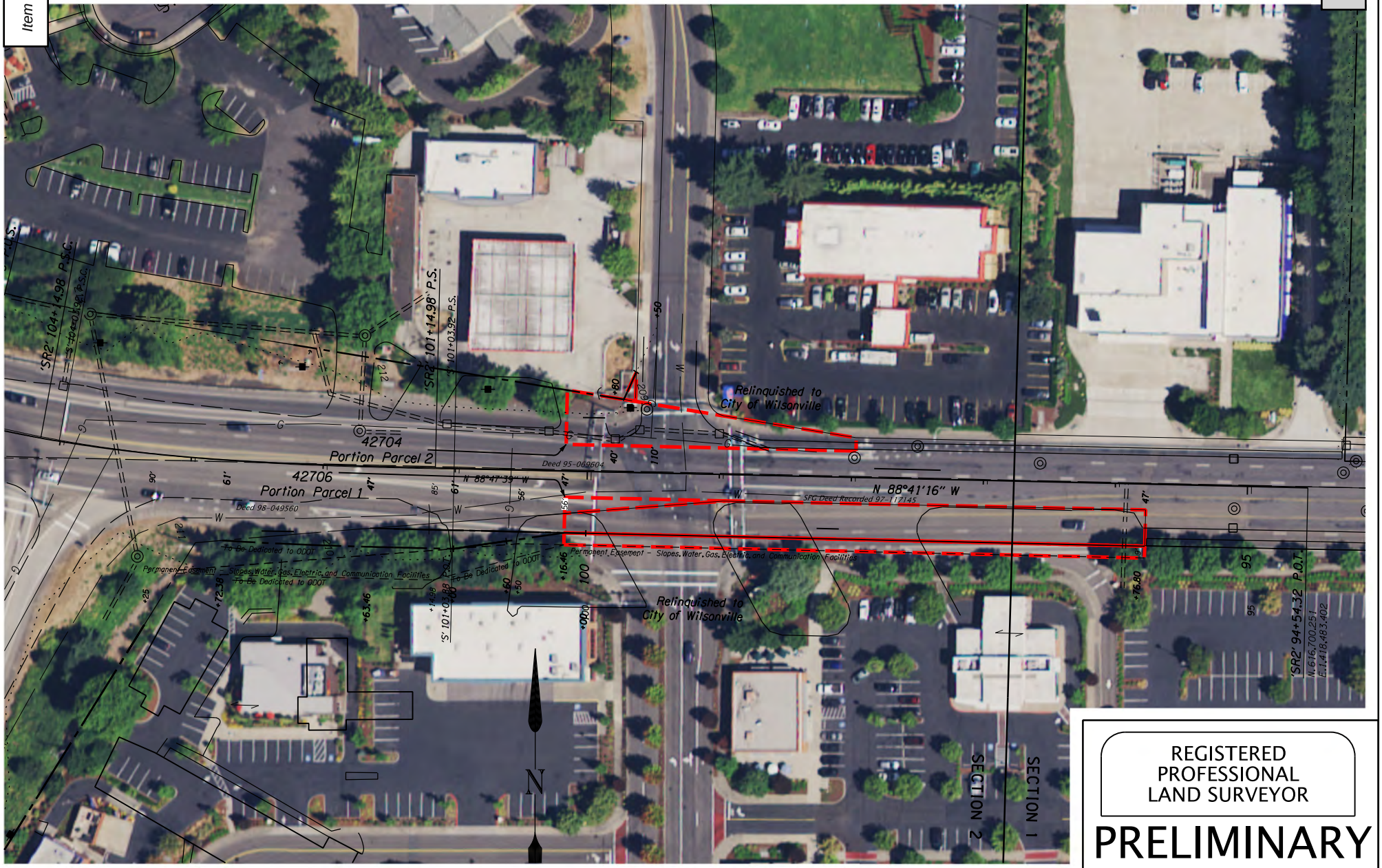
Agency/State
Agreement No. 73000-00011232

Item 11.

SEC. 1 & 2, T. 3 S., R. 1 W., W.M.

63



OREGON DEPARTMENT OF TRANSPORTATION

RIGHT OF WAY RELINQUISHMENT

EXHIBIT B SHEET 1 OF 1

SECTION	STAFFORD INTERCHANGE & I5 PVMT.				
HIGHWAY	PACIFIC				
COUNTY	CLACKAMAS	DRG. NO.	1A-22-26, 5B-34-16		
FILE	6349000A	SCALE	1" = 100'	DATE	AUG., 2020

REGISTERED PROFESSIONAL LAND SURVEYOR

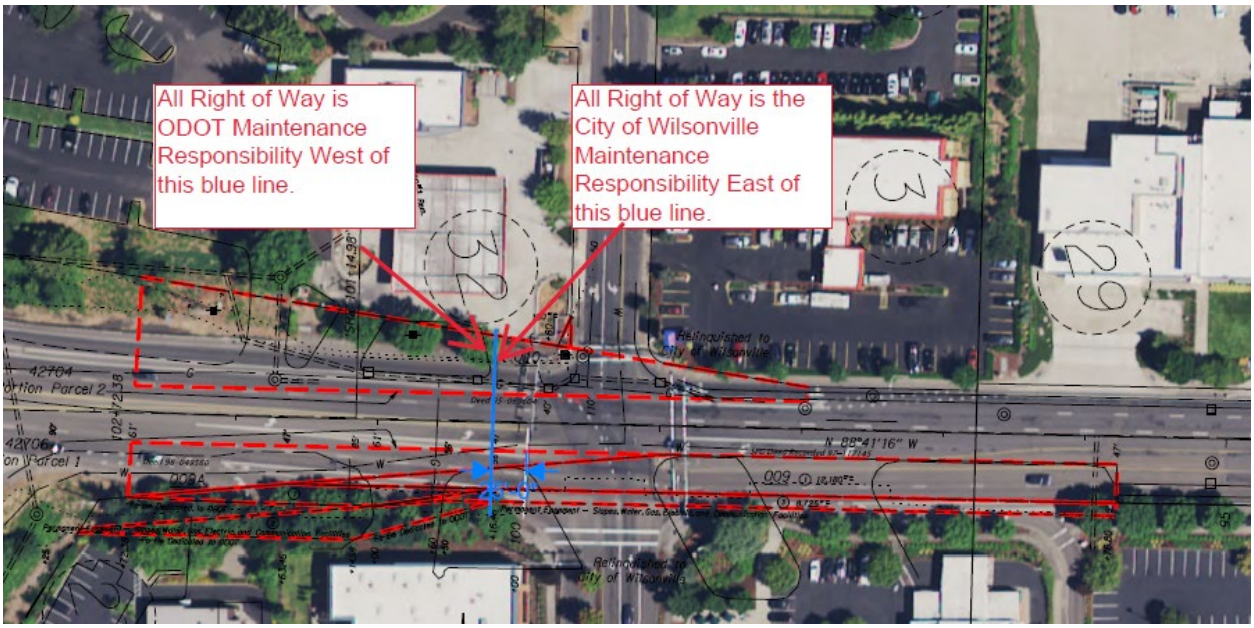
PRELIMINARY

OREGON
JUNE 13, 2008
MICHAEL RAEY FALLERT
78960

RENEWS: 12-31-2021

Agency/State
Agreement No. 73000-00011232

EXHIBIT B – Map of Maintenance Responsibilities



WILSONVILLE
OREGON

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: April, 15, 2024	**Subject: Resolution No. 3138** A Construction Contract With Flow Line Construction, LLC., Inc. for the Park at Merryfield Trail and Boones Ferry Park Trail Projects **Staff Member:** Dustin Schull, Parks Supervisor **Department:** Parks and Recreation
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☒ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Staff recommends Council adopt the Consent Agenda.	
Recommended Language for Motion: I move to adopt Consent Agenda.	
Project / Issue Relates To:	

☐Council Goals/Priorities:	☒Adopted Master Plan(s): Parks and Recreation Comprehensive Master Plan & Boones Ferry Park Master Plan	☐Not Applicable

ISSUE BEFORE COUNCIL:

The award of contract to Flow Line Construction LLC. for construction of upgrades to the Park at Merryfield trail and construction of the new Boones Ferry Park trail. These projects are included in the Parks and Recreation Comprehensive Master Plan and the Boones Ferry Park Master Plan.

EXECUTIVE SUMMARY:
The Park at Merryfield project will address current ADA issues related to the slope of the trail as well as widen the existing asphalt trail. The 0.16-mile asphalt trail was built prior to the year 2000 and is narrow, resulting in safety conflicts between pedestrians and bicyclists. The project will widen the trail to ten (10) feet and add striping to address the existing user conflicts. The Park at Merryfield trail is highly utilized by students accessing Boones Ferry Primary School and Inza R. Wood Middle School. Given the high utilization, upgrading the trail and improving safety is an important and positive investment in the community.

The Boones Ferry Park project includes the construction of a new five foot asphalt path to connect the Old Town neighborhood to Boones Ferry Park. The trail will also increase access to the existing Boones Ferry Park trail system. The Boones Ferry Park trail system links neighborhoods on the west side of the city to neighborhoods near Memorial Park.

EXPECTED RESULTS:
The construction of a new trail in Boones Ferry Park and enhancements to the existing trail in Park at Merryfield.

TIMELINE:
Construction is expected to begin in the spring of 2024.

CURRENT YEAR BUDGET IMPACTS:
Total project scope is approximately $252,831. This funding is located in CIP #9171 – Boones Ferry Park Master Plan Implementation ($90,092.50) and CIP #9173 - Merryfield Trail Update ($162,737.50).

Both Projects will be partially grant funded; the Boones Ferry Trail received a $40,000 Wilsonville – Metro Community Enhancement grant while the Merryfield Trail received $75,000 Local Government Grant Program from Oregon State Parks.

COMMUNITY INVOLVEMENT PROCESS:
The community engagement process for the Parks and Recreation Comprehensive Master Plan and Boones Ferry Master Plan identified both projects as high priorities to the community.

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
The upgrade of the Park at Merryfield trail and construction of a new trail at Boones Ferry Park will increase accessibility and connectivity throughout the community.

ALTERNATIVES:
The alternative is to not enhance the existing Park at Merryfield trail or construct a new trail at Boones Ferry Park.

CITY MANAGER COMMENT:
N/A

ATTACHMENTS:
1. Resolution No. 3138
    A. Contract
    B. Map

RESOLUTION NO. 3138

A RESOLUTION OF THE CITY OF WILSONVILLE AUTHORIZING THE CITY MANAGER TO EXECUTE A CONSTRUCTION CONTRACT WITH FLOW LINE CONSTRUCTION, LLC., INC. TO CONSTRUCT THE PARK AT MERRYFIELD AND BOONES FERRY PARK TRAILS PROJECT.

WHEREAS, the City of Wilsonville has identified The Park at Merryfield and Boones Ferry Park Trial projects through Master planning processes; and

WHEREAS, the City of Wilsonville Parks and Recreation Department has identified these projects as key trail connections for improvement; and

WHEREAS, the City wishes to assure the usability of its assets; and

WHEREAS, the City has selected a contractor through a formal bid process for this project in accordance with the City's and State's procurement rules.

NOW, THEREFORE, THE CITY OF WILSONVILLE RESOLVES AS FOLLOWS:

Section 1. The procurement process for the Project duly followed Oregon Contracting Rules, and Flow Line Construction, LLC. was determined to be the lowest responsive bidder

Section 2. The City of Wilsonville, acting as the Local Contract Review Board, authorizes the City Manager to enter into and execute, on behalf of the City of Wilsonville, a construction contract with Flow Line Construction, LLC. for a not-to-exceed amount of $252,831.00, which contract must be substantially similar to Exhibit A attached hereto.

Section 3. This resolution is effective upon adoption.

ADOPTED by the Wilsonville City Council at a regular meeting there of this 15th Day of April 2024, and filed with the Wilsonville City Recorder this date.

_____

JULIE FITZGERALD, MAYOR

ATTEST:

_____

Kimberly Veliz, City Recorder

SUMMARY OF VOTES:

Mayor Fitzgerald

Council President Akervall

Councilor Berry

Councilor Dunwell

Councilor Linville

EXHIBIT:

A. Construction Contract Flow Line Construction, LLC, to conduct the Park at Merryfield and Boones Ferry Park Trail project.

EXHIBIT A

Contract No. 242260
CIP No. 9173 & 9171

CITY OF WILSONVILLE
CONSTRUCTION CONTRACT

This Construction Contract ("Contract") for the Merryfield and Boones Ferry Trail Project ("Project") is made and entered into on this _____ day of April 2024 ("Effective Date") by and between the **City of Wilsonville**, a municipal corporation of the State of Oregon (hereinafter referred to as the "City"), and **Flow Line Construction LLC**, a domestic limited liability company (hereinafter referred to as "Contractor").

RECITALS

WHEREAS, the City issued a formal Invitation to Bid for the Project described herein; and

WHEREAS, Contractor represents that Contractor is qualified to perform the services described in the Invitation to Bid on the basis of specialized experience and technical expertise; and

WHEREAS, after reviewing all bids submitted in accordance with the Invitation to Bid, the City has determined this Contract shall be awarded to Contractor; and

WHEREAS, Contractor is prepared to perform this Contract in accordance with all the terms and conditions as set forth below, as the City does hereinafter require.

NOW, THEREFORE, in consideration of these mutual promises and the terms and conditions set forth herein, the parties agree as follows:

AGREEMENT

Section 1. Contract Documents

This Contract includes and incorporates by reference all of the foregoing Recitals, all of the following additional "Contract Documents," and any and all terms and conditions set forth in such Contract Documents for the Merryfield and Boones Ferry Trail Project dated March 6, 2024, including Plans and Details bound separately; Contractor's Bid submitted in response thereto; 2017 City of Wilsonville Public Works Standards; City of Wilsonville Special Provisions; Project Specific Special Provisions; Oregon Department of Transportation 2021 Oregon Standard Specifications for Construction; Special Provisions to ODOT Standards; 2010 ADA Standards for Accessible Design, as amended; 2004 Americans with Disabilities Act Accessibility Guidelines ("ADAAG"), as amended and the provisions of Oregon Revised Statutes (ORS) 279C, as more particularly set forth in this Contract. Contractor must be familiar with all of the foregoing and comply with them. Any conflict or inconsistency between the Contract Documents shall be called to the attention of the City by Contractor before proceeding with affected work. All Contract Documents should be read in concert and Contractor is required to bring any perceived inconsistencies to the attention of the City before executing this Contract. In the event a provision of this Contract conflicts with standards or requirements contained in any of the foregoing Contract Documents, the provision that is more favorable to the City, as determined by the City, will apply.

Section 2. Scope of Work

Contractor will perform the installation services of trail work, as more particularly described herein and in the other Contract Documents for the Project (the "Work"). Contractor shall diligently perform the Work according to the requirements and deliverable dates identified in the Scope of Work and Contract Documents.

Section 3. Term

The term of this Contract shall be from the Effective Date until all Work required to be performed hereunder is completed and accepted, or no later than June 25, 2024 for Boones Ferry Park Trail and December 15, 2024, for Park at Merryfield, whichever occurs first, unless earlier terminated in accordance herewith or an extension of time is agreed to, in writing, by the City. All Work must be at Final Completion by no later than December 15, 2024. See **Section 24** for the definition of Final Completion.

Section 4. Contractor's Work

4.1. All written documents, drawings, and plans submitted by Contractor in conjunction with the Work shall bear the signature, stamp, or initials of Contractor's authorized Project Manager. Any documents submitted by Contractor that do not bear the signature, stamp, or initials of Contractor's authorized Project Manager, will not be relied upon by the City. Interpretation of plans and answers to questions regarding the Work given by Contractor's Project Manager may be verbal or in writing, and may be relied upon by the City, whether given verbally or in writing. If requested by the City to be in writing, Contractor's Project Manager will provide such written documentation.

4.2. The existence of this Contract between the City and Contractor shall not be construed as the City's promise or assurance that Contractor will be retained for future services beyond the Work described herein.

4.3. Contractor shall maintain the confidentiality of any confidential information that is exempt from disclosure under state or federal law to which Contractor may have access by reason of this Contract. Contractor warrants that Contractor's employees assigned to perform any of the Work provided in this Contract shall be clearly instructed to maintain this confidentiality. All agreements with respect to confidentiality shall survive the termination or expiration of this Contract.

Section 5. Contract Sum and Payment

5.1. Except as otherwise set forth in this **Section 5**, the City agrees to pay Contractor the not-to-exceed amount of TWO HUNDRED FIFTY-TWO THOUSAND EIGHT HUNDRED THIRTY-ONE DOLLARS ($252,831.00), based on the unit pricing described in the Contract Documents, for performance of the Work ("Contract Sum"). Any compensation in excess of the Contract Sum will require an express written Change Order between the City and Contractor. Contractor's unit pricing is set forth in **Exhibit A**, attached hereto and incorporated by reference herein.

5.2. During the course of Contractor's performance, if the City, through its Project Manager, specifically requests Contractor to provide additional services beyond the Scope of Work described in the Contract Documents, Contractor shall provide such additional services and bill the City a reasonable agreed upon fee, pursuant to a written Change Order, executed in compliance with the provisions of **Section 25**.

5.3. Contractor will be paid for Work for which an itemized invoice is received by the City within thirty (30) days of receipt, unless the City disputes such invoice, less a five percent (5%) withholding for retainage. Retainage shall be as outlined in the Contract Documents and as specified under ORS 279C.550 to 279C.570. If the City disputes an invoice, the undisputed portion of the invoice will be paid by the City within the above timeframe, less the retainage. The City will set forth its reasons for the disputed claim amount and make good faith efforts to resolve the invoice dispute with Contractor as promptly as is reasonably possible.

5.4. The City will be responsible for the direct payment of required fees payable to governmental agencies, including but not limited to plan checking, land use, zoning, permitting, and all other similar fees resulting from this Project that are not specifically otherwise provided for in the Contract Documents.

5.5 Contractor's unit prices and Contract Sum are all inclusive and include, but are not limited to, all work-related costs, expenses, salaries or wages, plus fringe benefits and contributions, including payroll taxes, workers compensation insurance, liability insurance, profit, pension benefits, and all other contributions and benefits, office expenses, travel expenses, mileage, and all other indirect and overhead charges, including, but not limited to, the Oregon Corporate Activity Tax (CAT).

5.6. Contract provisions regarding payment policies, progress payments, interest, etc. are as outlined in the Contract Documents and in ORS 279C.570.

Section 6. Prevailing Wages

This is a Contract for a Public Works Project, subject to ORS 279C.800 to 279C.870. Therefore, not less than the current applicable state prevailing wage must be paid on this Project. Wage rates for this Project are those published by the Oregon Bureau of Labor and Industries (BOLI), entitled "Prevailing Wage Rates for Public Works Contracts," effective January 5, 2024, and all subsequent amendments. The BOLI prevailing wage rate for public works contracts can be found at the following website: http://www.oregon.gov/boli/employers/pages/prevailing-wage-rates.aspx. Because this is a public works contract subject to payment of prevailing wages, each worker in each trade or occupation employed in the performance of the Work, either by Contractor, a subcontractor, or other person doing or contracting to do, or contracting for the whole or any part of the Work, must be paid not less than the applicable state prevailing wage for an hour's work in the same trade or occupation in the locality where such labor is performed, in accordance with ORS 279C.838 and 279C.840, if applicable. Contractor must comply with all public contracting wages required by law. If applicable, Contractor and any subcontractor, or their sureties, shall file a certificate of rate of wage as required by ORS 279C.845. If the City determines at any time that the prevailing rate of wages has not been or is not being paid as required herein, it may retain from the moneys due to Contractor an amount sufficient to make up the difference between the wages actually paid and the prevailing rate of wages, and may also cancel the Contract for breach. Contractor shall be liable to the workers affected for failure to pay the required rate of wage, including all fringe benefits under ORS 279C.840(5). If applicable, Contractor must include a

contract provision in compliance with this paragraph in every subcontract and shall require each subcontractor to include it in subcontract(s).

See **Contractor's Responsibilities** below and other Contract Documents for additional requirements and responsibilities regarding compliance with wage and hour laws and regulations.

Section 7. Filing of Certified Statement

As required in ORS 279C.845(7), the City will retain twenty-five percent (25%) of any amount earned by Contractor under the Contract until Contractor has filed the certified statements required in ORS 279C.845(1). The City will pay to Contractor the amount withheld within fourteen (14) days after Contractor files the required certified statements. As required in ORS 279C.845(8), Contractor shall retain twenty-five percent (25%) of any amount earned by a first-tier subcontractor on the Project until the first-tier subcontractor has filed with the City the certified statements required in ORS 279C.845(1). Before paying any amount withheld, Contractor shall verify that the first-tier subcontractor has filed the certified statement. Within fourteen (14) days after the first-tier subcontractor files the required certified statement, Contractor shall pay the first-tier subcontractor any amount withheld. Contractor shall require all other sub-subcontractors to file certified statements regarding payment of prevailing wage rates with the City.

Section 8. Reports to Department of Revenue

When a public contract is awarded to a nonresident bidder and the contract sum exceeds Ten Thousand Dollars ($10,000), Contractor shall promptly report to the Department of Revenue, on forms to be provided by the Department, the total contract sum, terms of payment, length of contract, and such other information as the Department may require, before the City will make final payment on the Contract.

Section 9. City's Rights and Responsibilities

9.1. The City will designate a Project Manager to facilitate day-to-day communication between Contractor and the City, including timely receipt and processing of invoices, requests for information, and general coordination of City staff to support the Project.

9.2. If applicable, the City will pay the required Bureau of Labor and Industries fee of one/tenth of one percent (0.1%) of the Contract Sum, or as required by statute.

9.3. The City reserves the right to reject any bid or to refuse delivery of materials or services at or from any manufacturer, supplier, or contractor with which the City has reasonable grounds to believe is or may be operating in violation of any local, state, or federal law or which is the subject of pending litigation.

9.4. If Contractor fails, neglects, or refuses to make prompt payment of any claim for labor or services furnished to Contractor or a subcontractor by any person in connection with the Contract as such claim becomes due, the City may, but shall not be obligated to, pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due Contractor by reason of the Contract. The payment of a claim in the manner authorized hereby shall not relieve Contractor or its surety from the obligation with respect to any unpaid claim. If the City is unable to determine the validity of any claim for labor or services furnished, the City may withhold from

any current payment due Contractor an amount equal to said claim until its validity is determined, and the claim, if valid, is paid by Contractor or the City. There shall be no final acceptance of the Work under the Contract until all such claims have been resolved.

9.5. Award of this Contract is subject to budget appropriation. Funds are approved for Fiscal Year 2023-24. If not completed within this fiscal year, funds may not be appropriated for the next fiscal year. The City also reserves the right to terminate this Contract early, as described in **Section 22**.

Section 10. City's Project Manager

The City's Project Manager is Dustin Schull. The City shall give Contractor prompt written notice of any re-designation of its Project Manager.

Section 11. Contractor's Project Manager

Contractor's Project Manager is Trey Renoud. In the event that Contractor's Project Manager is changed, Contractor shall give the City prompt written notification of such re-designation. Recognizing the need for consistency and knowledge in the administration of the Project, Contractor's Project Manager will not be changed without the written consent of the City, which consent shall not be unreasonably withheld. In the event the City receives any communication from Contractor that is not from Contractor's Project Manager, the City may request verification by Contractor's Project Manager, which verification must be promptly furnished.

Section 12. Project Information

Except for confidential information designated by the City as information not to be shared, Contractor agrees to share Project information with, and to fully cooperate with, those corporations, firms, contractors, public utilities, governmental entities, and persons involved in the Project. No information, news, or press releases related to the Project, whether made to representatives of newspapers, magazines, or television and radio stations, shall be made without the written authorization of the City's Project Manager.

Section 13. Duty to Inform

If at any time during the performance of this Contract, Contractor becomes aware of actual or potential problems, faults, environmental concerns, or defects in the Project, Contract Documents, or Work, or any portion thereof; or of any nonconformance with federal, state, or local laws, rules, or regulations; or if Contractor has any objection to any decision or order made by the City with respect to such laws, rules, or regulations, Contractor shall give prompt written notice thereof to the City's Project Manager. Any delay or failure on the part of the City to provide a written response to Contractor shall neither constitute agreement with nor acquiescence to Contractor's statement or claim, nor constitute a waiver of any of the City's rights.

Section 14. Subcontractors and Assignments

14.1. Contractor shall not assign any of Contractor's rights acquired hereunder without obtaining prior written approval from the City. Some Work may be performed by persons other than Contractor, provided Contractor advises the City of the names of such subcontractors and the services

which they intend to provide, and the City specifically agrees, in writing, to such subcontracting. The City hereby agrees that Contractor will contract with **Schurter Trucking LLC**, **Roy L. Houck Construction Co**., and **Recorp, LLC.** to provide its trucking, asphalt paving, and construction staking services, which is a critical part of this Contract. Contractor acknowledges such services will be provided to the City pursuant to a subcontract(s) between Contractor and subcontractor(s) and no privity of contract exists between the City and the subcontractor(s). Unless otherwise specifically provided by this Contract, the City incurs no liability to third persons for payment of any compensation provided herein to Contractor. Any attempted assignment of this Contract without the written consent of the City shall be void. Except as otherwise specifically agreed, all costs for services performed by others on behalf of Contractor shall not be subject to additional reimbursement by the City.

14.2. The City shall have the right to enter into other agreements for the Project, to be coordinated with this Contract. Contractor shall cooperate with the City and other firms, engineers, or subcontractors on the Project so that all portions of the Project may be completed in the least possible time and within normal working hours. Contractor shall furnish other engineers, subcontractors, and affected public utilities, whose designs are fitted into Contractor's design, detail drawings giving full information so that conflicts can be avoided.

Section 15. Contractor's Responsibilities

This Contract is a public works contract governed by the laws found at ORS Chapter 279C, which Contractor must be familiar with and adhere to. Those required provisions include but are not limited to all of the following:

15.1. Except as otherwise provided under ORS 30.265, the performance under this Contract is at Contractor's sole risk. All damages or loss to Work, equipment, or materials incurred during the performance of the Work shall be at Contractor's sole risk. Any injury to persons or property incurred during the performance of the Work shall be at Contractor's sole risk. The service or services to be rendered under the Contract are those of an independent contractor who is not an officer, employee, or agent of the City, as those terms are used in ORS 30.265. Notwithstanding the Oregon Tort Claims Act or provisions of any other contract, Contractor is acting as and assumes liability of an independent contractor as to claims between the City and Contractor. Contractor is solely liable for any workers compensation coverage, social security, unemployment insurance or retirement payments, and federal or state taxes due as a result of payments under the Contract. Any subcontractor hired by Contractor shall be similarly responsible. Contractor shall be liable to the City for any failure of any subcontractor(s) to comply with the terms of the Contract.

15.2. Contractor is an independent contractor for all purposes and shall be entitled to no compensation other than the Contract Sum provided for under **Section 5** of this Contract. Contractor will be solely responsible for determining the manner and means of accomplishing the end result of Contractor's Work. The City does not have the right to control or interfere with the manner or method of accomplishing said Work. The City, however, will have the right to specify and control the results of Contractor's Work so such Work meets the requirements of the Project.

15.3. The City understands and agrees that Contractor has requested that some Work be performed on the Project by persons or firms other than Contractor, through a subcontract with Contractor. Contractor acknowledges that if such Work is provided to the City pursuant to a subcontract(s) between Contractor and those who provide such services, Contractor may not utilize any

subcontractor(s), or in any way assign its responsibility under this Contract, without first obtaining the express written consent of the City. In all cases, processing and payment of billings from subcontractors is solely the responsibility of Contractor. References to "subcontractor" in this Contract mean a subcontractor at any tier.

15.4. Contractor shall be responsible for, and defend, indemnify, and hold the City harmless against, any liability, cost, or damage arising out of Contractor's use of such subcontractor(s) and subcontractor's negligent acts, errors, or omissions. Unless otherwise agreed to, in writing, by the City, Contractor shall require that all of Contractor's subcontractors also comply with, and be subject to, the provisions of this **Section 15** and meet the same insurance requirements of Contractor under this Contract.

15.5. Contractor must make prompt payment for any claims for labor, materials, or services furnished to Contractor by any person in connection with this Contract as such claims become due. Contractor shall not permit any liens or claims to be filed or prosecuted against the City on account of any labor or material furnished to or on behalf of Contractor. If Contractor fails, neglects, or refuses to make prompt payment of any such claim, the City may pay such claim to the person furnishing the labor, materials, or services, and offset the amount of the payment against funds due, or to become due, to Contractor under this Contract. The City may also recover any such amounts directly from Contractor.

15.6. Contractor must comply with all Oregon and federal wage and hour laws, including BOLI wage requirements, if applicable. Contractor shall make all required workers compensation and medical care payments on time. Contractor shall be fully responsible for payment of all employee withholdings required by law, including but not limited to taxes, including payroll, income, Social Security (FICA), and Medicaid. Contractor shall also be fully responsible for payment of salaries, benefits, taxes, and all other charges due on account of any employees. Contractor shall pay all contributions or amounts due the Industrial Accident Fund from Contractor or subcontractor incurred in the performance of this Contract. Contractor shall pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167. All costs incident to the hiring of subcontractors or employees shall be Contractor's responsibility. Contractor shall defend, indemnify, and hold the City harmless from claims for payment of all such expenses.

15.7. No person shall be discriminated against by Contractor or any subcontractor in the performance of this Contract on the basis of sex, gender, race, color, creed, religion, marital status, age, disability, sexual orientation, gender identity, or national origin. Any violation of this provision shall be grounds for cancellation, termination, or suspension of the Contract, in whole or in part, by the City. Contractor shall comply with all federal, state, and local laws, regulations, executive orders, and ordinances applicable to the Contract or to the implementation of the Project. Without limiting the generality of the foregoing, Contractor expressly agrees to comply with the following laws, regulations, and executive orders to the extent they are applicable to the Contract or the implementation of the Project: (a) all applicable requirements of state civil rights and rehabilitation statutes, rules, and regulations; (b) Titles VI and VII of the Civil Rights Act of 1964, as amended; (c) Sections 503 and 504 of the Rehabilitation Act of 1973, as amended; (d) the Americans with Disabilities Act of 1990, as amended, and ORS 659A.142; (e) Executive Order 11246, as amended; (f) the Health Insurance Portability and Accountability Act of 1996; (g) the Age Discrimination in Employment Act of 1967, as amended, and the Age Discrimination Act of 1975, as amended; (h) the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended; (i) all regulations and administrative rules established pursuant to

the foregoing laws; and (j) all other applicable requirements of federal civil rights and rehabilitation statutes, rules, and regulations.

15.8. Contractor certifies that Contractor has not discriminated against minority, women, or small business enterprises in obtaining any subcontract.

15.9. Pursuant with ORS 279C.505(2), by execution of this Contract, Contractor agrees to have an employee drug testing program in place at the time of executing the Contract, acknowledges that such a program will be maintained throughout the Contract period, including any extensions, and shall demonstrate to the City that such drug testing program is in place. The failure of Contractor to have, or to maintain, such a drug-testing program is grounds for immediate termination of the Contract. Contractor shall require each subcontractor providing labor for the Project to also comply with this drug testing program requirement.

15.10. Contractor agrees that the City shall not be liable, either directly or indirectly, in any dispute arising out of the substance or procedure of Contractor's drug testing program. Nothing in this drug testing provision shall be construed as requiring Contractor to violate any legal, including constitutional, rights of any employee, including but not limited to selection of which employees to test and the manner of such testing. The City shall not be liable for Contractor's negligence in establishing or implementing, or failure to establish or implement, a drug testing policy or for any damage or injury caused by Contractor's employees acting under the influence of drugs while performing Work covered by the Contract. These are Contractor's sole responsibilities, and nothing in this provision is intended to create any third party beneficiary rights against the City.

15.11. Contractor is solely responsible for ensuring that any subcontractor selection and substitution is in accordance with all legal requirements. The City shall not be liable, either directly or indirectly, in any dispute arising out of Contractor's actions with regard to subcontractor selection and/or substitution.

15.12. Contractor shall make payment promptly, as due, to all parties supplying to such Contractor labor or material for the prosecution of the Work provided for in the Contract Documents, and shall be responsible for payment to such persons supplying labor or material to any subcontractor.

15.13. By execution of this Contract, as required by ORS 305.385(6), Contractor certifies under penalty of perjury that to the best of Contractor's knowledge, Contractor is not in violation of any tax laws described in ORS 305.380(4).

15.14. Contractor agrees that if Contractor or a first-tier subcontractor fails, neglects, or refuses to make payment to a person furnishing labor or materials in connection with this Contract within thirty (30) days after receiving payment from the City or a contractor, Contractor or the first-tier subcontractor shall owe the person the amount due plus interest charges commencing at the end of the ten (10) day period within which payment is due under ORS 279C.580(3)(a) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest on the amount due shall be calculated in accordance with ORS 279C.515(2). The amount of interest may not be waived.

15.15. Contractor agrees that if Contractor or a subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with this Contract, the person may file

a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580.

15.16. Contractor shall make payment promptly, as due, to any party furnishing medical, surgical, hospital, or other needed care and attention, incident to sickness or injury, to the employees of Contractor, of all sums which Contractor agreed to pay or collected or deducted from the wages of employees pursuant to any law, contract, or agreement for the purpose of providing payment for such service.

15.17. Contractor and all subcontractors shall comply with the provisions of ORS 279C.540 pertaining to maximum hours, holidays, and overtime. With certain exceptions listed below, Contractor shall not require or permit any person to work more than ten (10) hours in any one (1) day, or forty (40) hours in any one (1) week, except in case of necessity, emergency, or where public policy requires it, and in such cases the person shall be paid at least time and a half for:

15.17.1. All overtime in excess of eight (8) hours in any one (1) day or forty (40) hours in any one (1) week when the work week is five (5) consecutive days, Monday through Friday; or

15.17.2. All overtime in excess of ten (10) hours in any one (1) day or forty (40) hours in any one (1) week when the work week is four (4) consecutive days, Monday through Friday; and

15.17.3. All work performed on the days specified in ORS 279C.540(1)(b) for public improvement contracts.

15.18. Contractor and all subcontractors shall comply with the provisions of ORS 279C.545 pertaining to time limitation on claims for overtime and requirements for posting circulars containing said provisions.

15.19. For personal/professional service contracts, as designated under ORS 279A.055, instead of 15.17.1, 15.17.2, and 15.17.3 above, a laborer shall be paid at least time and a half for all overtime worked in excess of forty (40) hours in any one (1) week, except for individuals under these contracts who are excluded under ORS 653.010 to 653.261 or under 29 USC §§ 201 to 209 from receiving overtime.

15.20. Contractor shall follow all other exceptions, pursuant to ORS 279B.235 (for non-public improvement contracts) and ORS 279C.540 (for public improvement contracts), including contracts involving a collective bargaining agreement, contracts for services, and contracts for fire prevention or suppression.

15.21. Contractor must give notice to employees who work on a public contract, in writing, either at the time of hire or before commencement of Work on the Contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that the employees may be required to work.

15.22. The hourly rate of wage to be paid by any Contractor or subcontractor to employed workers or other persons doing or contracting to do all or part of the work contemplated by a public contract shall be not less than the applicable wage required by law.

15.23. Contractor, its subcontractors, and all employers working under the Contract are subject employers under the Oregon Workers Compensation Law and shall comply with ORS 656.017 and provide the required workers compensation coverage, unless otherwise exempt under ORS 656.126. Contractor shall ensure that each of its subcontractors complies with these requirements.

15.24. In the performance of this Contract, Contractor shall comply with all applicable federal, state, and local laws, municipal codes, regulations, rules, and ordinances, including but not limited to those dealing with public contracts (ORS Chapter 279C) and with the prevention of environmental pollution and the preservation of natural resources (and avoidance of natural resource damages) in the performance of the Contract, including but not limited to ORS 279C.525. To the extent that known environmental and natural resource risks are specifically noted, shown, or specified in the Contract Documents or on the construction drawings, such risks are allocated to Contractor pursuant with ORS 279C.525(8)(a). If new or amended statutes, ordinances, rules, or regulations are adopted, or Contractor encounters a condition not referred to in this Contract, not caused by Contractor, and that was not discoverable by reasonable site inspection which requires compliance with federal, state, or local laws, codes, or regulations dealing with the preservation of the environment, both the City and Contractor shall have all the rights and obligations set forth in ORS 279C.525.

15.25. Contractor shall be liable for any fine imposed against Contractor, the City or the 'Project' as a result of a violation of any laws or permitting requirements by Contractor or any of its subcontractors or their sub-subcontractors or any suppliers.

15.26. Pursuant to ORS 279B.055, Contractor shall use recyclable products to the maximum extent economically feasible, and in full conformance with the Contract Document Specifications, in the performance of the Work.

15.27. Contractor must maintain a City of Wilsonville or Metro business license at all times while performing Work under this Contract.

15.28. Contractor must maintain and provide proof of a statutory public works bond throughout the term of this Contract.

Section 16. Subcontractor Requirements

16.1. If subcontractors are permitted, Contractor's relations with subcontractors shall comply with ORS 279C.580. Pursuant with ORS 279C.580(3), each subcontract for property or services that Contractor enters into with a first-tier subcontractor, including a material supplier, for the purpose of performing a construction contract, shall include:

16.1.1. A payment clause that obligates Contractor to pay the first-tier subcontractor for satisfactory performance under the subcontract within ten (10) days out of such amounts as are paid to Contractor by the City under the public improvement contract; and

16.1.2. An interest penalty clause that obligates Contractor, if payment is not made within 30 days after receipt of payment from the City, to pay to the first-tier subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause outlined in **Subsection 16.1.1** above. A contractor or first-tier subcontractor may not be obligated to pay an interest penalty if the only reason that the contractor or first-tier subcontractor did not make payment when payment was due is that the contractor or first-tier subcontractor did not receive payment from the City or Contractor when payment was due. The interest penalty period shall begin on the day after the required payment date and end on the date on which payment of the amount due is made and shall be computed at the rate specified in ORS 279C.515(2).

16.2. Contractor shall include in each subcontract, as a condition of performance of such contract, a provision requiring the first-tier subcontractor to include a payment clause and interest penalty clause, conforming to the standards set forth in **Subsections 16.1.1 and 16.1.2** above, in each of its subcontracts and requiring that the same clauses be included in any of the first-tier subcontractors' subcontracts with a lower-tier subcontractor or supplier.

16.3. Contractor shall certify that all subcontractors, as described in ORS 701.005(2), will be registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.035 or 701.026, respectively, before the subcontractors commence Work under the Contract.

16.4. In no event shall any subcontract be awarded to any person or entity debarred, suspended, or disqualified from federal, state, or municipal contracting.

16.5. Contractor shall include this Contract by reference in any subcontract and require subcontractors to perform in strict compliance with this Contract.

Section 17. Environmental Laws

17.1. Although the City is not aware of any of the following, before beginning construction, Contractor shall determine if there is any asbestos, lead paint, or other hazardous materials that will be removed or disturbed as a part of the Project. If disturbance or removal is required, Contractor will advise the City, in writing, and will provide the City with a detailed written supplemental Scope of Work concerning how such disturbance or removal will be accomplished and how materials, if any, will be disposed of, all in accordance with State and Federal environmental laws. Work required due to the finding of any such hazardous materials will require a written Change Order.

17.2. Contractor shall perform all Work in compliance with permits for the Project issued by the US Army Corp of Engineers, Oregon Department of State Lands, and Oregon Department of Environmental Quality, and shall maintain a copy of these permits on the job site at all times.

17.3. In compliance with the provisions of ORS 279C.525, the following is a list of federal, state, and local agencies, of which the City has knowledge, that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that may affect the performance of the Contract:

FEDERAL AGENCIES:	Agriculture, Department of
Forest Service	Soil Conservation Service
Defense, Department of	Army Corps of Engineers
Environmental Protection Agency	Interior, Department of
Bureau of Sport Fisheries and Wildlife	Bureau of Outdoor Recreation
Bureau of Land Management	Bureau of Indian Affairs
Bureau of Reclamation	Labor, Department of
Occupational Safety and Health Administration	Transportation, Department of
Coast Guard	Federal Highway Administration
STATE AGENCIES:	Agriculture, Department of
Environmental Quality, Department of	Fish and Wildlife, Department of
Forestry, Department of	Geology and Mineral Industries, Department of
Human Resources, Department of	Land Conservation and Development Commission
Soil and Water Conservation Commission	National Marine Fisheries Service (NMFS)
State Land Board	State Engineer
	Water Resources Board
LOCAL AGENCIES:	City Council
County Courts	County Commissioners, Board of
Port Districts	Metropolitan Service Districts
County Service Districts	Sanitary Districts
Water Districts	Fire Protection Districts

This list may not be all-inclusive, and it is the responsibility of Contractor to know all applicable laws and to comply with them in the performance of this Contract.

17.4. Pursuant with ORS 279C.510(1), if this Contract calls for demolition work, Contractor shall salvage or recycle construction and demolition debris, if feasible and cost-effective.

17.5. Pursuant with ORS 279C.510(2), if this Contract calls for lawn or landscape maintenance, Contractor shall compost or mulch yard waste material at an approved site, if feasible and cost-effective.

17.6. Contractor shall be responsible for the immediate clean-up, remediation, reporting, and payment of fines, if any, related to the release of any hazardous substance or material by Contractor or any subcontractor.

Section 18. Indemnity

18.1. Indemnification. Contractor acknowledges responsibility for liability arising out of the performance of this Contract, and shall defend, indemnify, and hold the City harmless from any and all liability, settlements, loss, costs, and expenses in connection with any action, suit, or claim resulting or allegedly resulting from Contractor's negligent acts, omissions, errors, or willful or reckless misconduct pursuant to this Contract, or from Contractor's failure to perform its responsibilities as set forth in this

Contract. The review, approval, or acceptance by the City, its Project Manager, or any City employee of documents or other work performed, prepared, or submitted by Contractor shall not be considered a negligent act, error, omission, or willful misconduct on the part of the City, and none of the foregoing shall relieve Contractor of its responsibility to perform in full conformity with the City's requirements, as set forth in this Contract, and to indemnify the City as provided above and to reimburse the City for any and all costs and damages suffered by the City as a result of Contractor's negligent performance of this Contract, failure of performance hereunder, violation of state or federal laws, or failure to adhere to the standards of performance and care described in **Subsection 18.2**. Contractor shall defend the City (using legal counsel reasonably acceptable to the City) against any claim that alleges negligent acts, omissions, errors, or willful or reckless misconduct by Contractor. As used herein, the term "Contractor" applies to Contractor and its own agents, employees, and suppliers, and to all of Contractor's subcontractors, including their agents, employees, and suppliers.

18.2. Standard of Care. In the performance of the Work, Contractor agrees to use at least that degree of care and skill exercised under similar circumstances by reputable members of Contractor's profession practicing in the Portland metropolitan area. Contractor will re-perform any Work not meeting this standard without additional compensation. Contractor's re-performance of any Work, even if done at the City's request, shall not be considered as a limitation or waiver by the City of any other remedies or claims it may have arising out of Contractor's failure to perform in accordance with the applicable standard of care of this Contract and within the prescribed timeframe.

Section 19. Insurance

19.1. Insurance Requirements. Contractor must maintain insurance coverage acceptable to the City in full force and effect throughout the term of this Contract. Such insurance shall cover all risks arising directly or indirectly out of Contractor's activities or Work hereunder. Any and all agents or subcontractors with which Contractor contracts for any portion of the Work must have insurance that conforms to the insurance requirements in this Contract. Additionally, if a subcontractor is an engineer, architect, or other professional, Contractor must require the subcontractor to carry Professional Errors and Omissions insurance and must provide to the City proof of such coverage. The amount of insurance carried is in no way a limitation on Contractor's liability hereunder. The policy or policies maintained by Contractor shall provide at least the following minimum limits and coverages at all times during performance of this Contract:

19.1.1. Commercial General Liability Insurance. Contractor and all subcontractors shall obtain, at each of their own expense, and keep in effect during the term of this Contract, comprehensive Commercial General Liability Insurance covering Bodily Injury and Property Damage, written on an "occurrence" form policy. This coverage shall include broad form Contractual Liability insurance for the indemnities provided under this Contract and shall be for the following minimum insurance coverage amounts: The coverage shall be in the amount of **$2,000,000** for each occurrence and **$3,000,000** general aggregate and shall include Products-Completed Operations Aggregate in the minimum amount of **$2,000,000** per occurrence, Fire Damage (any one fire) in the minimum amount of **$50,000**, and Medical Expense (any one person) in the minimum amount of **$10,000**. All of the foregoing coverages must be carried and maintained at all times during this Contract.

19.1.2. Business Automobile Liability Insurance. If Contractor or any subcontractors will be using a motor vehicle in the performance of the Work herein, Contractor shall provide

the City a certificate indicating that Contractor and its subcontractors have business automobile liability coverage for all owned, hired, and non-owned vehicles. The Combined Single Limit per occurrence shall not be less than **$2,000,000**.

19.1.3. Pollution Liability Coverage. Contractor shall carry sudden and accidental and gradual release pollution liability coverage that will cover, among other things, any spillage of paints, fuels, oils, lubricants, de-icing, anti-freeze or other hazardous materials, or disturbance of any hazardous materials, as that term is defined under Oregon law, during the performance of this Contract. Contractor will be fully responsible for the cost of any clean-up of any released materials or disturbance, in accordance with Oregon Department of Environmental Quality ("DEQ") and Federal Environmental Protection Agency ("EPA") clean-up requirements. The coverage shall be in the amount of **$2,000,000** for each occurrence and **$2,000,000** general aggregate.

19.1.4. Workers Compensation Insurance. Contractor, its subcontractors, and all employers providing work, labor, or materials under this Contract that are subject employers under the Oregon Workers Compensation Law shall comply with ORS 656.017, which requires them to provide workers compensation coverage that satisfies Oregon law for all their subject workers under ORS 656.126. Out-of-state employers must provide Oregon workers compensation coverage for their workers who work at a single location within Oregon for more than thirty (30) days in a calendar year. Contractors who perform work without the assistance or labor of any employee need not obtain such coverage. This shall include Employer's Liability Insurance with coverage limits of not less than **$500,000** each accident.

19.1.5. Insurance Carrier Rating. Coverages provided by Contractor and its subcontractors must be underwritten by an insurance company deemed acceptable by the City, with an AM Best Rating of A or better. The City reserves the right to reject all or any insurance carrier(s) with a financial rating that is unacceptable to the City.

19.1.6. Additional Insured and Termination Endorsements. The City will be named as an additional insured with respect to Contractor's liabilities hereunder in insurance coverages. Additional Insured coverage under Contractor's Commercial General Liability, Automobile Liability, Pollution Liability, and Excess Liability Policies, as applicable, will be provided by endorsement. Additional insured coverage shall be for both ongoing operations via ISO Form CG 2010 or its equivalent, and products and completed operations via ISO Form CG 2037 or its equivalent. Coverage shall be Primary and Non-Contributory. Waiver of Subrogation endorsement via ISO Form CG 2404 or its equivalent shall be provided. The following is included as additional insured: "The City of Wilsonville, its elected and appointed officials, officers, agents, employees, and volunteers." An endorsement shall also be provided requiring the insurance carrier to give the City at least thirty (30) days' written notification of any termination or major modification of the insurance policies required hereunder. Contractor must be an additional insured on the insurance policies obtained by its subcontractors performing any of the Work contemplated under this Contract.

19.1.7. Certificates of Insurance. As evidence of the insurance coverage required by this Contract, Contractor shall furnish a Certificate of Insurance to the City. This Contract shall not be effective until the required certificates and the Additional Insured Endorsements have been received and approved by the City. Contractor agrees that it will not terminate or change its

coverage during the term of this Contract without giving the City at least thirty (30) days' prior advance notice and Contractor will obtain an endorsement from its insurance carrier, in favor of the City, requiring the carrier to notify the City of any termination or change in insurance coverage, as provided above.

19.2. Primary Coverage. The coverage provided by these policies shall be primary, and any other insurance carried by the City is excess. Contractor shall be responsible for any deductible amounts payable under all policies of insurance. If insurance policies are "Claims Made" policies, Contractor will be required to maintain such policies in full force and effect throughout any warranty period.

Section 20. Bonding Requirements

20.1. Payment and Performance Bonds. Contractor shall obtain a Payment Bond and a Performance Bond, each in a form acceptable to the City and from a surety acceptable to the City, and each in the full amount of the Contract Sum.

20.2. Maintenance/Warranty Bond. Contractor shall maintain a two (2) year Maintenance/Warranty Bond, in a form acceptable to the City and from a surety acceptable to the City, in the amount of ten percent (10%) of the Contract Sum.

20.3. Public Works Bond. Pursuant to ORS 279C.830(2), in addition to the Payment and Performance bonds, before starting work on this Contract or any subcontract hereunder, Contractor and all subcontractors, unless exempt under ORS 279C.836(4), (7), (8), or (9), must have on file with the Construction Contractors Board a public works bond with a corporate surety authorized to do business in the State of Oregon in the minimum amount of **$30,000**. The bond must provide that the Contractor or subcontractor will pay claims ordered by the Bureau of Labor and Industries to workers performing labor upon public works projects. The bond must be a continuing obligation, and the surety's liability for the aggregate of claims that may be payable from the bond may not exceed the penal sum of the bond. The bond must remain in effect continuously until depleted by claims paid under ORS 279C.836, unless the surety sooner cancels the bond. Contractor further certifies that Contractor will include in every subcontract a provision requiring a subcontractor to have a public works bond filed with the Construction Contractors Board before starting work on the Project, unless exempt under ORS 279C.836(4), (7), (8), or (9).

20.4. Bond Claims. Any notice of claim on a payment or performance bond or public works bond shall comply with the requirements of ORS 279C.605.

Section 21. Warranty

21.1. In addition to, and not in lieu of, any other warranties provided by various manufacturers and suppliers, Contractor fully warrants all Work and materials for a period of two (2) years from the date of Final Acceptance of the Work and shall make all necessary repairs and replacements to remedy, in a manner satisfactory to the City's Project Manager and at no cost to the City, any and all defects, breaks, or failures of the Work or materials occurring within two (2) years following the date of completion due to faulty or inadequate materials or workmanship. Repair of damage or disturbances to other improvements under, within, or adjacent to the Work, whether or not caused by settling, washing, or slipping, when such damage or disturbance is caused, in whole or in part, from activities of Contractor in performing Contractor's duties and obligations under this Contract, is also covered by the warranty

when such defects or damage occur within the warranty period. The two (2) year warranty period shall, with relation to such required repair, be extended two (2) years from the date of completion of such repair.

21.2. If Contractor, after written notice, fails within **ten (10) days** to proceed to comply with the terms of this Section, the City may have the defects corrected, and Contractor and Contractor's surety shall be liable for all expense incurred. In case of an emergency where, in the opinion of the City's Project Manager, delay would cause serious loss or damage, repairs may be made without notice being given to Contractor, and Contractor or Contractor's surety shall pay the cost of repairs. Failure of the City's Project Manager to act in case of an emergency shall not relieve Contractor or Contractor's surety from liability and payment of all such costs.

21.3. Current State Law (ORS 12.135) provides for a ten (10) year period, from the time of substantial completion, as defined in ORS 12.135(4)(b), for the City to file a claim for repairs of defective Work due to Contractor's improper use of materials and/or workmanship, and Contractor agrees it is bound thereby.

Section 22. Early Termination; Default

22.1. This Contract may be terminated prior to the expiration of the agreed upon terms:

22.1.1. By mutual written consent of the parties;

22.1.2. By the City, for any reason, and within its sole discretion, effective upon delivery of written notice to Contractor by mail or in person. The City retains the right to elect whether or not to proceed with actual construction of the Project; or

22.1.3. By the City if Contractor breaches this Contract and fails to cure the breach within ten (10) days of receipt of written notice of the breach from the City.

22.2. If the City terminates this Contract in whole or in part, due to default or failure of Contractor to perform Work in accordance with the Contract, the City may procure, upon reasonable terms and in a reasonable manner, services similar to those so terminated. In addition to any other remedies the City may have, both at law and in equity, for breach of contract, Contractor shall be liable for all costs and damages incurred by the City as a result of the default by Contractor, including, but not limited to all costs incurred by the City in procuring services from others as needed to complete this Contract. This Contract shall be in full force to the extent not terminated by written notice from the City to Contractor. In the event of a default, the City will provide Contractor with written notice of the default and a period of ten (10) days to cure the default. If Contractor notifies the City that it wishes to cure the default but cannot, in good faith, do so within the ten (10) day cure period provided, then the City may elect, in its sole discretion, to extend the cure period to an agreed upon time period, which agreed upon extension must be in writing and signed by the parties prior to the expiration of the cure period. Unless a written, signed extension has been fully executed by the parties, if Contractor fails to cure prior to expiration of the cure period, the Contract is automatically terminated.

22.3. If the City terminates this Contract for its own convenience not due to any default by Contractor, payment of Contractor shall be prorated to, and include the day of, termination and shall be in full satisfaction of all claims by Contractor against the City under this Contract.

22.4. Termination under any provision of this Section shall not affect any right, obligation, or liability of Contractor or the City that accrued prior to such termination. Contractor shall surrender to the City items of work or portions thereof, referred to in **Section 28**, for which Contractor has received payment or the City has made payment.

Section 23. Suspension of Work

The City may suspend, delay, or interrupt all or any part of the Work for such time as the City deems appropriate for its own convenience by giving written notice thereof to Contractor. An adjustment in the time of performance or method of compensation shall be negotiated as a result of such delay or suspension, unless the reason for the delay was within Contractor's control. The City shall not be responsible for Work performed by any subcontractors after notice of suspension is given by the City to Contractor.

Section 24. Final Completion

24.1. Contractor's Project Manager and City's Project Manager shall conduct a final inspection of the Project when Contractor believes the Work is complete, and create a project corrections list ("punch list") of any remaining items to be completed before the Final Completion date of December 15, 2024. All punch list items must be fully addressed and corrected on or before the Final Completion date.

24.2. Contractor shall reimburse the City for all costs incurred by the City for engineering, inspection, and project management services required beyond the time specified for Final Completion. Contractor shall also reimburse the City for all costs incurred for inspection and project management services required due to punch list items not completed within the time allotted for Final Completion. If Contractor fails to reimburse the City directly, the City will deduct the cost from Contractor's final pay request.

24.3. Contractor will not be deemed to be in default by reason of delays in performance due to circumstances beyond Contractor's reasonable control, including but not limited to strikes, lockouts, severe acts of nature, or actions of unrelated third parties not under Contractor's direction and control that would preclude any reasonable Contractor from performing the Work ("Force Majeure"). In the case of the happening of any Force Majeure event, the time for completion of the Work will be extended accordingly and proportionately by the City, in writing, but the City will not be responsible for any additional costs as a result of the Force Majeure event. Poor weather conditions, unless extreme, lack of labor, supplies, materials, or the cost of any of the foregoing shall not be deemed a Force Majeure event.

Section 25. Contract Modification; Change Orders

Any modification of the provisions of this Contract shall not be enforceable or binding unless reduced to writing and signed by both the City and Contractor. A modification is a written document, contemporaneously executed by the City and Contractor, which increases or decreases the cost to the City over the agreed Contract Sum in **Section 5** of this Contract, or changes or modifies the Work described in the Contract Documents or the time for performance. In the event Contractor receives any communication of whatsoever nature from the City, which communication Contractor contends gives rise to any modification of this Contract, Contractor shall, within five (5) days after receipt, make a

written request for modification to the City's Project Manager in the form of a Change Order. Contractor's failure to submit such written request for modification in the form of a Change Order shall be the basis for refusal by the City to treat said communication as a basis for modification or to allow such modification. In connection with any modification to this Contract affecting any change in price, Contractor shall submit a complete breakdown of labor, material, equipment, and other costs. If Contractor incurs additional costs or devotes additional time on Project tasks, the City shall be responsible for payment of only those additional costs for which it has agreed to pay under a signed Change Order. To be enforceable, the Change Order must describe with particularity the nature of the change, any delay in time the Change Order will cause, or any increase or decrease in the Contract Sum. The Change Order must be signed and dated by both Contractor and the City before the Change Order may be implemented.

Section 26. Dispute Resolution

In the event of a dispute concerning performance of this Contract, the parties agree to meet to negotiate the problem. If such negotiation fails, the parties will mediate the dispute using a professional mediator, and the parties will split the cost. If the dispute cannot be resolved in either of the foregoing ways within thirty (30) days, either party may file suit in Clackamas County Circuit Court. In the alternative, at the City's election, the parties may follow the dispute resolution procedures found in the Special Provisions.

Section 27. Access to Records

The City shall have access, upon request, to such books, documents, receipts, papers, and records of Contractor as are directly pertinent to this Contract for the purpose of making audit, examination, excerpts, and transcripts during the term of this Contract and for a period of four (4) years after termination of the Contract, unless the City specifically requests an extension. This clause shall survive the expiration, completion, or termination of this Contract.

Section 28. Property of the City

All documents, reports, and research gathered or prepared by Contractor under this Contract, including but not limited to spreadsheets, charts, graphs, drawings, tracings, maps, surveying records, mylars, modeling, data generation, papers, diaries, inspection reports, photographs, and any originals or certified copies of the original work forms, if any, shall be the exclusive property of the City and shall be delivered to the City prior to final payment. Any statutory or common law rights to such property held by Contractor as creator of such work shall be conveyed to the City upon request without additional compensation.

Section 29. Notices

Any notice required or permitted under this Contract shall be in writing and shall be given when actually delivered in person or forty-eight (48) hours after having been deposited in the United States mail as certified or registered mail, addressed to the addresses set forth below, or to such other address as one party may indicate by written notice to the other party.

To City: City of Wilsonville
Attn: Dustin Schull, Parks and Maintenance Supervisor
29799 SW Town Center Loop East
Wilsonville, OR 97070

To Contractor: Flow Line Construction LLC
Attn: Trey Renoud, Project Manager
11805 State St
Salem, OR 97317

Section 30. Miscellaneous Provisions

30.1. Integration. This Contract contains the entire and integrated agreement between the parties and supersedes all prior written or oral discussions, representations, or agreements. In case of conflict among these or any other documents, the provisions of this Contract shall control, and the terms most favorable to the City, within the City's sole discretion, will apply.

30.2. Legal Effect and Assignment. This Contract shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, personal representatives, successors, and assigns. This Contract may be enforced by an action at law or in equity.

30.3. No Assignment. Contractor may not assign this Contract, nor delegate the performance of any obligations hereunder, unless agreed to in advance and in writing by the City.

30.4. Adherence to Law. This Contract shall be subject to, and Contractor shall adhere to, all applicable federal, state, and local laws (including the Wilsonville Code and Public Works Standards), including but not limited to laws, rules, regulations, and policies concerning employer and employee relationships, workers compensation, and minimum and prevailing wage requirements. Any certificates, licenses, or permits that Contractor is required by law to obtain or maintain in order to perform the Work described in this Contract shall be obtained and maintained throughout the term of the Contract.

30.5. Governing Law. This Contract shall be construed in accordance with and governed by the laws of the State of Oregon, regardless of any conflicts of laws. All contractual provisions required by ORS Chapters 279A, 279B, 279C, and related Oregon Administrative Rules to be included in public agreements are hereby incorporated by reference and shall become a part of this Contract as if fully set forth herein.

30.6. Jurisdiction. Jurisdiction and venue for any dispute will be in Clackamas County Circuit Court.

30.7. Legal Action/Attorney Fees. If a suit, action, or other proceeding of any nature whatsoever (including any proceeding under the U.S. Bankruptcy Code) is instituted in connection with any controversy arising out of this Contract or to interpret or enforce any rights or obligations hereunder, the prevailing party shall be entitled to recover attorney, paralegal, accountant, and other expert fees and all other fees, costs, and expenses actually incurred and reasonably necessary in connection therewith, as determined by the court or body at trial or on any appeal or review, in addition to all other amounts provided by law. If the City is required to seek legal assistance to enforce any term of this Contract,

such fees shall include all of the above fees, whether or not a proceeding is initiated. Payment of all such fees shall also apply to any administrative proceeding, trial, and/or any appeal or petition for review.

30.8. Nonwaiver. Failure by either party at any time to require performance by the other party of any of the provisions of this Contract shall in no way affect the party's rights hereunder to enforce the same, nor shall any waiver by the party of the breach hereof be held to be a waiver of any succeeding breach or a waiver of this nonwaiver clause.

30.9. Severability. If any provision of this Contract is found to be void or unenforceable to any extent, it is the intent of the parties that the rest of the Contract shall remain in full force and effect, to the greatest extent allowed by law.

30.10. Modification. This Contract may not be modified except by written instrument executed by Contractor and the City.

30.11. Time of the Essence. Time is expressly made of the essence in the performance of this Contract.

30.12. Calculation of Time. Except where the reference is to business days, all periods of time referred to herein shall include Saturdays, Sundays, and legal holidays in the State of Oregon, except that if the last day of any period falls on any Saturday, Sunday, or legal holiday observed by the City, the period shall be extended to include the next day which is not a Saturday, Sunday, or legal holiday. Where the reference is to business days, periods of time referred to herein shall exclude Saturdays, Sundays, and legal holidays observed by the City. Whenever a time period is set forth in days in this Contract, the first day from which the designated period of time begins to run shall not be included.

30.13. Headings. Any titles of the sections of this Contract are inserted for convenience of reference only and shall be disregarded in construing or interpreting any of its provisions.

30.14. Number, Gender and Captions. In construing this Contract, it is understood that, if the context so requires, the singular pronoun shall be taken to mean and include the plural, the masculine, the feminine and the neuter, and that, generally, all grammatical changes shall be made, assumed, and implied to individuals and/or corporations and partnerships. All captions and paragraph headings used herein are intended solely for convenience of reference and shall in no way limit any of the provisions of this Contract.

30.15. Good Faith and Reasonableness. The parties intend that the obligations of good faith and fair dealing apply to this Contract generally and that no negative inferences be drawn by the absence of an explicit obligation to be reasonable in any portion of this Contract. The obligation to be reasonable shall only be negated if arbitrariness is clearly and explicitly permitted as to the specific item in question, such as in the case of where this Contract gives the City "sole discretion" or the City is allowed to make a decision in its "sole judgment."

30.16. Other Necessary Acts. Each party shall execute and deliver to the other all such further instruments and documents as may be reasonably necessary to carry out this Contract in order to provide and secure to the other parties the full and complete enjoyment of rights and privileges hereunder.

30.17. Interpretation. As a further condition of this Contract, the City and Contractor acknowledge that this Contract shall be deemed and construed to have been prepared mutually by each party and it shall be expressly agreed that any uncertainty or ambiguity existing therein shall not be construed against any party. In the event that any party shall take an action, whether judicial or otherwise, to enforce or interpret any of the terms of the contract, the prevailing party shall be entitled to recover from the other party all expenses which it may reasonably incur in taking such action, including attorney fees and costs, whether incurred in a court of law or otherwise.

30.18. Defined Terms. Capitalized terms not otherwise defined herein shall have the meaning given to them in the Public Works Standards and Contract Documents.

30.19. Entire Agreement. This Contract, all documents attached to this Contract, and all Contract Documents and laws and regulations incorporated by reference herein, represent the entire agreement between the parties.

30.20. Counterparts. This Contract may be executed in one or more counterparts, each of which shall constitute an original Contract but all of which together shall constitute one and the same instrument.

30.21. Authority. Each party signing on behalf of Contractor and the City hereby warrants actual authority to bind their respective party.

The Contractor and the City hereby agree to all provisions of this Contract.

CONTRACTOR:

FLOW LINE CONSTRUCTION LLC

By:_____

Print Name:_____

As Its:_____

EIN/Tax I.D. No. _____

CITY:

CITY OF WILSONVILLE

By:_____

Print Name:_____

As Its:_____

APPROVED AS TO FORM:

_____

Stephanie Davidson, Assistant City Attorney
City of Wilsonville, Oregon

#242260
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EXHIBIT A

APPARENT LOW	

FLOW LINE CONSTRUCTION		
	UNIT PRICE	TOTAL
		$ 162,737.50
		$ 22,213
$	15,000.00	$ 15,000.00
$	1,000.00	$ 1,000.00
$	750.00	$ 750.00
$	6.85	$ 548.00
$	1,750.00	$ 1,750.00
$	50.00	$ 150.00
$	1.55	$ 1,395.00
$	2.90	$ 870.00
$	750.00	$ 750.00
		$ 46,225
$	7,375.00	$ 7,375.00
$	500.00	$ 500.00
$	152.00	$ 12,160.00
$	80.50	$ 14,490.00
$	78.00	$ 11,700.00
		$ 26,000
$	26,000.00	$ 26,000.00
		$ 8,400
$	70.00	$ 8,400.00
		$ 51,075
$	183.00	$ 43,920.00
$	47.00	$ 5,170.00
$	19.85	$ 1,985.00

EXHIBIT A

		$	6,696
$	2,254.00	$	4,508.00
$	1.25	$	2,187.50
		$	629
$	350.00	$	350.00
$	135.00	$	135.00
$	16.00	$	144.00
		$	1,500
$	1,500.00	$	1,500.00
		$	90,092.50
		$	21,685
$	10,000.00	$	10,000.00
$	500.00	$	500.00
$	750.00	$	750.00
$	6.85	$	5,137.50
$	1,750.00	$	1,750.00
$	1.55	$	1,162.50
$	2.90	$	1,885.00
$	500.00	$	500.00
		$	42,240
$	7,000.00	$	7,000.00
$	1,500.00	$	1,500.00
$	152.00	$	24,320.00
$	81.00	$	1,620.00
$	78.00	$	7,800.00
		$	5,950
$	70.00	$	3,850.00

EXHIBIT A

$	70.00	$	2,100.00
		$	20,218
$	185.50	$	15,767.50
$	178.00	$	4,450.00
TOTAL VERIFIED BID		**$**	**252,831.00**

The Park at Merryfield Trail
SW Brown Rd
SW Wilsonville Rd
SW Ore Pac Ave
SW Wilsonville Rd
SW Boones Ferry Rd
SW Bailey St
SW 5th St
SW Nutting Rd
SW Orchard Dr
SW Parkview Dr
Willamette Way E
Fir Ave
Boones Ferry Trail
Google Earth

CITY COUNCIL MINUTES

April 01, 2024 at 7:00 PM

Wilsonville City Hall & Remote Video Conferencing

CALL TO ORDER

1. Roll Call

2. Pledge of Allegiance

A regular meeting of the Wilsonville City Council was held at the Wilsonville City Hall beginning at 7:00 p.m. on Monday, April 1, 2024. The Mayor called the meeting to order at 7:46 p.m., followed by roll call and the Pledge of Allegiance.

PRESENT
Mayor Fitzgerald
Council President Akervall
Councilor Linville
Councilor Berry
Councilor Dunwell

STAFF PRESENT
Amanda Guile-Hinman, City Attorney
Bryan Cosgrove, City Manager
Dan Pauly, Planning Manager
Jeanna Troha, Assistant City Manager
Katherine Smith, Assistant Finance Director
Kerry Rappold, Natural Resources Manager
Kimberly Veliz, City Recorder
Zach Weigel, City Engineer
Zoe Mombert, Assistant to the City Manager

3. Motion to approve the following order of the agenda.

Motion: Moved to approve the following order of the agenda.

Motion made by Councilor Akervall, Seconded by Councilor Berry.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

MAYOR'S BUSINESS

4. Upcoming Meetings

The Mayor provided details on the following meetings and events:

Spring Break

- The Mayor hoped that everyone had a good, refreshing Spring Break Week.

Washington County Coordinating Committee (WCCC)

- Currently, Councilor Dunwell was the lead and the Mayor the alternate for Washington County Coordinating Committee.
- Due to a change in meeting times, for one of Councilor Dunwell's other committee assignments, starting in April, the Mayor would assume the lead on the WCCC and Councilor Dunwell would take the alternate role.
- This change would allow Councilor Dunwell to continue participation in the Willamette Falls and Landings Heritage Area Coalition (WFLHAC), which now met at the same time as the WCCC.

City Council Meetings

- Special City Council meeting scheduled for April 3, 2024.
- The next regular City Council meeting scheduled for April 15, 2024.

State Representative Neron Town Hall

- Wilsonville State Representative Courtney Neron of House District 26 was holding a Wilsonville Town Hall on Saturday, April 13, 2024 at the Wilsonville Public Library.
- Representative Neron would hear from constituents and provide a review of the 'short' 2024 legislative session that wrapped up on March 7, 2024.

Collaboration on Health and Housing Services with City and County

- The Mayor presented on the collaboration and progress between the City of Wilsonville and Clackamas County towards supportive housing services and the reduction of the County's houseless population.
- The PowerPoint shown was added to the record.

COMMUNICATIONS

There was none.

CITIZEN INPUT AND COMMUNITY ANNOUNCEMENTS

This is an opportunity for visitors to address the City Council on any matter concerning City's Business or any matter over which the Council has control. It is also the time to address items not on the agenda. It is also the time to address items that are on the agenda but not scheduled for a public hearing. Staff and the City Council will make every effort to respond to questions raised during citizen input before tonight's meeting ends or as quickly as possible thereafter. Please limit your comments to three minutes.

There was none.

COUNCILOR COMMENTS, LIAISON REPORTS AND MEETING ANNOUNCEMENTS

5. Council President Akervall

Councilor Akervall shared the following items recognized on the Diversity, Equity and Inclusion (DEI) Committee Cultural Calendar for April:

- Deaf Heritage Month
- Arab-American Heritage Month
- Passover
- Ramadan celebration of Eld-al-Fitr

It was announced the City was collaborating with the Wilsonville Muslim Community Center the month of April to collect hygiene products for Wilsonville Community Sharing.

6. Councilor Linville

Councilor Linville provided details on the following meetings and events:

- Wilsonville-Metro Community Enhancement Committee on March 19, 2024
- Greater Portland Inc. (GPI) Small Cities Consortium meeting on March 28, 2024
- Opioid Settlement Prevention, Treatment and Recovery Board on April 3, 2024
- Small Business Success Summit on April 3, 2024
- Mayor Fitzgerald's presentation at Charbonneau Country Club on April 4, 2024

7. Councilor Berry

Councilor Berry provided details on the following meetings and events:

- Wilsonville-Metro Community Enhancement Committee meeting on March 19, 2024
- Clackamas County Coordinating Committee (C4) Metro Subcommittee meeting on March 28, 2024
- Diversity, Equity and Inclusion (DEI) Lecture Series: Braving the Storm a Couple's Search for Sanctuary on April 4, 2024
- Clackamas County Coordinating Committee (C4) meeting on April 4, 2024

8. Councilor Dunwell

Councilor Dunwell provided details on the following meetings and events:

- French Prairie Forum meeting on March 20, 2024
- Parks and Recreation Annual Community Egg Hunt on March 30, 2024
- Foundation's "Tree City USA" Earth Day Celebration on April 20, 2024
- Murase Arboretum Grand Opening on April 20, 2024

Councilor Dunwell announced the City received for the twenty-sixth straight year an Arbor Day award. In addition, the City of Wilsonville received an Urban Forestry Award by Oregon Community Trees, which was the Oregon Department of Forestry's advisory board on urban forestry issues.

Lastly, the Mayor noted that in the packet provided by the Leo Company was the 2024 Legislative Session Review.

CONSENT AGENDA

The City Attorney read the titles of the Consent Agenda items into the record.

9. **Resolution No. 3110**
   A Resolution Of The City Of Wilsonville Adopting The Residential Specialty Code, The Plumbing Specialty Code, And The Electrical Specialty Code And Repealing All Prior Resolutions That Previously Adopted A Residential Specialty Code, Plumbing Specialty Code, Or Electrical Specialty Code.

10. **Resolution No. 3130**
    A Resolution Of The City Of Wilsonville Authorizing The Increase Of The Rate Agreement With Metereaders LLC.

11. **Resolution No. 3133**
    A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Construction Contract With Woodburn Construction CM/GC, LLC, Inc. To Construct The Wilsonville Police Department Interim Renovations.

12. Minutes of the March 18, 2024 City Council Meeting.

Motion: Moved to approve the Consent Agenda as read.

Motion made by Councilor Akervall, Seconded by Councilor Dunwell.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

NEW BUSINESS

There was none.

CONTINUING BUSINESS

There was none.

PUBLIC HEARING

The City Attorney read the title of Ordinance No. 890 into the record on first reading.

13. **Ordinance No. 890** - *1st Reading (Legislative Land Use Hearing)*
    An Ordinance Of The City Of Wilsonville To Adopt The 2024 Stormwater Master Plan As A Sub-Element To The City Of Wilsonville Comprehensive Plan And The Stormwater Capital Improvement Project List.

The Mayor provided the public hearing format and opened the public hearing at 8:17 p.m.

Kerry Rappold, Natural Resources Manager, and Angela Wieland of Brown and Caldwell provided the staff report and PowerPoint, which has been made a part of the record.

There was a brief recess as there was a smell of smoke in the building.

Tualatin Valley Fire and Rescue checked the building and did not find any cause for the smell. Therefore, the meeting resumed at 8:47 p.m.

Staff finished presenting the PowerPoint on Ordinance No 890.

Council asked clarifying question.

The Mayor invited public testimony, seeing none the Mayor closed the public hearing on Ordinance No. 890 at 8:53 p.m.

The Mayor then requested a motion on Ordinance No. 890.

Motion: Moved to adopt Ordinance No. 890 on the first reading.

Motion made by Councilor Berry, Seconded by Councilor Linville.

It was noted that on March 13, 2024, the Planning Commission held a public hearing on the plan. Furthermore, it was the Planning Commission's recommendation that City Council adopt the plan without further amendment.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

CITY MANAGER'S BUSINESS

There was none.

LEGAL BUSINESS

14. Ballot Measure 3-609 Explanatory Statement

The City Attorney recalled the City received challenges to the two ballot measures Council referred to voters regarding term limits. Those challenges sought to replace the ballot titles that Council had approved with different language that two party petitioners proposed. A hearing on the challenges was held on March 20, 2024 before the Clackamas County Circuit Court. The challenges were largely rejected by the Court and the City obtained very favorable outcomes including the rejection of the proposed alternate language from the petitioners.

However, the Court did make a change to a word that appears twice in the ballot title in Resolution No. 3125. This resolution refers to the voters to decide whether a two term City Council could serve two consecutive terms as Mayor, providing the opportunity. Both in the caption, and in the summary, there was a place that talks about the mayoral term limits and the Court changed that to Council term limits.

As a result, the explanatory statement to that ballot measure for Resolution No. 3125 was slightly inconsistent with the ballot title language. Council was reminded; the explanatory statement was not part of the ballot title so it was not part of the ballot title challenge. Given the inconsistency, the City Attorney updated the explanatory statement to match the ballot title language that was approved by the Court.

The City Attorney reminded the other ballot measure reviewed by the Court was in Resolution No. 3126, which was not the subject of the explanatory statement before the Council. It had two words that the Court added to the caption, where it said that the ballot measure was amending the charter, the Court added amends the charter term limits. The City Attorney stipulated to that change and believed that it made the language clearer.

Council was asked to ratify the revised explanatory statement, if the Council was so inclined.

The Mayor then requested a motion.

Motion: Moved to ratify the revised Explanatory Statement ballot language for measure 3-609.

Motion made by Councilor Akervall, Seconded by Councilor Dunwell.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

15. Consideration Of Scope Of Appeal Proceeding For The Appeal Of Development Review Board Resolution No. 429 To City Council, And The Procedure That City Council Will Follow During This Appeal Proceeding

The City Attorney explained the next item under Legal Business was consideration of the scope of appeal proceeding for the appeal of Development Review Board (DRB) Resolution No. 429 to the City Council, and the procedure Council would follow during the appeal proceeding.

Council was reminded the City received an appeal to a Development Review Board decision provided in DRB Resolution No. 429. The appeal was regarding the description of the current non-conforming use at the location of 29400 SW Town Center Loop West in Wilsonville, which is where the Fry's Electronics store was operating. Pursuant to Wilsonville City Code the City Council adopts an order establishing the date and time when the Council would hear the appeal, the process to be followed when hearing the appeal, and scope of the appeal. City staff had prepared a proposed order to that effect which was provided to Council for consideration.

The City Attorney shared if Council was so inclined, the Council may make a motion approve adopting the order provided by staff.

There were no clarifying questions.

The Mayor then requested a motion.

Motion: Moved to approve the order establishing scope of the appeal proceeding for the appeal of Development Review Board Resolution No. 429 to City Council, and the procedure that City Council will follow during this appeal proceeding.

Motion made by Councilor Akervall, Seconded by Councilor Linville.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

16. Public Contracting Code Update

Due to time constraints in Work Session, the public contracting code update was discussed on under Legal Business.

The City Attorney summarized the staff report and reviewed with Council items the Legal Department currently retains for contracts.

Council then provided feedback on items they would like added to the contracts quarterly reports to be created by the Legal Department. It was suggested that the report also include a brief summary, hyperlinks to the contracts, and asterisk at the bottom of report stating whom the initials represent under the attorney section.

ADJOURN

The Mayor adjourned the meeting at 9:07 p.m.

Respectfully submitted,

_____
Kimberly Veliz, City Recorder

ATTEST:

_____
Julie Fitzgerald, Mayor

DRAFT

SPECIAL CITY COUNCIL MINUTES

April 03, 2024 at 7:00 PM

Wilsonville City Hall & Remote Video Conferencing

DRAFT

CALL TO ORDER

1. Roll Call

2. Pledge of Allegiance

A special meeting of the Wilsonville City Council was held at the Wilsonville City Hall beginning at 7:00 p.m. on Wednesday, April 3, 2024. The Mayor called the meeting to order at 7:00 p.m., followed by roll call and the Pledge of Allegiance.

PRESENT
Mayor Fitzgerald
Council President Akervall
Councilor Linville
Councilor Berry
Councilor Dunwell

STAFF PRESENT
Amanda Guile-Hinman, City Attorney
Jeanna Troha, Assistant City Manager
Kimberly Veliz, City Recorder

3. Motion to approve the following order of the agenda.

Motion: Moved to approve the order of the agenda.

Motion made by Councilor Dunwell, Seconded by Councilor Linville.

Voting Yea:
Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

MAYOR'S BUSINESS

There was none.

COMMUNICATIONS

There was none.

CITIZEN INPUT AND COMMUNITY ANNOUNCEMENTS

There was none.

COUNCILOR COMMENTS, LIAISON REPORTS AND MEETING ANNOUNCEMENTS

There was none.

CONSENT AGENDA

There was none.

NEW BUSINESS

There was none.

CONTINUING BUSINESS

There was none.

PUBLIC HEARING

There was none.

LEGAL BUSINESS

The City Attorney read the title of the appeal into the record.

1. **Appeal**
   Consideration Of Scope Of Appeal Proceeding For The Appeal Of Development Review Board Resolution No. 429 To City Council, And The Procedure That City Council Will Follow During This Appeal Proceeding

The City Attorney shared staff had been in contact with the appellant representatives on this matter. Moreover, they had come to an agreement pending Council's approval to continue this matter to the regular City Council meeting on April 15, 2024 at 7:00 p.m. Council was informed if they wished to continue the item a motion was necessary.

It was clarified that the applicant wanted the continuation. Furthermore, the 120-day deadline that City must comply with under Oregon law regarding this decision the applicant had extended to April 15.

The Mayor then requested a motion for the continuation.

Motion: Moved to continue the Appeal Proceeding to April 15 at 7:00 p.m., Council meeting being held at City Hall at that time.

Motion made by Councilor Akervall, Seconded by Councilor Dunwell.

Voting Yea: Mayor Fitzgerald, Councilor Akervall, Councilor Linville, Councilor Berry, Councilor Dunwell

Vote: Motion carried 5-0.

ADJOURN

The Mayor adjourned the meeting at 7:05 p.m.

Respectfully submitted,

_____
Kimberly Veliz, City Recorder

ATTEST:

_____
Julie Fitzgerald, Mayor

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: April 15, 2024	**Subject: Ordinance No. 890 – 2nd Reading** Adopting the 2024 Stormwater Master Plan as a sub-element of the City of Wilsonville Comprehensive Plan and Stormwater Capital Improvement Project List **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☒ Public Hearing Date: April 1, 2024 ☒ Ordinance 1st Reading Date: April 1, 2024 ☒ Ordinance 2nd Reading Date: April 15, 2024 ☐ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☒ Approval ☐ Denial ☐ None Forwarded ☐ Not Applicable **Comments:** The Planning Commission conducted a public hearing on the proposed Stormwater Master Plan at their regular meeting on March 13, 2024, forwarding a recommendation of approval to the Council.
Staff Recommendation: Staff recommends Council adopt Ordinance No. 890 on 2nd Reading.	
Recommended Language for Motion: I move to adopt Ordinance No. 890 on 2nd Reading.	
Project / Issue Relates To:	

☒Council Goals/Priorities: Protect and Preserve Wilsonville's Environment	☐Adopted Master Plan(s):	☐Not Applicable

ISSUE BEFORE COUNCIL:

A City of Wilsonville ordinance adopting the 2024 Stormwater Master Plan ("Plan") as a sub-element of the City of Wilsonville Comprehensive Plan and the Stormwater Capital Improvement Project List.

EXECUTIVE SUMMARY:

In 2012, the City adopted the Stormwater Master Plan (SMP), which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., Urban Growth Boundary (UGB) expansion areas) and new stormwater management requirements (i.e., National Pollutant Discharge Elimination System Municipal Separate Sewer System (NPDES MS4) Permit) that needed to be considered within the framework of the update. The City employed an integrated approach to stormwater and watershed management that provided management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a virtual open house and survey were conducted to gather feedback from the community about the proposed Plan. Ninety respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

In preparing the Plan, the consultant team addressed data collection, problem area identification, modeling of the stormwater system, retrofit analysis, Capital Improvement Program (CIP) projects, and developing the policies that will guide the implementation of the Plan. A number of new elements were included in the Plan:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality (DEQ)) and Total Maximum Daily Load (TMDL) Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon DEQ) to determine the appropriate management and project objectives in the Plan.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The Capital Improvement Program considered the variety of issues and problems associated with the City's public stormwater system and represents a critical piece in the overall management of the system. Projects were prioritized to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as water quality retrofit and local drainage improvements, were developed to address regulatory drivers and support proactive system maintenance.

A total of 15 capital projects were developed for current and future storm drainage infrastructure needs over the 20-year planning period. Due to phasing some of the projects, these 15 capital projects represent 20 separately costed and phased projects for purposes of prioritization and scheduling efforts. The CIP projects, which are divided into annual, high priority (2024-28), medium priority (2029-33), and low priority, have an estimated total cost of $72,065,000.

The Plan is a sub-element to the Wilsonville Comprehensive Plan and as such, requires a formal adoption process that first includes a public hearing before the Planning Commission where conclusionary findings are considered for consistency with Statewide Planning Goals followed by a recommendation for adoption to the City Council. The City Council then conducts a public hearing and considers adoption of the Plan by Ordinance.

The Planning Commission public record, including Resolution LP24-0002 and the Conclusionary Findings demonstrating consistency with Statewide Planning Goals are included in **Exhibit A** to Ordnance No. 890. At the public hearing held on March 13, 2024, the Planning Commission recommended the City Council adopt the Plan without further amendment. Planning Commission did suggest edits to the project list, clarifying the consequences of not proceeding with each recommended capital project. The Plan (**Exhibit B**) has been amended to add this suggested clarification to the footnotes of Table ES-1 on Page xi and Table 7-1 on Page 7-9.

EXPECTED RESULTS:
Adoption by the City Council will make the Plan part of the City's Comprehensive Plan, allowing identified capital and operational improvements to be planned and budgeted. The total estimated amount of capital investment over the 20-year planning period is approximately $69 million, of which $19 million is anticipated in the next five years. In addition, annual program costs are estimated to be $2.5 million. The recommended capital improvements will provide the basis for an analysis of stormwater rates and system development charges (SDCs) that are necessary to adequately fund the improvements required to meet the projected growth and operational needs.

TIMELINE:
A second reading before the City Council for the Plan adoption is scheduled on April 15, 2024. The Plan would become effective 30-days following the second reading and approval of the Ordinance.

CURRENT YEAR BUDGET IMPACTS:
The amended fiscal year 2023-2024 Budget for CIP #7064 includes $77,425 in storm operations and system development charge funds to develop the Plan.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the SMP. The Public Engagement Plan incorporated the City's existing public engagement tools, including *Let's Talk Wilsonville* and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities. A follow-up survey has been posted to *Let's Talk Wilsonville* to gather current thoughts about the City's stormwater services and any stormwater-related topics the public would like to learn more about. The forthcoming Storm System Rate Study and SDC Update will also include a public engagement process with outreach to utility customers and the development community.

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
The Plan will benefit the community by providing goals and policies and an updated Capital Improvement Program to serve a growing population and meet environmental regulations.

ALTERNATIVES:
The project team considered and evaluated numerous alternatives to provide the needed storm drainage improvements and recommend a Capital Improvement Program that is efficient and cost effective. The City Council could also chose to adopt the Plan with modifications or not at all.

CITY MANAGER COMMENT:
N/A

ATTACHMENTS:
1. Ordinance No. 890
    A. Planning Commission Resolution No. LP24-0002, staff report and public record
    B. 2024 Stormwater Master Plan

ORDINANCE NO. 890

AN ORDINANCE OF THE CITY OF WILSONVILLE TO ADOPT THE 2024 STORMWATER MASTER PLAN AS A SUB-ELEMENT TO THE CITY OF WILSONVILLE COMPREHENSIVE PLAN AND THE STORMWATER CAPITAL IMPROVEMENT PROJECT LIST.

WHEREAS, ORS 197.175 requires cities to prepare, adopt and implement Comprehensive Plans consistent with statewide planning goals adopted by the Land Conservation and Development Commission; and

WHEREAS, ORS 197.712(2)(e) requires cities to develop and adopt a public facilities plan for areas within the Urban Growth Boundary containing a population greater than 2,500 people, including rough cost estimates for projects needed to provide sewer, water, and transportation uses contemplated in the Comprehensive Plan and Land Use Regulations; and

WHEREAS, the 2024 Stormwater Master Plan ("Plan") is needed to account for the existing public infrastructure and plan for future development; and

WHEREAS, the Plan provides a detailed framework for identifying and prioritizing programs and projects to increase system capacity including infrastructure and maintenance needs, compliance with environmental regulations, and proactively planning for future growth; and

WHEREAS, the Plan documents recommended capital improvement projects needed to ensure continued reliability and capacity of the stormwater system through the year 2043 and beyond; and

WHEREAS, the Plan identifies estimated costs and recommends schedules for the design and construction of the recommended capital improvement projects; and

WHEREAS, in preparing the Plan, the City has sought to carry out federal, state and regional mandates, provide for alternative improvement solutions to minimize public and private expense, avoid the creation of nuisances, and protect the environment; and

WHEREAS, to better understand the perceptions of stormwater services provided by the City and inform the development of the Plan, a public survey was conducted from April 1 to May 15, 2021 on the City's Let's Talk Wilsonville web platform; and

WHEREAS, the City conducted work sessions with the Planning Commission and City Council to solicit citizen input addressing Statewide Planning Goal #1 – Citizen involvement; and

WHEREAS, after providing due public notice as required by City Code and Oregon Law, the Wilsonville Planning Commission conducted a public hearing on March 13, 2024 and adopted Resolution LP24-0002 recommending approval of the Plan to the City Council; and

WHEREAS, after providing due public notice as required by City Code and Oregon Law, a public hearing was held before the City Council on April 1, 2024, at which time the City Council considered the recommendation of the Planning Commission, gathered additional evidence and afforded all interested parties an opportunity to present oral and written testimony concerning the Plan; and

WHEREAS, the City Council carefully considered the public record, including all recommendations and testimony.

NOW, THEREFORE, THE CITY OF WILSONVILLE ORDAINS AS FOLLOWS:

Section 1. The above findings are adopted and incorporated herein, including the findings and conclusions of Planning Commission Resolution LP24-0002, its staff report, and public record attached hereto as Exhibit A and incorporated herein.

Section 2. The Wilsonville City Council finds and concludes that the Plan is necessary to protect the public health, safety and welfare of the City of Wilsonville to help ensure adequate capacity and quality for the City's stormwater system.

Section 3. The City Council hereby adopts the Plan, attached hereto as Exhibit B and incorporated herein.

Section 4. Effective Date. This Ordinance shall be declared to be in full force and effect thirty (30) days from the date of final passage and approval.

SUBMITTED by the Wilsonville City Council at a regular meeting thereof this 1st day of April, 2024, and scheduled the second reading on April 15, 2024 commencing at the hour of 7:00 p.m. at the Wilsonville City Hall, 29799 SW Town Center Loop East, Wilsonville, Oregon.

_____

Kimberly Veliz, City Recorder

ENACTED by the City Council on the 1st day of April, 2024, by the following votes:

Yes: _____ No: _____

_____

Kimberly Veliz, City Recorder

DATED and signed by the Mayor this 15th day of April, 2024

_____

JULIE FITZGERALD MAYOR

SUMMARY OF VOTES:

Mayor Fitzgerald

Council President Akervall

Councilor Linville

Councilor Berry

Councilor Dunwell

EXHIBITS:

A. Planning Commission Resolution LP24-0002, staff report, and public record
B. 2024 Stormwater Master Plan

ORDINANCE NO. 890
EXHIBITS LINKS

Ordinance No. 890 Exhibit A:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/125119/d._ordinance_no._890_exhibit_a.pdf

Ordinance No. 890 Exhibit B1:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/125119/e._ordinance_no._890_exhibit_b1.pdf

Ordinance No. 890 Exhibit B2:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/125119/f._ordinance_no._890_exhibit_b2.pdf

Ordinance No. 890 Exhibit B3:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/125119/g._ordinance_no._890_exhibit_b3.pdf

EXHIBIT A

LP24-0002
Stormwater Master Plan
Planning Commission Public Hearing Record Index
FINAL (March 13, 2024)

PLANNING COMMISSION AND CITY COUNCIL MEETINGS

March 13, 2024 - Planning Commission Public Hearing
- Resolution LP24-0002
- Staff Report and Attachments
- Presentation
- Affidavit of Notice of Hearing

February 22, 2024 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

February 14, 2024 - Planning Commission Work Session
- Staff Report and Attachments
- Presentation
- Minutes Excerpt

November 6, 2023 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

October 11, 2023 - Planning Commission Work Session
- Staff Report and Attachments
- Presentation
- Minutes Excerpt

January 4, 2021 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

PUBLIC ENGAGEMENT

Project webpages: Let's Talk Wilsonville (English & Spanish) (2021-present

Surveys: Take Our Stormwater Survey (English & Spanish) (2021)

Open House: Virtual Open House (2021)

Boones Ferry Messenger: April 2021 excerpt

COMMENTS/ARTICLES

Vu Nguyen, AKS Engineering & Forestry, Email: February 26, 2024

PLANNING COMMISSION

WEDNESDAY, MARCH 13, 2024

PUBLIC HEARING

2. Stormwater Master Plan (Rappold) (45 minutes)

PLANNING COMMISSION
RESOLUTION NO. LP24-0002

A RESOLUTION OF THE CITY OF WILSONVILLE PLANNING COMMISSION RECOMMENDING THE WILSONVILLE CITY COUNCIL ADOPT AN UPDATE TO THE STORMWATER MASTER PLAN.

WHEREAS, the City's overall drainage system includes piped and open channel conveyance, as well as stormwater treatment and detention facilities for stormwater management; and

WHERAS, stormwater runoff must be managed for both flood control and water quality protection as a City-wide system and in a comprehensive manner that protects the public's health, safety, welfare and interests; and

WHEREAS, the Stomwater Master Plan was last updated in 2012, pursuant to Ordinance No. 700; and

WHEREAS, the Capital Improvement Program identified the completion of an update to the Stormwater Master Plan ("Plan") for FY 2023-24; and

WHEREAS, the Plan provides a detailed framework for identifying and prioritizing programs and projects to increase system capacity including infrastructure and maintenance needs, compliance with environmental regulations, and proactively planning for future growth; and

WHEREAS, to better understand the perceptions of stormwater services provided by the City and inform the development of the Plan, a public survey was conducted from April 1 to May 15, 2021 on the City's Let's Talk Wilsonville web platform; and

WHEREAS, the Planning Commission of the City has the authority to review and make recommendations to the City Council regarding the Capital Improvement Program pursuant to Wilsonville Code Sections 2.322 and 4.032; and

WHEREAS, the Planning Commission conducted work sessions on the draft Plan at their regular meetings of October 11, 2023 and February 14, 2024; and

WHEREAS, the Planning Commission, after Public Hearing Notices were mailed to property owners within the City limits and a list of interested citizens and agencies, and were posted in three locations throughout the City and on the City website, held a Public Hearing on March 13, 2024, to review the Plan and to gather additional testimony and evidence regarding the proposed Master Plan update in accordance with the public hearing and notice procedures that are set forth in Sections 4.008, 4.010, 4.011 and 4.012 of the Wilsonville Code (WC); and

WHEREAS, the Planning Commission has afforded all interested parties an opportunity to be heard on this subject and has entered all available evidence and testimony into the public record of their proceeding; and

WHEREAS, the Planning Commission has duly considered the subject, including the staff recommendations and all the exhibits and testimony introduced and offered by all interested parties.

NOW, THEREFORE, THE CITY OF WILSONVILLE PLANNING COMMISSION RESOLVES AS FOLLOWS:

Section 1. The Wilsonville Planning Commission does hereby adopt the Planning Staff Report (attached hereto as Exhibit A) and Attachments, as presented at the March 13, 2024, public hearing, including the findings and recommendations contained therein.

Section 2. The Planning Commission does hereby recommend that the Wilsonville City Council adopt the proposed Stormwater Master Plan, attached as Exhibit B.

Section 3. Effective Date. This Resolution is effective upon adoption.

ADOPTED by the Wilsonville Planning Commission at a regular meeting thereof this 13th day of March, 2024, and filed with the Planning Administrative Assistant on this date.

PLANNING COMMISSION CHAIR KARR

ATTEST:

Mandi Simmons, Administrative Assistant III

SUMMARY OF VOTES:

Andrew Karr, Chair Yes
Ronald Heberlein, Vice-Chair Absent
Matt Constantine Yes
Nicole Hendrix Yes
Sam Scull Yes
Yana Semenova Yes
Jennifer Willard Yes

EXHIBITS:

A. Staff Report and Attachments

PLANNING COMMISSION MEETING
STAFF REPORT

Meeting Date: March 6, 2024	**Subject:** Stormwater Master Plan **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☒ Public Hearing Date: 3/13/2024 ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☒ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: A motion to approve a recommendation to the City Council adopting the Stormwater Master Plan.	
Recommended Language for Motion: I move to approve Resolution LP24-0002 recommending approval of the Stormwater Master Plan.	
Project / Issue Relates To:	
☒Council Goals/Priorities: Protect and Preserve Wilsonville's Environment	☒Adopted Master Plan(s):
☐Not Applicable	

ISSUE BEFORE PLANNING COMMISSION:
The City of Wilsonville is completing an update to the Stormwater Master Plan (SMP) to identify and prioritize programs and projects to increase system capacity including infrastructure and

maintenance needs, compliance with environmental regulations, and proactively planning for the future. The SMP requires a formal adoption process that includes a hearing before the Planning Commission, a recommendation from the Planning Commission to the City Council, and adoption by the City Council.

EXECUTIVE SUMMARY:

In 2012, the City adopted the Stomwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., Urban Growth Boundary (UGB) expansion areas) and new stormwater management requirements (i.e., National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) Permit) that need to be addressed as part of the update. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a survey was conducted to gather feedback from the community about the proposed SMP. Ninety respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

Since 2021, the consultant team has been working on data collection, problem area identification, modeling of the stormwater system, retrofit analysis, Capital Improvement Program (CIP) projects, and developing the policies that will guide the implementation of the SMP. In developing the SMP, a number of new elements were included:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality) and Total Maximum Daily Load (TMDL) Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon DEQ) to determine the appropriate management and project objectives in the SMP.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The CIP addresses the variety of issues and problems associated with the City's public stormwater system and represents a critical piece in the overall management of the system. Projects were prioritized to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as water quality retrofit and local drainage

improvements, were developed to address regulatory drivers and support proactive system maintenance.

A total of 15 capital projects were identified to address current and future storm drainage infrastructure needs over the 20-year planning period. Due to phasing for some of the projects, these 15 capital projects represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts. The CIP projects, which are divided into annual, high priority (2024-28), medium priority (2029-33), and low priority, have an estimated total cost of $72,065,000.

On October 11, 2023 and February 14, 2024, staff presented the draft Stormwater Master Plan at Planning Commission work sessions.

EXPECTED RESULTS:
The SMP includes goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Program, and a fee in lieu of construction program. The recommended capital improvements will provide the basis for an analysis of stormwater rates and system development charges (SDCs) that are necessary to fund the projects needed to meet permit requirements and the City's stormwater management needs.

TIMELINE:
A public hearing before the City Council for the SMP adoption is scheduled for April 1, 2024, with a seconding reading on April 15, 2024.

CURRENT YEAR BUDGET IMPACTS:
The amended fiscal year 2023-2024 Budget for CIP#7064 includes $77,425 in storm operations and system development charge funds.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the SMP. The Public Engagement Plan incorporated the City's existing public engagement tools, including Let's Talk Wilsonville and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities. The forthcoming Storm System Rate Study and SDC Update will also include a public engagement process with outreach to utility customers and the development community.

POTENTIAL IMPACTS or BENEFIT TO THE COMMUNITY:
The SMP will benefit the community by providing goals and policies and an updated Capital Improvement Program to serve a growing population and meet environmental regulations.

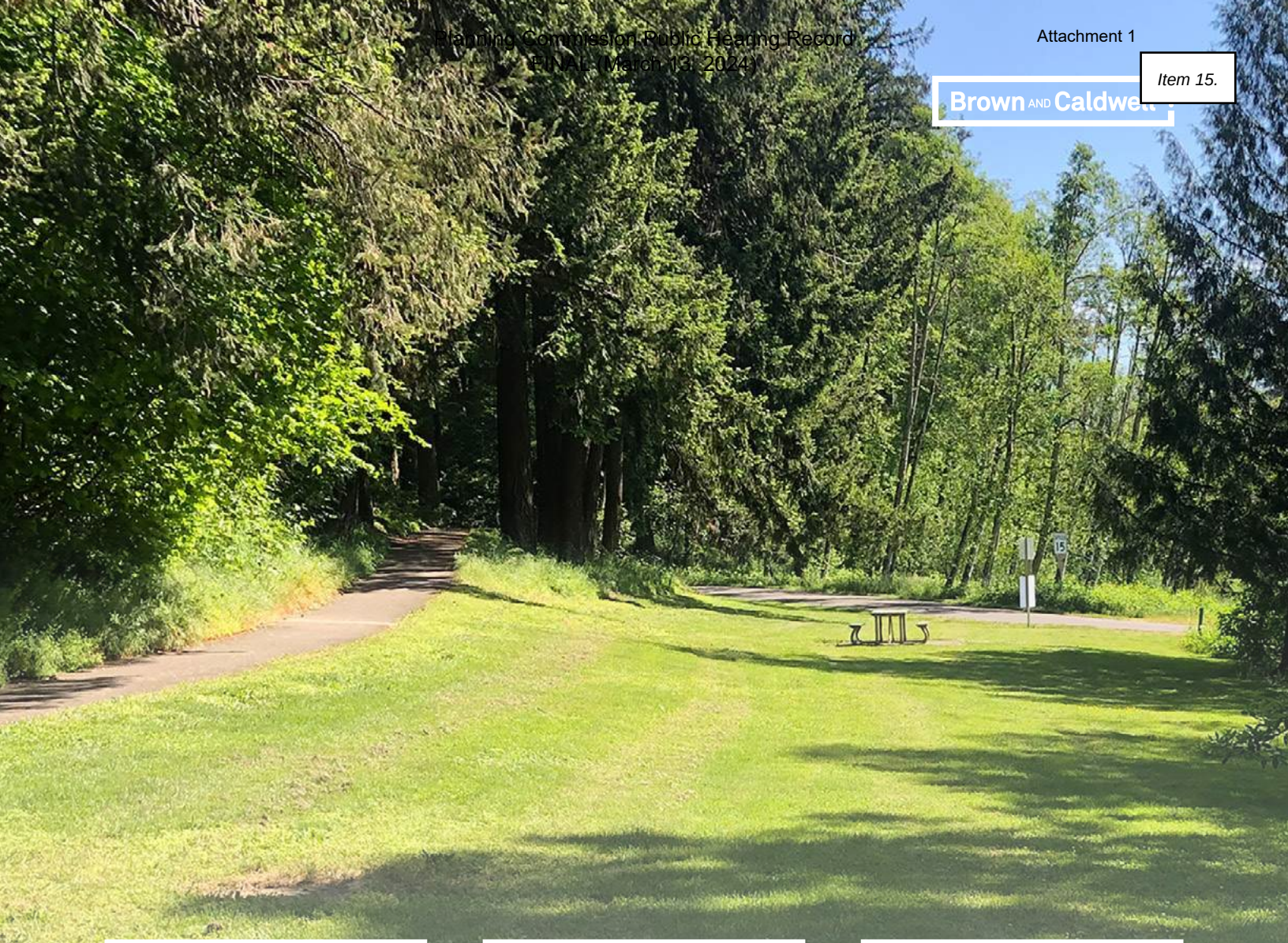
ALTERNATIVES:
The project team considered and evaluated numerous alternatives to provide the needed

storm drainage improvements necessary to meet the City's system management needs and permit requirements. The recommended Capital Improvement Program implements the needed improvements in a way that is efficient and cost effective.

ATTACHMENTS:

1. Stormwater Master Plan (dated March 2024)
2. Stormwater Master Plan Appendices (dated March 2024)
3. Conclusionary Findings
4. Master Plan Record (electronic only)

Brown AND Caldwell



Stormwater Master Plan

March 2024 // **FINAL**

WILSONVILLE
OREGON

Stormwater Master Plan

Prepared for
City of Wilsonville, Oregon
March 2024

Brown AND Caldwell

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552
T: 503.244.7005

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List of Abbreviations

AACE	Association for the Advancement of Cost Engineering
ac	acre
BC	Brown and Caldwell
BMP	best management practice
CB	catch basin
CCTV	closed-circuit television
cfs	cubic feet per second
COM/GOV	Commercial/Government
CIP	capital improvement program
City	City of Wilsonville
CPs	capital projects
CPP	corrugated polyethylene pipe
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DIP	ductile iron pipe
DS	downstream
EPA	U.S. Environmental Protection Agency
E&S	Erosion and Sediment
fps	feet per second
ft	feet/foot
GIS	geographic information system
H	horizontal
H/H	hydrologic and hydraulic
HSG	Hydrologic Soil Group
IGA	Intergovernmental Agreements
in.	inch/inches
IND	Industrial
INST	Institutional
I-5	Interstate 5
LA	Load Allocation
LF	linear foot/feet
LID	low impact development
MEP	maximum extent practicable
MH(s)	manhole(s)
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
Plan	Stormwater Master Plan
PVC	polyvinyl chloride
PWS	Wilsonville Public Works Standards
RA	Rural Agricultural
RCP	reinforced concrete pipe
ROW	right-of-way
R/R	repair/replacement
SDC	System Development Charge
SF	square feet
SMP	Stormwater Master Plan
SOPs	standard operating procedures
SROZ	Significant Resource Overlay Zone
SSURGO	Soil Survey Geographic Database
TM	technical memorandum
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UGB	Urban Growth Boundary
US	upstream
USCS	Unified Classification System
V	vertical
VAC	Vacant
WDC	Wilsonville Development Code
WLA	Waste Load Allocation
WQ	water quality

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Acknowledgements

The Brown and Caldwell Team, including Waterways Consulting, Inc. and Consor (formerly Barney and Worth) would like to extend thanks to the following staff and stakeholders for assistance in completing this Stormwater Master Plan:

- Kerry Rappold, Natural Resources Manager and City Project Manager
- Andy Sheehan, Asset Management Coordinator
- Sean Shortes, Engineering Tech II

Wilsonville Internal Stakeholders

- Zach Weigel, City Engineer
- Andrew Barrett, Capital Projects Manager
- Amy Pepper, Development Engineering Manager
- Dan Pauly, Planning Manager
- Jim Cartan, Environmental Specialist
- Delora Kerber, Public Works Director
- Martin Montalvo, Operations Manager
- Brad Painter, Roads and Stormwater Supervisor
- Bill Evans, Communications and Marketing Manager

City Council

- Mayor Julie Fitzgerald
- Kristin Akervall, Council President
- Dr. Joann Linville, Councilor
- Caroline Berry, Councilor
- Katie Dunwell, Councilor

City Planning Commission

- Ronald Heberlein, Chair
- Jennifer Willard, Vice-Chair
- Nicole Hendrix
- Andrew Karr
- Kamran Mesbah
- Kathryn Neil

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include the need to: 1) address changing regulatory requirements; 2) reassess the storm system based on completion of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), 3) accommodate new and redevelopment activities, and 4) address observed system deficiencies warranting additional study.

This 2024 SMP identifies and prioritizes projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth. The SMP development process includes the:

- Evaluation of project needs and system improvements as identified by City staff.
- Development of validated hydrologic and hydraulic (H/H) model to confirm capacity issues and to assess anticipated flooding frequency and severity.
- Assessment of stormwater system retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risks to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality issues at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. Project needs were initially identified through the distribution of surveys to City staff and the public, a literature-based and Geographic Information System (GIS) data review, and site visits and staff interviews. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of this effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvements, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, the continued applicability of water quality projects not implemented from the 2012 SMP, and the ability to integrate water quality into other project needs, CP and program needs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby referred to as Kruse Creek for this SMP) to inform locations where stream morphology may

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be or is currently impacted by changes to upstream land use, and in response to changes in flow, infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) model developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities constructed since 2012. CPs installed since 2012 were also incorporated into the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and projected future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing level needs and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into staffing recommendations for both Public Works and Community Development/Engineering.

Project/Program Development and Prioritization. Project opportunities from the various technical evaluations were consolidated and developed into CPs and programs. CP development included conceptual design, facility sizing, and cost estimation. CPs were prioritized based on multiple criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing drainage area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater funding evaluations.

General Recommendations

The following project, program, and policy actions are recommended to improve and enhance the performance of the storm drainage infrastructure throughout the city:

1. Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
2. Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
3. Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
4. Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
5. Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.
6. Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
7. Clearly document CP and program costs and schedule to inform future funding and rate analyses.

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Capital Project Summary

Individual and city-wide CPs, as well as stormwater programs, were developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified 15 CPs (representing 20 individually costed project phases) and 4 city-wide planning projects, including conceptual cost estimates and respective priorities. Figure ES-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
Capital Projects							
BC-1	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	$1,880,000	11%	X		
BC-2	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	$2,940,000	27%	X		
BC-3-Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	$4,860,000	19%			X
BC-3-Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	$7,210,000	19%			X
BC-4	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	$410,000	19%	X		
BC-5	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	$910,000	2%			X
BC-6	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	$400,000	1%	X		
CLC-1-Phase 1	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	$8,020,000	38%	X		
CLC-1-Phase 2	Day Road Stormwater Improvements, Phase 2	• **Capacity**	$3,930,000	38%		X	

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Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	$290,000	6%		X	
CLC-3	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	$3,780,000	35%		X	
NC-1	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	$4,090,000	79%	X		
WR-1-Phase 1	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **Capacity** • Water Quality	$2,310,000	2%		X	
WR-1-Phase 2	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **Capacity**	$1,080,000	2%			X
WR-2-Phase 1	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	$820,000	--		X	
WR-2-Phase 2	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$10,510,000	--			X
WR-3	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	$200,000	10%	X		
WR-4-Phase 1	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	$600,000	--			X
WR-4-Phase 2	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$4,440,000	--			X
WR-5	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	$10,370,000	--			X
City-wide Planning Projects							
City-1	Flow Monitoring and Rain Gauge Installation	• **Capacity**	$100,000	N/A	X		
City-2	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	$30,000/ event	N/A	X	X	X
City-3	Porous Pavement Pilot Study	• **Water Quality**	$100,000	N/A	X		
City-4	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	$150,000	N/A	X		
				TOTAL:	**$19.14M**	**$20.85M**	**$29.53M**

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. City-wide planning projects are designated as "City".

*b. Primary objectives addressed are identified in **BOLD**.*

c. % Related to Growth refers to SDC-eligible projects and the proportional cost attributable to growth.

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Program Summary

In addition to the identified CPs, the following programs were identified to address regulatory drivers and support proactive stormwater system maintenance. These programs, objectives, and estimated annual cost are listed in Table ES-2 and described below:

- **Local Drainage Improvements Program (P-1).** Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).
- **Water Quality Retrofit Program (P-2).** Establish an annual funding mechanism to integrate low impact development (LID) and/or green infrastructure (GI) in conjunction with street improvements, public improvements, and other utility projects. This program supports the City's retrofit strategy and regulatory objectives by adding water quality treatment in areas that do not currently have treatment.
- **City-wide Repair/Replacement Program (P-3).** Allocate funds to conduct replacement of public pipe and outfalls (outside of the Charbonneau development area) in conjunction with inspection results and asset management efforts.
- **Charbonneau Repair/Replacement Program (P-4).** Allocate funds to conduct replacement of public pipe and structures within the Charbonneau development area in accordance with the Charbonneau Consolidated Improvement Plan (2014). Excludes portions of the system identified by CPs WR-4 and WR-5.
- **Riparian Vegetation Management Program (P-5).** Allocate funds to conduct riparian and/or in-channel vegetation restoration and maintenance including removal of invasive plant species.
- **Vegetative Facility Maintenance Program (P-6).** Allocate funds to conduct restorative maintenance for select stormwater facilities (public and private) in the City where larger-scale maintenance is needed and/or maintenance agreements are not in place or executed.

Table ES-2. Program Costs

Project Number	Project Name	Objective(s) Addressed	Estimated Annual Cost
City-Wide Programs			
P-1	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	$100,000/yr
P-2	Water Quality Retrofit Program	• **Water Quality** • Capacity	$200,000/yr
P-3	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$275,000/yr
P-4	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$1,920,000/yr
P-5	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	$25,000/yr
P-6	Vegetative Facility Maintenance Program	• **Water Quality** • Maintenance	$25,000/yr
		Annual Total	$2,545,000/yr

*Note: Primary objectives addressed are identified in **BOLD**.*

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Implementation

CPs, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP) as described in this SMP.

To ensure effective implementation of the CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP. The purpose of this analysis was to inform recommendations as needed for additional Public Works Operations and Community Development engineering staff.

An additional 2.7 FTE in Public Works Operations and 1.4 FTE in Community Development/Engineering are recommended to accommodate new projects and programs defined in this SMP as well as to address deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the implementation schedule and respective funding needs of capital investments. The City will need to develop a financial plan to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, should reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

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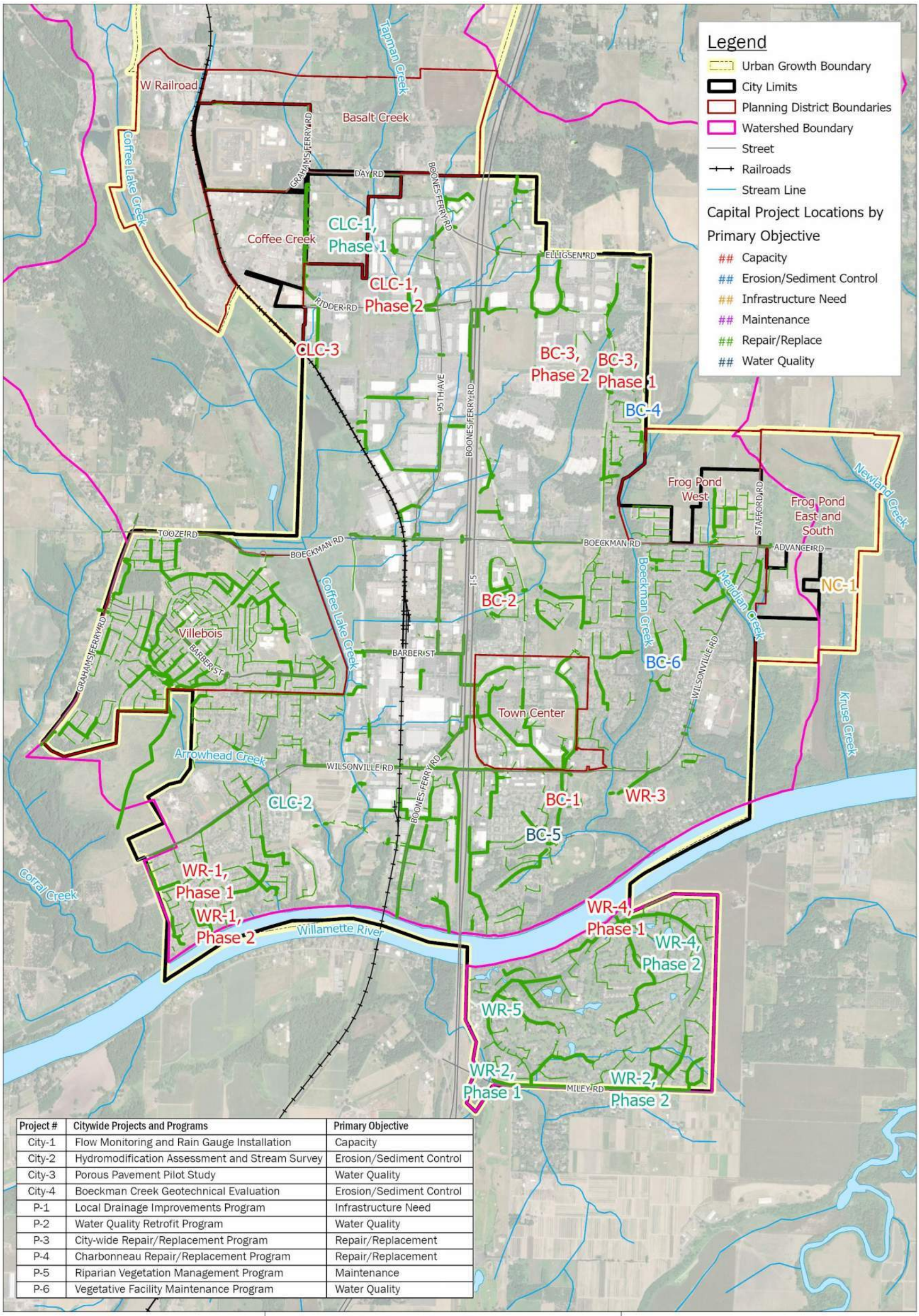

Project #	Citywide Projects and Programs	Primary Objective
City-1	Flow Monitoring and Rain Gauge Installation	Capacity
City-2	Hydromodification Assessment and Stream Survey	Erosion/Sediment Control
City-3	Porous Pavement Pilot Study	Water Quality
City-4	Boeckman Creek Geotechnical Evaluation	Erosion/Sediment Control
P-1	Local Drainage Improvements Program	Infrastructure Need
P-2	Water Quality Retrofit Program	Water Quality
P-3	City-wide Repair/Replacement Program	Repair/Replacement
P-4	Charbonneau Repair/Replacement Program	Repair/Replacement
P-5	Riparian Vegetation Management Program	Maintenance
P-6	Vegetative Facility Maintenance Program	Water Quality

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Capital Projects City-1 to City-4 and Programs P-1 to P-6 are citywide and not specific to a single location.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure ES-1: City of Wilsonville Capital Improvement Program Overview

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Section 1

Introduction

The City of Wilsonville (City) developed this Stormwater Master Plan (SMP or Plan) to guide stormwater and drainage-related capital project (CP), program, and policy decisions over a 20-year planning period.

The City's overall storm drainage system includes approximately 87 miles of piped and open channel (e.g., ditch, stream) conveyance, in addition to stormwater treatment and detention facilities for stormwater management. Most of the City's stormwater is collected and conveyed from north to south, discharging to the Willamette River via major stream corridors including Boeckman Creek (eastern portion of the City) and Coffee Lake Creek (western portion of the City). This SMP collectively considers both piped and open channel conveyances as part of the overall storm drainage system.

This Plan documents the processes and methods used to evaluate the City's storm drainage infrastructure, City stormwater programs, and maintenance activities. Results of the evaluation provide the City with projects, programs, and policies for implementation over the next 20 years and support future funding evaluations and stormwater utility rate and system development charge (SDC) calculations.

1.1 Need for a Master Plan

The City's previous SMP was completed in 2012, setting the course for stormwater management policies and CPs for the last decade. CPs and programs were proposed, prioritized, and scheduled (short term, midterm, long term, and unfunded) in the 2012 SMP, and some of the higher priority projects have been initiated or constructed. However, for some unconstructed and unfunded projects, the project needs have changed, and warrant reconsideration based on development drivers and regulatory needs.

In 2012, project prioritization focused more on project complexity and cost versus other objectives that are of increased importance (e.g., safety, recurring maintenance, water quality, erosion, and stream protection). New regulatory drivers, including the City's reissued 2021 Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit and the Oregon Department of Environmental Quality's (DEQ's) 2021 finalization of the 2019 Revised Willamette Basin total maximum daily load (TMDL) for mercury prompted increased consideration of water quality objectives as part of the capital project and program development effort.

Since 2012, new and re-development activities are rapidly occurring within the City's urban growth boundary (UGB). New infrastructure is continually being added, and ongoing maintenance of new infrastructure can strain City resources. The City also needs a proactive plan to address existing capacity deficiencies and aging and failing infrastructure, while considering resource limitations and development trends.

This SMP addresses water quantity, quality, and natural resource management for constructed drainage systems and stream corridors under the City's management.

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1.2 Master Plan Objectives

The City's overarching goal for this SMP is to guide storm drainage infrastructure improvements over a 20-year implementation period. Improvements must address maintenance/system condition issues, capacity issues, and water quality needs into the future. Specific objectives of the City's SMP include the following:

- Establish a process for evaluating and prioritizing stormwater needs in Wilsonville.
- Solicit information from staff to inform the identification of project needs and improvements.
- Identify known areas of flooding and other storm drainage problems, and provide project solutions related to collection, conveyance, treatment, and natural resource protection.
  - Update the City's existing hydrologic and hydraulic (H/H) model to evaluate system capacity based on current system information and updated land use and development conditions as obtained from the City's Planning Division.
  - Integrate findings and project needs stemming from stormwater planning documents completed since 2012 (i.e., 2015 Retrofit Plan, 2015 Hydromodification Assessment, development-specific master plans, etc.).
- Identify programmatic and planning opportunities to address areas of frequent maintenance needs, system condition deficiencies, and water quality concerns on a City-wide scale.
- Support long-term staffing and funding of the City's stormwater utility.
- Support current, pending, and future regulatory requirements and drivers through CPs, programs and policy recommendations.

This Plan is intended to support regulatory directives under the City's NPDES MS4 Permit and total maximum daily load (TMDL) obligations.

1.3 Approach

The City developed this SMP using an initial, collaborative planning approach with Community Development (Engineering and Planning divisions) and Public Works to assess known storm drainage problem areas and identify areas where the addition, replacement, or retrofit of infrastructure is needed to address an issue.

Targeted system evaluations were conducted to investigate water quality or natural resource opportunities and confirm capacity limitations. Following system evaluation efforts, Project Opportunity Areas were defined and vetted with the project team to inform the development of capital project and program concepts and costs.

This overall process allowed the City to develop multi-benefit projects that target areas of the City likely to be prioritized and funded in a capital improvement program.

Figure 1-1 outlines the approach used to develop this Plan. Detail related to specific evaluation efforts can be found in the following technical memorandums:

- Technical Memorandum #1 (TM1)- Stormwater Basis of Planning (February 2022), not included directly in this SMP document, but much of the content and figures have been integrated into this SMP document.
- Technical Memorandum #2 (TM2)-Geomorphic Reconnaissance of Boeckman, Meridian, and Arrowhead Creeks (May 2022), included in this SMP as Appendix C.
- Technical Memorandum #3 (TM3)-Hydrologic and Hydraulic Modeling Methods and Results, included in this SMP as Appendix B.

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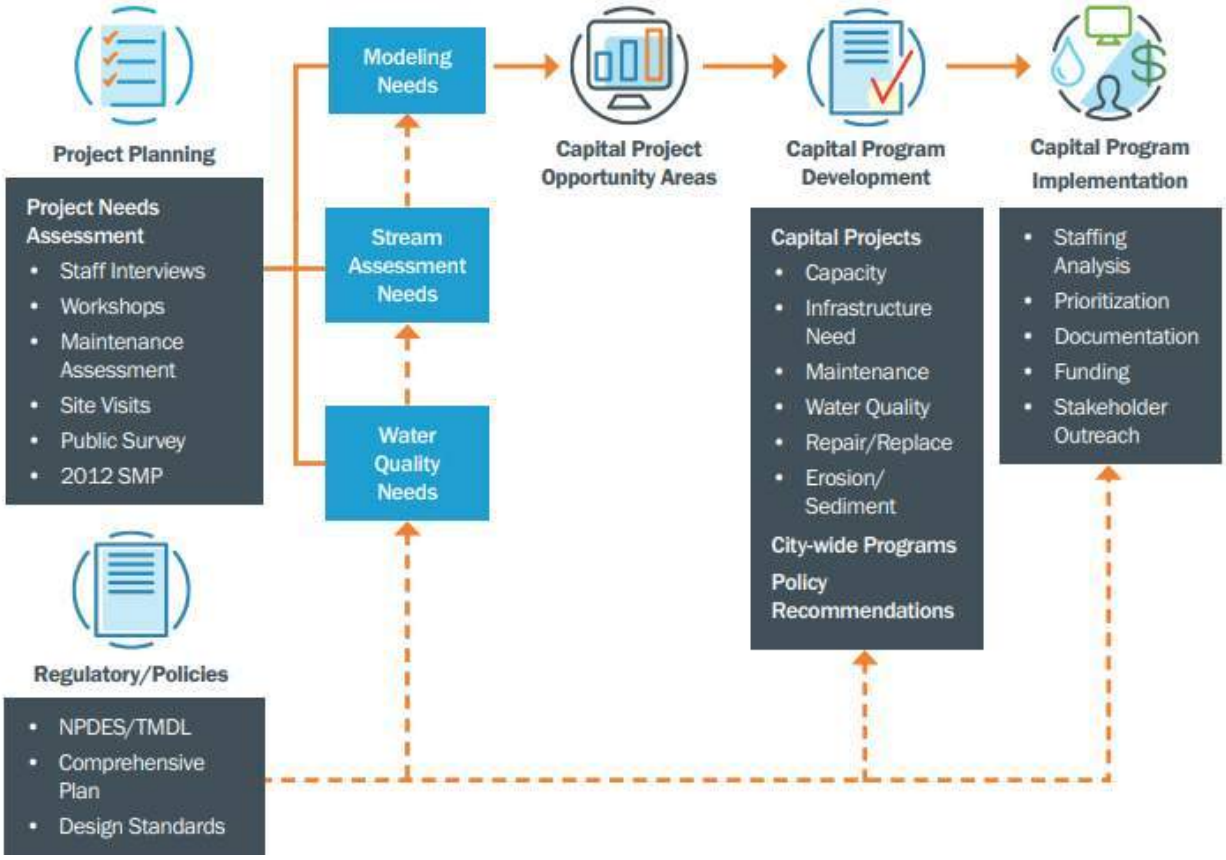

Figure 1-1: Stormwater Master Plan Approach

1.4 Supporting Documents

In addition to the 2012 SMP, several development-specific drainage reports and technical studies prepared since 2012 helped inform project development efforts. Many of these documents contain proposed infrastructure and capital improvements that have been integrated into capital projects proposed in this SMP. However, individual development master plans should still be referenced for detailed design concepts in these development areas. A summary of the reports and studies reviewed and considered for this SMP are listed in Table 1-1.

Additional detail related to regulatory drivers including the 2015 Retrofit Assessment and 2015 Hydromodification Assessment is provided in Section 2.6.

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Table 1-1. Existing Stormwater Planning Documentation and Reports		
Report	Date	Summary and application to the SMP
City of Wilsonville Stormwater Master Plan	2012	Recommends capital improvement projects to achieve city wide stormwater goals and objectives. Projects completed or in progress include SD4208 & SD4209, BC-4, BC-7, ST-6, ST-7, SD9030-9037, SD9013-9021, SD9060, ST-5, LID1, SD9022-9029, ST-9, and WD-3.
Villebois Village Master Plan	2013	Establishes projected land use categories/density requirements for the 2,300 residential unit development. Onsite and regional stormwater management concepts for treatment and detention are outlined.
Charbonneau Consolidated Improvement Plan	2014	Documents pipe replacement projects to address capacity deficiencies and poor condition of the existing stormwater collection system. Includes prioritization of stormwater pipe replacement in conjunction with other utilities (sanitary, water, etc.).
Stormwater Retrofit Plan	2015	Provides an updated prioritization of capital project needs stemming from the 2012 SMP, focusing on water quality criteria.
Hydromodification Assessment	2015	Provides an evaluation of hydromodification risk in stream corridors within the City, as well as recommended actions (including projects) for the City to implement.
Frog Pond Area Plan/West Master Plan	2015/2017	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage. The Frog Pond West Master Plan does not include information about proposed storm drain infrastructure, as that is detailed in the Area Plan.
Basalt Creek Concept Plan	2018	Provides preferred land use and recommends high-level concepts for transportation and infrastructure planning for the Basalt Creek Planning Area.
Town Center Plan	2019	Documents the proposed reconfiguration of existing stormwater infrastructure in conjunction with redevelopment of the Town Center area. Preliminary concepts send additional flow to the Library Detention Pond and remove an existing high flow bypass structure directing runoff west across I-5.
TMDL Implementation Plan	2019/2022	Outlines programmatic activities and best management practices (BMPs) implemented by the City to address instream temperature.
Frog Pond East/South Master Plan	2022	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage.

1.5 Master Plan Organization

Following this introductory Section 1, this SMP is organized as follows:

- Section 2 includes a description of the study area characteristics.
- Section 3 outlines the basis of planning, including the project needs assessment (identification of stormwater problem areas), water quality retrofit evaluation, and additional background to support the project identification and development effort.
- Section 4 summarizes the geomorphic stream assessment.
- Section 5 describes H/H modeling methods and results of the stormwater drainage system capacity evaluation and the identification of capacity-related capital project needs.
- Section 6 summarizes the stormwater capital project development effort, including development of project opportunity areas and determination of final capital project and program needs.
- Section 7 provides an overview of the implementation elements of the capital improvement program, including results of the stormwater staffing analysis specific to Public Works and Community Development, as well as project prioritization and policy recommendations.

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Section 2

Study Area Characteristics

This section provides an overview of study area characteristics, including location, topography, soils, land use, climate and rainfall, drainage system configuration, community perspectives, and regulatory objectives.

Referenced figures depicting study area characteristics are located at the end of this section.

2.1 Location and Study Area

The City of Wilsonville (City) is located primarily in Clackamas County with the northern portion of the City located in Washington County. The City is approximately 17 miles south of Portland, Oregon in the Willamette River Valley. The Willamette River runs west-east in the vicinity of the City, generally forming the southern City boundary with the majority of the City situated to the north of the river. The Charbonneau District is located south of the Willamette River (Figure 2-1). Interstate 5 (I-5) runs north to south through the center of the City and influences topography and drainage patterns.

The City covers six major basins within the city limits with topography that causes each basin to ultimately drain to the Willamette River (see Figure 2-2 at the end of this section). The waterways that define the major basins include Mill Creek (including the Corral Creek tributary), Coffee Lake Creek (including the Tapman Creek tributary), Boeckman Creek, and Meridian Creek which all flow from north to south and drain to the Willamette River. Developed areas adjacent to the Willamette River directly discharges to the Willamette River via pipe or open channel, and these areas are indicated on Figure 2-2, at the end of this section, as the Charbonneau basin and Willamette River direct basin. Together, Coffee Lake Creek/Tapman Creek and Boeckman Creek drain about 71 percent of the total city area, and their watershed boundaries extend outside the city limits and the urban growth boundary (UGB). The Coffee Lake Creek watershed is the largest, covering approximately 50 percent of the city area within the UGB.

The future Frog Pond East and South Planning District (within the UGB but partially within and outside of current City limits) will drain to Newland Creek, a tributary to the Willamette River, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby known as Kruse Creek in this SMP).

Some drainage systems in the city have also been re-routed to accommodate new development. For example, a historical flow diversion was constructed to re-route flows from Arrowhead Creek (in the Coffee Lake Creek watershed) to Legacy Creek (outside of the city limits), and a current flow diversion is used to re-route flow from the middle tributary of Coffee Lake Creek toward upstream Boeckman Creek. While efforts have been made to redirect flows back to their historical points of discharge, impacts can still be observed.

Table 2-1 summarizes the major basins and contributing drainage areas, both within the city limits/UGB and outside of the UGB. The defined study area for this SMP reflects areas of the City where hydrologic modeling was conducted, and the study area includes all areas within the city limits and UGB, with the exception of the Frog Pond East and South Planning District, located in the Newland and Kruse Creek basins. This area is predominately outside of the current UGB and subject to basin-specific master planning for utility placement (see Section 3.5).

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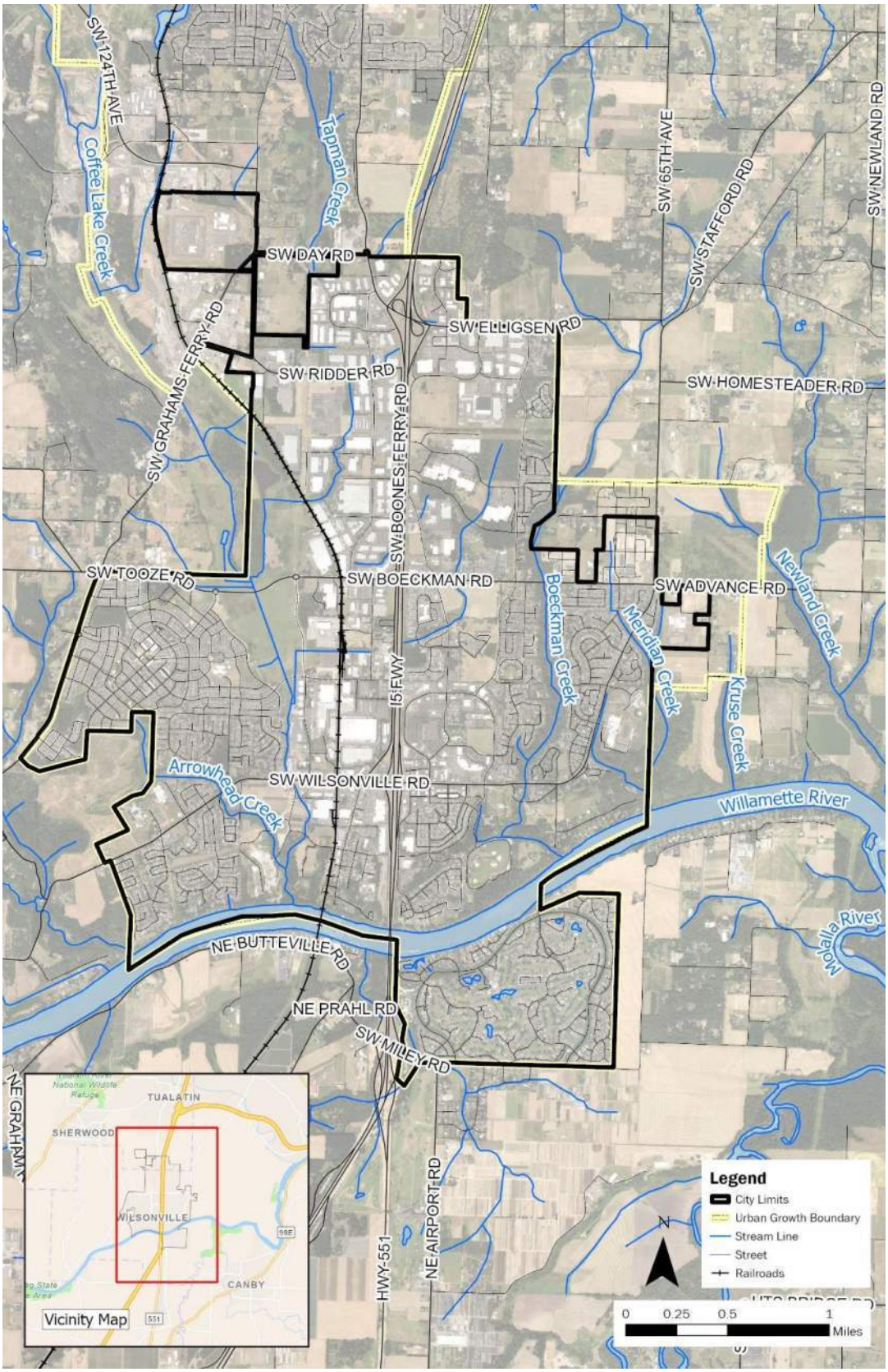

Figure 2-1: Location Overview

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Table 2-1. Study Area Overview				
Basin	Study Area (ac)			Total Study Area (ac)
	Within City Limits	Outside of City Limits (within the UGB)	Outside UGB	
Major Basins				
Boeckman Creek	1,096	70	806	1,972
Charbonneau	478	0	4	482
Coffee Lake Creek	2,332	1,418	1,412	5,162
Mill Creek[a]	101	0	10,424	10,525
Meridian Creek	283	100	87	470
Willamette River	505	0	0	505
Total	**4,795**	**1,588**	**12,733**	**19,116**
Related Basins				
Kruse Creek	13	55	231	299
Newland Creek	0	138	3,098	3,236

a. Area outside UGB is provided for informational purposes and does not contribute to City infrastructure.

2.2 Topography/Soils

Wilsonville's natural topography is characterized by steep hillsides on the eastern edge of the city, along the Boeckman Creek corridor, and relatively flat topography and floodplain area around Coffee Lake Creek basin and the associated Coffee Lake wetlands along the western portion of the city. Elevation within the city ranges from approximately 380 feet in the headwaters of Coffee Lake Creek to approximately 60 feet at the Willamette River.

Soil characteristics within the city vary by watershed. Soils within the city are generally limited in infiltration capability (Hydrologic Soil Group (HSG) C/D), although large areas of HSG B soils along the Willamette River and in the headwaters of Tapman Creek have higher infiltration rates. Soils are generally silty or silty loam, except along the canyon portion of Boeckman Creek, which are combination silt and sand. The downstream reach of Coffee Lake Creek also has a higher portion of gravel and cobble substrate materials than other city areas (ODFW, 2006).

Soils are an important watershed characteristic for evaluating potential runoff rates and volumes. Soils information for the study area was sourced from the National Resources Conservation Service (NRCS) Soil Survey online tool. Soil information is based upon data obtained from a 2016 publication from the U.S. Department of Agriculture, NRCS titled "Soil Survey (SSURGO) Database for Columbia County, Oregon."

For this SMP, soil texture classifications were considered for hydrologic modeling purposes. These texture classifications include various parameters that approximate soil runoff and infiltration potential. Generally, soils with sandy or silt textures have higher rates of infiltration and lower runoff potential, whereas soils with clay textures have lower rates of infiltration and high runoff potential.

Table 2-2 lists the NRCS Soil Texture Classes by percent coverage and by basin. Most of the study area (80 percent) is in the Silt Loam soil texture class. This soil class is characterized as, more than 70 percent silt, 50 percent or less sand, and less than 30 percent clay by weight.

Figure 2-3, at the end of this section, shows the soil texture classifications throughout the study area.

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Table 2-2. Soil Textures within the Study Area (by % of major basin)						
Basin	Clay	Loam	Sandy Loam	Silt Loam	Silty Clay Loam	Total
Boeckman Creek	0%	1%	0%	95%	4%	100%
Charbonneau	0%	67%	2%	30%	1%	100%
Coffee Lake Creek	7%	12%	0%	76%	5%	100%
Mill Creek	0%	0%	0%	97%	3%	100%
Meridian Creek	0%	0%	0%	100%	0%	100%
Willamette River	0%	16%	6%	74%	4%	100%
Total by Combined Area	**4%**	**11%**	**1%**	**80%**	**4%**	**100%**

2.3 Land Use and Population

The City resides within the Metro UGB, and as such development in and around Wilsonville is coordinated with Metro and the surrounding jurisdictions. The City has grown from a rural farming community to a thriving city encompassing approximately 7.8 square miles (approximately 5,000 acres) and is home to over 26,500 residents. The City's population has increased by approximately 3.6 percent annually over the last decade; increasing from approximately 19,509 in 2010 to 26,597 in 2022.[1]

Land use within the City of Wilsonville includes residential, commercial, and industrial, with most of the commercial and industrial development located along the I-5 corridor. Open space areas are scattered throughout the City and include a number of parks, wetlands, and riparian areas.

2.3.1 Development Conditions

Wilsonville is primarily developed within the current city limits; however, there are areas of undeveloped and underdeveloped land that are anticipated to redevelop and densify over this SMP planning period. These areas include the Town Center Planning District and existing low-density residential in the southern portion of the City.[2]

New development is projected to occur in designated future planning areas within the UGB. These future planning areas include the Coffee Creek Planning Area (industrial development), Basalt Creek Planning Area (industrial development), Frog Pond West Planning Area (residential development), and Frog Pond East and South Planning Area (residential and institutional development). The City uses a similar master planning process for the planning areas to guide infrastructure planning and provide opportunities to mitigate natural resource impacts, including the protection and restoration of adjacent stream channels.

1 United States Census Bureau (2022), https://www.census.gov/quickfacts/fact/table/wilsonvillecityoregon#

2 House Bill (HB) 2001 was adopted by the Oregon Legislative Assembly in June 2019, and it promotes middle housing to increase housing options for Oregon citizens. As such, areas zoned as "single family residential" had to be reclassified to allow for duplexes, triplexes, and other middle housing options.

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2.3.2 Land Use Coverage and Imperviousness

For this SMP, land use categories, coverages, and impervious percentages by land use category were initially prepared by the City's Planning Division and reviewed by BC to accurately reflect existing conditions and future development/densification anticipated because of House Bill (HB) 2001.[3]

Existing and future land use coverages for the study area are provided in Figure 2-4 and Figure 2-5 at the end of this section. Land use/zoning consolidation and reclassification, as well as associated impervious percentages by land use are reflected in Table 2-3. Additional description of the process for developing updated land use GIS coverages and impervious percentage estimates are reflected in Section 5.4.

Future land use coverage within the city limits or a defined concept planning area assumes that all developable (vacant) lands will develop into their underlining zoning category. In addition, specific residential areas in the City may adjust to a denser land use category (i.e., PDR2 to PDR5) per HB 2001. Aside from these situations, the existing land use coverage is generally assumed to be retained for the future development condition.

Table 2-3. Land Use Categories

Land Use Categories (2012)	Land Use Categories (Updated)	Calculated Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15 [b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential-Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used.

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City (October 2021).

b. Based on the adjusted impervious percentage value per the Boeckman Road Hydraulic Evaluation and model calibration (December 2021).

[3] Key revisions to City zoning coverage made for this SMP include the adoption of the "Planned Development Residential" (PDR) nomenclature to define residential lands, the subsequent removal of the "Villebois" designation for a subset of residential, multi-family residential, and commercial areas, and the addition of several previously uncategorized land use types.

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2.4 Climate and Rainfall

Wilsonville's climate is characterized by cool wet winters and warm summers. Most rainfall occurs between October and March. On average, December is the wettest month with an average of 7.1 inches of precipitation. July and August are the warmest and driest months with average high temperatures above 80 degrees Fahrenheit and less than 1 inch of rain per month.

The average annual precipitation for the Portland metropolitan area ranges from 37 to 43 inches, with an average of 1.8 inches of snowfall annually. There is currently no rain gage within the City of Wilsonville's jurisdiction, so the Aurora State Airport (UAO) rain gage (approximately 5 miles to the south) is used as a proxy. Based on the UAO data, Wilsonville averages 43 inches of rainfall a year and 2 inches of snowfall annually. Rainfall data from Clean Water Services (CWS) was also used to supplement H/H modeling and model validation efforts.

The lack of, and need for, local rainfall data has led the City to prioritize the installation of a rain gage and at least three flow meters as funded through the city-wide CP "City-1" (see Section 7 for more information). Acquisition of localized and real-time precipitation data allows the City to prepare for and support mitigation of precipitation-related impacts of climate change including increased rainfall intensities, storm surges and flooding, which are likely to affect many urban systems and services.

Current climate and rainfall projections show wide ranging uncertainty regionally and are not time scales typically used for designing storm systems. Therefore, modifications to the City's Public Works Design Standards (PWDS) and design storm events were not proposed for this SMP and associated CP sizing. However, urban planning is key to developing and implementing responses to changing precipitation patterns in urban systems. Incorporation of tools such as updated design storms reflecting local precipitation patterns are one way to adapt the SMP as necessary to address climate change. As data becomes available, the City will continue to work to identify how climate change is likely to impact the City's ability to operate its facilities and meet policy, program, and project objectives.

2.5 Drainage System

The City maintains an asset inventory of their stormwater collection system in GIS that contains various attribute fields depending on the asset class. This information is continually updated by City staff as new information becomes available, either from field investigations or as-built records.

The City manages approximately 83 miles (approximately 439,100 linear feet [LF]) of stormwater drainage pipe and culverts. Table 2-4 summarizes City-owned pipe and culvert system assets mapped (in GIS) throughout the City, as well as approximately 4 miles of mapped streams.[4]

4 Data for Tables 2-4 through 2-6 was sourced from City-provided GIS databases in 2021.

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Table 2-4. System Asset Inventory-Public (City) Pipe/Culvert/Stream (mapped in GIS), City-wide							
Diameter (in)	Length (ft) by basin						Total (ft)
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
<12	11,941	11,168	21,115	532	1,104	6,514	52,375
12-18	53,046	35,189	126,356	11,591	17,799	29,216	273,196
20-27	9,469	6,104	28,636	1,205	2,772	6,125	54,311
30-36	7,326	8,358	18,855	0	1,045	4,047	39,632
42-48	1,807	823	6,054	0	0	4,381	13,064
54-60	60	0	169	0	0	0	229
72-84	424	0	250	0	0	0	674
Total Pipe [a]	84,072	61,641	201,437	13,328	22,720	50,284	433,481
Total Culvert [b]	1,412	212	3,035	322	331	284	5,596
Total Pipe & Culvert	85,484	61,853	204,472	13,650	23,051	50,568	439,077
Total Mapped Stream [c]	5,791	2,718	11,003	0	2,760	197	22,469

a. Pipe refers to active, public mainlines only, excludes laterals.

b. Ownership, maintenance responsibility, and life cycle status of culverts not identified in GIS data-all available data is included in total length.

c. Mapped stream/creek total length clipped to area within city limits and excludes Willamette River shoreline.

Tables 2-5 and 2-6 summarize major City-owned storm structures, such as clean outs, inlets, manholes, stormwater treatment facilities, and outfalls.

Table 2-5. System Asset Inventory–Storm Structures (City ownership)							
Facility	Number by basin						Total
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
Clean out	566	95	656	3	104	109	1,533
Inlets [a]	618	423	1,363	101	203	292	3,000
Manholes [b]	619	304	1,574	119	158	307	3,081
Outfalls	77	5	117	18	21	24	262

Note: Excludes identified county, ODOT and private infrastructure.

a. Inlets include all inlet types: area drains, beehive inlets, catch basins, curb inlets, and other.

b. Includes all manhole types. Ownership not identified in GIS attribute data.

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Table 2-6. System Asset Inventory-Water Quality Facilities (City ownership/maintenance responsibility)

Facility	Number /Footprint Area (SF) by basin												Total	
	Boeckman Creek		Charbonneau		Coffee Lake Creek		Mill Creek		Meridian Creek		Willamette River (direct)			
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Infiltration Vault [a]	1	N/A	0		2	N/A	0		0		3	N/A	6	N/A
Vegetated Facility [b]	113	37,248	0		44	213,420	2	1,432	50	46,234	3	3,443	212	301,777
Pond	6	35,758	0		4	58,518	0		0		1	992	11	95,268

a. GIS data do not include the configuration of an infiltration vault. Based on communications with City staff, an infiltration vault is likely a proprietary filtration vault (e.g., Contech StormFilter). Infiltration vaults have N/A listed in the area column as these are point locations and not dependent on facility surface size.

b. Includes swales, lined planters, and filtration rain gardens.

Figure 2-6, at the end of this section, provides an overview of the stormwater collection system throughout the City including stormwater mains, manholes, outfalls and public stormwater treatment and detention facilities as of 2021. The City's GIS data reflecting both public and private stormwater treatment and detention/retention facilities is continuously updated by City staff, the most up to date record can be found at https://www.wilsonvillemaps.com/.

2.6 Regulatory Drivers

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing provisions of the federal Clean Water Act pertaining to stormwater discharges and surface water quality. DEQ issues permits related to surface water discharges, establishes water quality criteria for waterbodies based on designated beneficial use, and conducts studies and evaluations to determine whether a waterbody adheres to water quality standards.

Regulatory drivers considered in the context of this SMP include Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit requirements and the Total Maximum Daily Load (TMDL) program and associated 303(d) listings for receiving waters.

2.6.1 NPDES Permit Requirements

The City is a co-permittee on the Clackamas County Phase 1 NPDES MS4 permit, along with 13 other jurisdictions in Clackamas County, for management of stormwater runoff. Other neighboring co-permittees include the cities of West Linn, Lake Oswego, and Oregon City.

The NPDES MS4 permit program regulates the discharges of stormwater to receiving waters from urbanized areas and requires permitted municipalities to develop and implement stormwater control measures to address water quality. As a co-permittee, the City is independently responsible for the implementation of their permit, although coordination through intergovernmental agreements (IGAs) with co-permittees is commonplace to help efficiently address programmatic needs such as public education and monitoring. The City's NPDES MS4 permit was reissued in October 2021 after being administratively extended when the previous permit expired in 2017. Most recently, the effective NPDES MS4 permit was modified in May 2023 to address a change in monitoring requirements.

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Implementation of the City's NPDES MS4 permit is outlined in their 2022 Stormwater Management Program document (SWMP). Stormwater activities or best management practices (BMPs) are outlined to address the elements of the permit including:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Stormwater Management for New Development and Redevelopment
- Pollution Prevention and Good Housekeeping for Municipal Operations
- Industrial and Commercial Facilities
- Monitoring and Reporting
- Stormwater Management Facilities Operation and Maintenance Activities

In addition to the elements above, the reissued NPDES permit requires an assessment of outcomes from the 2015 Hydromodification Assessment and 2015 Retrofit strategy, which was due to DEQ by December 1, 2023. This review required an evaluation of progress made under both plans and, as necessary, establishing new goals, priorities, and projects. This SMP incorporates goals and project identification efforts conducted for both documents (see Section 3.2 Water Quality Retrofit Analysis and Section 4 Stream Assessment), as well as identifies new projects and programs to support efforts in the future.

The continued consideration of water quality in conjunction with planning and development efforts is addressed within the City's NPDES MS4 permit, further necessitating the need for this SMP to address stormwater treatment, particularly in locations where treatment is not provided.

2.6.2 TMDL and 303(d) Listings

Wilsonville is in the Middle Willamette River watershed. All areas within the city limits and associated concept planning areas discharge either directly or indirectly to the Willamette River between river mile (RM) 37 and 40.

On September 21, 2006, DEQ finalized a TMDL for the Willamette Basin. The TMDL addressed water quality impairment of the Middle Willamette River and its tributaries and included previously approved TMDLs by reference. The Willamette Basin TMDL addressed bacteria, mercury, and temperature, and included wasteload allocations (WLAs) and load allocations (LAs) specific to Designated Management Agencies (DMAs), except for mercury, as it required additional monitoring and analysis prior to the development of allocations.

On November 22, 2019, DEQ issued the Final Revised Willamette Basin Mercury TMDL, which was in turn submitted and disapproved by the United States Environmental Protection Agency (USEPA) due to questions related to the identification of sources and associated concentrations used to define WLAs and LAs. On February 4, 2021, the Willamette Basin mercury TMDL was reissued by the USEPA, including WLAs specific to the stormwater.

Table 2-7 summarizes the TMDL pollutants and associated LAs and WLAs applicable to Wilsonville. The City's 2022 TMDL Implementation Plan specifies temperature management activities targeting effective shade as well as natural resource and stream channel restoration and riparian cover. Additionally, in conjunction with NPDES MS4 obligations, the City is required to develop pollutant load reduction benchmarks at the end of each permit cycle to quantify TMDL pollutant load reduction estimates due to stormwater management activities and facilities. This requires the continual

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installation of water quality treatment facilities to ensure progress is made towards TMDL pollutant load reduction goals.

Additional water quality impairments relevant to the City are reflected in the effective (2018/2020) 303(d) list for receiving waters within the City. Parameters of concern for the Middle Willamette River include aldrin, biological criteria, DDT/DDE, dieldrin, and polychlorinated biphenyls (PCBs). Such parameters represent additional targeted parameters for pollutant reduction with the City's stormwater program, as TMDLs are slated for development for these parameters in the future.

Table 2-7. TMDL Summary for Wilsonville

TMDL	Year	Subbasin(s)	TMDL Parameters	TMDL Surrogate Parameters	WLA	LA
Willamette River	2006	Middle Willamette	• Mercury • Bacteria (*E. coli*) • Temperature	Effective shade (surrogate for temperature)	• Mercury = 97% [a] • Bacteria = 75-88% reduction [b]	Temperature = 85-95% effective shade

a. Air deposition is the primary source of mercury for MS4 permittees. Through the City's reissued (2021) MS4 NPDES permit, the City was required to prepare a mercury minimization assessment and BMP effectiveness analysis to assess pollutant removal potential.

b. The WLA for bacteria varies according to season and discharge location. A 75% reduction in bacteria load is applicable for areas directly discharging to the Willamette River and a 75% reduction is applicable during the fall, winter, and spring seasons for areas discharging to tributaries. An 88% reduction during the summer season is applicable for areas that discharge to tributaries.

2.6.3 Regulatory Program Integration

Development of this SMP provides a unique opportunity to address regulatory requirements in the context of capital improvement program development, as outlined below:

- The City's 2021 NPDES MS4 permit includes expanded stormwater program and maintenance activities that will require additional stormwater resources and staffing, and such needs have been considered when developing capital project and program costs in this SMP (see Section 3.2 and Section 7.3).
- Updates to the 2015 Retrofit Plan and the 2015 Hydromodification Assessment (as required by the 2021 NPDES MS4 permit) are reflected with updated project needs identified and prioritization reflected in this SMP.
- Ongoing preservation and maintenance of stream channel vegetation and planting activities, as reflected in the 2022 TMDL Implementation Plan, are supported by capital project and program efforts (see Section 4).

Regulatory requirements have the potential to influence the City's overall stormwater capital program throughout the 20-year SMP implementation period. Figure 2-7 shows the correlation between the regulatory programs and SMP components. It reflects how requirements and activities conducted independently under individual regulatory programs help inform each other, as well as how the SMP is the primary mechanism to support capital and program funding and staffing resources that collectively benefits all programs.

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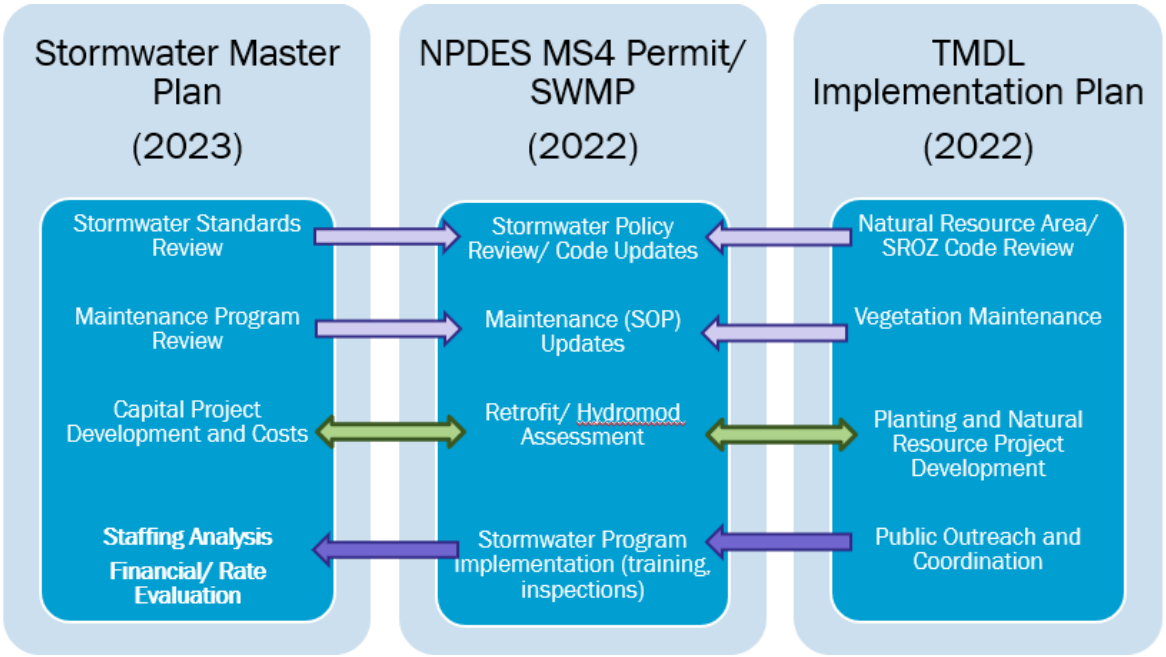

Figure 2-7: SMP and Regulatory Connectivity

2.7 Comprehensive Plan Review

All cities and counties in Oregon are required to adopt Comprehensive Plans and implement ordinances in conformance with the Statewide Planning Goals. Comprehensive Plans direct land use and development within local jurisdictions and must be legislatively adopted by the City and reviewed by the Land Conservation and Development Commission for compliance with Statewide Planning Goals. Local land use decisions must be made in conformance with the provisions and policies of the City's Comprehensive Plan.

The City of Wilsonville Comprehensive Plan (October 2018, updated June 2020) is periodically reviewed to ensure it is current and reflective of continued compliance. BC reviewed the City's Comprehensive Plan with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit. Review comments are associated with the Public Facilities and Services, under the subcategory heading "Storm Drainage Plan". Comments and suggested changes are summarized below:

- Under Policy 3.1.8, page C-8 related to the Storm Drainage Plan, to be more consistent with the MS4 NPDES permit, the reference to pollutants "temperature and turbidity" should be updated to include additional pollutants of concern.
- Under Policy 3.1.8, page C-8 and throughout the plan, there are references to "detention facilities". These references imply that detention is the main or sole type of facility used for stormwater management. Given the focus of the MS4 NPDES permit on green infrastructure, low impact development, and infiltration/retention, the term "detention facilities" should be replaced with a broader term such as "stormwater management facilities" or itemized to include more recently prioritized types of facilities.
- Under Policy 3.1.7 (based on numbering, it should be Policy 3.1.9), there is reference to constructing facilities to improve stormwater quality and control the volume of runoff. To be comprehensive this should be expanded to include reference to controlling peak rates of runoff.

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While not related to the MS4 permit, implementation measures related to natural resource areas and overlay zones in the Environmental Resources and Community Design Section (e.g., Implementation Management Measures 4.1.5.e, 4.1.5.m, and 4.1.5.n) were reviewed but no proposed adjustments are recommended in the context of the SMP.

2.8 Stormwater Operations

Stormwater-related maintenance activities are managed by the City of Wilsonville's Public Works Department, Roads and Stormwater Section. Stormwater-related planning, NPDES MS4 and TMDL compliance, and engineering activities are managed under the Community Development Department in the Engineering Division.

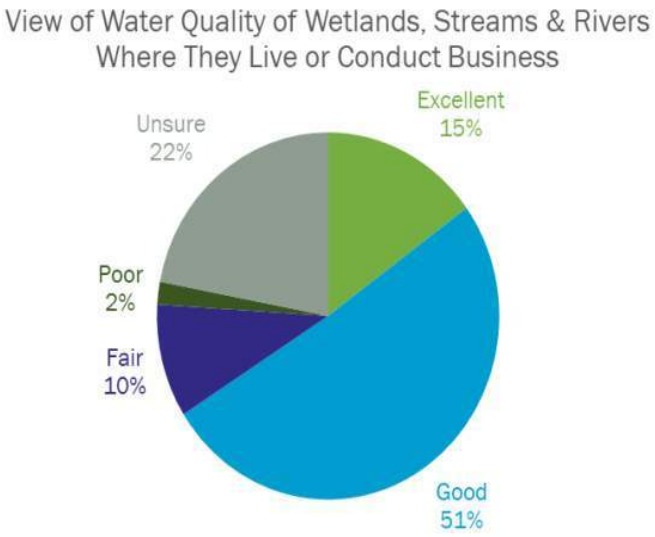
The City of Wilsonville's Public Works Roads and Stormwater Section currently has 2.74 full-time equivalent (FTE) to support ongoing stormwater maintenance efforts (0.4 FTE Stormwater Supervisor and 2.34 FTE Utility Maintenance Specialists). Of the 2.34 FTE Utility Maintenance Specialists, 2.0 FTE are dedicated to stormwater and the other 0.34 FTE reflect staff that assist with underground utility locating, but not dedicated to stormwater. Occasionally, additional coordination with Parks and Recreation is required to supplement staff to conduct routine and response-driven maintenance activities (time not reflected in the FTE summary).

The City of Wilsonville Community Development Department in the Engineering Division includes 1.5 FTE that are responsible for NPDES MS4 and TMDL compliance and directly support the Public Works Roads and Stormwater Section with facility inspections and other activities. Additional Engineering staff oversee and manage capital projects, as well as perform stormwater development review activities.

2.9 Community Perspectives

Outreach efforts were conducted at the beginning of the SMP process, in part, to obtain a better understanding of City perceptions of stormwater, as well as the perception of stormwater services provided by the City.

A public survey was advertised from April 1 to May 15, 2021, on the City's *Let's Talk Wilsonville* web platform. Interested citizens and community members were invited to participate. The survey was provided in both English and Spanish, and 90 participants completed the survey, encompassing both residential and business customers. The survey also provided a forum for participants to describe observed issues and concerns with the stormwater system operation and functionality.



Public surveys help confirm the types of capital projects most beneficial to the community

Findings from the survey indicated that more than 65 percent of the participants believe water quality in wetlands, streams, and rivers in Wilsonville are of excellent or good condition and 97 percent of participants the City had a positive impression of Wilsonville's stormwater services. For both residential and business customers, removal of pollutants before runoff enters streams; the improvement of water quality and habitat; and management of flood/flooding problems (in pipes and facilities) were identified as the most important stormwater services.

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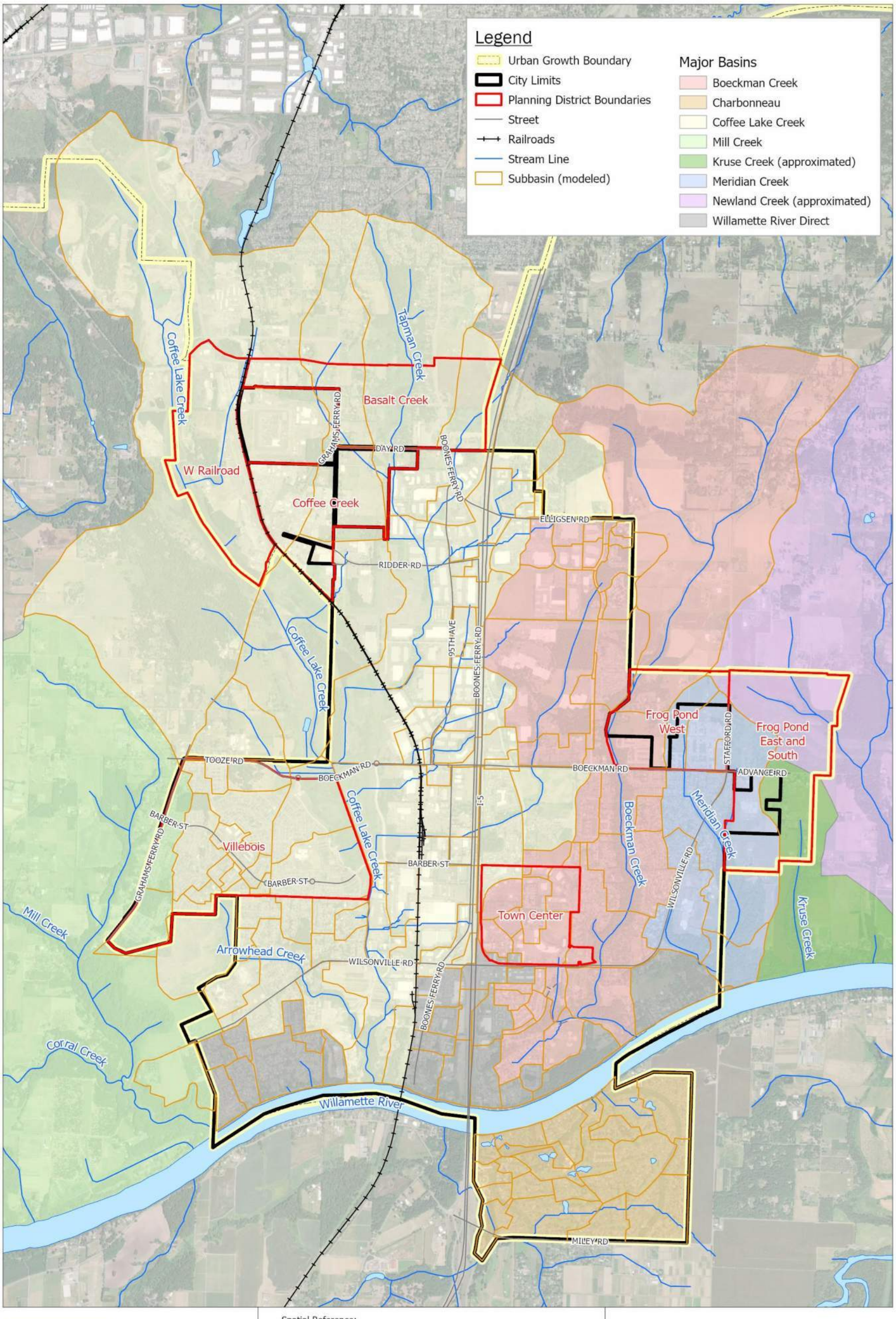

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-2: Major Basins and Planning Areas

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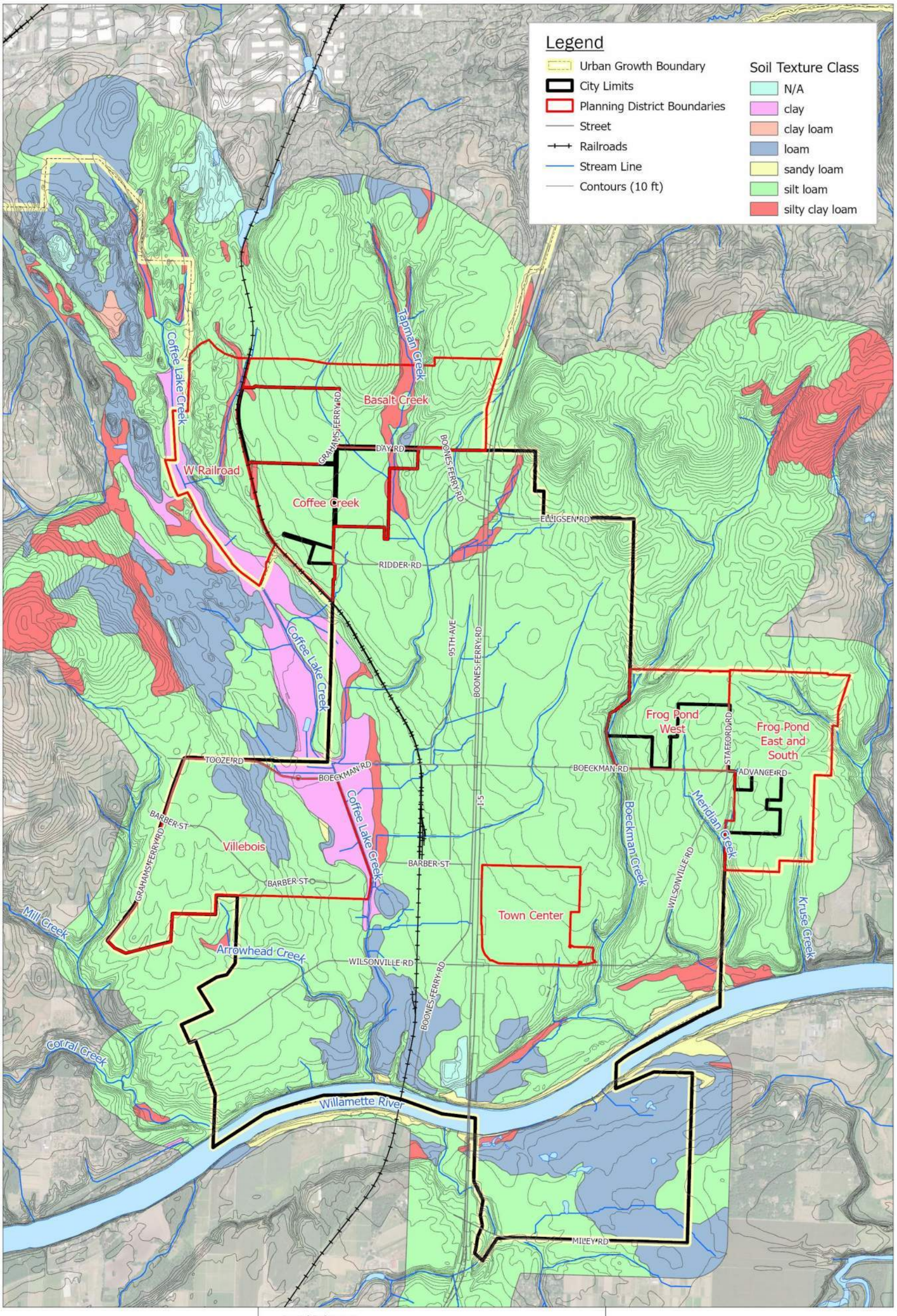

Figure 2-3: Soils and Topography

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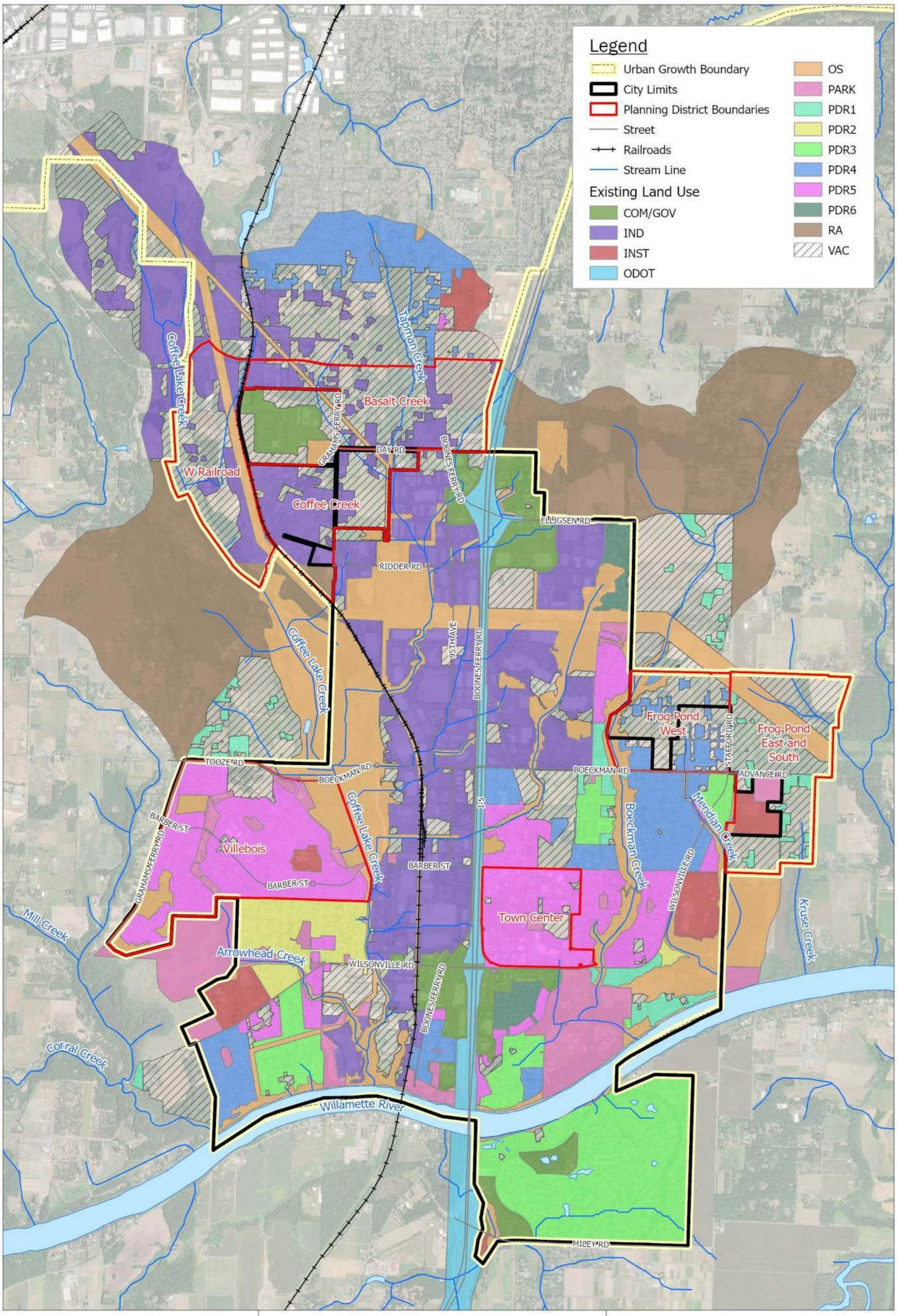

Figure 2-4: Existing Land Use Condition

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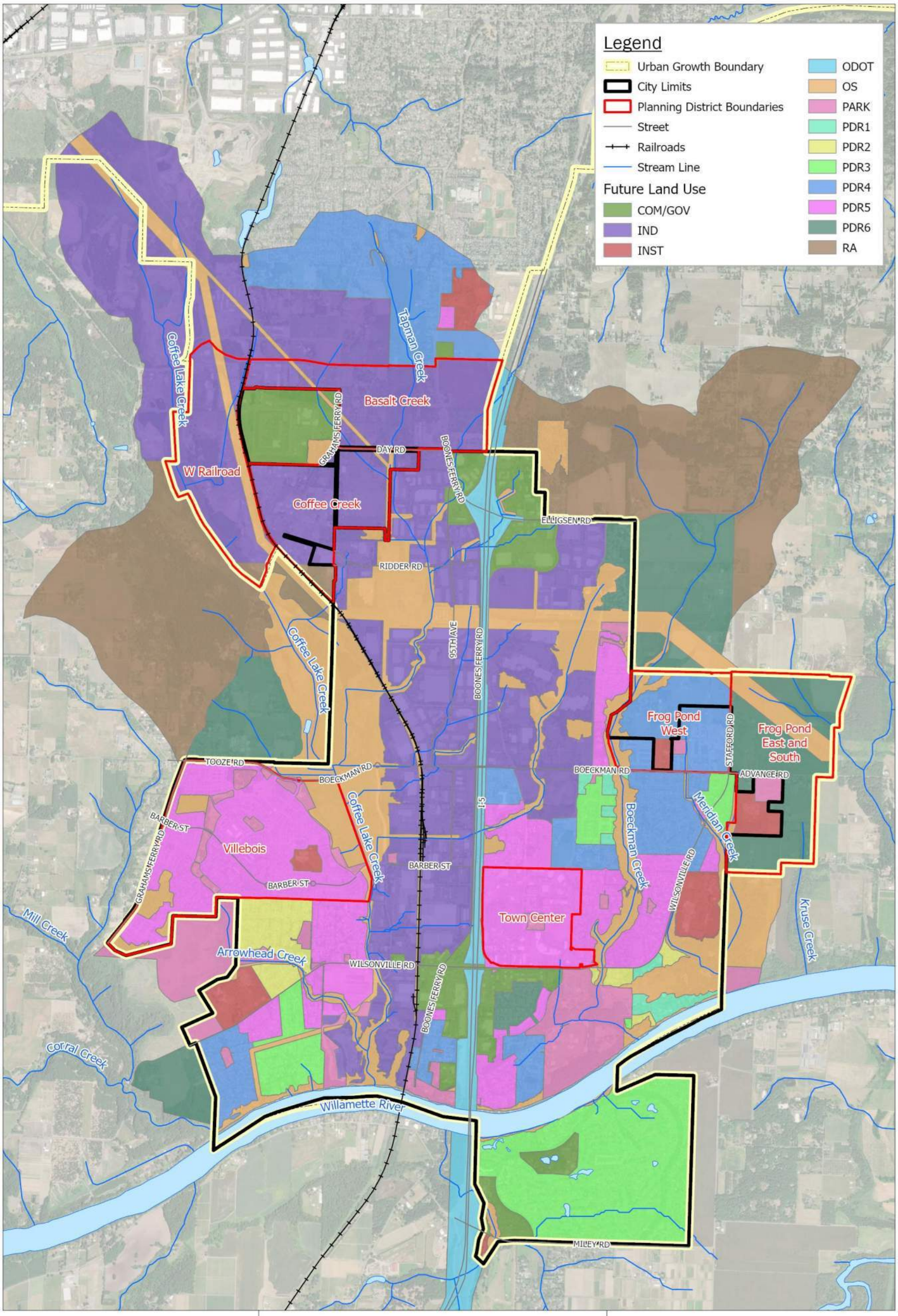

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-5: Future Land Use Condition

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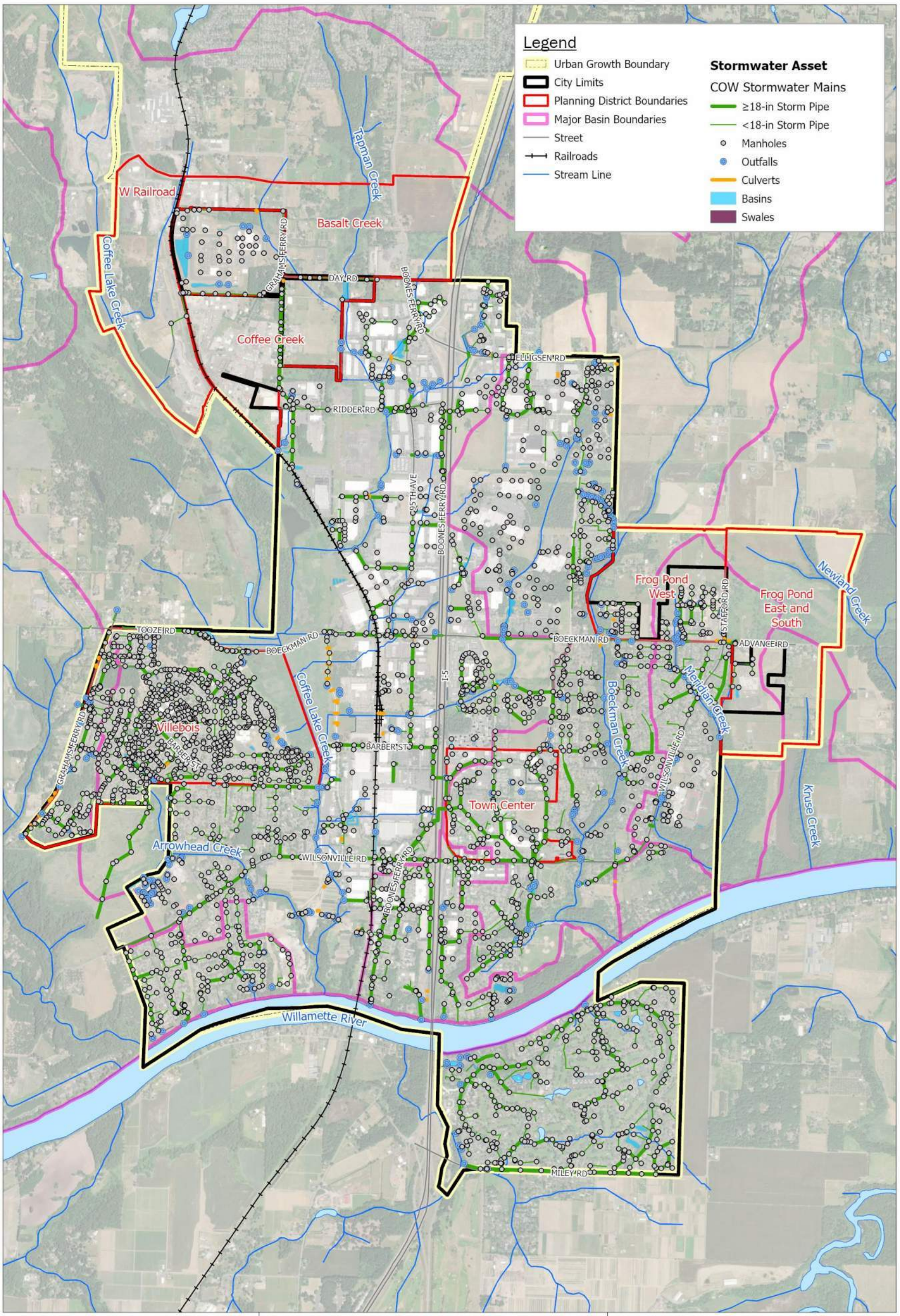

Figure 2-6: Stormwater System Overview

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Section 3

Basis of Planning

This section summarizes the overall project planning process and the process to identify stormwater problem areas and water quality retrofit needs, which collectively inform capital project needs identification and development efforts.

This project planning process allowed the City to develop information for areas and activities most likely to be prioritized and funded in a capital improvement program. This process qualified project and program needs in consideration of the SMP objectives, including rectifying known areas of stormwater drainage problems and flooding; enhancing and/or expanding water quality treatment and flow control; and identifying programmatic opportunities to address stormwater needs on a city-wide scale.

Appendix A includes background documentation related to the project planning activities, including a Stormwater Problem Area matrix (Appendix A, Table A-1) and a Project Opportunity Matrix (Appendix A, Table A-2). Identified project opportunities stem from the individual assessment of problem areas (Section 3.1), water quality retrofit opportunities (Section 3.2), stream assessment efforts (Section 4), and H/H modeling results (Section 5).

Referenced figures are included at the end of this section.

3.1 Problem Area Identification

A collaborative approach with Community Development and Public Works staff, as well as the public, was used to identify known stormwater problem areas where infrastructure improvement, replacement, or retrofit may be needed. Problem areas were initially identified through a combination of City staff surveys and follow-up discussions, an external survey (distributed via a virtual open house platform), review of the 2012 SMP, field investigations, and a Project Planning Workshop.

Problem areas were documented in a Stormwater Problem Area Matrix (Appendix A, Table A-1) by primary and secondary deficiency category (i.e., capacity issue, instream erosion/sediment issue, maintenance, and repair and replacement). In addition, portions of the stormwater system requiring refinement/update or expansion of the existing H/H model, as well as locations to be investigated as part of the stream assessment were identified. Problem areas are mapped by primary deficiency (see Figure 3-1 at the end of this section).

3.1.1 City Staff Surveys

In February 2021, surveys were distributed to City staff requesting input on specific locations of reported capacity deficiencies, system condition issues (i.e., pipe and open channel), frequent maintenance needs, and water quality opportunities.

On March 16, 2021, Public Works and Community Development staff collaborated and provided a summary table and accompanying map reflecting 39 problem area locations. Some locations and descriptions provided from Community Development staff overlapped with locations identified by Public Works. Specific issues included culvert misalignments, use of bubblers, standing water in roads and easements due to a lack of system capacity, flooding at open channels, crushed or

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improperly abandoned pipe, the buildup of sediment at catch basins, and damaged outfall structures.

3.1.2 External Stakeholder Surveys

To help facilitate external communications to the public (i.e., citizens and business community), a survey was prepared for external stakeholders to solicit information regarding drainage issues and project needs. External stakeholders included community members, businesses and community groups, developers and contractors, and neighboring jurisdictions.

The Let's Talk Wilsonville web platform was used to publish the external survey as well as provide general background information related to stormwater, the City's current stormwater system, and the purpose of the SMP. The external survey was publicized using local publications (i.e., Boones Ferry Messenger) as well as social media.[5] Website content was also translated into Spanish.

The external survey was open from April 1 to May 15, 2021, and included general demographic questions and questions intended to assess the level of understanding of the participant with respect to stormwater utilities. Additional questions related to values and level of service were also included. The survey included an opportunity for the participant to directly identify problem areas/locations and issues of concern.

The external surveys resulted in the identification of four additional problem areas that are documented in the Problem Area Matrix (Appendix A, Table A-1).

3.1.3 2012 Stormwater Master Plan

The City's 2012 SMP identified 50 stormwater CPs. Project categories included pipe replacement, planning/studies, restoration projects, and low impact development (LID) projects. Sixteen of the projects identified in the 2012 SMP were either completed or are in progress. Some of the proposed pipe replacement projects were subsequently reflected in the Charbonneau Infrastructure Plan (2014).

Outstanding (non-constructed) projects from the 2012 SMP were reviewed against identified problem areas and seven locations directly overlapped. The remainder of projects from the 2012 SMP were discussed with the City during a project coordination call to confirm the need to include the associated project area directly in the Problem Area Matrix. Because hydrologic modeling methods for this plan deviate from the 2012 SMP, and additional assessment efforts (water quality retrofit assessment, stream assessment) were conducted for this SMP, the City opted to independently evaluate project needs for this SMP update instead of relying on previous outdated work.

3.1.4 Project Planning Workshop

A Project Planning Workshop was conducted with City staff on August 24, 2021, to review data compilation efforts and the identification of the stormwater problem areas. The objective of the workshop was to solicit additional detail on the nature of each problem area, add any additional problem areas suggested by the City, and to categorize the problem areas by potential solution (whether project-based or programmatic).

A total of 46 problem areas were identified for discussion. Discussion included the size and scale of the anticipated project and whether a capital project solution or programmatic approach may be taken to address the issue. Problem area locations were also reviewed to establish 1) the need to conduct a site visit; 2) a need to expand model extents to evaluate the problem area; and 3) whether

[5] The current website is: Stormwater Master Plan Update | Let's Talk, Wilsonville! (letstalkwilsonville.com).

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there is benefit in including the location as part of the stream assessment effort. From the workshop, 22 locations requiring site visits were flagged and scheduled. Seven locations were flagged for consideration as part of the stream assessment effort.

3.1.5 Field Investigation

An initial field investigation was conducted September 27, 2021, to verify stormwater problem areas and assess potential project concepts in conjunction with the Project Planning Workshop. A total of 14 problem areas were visited, clustered into seven discrete site visit locations. The site visits provided BC staff with an opportunity to discuss each of the problem areas and better understand the overall drainage patterns and system to advance discussion of modeling needs and capital project concepts.

Subsequent site visits were conducted to inform H/H model validation, water quality retrofits, and capital project development efforts, and those field investigation efforts are discussed under the respective sections.

3.1.6 Results

The Problem Area Matrix (Appendix A, Table A-1) includes the findings from the Project Planning Workshop and field investigation efforts, and documents whether the problem area and potential project solution required additional evaluation as part of the stream assessment and/or hydraulic modeling (via expansion of the existing modeling extents). Problem area locations, including those where a site visit was conducted are reflected in Figure 3-1 at the end of this section.

Of the comprehensive list of 46 identified problem area locations, 11 locations were not anticipated to warrant a project or program solution but were maintained in Table A-1 for reference. Seven locations were identified for further evaluation as part of the stream assessment effort, and eight locations were identified for evaluation as part of the capacity analysis.

Following field investigations and additional evaluation efforts, vetted problem areas were carried forward as Project Opportunity Areas (see additional discussion in Section 6.1) and CP needs. Project Opportunity Areas are documented in Appendix A, Table A-2.

3.2 Maintenance Evaluation

Per Section 3.1, some problem areas were identified as the result of deferred maintenance or due to a relatively minor drainage issue that may not warrant capital project funding. These issues can be more efficiently addressed by expansion of the City's maintenance program (with increased staffing) and/or by defining a programmatic need that can be annually funded.

Maintenance activities and staffing allocations were discussed during a series of two interviews with Public Works staff in late 2021. Staff labor estimates by department and maintenance activity were compiled for use during interviews. The interviews were used to verify the current (as of 2021) maintenance activities, maintenance frequencies and internal processes to issue work orders. The City's Public Works Department uses Cartegraph for asset management, and Cartegraph refers to features (assets) in the City's GIS system to specify where maintenance is required.

Table 3-1 summarizes the primary stormwater maintenance activities conducted by the City of Wilsonville's Public Works Roads and Stormwater Section, along with a summary of the frequency and ability of the stormwater staff to meet maintenance targets (whether they are NPDES MS4 Permit-related or individual Public Works goals). Table 3-1 does not reflect an extensive list of activities but rather reflects the primary activities with a regulatory driver.

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Table 3-1. City Maintenance Activities and Potential Implementation Gaps

Activity	NPDES MS4 SWMP Requirement	Frequency Required [a]	Annual Target [a]	Regularly Meeting Target? (Y/N) [b]	Required Crew Size	Stormwater Staff Time (per person)	Department	Increased Staffing Need (Y/N)
TV inspection	Not explicitly stated	Annual	15% (60,000 LF) of public conveyance system >6"	N	2	200 ft/hr	Public Works (see Cartegraph Work Flow Process 8.0)	Y
Pipeline cleaning	Y	Annual	As required based on inspections	Y	2	250 ft/hr	Public Works	N
Priority CB inspection and cleaning	Y	Annual	All	Y	2	0.5 hr/facility	Public Works	N
Other CB inspection and cleaning (public)	Y	Every 4 years	25% of total	N	2	0.5 hr/facility	Public Works	Y
Culvert inspections and cleaning	Y	Annual	20%	Uncertain	2	2 hr/facility	Public Works	Potential
WQ MH inspection/cleaning	Y	Annual	150	N	2	1 hr/facility	Public Works	Y
Street sweeping [c]	Y	Monthly	All curbed	Y	NA	165 hours total annually	Contractor	N
System repair and maintenance	Y	As needed	–	Y	2	Varies	Public Works	N (Programmatic approach recommended)
Public water quality facility inspections	Y	Annual	All	N	2	1 hr/facility	Community Development/ Public Works	N
Public water quality facility maintenance [c]	Y	Annual	Public works performs maintenance independent of inspection results	Y (magnitude varies)	2	1-16+ hrs/facility	Public Works	Potential
Public water quality facility maintenance (landscaping)	Y	Annual	All	Y (magnitude varies	NA	291 hours	Public Works	Potential
Private WQ facility inspections [d]	Y	Annual	Varies	Y	1	4 hr/facility	Community Development	N

a. Based on the documentation in the 2022 SWMP Document and/or as documented in the City's Stormwater Maintenance Schedule.

b. Based on the available documentation in the NPDES MS4 annual reports or as provided by Public Works. This column reflects the ability of the Roads and Stormwater Section to conduct this work independently (not requiring staff supplementation from other Sections or Divisions).

c. Activity requirements vary based on inspection results.

d. Current GIS data does not differentiate types of facilities in the "basins" GIS layer. Basins includes ponds, swales, planters, and raingardens.

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3.2.1 Staffing Estimates to Support Maintenance Activities

In accordance with Table 3-1, additional staffing is required to conduct routine maintenance activities in conjunction with NPDES MS4 permit requirements. Estimated staffing needs were initially calculated based on required staff time and length/number of assets (see Section 2.5) and discussed with the Public Works Operations Manager to better incorporate the following staffing considerations:

- Approximately 35 percent of time reserved for stormwater maintenance ultimately supports other departments and emergency response needs. Because many maintenance activities require a crew of two people, the Public Works Roads and Stormwater Section (with 2.74 FTE) is unable to consistently conduct routine maintenance activities and be available to respond to emergencies.
- Based on detailed staff labor estimates compiled by the City, approximately 15 percent of work orders issued by the Stormwater Division are cancelled, which means staffing limitations are preventing the work orders from being completed.

Additional staffing estimates assume that one FTE equals approximately 1,650 hours of work after deducting estimated annual leaves, training, and other non-task related hours (Personal communication with Martin Montalvo, Public Works Department Operations Manager, November 17, 2021). The following maintenance activities were evaluated and additional staff support needs estimated.

- **CCTV Inspections:** Closed-circuit television (CCTV) inspections for stormwater and sanitary were historically contracted out by the City, but in 2021, the City took over delivery of the work. Stormwater CCTV efforts do not routinely occur. The City maintains a Public Works goal of inspecting 15 percent of their public collection system (>6 inches in diameter) annually, which is approximately 60,000 LF of pipe. Stormwater Division staff are needed to operate the CCTV equipment and review of the CCTV reports.

  Recommendation = 0.5 FTE

- **Non-priority Catch Basin/Pollution Control Manhole Cleaning:** The City regularly maintains identified priority catch basins, but routine cleaning of all catch basins is more challenging with current Roads and Stormwater section staffing levels (i.e., clean all catch basins on a 4-year cycle).

  Recommendation = 0.25 FTE

- **Vegetated System Maintenance:** LID facilities (swales/planters) and stormwater basins (ponds) require more extensive maintenance than traditional gray infrastructure (e.g., filter vaults, underground detention facilities, etc.). Maintenance activities include debris removal, vegetation removal and replacement, regrading, replacement of amended soil media, inlet and outlet cleaning, and repair of structural components. Some activities may occur during each maintenance effort (e.g., annually), whereas some may be conducted once every few years.

  Current staffing levels and maintenance efforts do not account for/include vegetation/soil replacement or the large-scale reconstruction/replanting of facilities that are not operating property. Additional staffing needs will help ensure a more proactive program for inspection and maintenance, as well as development of a standard operating procedure (SOP) to guide vegetated system maintenance (both shorter term and larger scale).

  Recommendation = 1.25 FTE (assuming annual maintenance of 4 hours for vegetated facilities; 16 hours for ponds).

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A total of two additional FTE are estimated to address recurring and deferred maintenance activities exclusive to the Public Works Roads and Stormwater Section. Final maintenance-related staffing recommendations in conjunction with the 2022 SWMP Document and identified CPs per this SMP are referenced in Section 7.3.

3.2.2 Programmatic Needs

The Project Planning Workshop and subsequent interviews with Public Works staff also identified the following ongoing programmatic activities that, if routinely conducted, could offset individual CP needs. These programmatic concepts were refined and are detailed in conjunction with CP development activities in Section 6.

- **Repair and Replacement (R/R) Program**. Dedicated funding is needed to repair/replace all public pipe 12-inches and greater within the City limits over a defined timeframe to address lifecycle costs.
- **Localized Drainage Improvements**. Dedicated funding is needed to assist with minor system configuration or installation needs or to respond to recurring maintenance needs.
- **Inlet Replacement Program**. Dedicated funding is needed to relocate and/or install curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues.
- **Green Street Retrofit Program.** A dedicated program is needed to retrofit local streets, which may include, depending on the feasibility, porous pavement overlays and/or green street facilities to promote additional infiltration and water quality treatment.

3.3 Water Quality Retrofit Analysis

Opportunities to incorporate water quality treatment are necessitated by the regulatory drivers in place for the City and supported by the community and public goals to protect water quality. These water quality retrofits can be accommodated through the addition of new water quality and/or detention facilities or the reconfiguration of existing facilities.

The problem area identification effort was focused on capacity and maintenance issues (Section 3.1) and did not focus on water quality objectives. Therefore, a separate analysis was conducted to identify locations where water quality could be integrated into the developed landscape or where pending development and future transportation projects could be leveraged to initiate construction of new facilities. To support the analysis, a GIS desktop evaluation was conducted to map public property (classified as vacant, parks, open space, or City-owned), ponds (public and private), water quality projects from the 2012 SMP, existing stormwater facility contributing drainage areas, and future transportation corridors.

Based on a review of the mapping and City staff preferences, the following objectives (strategies) were developed to guide the water quality retrofit analysis for this SMP:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects reflect water quality-related projects per the 2012 SMP. Review and integration of findings from the 2015 Retrofit Assessment was conducted to support compliance with requirements of the 2021 NPDES MS4 permit.
2. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation to address erosion/hydromodification issues.
3. Integrate water quality and/or flow control into existing project opportunity areas (where possible).

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Identification of new facilities to support future development and growth is not a preferred retrofit strategy, given the fact that private development will already be required to adhere to the City's prescriptive stormwater design standards.

Figure 3-2, at the end of this section, reflects source information used for the water quality retrofit analysis, as well as the resulting project needs.

3.3.1 2015 Retrofit Assessment Update

The City's 2015 Stormwater Retrofit Plan documents the City's stormwater policies, projects, and programs intended to improve water quality in areas of the City that are currently underserved or lacking stormwater quality controls. The 2015 Retrofit Plan included a review of twenty, non-constructed capital projects (CPs) per the City's 2012 SMP and 2014 Capital Improvement Program that had a water-quality element. Updated scoring criteria that focused on water quality objectives were applied to each project. Criteria included:

- Progress toward meeting TMDL Wasteload Allocations (i.e., bacteria and mercury)
- Priority areas for treatment (focusing on areas with no structural stormwater treatment facility and high pollutant generating areas [commercial/industrial land uses])
- Temperature control (meet the shade targets identified in the TMDL)
- Erosion prevention and control (i.e., retrofit of outfalls or stream channel restoration where active erosion results in the transport of excess sediment, increased turbidity and reduced instream water quality).
- Additional objectives (including project integration, maintenance, livability/sustainability, safety, and land acquisition).

For this SMP, the prioritized projects per the City's 2015 Retrofit Plan were reviewed to confirm: 1) projects completed and/or where a project need may have changed, and 2) projects that should be carried forward as part of this SMP.

Results of this review are detailed in Table 3-2. Identified project needs are carried forward as a Project Opportunity Area.

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	16	Viable project, but could be reflected in program (Section 6.5)		X	
LID7	SW Wilsonville Road Stormwater Planters	No	No	16	Viable project, but could be reflected in program (Section 6.5)		X	
CLC-10B	Coffee Creek Storm Projects	No	Yes	16	Not Applicable-reflects 2012 SMP CLC-1. Project number is unique to the Retrofit Assessment source document.			X
BC-5	Boeckman Creek Outfall Realignment	No	No	13	• Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. • Erosion issues not identified/confirmed in 2022 stream assessment effort. • Project location overlaps potential Boeckman Road mitigation site (Creekside Apartments). See Project Opportunity Area #23.	X		
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	13	• Referenced as a long-term project need from source document of retrofit assessment. • Project location overlaps with a portion of the Boeckman Road mitigation area (Siemens/Ash Meadows). Current METRO project may also negate the project need.			X
BC-4	Gesellschaft Water Well Channel Restoration	No	No	13	Project still viable and construction may occur in conjunction with other infrastructure projects (Interceptor Trail).	X		
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	13	Viable project, but could be reflected in program (Section 6.5)		X	
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	12	• Short term/High priority CIP need per source document from retrofit assessment. • Project locations may overlap potential Boeckman Road mitigation site (Canyon Creek Park). See Project Opportunity Area #24.	X		
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	12	• Mid-term project need from source document of retrofit assessment. • See Project Opportunity Area #9.	X		
WD-4A	Willamette Way West Outfall Replacement	No	No	11	Project location is being monitored. No immediate project needs.			X
WD-4B	Belknap Ct Outfall Protection	Yes	No	11	Complete. Remove from list.			X

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
WD-4C	Morey Ct West Outfall Protection	Yes	No	11	Complete. Remove from list.			X
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	9	• Project involves rehab of five existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. • Erosion issues not identified/confirmed in the 2022 stream assessment. • Targeted retrofit of culverts has already occurred.			X
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	9	• Project was intended to enhance the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream. Mid-term project need from source document of retrofit assessment. • Project location overlaps with potential Boeckman Road flow mitigation site. See Project Opportunity Area #23.	X		
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	8	• Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. • See Project Opportunity Area #9.	X		
CLC-2	SW Parkway Avenue Stream Restoration	No	No	8	• Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.			X
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	8	• Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.			X
CLC-8	Coffee Lake Creek Restoration	No	No	8	• Project is no longer needed. This location is associated with 5th and Kinsman Project-Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.			X
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Limited access onto private property.			X
CLC-4	Ridder Road Wetland Restoration	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Not a high priority need for future restoration, but maintain as a future Project Opportunity Area.	X		

a. The overall score is per the 2015 Retrofit Assessment and considered for this 2024 SMP as an indication of the preferred water quality projects per the 2012 SMP.

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3.3.2 New Retrofit Opportunities

In addition to project needs maintained from the 2015 Retrofit Assessment, several opportunities to integrate water quality and/or flow control into existing, underutilized facilities or another Project Opportunity Area were identified. These opportunities and their preliminary retrofit concepts are summarized in Table 3-3.

Table 3-3. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Underutilized Facility	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-in-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. Piped stormwater system may be reconfigured to provide a flow control benefit. Opportunity to help mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Underutilized Facility and Existing Project Opportunity	Existing swale is not draining properly. Swale needs retrofit and potential relocation.
Canyon Creek Park	Existing Project Opportunity	Existing Park property has potential for construction of a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

3.4 Boeckman Road Hydraulic Evaluation and Mitigation Opportunities

Concurrent with development of this SMP, Wilsonville is constructing improvements to Boeckman Road from SW Canyon Creek Road to SW Stafford Road, as part of a Progressive Design-Build project. The Boeckman Road Corridor Project (BRCP), initiated in 2021, involves widening and reconstruction of the road, including removal of an existing culvert and instream flow control structure (FCS) on Boeckman Creek immediately north of Boeckman Road. The removal of the culvert and FCS prompted earlier planning efforts and a technical evaluation of Boeckman Creek. Opportunities for water quality and flow control mitigation within the Boeckman Creek watershed were identified and considered with project planning efforts for this SMP.

In 2021, a hydraulic evaluation of Boeckman Creek was conducted to evaluate potential changes to flows and water surface elevations (WSE) in Boeckman Creek due to removal of the FCS and the existing culvert crossing (Boeckman Road Hydraulic Evaluation, January 2022). The City's existing H/H InfoSWMM model (also used for this SMP) was refined and calibrated to reflect existing hydraulic performance. Efforts to identify potential off-site flow mitigation were initiated in 2022 with significant participation from City staff and the Progressive Design-Build consultant team. Both upland and instream mitigation locations were evaluated based on specific criteria including contributing drainage area and available storage capacity.

Four potential mitigation locations were ultimately identified as preferred locations. Preferred mitigation locations are referenced in the Project Opportunity Matrix for this SMP (see Appendix A, Table A-2).

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3.5 Growth-Related Considerations

A particular focus for this SMP is future development/growth areas, as these areas are expected to develop in the near term and require new stormwater infrastructure including pipe and stormwater management facilities. Such future development may result in increased impervious area and additional stormwater runoff.

Specific growth areas of interest for this SMP include those areas documented in the Basalt Creek Concept Plan (2018), the Town Center Plan (2019), and the Frog Pond East/South Concept Plan (2022). These growth areas represent Project Opportunity locations because new public infrastructure is required and may be funded (in part) by the City. Therefore, cost estimates for new infrastructure are required for inclusion in the overall stormwater CIP.

3.5.1 Basalt Creek Concept Planning Area

With the adoption of the Basalt Creek Concept Plan by the cities of Tualatin and Wilsonville in August 2018, efforts are underway to amend the City's Comprehensive Plan and Transportation System Plan to promote industrial development in the area. Downstream capacity deficiencies on Tapman Creek require further study and planning to address increases in impervious surface due to anticipated development. Development in the Tapman Creek basin will be subject to differing onsite stormwater management standards for new and redevelopment activities. The City of Tualatin, in the upstream portion of the basin, implements Clean Water Services (CWS) standards, whereas the City of Wilsonville regulates stormwater locally. Despite differing standards and requirements, all drainage from the Basalt Creek concept planning area will ultimately drain through City infrastructure before entering Coffee Lake Creek.

The Day Road area, including Commerce Circle, is identified as a problem area (Appendix A, Table A-1) and Project Opportunity Area (Appendix A, Table A-2) and receives flow directly from new development in the Basalt Creek Concept Planning area. Policies related to onsite stormwater management in the upstream portions of the basin may be considered to help mitigate existing, downstream capacity constraints.

3.5.2 Town Center Planning Area

The Town Center Plan (2019) addresses a key redevelopment area in the city, located north of Wilsonville Road in the Boeckman Creek basin. Redevelopment of the Town Center area is anticipated to require major reconfiguration of the existing stormwater collection system. The Town Center Plan proposes the demolition of several segments of existing stormwater trunkline and the installation of new piping alignments in conjunction with City ROW. As a result of these improvements, additional flow is anticipated to be conveyed to the downstream Library Detention Pond, south of Wilsonville Road in Memorial Park.

Inclusion of new infrastructure associated with the Town Center redevelopment area is reflected as a Project Opportunity in Appendix A, Table A-2 (Figure 3-3). In addition, the Library Pond is identified as a current problem area, as well as a Project Opportunity. Policies related to the use of the Library Pond as a fee-in-lieu strategy/facility for treatment and/or flow control for upstream redevelopment are described in Section 6.3.4.

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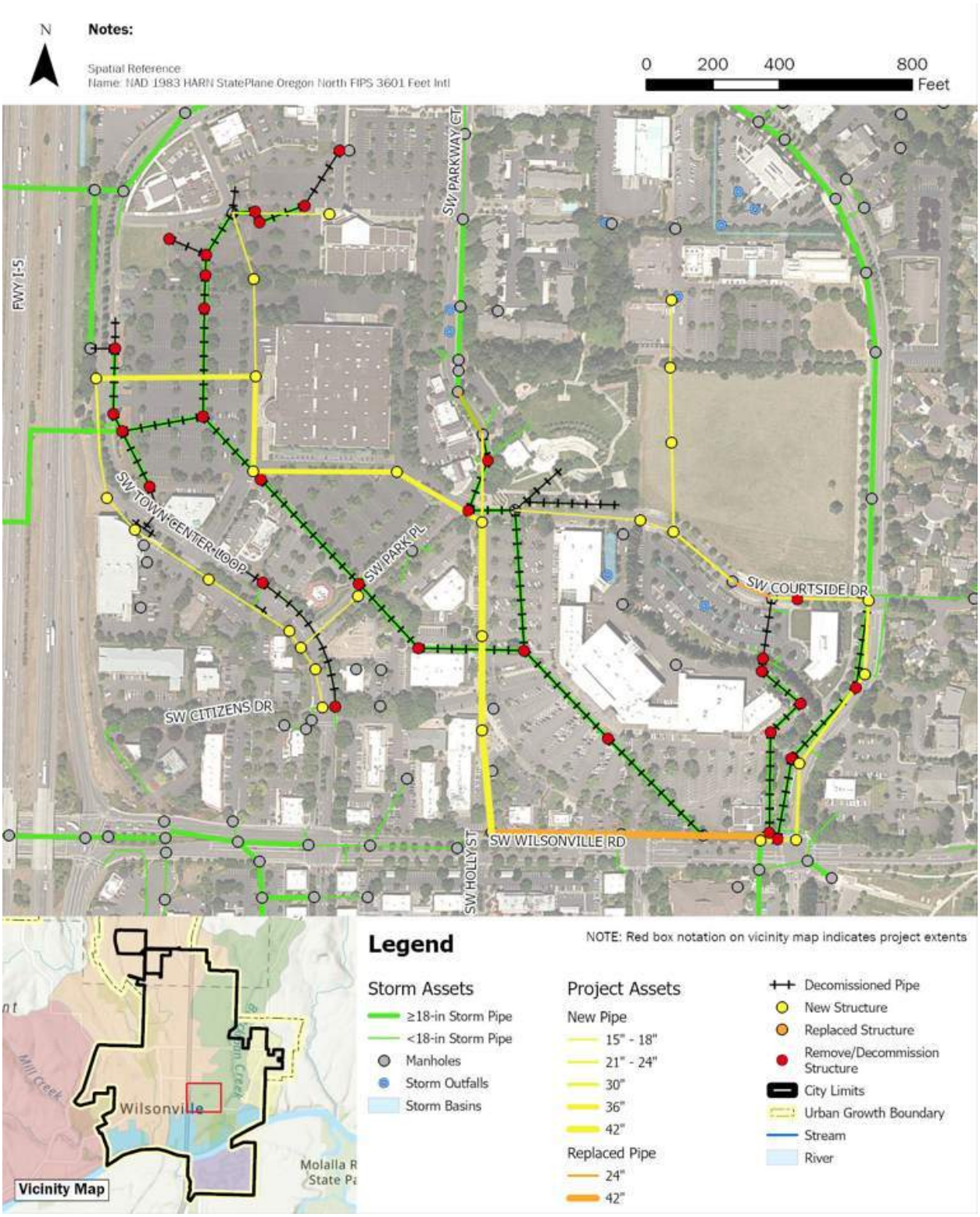

Figure 3-3: Town Center Stormwater Infrastructure Proposal

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3.5.3 Frog Pond East and South Planning Area

The Frog Pond East and South Planning Area is located east of the existing Frog Pond development, adjacent to Advance Road in the Newland Creek basin. New development warrants the installation of new stormwater trunklines and outfalls in dedicated City ROW. Inclusion of new infrastructure associated with the Frog Pond East and South Planning Area is reflected as a Project Opportunity Area (Appendix C, Table C-2).

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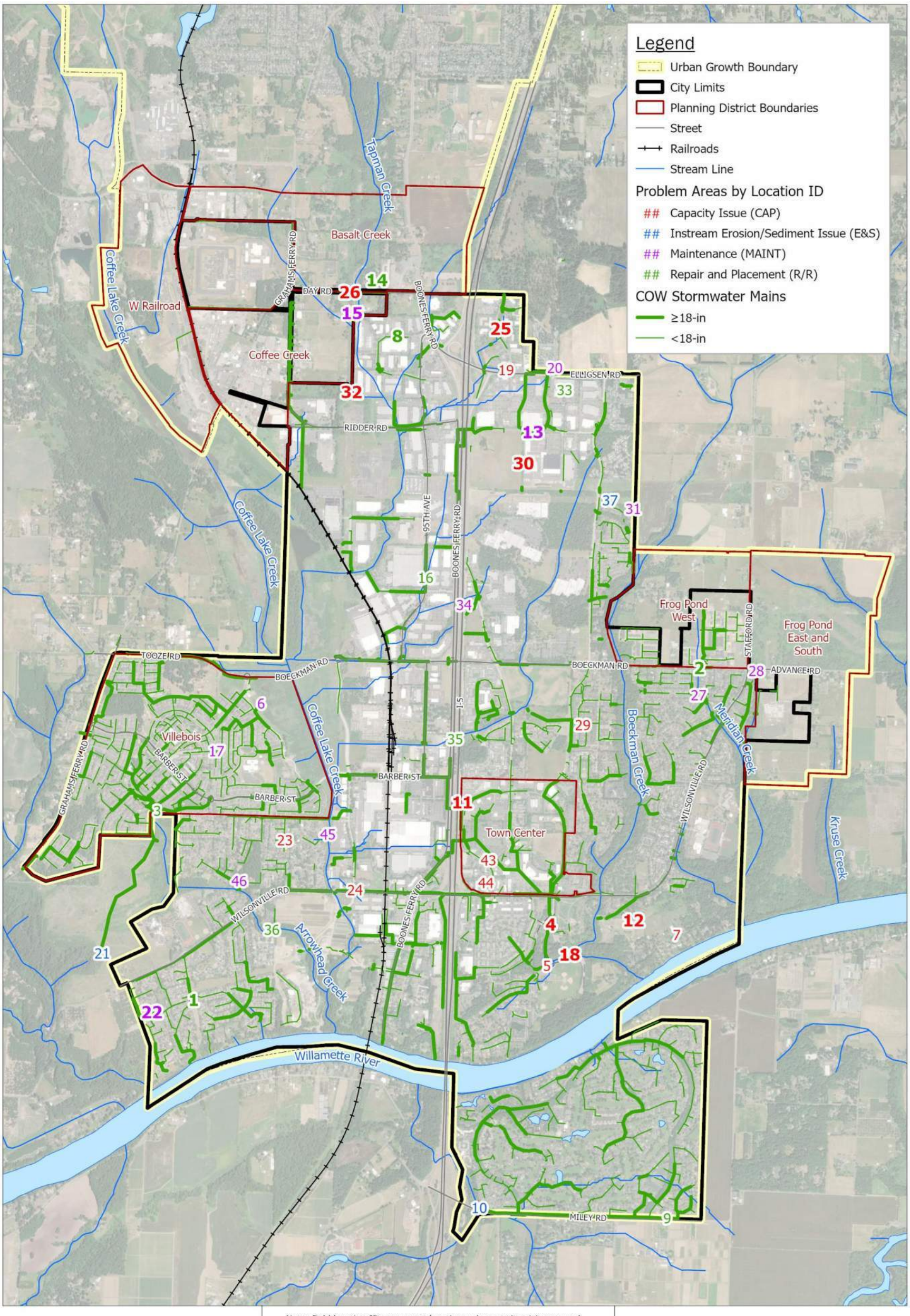

Note: Bold location IDs represent locations where a site visit occurred.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

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Stormwater Master Plan

Figure 3-1: Problem Area Location

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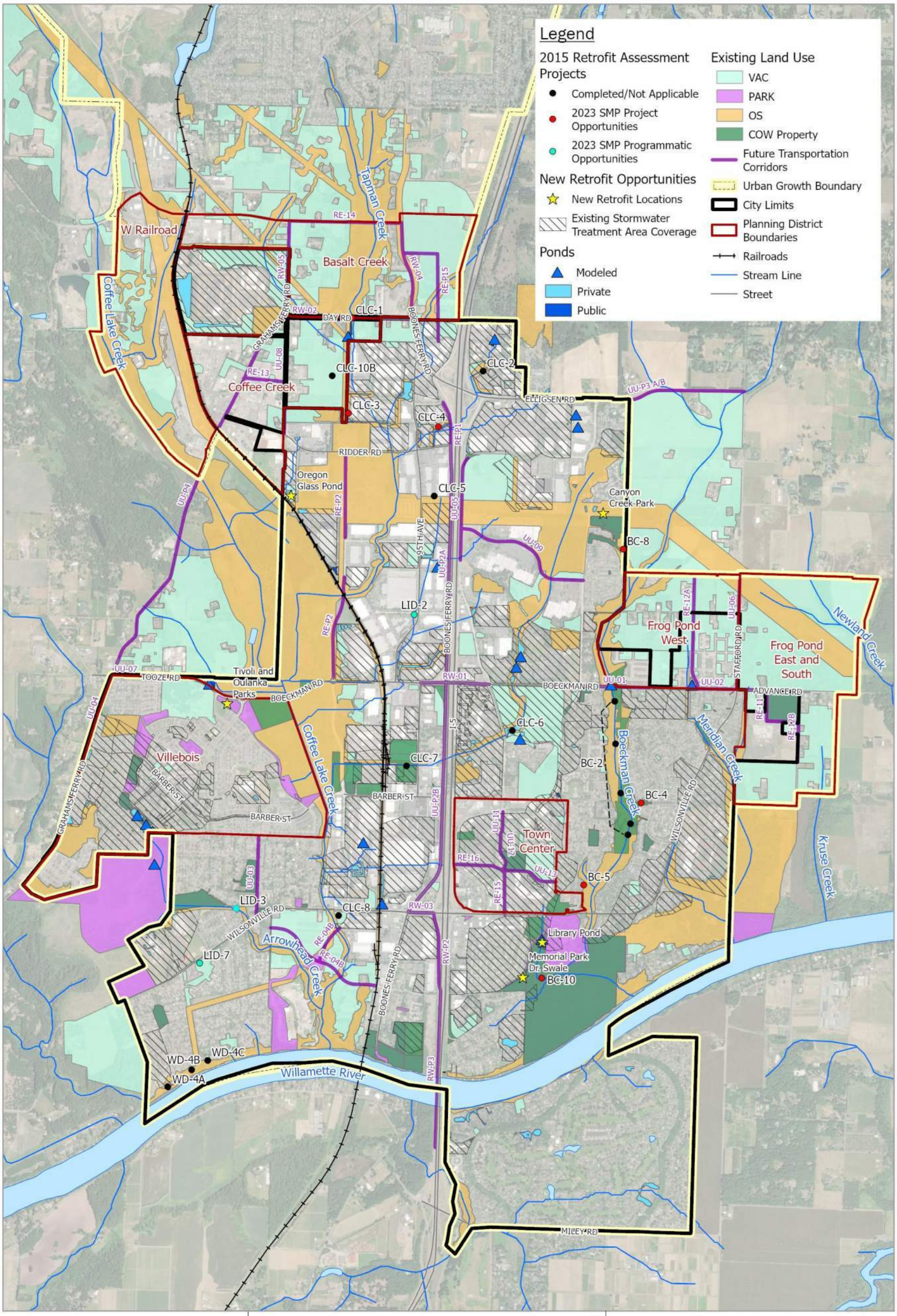

Figure 3-2: Water Quality Retrofit Analysis

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Section 4

Stream Assessment

Tributary stream channels to the Willamette River are an important element of the overall stormwater collection and conveyance system in the city. Stream channels provide conveyance and storage of water and sediment and provide habitat for aquatic and terrestrial species.

This section outlines results of the stream assessment conducted for this SMP to inform project, program, and policy recommendations. The stream assessment effort helps improve the understanding of hydraulic processes in the selected reaches, as well as identify infrastructure risks associated with changes in stream hydraulics. The stream assessment is described in additional detail in Appendix C. Project Opportunities stemming from the results of the Stream Assessment are detailed below and referenced in the Project Opportunity Matrix (Appendix A, Table A-2).

4.1 Regulatory Background

The City of Wilsonville prepared a 2015 Hydromodification Assessment in accordance with requirements of the City's 2012 NPDES MS4 permit. The 2015 Hydromodification Assessment focused on aspects of hydromodification[6] that are addressed in NPDES MS4 permits, specifically erosion, sedimentation, and alteration of stormwater flow, volume, and duration that may cause or contribute to water quality degradation. Efforts included a GIS desktop assessment, targeted field assessment, and review of existing planning documents and policies to inform the development of strategies and approaches to address hydromodification. Findings from the 2015 Hydromodification Assessment reflect the following:

- Observed stream channels indicate historical hydromodification impacts; minor impacts are observed in locations of concentrated flow or development encroachment.
- Current City programs and policies appear to be effective at addressing hydromodification indicators.
- Current land use and future development patterns show there is a potential for future flow increases; however, the City's current land use policies and updated stormwater design standards are in line with best practices to address hydromodification; and
- The City has identified, and is implementing projects to address hydromodification (per their 2012 SMP).

Recommendations from the 2015 Hydromodification Assessment included the following:

- Implement key capital projects to address instream hydromodification problems including erosion at stormwater outfalls and sites with historic channel modifications.
- Continue to monitor known problem areas.
- Continue to develop and implement master plans for new development areas that address natural resource and channel restoration needs.

[6] The U.S. Environmental Protection Agency (EPA) broadly defines hydromodification as the alternation of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources."

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This SMP update includes a focus on instream channel conditions and erosion prevention in conjunction with capital project development. To inform capital project and program needs, as well as directly address the recommendations per the 2015 Hydromodification Assessment, a geomorphic stream assessment was conducted for select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse creeks to better understand the stream processes and identify infrastructure at risk due to changes in stream hydraulics.

Channel incision and aggradation can inform locations of active erosion and hydromodification risk

4.2 Objectives and Methods

The stream assessment included stream walks along priority reaches as well as desktop mapping and analysis. The objectives of the stream assessment were to:

- Provide a baseline assessment of existing physical stream conditions.
- Identify existing problem areas, such as locations of channel instability or excessive erosion that may impact private or public infrastructure.
- Assess the potential for changes and impacts to the stream channel.
- Recommend capital, operational, maintenance or other solutions or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The stream assessment was conducted by Waterways Consulting, Inc. (Waterways) to reflect the continued evaluation of stream channel conditions as recommended by the 2015 Hydromodification Assessment. Information collected as part of this assessment should be referenced and used during future inspection efforts to help assess improvements and degradation.

In accordance with the Problem Area Identification effort (Section 3.1), City staff identified priority and secondary assessment locations in the city based on the observed hydromodification impacts, land accessibility, future development potential (and the ability to establish a baseline condition of the stream), and history of staff or citizen complaints/concerns.

Figure 4-1 identifies specific stream reaches investigated for the Stream Assessment, as well as the secondary assessment locations not investigated as part of this effort that may be considered in the future.

4.2.1 Stream Walks

Stream walks were conducted over four days, in November 2021 and January 2022 in the Meridian, Boeckman, and Arrowhead Creek basins. Additional stream walks were conducted in October 2023 in the Newland Creek and Kruse Creek basins. Stream walk locations are identified generally in Figure 4-1 at the end of this section. Specific reach numbering associated with stream walk locations can be referenced in Appendix C.

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Stream walk activities included a review of key geomorphic features, stream and bank conditions, and infrastructure. During the stream walks, photographs were taken to document stream characteristics and conditions. Physical and biological stream conditions were noted and mapped and included:

- General vegetation condition.
- In-stream and hillslope erosion processes (incision, aggradation, and hillslope failures).
- Location of stormwater outfalls, exposed pipes, bridges, culverts, affected roads and trails.
- Wildlife activity (presence of beaver dams).
- Heavily eroded banks, headcuts, and bedrock outcrops.

Photo logs and stream reach summary sheets were developed to identify cross section and physical condition characteristics for each reach at the time of the stream walk (see Appendix A).

4.2.2 Desktop Analysis

The desktop assessment included compilation and analysis of geospatial data, including infrastructure, topographic, and geologic information. Waterways used the 2014 LiDAR data to create “Relative Elevation Models” (REMs) for Boeckman, Meridian, Arrowhead, Newland, Kruse and Tapman[7] creeks. A REM shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream.

Waterways also created and analyzed topographic and geologic cross sections and stream longitudinal profiles to develop a set of field maps identifying streams and stormwater infrastructure identified during the field component.

4.3 Findings and Results

Observations made during the stream walks were used to qualitatively identify current stream channel deficiencies and potential strategies for improvement.

Table 4-1 summarizes the general findings by stream reach. Locations where ongoing vegetation management/invasive removal is needed are identified, as well as locations where future monitoring for impacts is recommended. Locations considered a Project Opportunity (see Appendix A, Table A-2) are also identified, and these locations were discussed with the City for consideration as a capital project (see Section 6). Additional detail on these locations is provided in Appendix C.

Of note, the downstream portion of Kruse Creek (Reach 4) was unable to be accessed due to bank stability issues. Future annexation and development activity along Kruse Creek should incorporate a geotechnical evaluation and consider setbacks from the top of canyon, given ongoing landslide risk.

[7] Tapman Creek is referred to as Basalt Creek in TM2.

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Table 4-1. Summary of Stream Assessment Findings

Stream	Assessment Date(s)	Reach No.[a]	Beaver Dam Presence (Y/N)	Infrastructure at Risk? (Y/N)	Invasive Vegetation Present? (Y/N)	Field Observations	Vegetation Management Need? (Y/N)	Ongoing Monitoring Need? (Y/N)	Project Opportunity? (Y/N)
Boeckman Creek	Nov. 19 and 24, 2021	2-9	Y	N	Y	Stream reaches appear laterally confined and vertically stable.	Y	Y	N
Boeckman Creek	Jan. 25, 2022	1	N	Y	N	Risk of channel incision and lateral erosion due to lack of stable beaver dams and seasonal variability in the backwater conditions on the Willamette River.	N	Y	Y
Meridian Creek	Nov. 26, 2021	1	N	Y	Y	Stable stream reaches due to bedrock base level control and lateral confinement. Obstructed culvert at Wilsonville Road (30") results in backwater conditions.	Y	Y	Y
Meridian Creek	Nov. 26, 2021	2	N	Y	Y	Historic channel incision and head cuts, but active head cuts not readily observed. Obstructed culvert at Willow Creek Drive and downstream stabilization measures in place.	Y	Y	Y
Arrowhead Creek	Jan. 25, 2022	2-3	Y	N	Y	General stream stability due to shallow hardpan and abundant beaver dams. Riparian vegetation management needed to ensure beaver activity.	Y	Y	N
Arrowhead Creek	Jan. 25, 2022	4	Y	Y	Y	Culvert at pedestrian crossing is failing. Upstream portion of culvert not evaluated due to access issues.	Y	Y	Y
Kruse Creek	Oct. 26, 2023	1-2	N	N	Y	Moderately incised channel but appears relatively stable. Riparian corridor in relatively good condition, but non-native (ivy and English holly) was noted in Reach 1.	Y	Y	N
Kruse Creek	Oct. 26, 2023	3-4	Unknown	Unknown	Unknown	Reach 4 was inaccessible due to deep channel incision and unstable banks. High groundwater table and seeps and springs contributing to natural stability issues.	Unknown	Y	N
Newland Creek	Oct. 26, 2023	1-3	N	N	N	Reaches are highly incised and likely to incise further. Culvert at SW Kahle Road is acting as grade control and likely preventing additional headcut. Riparian corridor is in good condition, but narrower in reaches 2 and 3.	N	Y	N
Newland Creek	Oct. 26, 2023	4	Y	N	N	Gradient is flatter with in-channel wood and debris dams. Reach 4 is at risk of bank stability, but only one head cut observed. Riparian corridor is in good condition.	N	Y	N

a. Reach numbering can be referenced in Appendix C.

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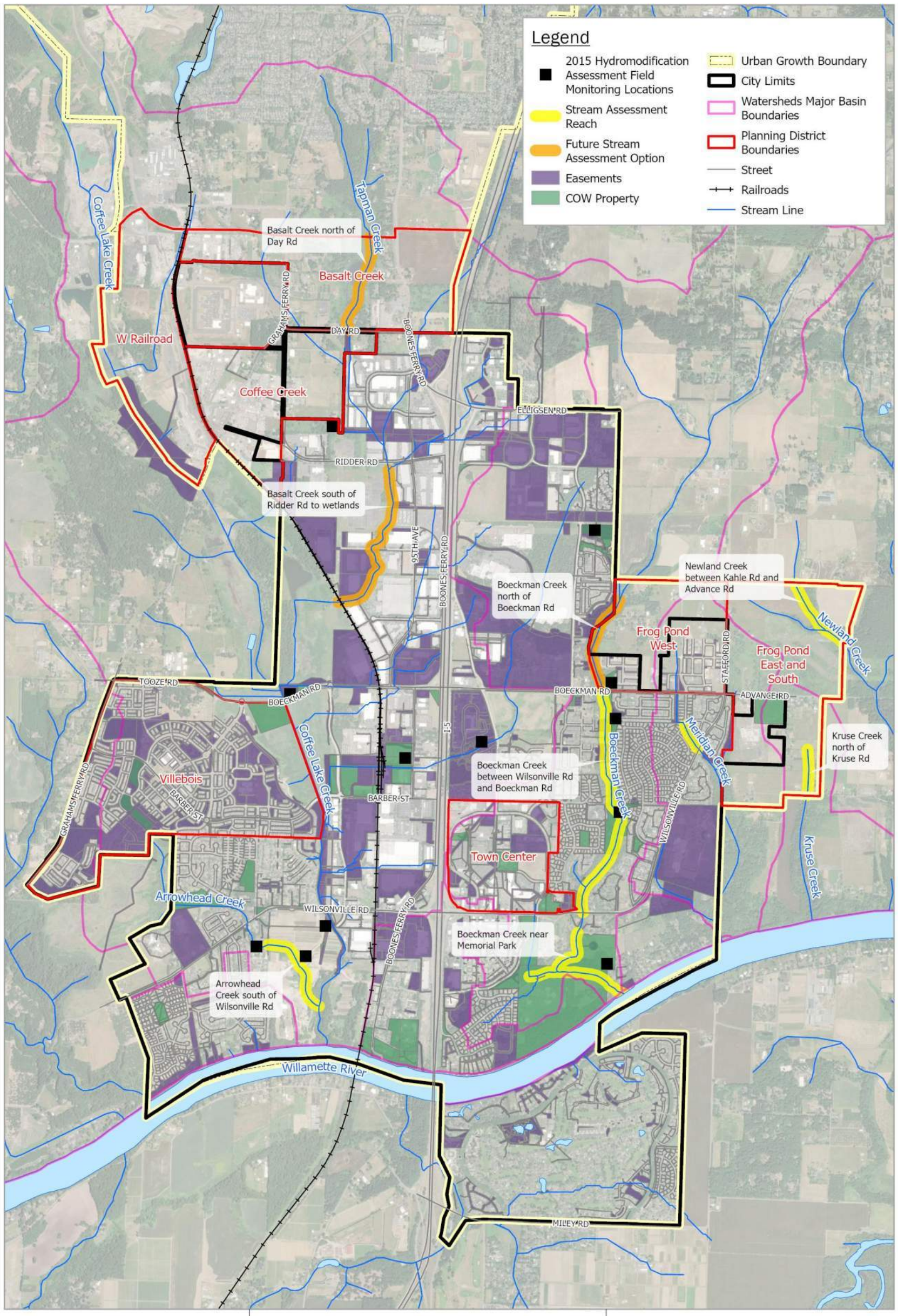

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Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Figure 4-1: Stream Assessment

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Section 5

Capacity Evaluation

Stormwater conveyance is the primary function of the City's storm drainage infrastructure. This section summarizes the H/H system modeling methods and results to verify and identify conveyance capacity limitations.

H/H modeling conducted for this SMP used the City's existing InfoSWMM model, which was originally developed as part of the 2012 SMP effort. The model includes major hydraulic components of the City's stormwater drainage system including public stormwater pipe (15-inch-diameter and greater) and open channel conveyances defined by a simplified trapezoidal geometry. Capacity deficiencies within the study area were identified and/or problem areas validated using the H/H model.

This section summarizes the updates to the City's 2012 InfoSWMM model for this SMP effort, as well as the H/H modeling approach and results.

H/H modeling assumptions, methods and results are described in additional detail in Technical Memorandum #3 (TM3), included in this SMP as Appendix B. Referenced figures are included at the end of this section.

5.1 Objectives and Approach

The City's existing InfoSWMM model was used to simulate the hydraulic performance of select pipe and open-channel systems and evaluate the capacity limitations of City-owned stormwater infrastructure.

Targeted updates to the City's existing model were conducted where updated development activities, CP installations or identified problem areas were identified and there was a need to quantify system capacity to help develop project solutions.

For this SMP, the following modeling approach was generally used to update the H/H model and evaluate conveyance capacity:

1. Review available data (via GIS, as-builts, etc.) to compare mapped infrastructure (i.e., pipe size, slope, etc.) and existing model profiles. Update the existing hydraulic model accordingly.
2. Compile a list of known and suspected problem areas and identify areas where modeling is needed to inform corrective measures. Expand the hydraulic model extents accordingly.
3. Refine the existing subbasin delineation based on the updated hydraulic model coverage.
4. Develop an updated city-wide hydrologic model to estimate stormwater runoff generated for existing and future development conditions.
5. Validate modeled flooding using historical rainfall records, and anecdotal flooding information (photographs, City records),
6. Verify capacity constraints and identify potential sources or causes of flooding with City staff (preliminary flooding results); and
7. Use the validated hydraulic model to document existing capacity deficiencies for inclusion as Problem Opportunity Areas.
8. Use the validated hydraulic model to develop potential solutions to capacity problems (see Section 6).

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5.2 Stormwater Design Standards and Performance Criteria

Design standards and criteria related to the sizing and evaluation of stormwater infrastructure are described in the City of Wilsonville's Public Works Standards (PWS), Section 3 Stormwater & Surface Water Design and Construction Standards, as revised in December 2015.

Additional planning guidelines are described in the City of Wilsonville Code (WC), Chapter 4 Wilsonville Development Code (WDC). The WDC defines assumptions related to the concept planning district designations, overlays and open space designations, and general development regulations that inform land use coverage and hydrologic modeling assumptions for this project.

5.2.1 Planning and Sizing Criteria

Stormwater sizing/design criteria will ultimately be used to both assess the existing stormwater system for deficiencies and guide the design of capital projects in the context of the SMP. Planning and sizing design criteria for select infrastructure components are outlined in Table 5-1. Design storms referenced in the design criteria are outlined in Table 5-2.

Table 5-1. Wilsonville Drainage Standards and Design Criteria

Criteria	Source	Value
Water Quality Facility Design	• PWS 301.4.04.c	• Provide water quality treatment for a design storm of 1 inch in 24 hours. • Design water quality facilities to capture and treat 80% of the average annual runoff volume to the MEP with the goal of 70% TSS removal. • See BMP Sizing Tool.
Water Quantity Facility Design	• PWS 301.4.09.d • PWS 301.4.09.e • PWS 301.4.09.f	• Properties or development draining directly to and within 300 ft of the Willamette River or the Coffee Lake wetlands are exempt from the flow control standards. • Maximum water storage depth for the 100-year storm should not exceed 4 ft deep. • Side slopes should not exceed 4H:1V up to the maximum design water surface elevation; maximum exterior side slopes = 2H:1V. • At least 25% of the pond perimeter should be vegetated with maximum slide slopes of 3H:1V. • See BMP Sizing Tool.
Conveyance Piping Design	• PWS 301.1.10.e • PWS 301.1.13 • PWS 301.8.02 • PWS 301.8.02.c • PWS 301.9.03.b	• Mainline pipes shall be 12 inches in diameter. • Design pipes for conveyance of the 25-year undetained storm (emergency overflow structures should be designed for the 100-year storm). • A minimum of 1 ft of freeboard should be provided between the hydraulic grade line and the top of the structure or finished grade. • Mainline pipes should be reinforced concrete pipe (RCP), ductile iron pipe (CIP), polyvinyl chloride pipe (PVC), or corrugated polyethylene pipe (CPP). Pipe and fittings shall consist of one type of material throughout.
Culvert Design	• PWS 301.1.14 • PWS 301.7.02	• Culverts shall be designed for the 100-year storm. • All culverts shall be designed for fish passage in accordance with ODFW's "Fish Passage Criteria," or latest edition, unless exempt by ODFW or the City. • The headwater elevation must be at least 1 foot lower than road or parking lot subgrade. • New culverts ≤18 inches in diameter: the maximum headwater elevation (measured from the inlet invert) should not exceed 2x the pipe diameter. • New culverts >1 8 inches in diameter: the maximum headwater elevation should not exceed 1.5x the pipe diameter.

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Table 5-1. Wilsonville Drainage Standards and Design Criteria		
Criteria	**Source**	**Value**
Open Channel Design	• PWS 301.1.13.f • PWS 301.6.02	• Open channels shall be designed for the 25-year undetained storm with a minimum of 1 ft of freeboard. • Channel lining material is site specific. • The minimum slope for the flow line is 1% where practicable, but flow shall not be less than 2 fps (unless approved by City).
Pipe Cover	• PWS 301.8.02m Table 3.8 Minimum Pipe Cover	• 36" of cover: Nonreinforced, RCP Class III, Other Pipe Materials • 24" of cover: RCP Class IV • 12" of cover: RCP Class V, AWWA C-900, AWWA C-905, DIP
Structure Spacing	• PWS 301.8.06	• The maximum distance between structures (manholes, area drains, and catch basins-excluding clean outs) is 400 ft.
Outfalls to Open Channel Waterways	• PWS 301.6.04	• Design bank stabilization for the 25-year storm. • Flows from outfall structures should be directed downstream, typically no less than 30 degrees from perpendicular to waterway flow. • Outfalls must be located at higher elevations than the downstream mean low water. • Plantings (willows or other approved plantings) every 2 ft.
Manhole Design	• PWS 301.8.01 • PWS 301.9.01 • PWS 301.4.11	• Manholes are required at least every 400 ft (unless approved by the City). Required placement includes at every grade change, change in pipe size, change in alignment, pipe connection greater than 6 inches, and at the end of the main lines. • Manhole sizing: • 48-inch-diameter manhole for pipe ≤24 inches in diameter • 60-inch-diameter manhole for pipe 27 to 36 inches in diameter and pretreatment manholes • 72-inch-diameter manhole for pipe ≥42 inches in diameter • Maximum of four pipes entering/exiting a manhole. • Minimum free drop of 0.20 ft, maximum free drop of 1.5 ft.
Catch Basins/Curb Inlets	• PWS 301.8.04 • PWS 301.8.05 • PWS 301.8.05.b	• Must be designed for the 10-year storm. • All catch basins must have a sump (unless approved by the City). • Maximum of three catch basins may be connected in a series before connecting to the mainline. • Curb inlets should be constructed with an 18" minimum sump and 6 ft deep from the top of grate to the lowest pipe invert. • Between the inlet and the mainline or mainline structure, the maximum length of pipeline shall be 60 ft for 12" pipe, unless additional length is required to cross the street ROW.

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service. Design storms evaluated in this SMP include the 2-, 10-, 25-, and 100-year recurrence interval 24-hour events as well as water quality events. Design storms are listed in the City's PWS and listed in Table 5-2. The rainfall distribution for these design storms is based on a Unified Soil Classification System (USCS) Type IA distribution.

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Table 5-2. Design Storm Depths	
Design storm event	Rainfall depth, inches
2-yr, 24-hr	2.50
10-yr, 24-hr	3.45
25-yr, 24-hr	3.90
100-yr, 24-hr	4.50
Water Quality Event , 24-hr	1.00

5.2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater treatment and flow control facilities in consideration of instream hydromodification impacts. The BMP Sizing Tool (updated 2017) is intended to be used in conjunction with the City's PWS to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate facility sizes for the following BMP types:

- Rain Garden-Filtration and Infiltration
- Stormwater Planter-Filtration and Infiltration
- Vegetated Swale-Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The BMP Sizing Tool was developed and calibrated based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration-based facilities is based on the facility soil subgroup. Infiltration rates greater than 0.5 in/hr are considered acceptable for use with infiltration facilities and can be used to meet treatment and flow control standards directly. Infiltration rates less than 0.5 in/hr require use of filtration facilities that include piped underdrain systems and orifice controls to meet flow control requirements.

Use of the BMP Sizing Tool represents a shift away from traditional stormwater detention design practices to match pre- and post- development peak flows for standard (i.e., 24-hour) synthetic design storms. Instead, the tool sizes facilities to match the duration of post development peak flows to pre-development levels for the range of flows anticipated to be the most erosive. The BMP Sizing tool was used to size several CPs in this SMP as well as to evaluate policy recommendations associated with use of the Library Pond to support treatment and flow control requirements associated with the Town Center redevelopment. Additional information related to the Library Pond evaluation is discussed in Section 6.3.4 and Appendix F.

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5.3 Model Evaluation Criteria

Stormwater infrastructure was evaluated using the H/H model for capacity per the design criteria defined in Table 5-1. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding where the hydraulic grade line (HGL) exceeds the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level.

For capacity deficient locations where a CP was recommended and developed (see Section 6), the goal was to adhere to the PWS and accommodate the minimum of 1 foot of freeboard between the HGL and the ground surface.

5.4 Model Refinement

Wilsonville developed a city-wide H/H model using the Innovyze InfoSWMM model platform for the 2012 SMP. Localized model updates were incorporated in 2019.

For this SMP, updates to the model datum, hydrologic input parameters, hydraulic model extents and select hydraulic infrastructure were completed. Additional detail related to datum corrections and hydrologic model refinements are included in TM1, which are independent from this SMP. Specific locations of hydraulic model refinement, as well as more detailed explanation of the model validation effort are outlined in Appendix B.

5.4.1 Datum Conversion

As part of the GIS data review process, initiated in 2021, BC reviewed rim and invert elevation data stored in the City's GIS with LiDAR data to identify consistency regarding the vertical datum. Results of this GIS-based spatial analysis indicated inconsistency between recorded datums within the City's GIS dataset, which prompted a similar comparison effort on the City's 2012 InfoSWMM model.

Based on the model comparison results, the original (2012) hydraulic model appeared to rely on inconsistent vertical datums for select model elements. Through discussions with the City, this inconsistency was due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted hydraulic model elevations to be consistent with the City's current standard of NAVD88. Successful conversion of the existing model to NAVD88 was completed in June 2021.

5.4.2 Hydrologic Model Refinement

Hydrologic model refinements included updated subbasin delineations, existing and future land use coverage, and land-use based impervious percentages. With the adjusted subbasin delineation, updated area-weighted average values for infiltration parameters and impervious areas were assigned for each subbasin. In addition, updated subbasin areas, slopes and widths were calculated.

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The City's 2012 SMP reflected an initial subbasin delineation within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and made updates based on:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

A summary of the updated subbasin delineation by major basin is presented in Table 5-3. Please note Newland Creek (and its associated drainage area) is outside the designated study area for the H/H model and not included in Table 5-3.

Table 5-3. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

As introduced in Section 2.3, City staff developed an updated existing and future (full build-out) land use coverage using City zoning and comprehensive plan designations plus specific overlays where development is restricted (e.g., Significant Resource Overlay Zone (SROZ), METRO vacant/developable lands, City maintained vacant lands, Bonneville Power Administration (BPA) easements, significant wetlands, public parks/natural areas etc.). Impervious coverage by land use designation was based on digitization of impervious area (from aerial imagery) for representative tax lots within each existing land use category and calculated by the City as an area-weighted impervious percentage.

Land use categories reflecting reclassification due to HB 2001, as well as calculated impervious percentages are provided in Table 2-3.

5.4.3 Hydraulic Model Refinement and Model Validation

Updates to the City's 2012 InfoSWMM hydraulic model were completed from May 2021 to May 2022. Hydraulic model updates included areas of model expansion, primarily in new growth areas since the 2012 SMP was completed or identified problem areas, and updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects.

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The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments recommended as part of the Boeckman Road Hydraulic Evaluation (January 2022).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

Discussion of preliminary model flooding results with City staff focused on newly identified 25-year flooding locations where the 2012 SMP did not define a CP to address flooding under existing land use conditions. In general, City staff agreed with the preliminary flooding results presented by the model. However, based on results of the validation exercise, additional hydraulic model updates were warranted in select locations based on updated information provided by the City.

These locations included:

- **Charbonneau SW French Prairie Rd. Outfall**. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- **Library Pond**. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- **Penske Truck Rental Property**. Model revised to reflect updated culvert information underneath the parking lot based on as-built drawings.
- **Wilsonville Distribution Center Pond**. Model revised to reflect the pond outlet structure based on as-built drawings.

Figure 5-1, at the end of this section, summarizes the hydraulic modeling extents as well as locations where the hydraulic model was expanded or updated, including updates based on model validation efforts.

5.5 Model Results and Project Opportunity Area Identification

Upon completion of the model validation effort, detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm.

H/H model inputs and results are summarized for the hydrologic and hydraulic models in Appendix B, Attachment B, Tables B-2 and B-3, respectively.

5.5.1 Hydrologic Model Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events.

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are

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primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow).

Although flow attenuation with new development is anticipated through implementation of the City's stormwater design standards, for purposes of this SMP, CP sizing is based on unmitigated flows. In addition, policy recommendations may be considered to ensure that for capacity limited infrastructure, additional efforts are made to retain and mitigate stormwater flows onsite.

5.5.2 Hydraulic Model Results and Project Opportunity Areas

Hydraulic model results identify locations with the potential for flooding and the need to develop CPs to increase conveyance capacity. As described in Section 5.2, flooding within the model is defined as locations where the hydraulic grade line exceeded the structure's rim elevation. Flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storms were also simulated to identify the minimum flooding frequency. Table 5-4 and Figure 5-2, at the end of this Section, summarize the 18 locations that are anticipated to experience flooding under the existing conditions. Generally, all modeled flooding locations are designated as Project Opportunity Areas unless indicated otherwise, and the "priority need" column in Table 5-4 indicates whether a flooding location is confirmed by City staff as necessitating a CP or program to address.

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Table 5-4. Modeled Capacity Deficiencies

Flooding Location ID (Figure 5-2)	Basin	Location Description	Minimum Flooding Frequency	Flooding Predicted in 2012 SMP? (Y/N)	Project Opportunity Area (Y/N)	Priority Need
1	Charbonneau	Miley Road	10-yr	Y	Y	Y
2	Charbonneau	French Prairie Rd and Old Farm Rd	2-yr	Y	Y	Y
3	Willamette	Parkway Ave/Metolius Ln	10-yr	Y	Y	N
4	Willamette	SW Miami	25-yr	N	Y	N
5	Boeckman	Memorial Dr	2-yr	Y	Y	Y
6	Boeckman	Canyon Creek Rd	10-yr	Y	Y	N
7	Boeckman	Sysco Ditch	10-yr	N	Y	N
8[a]	Boeckman	Elligsen Rd	10-yr	Y	N	N
9	Coffee	Shrine Center Pond	2-yr	Y	Y	Y
10	Coffee	Commerce Circle Ditch	2-yr	Y	Y	Y
11	Coffee	Garden Acres	2-yr	N (not modeled)	Y	Y
12[b]	Coffee	Coffee Creek Wetlands	2-yr	Y	N	N
13	Coffee	Boberg Rd and RR crossing	10-yr	N	Y	N
14	Coffee	I-5 Culverts	25-yr	N	Y	N
15	Coffee	Barber Street	25-yr	Y	Y	N
16	Willamette	River Fox Park	2-yr	N	Y	Y
17	Willamette	Lower Boones Ferry	2-yr	Y	Y	N
18[c]	Coffee Lake	Boeckman Corp. Center Pond	10-yr	Y	N	N

a. *Flooding likely due to modeled routing (large subbasin at the upstream end of model). City indicated no Project Opportunity Area designation needed.*

b. *Generalized modeled cross sections are underrepresenting the actual storage. City indicated no Project Opportunity Area designation needed.*

c. *Model configuration questions exist in regard to an existing flow control structure in this area. City staff report no flooding and so this area was not included as a Project Opportunity at this time.*

Three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and required alternatives analysis to ensure that City objectives and preferences will be achieved. These locations are discussed further in Section 6.3 and include:

- Flooding Location ID 2: Charbonneau (French Prairie and Old Farm Road)
- Flooding Location ID 10: Commerce Circle Ditch (Day Road)
- Flooding Location ID 11: Garden Acres

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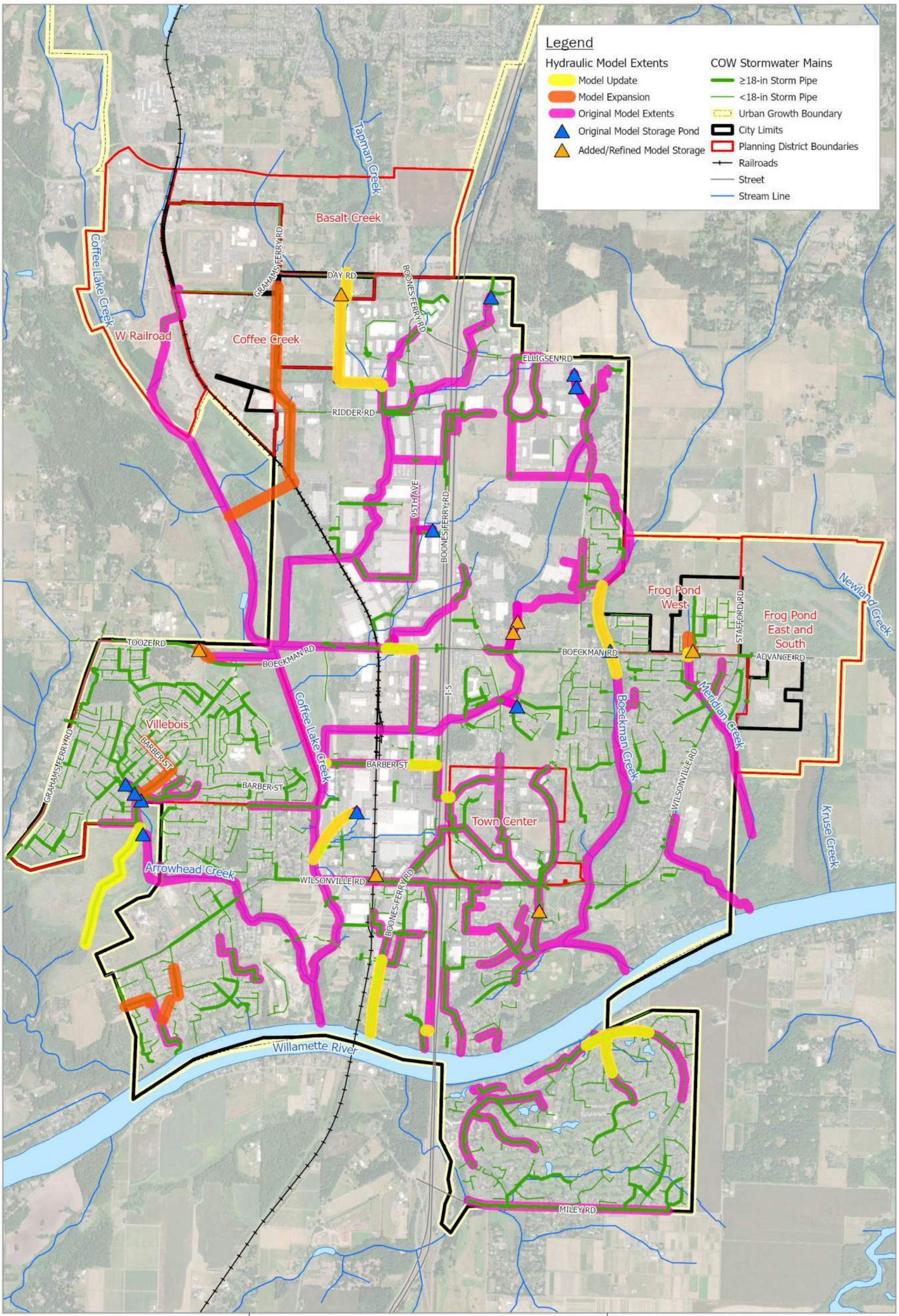

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 5-1: Hydraulic Model Overview

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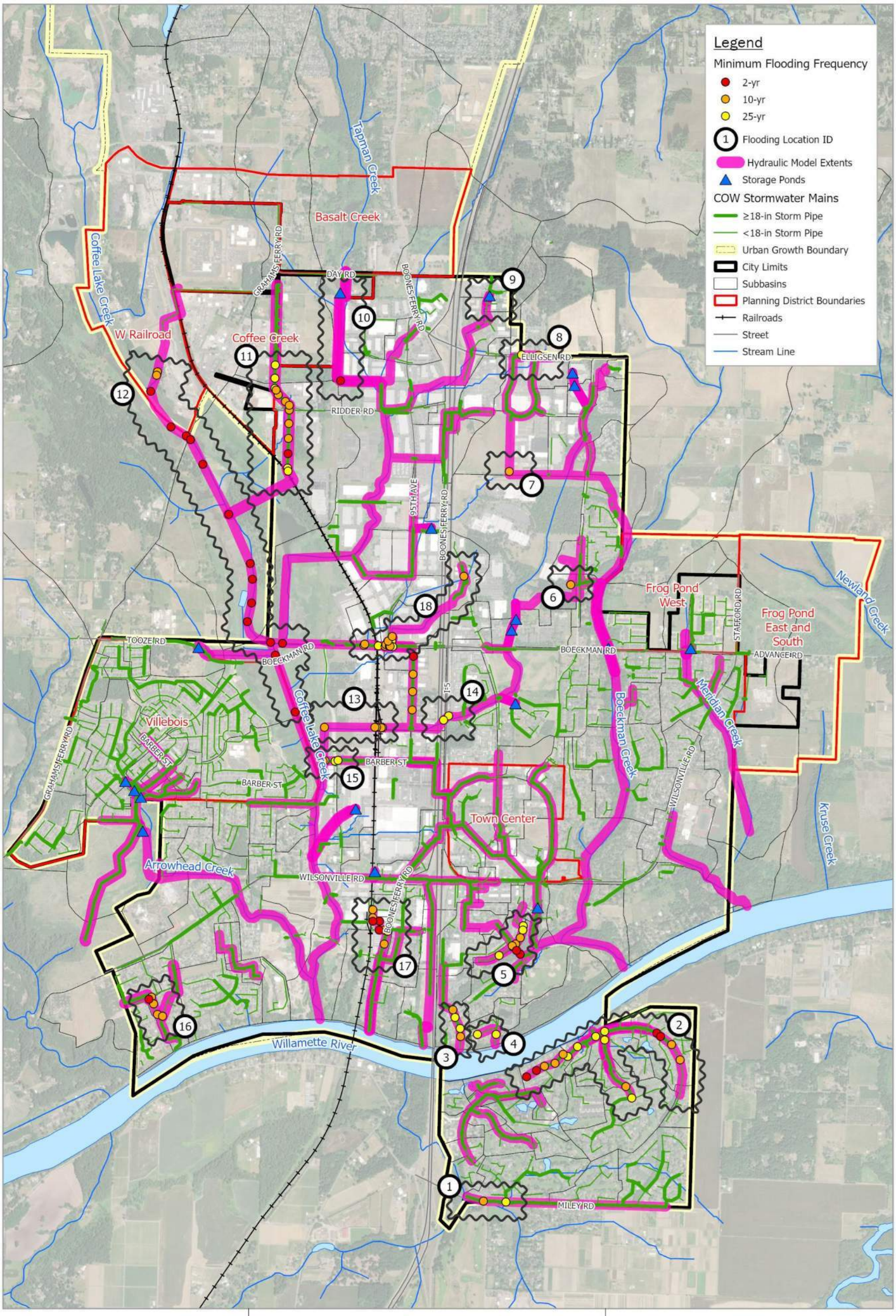

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Figure 5-2: Capacity Deficiencies (Existing Land Use)

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Section 6

Capital Program Development

Project planning and technical analyses as outlined in Sections 3, 4, and 5 of this SMP resulted in the identification of 47 Project Opportunities, which represent locations with a potential need for a Capital Project (CP) or program as part of the overall stormwater Capital Improvement Program (CIP).

Input from City staff helped focus the projects and programs selected for inclusion in the CIP on addressing the most immediate needs. Project Opportunities not developed into recommended CPs are documented in this SMP as future project needs, although full project descriptions and costs are not developed as part of this SMP.

This section describes the process to develop CPs from Project Opportunities. A detailed list of Project Opportunities is provided in Appendix A, Table A-2. Resulting fact sheets for identified CPs are provided in Appendix D and detailed cost estimates for identified CPs are provided in Appendix E.

6.1 Capital Project Needs Identification

Project Opportunities stemming from the Problem Area identification effort (Section 3.1); Water Quality Retrofit Assessment (Section 3.3); Stream Assessment (Section 4) and Model Evaluation (Section 5) were compiled into a matrix to facilitate discussion amongst Public Works and Community Development/Engineering staff. Areas with overlapping project needs were consolidated into a single Project Opportunity area to facilitate development of multi-objective project concepts.

6.1.1 Project Opportunity Matrix

The Project Opportunity matrix (Appendix A, Table A-2) details the source of the Project Opportunity; the relative deficiency or objective the project would address; and how the system evaluation activities support the project need. If applicable, the Problem Area Location (Appendix A, Table A-1) is also identified. Figure 6-1, at the end of this section, identifies all Project Opportunity Locations by primary deficiency category.

6.1.2 Capital Project Workshops

Two capital project planning workshops were held in the spring of 2023 with members of Public Works and Community Development/Engineering to discuss which Project Opportunities should be prioritized for project development. Staff considered the feasibility of construction during a 20-year Capital Improvement Plan (CIP) implementation period in the selection of locations warranting a capital project, as well as recurring maintenance activities, known/reported capacity deficiencies, and pending development drivers. These identified priority locations (i.e., Project Opportunities identified as “costed capital project needs” per Table A-2) include a conceptual project design and cost estimate that will ultimately factor into future financial evaluations and rate studies.

In some cases, an immediate project need was not identified, and instead a program to address activities at a city-wide scale was the preferred approach. These programmatic needs are identified with an annual funding mechanism (see Section 6.5). In other cases, the Opportunity Area does not warrant a more immediate project, but a project may become more necessary in the future. Those areas are identified as “unfunded capital project need” per Table A-2. These Project Opportunities

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are typically associated with a modeled capacity deficiency that was not confirmed or substantiated by city staff.

Of the Project Opportunity Areas, 22 locations resulted in a capital project conceptually designed and costed in this SMP. Notes from the respective workshops are detailed in Table A-2.

6.2 Capital Project Sizing and Design Assumptions

CP sizing generally follow the City's PWS and design criteria summarized in Table 5-1 as detailed below.

- **Capacity Projects**. Projects to replace stormwater infrastructure, including pipes and culverts, are sized in accordance with the City's PWS unless noted. Pipelines are sized for the 25-year, 24-hour design event under future land use conditions and culverts for the 100-year, 24-hour design event under future land use conditions. Where possible, replaced infrastructure was sized to adhere to the minimum one-foot freeboard between the HGL and top of structure.
- **Water Quality Facility**. For purposes of conceptual sizing and cost estimation, the BMP Sizing Tool was used to size treatment or treatment and flow control facilities in accordance with the specified facility type.
- **New Infrastructure**. Several capital projects require new infrastructure in locations where no storm system currently exists. In the case of the Frog Pond East and South Planning Area, infrastructure sizing per the concept plan was maintained for CP development and costing. For other areas, new infrastructure was sized in accordance with the City's PWS. New infrastructure alignments are in the public right-of-way (ROW). However, it should be noted that final design may require additional structures, alternate alignments, or deeper/shallower infrastructure than assumed for this conceptual project design to address utility conflicts and other constraints not identified as part of this SMP. Survey will be required to verify elevations and locations.

For certain CPs, the project description and costs are developed with a phased approach, splitting the overall project into multiple phases that may be funded and constructed on different timelines. This approach was applied to specific, higher-cost projects for this SMP. These selected projects are generally associated with the same Project Opportunity area but have separate, independent components. In some cases, additional flow monitoring and model calibration may influence the scope or size of the proposed improvements and as such, portions of the project may be delayed, warranting scheduling as a different phase.

For phased projects, Phase 1 project elements should be constructed first, and Phase 2 project elements may be conducted later or following additional evaluation efforts.

6.3 Project Alternative Analysis

In developing CP concepts, a more in-depth evaluation of alternatives was warranted for select locations. These locations include Day Road, Charbonneau, and Garden Acres Road. These areas have complicated drainage patterns and reflect Project Opportunities where a single project solution may not resolve all deficiencies.

A description of the alternatives analysis and H/H model development is provided below for these locations, identified by their Project Opportunity ID. Additional background and description of the preferred design concept is provided in the respective fact sheets (Appendix D).

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6.3.1 Day Road/Commerce Circle (Project Opportunity ID#9)

Tapman Creek, between Day Road and Ridder Road, is conveyed through a series of culverts and open channels before it enters a piped section just north of Ridder Road. The open channels include reaches of negative slope and limited capacity and storage potential. Flooding has been observed at adjacent industrial properties, and the catchment area upstream includes the Basalt Creek Planning Area (see Section 3.5.1). Pending, and future, development from the Coffee Creek Industrial Area and Basalt Creek Planning Area may increase the frequency and severity of flooding.

In 2019, AKS prepared a facility siting alternatives report, which included design concepts expected to alleviate flooding during the existing land use condition. The report did not include analysis of alternatives' performance under future land use conditions.

For this SMP, the preferred AKS concept as well as other system configurations were analyzed for both existing and future development conditions using the updated H/H model. Model results validated the AKS report's conclusion that the preferred concept would alleviate flooding under existing land use conditions, but flooding under future land use conditions is still predicted.

Therefore, to augment the preferred AKS alternative, additional system configuration alternatives were evaluated, including use of a surface detention facility, pipe/culvert upsizing at Day Road, and piped conveyance system upsizing north of Ridder Road. The 25-year storm was used to evaluate flooding, and water surface elevations (WSE) predicted during the 100-year storm were also compared to the elevation of adjacent structures. Results of the additional alternatives evaluation are shown in Table 6-1.

Table 6-1. Day Road Evaluation Summary

Alternative	25-Year Flooding Result		100-Year Flooding Result	
	Existing Land Use	Future Land Use (unmitigated)	Existing Land Use	Future Land Use (unmitigated)
Existing Conveyance	Flooding at multiple points in system	Extensive system flooding	WSE at or above structures at multiple locations	WSE at or above structures at multiple locations
AKS Preferred Concept (AKS)	None	Extensive system flooding	Approx. 2 ft freeboard to structures	WSE at or above structures
AKS + Detention Pond	None	Flooding at multiple points in system	Not analyzed[a]	WSE at or above structures
AKS + Upsizing pipes upstream of Ridder Rd	None	Flooding at multiple points in system	Not analyzed[a]	Approx. 1 ft freeboard to structures
AKS + Detention Pond + Upsizing pipes upstream of Ridder Rd	None	Minimal flooding	Not analyzed[a]	Approx. 1 ft freeboard to structures

a. Alternative not analyzed because it was assumed to have good or better performance than the AKS Preferred Concept.

Evaluation of alternatives considered the relative costs and benefits associated with the alternatives. For example, the addition of a detention pond involves significant costs and logistical challenges, while model results still predict flooding, albeit reduced, for this alternative. Ultimately, the City selected the alternative that included both the preferred AKS concept and upsizing of pipes upstream of Ridder Road. See Appendix F, CP CLC-1, Phases 1 and 2.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. Application of the City's design standards are anticipated to mitigate some of the increased flow associated with future land use.

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However, the larger drainage area to this conveyance system includes area outside of city limits, creating further uncertainty about flow mitigation. In conjunction with this CP, a policy defining and directing the implementation of design standards in the Coffee Creek Industrial Area (as well as other new development areas currently outside of the UGB but draining towards capacity-limited infrastructure and stream corridors) is recommended. In addition, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.2 Charbonneau East (Project Opportunity ID#30)

The Charbonneau East Project Opportunity reflects the continuation of identified pipe replacement and system upsizing along SW French Prairie Rd and SW Old Farm Road. The 2012 SMP identified both capacity and condition limitations throughout the Charbonneau basin. The 2014 Charbonneau Consolidated Improvement Plan categorizes the stormwater infrastructure in this neighborhood as Storm Priority 1 and 2, and efforts to replace deficient infrastructure are ongoing (Figure 6-2). Specific to the SW French Prairie Rd and SW Old Farm Road systems, some pipe upsizing and replacement has already occurred in the downstream portions of the system.

Figure 6-2: Charbonneau Consolidated Improvement Plan (2014), Charbonneau East

In accordance with this SMP, H/H modeling confirmed continued flooding along the extents of SW French Prairie Rd and SW Old Farm Road due, in part, to an undersized outfall pipe discharging to the Willamette River. Reported condition deficiencies also exist.

Various alternatives were evaluated to reduce the extent and coverage of flooding predicted under existing (25-year) and future development scenarios, while considering the portions of the piped collection system that have already been replaced. Due to space limitations, above ground detention was ruled out as a method of flow control to minimize the need for widespread pipe upsizing. Alternatives evaluated included inline detention along SW French Prairie Rd and/or SW Old Farm Rd,

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both at the upstream end and downstream end, as well as the upsizing and replacement of the outfall.

Alternatives were presented to the City in a workshop, and ultimately inline detention alternatives were not selected due to existing sanitary utility conflicts, space (limited ROW) constraints, maintenance concerns, as well as cost implications of replacing recently constructed infrastructure. The selected alternative includes a phased approach reflecting upsizing of the outfall to the Willamette River under Phase 1, and selective upsizing/replacing the remaining condition-limited pipes along SW French Prairie Rd and SW Old Farm Rd under Phase 2. See Appendix F, CP WR-4, Phases 1 and 2.

Like with the Day Road CP, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.3 Garden Acres (Project Opportunity ID#32)

The stormwater collection system along Peters Road is undersized with several pipe constrictions and a downstream pipe constriction at the P&W railroad crossing on the south end of Peters Road. The larger catchment area upstream includes portions of the Coffee Creek Industrial Area and West Railroad Planning Area. Pending development may increase the frequency and severity of flooding.

Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO. Stormwater is currently diverted towards a public stormwater pond on the 10450 SW Riddler Road parcel west of Peters Road to reduce flow through undersized storm piping (Figure 6-3). The existing pond does not have an outlet control structure and based on aerial imagery and site visits, appears to overflow to an existing stormwater ditch west of the pond along the railroad ROW.

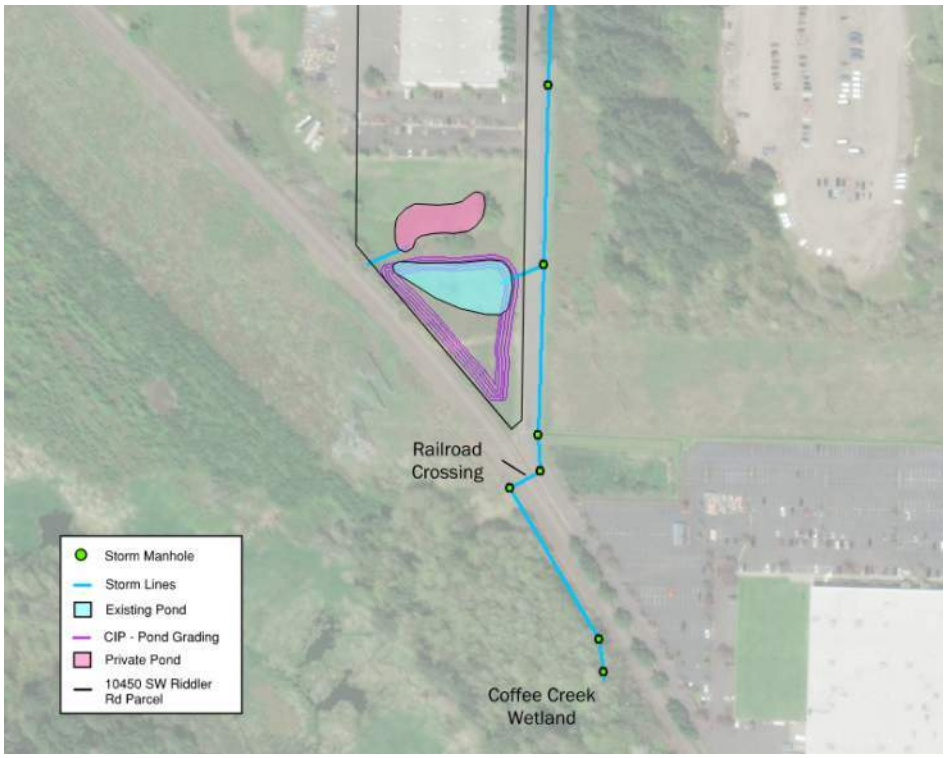

Figure 6-3: Garden Acres Pond (within Coffee Lake Wetlands)

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Several alternatives were evaluated to retrofit the existing public pond to provide additional treatment and storage (detention) of stormwater during high flow events. In addition, reconfiguration of the pond to establish a discharge route from the pond to the stormwater collection system in Peters Road would also reduce the amount of overflow to the railroad ROW. Design alternatives include expansion of the public pond footprint and available storage capacity, including one scenario to utilize additional storage capacity in a private detention pond (currently serving private development).

H/H model scenarios to optimize the storage capacity needed and relieve reported flooding in Peters Road during the 25-year storm event were developed and presented to City staff in a workshop setting. The City opted to increase the existing pond storage capacity to 39,000 cubic feet, fully utilizing the existing parcel while maintaining separation from the private pond located to the north. See Appendix F, CP CLC-3.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. As with the Day Road CP, application of the City's design standards is anticipated to mitigate and offset some of the increased flow associated with future land use. The Garden Acres system reflects another area of the City where adherence to current stormwater design standards requiring retention/mitigation of flows to pre-development conditions is needed, as the CP does not completely alleviate all modeled flooding in the system.

6.3.4 Library Pond Analysis (Project Opportunity ID#4)

The Library Detention Pond (Library Pond), located in Memorial Park, was originally constructed in the 1980s and receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, predominately associated with the Town Center Planning Area. Although operating as a regional detention facility, the current pond configuration has structural and sizing limitations preventing it from adhering to the City's current PWS as a water quality and flow control facility.

Dense, overgrown vegetation and accumulated sediment, combined with a lack of an outlet control structure, limits Library Pond's capacity and water quality function.

The city anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with redevelopment of the Town Center Planning Area. Therefore, as part of this SMP, a sizing evaluation was conducted to confirm capital project needs (specific to retrofit of the pond to meet current operations), as well as policy recommendations applicable to the Town Center Planning Area to allow the Library Pond to offset onsite stormwater treatment and flow control needs associated with redevelopment.

The BMP Sizing Tool was used to evaluate sizing of the Library Pond in conjunction with 1) varying pre-development conditions (to facilitate adherence to the City's flow control standard), 2) varying coverage of onsite stormwater management facilities applied to

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redevelopment areas, and 3) varying site and depth constraints associated with retrofit of the Library Pond (while maintaining the same pond footprint). Detailed findings and results of the sizing evaluation are contained in Appendix F.

Results of the evaluation conclude that there are limited redevelopment options to retrofit the Library Pond to current design standards under future development conditions. Scenarios are described in Appendix F, Table 5, with Scenario 2B and Scenario 3 being the sole options that meet pond design criteria under future development conditions.

Scenario 2B requires onsite mitigation (treatment and flow control) of approximately 50 percent of all redeveloped impervious surface, which requires redevelopment to adhere to the stormwater standards as outlined in the PWS including definition of pre-developed land cover condition and pond design criteria. Scenario 3 requires the City to approve of a policy change, allowing the definition of pre-development for the Town Center Planning Area to conform with existing development conditions (as opposed to pre-developed land cover).

For purposes of capital project development, Scenario 2B was assumed for costing and reflected in the CP fact sheet. See Appendix F, CP BC-1. In conjunction with this CP, a policy defining and directing redevelopment in the Town Center Planning Area is required. The policy needs to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment.

6.4 Cost Estimate Assumptions

CP costs are based on the total capital investment necessary to complete a project (i.e., engineering through construction). Unit costs for project (construction) elements are generally based on recent bid tabs and stormwater master planning efforts and (as necessary) adjusted for 2023 based on a historical cost index. City staff validated unit costs used in this SMP. Cost estimates presented in this SMP are Association for the Advancement of Cost Engineering (AACE) Class 5 Conceptual Level or Project Viability Estimates. Actual costs may vary from these estimates between -50 percent to +100 percent, although changes to design may result in cost differences outside of this anticipated range.

Project cost estimates use unit cost information for construction elements and generally apply a 40 percent construction contingency and multipliers to account for traffic control/utility relocation (5-10 percent), erosion control (3 percent), surveying (5 percent) and mobilization (10 percent). The range in traffic control/utility relocation is based on location (arterial vs. local street). Additional multipliers to account for engineering and permitting (20-30 percent) and construction administration (13.5 percent) are applied to the total construction cost with contingencies. The range in engineering and permitting costs is based on the anticipated permitting level of effort, such as whether in-water work is anticipated. Variations from these assumptions are noted on the project fact sheets in Appendix D.

Due to the resulting construction cost of select projects, the cost applicable to engineering and permitting and construction administration was capped in certain cases. For planning purposes, costs were rounded to the nearest $1,000 for engineering and permitting and construction administration; total project cost was rounded to the nearest $10,000 for budgeted purposes.

Appendix E includes unit costs developed for this SMP and presents the planning-level cost estimates for capital projects. Cost assumptions related to program recommendations are described in Section 6.5.

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Land acquisition and easements are not included in the cost estimates, as most projects are located on City property or within the City right-of-way (ROW).

6.5 Programmatic Recommendations

During the problem area identification (Section 3.1) and project planning efforts (Section 6.1), select maintenance-related, regulatory-driven, and condition-related project needs were consolidated into program recommendations, to address issues at a city-wide scale instead of as multiple, stand-alone individual projects.

The following programs defined below support the successful management of a municipal stormwater system. Implementation will result in cost savings by providing for proactive maintenance, replacement, and repair, as well as contracting efficiencies for smaller, localized project needs.

Costs proposed for the programs are estimated based on current City spending and vetted with City staff. Funding may accumulate over multiple years to be used on a larger cost effort.

6.5.1 Localized Drainage Improvements (P-1)

This program would dedicate funding to assist with minor system configuration/reconfiguration or installation needs or in response to a recurring maintenance need. Improvements funded under this program are not anticipated to require extensive engineering services and would help address localized issues that do not warrant a standalone capital project. These improvements may include relocation and/or installation of curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues, as well as the installation of additional inlets and laterals (to address localized flooding or lack of infrastructure) and the minor regrading and replanting of conveyance ditches and swales.

An annual cost of $100,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- Wilsonville Road and Kinsman Road (Project Opportunity ID #10),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Commerce Circle (Project Opportunity ID #36),
- Serenity Way (Project Opportunity ID #37),
- SW Camelot Street (Project Opportunity ID #38), and
- SW Del Monte Ct (regular maintenance need reported during staff interviews).

6.5.2 Water Quality Retrofit Program (P-2)

This program stems from the project planning efforts and the stormwater retrofit analysis. This program involves the opportunistic incorporation of LID features (planters, curb bump outs, bioretention basins, porous pavement overlays, etc.) to address water quality in conjunction with other transportation, public improvement, or utility planning projects. These types of retrofit activities promote additional infiltration and water quality treatment, which are core values reflected in results from the public survey and external stakeholder outreach efforts. Efforts will help address NPDES MS4 retrofit requirements and TMDL compliance. Targeted locations may include collector roadways, park properties, and residential neighborhoods with limited or no existing water quality treatment.

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An annual cost of $200,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Green Streets/LID Facilities (Project Opportunity ID #39),

6.5.3 Repair and Replacement (R/R) Program (P-3)

CCTV is one of the least expensive and most robust methods to document, assess, and identify condition-related issues in the piped stormwater network. The City's Public Works Road and Storm Section is implementing their CCTV program in accordance with staffing recommendations.

An R/R Program is used to budget the design and construction of improvements stemming from a CCTV and Asset Management Program. The gathered information and subsequent ranking of pipe and infrastructure condition will inform the locations where pipes need to be repaired or replaced in accordance with available funding and schedule. An R/R Program is key to the long-term sustainability of the stormwater collection system. An R/R program ensures that replacement is scheduled for older infrastructure nearing the end of its useful life before failure, as well as prioritizing damaged or failing pipes identified through the CCTV Program.

This program includes dedicated funding to repair/replace all public pipe 12-inches to 48-inches in diameter in-kind within the city limits over a 100-year timeframe. This fund would utilize results of the CCTV inspections to proactively schedule necessary replacement projects and exclude Charbonneau infrastructure, as replacement of a significant portion of the system is underway via a separate program effort in accordance with the Charbonneau Consolidated Improvement Plan (2014) (see Section 6.5.4).

Based on the City's asset inventory, this requires the replacement of approximately 3,700 LF of public stormwater pipe and associated manholes annually, reflecting a present-day construction cost (excluding contingencies and multipliers) of approximately $2.66M/year. However, this estimate does not consider ongoing pipe replacement efforts in CIP implementation and other drainage improvements. The estimate also excludes unknowns related to pipe age and associated lifespan of plastic pipe. As such, the City opted to allocate an additional $275,000 per year (approximately 10 percent of the annually calculated amount for this program.

6.5.4 Charbonneau R/R Program (P-4)

Since 2014, the City has implemented stormwater R/R efforts in the Charbonneau basin as part of the Charbonneau Consolidated Improvement Plan. The Charbonneau Consolidated Improvement Plan identified improvements across four utilities and consolidated utility improvements based on priority and location over a 20+ year period. To date, approximately 12,900 linear feet of pipe has been replaced. Project identification and H/H modeling efforts as part of this SMP identified two CP needs (WR-4, Phases 1 and 2 and WR-5) that incorporate pipe upsizing and direct pipe replacement in the Charbonneau basin.

This R/R program reflects direct replacement of remaining public pipe identified in the Charbonneau Consolidated Improvement Plan that has not been replaced or costed as a CP in this SMP (see Figure 6-4). This program includes in-kind replacement of approximately 30,000 linear feet of public pipe and 150 manhole structures. Pipe replacement will use PVC; pipe diameters less than 12 inches are assumed to be replaced with 12-inch pipe in accordance with the PWDS. A program duration of 20 years is maintained in conjunction with the Charbonneau Consolidated Improvement Plan.

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Program costs were calculated directly and incorporate contingency, and multipliers as outlined in Section 6.4 (see Appendix E for a detailed cost estimate). The present-day construction cost (including contingencies and multipliers) is approximately $38.36M, resulting in an annualized program cost of approximately $1.92M per year.

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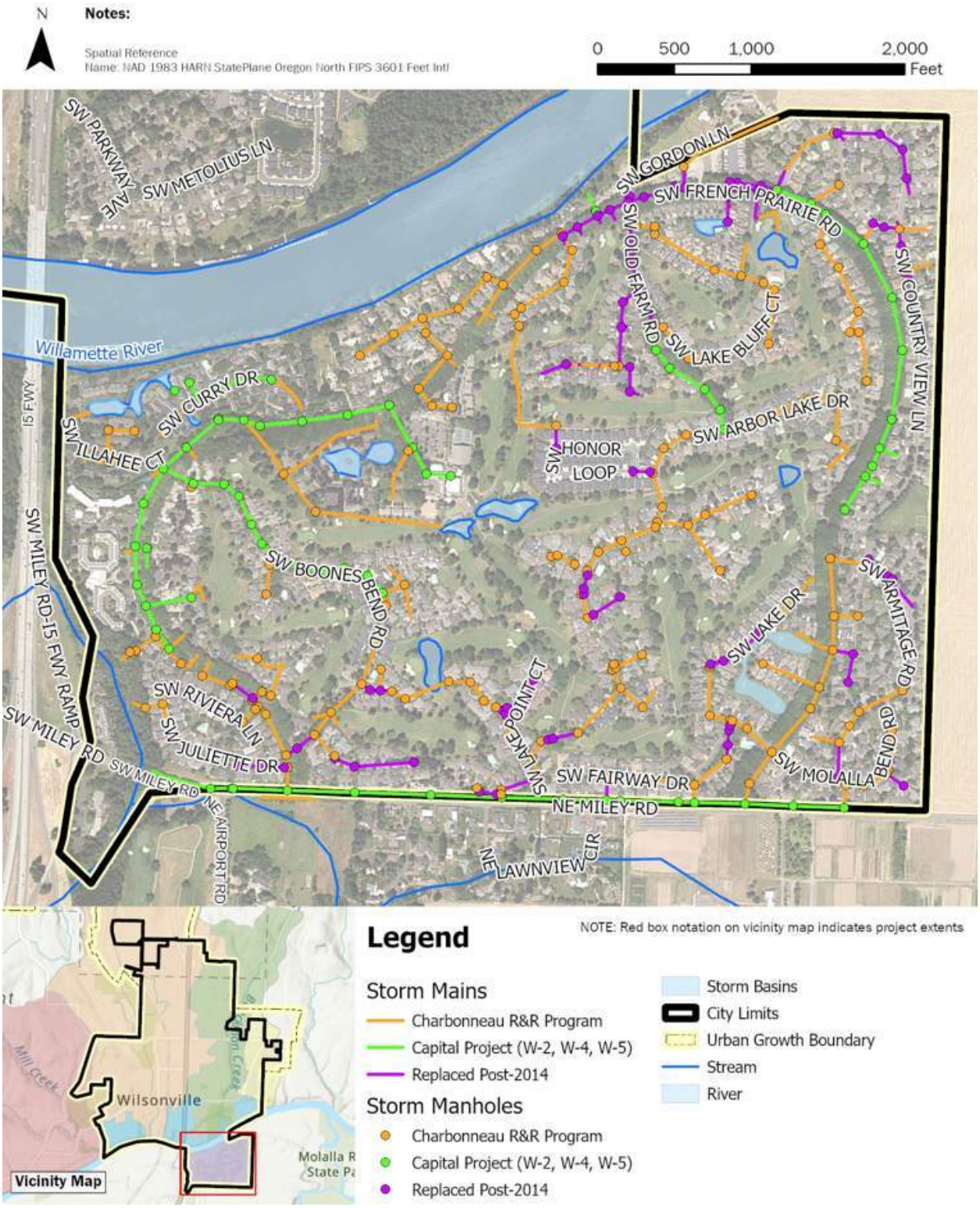

Figure 6-4: Charbonneau R/R Program Coverage

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6.5.5 Riparian Vegetation Management Program (P-5)

This program includes dedicated funding to conduct riparian vegetation management and maintenance activities along stream corridors including removal of invasive species. This need was identified in the Stream Assessment (Section 4 and Appendix C), as there was dense coverage of invasive species including Himalayan blackberry, reed canary grass, and English ivy. In some cases, extensive vegetation prevented data collection efforts. These efforts support NPDES MS4 and TMDL (temperature management) initiatives.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas and specific locations noted in the Stream Assessment (Appendix C) that would potentially benefit from this program include:

- Boeckman Creek Reaches 2-9 (Stream Assessment identified vegetation management need)
- Kruse Creek Reaches 1-2 (Stream Assessment identified vegetation management need)
- Meridian Creek in Landover Park (Reaches 1 and 2) (Project Opportunity ID #18 and #19)
- Arrowhead Creek Reach 4 (Project Opportunity ID #20)
- Boeckman Creek Instream Flow Mitigation and Restoration (Project Opportunity ID #27)

6.5.6 Stormwater Facility Enhanced Maintenance Program (P-6)

This program establishes a dedicated funding mechanism supporting Public Works staff efforts to conduct more reactive and extensive maintenance of public and private vegetated stormwater facilities. Although routine maintenance of public facilities is addressed in conjunction with existing maintenance activities and staffing levels, occasionally additional support is needed to conduct a more robust, restorative maintenance effort on a larger, regional facility or address widespread replacement of amended soils and vegetation on LID/GI facilities.

Private facilities subject to this program would include those where private facility maintenance agreements are not in place and/or not being implemented after enforcement efforts are conducted. Maintenance on private facilities where a maintenance agreement is on file may be subject to reimbursement.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- Pond F and other ponds in Villebois (Project Opportunity ID #5),
- SW Daybreak Street and SW Morningside Avenue (Project Opportunity ID #12),
- Oulanka and Tivoli Parks (Project Opportunity ID #22)

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6.6 Project and Program Numbering and Naming

CP numbering is applied to all location-specific capital projects, based on major basin. The project numbering convention maintains consistency with the 2012 SMP and includes a major basin abbreviation and number to indicate the individual project location. Phasing is defined within the project numbering. Project naming incorporates the location and primary objective of the project in the title.

Major basin abbreviations used for project numbering are listed below:

- Boeckman Creek (BC)
- Coffee Lake Creek (CC), includes projects associated with Tapman Creek drainage area
- Willamette River (WR), includes projects associated with the Charbonneau planning area
- Newland Creek (NC)

Four planning-related capital projects are identified and numbered with a “City” prefix.

Programmatic activities are numbered P-1 through P-6 and reflect city-wide implementation and an annual funding need.

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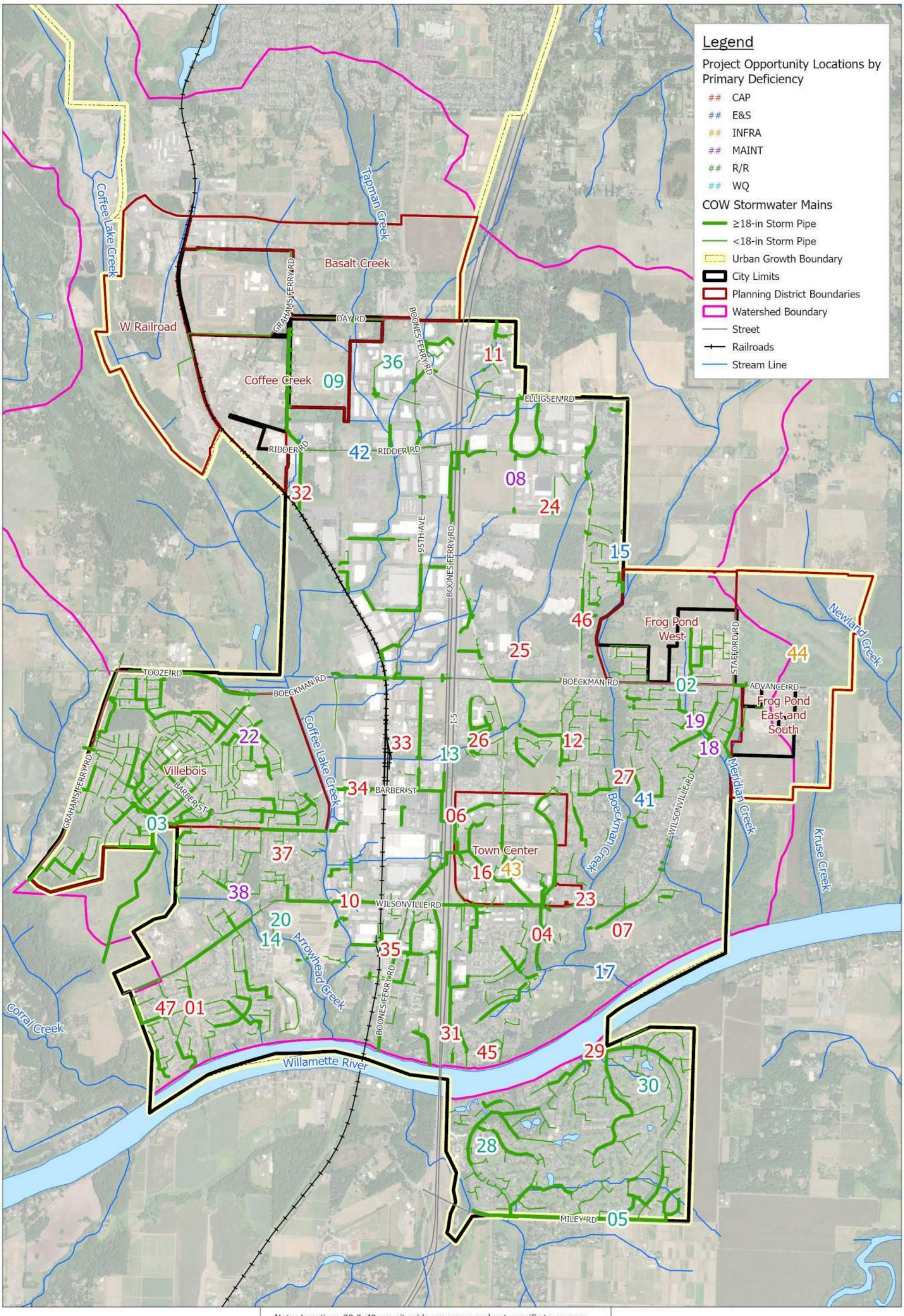

Note: Locations 39 & 40 are citywide programs and not specific to an area.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 6-1: Project Opportunity Locations

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Section 7

Capital Improvement Plan

This section summarizes the capital projects, programs, and policy recommendations identified through the master planning process, collectively comprising the City's Stormwater Capital Improvement Plan (CIP).

A total of 15 capital projects (CPs) are identified to address current and future storm drainage infrastructure needs related to system capacity, repair and replacement (R/R), a lack of infrastructure, recurring maintenance, instream erosion and sediment accumulation, and water quality. Considering multiples phases for some projects, these 15 CPs represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts.

CP recommendations are considered a one-time cost and are shown in Figure 7-1, located at the end of this section.

In addition to the 15 CPs, there are four, city-wide planning projects that are also considered a one-time cost. These planning projects are described in Section 7.2.

Six programmatic recommendations are identified, including addressing ongoing support for localized drainage improvements, city-wide system repair and replacement (R/R) needs, water quality retrofits and expanded stormwater facility maintenance needs, and riparian vegetation management. Program recommendations are considered an annual cost, as described in Section 6.5, and intended to support ongoing asset management efforts.

Section 7.1 summarizes the recommended actions costed for this SMP. Section 7.2 summarizes the overall CIP, and Section 7.3 outlines the staffing analysis to assess Public Works and Engineering staffing needs in support of this SMP and regulatory obligations.

7.1 Summary of Recommended Actions

Project, program, and policy recommendations in this SMP are proposed to improve and enhance drainage infrastructure and water resources throughout the City, as summarized by the following recommended actions.

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
- Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
- Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
- Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.

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- Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
- Clearly document capital project and program costs and schedule to inform future funding and rate analyses.

7.2 Capital Improvement Program Recommendations

CP locations are mapped in Figure 7-1, at the end of this section, based on the following objectives (identified in **BOLD**):

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table 7-1 lists all CP and program recommendations and references the associated Project Opportunity Area as defined in Section 6. A brief description of the project and summary of project objectives are also included. Most projects address multiple objectives. Table 7-1 also reflects the anticipated implementation schedule for the CP, based on prioritization efforts. Corresponding CP fact sheets with more detailed project information are provided in Appendix D.

The portion of total project cost considered eligible for funding via system development charges (SDCs) is also provided in Table 7-1. Projects solely related to planning, repair & replacement, and maintenance were determined not eligible for SDCs, as they do not address required improvements associated with new or redevelopment. The portion of the total project cost considered SDC eligible is calculated based on the increase in flow associated with anticipated development, using percent increase in impervious coverage as a surrogate.

Description of the four planning-related projects (City-1, City-2, City-3, and City-4) are provided below. Planning projects require specific, scheduled budget allocations and so were added to the overall stormwater CIP.

7.2.1 Flow Monitoring and Rain Gauge Installation (City-1)

This planning project includes the installation of three flow monitors, installed in the piped stormwater collection system, as well as the installation of one rain gauge to assess stormwater flow and aid in the more refined calibration of the City's InfoSWMM model. Additional flow monitoring and model calibration will help confirm the need for and sizing of select CPs, particularly where City staff have not yet observed flooding issues, but the model is predicting flooding.

Recommended locations for installation of flow monitoring include locations with a phased, capacity-related CP and pending new development. They include locations in each of the three major basins: Coffee Lake Creek, Boeckman Creek, and the Willamette basin (e.g., Charbonneau). CPs potentially informed by this effort include Day Road Stormwater Improvements (Project ID CLC-1), Garden Acres Pond Retrofit (Project ID CLC-3), Morey's Landing (Project ID WR-1), Charbonneau East (WR-4), and Charbonneau West (WR-5).

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The project duration (for costing purposes) is estimated at 12 months, and the cost estimate of $100,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

7.2.2 Hydromodification Assessment and Stream Survey (City-2)

This planning project includes follow up monitoring efforts related to the 2022 geomorphic assessment of select high priority reaches as conducted for this SMP (see Appendix C). Although the focus of the assessment was to identify existing and potential future risks associated with hydromodification, the assessment also provided a baseline within the study areas to assess changes in channel, floodplain, and riparian condition over time. This was done by documenting locations of noticeable bank erosion, headcuts, neglected or compromised riparian corridor, grade control locations, and other points of interest.

Data collection efforts will use similar protocols and data sheets developed during the 2022 assessment along these high priority reaches to provide continuous monitoring of stream impacts associated with upstream development activities or hydromodification mitigation strategies. The assessment will be both field-based, consisting of stream walks along the select reaches, and qualitative, including descriptions of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure. Reaches recommended for ongoing evaluation per the 2022 assessment include Boeckman Creek (reaches 2, and 9), Meridian Creek (reaches 1 and 2), Arrowhead Creek (reaches 2 and 3), Newland Creek (reaches 1-4), and Kruse Creek (reaches 1-3).

Additionally, the City may want to establish baseline conditions associated with identified “secondary” locations that were not included in the 2022 geomorphic assessment effort. This new evaluation may be conducted in addition to or in lieu of ongoing monitoring at select reaches.

The complete assessment will be documented in a technical memorandum summarizing the results for inclusion in TMDL and/or NPDES MS4 reporting.

This project is estimated to be completed every three years and/or following a high flow event that exceeds the 10-yr discharge. A project cost of $30,000 per monitoring event is reflected in Table 7-1 and is assumed to occur once during initial 5-year CIP implementation period; once during the second 5-year CIP implementation period; and twice during the third, 10-year CIP implementation period.

7.2.3 Porous Pavement Pilot Study (City-3)

This planning project stems from the City’s NPDES MS4 Retrofit Strategy, water quality project objectives, TMDL drivers, and the need to expand water quality treatment to areas lacking in treatment. To date, use of pervious pavement, porous asphalt or other permeable road and drive surfaces has not been used in the public right-of-way (ROW). This pilot study would include the installation of a porous pavement overlay in conjunction with pavement resurfacing efforts in the City. Water quality monitoring may be conducted to confirm/inform stormwater pollutant reduction, as local research efforts have indicated water quality benefits (i.e., reduction of sediment, bacteria, heavy metals, and organic compounds) can be observed, even with an overlay versus full pavement replacement with pervious pavement.

Recommended locations for implementation of the pilot project have not yet been identified but are anticipated to coordinate with scheduled pavement maintenance. A project duration (for costing purposes) is estimated at 24 months and scheduled during the first 5-year CIP implementation period, and the cost estimate of $100,000 for this effort is based on recent efforts in the City of Milwaukie. This estimate has not been validated or based on a detailed scope.

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7.2.4 Boeckman Creek Geomorphic and Geotechnical Evaluation (City-4)

This planning project is to conduct a geomorphic and geotechnical evaluation on Reach 1 of Boeckman Creek, where continued risk of channel incision and bank erosion exists. This project stems from a recommendation in the 2022 geomorphic assessment, which was unable to confirm source, rate, or extent of bank failure in the reach (see Appendix C). A holistic evaluation of backwater conditions, geomorphic conditions and a geotechnical assessment of slope stability and potential bank stabilization techniques is recommended.

The project duration (for costing purposes) is estimated at 12 months, and a cost estimate of $150,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-1	4	Boeckman Creek	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	Existing Library Pond facility, east of SW Memorial Drive in Memorial Park	132.0	• Clear, regrade, and replant 0.7 acre detention pond, including adding 3 ft required rocks and media to pond bottom. • Install a new outlet structure. • Replace 70 LF of 18-inch CSP pipe. • Install 70 LF of 6-inch perforated HDPE underdrain. • Install 15-foot-wide, 25-foot-long road for maintenance access.	$1,880,000	$213,000		X		
BC-2	25, 26	Boeckman Creek	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	East of SW Ash Meadows Rd, West of SW Parkway Ave, and north of SW Greenway Dr	295.0	• Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Update 80 LF of 36-inch culvert at SW Parkway Ave to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at Ash Meadows Cir. • Clear, regrade, and replant 1.3 acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.	$2,940,000	$798,000		X		
BC-3-Phase 1	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	Canyon Creek Park, north of SW Carriage Oaks Ln	295.0	• Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe.	$4,860,000	$920,000				X
BC-3-Phase 2	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	Existing Wiedemann Ditch alignment, south of Sysco property	295.0	• Clear, regrade, and replant approximately 2.1 acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot-wide, 1,500-foot-long access road west of Canyon Creek Road.	$7,210,000	$1,365,000				X
BC-4	15	Boeckman Creek	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	Boeckman Creek corridor adjacent to Canyon Creek Estates and bounded on the west by SW Roanoke Dr	358.0	• Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch-diameter PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of 150 LF of vegetated swale in accordance with the City's PWS.	$410,000	$78,000		X		
BC-5	21	Boeckman Creek	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	Within Memorial Park, north of the parking lot by the baseball fields and south of SW Memorial Dr	33.0	• Remove 90 LF of 10-inch CSP (SD5041 and SD5042). • Remove 120 LF of 12-inch CSP (SD5044). • Remove: manhole (ST5098), swale inlet structure (CARTE ID 568), and outlet structure (CARTE ID 19). • Fill existing 1,500 SF swale and revegetate area. • Replace two 48-inch manholes (ST5200 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Replace manhole ST5208 with a 72-inch flow splitting/WQ manhole. • Install 2,400 SF vegetated water quality swale with 1 foot of drain rock and 1.5 feet of amended soil. • Install 140 LF of 6-inch perforated HDPE underdrain pipe. • Install 50 LF of 12-inch PVC pipe. • Install structures for the new swale: swale inflow spreader with rip-rad pad, beehive overflow structure, and outfall to the creek.	$910,000	$22,000				X

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-6	41	Boeckman Creek	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	Boeckman Creek riparian area near Wilsonville High School, at the Gesellschaft well site (29001 SW Meadows Pkwy)	25.0	• Install approx. 480 LF of 12" PVC pipe to convey discharge flows from the well maintenance. • Install two new 48-inch manholes. • Install outfall with 8 CY of Class 200 rip-rap to the creek. • Restore approx. 310 LF of the existing channel with coir log check dams and matting, and re-vegetating with native trees and shrubs.	$400,000	$2,000		X		
CLC-1 - Phase 1	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	Open channel alignment south of Day Rd	944.0	• Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 180 LF of two barrel, 36-inch diameter PVC culverts at Day Road.	$8,020,000	$3,054,000		X		
CLC-1 - Phase 2	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 2	• **Capacity**	North of Ridder Rd through Tax Lot 500	944.0	• Remove 1.200 LF of existing pipe. • Upsize 1,800 LF of existing 36-inch parallel storm pipes to 48-inch. • Replace seven 72-inch manholes. • Install 3 trash racks.	$3,930,000	$1,497,000			X	
CLC-2	20	Coffee Lake Creek	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	Arrowhead Creek culvert crossings under pedestrian path at the south end of SW Morey Ln	421.0	• Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.	$290,000	$16,000			X	
CLC-3	32	Coffee Lake Creek	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	Existing public pond in an industrial area along Peters Rd between SW Graham's Ferry Rd to the west, SW Day Rd to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.	231.0	• Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.	$3,780,000	$1,339,000			X	
NC-1	44	Newland Creek	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	East of SW Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. Only K1 Basin of Frog Pond East and South.	61.0	• Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.	$4,090,000	$3,222,000		X		

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-1 - Phase 1	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **System Capacity** • Water Quality	Along Willamette Wy East from SW Pkwy Dr to the Belknap Ct Outfall, including greenfield along BPA easement	46.0	• Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).	$2,310,000	$45,000			X	
WR-1 - Phase 2	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **System Capacity**	SW Champoeg Dr	46.0	• Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 - SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).	$1,080,000	$21,000				X
WR-2 - Phase 1	5	Willamette River	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	Miley Rd outfall	138.0	• Replace and upsize 80 LF outfall pipe (from area drain with ENG ID 9341 to outfall) from 36-inch CMP to 42-inch PVC. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe between area drain (9341) and MH (ST9002) with same diameter 42-inch PVC. • Replace and lower invert of MH (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 25 feet along the channel upstream and downstream of the outfall.	$820,000	$0		X		
WR-2 - Phase 2	5	Willamette River	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	Miley Rd from NE Airport Rd to eastern intersection with SW French Prairie Rd	138.0	• Install approx. 530 LF of new 42-inch pipe from replaced MH ST9002 to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch diameter manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install 10 new 60-inch diameter manholes and approx. 3015 LF of new 36-inch storm pipe along NE Miley Road from SW French Prairie Road to new manhole adjacent to MH ST9011. • Install 2 new 48-inch diameter manholes and approx. 650 LF of new 24-inch storm pipe from the new manhole adjacent to MH ST9011 to new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets along new NE Miley Road alignment - approximately 13.	$10,510,000	$0			X	
WR-3	7	Willamette River	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	SW Rose Ln between SW Wilsonville Rd and SW Montgomery Wy	14.0	• Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370). • Install approx. 40 LF of parallel 12-inch RCP culverts. Realign the culverts at a diagonal across the road with the same outlet location. • Reinforce stormwater conveyance around property near culvert to move water into ditch.	$200,000	$19,000		X		
WR-4 - Phase 1	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	SW French Prairie outfall	159.0	• Remove and replace existing Charbonneau East Outfall (ENG ID: STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch PVC discharging to Willamette River (ENG ID: STD9005 to ST9014). • Replace one 72-inch manhole (ST9014).	$600,000	$0				X

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives[b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost[c]	SDC Eligible Cost[c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-4 - Phase 2	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	SW French Prairie Rd and SW Old Farm Rd	159.0	• Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes. • Replace nine 60-inch manholes.	$4,440,000	$0				X
WR-5	28	Willamette River	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	SW Curry Dr, SW French Prairie Rd, and SW Boones Bend Rd	54.0	• Pipe replacement along SW Curry Drive: • Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). • Replace 520 LF of 18-in pipe with PVC (new manhole to PRIVATE manhole CARTE ID: 1892). • Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). • Replace private outfall (CARTE ID: 15). • Replace two private 48-in manholes (CARTE ID 1892 and 1383). • Install three 48-in manholes. • Pipe replacement along SW French Prairie Road: • Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) • Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). • Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 - ENG ID unknown) • Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). • Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). • Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). • Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall - ID unknown). • Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. • Pipe replacement along SW Boones Bend Road: • Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). • Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). • Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). • Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). • Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). • Replace eight 48-in manholes; and replace three 60-in manholes.	$10,370,000	$0				X
City-1	N/A	City-wide	Flow Monitoring and Rain Gauge Installation	• **Capacity**	City-wide	N/A	• Location of one rain gauge and installation of a minimum of three flow meters over a 12-month duration to aid in Info-SWMM model calibration and validation of project needs/phasing.	$100,000	N/A		X		

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
City-2	18, 19, 27	Boeckman, Meridian, and Newland	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	Stream corridors associated with developing portions of the Boeckman Creek, Meridian Creek and Newland Creek basins	N/A	• Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	$30,000/event	N/A		X	X	X
City-3	40	City-wide	Porous Pavement Pilot Study	• **Water Quality**	City-wide	N/A	• Implementation of a porous pavement overlay and associated water quality monitoring to inform more widespread applications.	$100,000	N/A		X		
City-4	17	Boeckman Creek	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	Downstream 750' of the Boeckman Creek stream corridor	N/A	• Geomorphic and geotechnical evaluation of the downstream 750' of Boeckman Creek at the confluence with the Willamette River.	$150,000	N/A		X		
P-1	5, 7, 10, 17	City-wide	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	City-wide	N/A	• Installation of small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow). • Relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues	$100,000/yr	N/A	X			
P-2	8, 11, 39, 40	City-wide	Water Quality Retrofit Program	• **Water Quality** • Capacity	City-wide	N/A	• Design and install opportunistic LID or green infrastructure (porous pavement overlays, regional facilities, stormwater planters/curb bump outs) along streets, within public property, and/or within available ROW to provide water quality treatment.	$200,000/yr	N/A	X			
P-3	N/A	City-wide	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	City-wide	N/A	• Conduct prescriptive replacement of public pipe and structures s over a 100-year period. Use results of CCTV analysis to inform locations.	$275,000/yr	N/A	X			
P-4	29	Willamette River	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	Charbonneau Basin	478.0	• In-kind repair and replacement of public pipe and manholes within the Charbonneau basin, in accordance with the Charbonneau Consolidated Improvement Plan. Excludes pipes replaced within the last 10-years (since 2014) and CP WR-4, Phases 1 and 2 and WR-5.	$1,920,000/yr	N/A	X			
P-5	18, 19, 20, 27	City-wide	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	City-wide	N/A	• Conduct riparian and/or in-channel vegetation maintenance including removal of invasives.	$25,000/yr	N/A	X			
P-6	5, 12, 22	City-wide	Stormwater Facility Enhanced Maintenance Program	• **Water Quality** • Maintenance	City-wide	N/A	• Conduct restorative maintenance on select public and private stormwater facilities.	$25,000/yr	N/A	X			
									TOTAL	$2.545M	$19,140,000	$20,850,000	$29,530,000

N/A: Not Applicable

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. Citywide planning projects are designated as "City". Programs (to be funded annually) are prefaced with a P designation.

*b. Primary objective (for mapping purposes) is identified in **BOLD**.*

c. Estimated costs and SDC eligible costs are described in Section 7 of the SMP and detailed cost summaries provided in Appendix E. City-wide planning projects and solely related to Repair/Replacement or Maintenance are not eligible for SDCs and the SDC eligible cost is indicated as N/A. For projects with no developable lands in the upstream contributing drainage area, the portion of project cost associated with SDCs is $0.

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7.3 Future/Unfunded Capital Project Opportunities

Table 7-2 summarizes potential, additional CP needs as identified during project planning efforts and documented in the Project Opportunity Matrix (Appendix A, Table A-2). However, these are considered unfunded capital projects for purposes of this SMP, as needs are more undefined and/or staff have not observed specific deficiencies in these areas. In some cases, a standalone CP may not be necessary if the project opportunity can be addressed as part of a program activity (i.e., Localized Drainage Improvement [P-1]).

Specific cost estimates have not been developed and schedule for implementation not established for these projects.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
8	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch. Downstream N-S drainage swale has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	N	Y	• Install WQ manhole(s) or other facilities to remove sediments from public runoff.
11	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	A city-owned pond receives a small amount of drainage and requires frequent maintenance (due to undersized catch basins). Model predicts flooding within the pond and outlet.	CAP		Y	N	N	• Improve maintenance access from the Shrine Center parking lot. • Expand/retrofit pond to improve water quality function and outlet configuration.
17	Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River.	E&S		N	Y	N	• Planning project (City-4) proposed to evaluate source and potential, structural repairs first. • Channel stabilization and grade control (retaining/crib wall or soldier pile) pending planning study feedback.
22	Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	Four private swales—have not been maintained consistently	MAINT	WQ	N/A	N	Y	• Acquire private swales and conduct restorative maintenance.
23	Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	Underutilized irrigation pond adjacent to Boeckman Creek. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	N/A	N	Y	• Expand water quality treatment through retrofit of existing facility. • Will require private property partnership.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
31	Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Pipe upsizing and realignment as necessary.
34	Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		Y	N	N	• Pipe upsizing and realignment as necessary. No immediate need.
35	Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		Y	N	Y	• Pipe upsizing and realignment as necessary. No immediate need.
42	Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	--	N	Y	• Future restoration/retrofit opportunity.
43	Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		--	N	Y	• Additional assets/re-piping is development driven. • New/decommissioned infrastructure pending development activities.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
45	SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
46	Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
47	River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.

N/A = not applicable.

a. Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.

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7.4 Staffing Evaluation

A supplemental staffing analysis was conducted to support the earlier, maintenance-related staffing evaluation described in Section 3.2. This analysis included both Public Works and Engineering staffing needs in conjunction with 1) new regulatory obligations associated with the City's 2021 NPDES MS4 permit and 2022 Stormwater Management Program (SWMP) Document, and 2) implementation of this SMP.

Specific to implementation of this SMP, additional Engineering staff are required to execute and manage the CPs over the 20-year CIP (see the construction administration cost by CP included in Appendix E). Additional Public Works staff support will be needed to maintain additional assets resulting from CP implementation. Figure 7-2 summarizes the departments and associated activities resulting in the need for additional staff. Summary tables and documentation related to this evaluation are included in Appendix G.

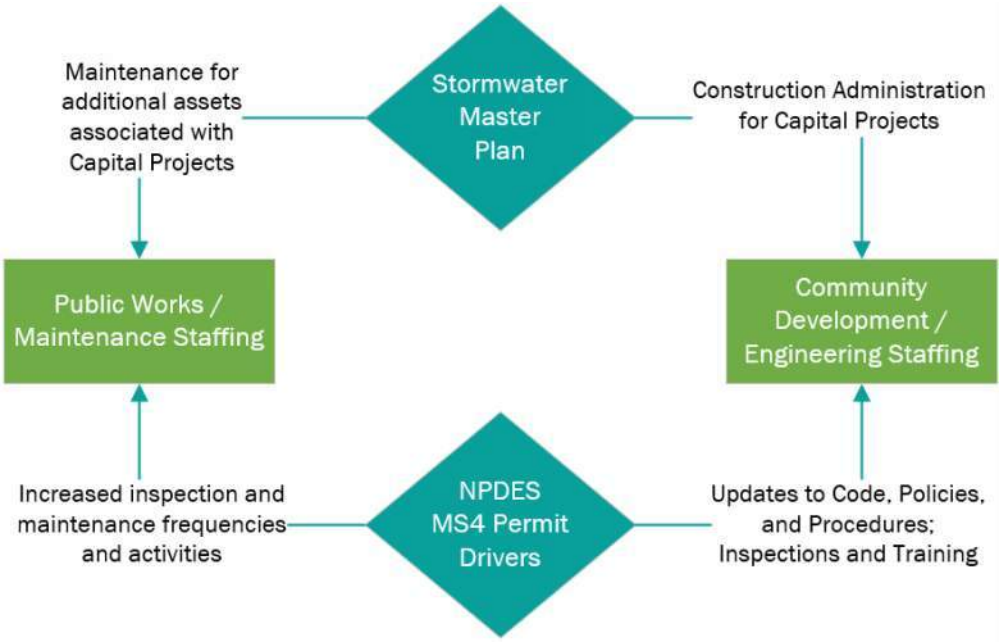

Figure 7-2: Staffing Evaluation Considerations

7.4.1 Assumptions

The following general assumptions were used to develop the staffing evaluation for both Public Works Stormwater staff and Engineering staff. Detailed assumptions specific to staffing estimates by activity are outlined in Appendix G.

- Except for the additional Public Works staffing needs identified in Section 3.2 for deferred maintenance, it is assumed that existing Public Works and Engineering staffing levels were adequate to implement the City's stormwater program and CP implementation prior to reissuance of the City's NPDES MS4 permit or implementation of this SMP. Thus, only additional activities are used to inform additional staff resource needs.
- One FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year (as confirmed by City staff).

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- The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021-Sept. 30, 2026) - reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.
- CPs are assumed implemented on an annual basis, and the CIP is assumed to be implemented over a 20-year implementation schedule, ranging from 2024-2043. Given uncertainty with schedule, CP costs are averaged across the 20-year implementation schedule equally. In practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.
- For the CPs listed in this SMP, 100 percent of engineering and permitting costs will be used for consultant support, and 100 percent of design/construction administration costs will be required for City Engineering staff.

7.4.2 Results

Table 7-3 provides a summary of the combined Public Works/Stormwater and Community Development/Engineering staffing needs for both the NPDES MS4 Permit driven activities and CP implementation activities. Detailed staffing projections, as reported in Appendix G, reflect FY 2023-2027 in alignment with the NPDES MS4 Permit timeline. However, staffing projections are relatively consistent when annualized and reflect the ongoing implementation of regulatory requirements over the 5-year permit period, as well as an annual average over a 20-year CIP implementation period. Thus, the annual average staffing is reflected below, and rounded to the nearest 0.1 FTE.

Table 7-3. Combined Staffing Assessment Summary

		Increased Staffing (FTE)
		Annual Average
Public Works/Stormwater Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.1
	Staffing contingency for NPDES MS4 Driven Activities [a]	0.4
	CP Implementation	0.2
	Public Works Staffing Total	2.7
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.2
	CP Implementation	1.2
	Community Development Staffing Total	1.4

a. Staffing contingency estimated at 20% to account unscheduled maintenance and response.

For Public Works (Roads and Stormwater Section), an increase of approximately 2.5 FTE is recommended to address both deferred and additional maintenance activities as defined with the reissued NPDES MS4 permit. This increase reflects a 20 percent contingency to account for additional, unscheduled activities as well as prescriptive maintenance efforts. An additional 0.2 FTE increase is anticipated for maintenance of new infrastructure (assets) associated with CIP implementation. However, timing of this 0.2 FTE may vary in accordance with construction of CPs and could be delayed over the 20-year implementation period.

For Community Development (Engineering Division), an increase of approximately 0.2 FTE is recommended to address additional tracking and inspection needs as defined with the reissued NPDES MS4 permit. This may be accommodated through reallocation of existing staffing or contracted support. An additional 1.2 FTE is anticipated to manage and execute contracts for CP design and construction services. This increase accounts for the 1.0 FTE of engineering staff

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currently dedicated to overseeing stormwater CP implementation, and reflects the additional staffing need. As with Public Works staffing, timing of this 1.2 FTE may vary in accordance with design and construction schedules and could be delayed over the 20-year implementation period. It should be noted that cost estimates for programmatic activities (i.e., Projects P-1 through P-5) have not been included in the staffing projections.

7.5 Project Prioritization

Project prioritization is an important component of the stormwater master planning process and can provide direction in sequencing projects in accordance with City objectives. This section summarizes the prioritization of CPs for implementation.

For this SMP, a CP prioritization tool was developed to assist with project prioritization. This Multi-Criteria Decision Analysis (MCDA) tool was developed using Microsoft Excel and includes prioritization criteria, scoring mechanism, and weighting factor schemes to present graphical and numeric rankings of CPs. The MCDA tool normalizes City-assigned scores for each criterion and project, which allows better differentiation of relative project performance (difference between best and worst options) and balances variability in scoring. Normalized scores were multiplied by their associated weights and summed to represent the overall project priority. The MCDA tool is intended to be updated on a continual basis; as projects are constructed, they can be removed from the ranking tool and new projects can be included as master plans are updated.

It should be noted that the overall stormwater CIP includes several new programs established to facilitate improvements without dedicated, individual CP consideration. Programs are not prioritized as part of this effort.

7.5.1 Prioritization Criteria

Proposed CPs are developed to address a variety of objectives including increased capacity, new infrastructure needs, maintenance, repair & replacement, water quality, and instream erosion/sediment control.

In consideration of the varied scope of proposed CPs and overlapping project objectives, the following scoring categories were used as the basis for developing project prioritization criteria.

- **System Operations**: System operations is a collective category representing capacity deficiencies, regular or recurring maintenance needs, and safety and accessibility as related to the location of a proposed issue or deficiency.
- **System Condition:** System condition reflects known problem areas where repair or replacement of an asset addresses a known or immediate issue.
- **Compliance:** Compliance reflects a CPs ability to address regulatory drivers including NPDES MS4 permit needs (water quality retrofits needs), TMDL and shade management drivers, and hydromodification risk.
- **Other:** Other criteria including contributing drainage area, project sequencing and phasing, construction constraints and funding source.

Table 7-4 summarizes the evaluation criteria and scoring guide. The scoring guide helps score projects consistently and advises others that may need to apply the tool in the future. A range of scores, from 0 to 3, is applied to each criterion for every project to yield an unweighted total score. As the City implements projects over time, and as priorities change and evolve, these criteria and the scoring guide can be revised in the CP prioritization tool.

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Table 7-4. Project Prioritization Criteria

Criteria	Scoring Definition (3 = High; 2 = Medium; 1 = Lower; 0=Does not address)			
	High (H)	Medium (M)	Lower (L)	Does not address
System Operation-Capacity	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses an existing capacity deficiency per hydraulic modeling efforts.	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses a lack of infrastructure (infrastructure need)	• Addresses a future capacity/infrastructure need.	• May provide some capacity benefit, but the location has not been identified as an existing or future capacity deficiency.
System Operation-Maintenance	• Addresses a location that has frequent citizen complaints and onsite response requirements.	• Addresses a location that has frequent citizen complaints and will reduce existing maintenance needs.	• Addresses a location that has less frequent citizen complaints and will reduce existing maintenance needs.	• Project does not address existing maintenance deficiency or lack of infrastructure
System Operation-Safety and Accessibility	• Reduces risk near a transit line, school, or backbone utility	• Mitigates risk, including system relocation into the public ROW to avoid collateral damage, safety concerns on private property.	• Reduces risk to non-essential property/minor roadways/structures.	• The identified problem is not anticipated to address safety concerns.
System Condition	• Addresses an immediate system condition need (problem area) where delay may result in immediate property damage or safety concerns.	• Addresses a system condition need (problem area) where delay may result in additional infrastructure deterioration or property damage.	• Replaces an existing City asset.	• The project does not include replacement of an existing asset.
Compliance-Water Quality	• Provides new or enhanced water quality treatment to address pollutants of concern, qualifying as a retrofit project with potential for fee-in-lieu	• Restores or enhances water quality function or coverage, qualifying as a retrofit project only.	• Provides some water quality benefit through sedimentation.	• The project does not include water quality treatment.
Compliance-Vegetation Management	• Restores shade protection (within 100' of stream bank) to address temperature TMDL	• Enhances riparian corridor vegetation coverage; removes invasive species	• Enhances upland vegetation conditions/characteristics.	• No plantings or vegetation enhancement associated with project construction
Compliance-Hydromodification	• Addresses area of known or observed instream erosion that could result in property damage or infrastructure failure.	• Addresses area of known or observed instream erosion that could result in bank stability issues.	N/A	• Project does not address area of known hydromodification impacts
Other-Contributing Area	• Project has regional impacts (drainage area is > 100 acres)	• Project has subbasin impacts (drainage area is > 10 acres)	• Project has local impacts (drainage area is < 10 acres)	
Other-Sequencing	• Project is required as a pre-requisite or preliminary project before another prioritized project need.	N/A	N/A	• Project construction scheduling would not be impacted by other project scheduling needs.
Other-Traffic and Accessibility	• Project construction is not expected to impact traffic or private property	• Construction may impact residential streets.	• Construction may impact collector streets.	• Construction will impact arterial streets or structures on private property are expected
Other-Development Drivers	• Project is a prerequisite to a current construction project.	• Project is required to support future growth and development or a planning area.	N/A	N/A
Other-Funding Source	• Project is eligible for funding via SDCs (50% or greater)	• Project is eligible for funding via SDCs (25%-50%)	• Project is eligible for funding via SDCs (up to 25%)	• Project is not eligible for SDC funding.

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7.5.2 Scoring and Weighting Factors

Every CP was reviewed by the City Engineer, Natural Resource Manager, and Public Works Operations Supervisor and scored by assigning a "0" through "3" score to each criterion in accordance with the scoring definitions (Table 7-4).

The MCDA tool includes the ability to incorporate weighting factors schemes that vary based on the importance of various scoring categories and individual criteria. Weighting factor schemes were established in collaboration with City staff including 1) an initial weighting with emphasis on system condition and balanced weights within the system operation and compliance categories, 2) adjusted weighting to emphasize on project sequencing (part of the other category), and 3) emphasis on criteria prioritized by Public Works.

Results of the various weighting schemes were compared, and outcomes discussed internally by the City. These schemes resulted in relatively consistent prioritization of projects, with some projects moving slightly up or down in ranking depending on the scheme. Ultimately, the city selected the initial weighting scheme and opted to make some related project scheduling adjustments in accordance with Public Works feedback. Resulting weighting factors are provided in Table 7-5.

The final, average score for each criterion were multiplied by the weighting factors associated with the select weighting factor scheme and summed for a final project score creating a project ranking.

Table 7-5. Selected Weighting Schema

Scoring Category	Category Weight (%)	Criteria	Criteria Weight (%)
System Operation	30	System Operation - Capacity	10
		System Operation - Maintenance	10
		System Operation - Safety and Accessibility	10
System Condition	25	System Condition	25
Compliance	25	Compliance - Water Quality	8.33
		Compliance - Vegetation Management	8.33
		Compliance - Hydromodification	8.33
Other	20	Other - Contributing Area	5
		Other - Sequencing	5
		Other - Traffic and Accessibility	5
		Other - Development Drivers	2.5
		Other - Funding Source	2.5

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7.5.3 Prioritization Results

The CP prioritization tool provides a bar graph that illustrates scoring results (see Figure 7-3). Each bar represents the total score, and each colored segment of the bar represents a specific evaluation criterion so the user can see which criterion played the most prominent role in the scoring results for each project.

The prioritization and ranking of the CPs were reviewed and used to inform the ultimate project scheduling (see Figure 7-1). In general, the highest scoring priority projects are scheduled in the next 5 years (2024-2028); the next level of priority projects are scheduled in the following 5 years (2029-2033); and the remaining priority projects are scheduled 10 years from now (2034-2043). Based on the total number and cost of projects within any one timeframe, some project schedules were adjusted per City feedback (see Table 7-1).

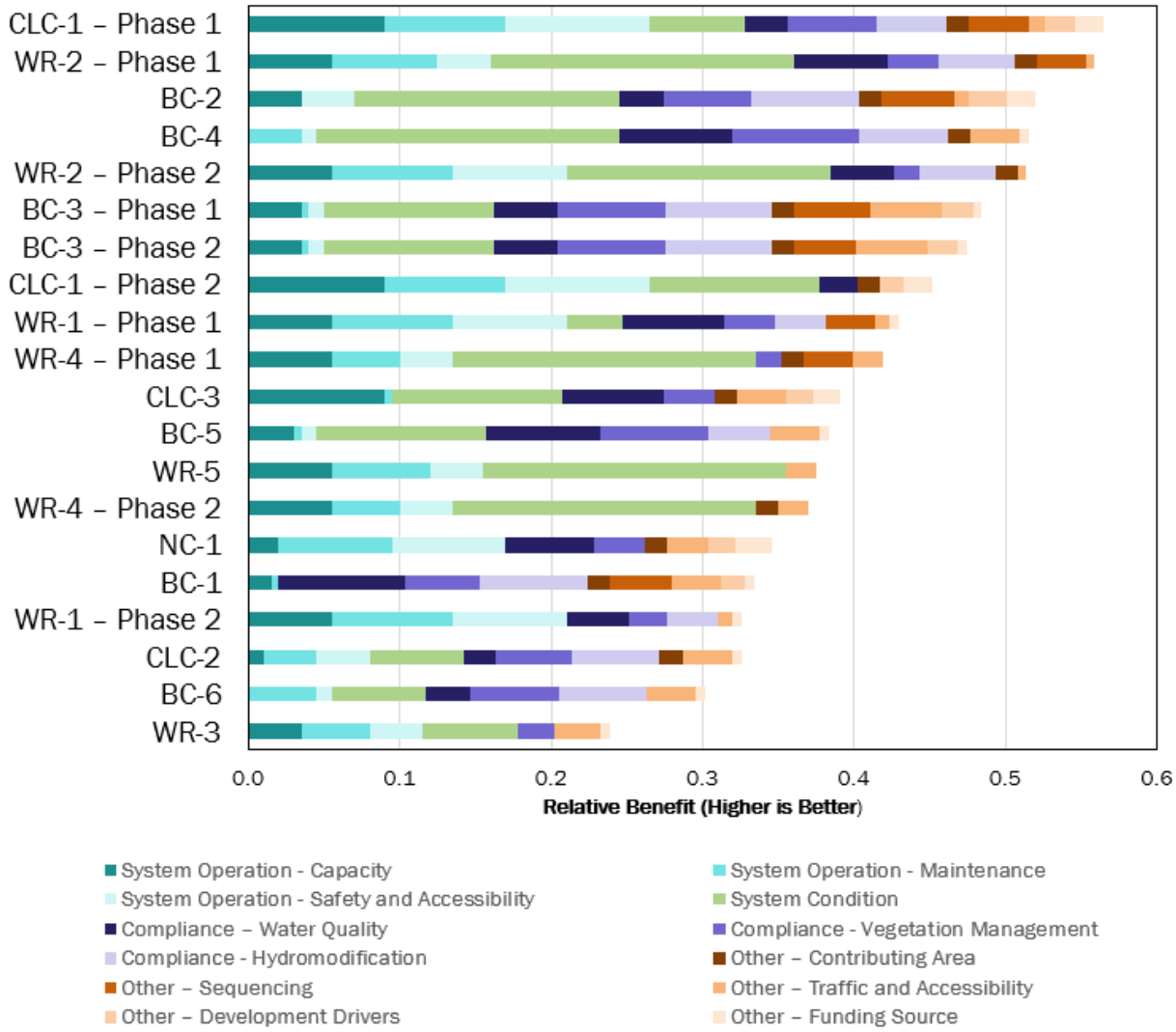

Figure 7-3: Prioritization Results

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7.6 Policy Recommendations

The following policy recommendations pertaining to the implementation of this SMP and associated CIP have been referenced in this SMP and are summarized for City consideration:

7.6.1 Stormwater Design Standards Applicable to Town Center

As described in Section 6.3.4, utilization of the Library Pond to mitigate stormwater treatment and flow control for Town Center redevelopment requires a site-specific stormwater design standard applicable to the Town Center property.

The City will need to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment. Onsite treatment and flow control will need to be provided for 50% of the redeveloped property (both private and public ROW).

7.6.2 Comprehensive Plan Updates

As summarized in Section 2.7, the City of Wilsonville Comprehensive Plan was reviewed with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit to ensure it is current and reflective of continued compliance.

A detailed summary of proposed modifications to the Comprehensive Plan are provided in Appendix H.

7.6.3 Design Standards for New Development and Growth Areas

Capacity-related CPs are sized in accordance with future growth and development, both within the city limits and outside city limits to the extent future zoning is established. Most area subject to new development will be within the City's jurisdiction and subject to the city's stormwater design standards that mimic pre-development flow conditions and require the use of infiltration-based facilities to the maximum extent feasible.

Site constraints occasionally prevented CP design to adhere to the City's design criteria, and in a few cases, flooding or system surcharge is still anticipated with implementation of CPs. Implementation of the City's stormwater design standards help ensure maximum capacity in the downstream stormwater collection system.

There are a few key locations in the City where future development outside of the city limits will be subject to another jurisdictions stormwater design standards (i.e., CP CLC-1: Day Road Stormwater Improvements). Establishing consistent stormwater design standards and design metrics for key Planning Areas (Coffee Creek Industrial Planning Area, Basalt Creek Planning Area) that encompass neighboring jurisdictions including Clean Water Services and the City of Tualatin is recommended to ensure that onsite retention and flow mitigation are applied to these new development areas. This mitigation should mimic pre-development site conditions to reduce the risk of downstream capacity and hydromodification impacts, as well as preserve water quality.

7.6.4 Stormwater Facility Tracking and Maintenance for Private Facilities

The City's GIS inventory of stormwater treatment and detention facilities is currently being updated to include consistent facility naming conventions (i.e., swales, raingardens, detention ponds) and inclusion of ownership information (specific to private facilities). Such updates will allow better integration between mapping and asset management, as well as allow geographic tracking of maintenance activities and responsibilities.

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The City's Stormwater Operations and Maintenance Plan is required for newly installed private facilities to ensure that the owners recognize responsibility for inspections and maintenance of their private stormwater facilities. The Stormwater Operations and Maintenance Plan requirements went into effect in 2012 and require submittal of an Annual Inspection and Maintenance Report by May 1 each year. The City conducts private facility inspections annually, targeting facilities that did not return an Annual Inspection and Maintenance Report.

In conjunction with the identification of problem areas and Project Opportunity Areas, private facilities are routinely observed to have deficient system maintenance, due to inconsistent and infrequent maintenance. In cases where the private facility is not being maintained and functionality is compromised, the City may consider a policy to reassign maintenance responsibility for existing private stormwater facilities and conduct maintenance in accordance with public facility maintenance protocols and schedules, subject to reimbursement by the private facility owner. Implementation of this proposed policy is supported through P-5: Stormwater Facility Enhanced Maintenance Program.

7.7 Next Steps

Following adoption of this Plan, a financial analysis will be required to evaluate the City's current stormwater utility rate and SDCs to ensure adequate funding is available for implementation of CPs and programs outlined in this SMP. The resulting financial plan will provide a funding structure in accordance with the defined LOS that allows the City to implement the CPs and programs as costed and scheduled in this SMP while meeting other financial obligations and policy objectives.

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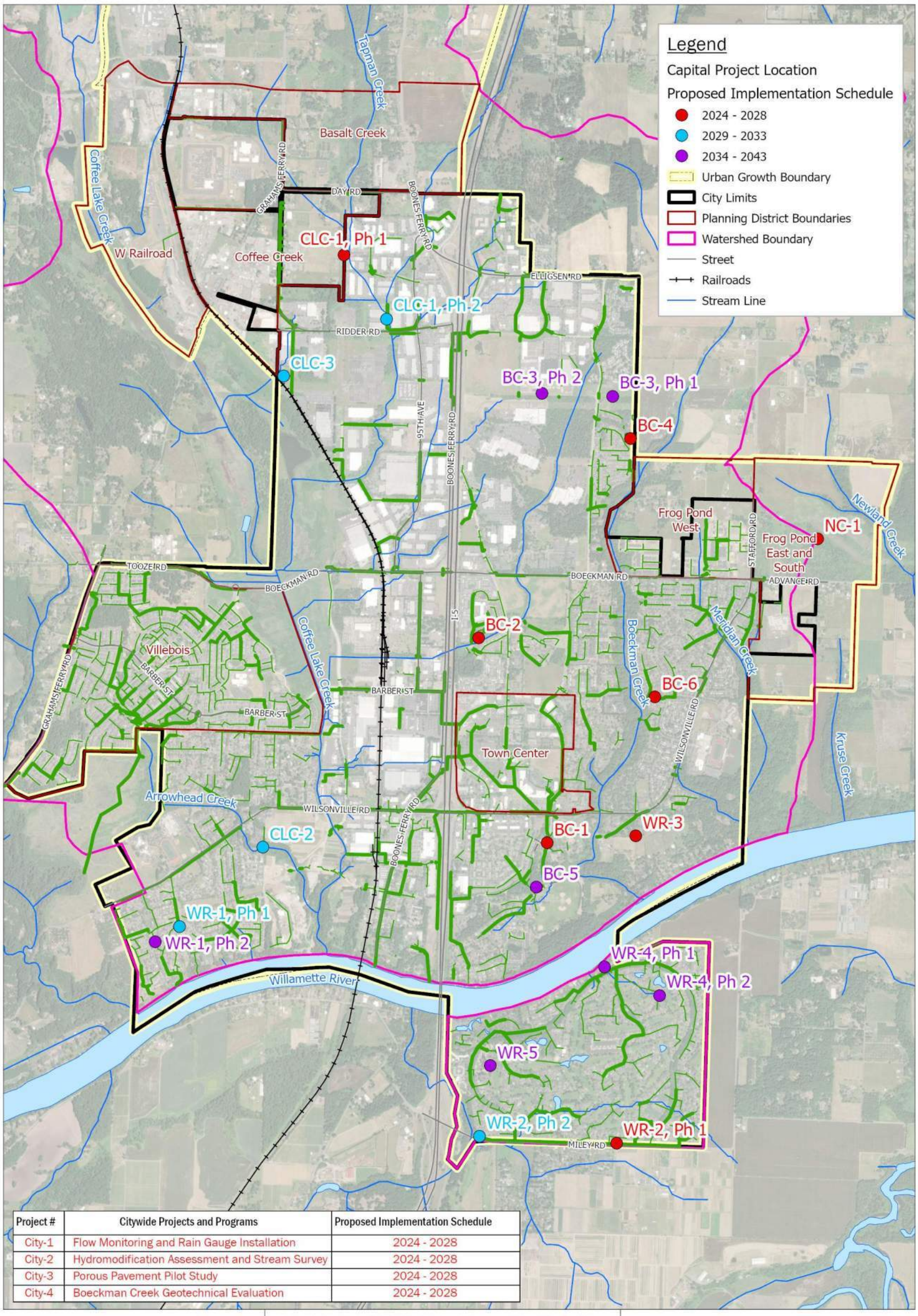

Project #	Citywide Projects and Programs	Proposed Implementation Schedule
City-1	Flow Monitoring and Rain Gauge Installation	2024 - 2028
City-2	Hydromodification Assessment and Stream Survey	2024 - 2028
City-3	Porous Pavement Pilot Study	2024 - 2028
City-4	Boeckman Creek Geotechnical Evaluation	2024 - 2028

Note: Planning Projects City-1 to City-4 and Programs P-1 to P-6 are all city-wide and not specific to a location. Programs P-1 to P-6 assume annualized funding.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 7-1: Capital Improvement Projects Prioritization

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Section 8

Limitations

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

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Appendices

Appendix A: Project Planning Matrices
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Appendix C: TM #2: Stream Assessment
Appendix D: Capital Project Fact Sheets
Appendix E: Capital Project Cost Estimates
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Appendix G: Staffing Evaluation
Appendix H: Comprehensive Plan Review

Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix
Table A-2: Project Opportunity Matrix

Appendix B: TM #3: Stormwater Modeling Methods, Assumptions, and Results

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

Appendix E: Capital Project Cost Estimates

Appendix F: Library Pond Analysis

Appendix G: Staffing Evaluation

Appendix H: Comprehensive Plan Review

Brown AND Caldwell

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Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix
Table A-2: Project Opportunity Matrix

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Public Works Community Development	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass easement area under the power line and to the river. The design (location) is flawed and the water flows into the yard of the homes that back up against the easement, requiring sandbags to redirect flow.	R/R		Y	Recent outfall projects on Belknap and Morey Lane. AKS study (2017) indicated current pipe size is not sufficient to redirect flow into pipe to SW Belnap Ct outfall. AKS study identified alternatives. Meetings have occurred with BPA related to locating a pond.	Any pond option on the BPA easement would require coordination and adequate BPA utility access. There is a high-pressured fuel line running N-S on the E edge of the easement that would need to be avoided. Infiltration rates anticipated to be high. Project development considerations: Need to understand infiltration rates for pond/gsi feasibility. Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. Both pond/GSI and pipe upsizing in one project unlikely System modeling would be needed to assess flows and size detention.	Y	N	Y*	N
2	Frog Pond ditch and culvert under Boeckman Rd.	Public Works	Ongoing flooding issue at 6920 SW Boeckman Rd. House - foundation is only 2-3 in. higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R		Y	Area has presented an ongoing issue. Model extension is needed.	Existing culvert along Boeckman Road is directed toward the homeowner's garage, where peak flows come very close to the foundation. Project development considerations: Project needed to right size the culvert underneath Boeckman Rd (currently not in the model). A box culvert may be easier to maintain. Pipe the drainage along Boeckman Road beyond the property owner's house where the channel has additional vertical drop. Projects may be implemented as part of the Boeckman Road improvements	Y	Secondary	Y*	N
3	Pond F	Public Works	Possible design flaw and blockages impeding flow; potential maintenance issue.	R/R	MAINT	N		Not visited but discussed with PW staff. Pond is already included in model but scheduled for reconfiguration.	N	N	TBD	TBD
4	Library Pond	Public Works Community Development	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP		Y	City wants to include Library Pond expansion in fee in lieu program for Town Center redevelopment. Current configuration/ contributing drainage area in model overestimates flow contribution. Model updates needed to more accurately reflect existing drainage area to pond.	Flow from the pond is a ditch inlet that requires maintenance to keep clear from vegetation and debris (currently there is a temporary fence installed for this purpose). Project development considerations: Phase 1: retrofit the pond outlet structure to include an emergency overflow for consistency with current standard pond details. Clear vegetation and debris. Phase 2: construct flow control structure per standard details and pond outlet structure to accommodate per future growth. Include a dedicated maintenance access path. No as-builts/drainage report available to confirm existing stage-storage. Model updates required to refine the current contributing drainage area (hydrology) and evaluate capacity.	N	Primary	Y*	N

[1] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[2] Stream assessment locations identified as priority or secondary.
[3] Priority project location identified with a *

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
5	Memorial Lift Station - current location	Public Works	Ditch behind lift station occasionally overflows during heavy precipitation.	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
6	Regional Parks 7 & 8; SW Coffee Lake Dr. Level Spreader	Public Works	Level spreader does not drain properly causing erosion issues	MAINT	E&S	N	Appears to be an operational issue only.	Not visited.	N	N	N	N
7	SW Montgomery Way	Public Works Community Development 2012 SMP	Channel and culvert issues are causing flooding. Future development (PDR1) is anticipated upstream of problem area.	CAP		N	City staff have not reported recent flooding issues here and don't consider it a project need any longer. 2012 MP identified a CIP (WD-1) for this location. Limited GIS information available to conduct modeling. City staff have not reported recent flooding issues here and don't consider it a project need any longer.	Not visited.	N	N	N	N
8	Commerce Circle near Delta Logics parking lot	Public Works Community Development	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	Contributing drainage area to pipeline is unclear.	Improperly abandoned storm line is not shown in the GIS. Pipe is on private property north of the street. Project/ program development considerations: Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. Current sink hole is causing a safety concern. Additional as-built research is needed to identify lateral connections to the abandoned pipe.	N	N	N	Y
9	Miley Rd sinkhole	Public Works 2012 SMP	Collapsed mainline due to age and pipe corrosion has caused a sinkhole. Remaining pipe is failing and needs replacement.	R/R		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents.	Not visited.	N	N	Y	TBD
10	Miley Rd outfall	Public Works 2012 SMP	Significant scouring into jurisdictional wetland.	E&S		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents. Erosion issues are entering a jurisdictional wetland and thus replacement is beyond scope for maintenance.	Not visited.	N	N	Y*	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
11	Town Center Loop near Les Schwab Tire Shop	Public Works Community Development	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Town Center redevelopment will impact high flow bypass for flows towards Library Pond.	CAP		Y	In 2015, ODOT installed a reducer on the 18" pipe that outfalls west before entering ODOT culvert under I-5.	ODOT reducer (12" as verified by PW 10-11-21) limits the existing 18" pipe that outfalls west to the ODOT culvert underneath I-5. Town Center redevelopment will remove the high flow bypass that currently sends flow south towards Library Pond. PW has observed flooding along Town Center Loop W via the CBs that tie into this current high flow bypass line. Project development considerations: **Model development needed to determine when it floods, and project need for existing conditions.** **Future conditions will be driven by adherence to Town Center plan.**	Y	N	Y	N
12	Rose Ln culvert	Public Works Community Development 2012 SMP	Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	City has implemented programmatic activities to resolve the issues but is still a problem. **2012 MP identified a CIP (WD-2) for this location.** **Limited GIS information available to conduct modeling.** Boeckman Road project may inform need.	Culvert underneath Rose Lane floods as vegetation on the upstream side blocks flow and drainage overtops the road and floods the neighbor's yard/garage on the downstream side. Drainage patterns here take several hard turns and is very flat. Project development considerations: **Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field.**	N	N	Y	N
13	SW Parkway Ave south of Costco	Public Works	N-S drainage swale south of Parkway has filled with sediment, surcharging the roadway drainage system, and resulting in ongoing maintenance. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	MAINT	CAP	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. **Location is already included in hydraulic model extents.**	Sysco ditch experiences high sedimentation rates due to minimal grade for the first section of the ditch. Sysco has plans to develop the lot to the west of the ditch, but timeline for this is unknown. Project development considerations: **Since this is a complicated issue (Sysco owns ditch but receives drainage from others both public/private), City may install WQ manhole (s) to remove sediments from public runoff. This would isolate any additional sediment accumulated in Sysco ditch to private sources.** **Hydraulic model review is needed to confirm long stream profile for potential improvement opportunities.** **Public works confirmed 36" pipe from Costco to 40" pipe to Sysco ditch (may attribute to Costco backwater).**	N	N	TBD	TBD
14	Culvert south of Day Rd.	Public Works	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #15/26.	R/R		Y	Location is already included in hydraulic model extents. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	Y	Secondary	Y*	N

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15	South of Day Road ponds near power lines behind businesses	Public Works 2012 SMP	Without brush clearing, the ponds south of Day Road back up and flow onto the road. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #14/26.	MAINT		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-1) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	Area studied as part of AKS Coffee Creek Facility Study. Effort worked to identify infrastructure needs and alternatives). The 2012 MP also included several capital projects to address these issues. Project development considerations: AKS study did not directly incorporate survey into existing condition model (extra effort required to incorporate survey independently into the hydraulic model). AKS study does not alleviate flooding.	Y	Secondary	TBD	TBD
16	95th Ave north of Hillman Rd.	Public Works	Crushed storm pipe found during CCTV inspection.	R/R		N	Location is already included in hydraulic model extents. Per City (10-1-21), replacement being completed as CIP #7062 95th Avenue Storm Line Repair. North repair is replacement of 120 LF of existing 24" CMP with 24" PVC (Carte ID 2335). South Repair is replacement of 44 LF of 15" CMP with 15" PVC (Carte ID 2337).	Not visited.	N	N	N	N
17	Mont Blanc in Villebois	Public Works	Tree planted in front of inlet blocking drainage into swale	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
18	Memorial Park drainage area behind the barn	Public Works	Same drainage ditch that causes issues with Memorial lift station (see Location ID5).	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
19	NW intersection of Elligsen Road and SW Parkway Ave near 76 gas station	Public Works External Survey	During heavy precipitation the CB backs up and floods the road at the corner	CAP		N	Additional CBs were installed with roadway improvements at low points and has alleviated flooding issue.	Visited surrounding property area and confirmed no issue.	N	N	N	N
20	NE corner of Elligsen Road and SW Parkway Center	Public Works	Sediment from the agriculture area north of Elligsen Road impacts Pheasant Ridge RV Park detention pond.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
21	NW corner of Graham Oaks parking lot	Public Works	Erosion around outfall sends debris into creek.	E&S		N	Outfall included in model for capacity only, does not evaluate erosion. Public Works filled with CDF and is continuing to monitor for erosion.	Not visited.	N	N	N	N

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22	Converted bubbler River Fox Park & SW Preakness	Parks Department (via) Public Works	Piped collection system is outside of the ROW and pipe diameter is reduced. Leaf debris affects the manhole in front of 11591 SW Preakness limits flow to mainline to Willamette Way East causing flooding. "Bubbler" manhole at fenceline acts like a sump.	MAINT	CAP	Y	Manhole (Cartograph # 57) surcharges and water exits the system, overflowing to inlet Cart #1240. Issue is capacity and whether the manhole should be redesigned to actually be a bubbler and not a surcharged manhole.	Complicated SW configuration. Pipe size changes from 24" to 18" to 12". Based on conversations with the property owner at 11242 SW Champoeg Dr (adjacent to inlet grate in SW corner of park) no flooding occurs here. Project development considerations: May consider installation of a pipe to directly tie runoff that is coming from Preakness Dr. into the MH at the end of Champoeg Dr. Following site visit, PW confirmed with Parks that this is nonissue. Clearing grates of any leaf debris addresses the issue. Future CCTV at this location may be warranted to confirm configuration.	N	N	N	N
23	Cul-de-sacs west of Serenity Way	Public Works	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul-de-sac.	Not visited but confirmed that additional inlets can be included in a programmatic effort.	N	N	N	Y
24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Public Works	Recurring flooding at catchbasins occurs after cleaning.	CAP	MAINT	Still Needed	Location is already included in hydraulic model extents.	Not visited.	N	N	TBD	TBD
25	SW Salish Ln at intersection with Parkway Ave	Public Works	Undersized catch basins cause flooding (ponding in SE corner by pond).	CAP		Y	Location is already included in hydraulic model extents, but with limited detail. As-builts provided from City reflect drainage ditches but no cross sections for ditches.	City pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Project development considerations: Need improved access (for a vactor truck) to the WQ MH and pond maintenance (like Library Pond). Access should be from the Shrine Center parking lot. Refinement of the model extents not needed.	N	N	Y	TBD
26	Day Rd culvert at Tapman Creek near PGE substation	Public Works	Undersized culvert over capacity causing flooding. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Areas #14/15.	CAP		Y	Location is already included in hydraulic model extents. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	N	Secondary	Y*	N
27	Storm basin SW Iron Horse St & SW Willow Creek Dr	Public Works	Reoccurring maintenance issues causing flooding; mix of private and City maintained structures	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
28	SW Advance Rd btwn Stafford Rd & SW 63rd Ave	Public Works	Outfall blockage issues caused by vegetation. City cannot access to fix	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N

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Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
29	SW Daybreak St & SW Morningside Ave	Public Works	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond	CAP		N	Renaissance Pond is included in existing hydraulic model. City confirmed configuration and pond outlet to west.	Not visited.	N	N	TBD	N
30	Sysco drainage ditch south of Parkway Ave	Public Works Community Development	Historical flooding issues; can no longer be accessed due to newly constructed fence. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	CAP	MAINT	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. Location is already included in hydraulic model extents.	See Problem #13. Same issue.	N	N	Y	TBD
31	Off Canyon Creek Road; catch basin in a residential backyard	Public Works	When farmer plows the field east of area debris enters catch basin and causes backups.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
32	Drainage ditch west & south of Delta Logistics	Public Works 2012 SMP	Overflow floods parking lot/channel conveyance issues. Related to Problem Area#15.	CAP		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-3) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15. Same issue.	Y	Secondary	Y*	N
33	Elligsen Rd and Parkway Center Dr near Jeep Dealership	Public Works	Bubbler does not operate as designed; runoff goes over road.	R/R		N	Bubbler location is mapped incorrectly (located on SW Canyon Creek Rd near Burns Way). Issue deemed to be not significant by COW staff.	Not visited.	N	N	N	N
34	95th Ave at Grace Chapel	Public Works Community Development	Outfall blockage in ODOT right of way.	MAINT		N	Appears to be an operational issue requiring coordination with ODOT.	Not visited.	N	N	N	N
35	Culverts under I-5	Public Works	End of design life and need to be replaced (already modeled). Various locations along Parkway Ave & Boones Ferry Rd.	R/R		Still Needed	Locations already included in hydraulic model extents. Requires coordination with ODOT.	Not visited.	N	N	TBD	TBD

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
36	Culverts under Jobsey Ln. and Arrowhead Creek	Public Works 2012 SMP	Damaged and old culverts (already modeled), need to be replaced	R/R		Y	Locations already included in hydraulic model extents. 2012 MP identified a CIP (CLC-9) for this location.	Not visited.	N	N	Y	TBD
37	Boeckman Creek N of Colvin Ln.	Public Works	Erosion of streambank and migrating channel.	E&S		N	Potential stream survey evaluation area	Not visited.	N	Primary	Y	N
38	Villebois neighborhoods	Public Works	Ponding issues in front of mailboxes.	R/R		N	Staff is unaware of any ponding in this area. Existing modeling extents are adequate.	Not visited.	N	N	N	N
39	Villebois neighborhood	Public Works	Concerns about the various detention ponds and whether they are being maintained appropriately. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issues.	MAINT		Still Needed	HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the City maintains the inlets and outlets. Grahams Ferry Pond has some design issues associated with the WQ manhole and adjacent inlets. Tooze Pond needs to be added to the hydraulic model (need stage-storage curve).	Not visited but discussed with PW. Pond maintenance is an ongoing issue. Recommend dedicated program to address and review of SOPs.	Y	N	TBD	Y
40	Citywide	Public Works	1996 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
41	Citywide	Public Works	2006 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
42	Citywide	Public Works	2015 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
43	Town Center Loop W - Shari's	External Survey	Drainage issues -Shari's parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
44	Town Center Loop W - Starbucks	External Survey	Drainage issues -Starbucks parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
45	Coffee Creek	External Survey	Lots of trash within creek at various locations (especially at choke points).	MAINT		N	Locations already included in hydraulic model extents, but need to verify configuration.	Not visited but location discussed with PW. Modeling refinements to incorporate the 30" and 36" lines from the Coca Cola Pond, starting at Seely Road to Coffee Creek.	Y	N	N	N
46	29851/29840 SW Camelot St	External Survey	Flooding from storm drain street grate. Grate clogs with debris .	MAINT		N	Appears to be an operational issue.		N	N	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
1	1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Willamette River	Staff Surveys	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass area within the BPA power line easement and to the river. 2012 AKS study identified deficient pipe capacity, preventing flow from reaching SWM Belknap Court outfall. Water flows into yards adjacent to the easement, requiring sandbags to redirect flow.	R/R	WQ	Y	Y	Y	N	Y	• Project area is adjacent to high pressure fuel line. • Project will require continued coordination with BPA to locate water quality facility and maintain utility access. • Need to understand infiltration rates for retention/GSI feasibility. • Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. • GSI and pipe upsizing in one project unlikely	Y- WR-1, Phase 1 and 2	--	--	--
2	2	Frog Pond ditch and culvert under Boeckman Rd.	Meridian Creek	Staff Surveys H&H Model	Ongoing flooding issue at 6920 SW Boeckman Rd. Culvert along Boeckman Road directs flows toward an existing garage. The foundation is only 2-3 inches higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R	CAP	Y	Y	Y	Y	N	• Project Fact Sheet and Cost Estimate prepared March 2022. • Project currently in design as part of the Boeckman Road improvements • Piped drainage system extended along Boeckman Road beyond the existing house, where the channel has additional vertical drop.	N	N	N	N
3	3, 39	Pond F and other ponds in Villebois	Coffee Lake Creek	Staff Surveys	Concerns whether various private detention ponds are being maintained appropriately. HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the city maintains the inlets and outlets. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issue.	R/R	MAINT	Y	Y, except for Grahams Ferry Pond	N	N	Y	• H/H model updated to include relevant facilities. • Active maintenance implemented by HOA. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement. • Per City (6/9/23) – Pond F swales above the level spreader have been cleaned out and are no longer causing issues.	N	N	Y- P-6	Y
4*	4	Library Pond	Boeckman Creek	Staff Surveys Retrofit Analysis H&H Model	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP	WQ	Y	Y	Y	N	Y	• Primary objective is to accommodate redevelopment of the Town Center; secondary is to accommodate Boeckman mitigation needs. • As-builts (stage-storage) incorporated into H&H evaluation.	Y – BC-1	--	--	Y

N/A = Not Applicable
Project Opportunities in gray have been removed from consideration for further project development.
[1] Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.
[2] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[3] Stream assessment locations identified as priority or secondary.
[4] Costed Project needs = Y were confirmed with City during on 3-15-23 and require a conceptual design, fact sheet and cost estimate. Unfunded Project needs will be documented in the SMP but will not have a conceptual design or cost associated. The resulting Project ID is listed for reference.
[5] Project Opportunity Locations affiliated with the Boeckman Road mitigation efforts are indicated with a *.

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					Ongoing challenges with debris removal at existing ditch inlet (which serves as outlet from pond). City has considered expanding the pond as part of the fee in lieu program for Town Center redevelopment.								• BC to document findings specific to future policy requirements and cost improvements to the pond to adhere to current design criteria. • Policy recommendation –Require portions of redevelopment to install onsite treatment and flow control to ensure capacity in Library Pond as a fee-in-lieu opportunity.				
5	9, 10	Miley Rd sinkhole and outfall	Charbonneau	Staff Surveys 2012 SMP H&H Model	2012 MP CIP SD9000 to SD9069. Collapsed mainline due to age and pipe corrosion has caused a sinkhole at eastern edge of pipe alignment. Challenge is exacerbated by steep slopes. Remaining pipe along Miley Rd. is failing and needs replacement. Significant scouring into jurisdictional wetland. Upstream capacity deficiencies indicated by H/H modeling (preliminary flooding location #1).	R/R	CAP	Y	Y	Y	N	N	• Steep slopes will require geotechnical evaluation. • Erosion issues are entering the jurisdictional wetland, and beyond the scope of maintenance actions, such as adding riprap to dissipate energy at the outfall. • Upstream end is collapsed (replacement in kind) and upsizing with outfall. Alignment is under private retaining wall. • Modeled capacity deficiencies at the upstream portion of the alignment (due to hydrologic inputs)	Y – WR-2, Phase 1 and 2	--	--	--
6	11	Town Center Loop near Les Schwab Tire Shop	Boeckman Creek	Staff Surveys	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Existing reducer (12” control on 18” pipe) was installed in 2015 to limit flow toward ODOT culvert under I-5. Restriction contributes to upstream problems through Town Center Loop. Town Center redevelopment will remove the high flow bypass for flows towards Library Pond.	CAP		Y	Y	N	N	N	• Model does not reflect flooding in this location. • Future conditions will be driven by adherence to Town Center Plan. • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
7	12	Rose Ln culvert	Willamette River	Staff Surveys 2012 SMP	2012 MP identified a CIP WD-2 for this location. Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage pattern is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	N	N/A	N	N	• Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field. • Consider opportunity to construct project in conjunction with future upstream development (PDR1). • Discussion during 3-15 Wksp confirmed historic project need requiring cost estimate.	Y – WR-3	--	--	--
8	13, 30	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	N-S drainage swale south of Parkway has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	Y	Y	N	Y	• Public works confirmed 36” pipe from Costco to 40” pipe to Sysco ditch (may attribute to Costco backwater). • Sysco intends to expand its footprint at this location, so private development may alleviate immediate open channel issue.	N	Y	Y-P-1	--

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					Ditch is owned and maintained by private owner (Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch.								• Future Project/ Program Recommendation - City may install WQ manhole(s) or other facilities to remove sediments from public runoff (Localized Drainage Improvements Program or Green Street/LID Retrofit). This would isolate any additional sediment accumulated in the ditch to private sources (could be done as part of a program activity).				
9	14, 15, 26, 32	Open channel system from Day Rd. to Ridder Rd	Coffee Lake Creek	Staff Surveys 2012 SMP H&H Model	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Existing AKS design does not fully alleviate modeled flooding.	R/R		Y	Y	Y	N	Y	• AKS Coffee Creek system evaluation included additional survey that was incorporated into model as part of validation efforts. AKS evaluation did not include impoundment (incorporated into BC model) or updated hydrology. • Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement. • Discussion during 3-15 Wksp indicated purchasing the adjacent (to the west) parcel for installation of the detention pond (AKS concept) is complicated by access road issues. • BC to confirm feasibility of improvements and 100-year WSE with respect to adjacent structures. City to confirm what level of future flooding is acceptable. • Policy recommendation – May be required to limit/ confirm adherence to City stormwater standards upstream (north) of Day Rd and establish similar standards for Tualatin discharge. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs.	Y – CLC-1, Phase 1 and 2 and City-1	--	Y-P-5	Y
10	24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Coffee Lake Creek	Staff Surveys	Recurring flooding at catch basins occurs even after cleaning.	CAP	MAINT	N	Y	N	N	Y	• Reconstruction is occurring so this may not be a pressing issue; future deficiencies to be addressed as part of a program (Localized Drainage Improvements Program)	N	N	Y-P-1	N
11	25	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	Undersized catch basins cause flooding (ponding in SE corner by pond). A city-owned pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Model predicts flooding within the pond and outlet. Pond configuration is based on original model build from 2012 SMP (preliminary flooding location #10).	CAP		Y	Y	Y	N	N	• Need improved access for a vactor truck to access the WQ MH and pond for maintenance. Access should be from the Shrine Center parking lot. • Refinement of the model extents or pond configuration determined to not be needed. • Program Recommendation - Localized Drainage Improvements Program or Green Street/LID Retrofit.	N	Y	Y-P-1	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
													• Other option would be documentation of an unfunded project for maintenance enhancement.				
12*	29	SW Daybreak St & SW Morningside Ave	Coffee Lake Creek	Staff Surveys	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond. Opportunity to improve water quality treatment through retrofit and reconfiguration of existing pond property.	CAP		Y	N	N	N	Y	• Possible pond retrofit to increase storage capacity and improve water quality treatment. • Location is also affiliated with Boeckman Road mitigation alternative locations and Ash Meadows (Project Opportunity Location #26), but not a prioritized location. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	N	Y- P-6	Y
13	35	Culverts under I-5	Coffee Lake Creek	Staff Surveys H/H Model	End of design life and need to be replaced. Various locations along Parkway Ave & Boones Ferry Rd (crossings from E-W).	R/R		N	Y	Y	N	N	• Project may be referred to ODOT; not one that the City would initiate. • Locations already included in hyd. model.	N	N	N	N
14	36	Culverts under Jobsey Ln. and Arrowhead Creek	Coffee Lake Creek	2012 SMP Stream Assessment	2012 MP identified CIP CLC-9 for this location. Damaged and old culverts (already modeled), need to be replaced	R/R	E&S	Y	Y	N	Y	N	• Locations already included in hydraulic model. • Combine with Project Opportunity #20.	Y – CLC-2	--	N	N
15	37	Boeckman Creek N of Colvin Ln.	Boeckman Creek	Staff Surveys 2012 SMP	2012 MP identified BC-8 (Canyon Creeks Estate Pipe Removal) for this location. Erosion of streambank and migrating channel reported in downstream portion of the project site.	E&S	WQ	Y	Y	N	N	N	• Consider more detailed stream survey evaluation to understand channel constraints and extents of potential planting. • Per meeting on 3-8, City confirmed ongoing issue. Refer to 2012 SMP.	Y – BC-4	--	N	N
16	43, 44	Town Center Loop W - Shari's and Starbucks	Boeckman Creek	External Survey	Drainage issues - Shari's and Starbucks parking lot (down the road from each other).	CAP		N	Y	N	N	TBD	• May be localized ponding addressed with addition of inlets (programmatic). • This issue was identified to be addressed through the Town Center Plan (2019). • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
17		Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Significant risk of continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River. Several properties have experienced bank failures and loss of land, and an active	E&S		Y	Y	N	Y	Y	• Consider upstream opportunities to reconnect floodplain, allow high flows to expand laterally, and dissipate channel energy. • Boeckman Road mitigation efforts (in progress) include evaluation of the tributary channel to the	Y- City-4	Possible	N	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					landslide is impacting the backyard and deck of one of the properties.								main reach of Boeckman and potential modification to increase upstream retention. • Per 3-15 Wksp, efforts may include stabilizing the channel and apply grade control; geotechnical investigation; retaining/ crib wall or soldier pile. • June 2023 – Per City - location to part of ongoing monitoring project (planning project need)				
18		Meridian Creek in Landover Park - Reach 1 (US of Wilsonville Rd.)	Meridian Creek	Stream Assessment	Sediment-clogged culvert (30-inch) at the Meridian Creek Crossing at Wilsonville Road. Culvert is mostly obstructed and appears to cause ponding during storm runoff.	MAINT	E&S	Y	Y	N	Y	N	• Consider location of ponding and whether infrastructure is being impacted. • If ponding is isolated to park and not overtopping any roadways or impacting private property, then maybe this isn't a problem that needs to be fixed. It's effectively a detention pond. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
19		Meridian Creek in Landover Park - Reach 2 (DS of Willow Creek Dr.)	Meridian Creek	Stream Assessment	Culvert outlet at upstream end of reach is clogged and backs up water underneath Willow Creek Dr. PVC SW outfall along reach is undermined (STA 1,100) and 6-foot section has washed out and moved downstream.	MAINT	E&S	Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • Traffic impacts to Willow Creek Drive during culvert replacement. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
20		Arrowhead Creek at Pedestrian Bridge (Reach 4)	Coffee Lake Creek	Stream Assessment	Culvert at upstream end of reach (at pedestrian crossing) is failing and should be considered for replacement.	R/R		Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • See Project Opportunity #14.	Y – CLC-2	N	N	N
21*		Memorial Park (Swale Retrofit, Pipe Upsizing, and Mitigation)	Boeckman Creek	Retrofit Analysis H/H Model	Swale at Memorial Dr. is not draining properly. Potential concept is to extend swale all the way along the road or relocate to the base of hill. Modeling evaluation indicates that the pipe system after convergence point at Memorial Drive has a constriction resulting in backwater and upstream system flooding (preliminary flooding location #5).	MAINT	CAP	Y	Y	Y	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Location is also affiliated with Boeckman Road mitigation alternative location (raising of pedestrian trail to detain flow from entering Boeckman Creek). • Relocation of swale allows for offline facility construction. •	Y – BC-5	--	N	N
22		Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	6 swales haven't been maintained properly - 2 are City owned and 4 need to be retrofitted and taken over by City	MAINT	WQ	Y	N	N/A	N	Y	• Level spreaders aren't working well. • Opportunity to expand water quality treatment through retrofit of existing facility. • June 2023 – Per City – PW already fixed the swales. Instead, recommend unfunded project or program for restorative maintenance of facilities (especially private). Current PW staffing doesn't support private facility maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	Y-P-6	Y

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						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
23*		Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	City staff have identified a former irrigation pond near this apartment complex adjacent to Boeckman Creek. This location may have potential to provide additional storage or provide mitigation measures. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	Y	N	N/A	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Boeckman Road mitigation efforts originally identified as a potential flow mitigation site but was not prioritized for alternative evaluation. • Will require private property partnership. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	N	Y
24*		Wiedeman Ditch/ Canyon Creek Park/BPA Easement	Boeckman Creek	Boeckman Road Mitigation Study 2012 SMP Retrofit Analysis	City staff identified potential project opportunity to construct a regional wetland or drainage facility at this location (would require BPA coordination). Facility would be able to manage runoff from Argyle Square, Sysco, and other future developments to help offset Boeckman Creek flows. This location is adjacent to previously identified erosion issues within Canyon Creek Estates (BC-8).	CAP	WQ	Y	N	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention through retrofit of existing facility. • Boeckman Road mitigation efforts evaluated storage capabilities in Wiedeman Ditch and Canyon Creek. This location is one of the preferred alternatives. • Will require coordination with BPA. • Potential mitigation opportunity for Sysco redevelopment (discussions in progress).	Y – BC-3, Phase 1 and 2	--	N	N
25*		Mentor Graphics/Siemens Ponds	Coffee Lake Creek	Boeckman Road Mitigation Study	Existing series of ponds located on Siemens property (8005 Boeckman Rd) currently only provide flow through storage. Ponds have potential to be modified to provide detention or reconfigured to divert less flow to Boeckman Creek during large storm events.	CAP		Y	Y	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention capacity through retrofit of existing facility. • Boeckman Road mitigation efforts included evaluation of potential bypass for low flow conditions and reroute from Boeckman to Coffee Creek watershed (in line with historic drainage patterns). See Project Opportunity #26. This location is one of the preferred alternatives.	Y – BC-2	--	N	N
26*		Mentor Graphics/Siemens Flow diversion structure and Ash Meadows Detention	Coffee Lake Creek	Boeckman Hydraulic Eval TM	Eliminate flow diversion structure on private property that diverts flows to Boeckman Creek during high flows (Project Opportunity Area 25). To account for additional flow returning to the Coffee Lake Creek drainage basin, utilize the Ash Meadows area to detain flows prior to entering the ODOT culvert underneath I-5. Utilize the volume of the natural depression near Ash Meadows to detain flows during large storm events.	CAP	WQ	Y	Y	N	N	N	• Boeckman Road mitigation efforts evaluated flow control potential at this location. This location is one of the preferred alternatives. • May require additional capital improvement projects downstream of Ash Meadows to ensure adequate conveyance capacity is available. • Will require coordination with ODOT.	Y – BC-2	--	N	N
27*		Boeckman Creek Instream flow mitigation and restoration	Boeckman Creek	Boeckman Hydraulic Eval TM	Within Boeckman Creek, several concepts have been identified to provide flow mitigation for projected increases in flow.	CAP	E&S	Y	Y	N	Y	Y	• Boeckman Road mitigation efforts indicated that instream improvements wouldn't provide the level of flow protection required.	Y- City-2	N	Y- P-5	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
				Retrofit Analysis	Specific locations within Boeckman Creek have not been identified at this stage: • Beaver Analogs: Increase the depth and size of natural ponding within the creek. This would supplement the existing population of beavers and dams currently within Boeckman Creek. • Channel Improvements: Protect, harden, or slow flow in areas potentially impacted by the change in creek flows. May include the addition of large woody debris, large root wads, grade control structures or other appropriate measures to protect threatened stream banks."								• Program need - Instream restoration or vegetation enhancement. Project needs may stem from monitoring efforts.				
28		Charbonneau West - SW French Prairie Rd and SW Boones Bend Rd.	Charbonneau	2012 SMP	Stormwater system within the western portion of Charbonneau was identified in the 2012 SMP as a location that requires replacement	R/R	CAP	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • The 2012 SMP and subsequent Charbonneau Plan identified the piped infrastructure at this location in need of repair and replacement. • Per 3-15 Wksp, City confirmed need to cost out capital project for this area per the R/R Chabonneau Infrastructure Master Plan.	Y – WR-5	--	N	N
29		Charbonneau East- SW French Prairie Rd Outfall and SW Edgewater	Charbonneau	H/H Model 2012 SMP	Model predicts flooding at this outfall and along the SW Edgewater piped system. Predicted flooding along this system generally starts at the 10-yr design storm, while the most upstream pipe segments along SW Edgewater are predicted to start at the 2-yr design storm. Restriction is caused by undersized outfall (30") in comparison to upstream pipe segments (36"). This outfall pipe was replaced in 2018 during an emergency repair but was not upsized to 36" per the recommendation from the 2012 SMP.	CAP	R/R	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Wallis Engineering is currently designing the portion of the system on Edgewater that contributes to this outfall. Per City (11-2-22), no capital project needed for Edgewater component.	N	N	Y- P-4	N
30		Charbonneau East- SW French Prairie Rd and SW Old Farm Rd piped system	Charbonneau	2012 SMP	Model predicts flooding throughout these piped systems starting at the 2-yr design storm due to insufficient capacity at the outfall pipe (Project Opportunity #29). Flooding at this location could impact the residential properties within Charbonneau.	R/R	CAP	Y	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Alternatives evaluated include inline detention upstream along SW French Prairie Rd and/or SW Old Farm Rd and replacement of outfall. Due to space limitations a detention pipe within the roadway cannot provide adequate flow control. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs. • City to confirm how much modeled flooding is acceptable.	Y – WR-4, Phase 1 and 2 and City-1	--	N	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
31		Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding at several nodes along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		N	Y	Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Per 3-15 Wksp, PW Ops confirmed no immediate project need.	N	Y	N	N
32		Garden Acres Rd./Peters Rd.	Coffee Lake Creek	H/H Model Retrofit Analysis	Model predicts flooding along N-S piped system along Garden Acres that crosses the RR tracks and outfalls to Coffee Creek wetlands. Model flooding starts at the 2-yr design storm. City concern with obtaining easement/ coordinating with railroad to upsize pipe. Flooding at this location during the 2-yr design storm is concerning as in the future the contributing drainage area will further develop which will exacerbate this issue.	CAP		Y	Y	Y	N	TBD	• Prior to outfall, there are several smaller size pipe constraints constricting flow and causing surcharge. • As-builts were received for the existing ponds (two private, one public) located near the outfall (at the location of several small diameter pipes) of the Garden Acres Rd./Peters Rd. piped system. • Potential pipe rerouting and new outfall was evaluated to divert flow away from the undersized storm piping along Peters Rd. and towards a separate outfall to Coffee Creek. Per meeting 3-29, not a preferred option because would require new outfall. • Expanded pond to help mitigate flow downstream.	Y – CLC-3	--	N	N
33		Boberg Rd. and RR crossing	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding along N-S pipe prior to discharging into open channel starting at the 2-yr design storm. Predicted flooding also at two large diameter culverts flowing E-W underneath RR tracks. Flooding at this location could impact the industrial properties along Boberg Rd.	CAP		N	Y	Y	N	N	• May be addressed in conjunction with Opp Area #32.	---	N	N	N
34		Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		N	Y	Y	N	N	• Per H/H results, immediate project need is unlikely.	N	Y	N	N
35		Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along piping that conveys private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		N	Y	Y	N	Y	• Modeled flooding may be due in part to hydrology node placement. • Large parking lots in adjacent areas could be potential for retrofit with pervious pavements or stormwater planters for stormwater collection. • Will require coordination with private property owners. • Per Wksp 3-15, City is unaware of existing issue here.	N	Y	N	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
36	8	Commerce Circle near Delta Logics parking lot	Coffee Lake Creek	Staff Survey	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	N	--	N	N	• Discussion during Public Works during site visit concludes no project need. • Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. • Additional as-built research is needed to identify lateral connections and drainage area to the abandoned pipe. • Program Recommendation - Localized Drainage Improvements Program or Repair and Replacement.	N	N	Y-P-1	N
37	23	Cul-de-sacs west of Serenity Way	Coffee Lake Creek	Staff Survey	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	N	--	N	N	• Program Recommendation - Localized Drainage Improvements Program. Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul de sac.	N	N	Y-P-1	N
38	46	29851/29840 SW Camelot St	Coffee Lake Creek	External Survey	Flooding from storm drain street grate. Grate clogs with debris.	MAINT	WQ	N	N	--	N	N	• Appears to be an operational issue. • Program Recommendation - Localized Drainage Improvements Program.	N	N	Y-P-1	N
39		Green Streets/LID Facilities	N/A	Retrofit Analysis	Develop a program to install LID facilities in conjunction with planned roadway improvements. Potential locations as listed in the Retrofit Assessment include SW Camelot, SW Wilsonville Road, and SW Hillman.	R/R			N	--	N	Y	• Program Recommendation – Water Quality Retrofit Program.	N	N	Y-P-2	N
40		Porous Pavement Pilot Study	N/A	Retrofit Analysis	Evaluate feasibility of porous pavement for future paving projects.	R/R			N	--	N	Y	• Consider applicability as a planning project to do porous pavement overlays for water quality in conjunction with pavement restoration/ improvement needs.	Y-City-3	N	N	N
41		Gesellschaft Water Well Channel Restoration	Boeckman Creek	2012 SMP Retrofit Analysis	Erosion is occurring within the drainage channel that enters Boeckman Creek.	E&S		N	N	--	N	Y	• Determined to be a higher priority retrofit location per 2015 Retrofit Assessment. • Per Wksp 3-15, project per 2012 SMP needed for funding.	Y – BC-6	N	N	N
42		Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	N	N	--	N	Y	• Determined to be a low priority retrofit location per 2015 Retrofit Assessment. • Discussion needed during planning workshop to confirm that funded project is not warranted.	N	Y	N	N
43		Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		Y	N	--	N	Y	• Conveyance sizing is based on no onsite controls. • Library Pond analysis will be used to support onsite (private) collection system requirements. • Additional assets/ re-piping is development driven. No defined project need, pending redevelopment.	N	Y	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
44		Frog Pond E and S Conveyance Piping	Newland Creek	Community Development Frog Pond East and South Master Plan	Public stormwater collection pipe and outfall along SW 60th Ave. (>15" diameter) per Frog Pond Master Plan.	INFRA		N	N	--	Y	Y	• Frog Pond E and S Master Plan complete in December 2022. • Additional stream assessment conducted in October 2023 baselined receiving water characteristics. • SMP incorporates trunk line and outfall associated with proposed system along SW 60th.	Y – NC-1	--	N	N
45		SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
46		Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
47		River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N

Appendix B: TM#3: Stormwater Modeling Methods, Assumptions, and Results

Technical Memorandum: Hydrologic and Hydraulic Modeling Methodology and Results

Brown AND Caldwell

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Technical Memorandum

FINAL

Prepared for: City of Wilsonville

Project Title: Stormwater Master Plan

Project No.: 156157

Technical Memorandum #3

Subject: Hydrologic and Hydraulic Modeling Methodology and Results

Date: March 7, 2023 (Final)

To: Kerry Rappold, City of Wilsonville

From: Michael Glass, P.E.
Angela Wieland, P.E.

Prepared by: _____
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Limitations:

This document was prepared solely for Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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List of Abbreviations

BC	Brown and Caldwell
BRCP	Boeckman Road Corridor Project
CIP	capital improvement program
City	City of Wilsonville
CMP	corrugated metal pipe
COM	Commercial
CPs	capital projects
CWS	Clean Water Services
GIS	geographic information system
GOV	Government
HB	House Bill
H/H	hydrological and hydraulic
HGL	hydraulic grade line
IND	Industrial
INST	Institution
LID	low impact development
LIDAR	Light Detection and Ranging
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NRCS	National Resource Conservation Service
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
PVC	polyvinyl chloride
PWS	Public Works Stadards
RA	Rural Agriculture
RCP	reinforced concrete pipe
SMP	Stormwater Master Plan
TM	Technical Memorandum
TMDL	total maximum daily load
TSS	total suspended solids
UGB	urban growth boundary
VAC	Vacant

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Section 1: Introduction

The City of Wilsonville (City) is developing an updated Stormwater Master Plan (SMP) to improve the understanding of stormwater system characteristics and infrastructure in the city. The SMP will include a capital improvement program (CIP) reflecting prioritized capital projects (CPs) and programmatic activities to address conveyance, capacity, water quality, and natural resource enhancement for existing and future development.

To document efforts completed as part of the SMP update, a series of Technical Memorandums (TM) have been developed. Technical Memorandum #1 (TM#1): Stormwater Basis of Planning (2/18/22) documented data collection and compilation efforts, presents applicable regulatory and design criteria, identifies stormwater problem areas (informing hydrologic and hydraulic [H/H] model updates), as well as preliminary project and programmatic concepts. Technical Memorandum #2 (TM#2): Geomorphic Analysis (5/25/22) documented field stream assessments for select stream channels within the City and identifies areas for additional consideration as a capital project.

This Technical Memorandum #3 (TM#3) builds upon the previously completed TMs to document the methodology and results of the H/H model activities. Topics covered in TM#3 include:

- H/H model evaluation criteria.
- Hydrologic model updates, including development of revised input parameters.
- Hydraulic model updates and expansion efforts, including refinement of existing modeled elements and the inclusion of additional stormwater infrastructure.
- Model validation approach, objectives, and adjustments.
- H/H model results under applicable design storm events, including identification of capacity limitations to inform development of capital projects.
- Next steps, including the comprehensive summary of project opportunities to inform CP development.

Section 2: Design Storm and Model Evaluation Criteria

The City's 2012 SMP developed a city-wide H/H model using the Innovyze InfoSWMM model platform. BC reviewed the City's existing H/H model and initiated updates as described in Sections 2.2 and 5.4 of TM#1. In addition, Brown and Caldwell (BC) reviewed Section 3 of the City's Public Works Standards (PWS) to outline planning criteria and sizing/design criteria to assess the existing stormwater system for deficiencies. This review is detailed in Section 4 of TM#1.

Section 2.1 identifies design storms that will be simulated for the H/H model and how model results will be used to assess compliance with the Surface Water Design and Construction Standards outlined in Section 3 of the City's PWS, revised December 2015.

2.1 Design Storms

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service.

Design storms used for this study include the 2-, 10-, 25-, and 100-year, 24-hour recurrence interval events. The rainfall distribution for these design storms is based on the standard National Resource Conservation Service (NRCS) Type IA storm, which is applicable to western Oregon, Washington, and northwestern California. Table 1 lists the design storm rainfall depths used in the hydrology model, as listed in the City's PWS.

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Table 1. Design Storm Depths	
Design Storm Event	Rainfall Depth (inches)
2-year, 24-hour	2.5
10-year, 24-hour	3.45
25-year, 24-hour	3.9
100-year, 24-hour	4.5

2.2 Model Evaluation Criteria

Stormwater infrastructure within the H/H model will be evaluated for capacity per the design criteria established in the PWS. The PWS reflects design criteria for new infrastructure and will also be the basis for design of future CPs developed as part of this SMP. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.
  - For new culverts 18 inches in diameter or less, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed two times the pipe diameter or three times the pipe diameter with a seepage collar, unless an exception is approved by the City.
  - For new culverts larger than 18 inches in diameter, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed 1.5 times the pipe diameter, unless an exception is approved by the City Engineer.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation conducted in Section 7 identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding which consisted of locations where the HGL exceeded the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level. For capacity deficient locations where a CP is developed, recommended projects will follow the PWS to allow for the minimum of 1 foot of freeboard between the HGL and ground surface. For additional information on PWS design standards and criteria as it relates to this SMP, refer to TM#1 Section 4.

Section 3: Hydrologic Model Development

The hydrologic model developed for this SMP update utilizes InfoSWMM version 15.0 and the RUNOFF method, which is consistent with the original modeling approach for the 2012 SMP. The RUNOFF method is a simple yet well-established method for simulating subbasin hydrology that utilizes the Green-Ampt method for calculating infiltration.

The necessary parameters for the RUNOFF method when utilizing the Green-Ampt method for infiltration includes subbasin area, slope, width, impervious percentage, hydraulic conductivity, initial moisture deficit, and suction head. The hydrologic module in InfoSWMM converts rainfall into stormwater runoff based on design storm parameters (i.e., volume and intensity of rainfall) and the hydrologic input parameters listed above.

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This section includes detailed descriptions of the methodology used in determining each of the hydrology model input parameters to update the original model.

3.1 Subbasin Delineation

The total contributing drainage area to City owned stormwater infrastructure is approximately 8,728 acres and extends beyond both the City limits and the urban growth boundary (UGB) in some locations. This total contributing drainage area represents the study area for the SMP and is organized by watershed or major basin. The study area is further subdivided into subbasins as shown on Figure A-1 of Attachment A. The receiving water body for all watersheds is the Willamette River.

The City's 2012 SMP developed subbasin delineations within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and updated based on the following City provided information:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

From this revised subbasin delineation, ArcGIS Pro was used to calculate individual subbasin areas for use as a hydrologic input into the model. A summary of the subbasins by major basin is presented in Table 2. Please note Newland Creek (and its associated drainage area) is outside the designated study area and not included in Table 2.

Table 2. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau [a]	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

a. The Charbonneau basin discharges to the Willamette River (direct) but was classified as a separate major based due to its location south of the Willamette River versus north.

The largest basins within the study area are the Boeckman Creek and Coffee Creek/Tapman Creek watersheds. These watersheds represent over 80 percent of the contributing drainage area from which the City manages stormwater runoff.

Subbasin names throughout the watershed are consistent with those developed for the 2012 SMP. This naming convention includes a unique four-digit ID (e.g., 1100, etc.) to classify each individual subbasin. Per the 2012 SMP, deviations from this convention include several subbasins that are instead named in accordance with the detention facility they drain to (e.g., CANYON_N etc.).

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Modification to subbasin naming for this SMP update only occurred when the original subbasin delineations were subdivided to provide a greater level of hydrologic detail. Split basins use “A” or “B” in the suffix to the original subbasin ID for identification purposes.

3.2 Subbasin Slope and Width

The RUNOFF method requires both subbasins slope and width parameters which are a function of the revised subbasin delineation discussed in Section 3.1. To approximate these two physical parameters for modeling purposes, the subbasin slope was first calculated based on the longest flow path line within each individual subbasin. Flow path lines were generated for each subbasin in ArcGIS Pro using automated spatial processing tools. These tools approximate the flow path line as the straight-line distance between the highest and lowest elevation points (based on LIDAR) in the subbasin. The auto generated flow path lines for each subbasin were then reviewed, and manually adjusted as necessary to correct instances where the flow path lines did not appear to represent reality. Examples of this includes flow path lines that did not follow the existing topography or followed a path outside of the subbasin due to an oddly shaped catchment or other nonstandard configuration. Subbasin slope was then calculated based on the flow path line length and upstream and downstream elevations. Subbasin width was then calculated for each subbasin by dividing the subbasin area by the flow path line length.

3.3 Infiltration Conditions and Soils

Soil classification and infiltration are important characteristics to consider when developing and evaluating runoff flow rates and volumes for subbasins. Soil classifications within the study area were identified using the NRCS Soil Survey. Soil information is based upon 2020 soil survey data in Clackamas and Washington County, Oregon. Soil texture class information for the study area is presented on Figure A-2 of Attachment A.

There are multiple methods that can be used to simulate infiltration associated with each soil type. For this project, the Green Ampt method was selected which is consistent with the 2012 SMP approach. The Green Ampt method was used due to its ability to be applied City-wide and for its use of parameters that can be sourced from available soil data without the need for field work.

The Green Ampt method requires the following input parameters for each soil texture classification:

- Average Capillary Suction. A measure of the water transport through soils due to surface tension acting in soil pores.
- Initial Moisture Deficit. The fractional difference between soil porosity and actual moisture content.
- Saturated Hydraulic Conductivity. A physical parameter reflective of the rate at which water moves through saturated soil.

All input parameters for soil texture classifications were based on the reference values in Table 6-1 of the City’s 2012 SMP and confirmed against published literature values. These values have been reproduced as Table 3.

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Table 3. Soil Infiltration Parameters (Green Ampt Method)				
Soil Texture Class	Saturated Hydraulic Conductivity (inches/hour)	Initial Moisture Deficit (fraction)	Suction Head (inches)	Percent of Contributing Drainage Area (%)
Sand	4.74	0.41	1.93	0
Loamy Sand	1.18	0.39	2.40	0
Sandy Loam	0.43	0.37	4.33	1
Loam	0.13	0.35	3.50	12
Silt Loam	0.26	0.37	6.69	79
Sandy Clay Loam	0.06	0.26	8.66	0
Clay Loam	0.04	0.28	8.27	0
Silty Clay Loam	0.04	0.26	10.63	4
Sandy Clay Loam	0.02	0.21	9.45	0
Silty Clay Loam	0.02	0.23	11.42	0
Clay	0.01	0.21	12.60	4

An area-weighted average value was assigned to each subbasin for each input parameter based on the distribution of soil texture class within the subbasin. The average input parameters for each subbasin are listed in Attachment B, Table B-2.

3.4 Land-Use and Impervious Percentage

Area-weighted impervious percentages were assigned to each subbasin based on an associated percent imperviousness for each land-use coverage in the City. Land use coverage and percent imperviousness by land use were adjusted from values used in the 2012 SMP due to refined zoning categories (i.e., impacts of House bill [HB] 2001) and improved methodology for calculating impervious coverage.

Land-use categories and coverages (reflecting existing development conditions and future, full-build out development conductions) were developed with the City in October 2021 using City zoning, comprehensive plan designations, developable lands/open space coverage, floodplain and wetland area designations, and impervious area coverages. The methodology of developing representative, current percent impervious percentages for each land-use coverage for this study is summarized in Section 2.3.2 of TM#1. A summary of the updated land use categories and associated impervious percentages are shown in Table 4 below.

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Table 4. Land-Use Categories		
SMP 2012 Categories	SMP Category	Representative Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15[b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential–Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City.

b. Adjusted as part of the calibration process for the Boeckman Creek Hydraulic Evaluation TM (1/31/22). See Section 5.1 of the TM.

An area-weighted average impervious percentage by subbasin was calculated for both existing and future development conditions based on the contributing land use and associated land-use based impervious percentages. The future land use coverage assumes conversion of vacant lands that are developable to their underlying zoning or comprehensive plan designation. The existing and future impervious percentage for each subbasin is listed in Attachment B, Table B-2 and shown in Attachment A, Figures A-3, and A-4.

The revised hydrologic input parameters discussed in this section inform the amount of runoff generated and ultimately routed through the hydraulic model as discussed in Section 4.

Section 4: Hydraulic Model Development

The City's existing InfoSWMM H/H model was initially developed as part of the 2012 SMP effort with minor, localized revisions for the Elligsen Pump-to-Waste evaluation completed in 2019. This most recent version of the H/H model was provided to BC in March 2021 and additional hydraulic updates were made as necessary for this SMP effort. The following subsections provide a description of the key hydraulic inputs required for the model and a summary of the hydraulic updates completed for this SMP.

4.1 Hydraulic Input Parameters

The InfoSWMM hydraulic model includes a network of nodes connected by conduits to represent the City's stormwater system in the model environment. Hydraulic information required by the model is stored within each node or conduit dataset. Within each node or conduit element, various hydraulic information is stored to govern the calculations and flow routing performed by the model.

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4.1.1 Node Data

Model nodes include structures such as manholes, outfalls, storage facilities and junctions. These elements are informed by the City's GIS. Model nodes also include other relevant connection points in the system not defined in the GIS such as connection points between continuous open channel segments. Key model node attributes are listed in Table 5.

Table 5. Model Node Attributes

Attribute	Value
ID	The ID is maintained from the original 2012 SMP model. New nodes were assigned an ID based on the City's GIS attribute information.
Invert elevation	Invert elevation of the junction in feet (vertical datum NAVD88)[a]
Rim elevation	Elevation at the ground level in feet (vertical datum NAVD88)[a]
Storage Volume (if applicable)	Stage storage relationship (Depth vs. surface area)

a. Vertical datum of GIS data discussed in Section 4.2.1.

Storage nodes within the model allow for the simulation of ponds, underground detention, and other flow control facilities within the City's stormwater network. Each storage node is assigned a stage storage relationship (depth. vs. surface area) to represent the available volume of storage at a given water elevation. Table 6 lists the storage facilities included within the H/H model, including both those reflected in the 2012 SMP and those newly added or modified as part of this SMP update.

Table 6. Model Storage Nodes

Storage Node ID	Description	SMP update status
POND_LIBRARY	Library Pond (Memorial Dr.)	Updated
POND_E1	Villebois–Palermo Park dry pond	No adjustment
POND_E2	Villebois–Palermo Park dry pond	No adjustment
POND_F	Villebois–Palermo Park dry pond	No adjustment
COCA-COLA_POND	Coca Cola Facility Pond (SW Kinsman Rd.)	No adjustment
RENAISSANCE_POND	Renaissance Development Pond (SW Canyon Creek Rd.)	No adjustment
STAFFORD_POND	Al Kader Shrine Center pond (SW Parkway Ave.)	No adjustment
WILSONVILLE_DIST_CTR_POND	Wilsonville Distribution Center pond (Boones Ferry Rd.)	No adjustment
TONKIN_NISSAN_POND	Tonkin Wilsonville Nissan Pond (SW 95th Ave.)	No adjustment
CANYON_CR_PH2_DET	Canyon Creek Business Park underground detention facility	No adjustment
CANYON_CR_ARCH_PIPE	Canyon Creek Business Park underground detention facility	No adjustment
POND_BOECKMAN	Area upstream of Boeckman Rd. flow control structure	Updated
SIEMENS_POND_B	Private pond on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
SIEMENS_POND_C&D	Private ponds on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
STAFFORD_MEADOWS_1_BASIN	Frog Pond West–Stafford Meadows pond (Boeckman Rd.)	Added
DAY_RD_IMPOUNDMENT	Impoundment south of Day Rd.	Added
TOOZE_POND	Villebois–Calais East (Tooze Rd.)	Added

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4.1.2 Conduit Data

Key attributes for conduits (i.e., pipes, culverts, and open channels) include ID, length, invert elevations, slope, shape (i.e., circular, or open channel cross-section), inlet and outlet losses, and Manning's roughness coefficient. The existing model conduit ID and naming convention was maintained for this SMP update. In locations where new conduits were integrated into the model, an ID was assigned based on the City's GIS attribute information.

Manning's roughness coefficient "n" is dependent on the material of the conduit. Table 7 provides a list of the roughness values applied, which are consistent with the documentation for the 2012 H/H model.

Table 7. Model Conduit Roughness

	Manning's *"n"* Roughness Coefficient
Pipe Material and Open Channel	Polyvinyl chloride (PVC) Pipe: 0.011
	Reinforced Concrete Pipe (RCP): 0.013
	Concrete Pipe: 0.013
	Corrugated Metal Pipe (CMP): 0.024
	Open channels: 0.035

4.2 Hydraulic Updates

Hydraulic model updates completed for this SMP update include model expansion, primarily in new growth areas since the previous 2012 SMP was completed or in identified problem areas (see TM#1), and model updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects. These areas were discussed in a System Status and Modeling Extents workshop with City Staff in August 2021 to identify/confirm the specific locations for hydraulic model updates and documented in TM#1. Hydraulic updates used the City's GIS data (provided June 2021) as the primary source information and supplemented by City provided as-built drawings and field verification where necessary. Additional hydraulic model refinement described outside of this section was completed as part of the model validation adjustments discussed in Section 5.3.

4.2.1 Vertical Datum Resolution

The original hydraulic model used inconsistent vertical datums to reflect elevations of hydraulic model elements. Based on discussions with the City, this inconsistency was determined to be due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted all existing hydraulic model elevations to be consistent with the City's current standard of NAVD88. Details and assumptions related to the identification and correction of datums is included in TM#1, Section 2.1.2. With this effort complete, future hydraulic updates (Section 4.2.2) were able to be integrated into the model under a consistent datum.

4.2.2 Model Update and Area Expansion Locations

Hydraulic model updates were completed from May 2021 through May 2022 as additional data were received and concurrently with the problem area identification process (see TM#1 Section 5.1). This process supported the initial identification of stormwater problem areas for the City, as locations requiring modeling to validate an observed problem. Additionally, expanded modeling helps to identify new problem areas or predict future problem capacity deficiencies.

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Table 8 summarizes the specific locations of hydraulic model updates that were integrated into the City's InfoSWMM model for this SMP update. Comprehensive locations of hydraulic model updates are shown in Attachment A, Figure A-5.

Table 8. Hydraulic Model Update Summary

Date Completed	Type of Revision	Rationale for Update	Location	Description
May 2021	Update	Topographic survey	Boeckman Creek	Integrated open channel cross-sections surveyed in the vicinity of Boeckman Rd. crossing. Revised stage storage relationship of Boeckman Pond based on survey information.
June 2021	Update	Constructed capital project	Charbonneau	Revised model to incorporate Charbonneau pipe upsizing associated with CP SD9022-9025 (Old Farm Rd. Phase I) and CP SD9014-9016, & SD9030 (French Prairie Drive Phase II).
June 2021	Update	Constructed capital project	Barber Street	Revised model to incorporate pipe upsizing along Barber St. associated with CP SD4208 and SD4209.
August 2021	Update	GIS discrepancy	ODOT yard west of I-5	Updated diameter of modeled culvert from 40-in to 42-in to match GIS data.
August 2021	Update	GIS discrepancy	Boones Ferry Rd.	No model adjustment needed north of 5th St. for existing 24-in pipe segment. City rectified GIS data to match the 24-in pipe shown in model. Model adjusted south of 5th St. to reflect pipe upsizing to 30-in shown in GIS.
August 2021	Update	GIS discrepancy	Wilsonville Rd.	No model adjustment needed. City rectified GIS data to match 30-in pipe shown in model.
August 2021	Update	GIS discrepancy	Graham Oaks Nature Park	Adjusted model to follow correct piping alignment shown in GIS.
August 2021	Update	GIS discrepancy	Boeckman Rd. (west of I-5)	Adjusted pipe diameter to 24-in to reflect latest GIS data.
August 2021	Update	GIS discrepancy	Hillman Ct.	No model adjustment needed. City rectified GIS data to match 24-in pipe shown in model.
October 2021	Update	Problem area and site visit	Kinsman Rd.	Model adjusted to incorporate field measurements (rim and measure-down elevations) collected by Public Works.
October 2021	Update	Problem area and site visit	Town Center Loop	Model adjusted to incorporate field measurement of ODOT reducer (12-in) collected by Public Works.
November 2021	Expansion	Problem area and site visit	Tooze Pond	Model expanded to include Tooze Pond detention facility. Stage-storage relationship estimated form City provided as-built drawings.
November 2021	Update	Problem area and site visit	Day Rd. to Ridder Rd.	Model updated with culvert information (diameter, length, inverts) surveyed in 2019 as part of the Coffee Creek Stormwater Facility Study. Surveyed open channel information not incorporated.
November 2021	Update	Boeckman Creek Hydraulic TM	Boeckman Road flow control structure	Integrated as-built information to update flow control structure elevations and the storage capacity of the pond upstream of the flow control structure.
November 2021	Update	Boeckman Creek Hydraulic TM	Mentor Graphics/Siemens	Model updated based on survey information collected as part of the Boeckman Road Improvement Hydraulic Evaluation. Survey information included geometry and elevations of the Boeckman Creek diversion structure and weirs. Onsite Siemens ponds added to the model based on as-built drawings.

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Table 8. Hydraulic Model Update Summary				
Date Completed	Type of Revision	Rationale for Update	Location	Description
December 2021	Expansion	New growth	Garden Acres Rd.	Expand model to include piped stormwater infrastructure along Garden Acres Rd. to Coffee Creek outfall.
December 2021	Expansion	New growth	Villebois	Expand model to include additional large diameter (>18-in) pipe within the Villebois planning district.
December 2021	Expansion	Problem area and site visit	Willamette Way E	Expand model to include additional infrastructure associated with Belnap Court outfall and Bonneville Power Administration (BPA) easement outfall.
February 2022	Update/Expansion	Problem area and site visit	Meridian Creek at Boeckman Rd. (Frog Pond)	Revised Meridian Creek culvert information based on City provided as-built drawings. Expanded model to include the open channel and "Stafford Meadows 1 Basin" detention pond upstream of the culverts.
May 2022	Expansion	Problem area and site visit	Day Rd. impoundment	Impoundment south of Day Rd. added to model based on as-built information provided by the City.

Section 5: Model Validation

The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. Flow monitoring and model calibration was not specifically conducted as part of this SMP update. The validation process involved several successive steps, as described below, leading to refinement of model input data to ultimately support the use of the H/H model to identify and develop CPs under this SMP update. The validation process included discussion of intermediate modeling results with the City during regular project check in meetings, which informed additional hydraulic modeling updates where the incorporation of as-built information was necessary.

The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments determined as part of the Boeckman Road Hydraulic Evaluation (1/31/22).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

5.1 Boeckman Road System Calibration

The Boeckman Road Hydraulic Evaluation (1/31/22) is a separate but concurrent study conducted as a precursor to the Boeckman Road Corridor Project (BRCP). This study utilizes the same, updated, citywide InfoSWMM H/H model as being updated for this SMP. The study calibrated the H/H model for the Boeckman Creek basin based on flow monitoring data collected at the Boeckman Road flow control structure from March to June 2021. This flow data represents drainage from approximately 1,400 acres of the study area, specifically the upper Boeckman Creek watershed that drains to the Boeckman Road flow control structure.

Calibration adjustments integrated into the H/H model are summarized in Table 9 below.

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Table 9. Boeckman Rd. Hydraulic Evaluation Calibration Adjustment Summary	
Adjustment	**Description**
1. Baseflow addition	Added constant 0.4 cubic feet per second of inflow to the Boeckman Creek system and simulated the three preceding months of rainfall to replicate antecedent conditions.
2. Residential Agriculture (RA) Land Use Impervious Percentage	Revised the initial RA impervious percentage from 6 to 15 percent. This adjustment affected hydrology citywide.
3. Mentor Graphics/Siemens survey results (2022)	Updated model to better represent existing conditions of private stormwater infrastructure, which included the Boeckman Creek diversion structure and weirs.

These calibration adjustments result in model results that match (within 3 percent) the peak instream flow for the selected calibration storm (June 11-15, 2021). Since conveyance infrastructure is sized based on peak flows, matching peak flow was the primary objective for this calibration effort. Detailed results of this calibration process including assumptions and rationale are described in the Boeckman Creek Hydraulic Evaluation TM, dated 1/31/22.

The calibration adjustments were applied to the citywide H/H model as the initial validation step for this SMP update. The anticipated impact from these calibration adjustments is not expected to be substantial; however only adjustment #2 from Table 9 directly impacts basins outside of Boeckman Creek watershed. Residential agriculture (RA) land use only comprises a small portion of the study area (approximately 14 percent), and most of this area is outside of the city limits. As such, additional validation efforts beyond the Boeckman Road Hydraulic Evaluation calibration adjustments alone were needed to sufficiently validate the citywide model.

5.2 Model Validation

To further validate the City-wide model, a validation storm event from January 4 to 7, 2022, was selected by City staff for simulation in the H/H model. This event was identified based on reported flooding observed by Public Works staff near Day Road and Commerce Circle (NW portion of City limits). Available information for this storm event included anecdotal accounts of flooding, photographs, and water surface measurements. The 15-minute rainfall data was collected from a nearby rain gauge.

Public Works staff provided several photographs from January 6 (time unknown) to document the reported ponded water south of Day Road as shown in Figure 1.

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Figure 1. Validation observations (south of Day Road)

To correlate observed standing water conditions with measured data, BC staff collected a water depth measurement downstream of the observed flooding per Figure 2 (left) on January 7, 2022 at 11 a.m.. This measurement was collected at one of the 48-inch culverts underneath Ridder Road. While this measurement was collected after the peak of the storm event, water levels within the culvert remained high, as the culvert was approximately 67 percent full as shown in Figure 2 (right) below.

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Figure 2. Validation measurement location (48-in. culvert underneath Ridder Road)

Left: Location of culvert. Right: Depth of water in culvert.

Rainfall data for this validation storm event was obtained from a rain gauge owned and operated by Clean Water Services (CWS) located along 99W Pacific Hwy between King City and Sherwood near the Tualatin National Wildlife Refuge. The gauge is identified by CWS as "LTR" and is approximately 5.75 miles from the Boeckman Road and Boeckman Creek crossing. This rain gauge was also used for the model calibration effort conducted for the 2012 SMP. The validation storm event rainfall is plotted (15-minute increments) on Figure 3, and storm characteristics are summarized in Table 10.

Table 10. Validation Storm Event

Statistic	Storm 1
Start Date/Time	1/4/22, 12:00
End Date/Time	1/7/22, 12:00
Duration, hours	72
Total Rainfall, inches	1.76
Peak Intensity, inches/hour	0.28

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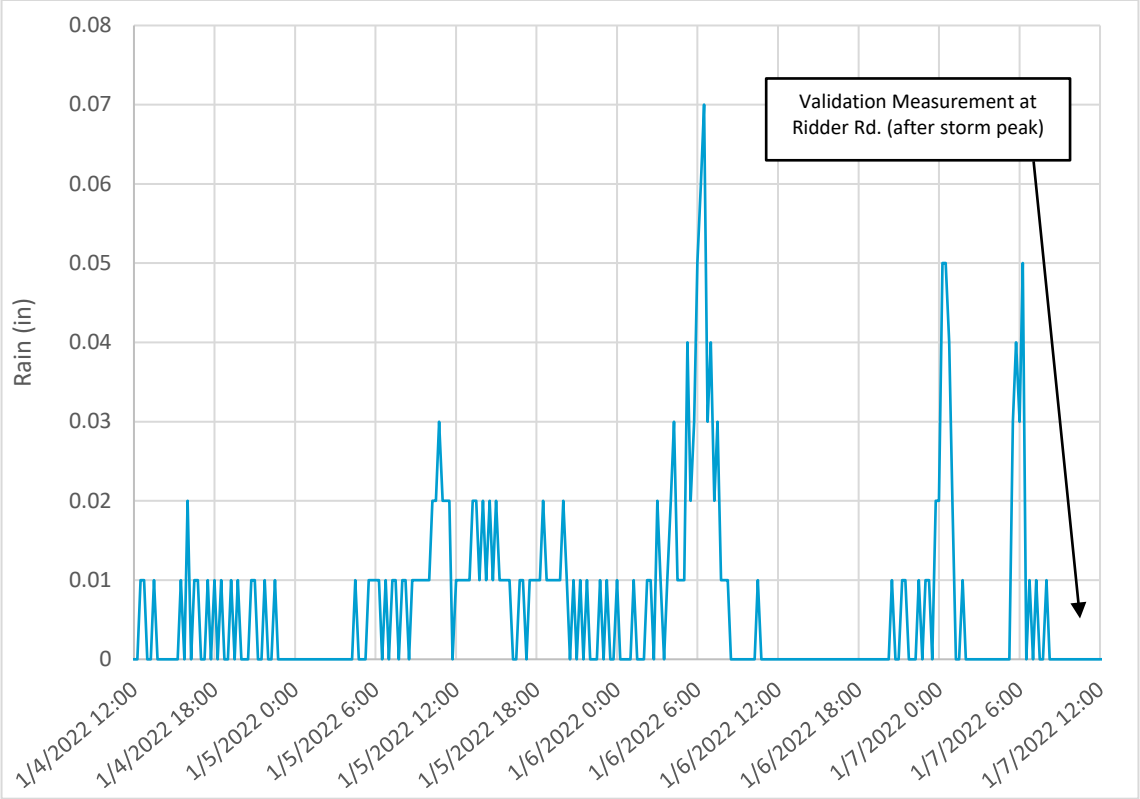

Figure 3. January 2022 validation storm event

5.2.1 Model Simulation

The validation storm was simulated in the H/H model to attempt to replicate the observed water surface elevations within the culverts at Ridder Road. The validation model simulation was unable to replicate observed conditions (i.e., standing water), indicating a discrepancy between the model results, City staff observations and BC measurements. The validation model results underpredicted the water depth measurements collected at the culverts underneath Ridder Road (Figure 2). While field measurements indicate that the culverts were approximately 67 percent full, the validation model predicted that the culverts would only be 11 percent full during that same period of the storm.

The discrepancy between the measured and simulated water surface elevation was attributed to the model not fully representing actual upstream hydraulic conditions from the culverts at Ridder Road. The modeled hydraulic reach between Day Road and Ridder Road includes simplified geometry to represent the open channel conveyance (trapezoidal cross-sections) and does not include the large wetland area north of Day Road nor the impoundment directly south of Day Road. In addition, it is suspected that during the storm event, the buildup of vegetation and sediment along this reach significantly contributed to backwater conditions and elevated water surface levels throughout the system.

5.2.2 Hydraulic Model Updates (Commerce Circle)

Adjustments to the system hydrology and hydrologic input parameters were briefly discussed with City staff but ultimately not made to resolve the large discrepancy in water surface elevations at the Ridder Road culverts. Rainfall patterns and storm volumes can vary significantly, and the rainfall gauge used to obtain the rainfall data is a relatively far distance from the validation location. Also, any adjustment to the hydrologic input parameters to increase flows at this location may have unintended consequences (i.e., impact CP sizing in other locations). The drainage area to the Ridder Road culverts is relatively small compared to the

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overall City's contributing drainage area. Therefore, it was decided that hydrologic adjustments associated with the model validation effort are not preferred and hydraulic model refinements should be made.

The hydraulic model between Day Road and Ridder Road was reviewed and updated based on available survey data within the general system area. Representative channel cross-sections were developed using the preliminary design information for AKS' 2019 Coffee Creek Stormwater Facility Study including the topographic data for the area collected by the survey team. This provided a more accurate representation of channel geometry in comparison to the conceptual trapezoidal channels included in the 2012 SMP model, although the change in the model results for the validation storm was marginal.

5.3 Preliminary Flooding Results and Additional Model Adjustments

With the large disparity in validation model results in the Day Road and Commerce Circle system (Section 5.2), it was decided jointly with the City to use a more comprehensive approach to qualify other flooding locations throughout the City.

Preliminary model results (reflecting validation adjustments described above) were discussed with the City in May 2022. This review focused on newly identified flooding locations (i.e., the 2012 SMP did not define a CP to address flooding in a specific location) throughout the City based on the 25-yr design storm (City's conveyance standard) under existing conditions. The preliminary flooding results were reviewed to identify and confirm deficiencies within the City's drainage network.

Locations with predicted flooding were cataloged in a summary table (Attachment B, Table B-2) and mapped (Attachment A, Figure A-6). City staff provided input on the preliminary modeled flooding locations as well as provided additional information (as-builts) to help refine the model prior to producing finalized results. City staff confirmed known flooding locations and locations where model flooding may not be indicative of a real-world issue.

In general, City staff agreed with the preliminary flooding results presented by the model. Preliminary flooding locations where City staff were not aware of issues were reviewed in detail to confirm their hydraulic configuration and whether the contributing drainage area and subbasin delineation was representative. For several locations where flooding had not been previously known by City staff, modeled flooding was resolved by further subdividing subbasins to simulate runoff entering the piped hydraulic system more accurately. It was decided jointly with the City that these adjustments were reasonable to resolve the issues and further effort should focus on the higher priority locations.

Additional locations (per Attachment A, Figure A-6) warranted hydraulic updates based on updated information provided by the City. These locations include:

- Location #2 Charbonneau SW French Prairie Rd. Outfall. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- Location #6 Library Pond. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- Location #11: Penske Truck Rental Property. Model revised to reflect updated culvert information underneath parking lot based on as-built drawings.
- Location #15: Wilsonville Distribution Center Pond: Model revised to reflect pond outlet structure based on as-built drawings.

Following hydraulic model adjustments, several locations are still predicted to flood despite City staff not being aware of any issues. These locations are outlined in Attachment B, Table B-1 as location IDs without narrative in the "City Validation Notes" column. Completion of the City-driven validation adjustments to the hydraulic model concluded the validation effort for the model. As previously discussed, traditional validation

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efforts for this H/H model were not feasible due to limited data. BC relied on feedback from City staff as part of this validation effort as it provided the most realistic path forward to continue with the capacity evaluation (Section 7) and advance CP development without requiring additional extensive data collection or flow monitoring.

Section 6: Future Flow Condition Modeling Analysis

During the model development process (Sections 3 and 4), BC evaluated different future flow assumption methodologies to determine impacts on runoff rates and ultimately CP sizing.

This analysis was initiated based on efforts to expedite design of a culvert replacement project at Meridian Creek at Boeckman Road (Problem Area #2) in February 2022. In this location, upstream development complies with current City stormwater design standards and incorporates various low impact development (LID) and flow control facilities and practices. As the sizing of CPs is typically independent of the presence of onsite facilities, the impact of onsite treatment and flow control on CP sizing was considered. While the immediate applicability of this effort was intended to inform this specific design effort (implemented and funded as part of the Boeckman Road Corridor Project), it was acknowledged that the future flow assumptions established here should apply to CPs developed as part of this SMP. This section documents the analysis for application to the SMP.

6.1 Background

The 2012 SMP developed CPs with a future flow condition that assumed each contributing subbasin would be fully built out to its zoning coverage. Future condition hydrology was developed from this future land use condition to size applicable stormwater infrastructure (i.e., pipes, culverts, ponds, etc.).

Since adoption of the 2012 SMP, the City revised their Stormwater and Surface Water Design and Construction Standards (2015). As part of this revision, developers are required to maintain pre-development runoff characteristics to minimize the effects of sediment transport and erosion, as described in Section 301.1.05 below:

> Stormwater management facilities shall be designed to maximize groundwater recharge through the process of infiltration of runoff into vegetated facilities and the use of what is referred to as Low Impact Development (LID) facilities and/or flow controls to address hydromodification.
>
> *Section 301.1.05, Wilsonville Stormwater and Surface Water Design and Construction Standards, 2015*

Compliance with this requirement provides a level of flow control for new development that was not accounted for in the 2012 SMP methodology for estimating future flows. If the same methodology is used, there is a potential to oversize CPs, as any upstream flow mitigation provided by LID facilities may reduce the peak flow to be managed by the constructed CP. The objective of this analysis was to evaluate whether implementation of onsite LID facilities should adjust the future flow methodology for CP development.

6.2 LID Facilities Modeling Approach

Evaluating the direct impact of future LID facilities associated with future development using the InfoSWMM H/H model is inherently difficult as the configuration and location of these facilities is unknown. InfoSWMM is capable of modeling specific LID facilities through its hydraulic module, but requires several known inputs such as invert elevations, depth/storage curves, outlet structure geometry, and specific locations within the drainage system to accurately retain and route flow.

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Due to the absence of this information, the impact of future LID facilities was estimated through InfoSWMM's hydrologic module, specifically by adjusting the Sub-Area routing feature. The Sub-Area routing default within InfoSWMM routes all impervious and pervious area associated with a subbasin directly to the outlet (outlet routing). An optional configuration called percent routing, allows for a percentage of the impervious area within a subbasin to be routed over the pervious area within a subbasin prior to reaching the outlet. This is illustrated in Figure 4, originally published in the EPA Storm Water Management Model Reference Manual Volume I, Hydrology.

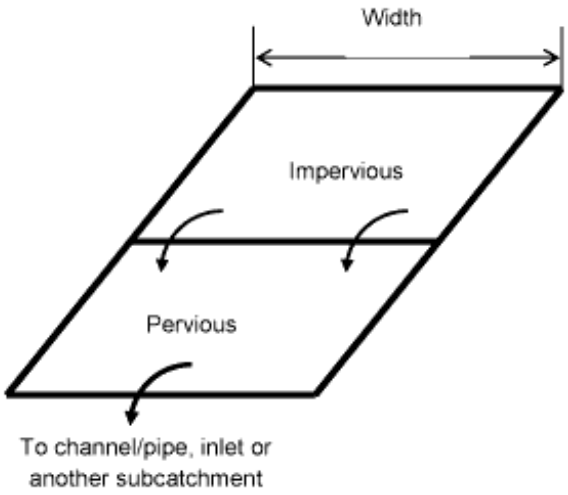

Figure 4. Percent routing diagram

Use of this percent routing feature within InfoSWMM is a simple routing mechanism. Available literature on this routing feature reflects its usage to approximate impacts of LID facilities within a subbasin, as it slows the timing of peak flow and allows for flow attenuation and additional infiltration.

The percent routed can range from 0 percent (direct outlet routing) to 100 percent (all runoff from impervious area routed to pervious area). To assess the sensitivity of the percent routing option on peak flows within the model, three different future alternative scenarios were simulated in addition to the traditional outlet routing model:

- PERV=75 percent
  - Routes 75 percent of impervious area over pervious area (less conservative)
- PERV=50 percent
  - Routes 50 percent of impervious area over pervious area
- PERV=25 percent
  - Routes 25 percent of impervious area over pervious area (more conservative)
- Outlet Routing
  - Impervious area and pervious area are routed directly to outlet (most conservative)

6.3 Results

The different future alternative scenarios were simulated for several design storms to assess relative impact on peak flows specific to the location of the Meridian Creek culvert replacement project. Results for the 10-yr design storm and the 100-yr design storm (culvert design standard) are shown below on Figures 5 and 6, respectively.

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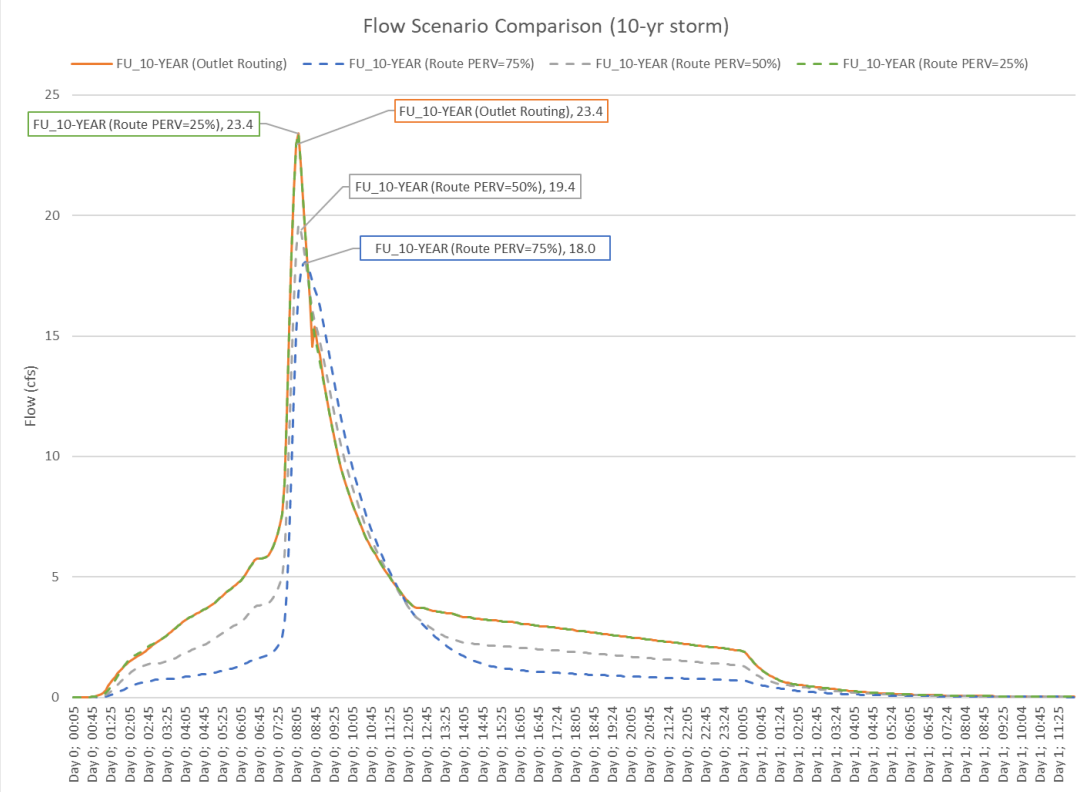

Figure 5. Meridian creek culvert–10-yr design storm

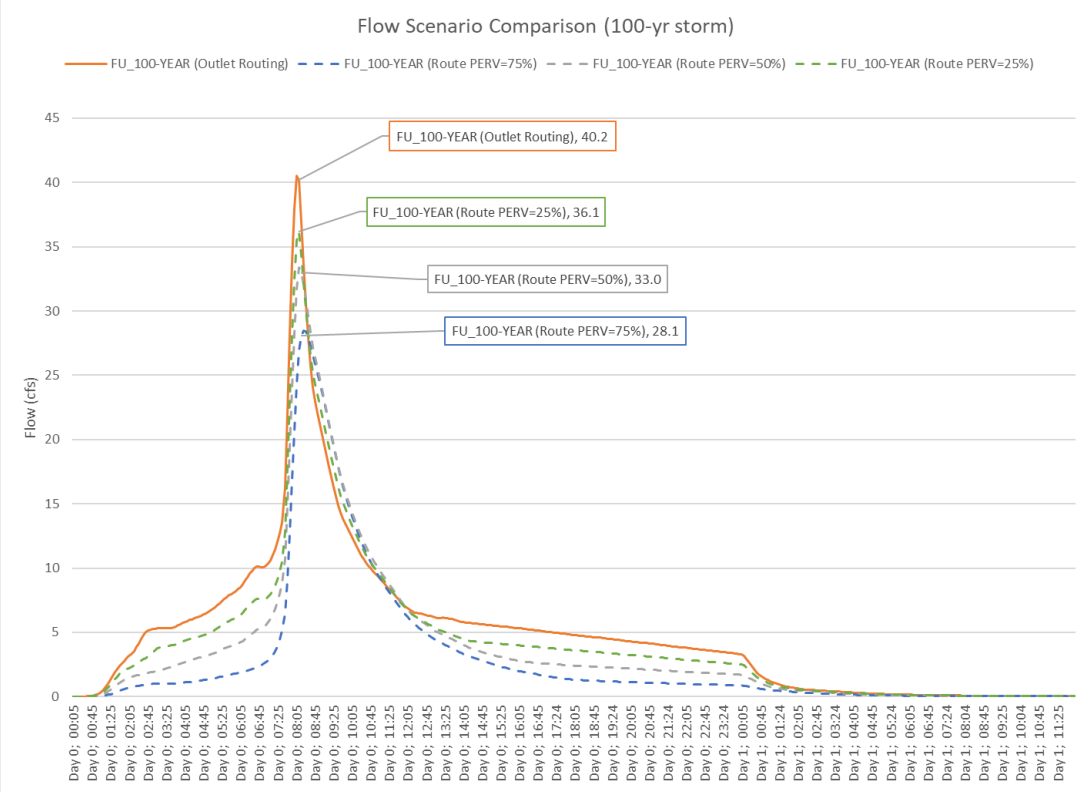

Figure 6. Meridian creek culvert–100-yr design storm

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Based on these sensitivity model runs, the following conclusions regarding peak flow percent routing were reached:

- Increasing percent routing for a subbasin reduces anticipated peak flows.
- Percent routing has a greater impact on anticipated peak flows for larger design storms (i.e., 100-yr design storm)
- Percent routing has a greater impact on subbasins with lower impervious percentages (undeveloped/vacant lands).
- For smaller design storms (i.e., 10-yr design storm) the anticipated peak flow difference between outlet routing and PERV=25 percent is insignificant.

Based on these conclusions, and the desire to build some conservatism into the sizing for future CPs, it was decided jointly with the City to proceed with future condition modeling without subbasin percent routing. It was acknowledged that this approach may lead to the oversizing of some stormwater infrastructure; however, this would only be where the contributing drainage area is primarily undeveloped.

Section 7: H/H Model Evaluation and Results

Upon completion of the model validation effort (Section 5), detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm. H/H model inputs and results are summarized for the hydrologic and hydraulic models in Tables B-2 and B-3, of Attachment B, respectively. The following sections present the findings resulting from the model and how the model will inform CP development efforts.

7.1 Hydrologic Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events. Future land use conditions represent the development of developable (vacant) lands per their associated zoning category or adjusted zoning coverage for select, developed lands based on anticipated zoning in accordance with House Bill (HB) 2001.[1]

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. Attachment A, Figure A-7 presents subbasins within the study area and their anticipated increase in peak flows (based on percentage) from existing to future land use conditions.

The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow). As noted in Section 6, flow attenuation during new development is anticipated through implementation of the City's stormwater design standards, but for purposes of this SMP, CP sizing will be based on unmitigated flows.

Detailed hydrologic inputs and peak flow results for all subbasins and design storms are included in Attachment B, Table B-2.

[1] HB 2001 was passed by the 2019 Oregon State Legislature and requires Cities to allow for middle housing (e.g., duplexes) for properties zoned as single family residential.

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7.2 Hydraulic Results

Hydraulic model results identify flooding locations with the intent to develop CPs to increase conveyance capacity and resolve flooding. For purposes of this evaluation, and as referenced in Section 2.2, flooding within the model was defined as locations where the hydraulic grade line exceeded the node rim elevation. Node flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storm flooding locations were also identified as shown in Attachment A, Figures A-8 and A-9. Using results from the three design storms, flooding locations were discussed with the City and cross-referenced with the Problem Area Matrix (Table A-1 of TM#1) to confirm the need to develop a CP for inclusion in the SMP.

As described in Attachment B, Table B-1, there are a total of 17 locations that continue to experience flooding in the existing condition. Of these, three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and may require alternatives analysis to ensure that City objectives and preferences will be achieved. Description of these key flooding locations is provided below.

7.2.1 Charbonneau

Flooding is predicted within the SW French Prairie Rd. area of the Charbonneau District during rainfall events starting at the 2-yr design storm. Deficiencies (capacity and condition) in stormwater infrastructure within Charbonneau were previously identified in the 2012 SMP and subsequent Charbonneau Consolidated Improvement Plan (2014). Since the completion of those studies, some of the recommended pipe improvements have been completed and as-builts or revised GIS is integrated into the updated hydraulic model (see Table 8).

As part of the model validation exercise (Section 6), this area was reviewed in detail to investigate predicted flooding in the model since model results should incorporate completed pipe upsizing projects. Discussions with City staff led to an in-depth review of the as-builts for an emergency outfall repair project adjacent to 31233 SW Edgewater Pl. completed in 2019. Review of the as-builts indicated that the damaged section of the 30-inch corrugated metal pipe (CMP) was removed and replaced with a lined 30-inch CMP. The outfall pipe was not upsized to 36-inches as recommended by the 2012 SMP due to limitations associated with the emergency repair. While the lining of the pipe increases flow (reduces pipe roughness), the H/H model still indicates this section of pipe is a bottleneck in the system resulting in an elevated hydraulic grade line upstream of the outfall as shown on Figure 7 below.

To address predicted flooding, CP development at this location will evaluate options to incorporate detention into the upstream (non-replaced) portions of the collection system, to reduce peak flows downstream. Since available space is limited within the area, concepts that utilize a limited footprint such as detention pipes will be explored.

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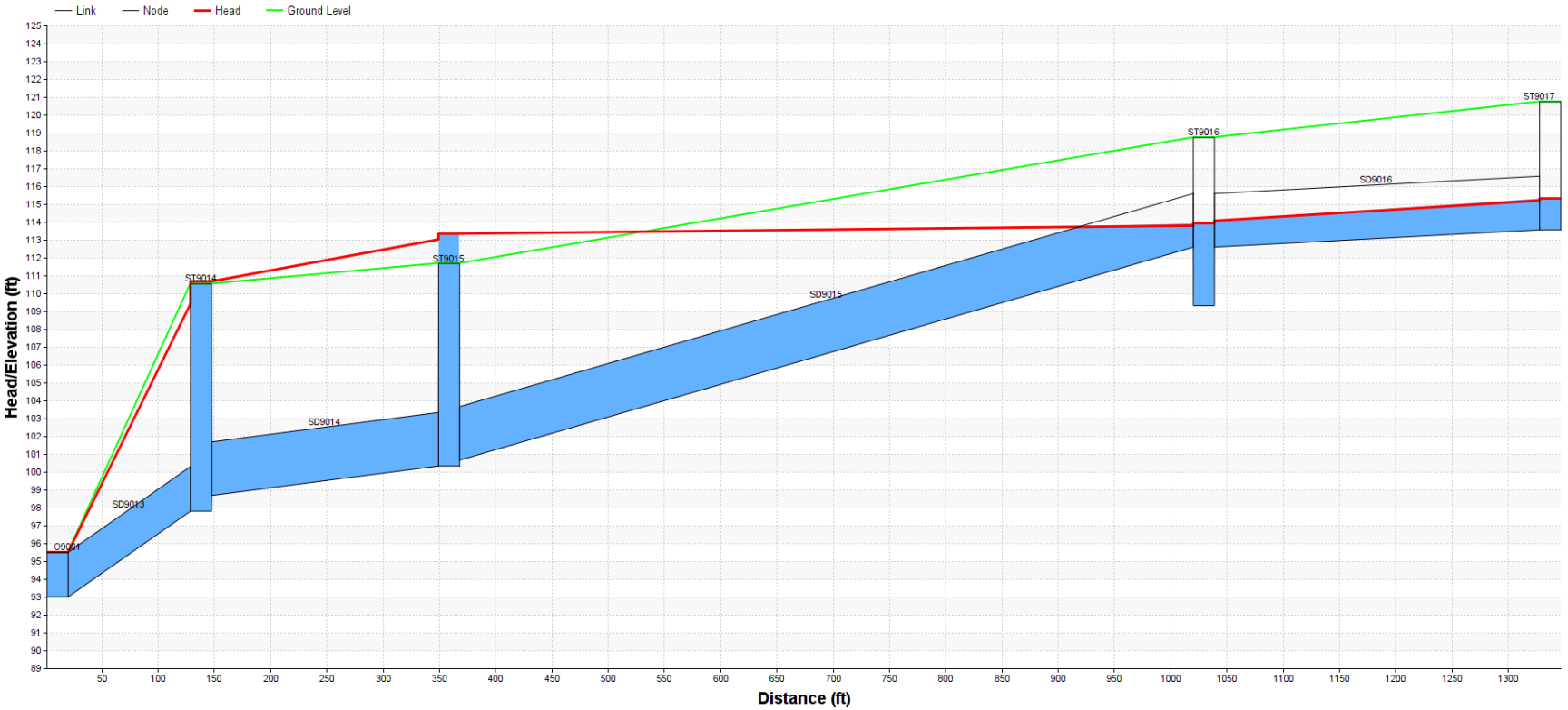

Figure 7. Charbonneau outfall–hydraulic grade line 25-yr design storm

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7.2.2 SW Garden Acres Rd./Peters Rd.

Starting at the 2-yr design storm, flooding is anticipated along the stormwater collection system running north to south along SW Garden Acres Rd. and Peters Rd. The modeled capacity issue at this location is caused by a constriction due to undersized pipes (24-inch/27-inch) prior to the system discharging to the Coffee Lake Creek wetlands as shown on Figure 8 below. The upstream drainage area to this piped system is expected to develop into a high impervious land use type (industrial) and as such currently contains large diameter conveyance pipes (42-inch/48-inch). Future development will further exacerbate the predicted flooding at this location. This location is a known issue for the City, and a CP will be developed at this location to address the capacity issues.

Early discussions with the City have identified potential issues to upsize the undersized pipe, due to the fact the alignment transects the railroad right-of-way and discharges to a greenspace property owned by Metro. To avoid railway and Metro conflicts, the City has suggested retrofit of existing (private and public) ponds along the pipe alignment near the terminus of Peters Road to provide additional flow mitigation (discussed further in Section 8.1). In addition, alternative alignments may also be considered to divert runoff from the identified pipe constriction near the existing outfall. One possibility that could avoid the railroad right-of-way and Metro property would be to install new piping along SW Clutter Rd. to the west and along Grahams Ferry Rd. to the south to outfall into Coffee Lake Creek wetlands. This concept is preliminary and will need to be investigated and tested further with the City once CPs start to be developed.

7.2.3 Commerce Circle and Day Road

Starting at the 2-year design storm, model results indicate that the open channel to the west of Commerce Circle continues to be a flooding problem area. Banks of the open channel and the existing impoundment adjacent to Day Road are expected to overtop during larger storm events. These model results are consistent with the modeling/CP development for the 2012 SMP, and the follow up study “Coffee Creek Stormwater Facility Study” completed by AKS in 2019.

This location has several deficiencies within the waterway such as undersized culverts, heavy buildup of vegetation/debris, and segments with negative grade. Historically, this location has been particularly difficult to address due to space constraints, limited available grade, and the original drainage design allowing for the adjacent parking lots to flood to provide detention. This SMP update will build upon previous preliminary design concepts to develop a refined option for implementation.

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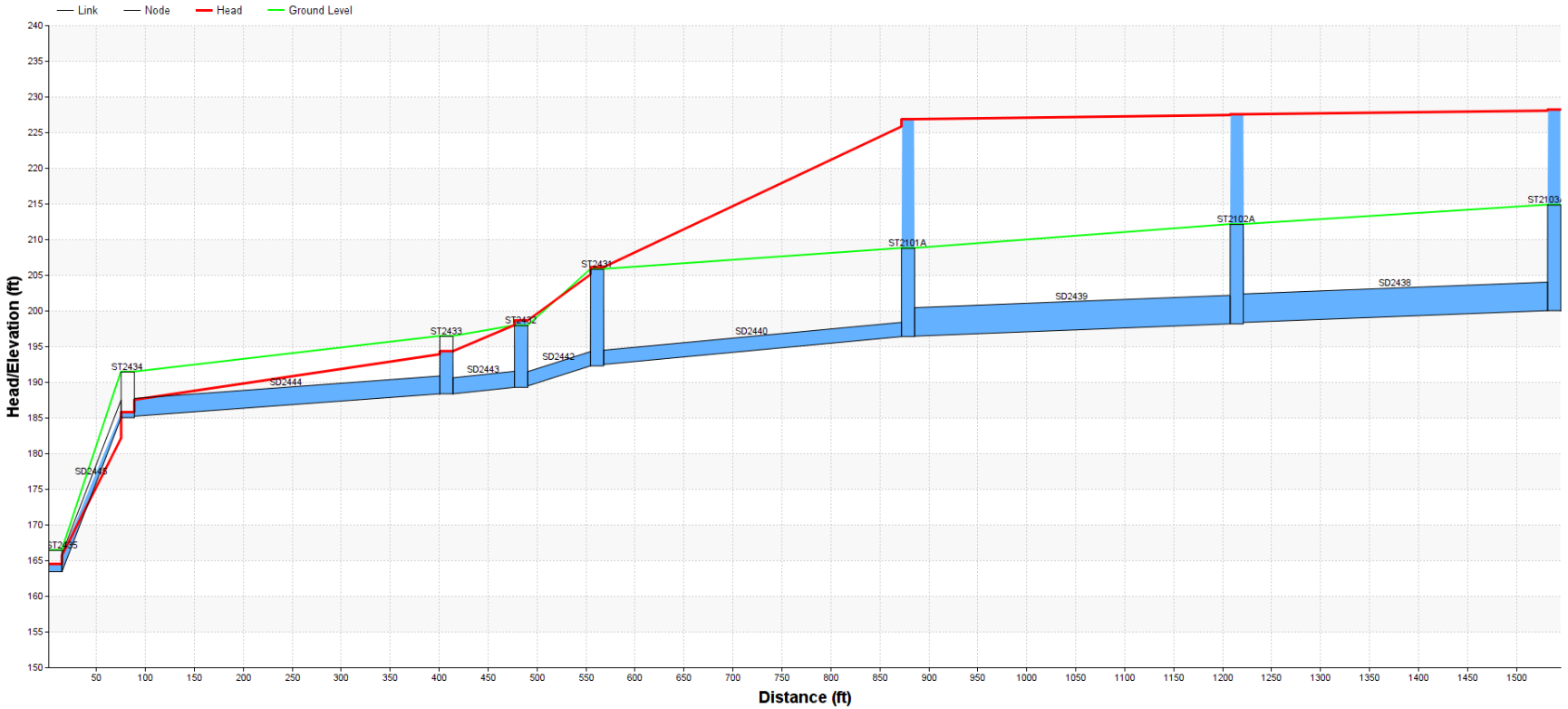

Figure 8. Peters Road–hydraulic grade line 25-yr design storm

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Section 8: Retrofit Analysis

In conjunction with the H/H modeling evaluation of the City's stormwater system, BC initiated efforts to investigate additional project opportunity locations where the addition of new water quality and/or detention facilities or the reconfiguration of such facilities can provide regulatory or development benefit within the City.

To assist in this analysis, a working map was developed to facilitate the identification of potential retrofit locations. Key elements displayed on this figure included potential property (classified as vacant, parks, open space, or City owned), ponds (public and private), water quality projects from the 2012 SMP, best management practice drainage areas, and future transportation corridors. This retrofit figure is included in Attachment A, Figure A-10.

Based on review of the retrofit analysis figure and City staff preferences, the following objectives (strategies) were developed to guide the retrofit analysis:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects generally align with water quality-related projects per the 2012 SMP. This effort supports requirements of the 2021 National Pollutant Discharge Elimination System municipal separate storm sewer permit, which requires permittees to revisit the 2015 Retrofit Assessment and provide a status update.
2. Integrate water quality and/or flow control into existing project opportunity areas (where possible).
3. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation.

Identification of new facilities to support anticipated development and growth was not considered a preferred retrofit strategy, given the fact that private development already has to adhere to the City's prescriptive stormwater design standards. These strategies helped to inform the retrofit projects and program discussed below.

8.1 Potential Retrofit Project Locations

Retrofit project locations were organized into two primary categories: previously identified locations and new opportunity locations. Applicable and relevant project opportunities are discussed in the following subsections to document potential locations for future CP development.

8.1.1 Previously Identified Opportunities

The 2012 SMP originally identified 14 restoration and 7 LID projects. These projects were reassessed and prioritized as part of the 2015 Retrofit Assessment.

For this SMP update, these projects were revisited to confirm implementation status and continued applicability in conjunction with current retrofit objectives. To track these projects and document discussions with City staff, Table 11 below was produced.

In this table, eight projects were removed (see gray shading) from consideration either due to them already being completed or no longer being feasible. Most projects were deemed still applicable and thus have been retained for inclusion in the overall project opportunity list.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	**16**	4	2	2	2	3	1	0	2	Reflect in Program
LID7	SW Wilsonville Road Stormwater Planters	No	No	**16**	4	2	2	2	3	1	0	2	Reflect in Program
CLC-10B	Coffee Creek Storm Projects	No	Yes	**16**	4	2	2	2	2	1	1	2	Not Applicable–reflects CLC-1. Project number is unique to the Retrofit Assessment source document.
BC-5	Boeckman Creek Outfall Realignment	No	No	**13**	2	0	0	3	3	2	1	2	Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with a Boeckman Road mitigation need (Creekside Woods Pond). Not considered a retrofit but keep as a Project Opportunity Area.
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	**13**	2	2	3	2	0	3	0	1	Referenced as a long-term project need from source document of retrofit assessment. Project location overlaps with Siemens/Ash Meadows. Current METRO project may also negate the project need. Remove from Project Opportunity List.
BC-4	Gesellschaft Water Well Channel Restoration	No	No	**13**	2	0	1	3	2	1	1	3	Project may be constructed in conjunction with other infrastructure projects (Interceptor Trail). Not considered a retrofit but keep as a Project Opportunity Area.
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	**13**	4	3	2	2	0	1	0	1	Reflect in Program
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	**12**	2	0	1	3	0	2	1	3	Short term/High priority CIP need per source document from retrofit assessment. Maintain as a retrofit project and keep as a Project Opportunity Area (combined with problem area).
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	**12**	0	0	3	1	3	2	1	2	Mid-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
WD-4A	Willamette Way West Outfall Replacement	No	No	**11**	2	0	0	3	0	2	1	3	Project location is being monitored. No immediate project need. Remove as a Retrofit project and Project Opportunity Area.
WD-4B	Belknap Ct Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
WD-4C	Morey Ct West Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	**9**	0	0	0	1	3	2	1	2	Project involves rehab of 5 existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with other infrastructure projects. Not considered a retrofit but keep as a Project Opportunity Area.
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	**9**	0	0	3	0	2	2	0	2	BC-10 enhances the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream (Problem Area #52 & BC-9). Mid-term project need from source document of retrofit assessment. Project location overlaps with potential Boeckman Road flow mitigation site. Keep as a retrofit project and Project Opportunity Area.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	**8**	2	1	0	2	0	1	1	1	Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-2	SW Parkway Avenue Stream Restoration	No	No	**8**	0	0	3	1	0	2	0	2	Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.
CLC-8	Coffee Lake Creek Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed. This location is associated with 5th and Kinsman Project–Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-4	Ridder Road Wetland Restoration	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).

a. *Overall score is based on a maximum 23 points possible.*

TMDL = total maximum daily load

WLA = waste load allocation

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8.1.2 New Opportunities

In addition to the projects previously identified in the 2015 Retrofit Assessment, this SMP update identified several opportunities to integrate water quality and/or flow control into an existing project opportunity or retrofit an existing, underutilized facility. These opportunities and their preliminary retrofit concept are summarized in Table 12.

Table 12. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Existing Project Opportunity	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-and-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. piped stormwater system may be able to be reconfigured to provide a flow control benefit. Opportunity to help to mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Existing Project Opportunity and Underutilized Facility	Existing swale is not draining properly. Swale needs retrofit.
Canyon Creek Park	Existing Project Opportunity	Existing park property has potential to construct a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

While these are the opportunities identified to date, additional opportunities may be identified in the future especially with the current design efforts associated with the BRCP. As part of the BRCP, mitigation opportunities associated with Boeckman Creek are currently being identified and evaluated for future project development. Any projects that result from the BRCP will be coordinated with projects developed as part of the SMP update. At this time, preferred mitigation opportunity locations have also been integrated into the larger project opportunity list for this SMP.

8.2 Potential Programs

To allow for the opportunistic integration of water quality in conjunction with transportation or other utility replacement projects, this retrofit assessment identified two potential programs that would provide a general funding mechanism to support retrofit strategies. These programs include the following:

- Green Street/LID Facilities–Allocate approximately $250,000/year to support green street and LID facility installations of facilities in conjunction with already planned utility work for select roadway improvements. This would allow for continued expansion of water quality treatment areas in areas without any existing treatment.
- Porous Pavement Pilot Study–Allocate approximately $25,000/year to install porous pavement overlays in conjunction with scheduled pavement replacement or restoration efforts. This would allow the City to begin to evaluate feasibility of adopting porous pavement for future paving projects in the City.

These programs will be considered in conjunction with other CP planning. Additional program opportunities have previously been identified as outlined in TM#1.

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Section 9: Conclusions and Next Steps

Project identification and preliminary project concepts stemming from the H/H modeling (Section 7) and retrofit assessment (Section 8), as documented in this TM, have been integrated into a Project Opportunity Matrix (Attachment B, Table B-4). The Project Opportunity Matrix expands the Problem Area Matrix that was originally included as Table A-1 in TM#1. The Project Opportunity Matrix provides a comprehensive summary of project needs in the City and will be used to facilitate City discussions and identify preferred locations to develop CPs for the SMP update.

Following City review of this TM, BC will start evaluating priority flooding locations (see Attachment B, Table B-4) to assess alternatives and feasibility of preferred project concepts. Subsequent evaluation efforts will focus on other priority locations, as confirmed through the Capital Project Workshop (scheduled for February/March 2023). Refined project concepts and cost estimates will be developed for select (approximately 15) project opportunity locations, and results documented in the SMP in graphical and tabular format.

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Attachment A: Figures

Figure A-1: Subbasin Delineation
Figure A-2: Soils and Topography
Figure A-3: Existing Land Use Condition
Figure A-4: Future Land Use Condition
Figure A-5: Hydraulic Model Overview
Figure A-6: Preliminary Flooding Results (25-yr design storm)
Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %
Figure A-8: Hydraulic Results: Existing Condition Flooding Locations
Figure A-9: Hydraulic Results: Future Condition Flooding Locations
Figure A-10: Retrofit Analysis

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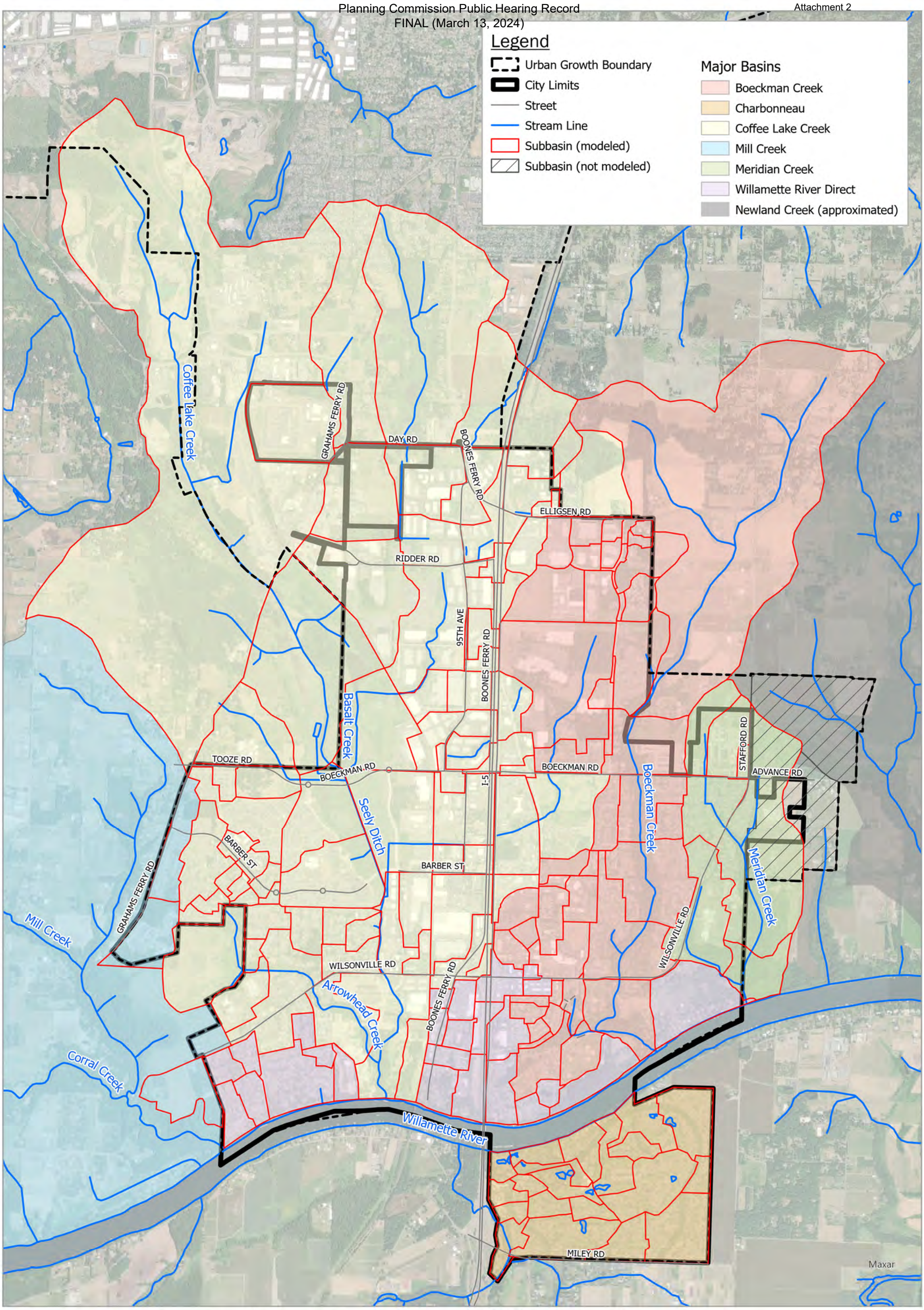

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

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Figure A-1: Subbasin Delineation

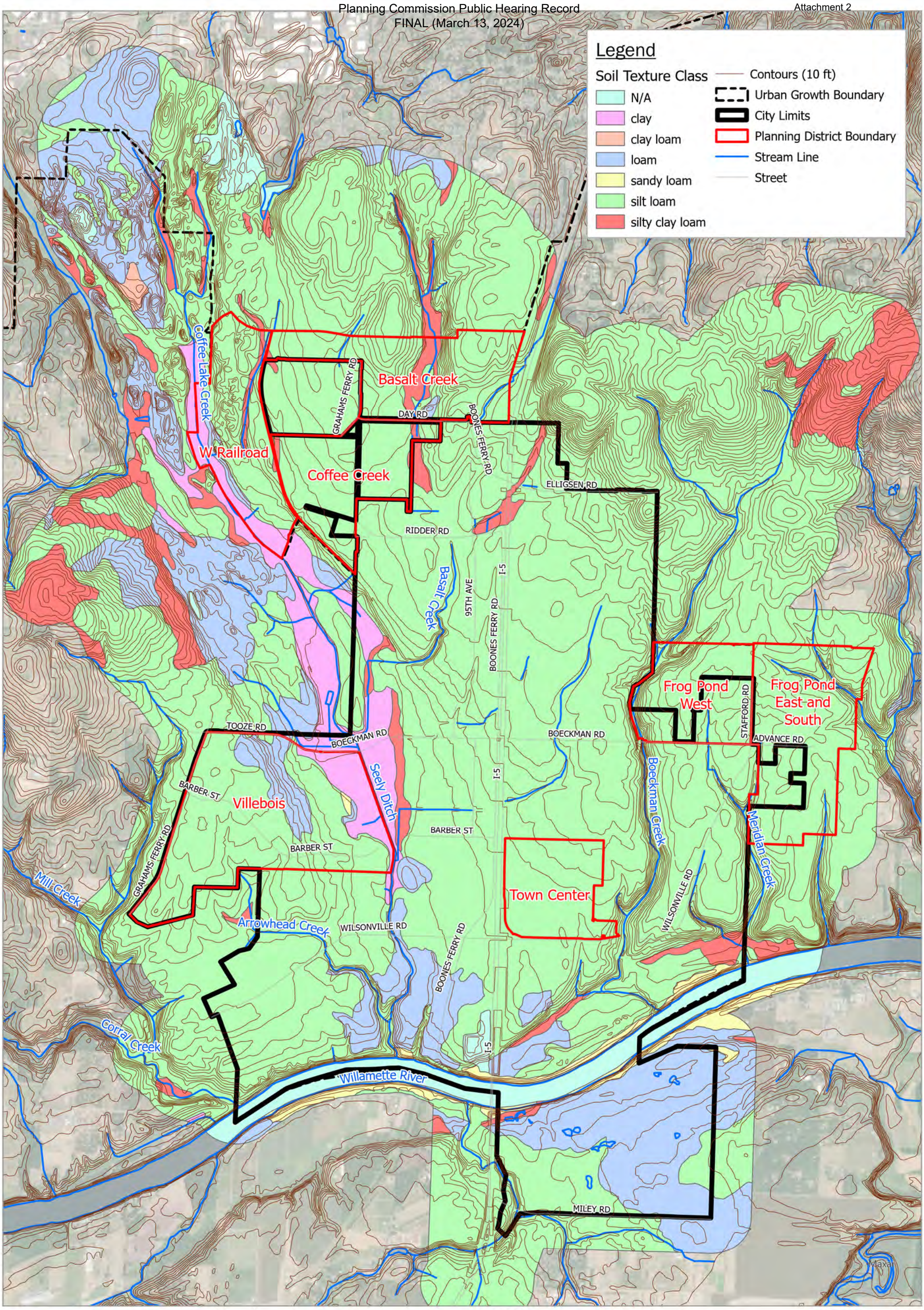

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Figure A-2: Soils and Topography

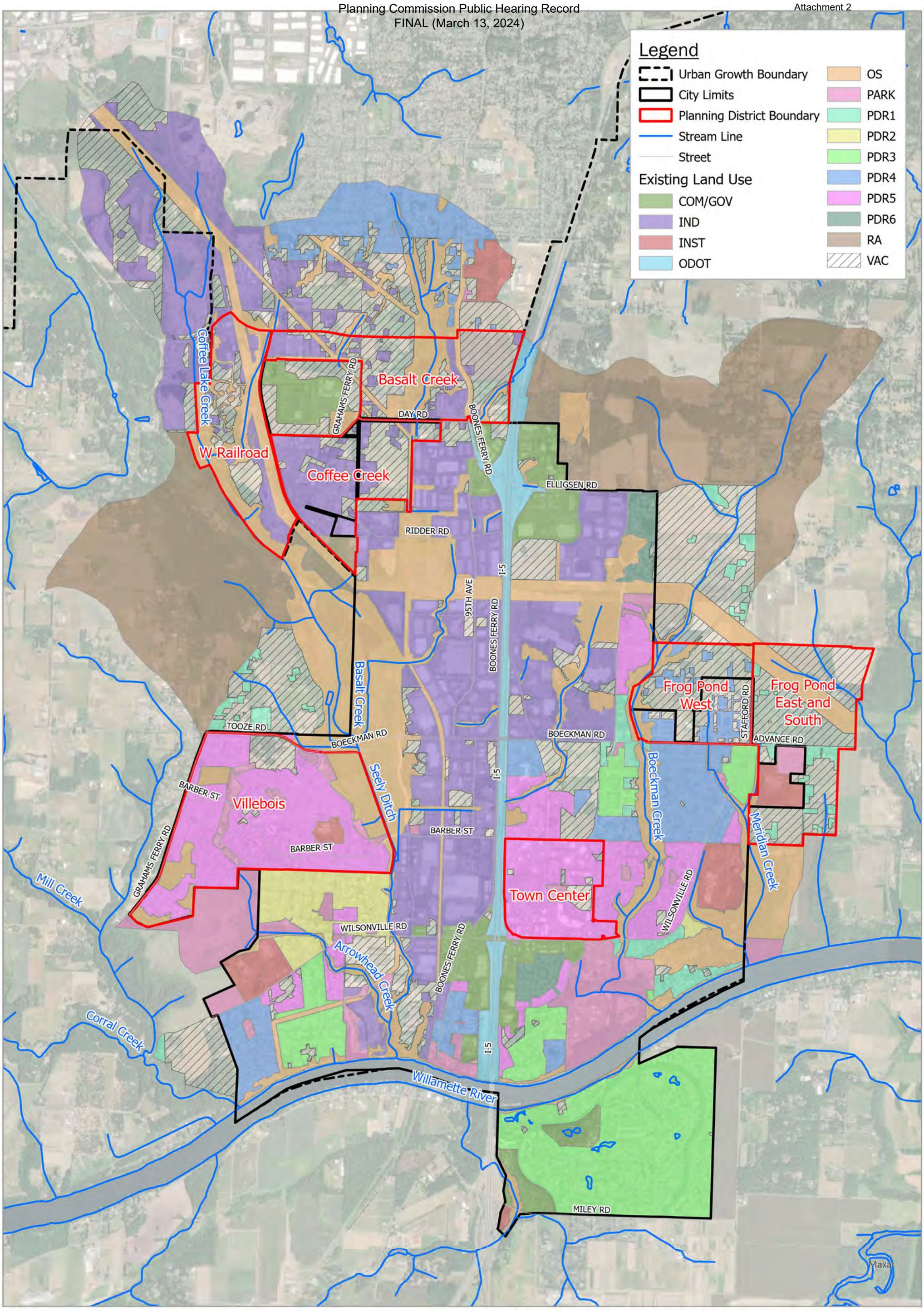

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Figure A-3: Existing Land Use Condition

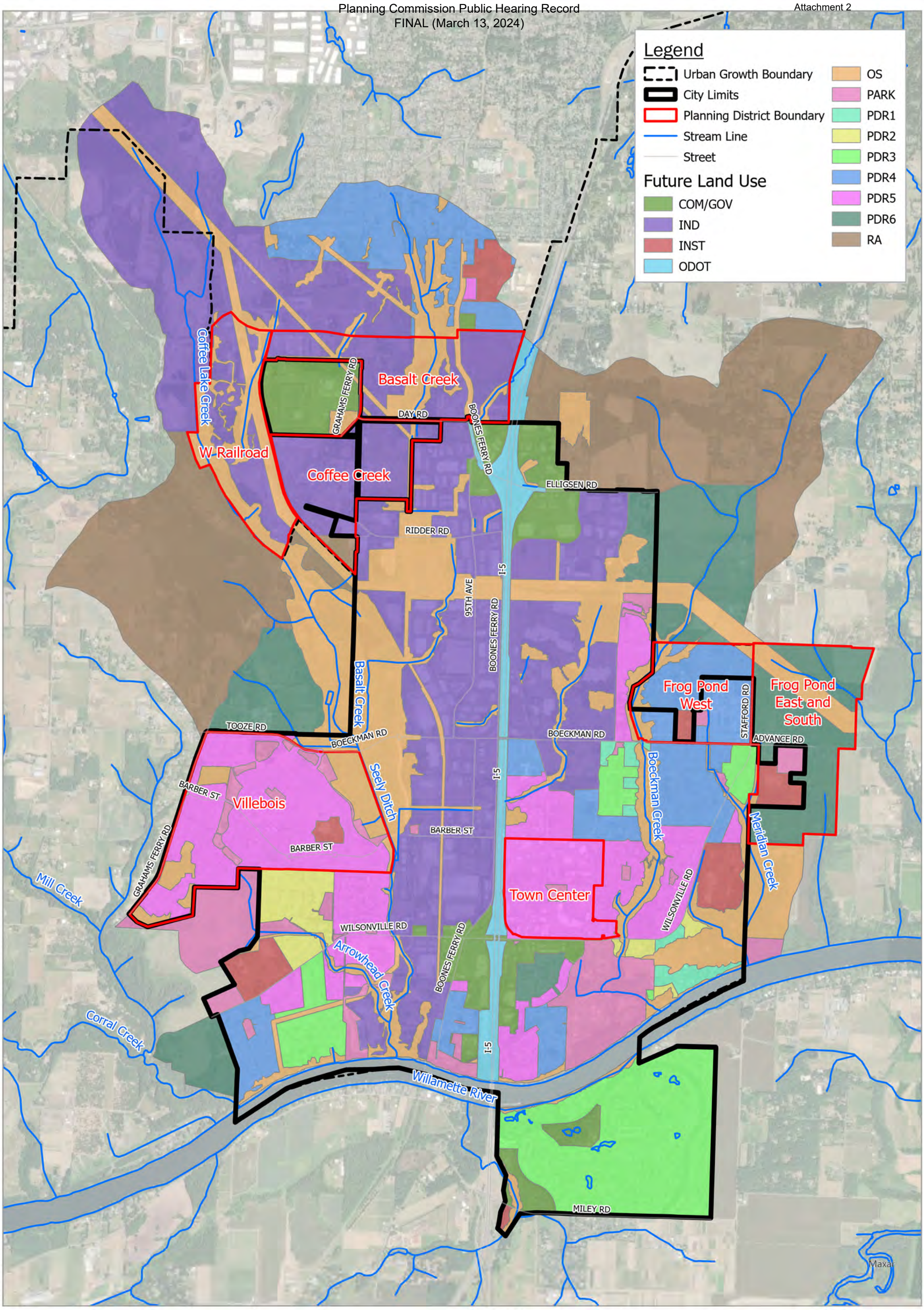

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Figure A-4: Future Land Use Condition

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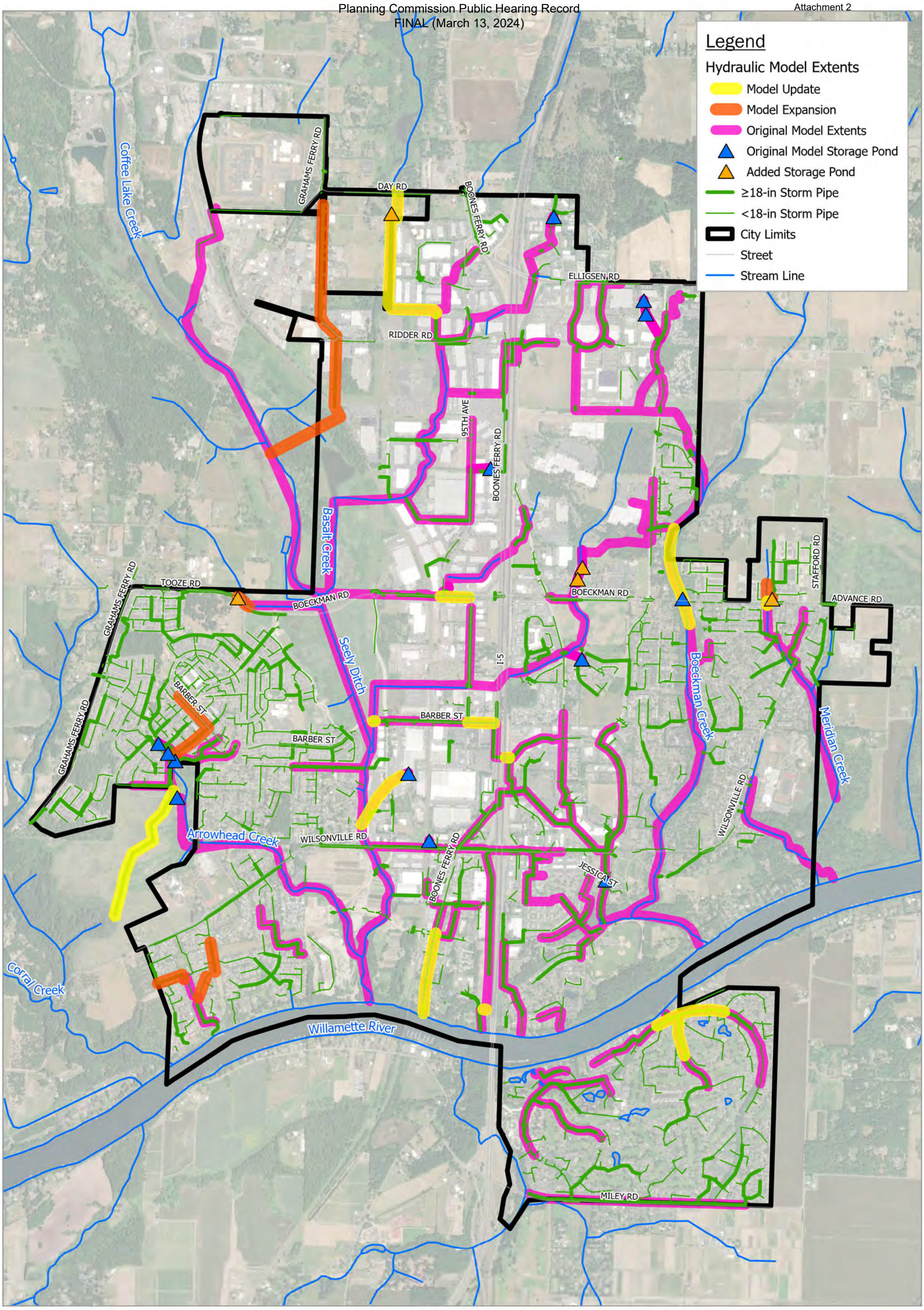

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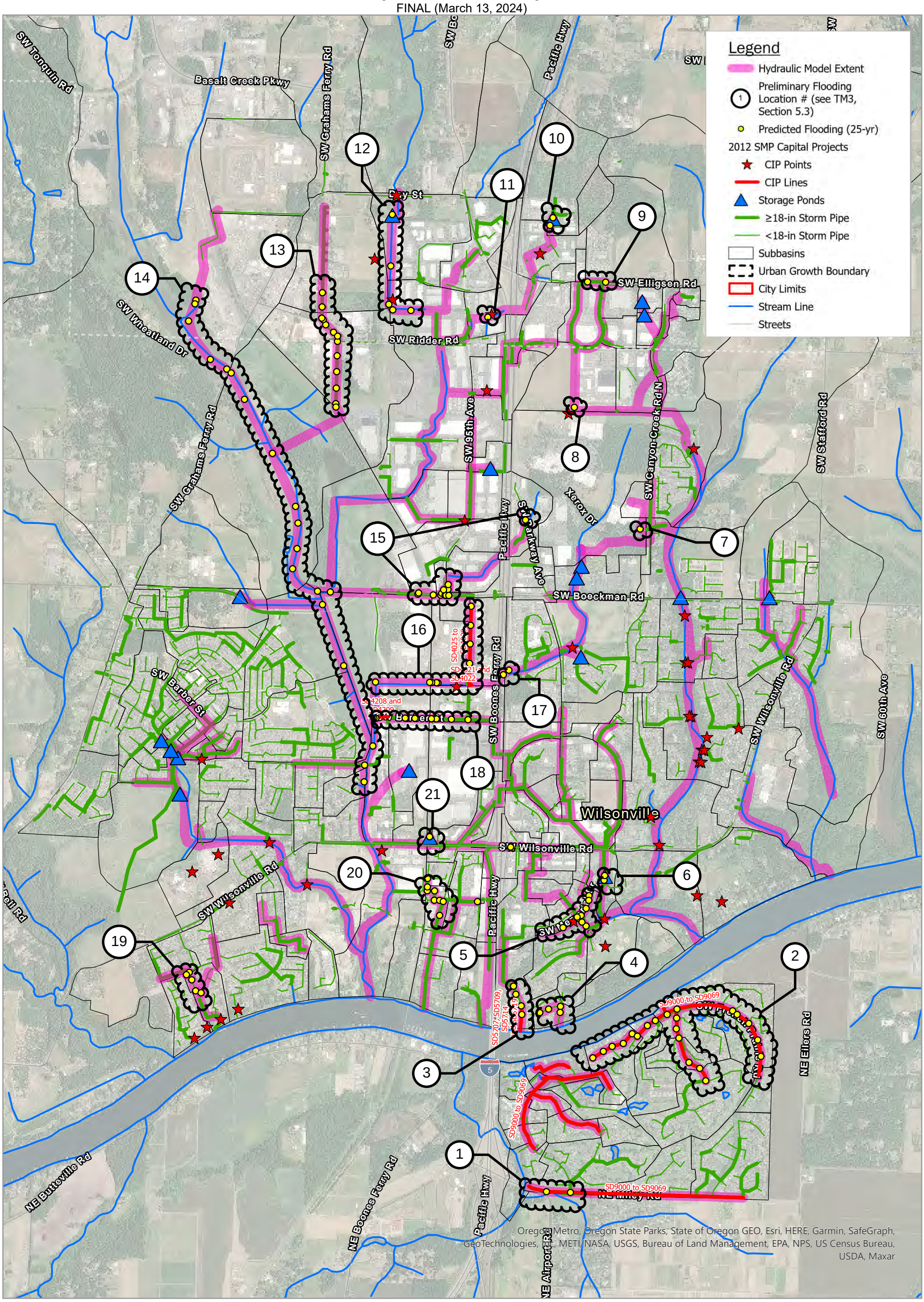
Figure A-5. Hydraulic Model Overview



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Planning Commission Meeting - March 13, 2024
Stormwater Master Plan

Figure A-6: Preliminary Flooding Results (25-yr design storm)

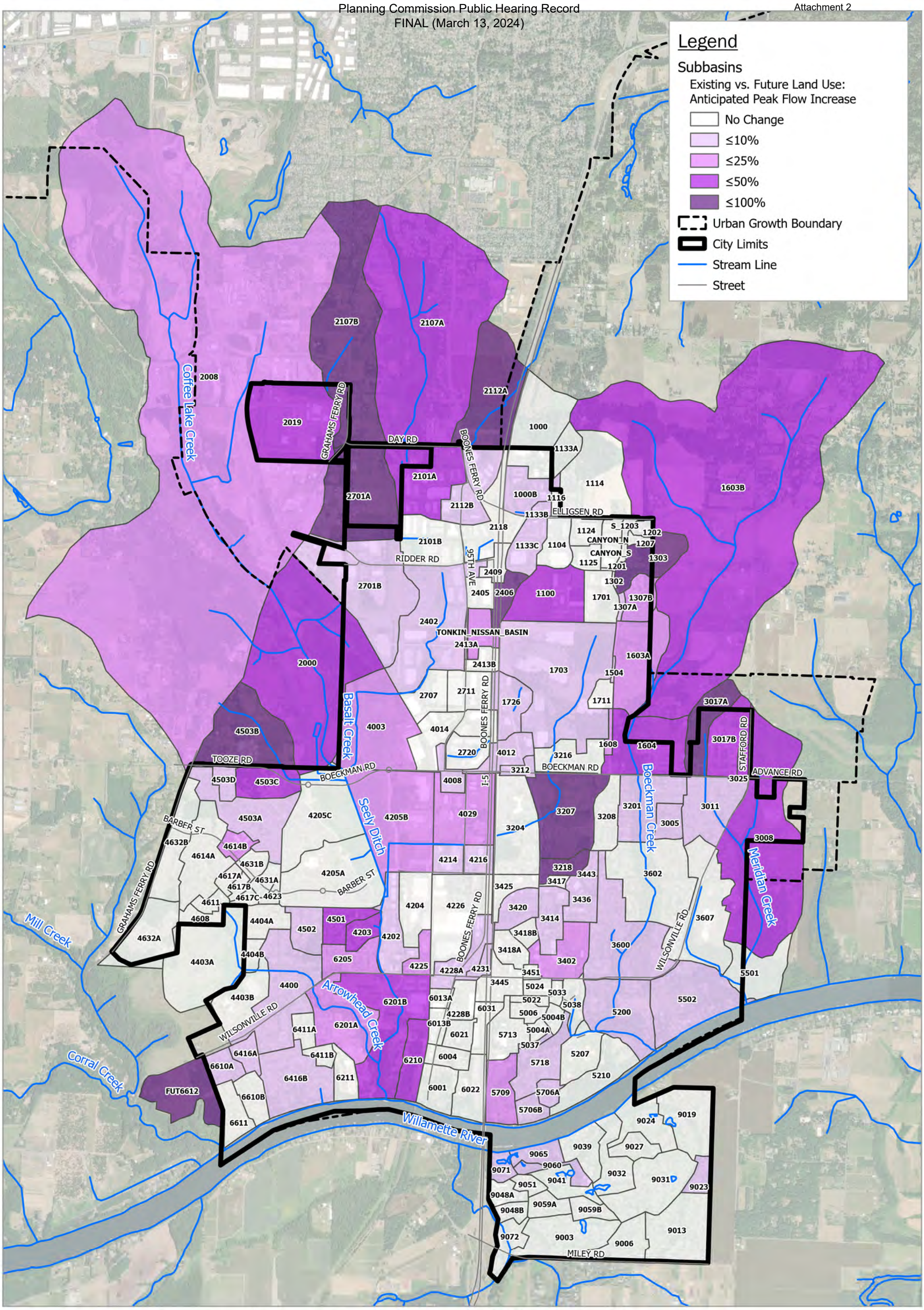

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Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %

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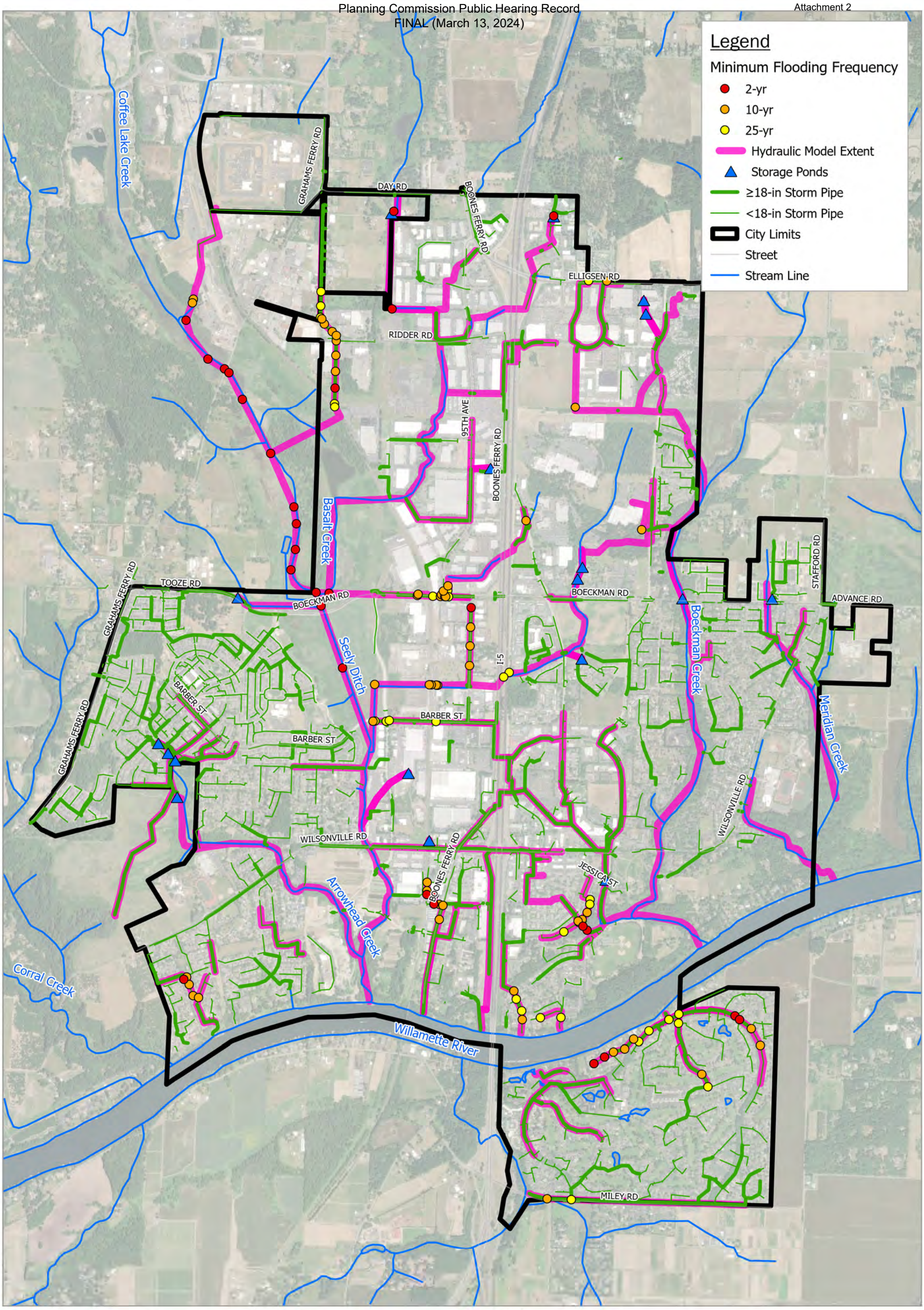

Accessed By: SGILMARTIN at 03/07/2023

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Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

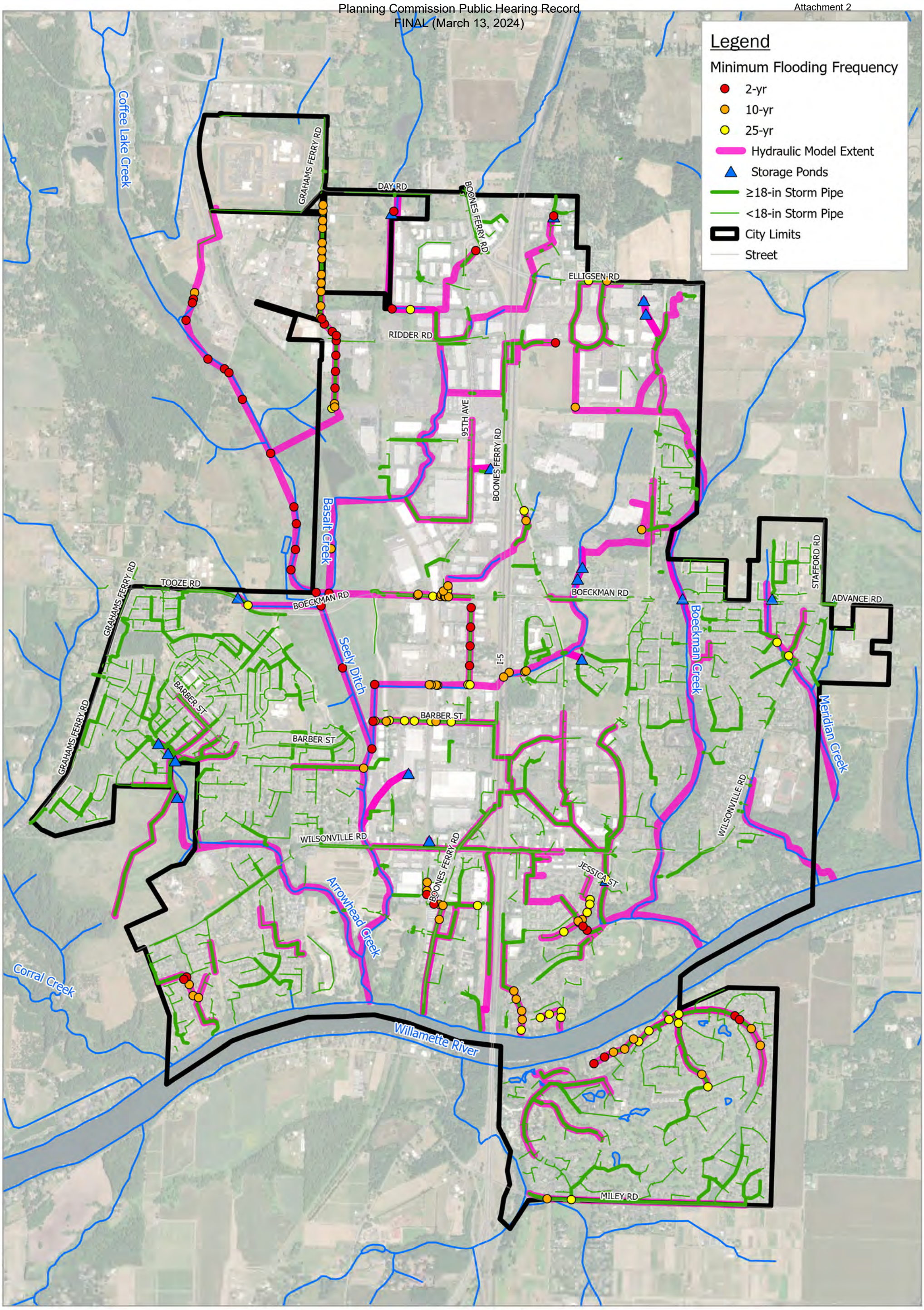
Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-8. Hydraulic Results: Existing Condition Flooding Locations



Accessed By: SGILMARTIN at 03/07/2023

Path: W:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\TM3\Fig A-8 and A-9_Existing and Future Hydraulic Model Flooding Results.aprx

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-9. Hydraulic Results: Future Condition Flooding Locations

Accessed By: SGILMARTIN at 03/07/2023

Legend

2015 Retrofit Assessment

WQ Projects (higher priority in red text)
- Erosion Control
- Planting/Restoration
- Treatment
- BMP Drainage Area

Ponds
- Modeled
- Private
- Public

Existing Land Use
- VAC
- PARK
- OS
- COW Property
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Future Transp Corridors
- Street
- Stream Line

Basalt Creek
W Railroad
Coffee Creek
Frog Pond West
Frog Pond East and South
Town Center
Villebois
Coffee Lake Creek
Basalt Creek
Boeckman Creek
Meridian Creek
Seely Ditch
Arrowhead Creek
Corral Creek
Willamette River
I-5
95TH AVE
GRAHAMS FERRY RD
BOONES FERRY RD
DAY RD
BOECKMAN RD
TOOZE RD
BARBER ST
RIDDER RD
ELLIGSEN RD
WILSONVILLE RD
JESSICA ST
STAFFORD RD
MILEY RD
RE-14
RW-05
RW-04
RE-P15
RW-02
CLC-1
RE-13
UU-08
CLC-10B
CLC-3
CLC-4
RE-P1
CLC-5
UU-P3 A/B
UU-P4
RE-P2
UU-P2A
UU-05
UU-09
BC-8
LID-2
RE-P2
RW-01
UU-01
UU-02
UU-06
RE-12A
UU-10
RE-11
RE-12B
BC-2
UU-07
UU-04
CLC-6
CLC-7
UU-P2B
UU-11
UU-12
UU-13
RE-16
RE-15
BC-5
UU-03
LID-3
CLC-8
RW-03
RE-04B
RW-P2
RW-P3
BC-10
LID-7
WD-4C
WD-4B
WD-4A

Path: W:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\TM3\Fig A-10_Retrofit Analysis.aprx

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000 Feet

Date: 3/7/2023

Figure A-10. Retrofit Analysis

Attachment B: Tables

Table B-1: Preliminary Flooding Results
Table B-2: Hydrologic Model Inputs and Results
Table B-3: Hydraulic Model Inputs and Results
Table B-4: Working Project Opportunity Matrix *(removed for the 2024 SMP deliverable, instead refer to Appendix A, Table A-2 of the SMP for the final Project Opportunity Matrix)*

Use of contents on this sheet is subject to the limitations specified at the beginning of this document.

Table B-1. Modeled Capacity Deficiencies

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
1	Charbonneau	Miley Rd.	Predicted flooding at 42" pipe segment upstream of Miley Rd. outfall.	10-yr	Rim elevations and inverts along pipe profile appears reasonable and match GIS data. No apparent issues.	None	10 (E&S)	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	N	Y	Y	City confirmed project need at this location for inclusion in the SMP.
2	Charbonneau	French Prairie Rd. & Old Farm Rd.	Flooding indicated throughout these piped systems. Model contains some pipe replacement projects completed as CIPs from the Charbonneau Consolidated Improvement Plan (2014). Small portion of all improvements recommended per the plan.	2-yr	Issues previously identified/documented in 2012 SMP and Charbonneau Consolidated Improvement Plan. Capacity issue appears to be the outfall piping (30") acting as a constriction to the upstream piping that was upsized (36") as part of the CIP.	Model previously was updated to reflect the completed CIPs. Asbuilts of the emergency outfall repair were provided and reviewed by BC. Confirmed model assumption of 30" diameter of outfall. Updated model to include revised pipe slope and Manning's roughness for installation of CMP liner based on provided asbuilt information.	None	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	Y (select phases completed)	Y	Y	Wallis Engineering is currently working on the design of pipe upsizing along SW French Prairie and SW Edgewater. City coordinated meeting between BC and Wallis with the goal to have the capacity deficiency identified by the SMP modeling effort (outfall pipe constriction) inform current design project. based on the capacity deficiency identified by the SMP modeling effort. This work is in progress and strategies are being discussed to provide flow detention to mitigate the model predicted flooding.
3	Willamette River	Parkway Ave./Metolius Ln.	Flooding at several nodes along N-S run of pipe. Constriction appears to be the small diameter pipe at the outfall and one conduit US.	10-yr	Invert elevations in MH prior to outfall are misaligned. Pipe sequence is 48">42">21">15" causing constriction. No GIS data available to verify the existing model data. Issue previously identified in previous MP.	None. Inverts and diameters appear odd but better information is not available in GIS to resolve. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	SD5707, SD5709, SD5714, and SD5719 (SW Parkway Pipes Replacement)	N	Y	?	
4	Willamette River	SW Miami	15" conveyance pipe with US node preliminary flooding results.	25-yr	Subbasin hydrology is inserted at most US node of each pipe segment to generate flow w/in all pipes. May not be fully representative of runoff received by US nodes in reality. There also is a pond that is not currently being modeled which may alleviate flooding to the system.	Original subbasin subdivided to try and address the suspected hydrology input issue. However flooding still predicted at this location.	None	N. However the drainage area to this location was revised from the original model.	None	N	Y	N	City does not recall issues at this location. Maintain this location as a flooding location however development of a project is not warranted.
5	Boeckman	Memorial Dr.	Piped system near Memorial Dr. swale predicts flooding.	2-yr	After convergence point at Memorial Dr. (ST5002) pipe sizes are 24">15">12">18">24" prior to outfall to Boeckman Creek causing the constriction and US flooding.	Asbuilts of the swale and piped system were provided and reviewed by BC. Asbuilts confirmed the model configuration, no adjustments required.	52 (swale issues)	Y	BC-9 (Memorial Drive Pathway and Storm Drain Repair)	Y	Y	Y	Based on confirmed pipe configuration and known issues at this location, project at this location is needed.
6	Boeckman	Library Pond	Preliminary Library Pond flooding. Depth >9' (pond max depth). and node DS of Library Pond outlet shows flooding	N/A	Unknown how previous model build accounted for amount of library pond storage or developed the outlet curve for flow leaving the pond. From site visit, outlet should just be a pipe w grate. Seems unlikely that pond would flood based on configuration.	Model updated per asbuilts to reflect pond outlet configuration	4 (CAP)	Y	None	N	N	Y	Project to be developed at this location to provide a flow control benefit for pond storage. Project need is primarily based on providing flow control for Town Center redevelopment and not for capacity (no issues observed by City).
7	Boeckman	Canyon Creek Rd (near Xerox)	Flooding at node that convey private SW (Xerox) to the S and then E across Canyon Creek Rd.	10-yr	Pipe sequence is 15">18">15">12">12" causing constriction at Canyon Creek Rd. Final 12" pipe is at 5%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	None		Y	N	City confirmed pipe configuration per as-built drawings. City does not recall this location as an issue and unlikely to be a project need.
8	Boeckman	Sysco Ditch	Flooding at US node of 30" culvert at end of N-S section of Sysco Ditch	10-yr	Issue (constriction) is at 30" culvert. Very steep slope @ 8.6%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	30 (CAP and MAINT)	N	BC-1 (Wiedeman Road Regional SW Detention/Stream Enhancement)		Y	N	Very limited grade. Flooding shown at upstream end of culvert and impacts downstream Costco property. Sysco owns property to west of ditch. Ditch can be removed (manmade) and they are proposing. Does not warrant a City project need - up to Sysco to resolve.
9	Boeckman	Elligsen Rd	Flooding along US nodes of 18" SW piping	10-yr	Model set up seems reasonable. Large subbasins is inserted at US end which may be causing the flooding. Trailer Park pond on N side of Elligsen is not currently in the model	None. Flooding likely can be disregarded here, otherwise additional routing likely needed for model (pond and open channel for routing purposes)	20 (MAINT)	Y	None		Y	N	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
10	Coffee Creek	Shrine Center Pond	Pond flooding (HGL>4.7' max pond depth) and DS node from pond outlet	2-yr	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	25 (MAINT Access)	Y	None		Y	Y (specfic to maintenance access only)	
11	Coffee Creek	NW of 95th Ave. and Ridder Rd. intersection	Preliminary flooding at US end of culvert that conveys flow E to W under a private parking lot (Penske Truck)	N/A	Rim elevation at US end of culvert appears low. GIS does not show culvert, so unable to verify inherited model data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	None	N	CLC-4 (Ridder Rd Wetland Restoration). Proj is immediately US of culvert that floods		N	N	Culvert under parking lot - private (Penske property) and not in GIS. City not aware of issues at this location but provided as-built information. -BC incorporated revised culvert information into model from provided asbuilts. US end of culvert flooding resolved.
12	Coffee Creek	Commerce Circle Ditch	Flooding throughout N-S run of ditch and culverts to the W of Commerce Circle	2-yr	See old MP and AKS study for issues that have been well documented. Current model has updated culvert inverts from survey	None	14/15/26 (R/R, MAINT, CAP)	Y	CLC-1 (Detention/Wetl and Facility near Tributary to Basalt Creek) and CLC-3 (Commerce Circle Channel Restoration)		Y	Y	Known important project area. Beaver dam, other unknowns may not be reflected in model and factor into current discrepancy in peak flow and WSE. Redevelopment application looking to build parking area west of channel and would have to span existing channel to other development area - no access from Day Road. -BC developed 4 representative cross-sections along the Commerce Circle Ditch based on AKS survey points. Model link geometry within this reach then revised accordingly. Note that survey data was unavailable for 1 model link and thus a revised cross-section was not developed for this section.
13	Coffee Creek	Garden Acres	N-S piped system along Garden Acres Rd. and Peters Rd. Outfalls to Coffee Creek wetlands.	2-yr	Prior to outfall there is several small diameter pipes (24") that cause constriction and elevated HGL that backs up system. Most other pipes in profile are large diameter (42"/36")	None. Model matches GIS info. City (Sean S.) provided as-builts of this outfall (1994) which showed this small diameter pipe near the outlet of piping run.	None	Not modeled	None		Y	Y	City not surprised by flooding here. This is a priority need in conjunction with build out of Coffee Creek area. Private development is currently having to overdetain. Higher priority need. Railroad and METRO coordination needed (outfalls to METRO property).
14	Coffee Creek	Coffee Creek Wetlands	Flooding throughout wetlands predicted	2-yr	Main issue is the generalization of cross-sections in the model(under represents the actual amount of storage in locations)	None	None	Y	None		Y	N	
15	Coffee Creek	Boeckman Corp. Center Pond	Flooding DS of flow control structure in model and at node near the US end. Flow control structure configuration rationale is unknown but appears to be the restriction	N/A	At very US end of this pipe segment there is a 30">12">24" which seems incorrect. GIS has same info	None. Would need to thouroughly look through asbuilts to modify how this flow control structure is modeled from scratch	None	Y	None		Y	N	US portion - on Parkway. No known issue DS portion - Car dealership - existing pond is mitigation for wetland. Flooding reported downstream of pond. City not aware of any flooding in area (may be an after effect of how pond was integrated into the model. - Based on asbuilt review, control structure configuration adjusted. Pond no longer floods during 25-yr storm event.
16	Coffee Creek	Boberg Rd. and RR crossing	Flooding along N-S pipe prior to discharging into ope channel. This was an area identified in original MP. Flooding also at two large diameter culverts (59" and 51"?!) flowing E-W underneath RR tracks	10-yr	Pipe profile looks reasonable. Previous CIP location. Culverts in model (in series) do not match configuration in GIS (parallel). GIS does not have diameters or inverts	None. Need more info about culverts to make updates	None	Y	SD4025-SD4029 (Boberg Rd Pipe Replacement)		Y	?	
17	Coffee Creek	I-5 Culverts	Flooding at culverts crossing I-5 from E to W	25-yr	Profile looks reasonable. Culvert size (36") can not be verified as that info is not in the GIS data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	35 (R&R)	N	None		Y	N	City thinks that flooding at this location is accurate. Maintain as a flooding location, however a project that upsizes ODOT culverts is unlikely.
18	Coffee Creek	Barber St	Flooding indicated at several DS nodes prior to outfall and at node near RR tracks	25-yr	DS flooding along this segment appears to be from backwatering of Coffee Creek (see location #14). Profile appears reasonable and matches the GIS data.	None	None	Y	SD4208 and SD4209 (Barber Street Pipe Replacement). -	N	Y	Unlikely	
19	Willamette River	River Fox Park (site visit	Flooding predicted within 12" pipes	2-yr	Profile looks reasonable and matches the GIS data.	None	22 (MAINT and CAP)	N	None	N/A	Y	Y	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
20	Willamette River	Lower Boones Ferry	Flooding along 18" Piped segment on private property.	2-yr	Hydrology is input at most US node to generate flow through all pipes, not reflective of reality for US node flooding.	Split subbasin at this location with assumption that they have the same hydrology characteristics. Model still indicates flooding during the 25-yr event.	None	Y	None	N/A	Y	?	
21	Coffee Creek	Wilsonville Distr Center Pond	Model predicts pond flooding	N/A	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	None	N. However the original model is configured incorrectly such that flow is not actually routed through the pond.	None	N/A	N	?	

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
1000	STAFFORD_POND	69.13	33.7	33.7	11.2	1616	6.85	0.36	0.25	14.3	14.3	23.9	23.9	29.8	29.8	38.7	38.7
1000B	ST1000	28.49	59.7	62.4	3.8	673	7.26	0.35	0.23	9.9	10.3	15.0	15.6	17.8	18.4	21.7	22.3
1100	ST1100	55.81	29.9	52.1	1.5	1516	6.69	0.37	0.26	9.8	16.6	15.2	24.7	18.2	29.1	22.8	35.2
1104	ST1104	21.55	82.2	82.2	1.7	625	6.69	0.37	0.26	9.8	9.8	14.3	14.3	16.6	16.6	19.6	19.6
1114	ST1114	74.81	15.3	15.3	7.8	1303	6.69	0.37	0.26	7.1	7.1	12.8	12.8	16.5	16.5	22.5	22.5
1116	ST1116	3.25	82.2	82.2	4.6	209	6.69	0.37	0.26	1.6	1.6	2.4	2.4	2.8	2.8	3.3	3.3
1124	ST1124	14.02	70.8	70.8	4.9	601	6.69	0.37	0.26	5.9	5.9	8.9	8.9	10.5	10.5	12.6	12.6
1125	ST1125	10.91	71.6	71.6	4.5	649	6.69	0.37	0.26	4.7	4.7	7.1	7.1	8.4	8.4	10.1	10.1
1133A	ST1002	14.12	10.0	10.0	11.9	412	6.69	0.37	0.26	1.0	1.0	2.5	2.5	3.5	3.5	5.1	5.1
1133B	ST1000	4.26	74.4	79.8	3.6	370	6.69	0.37	0.26	1.9	2.1	2.9	3.1	3.4	3.6	4.1	4.3
1133C	ST1132	25.05	74.2	80.6	2.1	766	6.69	0.37	0.26	10.5	11.3	15.5	16.7	18.1	19.4	21.6	22.9
1201	ST1201	2.75	66.1	66.1	5.6	151	6.69	0.37	0.26	1.1	1.1	1.7	1.7	2.0	2.0	2.4	2.4
1202	PST1202	4.78	64.1	64.1	11.9	588	6.69	0.37	0.26	2.0	2.0	3.2	3.2	3.8	3.8	4.6	4.6
1207	PST1207	4.10	64.1	64.1	14.5	392	6.69	0.37	0.26	1.7	1.7	2.7	2.7	3.2	3.2	3.9	3.9
1302	ST1302	0.70	39.5	39.5	1.8	68	6.69	0.37	0.26	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
1303	ST1303	35.38	19.2	51.4	5.6	841	6.69	0.37	0.26	4.2	10.7	7.4	16.3	9.4	19.5	12.6	23.9
1307A	ST1307	2.27	36.0	47.3	5.4	733	6.69	0.37	0.26	0.7	0.8	1.3	1.4	1.6	1.7	2.0	2.1
1307B	ST1402	20.17	36.0	47.3	5.4	733	6.69	0.37	0.26	4.4	5.8	7.3	9.1	9.1	11.0	11.7	13.8
1504	ST1504	1.09	37.0	43.6	2.8	82	6.69	0.37	0.26	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.8
1603A	ST1404A	63.03	30.0	37.1	3.8	1121	6.69	0.37	0.26	11.2	13.7	17.2	20.8	20.8	24.8	26.0	30.6
1603B	ST1603	809.84	12.6	26.7	3.5	3376	7.01	0.36	0.24	58.3	112.1	87.9	166.3	104.4	194.8	129.7	235.6
1604	POND_BOECKMAN	69.37	19.4	40.0	5.6	1559	6.69	0.37	0.26	8.3	16.5	14.3	25.7	18.2	31.0	24.4	38.7
1608	ST1608	3.82	49.3	62.5	4.1	209	6.69	0.37	0.26	1.1	1.4	1.9	2.2	2.3	2.7	2.8	3.2
1701	ST1701	25.65	40.7	40.7	2.2	907	6.69	0.37	0.26	6.2	6.2	9.6	9.6	11.6	11.6	14.4	14.4
1703	ST1703	171.87	41.3	46.8	1.5	2258	6.69	0.37	0.26	38.3	42.6	56.6	62.9	66.3	73.5	79.7	88.2
1711	ST1711	9.40	69.5	69.5	3.6	531	6.69	0.37	0.26	3.9	3.9	5.9	5.9	7.0	7.0	8.4	8.4
1726	ST1726	29.64	54.6	60.0	1.1	721	6.69	0.37	0.26	8.9	9.7	13.2	14.4	15.5	16.8	18.6	20.1
2000	ST2000	250.97	9.7	21.1	1.3	2548	8.82	0.30	0.14	16.6	32.0	30.9	52.7	30.4	55.3	30.9	59.8
2008	ST2008	1550.87	31.4	42.1	0.9	4917	6.57	0.34	0.19	194.4	238.8	292.4	358.6	343.9	421.2	415.2	507.8
2019	ST2019	102.09	48.4	76.9	3.6	2343	6.75	0.36	0.26	28.8	44.3	43.6	65.1	51.8	75.9	63.4	90.1
2101A	ST2120	69.86	43.0	62.5	2.9	1499	7.45	0.35	0.22	17.8	25.0	27.4	37.5	33.2	44.5	41.3	54.0
2101B	ST2101	44.71	50.7	50.7	1.4	1656	6.74	0.36	0.26	13.2	13.2	19.9	19.9	23.6	23.6	28.8	28.8
2107A	ST2123	359.21	24.0	41.2	1.2	2353	7.15	0.35	0.23	44.8	68.9	66.6	102.5	78.3	120.0	95.0	144.3
2107B	ST2123	178.65	22.1	55.4	1.9	1285	6.69	0.37	0.26	21.8	46.4	32.3	68.6	37.9	80.0	45.9	95.5
2112A	ST2112	88.70	15.9	56.5	2.9	1214	6.69	0.37	0.26	8.4	27.3	13.4	40.3	16.4	47.1	21.1	56.5
2112B	ST2112	43.89	62.6	71.3	2.9	854	6.69	0.37	0.26	15.4	17.3	22.7	25.4	26.6	29.7	31.9	35.4
2118	ST2118	42.69	52.3	52.3	2.0	571	7.85	0.34	0.19	12.1	12.1	18.4	18.4	21.8	21.8	26.6	26.6
2402	ST2402	112.36	39.2	41.2	1.6	1188	6.69	0.37	0.26	23.3	24.3	34.4	35.9	40.3	42.0	48.4	50.4

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
2405	ST2405	13.00	63.9	63.9	1.4	785	6.69	0.37	0.26	4.9	4.9	7.4	7.4	8.8	8.8	10.6	10.6
2406	ST2406	15.27	22.0	56.6	2.0	463	6.69	0.37	0.26	2.0	5.0	3.3	7.5	4.2	8.8	5.4	10.7
2409	ST2409	11.04	57.3	57.4	1.2	422	7.23	0.35	0.23	3.7	3.7	5.6	5.6	6.6	6.6	8.1	8.1
2413A	ST2413	2.04	46.8	50.2	1.1	73	6.69	0.37	0.26	0.6	0.6	0.8	0.9	1.0	1.0	1.2	1.3
2413B	ST2410	10.32	66.1	66.4	1.6	444	6.69	0.37	0.26	4.0	4.0	5.9	5.9	6.9	7.0	8.3	8.4
2701A	ST2119A	102.46	28.7	67.3	1.6	2586	6.69	0.37	0.26	17.4	38.2	26.8	56.4	32.3	65.9	40.4	78.7
2701B	ST2105A	128.40	39.2	41.1	1.8	2063	6.69	0.37	0.26	28.3	29.6	42.1	43.9	49.5	51.6	60.1	62.5
2707	ST2707	23.67	64.1	64.1	2.3	650	6.69	0.37	0.26	8.7	8.7	12.9	12.9	15.1	15.1	18.1	18.1
2711	ST2711	26.66	70.9	70.9	2.2	755	6.69	0.37	0.26	10.7	10.7	15.8	15.8	18.5	18.5	22.1	22.1
2720	ST2720	24.22	57.1	57.1	2.2	484	6.69	0.37	0.26	7.7	7.7	11.4	11.4	13.4	13.4	16.1	16.1
3005	ST3005	14.54	50.8	51.3	2.8	598	6.69	0.37	0.26	4.4	4.4	6.8	6.9	8.2	8.2	10.1	10.1
3008	ST3008	213.73	16.8	38.0	2.4	1453	6.69	0.37	0.26	20.4	41.6	30.5	61.4	36.1	71.7	44.2	85.9
3011	ST3011	51.74	45.7	46.3	2.8	2046	6.69	0.37	0.26	14.1	14.3	22.0	22.3	26.6	26.8	33.0	33.3
3017A	9067	36.66	10.9	46.6	1.5	600	6.69	0.37	0.26	2.4	9.3	4.0	13.8	4.9	16.2	6.5	19.4
3017B	STAFFORD_MEADOWS_1_BASIN	38.68	27.2	51.3	1.4	774	6.69	0.37	0.26	6.1	10.9	9.3	16.2	11.1	19.0	13.7	22.8
3025	ST3024	5.99	31.7	51.0	2.5	378	6.69	0.37	0.26	1.2	1.9	2.0	2.9	2.6	3.6	3.4	4.4
3201	ST3201	51.42	29.7	30.3	4.5	918	6.69	0.37	0.26	9.1	9.2	14.1	14.4	17.1	17.4	21.5	21.8
3204	ST3204	64.53	46.3	46.3	2.0	1078	6.69	0.37	0.26	16.7	16.7	24.7	24.7	29.1	29.1	35.1	35.1
3207	ST3207	78.25	17.7	56.7	2.1	1728	6.69	0.37	0.26	8.4	25.0	13.6	37.1	16.9	43.6	22.0	52.5
3208	RENAISSANCE_POND	25.07	41.1	41.2	0.9	587	6.69	0.37	0.26	5.8	5.8	8.6	8.6	10.1	10.1	12.2	12.2
3212	ST3212	7.21	62.2	66.8	2.1	366	6.69	0.37	0.26	2.7	2.8	4.0	4.3	4.8	5.0	5.8	6.1
3216	ST3208	30.40	62.0	62.0	2.0	881	6.69	0.37	0.26	10.8	10.8	16.0	16.0	18.8	18.8	22.6	22.6
3218	ST3218	14.44	19.6	51.8	1.8	415	6.69	0.37	0.26	1.7	4.3	2.8	6.5	3.5	7.6	4.6	9.3
3402	ST3402	34.92	41.4	52.6	1.4	1087	6.69	0.37	0.26	8.4	10.5	12.8	15.7	15.2	18.6	18.7	22.5
3414	ST3414	25.72	43.5	46.7	1.6	652	6.69	0.37	0.26	6.4	6.9	9.7	10.3	11.4	12.1	13.9	14.8
3417	ST3417	3.75	52.0	52.2	2.4	230	6.69	0.37	0.26	1.2	1.2	1.9	1.9	2.2	2.3	2.8	2.8
3418A	ST3421	14.99	51.6	52.0	0.6	631	6.69	0.37	0.26	5.6	5.7	8.9	8.9	10.4	10.4	12.2	12.3
3418B	ST3418	8.22	52.2	52.2	0.5	456	6.69	0.37	0.26	2.5	2.5	3.7	3.7	4.4	4.4	5.3	5.3
3420	ST3420	20.12	51.0	52.2	3.2	1215	6.69	0.37	0.26	6.2	6.4	10.0	10.2	12.1	12.3	15.0	15.2
3425	ST3425	15.60	51.2	51.3	1.2	378	6.69	0.37	0.26	4.5	4.5	6.6	6.6	7.8	7.8	9.4	9.4
3436	ST3436	22.08	48.4	52.2	1.8	734	6.69	0.37	0.26	6.2	6.7	9.4	10.1	11.2	11.9	13.7	14.5
3443	ST3443	4.70	49.2	51.3	2.3	314	6.69	0.37	0.26	1.4	1.5	2.2	2.3	2.7	2.8	3.4	3.5
3445	ST3445	23.46	63.5	63.5	2.6	930	6.69	0.37	0.26	8.7	8.7	13.2	13.2	15.5	15.5	18.8	18.8
3451	ST3451	3.55	56.1	56.1	0.9	289	6.69	0.37	0.26	1.2	1.2	1.8	1.8	2.2	2.2	2.7	2.7
3600	ST3600	91.20	41.5	43.1	3.7	1193	6.69	0.37	0.26	21.5	22.2	32.0	33.1	37.7	38.9	45.8	47.2
3602	ST3602	90.57	39.7	39.9	5.8	1918	6.69	0.37	0.26	21.4	21.5	33.1	33.3	40.0	40.1	49.9	50.0
3607	ST3606	82.77	36.5	36.5	2.9	916	6.70	0.37	0.26	16.9	16.9	25.0	25.1	29.4	29.5	35.6	35.7
4003	ST4003	95.74	18.9	22.1	1.7	1565	8.66	0.31	0.17	11.5	13.2	19.6	21.9	24.8	27.5	32.5	35.6

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4008	ST4008	12.06	67.5	70.9	3.3	714	6.69	0.37	0.26	4.9	5.1	7.4	7.7	8.8	9.1	10.6	10.9
4012	ST4012	22.39	59.4	66.3	2.0	626	6.69	0.37	0.26	7.6	8.4	11.3	12.4	13.3	14.6	16.0	17.5
4014	ST4014	41.33	66.2	66.2	2.7	710	6.69	0.37	0.26	14.9	14.9	22.0	22.0	25.7	25.7	30.8	30.8
4029	ST4029	59.74	51.7	64.5	2.7	1218	6.69	0.37	0.26	17.6	21.5	26.2	31.8	30.9	37.2	37.4	44.6
4202	ST4202	34.53	63.0	64.3	1.0	936	6.59	0.33	0.16	12.3	12.5	19.0	19.3	22.6	22.9	25.2	25.6
4203	ST4203	13.49	31.3	48.5	1.5	630	7.57	0.34	0.22	2.6	4.0	4.4	6.2	5.5	7.5	7.2	9.4
4204	COCA-COLA_POND	32.66	68.5	68.5	0.5	726	5.91	0.36	0.23	11.1	11.1	16.5	16.5	19.3	19.3	23.1	23.1
4205A	ST4205	89.30	40.5	40.5	3.2	1666	7.97	0.33	0.20	21.6	21.6	33.6	33.6	40.9	40.9	51.3	51.3
4205B	ST4205	113.36	28.3	34.3	1.3	2147	9.25	0.30	0.14	20.3	23.9	34.4	39.4	35.4	41.2	37.5	44.3
4205C	ST4000	79.50	29.0	29.0	3.2	1548	9.46	0.28	0.11	17.5	17.5	20.2	20.2	24.4	24.4	30.6	30.6
4214	ST4214	13.80	61.0	68.2	1.9	778	6.69	0.37	0.26	5.0	5.6	7.6	8.4	9.1	9.9	11.0	11.8
4216	ST4216	13.42	61.5	66.8	2.5	563	6.69	0.37	0.26	4.9	5.3	7.4	7.9	8.7	9.3	10.6	11.2
4225	ST4225	11.73	54.8	66.6	0.8	449	6.69	0.37	0.26	3.7	4.4	5.4	6.4	6.4	7.5	7.7	9.0
4226	WILSONVILLE_DIST_CTR_POND	65.84	68.0	68.0	1.0	1069	6.69	0.37	0.26	22.3	22.3	32.9	32.9	38.3	38.3	45.7	45.7
4228A	ST4228	28.98	72.6	74.3	1.4	623	6.69	0.37	0.26	11.2	11.4	16.4	16.8	19.2	19.5	22.8	23.2
4228B	ST6007	14.64	82.2	82.2	1.1	522	6.27	0.36	0.24	6.6	6.6	9.8	9.8	11.3	11.3	13.4	13.4
4231	ST4231	6.30	56.3	57.4	3.9	511	6.69	0.37	0.26	2.2	2.2	3.5	3.6	4.3	4.3	5.2	5.3
4400	ST4400	84.63	33.9	37.5	2.9	1896	6.69	0.37	0.26	16.9	18.6	26.1	28.5	31.4	34.1	39.2	42.2
4403A	ST4403	93.84	23.5	23.5	2.0	1987	6.88	0.36	0.25	13.2	13.2	20.7	20.7	25.2	25.2	32.1	32.1
4403B	ST4402	34.38	31.5	31.5	0.7	841	6.69	0.37	0.26	6.2	6.2	9.3	9.3	11.0	11.0	13.4	13.4
4404A	ST4639	19.90	32.9	32.9	2.6	672	6.69	0.37	0.26	3.9	3.9	6.3	6.3	7.7	7.7	9.8	9.8
4404B	ST4404	8.40	32.9	32.9	2.6	672	6.69	0.37	0.26	1.7	1.7	3.1	3.1	4.0	4.0	5.2	5.2
4501	ST4501	18.45	34.0	52.1	1.8	420	6.78	0.36	0.26	3.7	5.4	5.6	8.1	6.6	9.5	8.2	11.5
4502	ST4502	22.56	31.8	32.3	4.2	1035	6.69	0.37	0.26	4.4	4.5	7.6	7.7	9.6	9.7	12.5	12.6
4503A	ST4503	58.83	46.4	49.1	2.6	745	5.59	0.36	0.21	15.2	15.9	22.8	23.9	27.1	28.4	33.1	34.6
4503B	ST4503	81.06	6.2	64.1	3.9	1499	5.80	0.36	0.22	3.7	29.6	8.2	44.3	11.7	52.4	17.7	63.4
4503C	ST4503	30.20	13.8	39.1	5.7	899	5.86	0.33	0.14	4.2	8.5	9.9	15.3	8.3	15.0	8.8	16.5
4503D	TOOZE_POND	12.16	49.2	51.8	3.2	450	4.99	0.36	0.19	3.7	3.9	6.1	6.3	7.5	7.7	9.3	9.5
4608	ST4608	10.25	51.9	51.9	1.6	280	6.69	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4611	POND_E2	7.97	47.5	47.5	2.7	475	6.69	0.37	0.26	2.3	2.3	3.7	3.7	4.5	4.5	5.6	5.6
4614A	POND_E1	53.36	42.8	42.9	1.6	1058	6.69	0.37	0.26	12.9	12.9	19.2	19.2	22.6	22.6	27.4	27.4
4614B	ST4829	11.09	45.2	52.2	2.2	662	6.69	0.37	0.26	3.0	3.5	4.9	5.5	5.9	6.6	7.4	8.1
4617A	ST4610	6.68	52.1	52.1	1.6	378	6.69	0.37	0.26	2.1	2.1	3.2	3.2	3.8	3.8	4.7	4.7
4617B	ST4803	5.35	52.2	52.2	2.1	268	6.69	0.37	0.26	1.7	1.7	2.6	2.6	3.1	3.1	3.8	3.8
4617C	ST4617	4.89	52.2	52.2	2.2	310	6.69	0.37	0.26	1.5	1.5	2.4	2.4	2.9	2.9	3.6	3.6
4623	ST4623	4.26	52.2	52.2	1.2	453	6.69	0.37	0.26	1.4	1.4	2.2	2.2	2.6	2.6	3.3	3.3
4631A	ST4631	9.68	52.2	52.2	0.8	535	6.66	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4631B	ST4806	10.14	52.2	52.2	2.4	615	6.66	0.37	0.26	3.2	3.2	5.0	5.0	6.1	6.1	7.5	7.5

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4632A	04632A	49.06	31.8	31.8	1.7	814	6.69	0.37	0.26	8.9	8.9	13.4	13.4	15.8	15.8	19.4	19.4
4632B	04632B	41.58	43.7	43.7	1.2	674	6.69	0.37	0.26	9.9	9.9	14.6	14.6	17.1	17.1	20.5	20.5
5004A	ST5004	5.30	59.7	59.7	3.1	360	5.50	0.36	0.21	2.0	2.0	3.2	3.2	3.9	3.9	4.7	4.7
5004B	ST5028	6.65	54.3	54.3	4.2	380	6.69	0.37	0.26	2.2	2.2	3.5	3.5	4.2	4.2	5.2	5.2
5006	ST5006	9.00	64.1	64.1	1.1	589	6.69	0.37	0.26	3.4	3.4	5.1	5.1	6.0	6.0	7.3	7.3
5022	ST5022	4.80	70.7	70.7	0.9	304	6.69	0.37	0.26	2.0	2.0	2.9	2.9	3.4	3.4	4.1	4.1
5024	ST5024	7.31	78.8	78.8	1.2	645	6.69	0.37	0.26	3.4	3.4	5.1	5.1	5.9	5.9	7.0	7.0
5033	ST5033	4.32	71.8	71.8	3.3	476	6.69	0.37	0.26	1.9	1.9	2.9	2.9	3.4	3.4	4.2	4.2
5037	ST5037	2.66	49.2	50.3	3.5	135	4.36	0.35	0.16	0.9	0.9	1.5	1.5	1.8	1.9	2.0	2.0
5038	ST5038	15.24	43.6	43.6	7.1	553	6.69	0.37	0.26	4.0	4.0	6.6	6.6	8.1	8.1	10.2	10.2
5200	ST5200	64.84	21.6	23.9	4.8	1222	6.75	0.36	0.26	8.5	9.3	13.9	15.1	17.2	18.6	22.4	23.9
5207	ST5207	26.98	23.7	23.7	2.5	1176	6.91	0.36	0.24	4.0	4.0	7.2	7.2	9.1	9.1	12.4	12.4
5210	05210	37.10	23.5	23.5	10.3	3038	6.21	0.37	0.29	5.3	5.3	12.9	12.9	17.2	17.2	23.0	23.0
5501	ST5501	40.80	14.3	14.3	8.6	1077	7.94	0.33	0.19	4.6	4.6	10.2	10.2	14.2	14.2	19.9	19.9
5502	05502	75.65	12.7	13.9	7.8	1936	7.24	0.34	0.24	6.5	7.0	13.7	14.4	18.5	19.3	27.1	27.9
5706A	ST5703	8.78	43.6	47.1	3.6	607	5.51	0.36	0.24	2.4	2.6	4.1	4.3	5.1	5.3	6.5	6.7
5706B	ST5706	11.41	43.6	47.1	3.6	607	5.51	0.36	0.24	3.1	3.3	5.1	5.4	6.3	6.6	8.0	8.3
5709	ST5709	29.34	43.9	53.0	6.1	642	5.20	0.36	0.22	7.8	9.3	12.3	14.4	15.1	17.3	18.9	21.4
5713	ST5713	25.39	71.0	71.0	2.9	985	6.30	0.36	0.24	10.6	10.6	15.9	15.9	18.7	18.7	22.4	22.4
5718	ST5718	34.38	39.0	46.2	7.6	1251	6.12	0.34	0.16	9.6	11.0	17.7	19.3	21.9	23.6	23.1	25.2
6001	ST6001	24.29	39.6	39.6	10.7	1121	5.08	0.36	0.19	6.8	6.8	12.5	12.5	15.8	15.8	19.6	19.6
6004	ST6003	13.42	53.7	53.7	1.6	528	5.03	0.36	0.19	4.4	4.4	6.9	6.9	8.3	8.3	10.2	10.2
6013A	ST6013	6.55	73.9	73.9	1.3	1183	4.91	0.36	0.19	3.1	3.1	4.9	4.9	5.7	5.7	6.7	6.7
6013B	ST6007	9.69	73.9	73.9	1.3	1183	4.91	0.36	0.19	4.5	4.5	7.0	7.0	8.2	8.2	9.7	9.7
6021	ST6021	12.43	68.8	68.8	1.0	513	3.99	0.35	0.15	4.9	4.9	7.8	7.8	8.9	8.9	10.4	10.4
6022	ST6022	27.99	51.1	51.1	6.8	687	5.56	0.37	0.30	8.4	8.4	12.6	12.6	15.1	15.1	18.3	18.3
6031	ST6031	14.40	65.2	65.2	1.9	429	6.61	0.37	0.26	5.3	5.3	7.9	7.9	9.3	9.3	11.1	11.1
6201A	ST6412	56.66	34.1	42.4	1.9	885	5.81	0.36	0.22	11.1	13.5	16.9	20.3	20.2	24.2	25.1	29.6
6201B	ST6201	97.87	25.0	49.0	3.0	1101	4.90	0.36	0.19	14.6	26.4	23.2	40.1	28.4	47.8	36.2	58.4
6205	ST6205	25.21	37.1	49.6	2.3	757	6.71	0.36	0.25	5.6	7.3	8.7	11.1	10.5	13.3	13.2	16.3
6210	06210	26.56	23.8	51.5	4.4	551	4.29	0.35	0.17	4.2	8.4	7.8	13.4	10.1	16.2	12.0	19.0
6211	06211	16.53	37.7	37.7	10.1	587	4.46	0.35	0.17	4.5	4.5	8.3	8.3	10.4	10.4	12.2	12.2
6411A	ST6411	10.69	40.1	40.1	2.4	565	6.37	0.36	0.25	2.6	2.6	4.3	4.3	5.3	5.3	6.7	6.7
6411B	ST6405	7.47	40.1	40.1	2.4	565	6.37	0.36	0.25	1.9	1.9	3.2	3.2	4.0	4.0	5.1	5.1
6416A	ST6653	11.82	48.7	49.7	1.7	435	6.68	0.37	0.26	3.4	3.4	5.1	5.2	6.1	6.2	7.5	7.6
6416B	06416	59.26	34.8	36.5	5.6	1204	6.68	0.37	0.26	12.3	12.9	19.3	20.0	23.3	24.2	29.4	30.4
6610A	ST6610	15.48	44.9	46.9	2.6	789	6.69	0.37	0.26	4.2	4.4	6.7	6.9	8.1	8.4	10.2	10.5
6610B	ST6605	18.06	43.6	43.6	7.3	525	6.69	0.37	0.26	4.8	4.8	7.6	7.6	9.2	9.2	11.6	11.6

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
6611	06611	20.49	44.0	44.1	6.3	530	6.69	0.37	0.26	5.4	5.4	8.4	8.5	10.2	10.2	12.7	12.7
9003	ST9003	52.84	50.4	50.4	1.6	900	6.35	0.36	0.25	14.6	14.6	21.6	21.6	25.3	25.3	30.5	30.5
9006	ST9006	26.30	43.4	43.4	1.8	752	4.66	0.35	0.18	7.0	7.0	11.2	11.2	13.7	13.7	17.0	17.0
9013	ST9013	58.92	43.4	43.4	0.7	1462	4.40	0.35	0.17	14.7	14.7	22.9	22.9	27.6	27.6	32.4	32.4
9019	ST9019	46.34	43.4	43.4	2.0	995	3.51	0.35	0.13	12.2	12.2	18.9	18.9	20.6	20.6	25.2	25.2
9023	ST9023	11.00	42.7	43.4	1.5	481	4.61	0.35	0.18	3.0	3.0	4.9	5.0	6.1	6.1	7.6	7.7
9024	ST9024	30.75	41.9	41.9	4.5	727	3.57	0.35	0.16	8.3	8.3	13.8	13.8	17.3	17.3	19.0	19.0
9027	ST9027	14.17	43.4	43.4	3.2	799	3.50	0.35	0.13	4.3	4.3	7.3	7.3	7.7	7.7	9.7	9.7
9031	ST9031	56.63	43.4	43.4	1.3	1438	3.51	0.35	0.13	14.8	14.8	22.9	22.9	25.0	25.0	30.5	30.5
9032	ST9032	29.13	42.7	42.7	3.9	608	3.72	0.35	0.16	7.8	7.8	12.7	12.7	15.9	15.9	17.4	17.4
9039	ST9039	24.37	51.0	51.0	5.4	777	3.58	0.35	0.16	8.1	8.1	13.4	13.4	16.6	16.6	18.3	18.3
9041	ST9066	19.00	64.7	64.7	1.2	395	4.18	0.35	0.16	6.7	6.7	10.2	10.2	12.2	12.2	13.8	13.8
9048A	ST9044	11.52	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.8	3.8	6.3	6.3	7.6	7.6	9.4	9.4
9048B	ST9048	8.86	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.0	3.0	5.0	5.0	6.1	6.1	7.4	7.4
9051	ST9051	7.62	43.3	43.4	1.8	365	3.82	0.35	0.14	2.2	2.2	3.6	3.6	4.0	4.0	4.6	4.6
9059A	ST9053	13.59	43.4	43.4	1.4	582	6.15	0.36	0.24	3.5	3.5	5.5	5.5	6.6	6.6	8.3	8.3
9059B	ST9059	11.82	43.4	43.4	1.4	582	6.15	0.36	0.24	3.1	3.1	4.9	4.9	5.9	5.9	7.4	7.4
9060	ST9060	11.18	63.9	64.7	1.8	230	3.50	0.35	0.13	4.0	4.1	6.1	6.2	6.8	6.9	8.1	8.2
9065	ST9065	14.62	35.3	39.3	10.5	997	4.96	0.33	0.12	4.2	4.5	7.6	7.9	8.2	8.6	10.6	11.0
9071	09071	10.19	39.8	40.4	8.5	743	5.61	0.33	0.14	3.6	3.7	6.5	6.6	6.6	6.6	7.2	7.2
9072	09072	19.38	43.9	43.9	4.1	1126	6.69	0.37	0.26	5.2	5.2	8.7	8.7	10.7	10.7	13.5	13.5
CANYON_N	CANYON_CR_PH2_DET	7.24	70.4	70.4	9.3	367	6.69	0.37	0.26	3.1	3.1	4.8	4.8	5.6	5.6	6.8	6.8
CANYON_S	CANYON_CR_ARCH_PIPE	7.74	70.9	70.9	3.9	469	6.69	0.37	0.26	3.3	3.3	5.0	5.0	5.9	5.9	7.1	7.1
FUT6612	06612	50.30	3.7	64.1	5.1	1383	6.69	0.37	0.26	1.5	18.9	4.7	28.4	7.1	33.5	11.4	40.4
S_1203	1203	3.59	64.8	64.8	5.5	126	6.69	0.37	0.26	1.4	1.4	2.1	2.1	2.5	2.5	3.0	3.0
TONKIN_NISSAN_BASIN	TONKIN_NISSAN_POND	17.83	37.3	43.5	0.9	638	6.69	0.37	0.26	3.9	4.5	5.9	6.7	7.0	8.0	8.7	9.8

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
ST1202	1203	ST1202	CIRCULAR	1.5	-	262	276.62	265.7	3.87	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
17559	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
17558	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
SD6629	6652	ST6618	CIRCULAR	0.83	-	106.2	161.33	160.0	1.04	0.013	0.0	0.0	0.0	0.3	NF	0.0	0.0	0.0	1.8	NF
STAFFORD_MEADOWS_CHANNEL	9067	3316	STAFFORD_CHANNEL	88	3	410	214.8	212.8	0.50	0.035	2.4	3.8	4.8	6.3	NF	9.2	13.6	15.8	19.1	NF
SD2151	DAY_RD_IMPOUNDMENT	ST2107	CIRCULAR	2	-	192.4	227.55	227.5	0.07	0.01	17.4	16.7	16.4	16.4	2-yr, 24-hr	16.8	16.7	16.7	16.9	2-yr, 24-hr
SD5218	POND_LIBRARY	ST5215	CIRCULAR	1.5	-	69	140.76	136.0	4.08	0.013	19.3	22.2	22.2	22.2	100-yr, 24-hr	21.9	22.2	22.2	22.1	25-yr, 24-hr
PST1204	PST1202	PST1204	CIRCULAR	1	-	84.3	331.58	329.2	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1205	PST1204	PST1205	CIRCULAR	1	-	129.3	329.2	314.6	11.16	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1206	PST1205	PST1206	CIRCULAR	1	-	189.2	314.58	309.5	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1207	PST1206	PST1207	CIRCULAR	1	-	121.8	309.49	307.0	1.91	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1208	PST1207	PST1208	CIRCULAR	1	-	61.1	306.97	292.8	8.21	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.7	NF
PST1209	PST1208	PST1209	CIRCULAR	1	-	116.5	292.77	278.1	14.30	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
1203	PST1209	1203	CIRCULAR	1	-	23.3	278.08	276.6	1.50	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
SD1740	SIEMENS_POND_C&D	ST3208	CIRCULAR	2.5	-	77	208.45	207.0	1.95	0.013	2.8	6.1	8.3	11.8	NF	3.5	7.5	10.1	14.3	NF
SD1000	ST1000	ST1129	CIRCULAR	2.5	-	142.7	257.9	253.5	3.12	0.013	18.9	25.5	28.9	33.7	NF	19.5	26.2	29.7	34.6	NF
SD1001	ST1001	ST1000	CIRCULAR	1.5	-	900	270.05	257.9	1.24	0.013	7.2	8.3	7.9	8.1	NF	7.2	7.8	7.8	8.1	NF
SD1002	ST1002	ST1001	CIRCULAR	1.25	-	540	277.75	270.1	1.38	0.013	7.2	8.4	8.7	8.3	25-yr, 24-hr	7.2	8.1	8.1	8.2	25-yr, 24-hr
SD1100	ST1100	ST1700	CIRCULAR	2.5	-	72	241.73	239.2	3.59	0.013	36.2	49.6	57.9	72.9	10-yr, 24-hr	39.6	57.3	68.1	80.4	10-yr, 24-hr
SD1101	ST1101	ST1100	SYSCO	21	3.8	1170	244.65	241.7	0.25	0.035	28.5	43.6	48.3	52.6	NF	28.5	40.9	43.8	51.9	100-yr, 24-hr
SD1102	ST1102	ST1101	CIRCULAR	3.5	-	58	244.82	244.7	0.29	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1103	ST1103	ST1102	CIRCULAR	3.5	-	77	245.25	244.8	0.30	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1104	ST1104	ST1103	CIRCULAR	3	-	31	245.61	245.3	0.52	0.011	18.4	28.5	34.0	41.4	NF	18.4	28.5	34.0	41.5	NF
SD1105	ST1105	ST1104	CIRCULAR	2.5	-	150	250.61	245.6	3.20	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1106	ST1106	ST1105	CIRCULAR	2.5	-	332.6	253.77	250.6	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1107	ST1107	ST1106	CIRCULAR	2.5	-	170.5	255.79	253.8	1.07	0.011	8.7	14.6	18.2	22.8	NF	8.7	14.6	18.2	22.8	NF
SD1108	ST1108	ST1107	CIRCULAR	2.5	-	180	257.5	255.8	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1109	ST1109	ST1108	CIRCULAR	2.5	-	273.1	261.49	257.5	1.39	0.011	8.7	14.6	18.2	22.9	NF	8.7	14.6	18.2	22.9	NF
SD1110	ST1110	ST1109	CIRCULAR	2.5	-	218.1	266.69	261.5	2.29	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1111	ST1111	ST1110	CIRCULAR	2	-	112.9	267.03	266.7	0.30	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1112	ST1112	ST1111	CIRCULAR	1.5	-	100	271.56	267.0	4.53	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1113	ST1113	ST1112	CIRCULAR	1.5	-	67.4	272.22	271.6	0.68	0.013	7.1	12.4	15.7	20.4	25-yr, 24-hr	7.1	12.4	15.7	20.4	25-yr, 24-hr
SD1114	ST1114	ST1113	CIRCULAR	1.5	-	379.5	276.02	272.2	0.92	0.013	7.1	12.4	15.7	20.8	10-yr, 24-hr	7.1	12.4	15.7	20.8	10-yr, 24-hr
SD1115	ST1115	ST1110	CIRCULAR	2.5	-	47	268.44	266.7	2.32	0.012	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1116	ST1116	ST1115	CIRCULAR	2.25	-	79	270.48	268.4	2.58	0.013	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1117	ST1117	ST1103	CIRCULAR	2.75	-	238.4	246.52	245.3	0.31	0.013	10.6	15.9	18.4	22.0	NF	10.6	15.8	18.2	21.9	NF
SD1118	ST1118	ST1117	CIRCULAR	2.75	-	350.9	247.64	246.5	0.32	0.013	10.6	15.9	18.5	22.0	NF	10.6	15.9	18.3	21.9	NF
SD1119	ST1119	ST1118	CIRCULAR	2.75	-	293.1	262.81	247.6	5.18	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1120	ST1120	ST1119	CIRCULAR	1.5	-	309	267.58	262.8	1.48	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1121	ST1121	ST1120	CIRCULAR	1.5	-	277.3	271.88	267.6	1.44	0.013	5.9	8.9	10.5	12.4	NF	5.9	8.9	10.5	12.4	NF
SD1122	ST1122	ST1121	CIRCULAR	1.5	-	277.7	273.75	271.9	0.67	0.013	5.9	8.9	10.5	12.2	NF	5.9	8.9	10.5	12.2	NF
SD1123	ST1123	ST1122	CIRCULAR	1.25	-	105.6	276.24	273.8	2.12	0.013	5.9	8.9	10.5	12.2	100-yr, 24-hr	5.9	8.9	10.5	12.2	100-yr, 24-hr
SD1124	ST1124	ST1123	CIRCULAR	1.25	-	257.5	284.48	276.2	3.20	0.013	5.9	8.9	10.5	12.3	100-yr, 24-hr	5.9	8.9	10.5	12.3	100-yr, 24-hr
SD1125	ST1125	ST1118	CIRCULAR	1.75	-	193.8	251.13	247.6	1.28	0.013	4.7	7.1	8.4	10.1	NF	4.7	7.1	8.5	10.2	NF
SD1127	ST1126	ST1701	CANYON_CR	22	4	1500	246.95	237.5	0.63	0.035	12.5	19.9	24.0	31.1	NF	19.0	28.9	34.1	42.3	NF
SD1128	ST1128	ST2118	CIRCULAR	2.5	-	307.2	244.51	241.5	0.86	0.013	18.8	28.7	28.9	33.3	NF	19.3	28.8	29.4	34.1	NF
SD1129	ST1129	ST1128	BASALT_CR9	11	2	530	253.45	244.5	0.75	0.035	18.8	33.6	33.6	33.7	NF	19.3	38.5	38.5	34.3	NF
SD2411	ST1130	ST2407	CIRCULAR	2	-	727	240.02	236.7	0.43	0.024	8.7	9.4	9.8	10.4	NF	8.8	9.5	9.8	10.5	NF
SD2410	ST1130	ST2409	CIRCULAR	2	-	263.6	240.02	240.3	0.59	0.024	1.6	5.8	8.0	10.6	NF	2.1	6.2	8.2	10.8	NF
SD1130	ST1131	ST1130	CIRCULAR	2.75	-	105.9	242.76	240.0	0.32	0.024	10.5	15.4	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF
SD1131	ST1132	ST1131	CIRCULAR	2.75	-	399.7	244.2	242.8	0.31	0.024	10.5	15.5	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1132	ST1133	ST1132	CIRCULAR	1.25	-	282.4	247.5	244.2	0.64	0.013	0.0	0.0	0.0	0.1	NF	11.0	15.9	18.3	22.0	2-yr, 24-hr
SD1302	ST1200	ST1302	CIRCULAR	2.25	-	75	257.59	256.1	1.64	0.013	8.4	12.8	14.9	19.1	NF	8.4	12.8	14.9	19.1	NF
SD1200	ST1201	ST1200	CIRCULAR	2.25	-	180	260.31	257.6	1.46	0.013	8.5	12.8	14.9	19.1	NF	8.5	12.8	14.9	19.1	NF
SD1201	ST1202	ST1201	CIRCULAR	2	-	251.1	265.7	260.3	2.05	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
SD1126	ST1300	ST1126	CIRCULAR	3	-	68	247.22	247.0	0.40	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1300	ST1301	ST1300	CIRCULAR	3	-	121	248.45	247.2	0.55	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1301	ST1302	ST1301	CIRCULAR	2.5	-	323	256.11	248.5	2.18	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1303	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.33	0.011	1.4	2.8	3.6	4.3	NF	3.9	5.6	6.6	8.0	100-yr, 24-hr
SD1304	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.44	0.011	0.1	1.3	2.2	4.0	NF	3.1	5.4	6.4	7.9	100-yr, 24-hr
SD1305	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	0.44	0.011	2.7	3.2	3.5	4.3	NF	3.8	5.4	6.4	7.9	100-yr, 24-hr
SD1401	ST1304	ST1400	CIRCULAR	1.5	-	93.8	240.49	238.7	1.03	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1306	ST1305	ST1304	CIRCULAR	1	-	310.8	242.46	240.5	0.60	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1307	ST1306	ST1305	CIRCULAR	1.25	-	159	244.66	242.5	0.82	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1308	ST1307	ST1306	CIRCULAR	1.25	-	147.8	246.73	244.7	1.33	0.013	0.7	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1400	ST1400	ST1401	CIRCULAR	1.5	-	10	238.7	235.4	0.80	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1402	ST1401	ST1402	CIRCULAR	4	-	68	235.43	235.4	0.49	0.013	43.7	58.1	65.6	73.7	NF	50.9	65.0	71.1	79.1	NF
SD1403	ST1402	ST1403	BOECKMAN_CR	37	9	970	235.43	197.5	3.92	0.035	45.9	61.7	69.6	78.5	NF	53.5	68.8	75.5	83.9	NF
SD1404	ST1403	ST1404A	CIRCULAR	4	-	45	197.45	195.5	4.45	0.013	45.4	61.6	69.3	78.1	NF	53.1	68.6	75.2	83.6	NF
SD1405A	ST1404A	ST1404B	BOECKMAN_CR	37	9	1285	195.45	160.9	2.69	0.035	50.8	70.3	79.8	91.8	NF	59.7	78.6	88.7	102.5	NF
SD1405B	ST1404B	ST1603	BOECKMAN_CR	37	9	500	160.9	147.5	2.69	0.035	50.8	70.3	79.7	91.8	NF	59.7	78.6	88.4	102.2	NF
SD1602	ST1500	ST1600	CIRCULAR	2.5	-	221.5	203.36	194.6	2.06	0.011	0.3	0.4	1.5	3.1	NF	0.3	0.5	1.6	3.2	NF
SD1500	ST1501	ST1500	CIRCULAR	1.5	-	153	212.81	203.4	5.47	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1502	ST1502	ST1501	CIRCULAR	1.5	-	300.9	220.39	212.8	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1503	ST1503	ST1502	CIRCULAR	1.25	-	276	227.5	220.4	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1504	ST1504	ST1503	CIRCULAR	1.25	-	54	228.96	227.5	2.52	0.013	0.3	0.4	0.6	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1603	ST1600	ST1601	CIRCULAR	4	-	157.6	194.55	180.0	9.11	0.013	29.8	37.4	42.0	50.0	NF	31.3	39.9	44.8	56.1	NF
SD1604	ST1601	ST1602	CIRCULAR	4	-	169	180.04	156.6	14.03	0.013	29.8	37.4	42.0	50.2	NF	31.3	39.9	44.8	56.5	NF
SD1605	ST1602	ST1603	MENTOR_GRAPHICS	13	1	350	156.56	147.5	2.60	0.035	29.8	37.4	41.9	49.2	NF	31.3	39.9	44.8	54.5	NF
SD1607	ST1603	POND_BOECKMAN	BOECKMAN_CR_B	141.6	15.3	100	147.45	131.5	16.21	0.035	130.5	186.1	216.4	529.5	NF	196.0	278.7	707.7	651.9	NF
SD3200	ST1605	ST3200	CIRCULAR	5	-	300	131.45	127.6	1.29	0.024	124.0	161.8	210.5	289.9	25-yr, 24-hr	166.9	247.4	304.8	303.6	10-yr, 24-hr
SD1600	ST1608	ST1600	CIRCULAR	1.25	-	251	212.8	194.6	5.11	0.013	1.1	1.9	2.3	2.8	NF	1.4	2.2	2.7	3.2	NF
16687	ST1640	3316	CIRCULAR	1.5	-	125	214.82	212.8	1.54	0.011	3.7	4.9	5.3	5.9	NF	5.3	6.4	6.9	7.5	NF
SD1700	ST1700	ST1701	SYSCO-2	70	3	900	239.15	237.5	0.19	0.035	35.7	49.0	52.8	62.3	NF	39.3	52.2	59.7	70.3	NF
SD1701	ST1701	ST1702	SYSCO-3	24	5	350	237.45	236.2	0.35	0.035	43.5	57.9	65.4	73.8	NF	50.7	64.7	70.7	79.3	NF
SD1702	ST1702	ST1401	CIRCULAR	4	-	95	236.23	235.4	0.49	0.013	43.4	57.7	65.2	73.4	100-yr, 24-hr	50.6	64.6	70.7	78.7	100-yr, 24-hr
SD1703	ST1703	ST1704	CIRCULAR	4	-	56	208.45	210.4	0.18	0.013	24.9	30.8	34.7	40.2	NF	26.1	34.0	37.8	44.4	NF
SD1704	ST1704	ST1705	CIRCULAR	4	-	312	210.35	209.4	0.32	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1705	ST1705	ST1706	CIRCULAR	4	-	276.9	209.35	208.3	0.40	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1706	ST1706	ST1707	CIRCULAR	4	-	263.6	208.25	207.7	0.20	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1707	ST1707	ST1708	CIRCULAR	4	-	142.8	207.72	207.4	0.23	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1708	ST1708	ST1709	CIRCULAR	4	-	434.9	207.39	206.0	0.32	0.013	24.7	30.8	34.5	40.4	NF	26.0	33.4	37.6	44.4	NF
SD1709	ST1709	ST1710	CIRCULAR	4	-	277	205.99	200.6	1.93	0.013	24.8	30.8	34.6	42.4	NF	26.0	33.4	37.7	48.2	NF
SD1716	ST1710	ST1600	CIRCULAR	4	-	75	200.64	194.6	8.15	0.013	28.6	35.7	39.8	48.2	NF	29.8	38.1	42.9	54.5	NF
SD1710	ST1711	ST1712	CIRCULAR	1.25	-	310	217.25	215.0	0.71	0.013	3.9	5.9	7.1	8.4	100-yr, 24-hr	3.9	5.9	7.2	8.5	100-yr, 24-hr
SD1711	ST1712	ST1713	CIRCULAR	1.5	-	270	215.04	208.6	2.14	0.013	3.9	5.8	7.1	8.4	NF	3.9	5.8	7.2	8.4	NF
SD1715	ST1713	ST1500	CIRCULAR	1.5	-	128	208.58	203.4	9.93	0.013	0.0	0.0	1.0	2.5	NF	0.0	0.0	1.0	2.5	NF
SD1712	ST1713	ST1714	CIRCULAR	1.25	-	250.1	208.58	208.6	-0.28	0.013	3.9	5.3	6.2	6.5	NF	3.9	5.3	6.2	6.5	NF
SD1713	ST1714	ST1715	CIRCULAR	1	-	135	208.58	205.7	2.17	0.013	3.8	5.2	5.9	5.9	10-yr, 24-hr	3.8	5.3	5.9	5.9	10-yr, 24-hr
SD1714	ST1715	ST1710	CIRCULAR	1	-	20	205.65	200.6	25.88	0.013	3.8	5.2	5.9	5.9	NF	3.8	5.3	5.9	5.9	NF
SD2722	ST1717	ST2720	CIRCULAR	2	-	500	209.05	205.5	0.72	0.013	8.6	12.6	13.8	16.9	100-yr, 24-hr	9.3	13.0	14.5	17.2	100-yr, 24-hr
SD1717	ST1718	ST1717	TRAPEZOIDAL	30	2	50	209.45	209.1	0.80	0.035	8.7	12.9	13.8	17.4	100-yr, 24-hr	9.4	13.4	14.5	18.3	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1718	ST1719	ST1718	CIRCULAR	3.5	-	107	210.45	209.5	0.93	0.024	8.8	13.1	15.0	17.7	NF	9.5	14.2	15.9	18.9	NF
SD1719	ST1720	ST1719	ARCH	2.92	2	100	211.35	210.5	0.90	0.024	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.1	18.9	NF
SD1720	ST1721	ST1720	CIRCULAR	2	-	282.2	216.15	211.4	1.70	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	18.9	NF
SD1721	ST1722	ST1721	CIRCULAR	1.5	-	38.9	216.83	216.2	0.98	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	19.3	NF
SD1722	ST1723	ST1722	CIRCULAR	2	-	90	217.26	216.8	0.32	0.013	8.8	13.1	15.4	18.1	NF	9.5	14.2	16.5	19.3	100-yr, 24-hr
SD1723	ST1724	ST1723	CIRCULAR	1	-	40.9	217.39	217.3	0.05	0.011	8.8	13.1	15.3	18.1	25-yr, 24-hr	9.6	14.2	16.5	19.4	10-yr, 24-hr
SD1724	ST1725	ST1724	CIRCULAR	2.5	-	208	218.26	217.4	0.36	0.013	8.8	13.2	15.5	18.3	100-yr, 24-hr	9.6	14.4	16.6	19.7	100-yr, 24-hr
SD1725	ST1726	ST1725	CIRCULAR	2.5	-	34	218.56	218.3	0.56	0.013	8.9	13.2	15.5	18.6	NF	9.7	14.4	16.8	20.0	100-yr, 24-hr
SD2000	ST2000	ST4002	PRISON_OFFSITE6	33	3.5	820	139.95	139.5	0.06	0.035	127.8	162.0	174.8	191.0	2-yr, 24-hr	160.7	199.6	206.0	225.9	2-yr, 24-hr
SD2001	ST2001	ST2000	PRISON_OFFSITE6	33	3.5	331.9	140.15	140.0	0.06	0.035	157.8	187.7	190.6	190.8	2-yr, 24-hr	150.7	191.5	196.6	216.5	2-yr, 24-hr
SD2002	ST2002	ST2001	PRISON_OFFSITE5	40	3.5	630.6	140.45	140.2	0.05	0.035	143.6	179.7	178.7	184.3	2-yr, 24-hr	172.0	182.4	191.0	215.3	2-yr, 24-hr
SD2003	ST2003	ST2002	PRISON_OFFSITE4	19	3.5	359.2	140.95	140.5	0.14	0.035	166.1	167.6	177.3	181.0	2-yr, 24-hr	174.5	177.2	189.9	214.5	2-yr, 24-hr
SD2004	ST2004	ST2003	PRISON_OFFSITE4	19	3.5	1208.4	142.45	141.0	0.12	0.035	135.7	141.5	156.5	179.6	2-yr, 24-hr	145.3	175.5	189.3	214.1	2-yr, 24-hr
SD2005	ST2005	ST2004	PRISON_OFFSITE3	48	3	1322.9	142.95	142.5	0.04	0.035	121.1	143.8	156.6	177.1	2-yr, 24-hr	138.2	171.1	186.8	207.0	2-yr, 24-hr
SD2006	ST2006	ST2005	PRISON_OFFSITE2	23.4	2.3	705.4	143.85	143.0	0.13	0.035	132.5	173.0	192.3	219.2	2-yr, 24-hr	159.1	208.4	231.2	260.1	2-yr, 24-hr
SD2007	ST2007	ST2006	PRISON_OFFSITE2	23.4	2.3	46.3	143.95	143.9	0.22	0.035	137.8	182.4	203.7	232.9	2-yr, 24-hr	166.8	220.2	245.4	280.0	2-yr, 24-hr
SD2008	ST2008	ST2007	PRISON_OFFSITE2	23.4	2.3	195.6	144.15	144.0	0.10	0.035	140.3	187.1	209.8	241.4	2-yr, 24-hr	170.1	226.5	253.7	290.8	2-yr, 24-hr
SD2009	ST2009	ST2008	PRISON_OFFSITE2	23.4	2.3	1744.5	145.45	144.2	0.10	0.035	17.3	34.6	42.9	55.8	2-yr, 24-hr	19.8	39.8	54.8	73.7	2-yr, 24-hr
SD2010	ST2010	ST2009	PRISON_OFFSITE	20	4	108	150.46	145.5	4.18	0.035	29.5	78.9	115.0	90.8	10-yr, 24-hr	101.0	72.6	64.2	81.2	2-yr, 24-hr
SD2011	ST2011	ST2010	RECT_CLOSED	6	3	32	153.13	150.5	8.37	0.013	45.5	112.8	114.3	109.3	10-yr, 24-hr	110.2	115.1	81.6	86.6	2-yr, 24-hr
SD2012	ST2012	ST2011	PRISON_OFFSITE	20	4	89	160.54	153.1	8.35	0.035	28.7	54.1	57.9	62.4	100-yr, 24-hr	51.8	64.2	75.1	93.3	10-yr, 24-hr
SD2013	ST2013	ST2012	PRISON_OFFSITE	20	4	361	170.14	160.5	2.66	0.035	28.8	43.2	51.0	62.4	NF	43.8	64.2	77.1	89.5	100-yr, 24-hr
SD2014	ST2014	ST2013	RECT_CLOSED	6	3	32	170.46	170.1	1.00	0.013	28.8	43.1	51.0	62.5	NF	43.8	64.2	75.2	89.5	100-yr, 24-hr
SD2015	ST2015	ST2014	PRISON_OFFSITE	20	4	587	178.35	170.5	1.34	0.035	28.8	43.2	51.2	62.7	NF	43.9	64.5	75.6	89.8	NF
SD2016	ST2016	ST2015	CIRCULAR	3.5	-	279	187.75	178.4	3.37	0.013	28.8	43.3	51.4	62.9	NF	44.0	64.6	75.8	90.0	NF
SD2017	ST2017	ST2016	CIRCULAR	3.5	-	401	199.05	187.8	2.79	0.013	28.8	43.3	51.4	62.8	NF	44.0	64.6	75.8	90.0	NF
SD2018	ST2018	ST2017	CIRCULAR	3.5	-	551	201.95	199.1	0.50	0.013	28.8	43.4	51.4	62.9	NF	44.0	64.7	75.9	90.1	NF
SD2019	ST2019	ST2018	CIRCULAR	3.5	-	69	202.45	202.0	0.49	0.013	28.8	43.6	51.8	63.4	NF	44.2	65.1	75.9	90.1	NF
SD2403B	ST2100	ST2403	CIRCULAR	4	-	79.9	222.7	222.1	1.29	0.013	50.8	63.0	67.7	73.4	NF	58.7	69.1	72.9	77.5	NF
SD2403	ST2100	ST2403	CIRCULAR	4	-	80.8	222.7	222.1	0.84	0.013	46.1	59.5	64.6	70.1	NF	55.0	66.1	69.7	75.5	NF
SD2100	ST2101	ST2100	CIRCULAR	3	-	602.1	224.96	222.7	0.31	0.013	34.0	41.9	44.3	46.6	NF	42.8	48.0	49.3	51.2	NF
SD2101	ST2101	ST2100	CIRCULAR	3	-	603.7	224.96	222.7	0.28	0.013	33.9	41.8	44.2	46.5	NF	43.2	47.9	49.2	51.2	NF
SD2440	ST2101A	ST2431	CIRCULAR	2	-	327.1	196.41	192.3	1.19	0.013	37.9	47.3	51.3	56.2	2-yr, 24-hr	47.3	55.7	59.5	65.2	2-yr, 24-hr
SD2102	ST2102	ST2101	COMMERCE_CIR_DITCH	140.2	7.4	493.4	226.88	225.0	0.37	0.035	37.9	44.8	46.6	48.6	NF	45.0	48.8	49.9	50.3	NF
SD2439	ST2102A	ST2101A	CIRCULAR	4	-	346.6	198.2	196.4	0.50	0.013	38.8	54.5	55.8	70.9	10-yr, 24-hr	54.2	65.0	60.2	65.8	2-yr, 24-hr
SD2103	ST2103	ST2102	CIRCULAR	4	-	30	226.56	226.9	-1.07	0.024	37.9	42.6	44.4	46.1	NF	42.8	46.0	46.9	47.2	25-yr, 24-hr
SD2438	ST2103A	ST2102A	CIRCULAR	4	-	334.3	200.05	198.2	0.49	0.013	39.4	57.1	61.3	71.7	10-yr, 24-hr	57.6	62.7	63.5	69.7	2-yr, 24-hr
SD2104	ST2104	ST2103	BASALT_CR5_UPDATE	91.5	4	367.5	225.75	226.6	-0.22	0.035	38.1	43.3	44.2	45.0	2-yr, 24-hr	43.1	44.5	44.9	45.1	2-yr, 24-hr
SD2437	ST2104A	ST2103A	CIRCULAR	4	-	302.8	203.63	200.1	1.12	0.013	43.4	57.9	66.1	73.3	10-yr, 24-hr	59.9	69.9	71.2	75.6	2-yr, 24-hr
SD2105	ST2105	ST2104	CIRCULAR	4	-	96.7	226.41	225.8	0.68	0.024	39.7	44.1	45.9	47.4	NF	43.4	46.6	47.6	48.5	NF
SD2167	ST2105A	ST2104A	CIRCULAR	4	-	109.2	204.37	203.6	0.49	0.013	45.1	60.2	70.5	79.7	10-yr, 24-hr	63.2	76.4	77.6	80.1	2-yr, 24-hr
SD2106	ST2106	ST2105	COMMERCE_CIR_DITCH	42.1	9.8	754	226.75	226.4	0.05	0.035	41.0	44.6	46.7	48.8	NF	43.7	48.0	49.4	50.9	NF
SD2164	ST2106A	ST2105A	CIRCULAR	3.5	-	117.7	205.46	204.4	0.50	0.013	18.3	22.6	23.5	26.7	10-yr, 24-hr	35.8	43.4	44.2	43.4	2-yr, 24-hr
SD2107	ST2107	ST2120	COMMERCE_CIR_DITCH	26.4	7.4	965	227.47	226.7	0.08	0.035	28.8	28.8	29.1	29.5	NF	29.7	29.7	29.7	29.9	NF
SD2163	ST2107A	ST2106A	CIRCULAR	3.5	-	227.5	206.8	205.5	0.50	0.013	18.0	24.5	27.2	32.0	10-yr, 24-hr	42.2	48.6	48.5	50.6	2-yr, 24-hr
SD2108	ST2108	ST2101	BASALT_CR	24	5	300	228.84	225.0	1.27	0.035	22.8	34.0	40.2	50.4	NF	41.8	63.5	73.7	81.8	NF
17184	ST2108A	ST2107A	CIRCULAR	3.5	-	119.8	207.59	206.8	0.49	0.013	18.1	24.9	31.6	40.8	25-yr, 24-hr	41.9	48.0	48.4	48.5	2-yr, 24-hr
SD2109	ST2109	ST2108	BASALT_CR7	48	4	500	229.63	228.8	0.16	0.035	23.0	34.2	40.4	51.2	NF	42.1	63.9	74.2	85.8	NF
17195	ST2109A	ST2186	CIRCULAR	3.5	-	236.9	209.13	208.0	0.48	0.013	18.2	24.5	34.7	40.4	25-yr, 24-hr	40.5	47.4	47.7	47.6	10-yr, 24-hr
SD2110	ST2110	ST2109	CIRCULAR	3	-	70	230.56	229.6	1.33	0.013	23.0	34.4	40.6	52.0	NF	42.2	64.1	74.4	86.0	NF
17194	ST2110A	ST2109A	CIRCULAR	3.5	-	299.2	212.26	209.1	0.98	0.013	18.4	25.8	34.7	40.4	25-yr, 24-hr	40.3	47.4	47.6	47.9	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2111	ST2111	ST2110	BASALT_CR6	48	2	330	236.05	230.6	1.66	0.035	23.7	35.9	42.8	51.9	NF	44.3	64.1	74.4	86.0	NF
17203	ST2111A	ST2110A	CIRCULAR	3	-	177.8	214.19	212.3	0.80	0.013	17.4	26.8	34.5	40.4	100-yr, 24-hr	40.1	47.3	47.6	47.9	10-yr, 24-hr
SD2112	ST2112	ST2111	CIRCULAR	2	-	279.3	240.69	236.1	1.45	0.013	23.7	36.1	43.0	52.0	100-yr, 24-hr	44.4	64.2	74.5	88.8	10-yr, 24-hr
17201	ST2112A	ST2111A	CIRCULAR	3	-	178.4	215.82	214.2	0.80	0.013	17.4	28.7	34.3	40.5	100-yr, 24-hr	39.9	47.3	47.5	49.2	10-yr, 24-hr
SD2113	ST2113	ST2100	CIRCULAR	4	-	235.4	224.98	222.7	0.65	0.013	29.8	40.8	44.7	51.1	NF	30.2	41.0	45.2	51.6	NF
17269	ST2113A	ST2112A	CIRCULAR	3	-	329.5	218.27	215.8	0.68	0.013	17.4	27.5	34.2	40.5	100-yr, 24-hr	39.7	47.3	47.5	52.9	10-yr, 24-hr
SD2114	ST2114	ST2113	CIRCULAR	4	-	282.9	227.4	225.0	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17271	ST2114A	ST2113A	CIRCULAR	3	-	166	219.51	218.3	0.63	0.013	17.4	27.0	34.0	40.4	100-yr, 24-hr	39.5	47.2	50.3	57.1	10-yr, 24-hr
SD2115	ST2115	ST2114	CIRCULAR	4	-	242	229.45	227.4	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.0	45.2	51.7	NF
17280	ST2115A	ST2114A	CIRCULAR	3	-	166.1	220.95	219.5	0.75	0.013	17.4	27.6	33.7	40.4	100-yr, 24-hr	39.2	48.0	52.8	60.2	10-yr, 24-hr
SD2116	ST2116	ST2115	BASALT_CR11	16	4	150	233.95	229.5	3.00	0.035	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17282	ST2116A	ST2115A	CIRCULAR	2.5	-	300.4	224.4	221.0	0.98	0.013	17.4	28.8	33.5	40.2	100-yr, 24-hr	39.0	50.1	55.9	64.5	10-yr, 24-hr
SD2117	ST2117	ST2116	CIRCULAR	3	-	288	235.45	234.0	0.69	0.013	29.8	40.8	44.7	51.2	100-yr, 24-hr	30.3	41.1	45.2	51.8	100-yr, 24-hr
17285	ST2117A	ST2116A	CIRCULAR	2.5	-	159.9	226.55	224.4	1.22	0.013	17.4	26.7	33.2	40.2	NF	38.8	52.1	59.0	68.8	10-yr, 24-hr
SD2118	ST2118	ST2117	BASALT_CR10	44	4	380	241.45	235.5	1.45	0.035	30.8	45.2	50.3	59.7	NF	31.3	44.7	51.0	60.3	NF
17290	ST2118A	ST2117A	CIRCULAR	2.5	-	202.4	229.21	226.6	1.22	0.013	17.4	26.7	34.1	40.2	NF	38.5	53.8	61.8	72.8	10-yr, 24-hr
17291	ST2119A	ST2118A	CIRCULAR	2.5	-	120	230.56	229.2	0.96	0.013	17.4	26.7	32.4	40.2	100-yr, 24-hr	38.2	55.5	64.5	76.8	10-yr, 24-hr
SD2120	ST2120	ST2106	CIRCULAR	4	-	62	226.67	226.8	-0.13	0.024	41.8	45.3	47.2	49.5	NF	44.2	48.7	50.5	52.2	NF
SD2121	ST2121	ST2107	ARCH	3	1.67	53.8	228.59	227.5	2.10	0.024	14.1	13.5	13.2	13.3	NF	13.6	13.5	13.5	13.6	NF
DAY_RD_BYPASS_CHANNEL	ST2122	DAY_RD_IMPOUNDMENT	TRAPEZOIDAL	17	3	20	226.18	227.6	0.01	0.035	54.6	89.7	108.5	135.0	NF	105.6	163.5	193.1	233.5	NF
SD2122	ST2122	ST2121	COMMERCE_CIR_DITCH	20.9	3.7	583	226.18	228.6	-0.41	0.035	19.2	15.8	14.1	14.1	NF	14.4	14.1	14.1	14.4	NF
SD2123	ST2123	ST2122	CIRCULAR	3	-	43	226.37	226.2	0.44	0.024	66.6	98.9	116.2	140.8	NF	115.3	171.1	200.0	239.7	100-yr, 24-hr
17196	ST2186	ST2108A	CIRCULAR	3.5	-	42.6	207.99	207.6	0.47	0.013	17.6	24.7	34.8	40.4	25-yr, 24-hr	41.0	47.5	48.0	47.8	10-yr, 24-hr
SD2706	ST2400	ST2706	BASALT_CR3	42	5	1130	214.45	175.5	3.45	0.035	133.9	178.5	197.6	223.3	NF	155.1	196.9	214.7	238.8	NF
SD2400	ST2401	ST2400	BASALT_CR3	42	5	90	214.9	214.5	0.50	0.035	134.0	178.5	197.7	223.4	NF	155.1	197.0	214.8	238.9	NF
SD2401	ST2402	ST2401	BASALT_CR3	42	5	1110	220.95	214.9	0.55	0.035	134.3	178.7	197.9	223.6	NF	155.3	197.2	215.0	239.1	NF
SD2402	ST2403	ST2402	BASALT_CR8	38	5	1000	222.09	221.0	0.10	0.035	96.3	121.7	131.5	142.6	NF	113.1	134.4	141.9	152.3	NF
SD2404	ST2404	ST2402	BASALT_CR2	30	5	400	228.12	221.0	1.67	0.035	19.9	29.9	35.2	42.8	NF	23.1	33.6	39.0	47.1	NF
SD2405	ST2405	ST2404	CIRCULAR	4.5	-	250	228.12	228.1	0.00	0.013	19.9	29.9	35.2	42.9	NF	23.1	33.6	39.1	47.1	NF
SD2406	ST2406	ST2405	BASALT_CR	24	5	450	229.5	228.1	0.31	0.035	15.5	23.4	27.6	33.5	NF	18.7	27.2	31.5	38.0	NF
SD2407	ST2407	ST2406	CIRCULAR	3.5	-	677	236.7	229.5	1.06	0.011	13.8	20.6	24.1	28.9	NF	14.1	20.6	23.8	28.6	NF
SD2408	ST2408	ST2407	CIRCULAR	3	-	131	238.66	236.7	1.18	0.011	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2409	ST2409	ST2408	CIRCULAR	3	-	242.8	240.25	238.7	0.54	0.013	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2716	ST2410	ST2715	CIRCULAR	1.5	-	253	214.7	210.3	1.42	0.013	5.0	7.6	9.1	11.4	NF	5.1	8.1	9.7	11.9	NF
SD2412	ST2411	ST2410	CIRCULAR	1.25	-	284	217.44	214.7	0.84	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2413	ST2412	ST2411	CIRCULAR	1.25	-	415.1	221.01	217.4	0.85	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2414	ST2413	ST2412	CIRCULAR	1.25	-	318.4	223.72	221.0	0.82	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2442	ST2431	ST2432	CIRCULAR	2	-	69	192.31	189.3	4.08	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2443	ST2432	ST2433	CIRCULAR	2.25	-	67.6	189.3	188.4	1.35	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2444	ST2433	ST2434	CIRCULAR	2.5	-	335.6	188.39	185.1	0.94	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	25-yr, 24-hr
SD2445	ST2434	ST2435	CIRCULAR	2.5	-	65	185.05	163.5	35.23	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	NF
SD2446	ST2435	ST2004	PRISON_OFFSITE3	48	3	2000	163.45	142.5	1.05	0.035	37.4	47.1	51.2	56.2	NF	47.1	55.7	59.5	65.2	NF
SD2700	ST2700	ST4003	COFFEE_CR2	80	3.5	900	143.45	140.0	0.39	0.035	147.8	203.5	204.0	224.2	NF	170.4	192.2	226.7	298.4	10-yr, 24-hr
SD2701	ST2701	ST2700	COFFEE_CR2	80	3.5	1000	147.95	143.5	0.45	0.035	149.7	205.8	230.9	261.4	NF	172.0	223.8	248.1	278.0	NF
SD2702	ST2702	ST2701	COFFEE_CR2	80	3.5	1100	169.45	148.0	1.95	0.035	151.0	207.1	232.5	263.4	NF	173.3	225.7	250.1	280.6	NF
SD2703	ST2703	ST2702	COFFEE_CR	40	5	50	173.45	169.5	8.03	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2704	ST2705	ST2703	BASALT_CR4	44	4	350	173.95	173.5	0.14	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2705	ST2706	ST2705	BASALT_CR3	42	5	170	175.45	174.0	0.88	0.035	133.6	178.3	197.4	223.1	NF	154.9	196.7	214.5	238.6	NF
SD2707	ST2707	ST2705	CIRCULAR	2.5	-	48	178.69	174.0	6.79	0.013	24.2	35.8	40.7	47.6	NF	24.4	36.2	41.3	48.2	NF
SD2708	ST2708	ST2707	CIRCULAR	2.5	-	452	182.05	178.7	0.70	0.013	15.6	22.9	26.0	29.3	NF	15.7	23.3	26.6	30.1	NF
SD2709	ST2709	ST2708	CIRCULAR	2	-	274	188.85	182.1	2.30	0.013	15.6	23.1	26.3	29.5	NF	15.7	23.5	27.0	33.6	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2710	ST2710	ST2709	CIRCULAR	2	-	400	195.05	188.9	1.50	0.013	15.6	23.1	27.4	32.1	100-yr, 24-hr	15.7	23.5	30.2	32.2	100-yr, 24-hr
SD2711	ST2711	ST2710	CIRCULAR	2	-	400	200.45	195.1	1.30	0.013	15.6	23.1	27.3	32.7	100-yr, 24-hr	15.7	23.5	28.4	32.9	100-yr, 24-hr
SD2712	ST2712	ST2711	CIRCULAR	3	-	106.1	203.05	200.5	2.45	0.013	5.0	7.6	11.8	30.3	100-yr, 24-hr	5.1	8.0	13.4	29.9	100-yr, 24-hr
SD2713	ST2713	ST2712	CIRCULAR	2	-	247.2	205.72	203.1	0.76	0.013	5.0	7.6	9.1	14.3	NF	5.1	8.0	9.8	15.7	100-yr, 24-hr
SD2714	ST2714	ST2713	CIRCULAR	2	-	174.8	206.95	205.7	0.70	0.013	5.0	7.6	9.1	13.8	NF	5.1	8.0	9.7	16.9	100-yr, 24-hr
SD2715	ST2715	ST2714	CIRCULAR	1.75	-	293	210.3	207.0	1.04	0.013	5.0	7.6	9.1	11.7	NF	5.1	8.0	9.7	13.8	NF
SD2717	ST2716	ST4015	CIRCULAR	2.5	-	84.3	171.46	169.9	1.74	0.024	12.5	23.4	25.0	26.7	25-yr, 24-hr	13.7	24.1	25.5	26.9	25-yr, 24-hr
SD2718	ST2717B	ST2716	CIRCULAR	2.5	-	75	172.13	171.5	0.89	0.024	12.5	23.4	25.0	26.6	25-yr, 24-hr	13.8	24.1	25.5	26.8	25-yr, 24-hr
SD2719	ST2718	ST2717	COFFEE_CR	40	5	680	186.45	172.1	2.11	0.035	15.3	22.5	25.5	30.3	NF	15.9	23.0	26.1	31.0	NF
SD2720	ST2719	ST2718	ARCH	4.5	2.25	76	188.2	186.5	2.30	0.024	15.3	22.6	25.6	30.3	NF	16.0	23.1	26.2	31.0	NF
SD2721	ST2720	ST2719	COFFEE_CR	40	5	640	205.45	188.2	2.70	0.035	15.9	23.7	26.6	31.5	NF	16.6	24.0	27.3	32.8	NF
SD3000	ST3001	ST3201	CIRCULAR	1.25	-	111.7	171.92	113.5	25.67	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3001	ST3002	ST3001	CIRCULAR	1.25	-	71.5	180.31	171.9	11.82	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3002	ST3003	ST3002	CIRCULAR	1.25	-	116.4	188.52	180.3	7.07	0.011	4.4	6.8	8.1	10.2	NF	4.4	6.9	8.2	10.2	NF
SD3003	ST3004	ST3003	CIRCULAR	1.25	-	35	190.86	188.5	4.58	0.011	4.4	6.8	8.1	11.4	NF	4.4	6.9	8.2	10.6	NF
SD3004	ST3005	ST3004	CIRCULAR	1.25	-	293	195.52	190.9	1.53	0.011	4.4	6.8	8.1	10.7	NF	4.5	6.9	8.2	10.6	NF
SD3006	ST3007	03000	N_FORK_MERIDIAN_CR	22	4	5350	153.45	58.5	1.78	0.035	36.1	52.3	59.8	71.2	NF	61.6	85.8	98.4	120.8	NF
SD3007	ST3008	ST3007	N_FORK_MERIDIAN_CR	22	4	500	169.45	153.5	2.20	0.035	38.0	54.6	62.6	73.6	NF	63.6	88.7	101.6	123.8	NF
SD3008	ST3009	ST3008	N_FORK_MERIDIAN_CR	22	4	750	185.82	169.5	2.18	0.035	18.4	26.6	29.2	35.4	NF	24.5	30.8	34.9	46.1	NF
SD3009	ST3010	ST3009	CIRCULAR	2	-	63.8	190	185.8	6.57	0.011	18.4	26.6	29.2	40.5	NF	24.5	30.9	34.9	54.0	100-yr, 24-hr
SD3010	ST3011	ST3010	CIRCULAR	2	-	198	191.45	190.0	0.73	0.011	18.4	26.6	29.2	36.8	NF	24.5	30.9	34.9	49.3	100-yr, 24-hr
SD3011	ST3012	ST3011	N_FORK_MERIDIAN_CR	22	4	260	192.03	191.5	0.22	0.035	6.9	11.2	13.6	25.3	NF	14.6	18.0	19.5	37.2	100-yr, 24-hr
SD3012	ST3013	ST3012	CIRCULAR	3	-	101.9	198.56	192.0	6.42	0.013	6.4	9.9	11.9	25.2	NF	13.7	16.1	17.2	36.7	NF
SD3013	ST3014	ST3013	CIRCULAR	3	-	27.7	200.02	198.6	4.55	0.011	6.4	9.9	11.9	29.3	NF	13.7	16.1	17.2	36.7	NF
SD3014	ST3015	ST3014	CIRCULAR	3	-	116.1	204.42	200.0	3.79	0.013	6.4	9.9	11.9	17.3	NF	13.7	16.1	17.2	36.7	NF
SD3015	ST3016	ST3015	CIRCULAR	3	-	31.7	206.09	204.4	4.32	0.013	6.4	9.9	11.9	13.6	NF	13.7	16.1	17.2	53.3	NF
SD3016	ST3017	ST3016	N_FORK_MERIDIAN_CR	22	4	600	211.15	206.1	0.84	0.035	6.5	10.1	12.0	13.7	NF	13.7	16.1	17.2	18.9	NF
SD3017	ST3018	ST3011	CIRCULAR	2	-	158.4	203.41	191.5	3.18	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	15.6	NF
SD3018	ST3019	ST3018	CIRCULAR	2	-	61.4	204.08	203.4	1.01	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	7.0	NF
SD3019	ST3020	ST3019	CIRCULAR	2	-	266.8	205.51	204.1	0.50	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	5.0	NF
SD3020	ST3021	ST3020	CIRCULAR	1.5	-	56.5	209.33	205.5	4.48	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3021	ST3022	ST3021	CIRCULAR	1.5	-	203.2	210.35	209.3	0.40	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3022	ST3023	ST3022	CIRCULAR	1.25	-	38.7	211.86	210.4	0.41	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3023	ST3024	ST3023	CIRCULAR	1.25	-	220.6	212.84	211.9	0.40	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3201	ST3200	ST3201	BOECKMAN_CR_D	123.6	15.8	1100	127.59	113.5	1.29	0.035	124.0	161.8	188.4	281.1	NF	166.9	227.1	280.9	280.9	NF
SD3202	ST3201	ST3202	BOECKMAN_CR2	40	10	1100	113.45	111.5	0.18	0.035	132.6	172.7	195.5	285.6	NF	173.4	232.9	284.6	284.8	NF
SD3603	ST3202	ST3603	BOECKMAN_CR2	40	10	900	111.45	105.5	0.67	0.035	132.4	172.6	195.3	285.4	NF	173.3	232.1	284.5	284.8	NF
SD3203	ST3203	ST4025	CIRCULAR	3	-	100	177.45	177.0	0.50	0.013	39.1	51.4	56.3	70.1	25-yr, 24-hr	50.1	61.4	76.5	95.2	10-yr, 24-hr
SD3204	ST3204	ST3203	S_COFFEE_CR3	29	2	250	181.45	177.5	1.60	0.035	39.1	51.4	57.6	102.9	NF	50.1	94.4	109.5	118.2	25-yr, 24-hr
SD3220	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	15.6	23.8	27.0	24.4	100-yr, 24-hr	26.4	25.2	53.8	28.2	10-yr, 24-hr
SD3225	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	7.8	11.9	13.5	48.8	100-yr, 24-hr	13.2	50.4	26.9	56.4	10-yr, 24-hr
SD3221	ST3206	ST3205	S_COFFEE_CR2	30	2	750	190.73	183.5	0.97	0.035	23.6	36.1	43.2	54.5	NF	39.7	58.5	68.6	77.4	NF
SD3205	ST3207	ST3206	CIRCULAR	3	-	90.5	192.45	190.7	1.90	0.013	15.1	13.0	15.4	18.5	NF	25.6	19.7	22.4	58.5	NF
SD3206	ST3207	ST3206	CIRCULAR	2	-	90.6	192.45	190.7	0.79	0.013	8.6	23.2	28.0	36.1	NF	14.2	39.0	46.4	29.8	NF
SD3207	ST3208	ST3207	S_COFFEE_CR	16	2	1400	206.95	192.5	1.04	0.035	14.5	21.7	25.9	32.4	NF	14.8	22.4	27.0	34.7	NF
SD3208	ST3209	ST3208	CIRCULAR	1.5	-	204.1	210.24	207.0	1.20	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3209	ST3210	ST3209	CIRCULAR	1.5	-	218.1	212.35	210.2	0.88	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3210	ST3211	ST3210	CIRCULAR	1.5	-	50	213.1	212.4	1.30	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3211	ST3212	ST3211	CIRCULAR	1.5	-	38	213.53	213.1	0.66	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3418	ST3217	ST3417	CIRCULAR	1.25	-	279.3	188.65	186.5	0.70	0.013	1.7	2.8	3.5	4.5	NF	4.3	6.5	7.6	9.3	NF
SD3216	ST3218	ST3217	CIRCULAR	1.25	-	242.9	192.02	188.7	1.37	0.013	1.7	2.8	3.5	4.6	NF	4.3	6.5	7.6	9.3	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3400	ST3400	ST5039	CIRCULAR	4	-	88	158.96	155.2	0.48	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.5	87.7	NF
SD3401	ST3401	ST3400	CIRCULAR	3.5	-	17.3	159.33	159.0	2.14	0.013	27.6	42.8	50.7	62.4	NF	31.6	48.5	56.9	73.2	NF
SD3402	ST3402	ST3401	CIRCULAR	3.5	-	187.4	160.35	159.3	0.54	0.013	27.6	42.9	50.7	62.4	NF	31.6	48.5	56.9	70.5	NF
SD3403	ST3403	ST3402	CIRCULAR	3.5	-	400	162.32	160.4	0.44	0.013	19.3	30.7	36.5	45.3	NF	21.4	33.6	40.0	49.5	NF
SD3404	ST3404	ST3403	CIRCULAR	3	-	365	165.43	162.3	0.81	0.011	19.4	30.8	36.5	45.2	NF	21.5	33.6	39.8	50.7	NF
SD3405	ST3405	ST3404	CIRCULAR	2	-	410	170.29	165.4	0.89	0.011	7.6	11.4	13.5	16.4	NF	8.9	13.2	15.5	19.1	NF
SD3406	ST3406	ST3405	CIRCULAR	2	-	11.7	171.08	170.3	6.34	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3407	ST3407	ST3406	CIRCULAR	2	-	143	171.45	171.1	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3408	ST3408	ST3407	CIRCULAR	2	-	163	171.85	171.5	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3409	ST3409	ST3408	CIRCULAR	2	-	77	172.15	171.9	0.13	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3410	ST3410	ST3409	CIRCULAR	2	-	145	174.88	172.2	1.75	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.5	18.7	NF
SD3411	ST3411	ST3410	CIRCULAR	2	-	60	175.55	174.9	0.78	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3412	ST3412	ST3411	CIRCULAR	2	-	27.1	175.43	175.6	-0.81	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3413	ST3413	ST3412	CIRCULAR	2.5	-	145	176.1	175.4	0.46	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.8	NF
SD3414	ST3414	ST3413	CIRCULAR	2.5	-	20	176.25	176.1	0.75	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.3	15.6	18.8	NF
SD3415	ST3415	ST3414	CIRCULAR	1.5	-	268	178.63	176.3	0.73	0.013	1.2	1.8	2.2	2.8	NF	2.1	3.0	3.5	4.4	NF
SD3416	ST3416	ST3415	CIRCULAR	1.25	-	254	182.49	178.6	1.41	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3417	ST3417	ST3416	CIRCULAR	1	-	230.5	186.51	182.5	1.61	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3433	ST3417	ST3430	CIRCULAR	1.25	-	216.6	186.51	180.4	2.76	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3419	ST3418	ST3404	CIRCULAR	3	-	591	168.26	165.4	0.47	0.013	11.8	19.5	22.9	29.8	NF	12.6	20.3	24.3	31.5	NF
SD3420	ST3419	ST3418	CIRCULAR	3	-	429.1	169.25	168.3	0.23	0.013	9.4	15.9	18.8	24.1	NF	10.2	16.8	20.2	26.0	NF
SD3421	ST3420	ST3419	CIRCULAR	3	-	258	169.73	169.3	0.15	0.013	9.4	15.9	18.8	24.2	NF	10.2	16.8	20.3	26.0	NF
SD3422	ST3421	ST3420	CIRCULAR	1.75	-	247.8	170.98	169.7	0.50	0.013	3.2	6.2	7.0	9.3	NF	3.9	6.9	8.4	10.8	NF
SD3423	ST3421	ST4236	CIRCULAR	1.5	-	638	170.98	166.9	0.65	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD3424	ST3422	ST3421	CIRCULAR	1.75	-	59	170.81	171.0	-0.29	0.013	0.4	2.9	4.4	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3425	ST3423	ST3422	CIRCULAR	1.75	-	195	171.05	170.8	0.19	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3426	ST3424	ST3423	CIRCULAR	1.75	-	74.2	171.12	171.1	0.09	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.8	7.6	NF
SD3427	ST3425	ST3424	CIRCULAR	1.75	-	479.2	169.61	171.1	0.18	0.013	0.4	2.9	4.4	5.5	NF	1.7	4.9	5.8	9.3	100-yr, 24-hr
SD3428	ST3426	ST3425	CIRCULAR	1.75	-	85.1	169.79	169.6	0.21	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.3	8.0	100-yr, 24-hr
SD3429	ST3427	ST3426	CIRCULAR	1.5	-	297.3	173.44	169.8	1.20	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.8	8.0	100-yr, 24-hr
SD3430	ST3428	ST3427	CIRCULAR	1.5	-	434.9	178.86	173.4	1.21	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.3	NF
SD3431	ST3429	ST3428	CIRCULAR	1.5	-	171.5	179.89	178.9	0.59	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.0	NF
SD3432	ST3430	ST3429	CIRCULAR	1.5	-	65.7	180.41	179.9	0.65	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3434	ST3431	ST3400	CIRCULAR	3.5	-	51.4	160.46	159.0	0.90	0.013	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	18.6	NF
SD3435	ST3432	ST3431	CIRCULAR	2.5	-	257.6	163.39	160.5	1.04	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	17.8	NF
SD3436	ST3433	ST3432	CIRCULAR	2.5	-	287.9	166.73	163.4	1.09	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.6	17.8	NF
SD3437	ST3434	ST3433	CIRCULAR	2.5	-	262.1	169.86	166.7	1.12	0.011	7.6	11.6	13.8	16.9	NF	8.1	12.3	14.6	17.9	NF
SD3438	ST3435	ST3434	CIRCULAR	2.25	-	318.2	174.35	169.9	1.34	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3439	ST3436	ST3435	CIRCULAR	2.25	-	442.3	180.59	174.4	1.40	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3440	ST3437	ST3436	CIRCULAR	1.75	-	240	186.74	180.6	2.50	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3441	ST3438	ST3437	CIRCULAR	1.75	-	240	189.99	186.7	1.26	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3442	ST3439	ST3438	CIRCULAR	1.75	-	240	191.55	190.0	0.56	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3443	ST3440	ST3439	CIRCULAR	1.75	-	240	193.2	191.6	0.58	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3444	ST3441	ST3440	CIRCULAR	1.75	-	194.9	195.11	193.2	0.88	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3445	ST3442	ST3441	CIRCULAR	1.75	-	120	197.05	195.1	1.62	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3446	ST3443	ST3442	CIRCULAR	1.75	-	177	198.16	197.1	0.54	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3447	ST3444	ST6036	CIRCULAR	2	-	230	150.86	142.2	3.65	0.013	14.1	21.2	24.5	29.1	NF	14.1	21.2	24.1	29.0	NF
SD3448	ST3445	ST3444	CIRCULAR	1.5	-	66	156.67	150.9	7.70	0.013	14.1	21.2	27.1	32.0	25-yr, 24-hr	14.1	21.2	27.3	31.9	25-yr, 24-hr
SD3449	ST3446	ST3445	CIRCULAR	1.5	-	173.9	166.18	156.7	4.71	0.013	5.4	8.1	9.4	10.9	NF	5.4	8.1	9.4	10.9	NF
SD3450	ST3447	ST3446	CIRCULAR	1.5	-	29.7	166.66	166.2	1.62	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF
SD3451	ST3448	ST3447	CIRCULAR	1.5	-	198.7	168.66	166.7	1.06	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3452	ST3449	ST3448	CIRCULAR	1.5	-	214.2	171.41	168.7	1.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3453	ST3450	ST3449	CIRCULAR	1.25	-	178.4	175.05	171.4	2.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3454	ST3451	ST3450	CIRCULAR	1.25	-	268.6	175.8	175.1	0.28	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD5204	ST3600	ST5203	BOECKMAN_CR_WILSO	42.5	5.5	49	95.2	94.5	1.53	0.035	158.4	210.4	236.5	299.5	NF	194.7	256.7	297.1	299.4	NF
SD3601	ST3602	ST3600	BOECKMAN_CR2	40	10	1250	103.45	95.2	0.66	0.035	144.2	190.0	212.1	292.0	NF	182.6	244.0	290.5	290.8	NF
SD3602	ST3603	ST3602	BOECKMAN_CR2	40	10	600	105.45	103.5	0.33	0.035	132.1	172.5	195.1	285.4	NF	173.2	231.5	284.5	284.8	NF
SD5503	ST3605	ST5501	S_FORK_MERIDIAN_CR	22	4	1250	167.45	111.5	4.48	0.035	16.7	24.7	29.1	35.3	NF	16.7	24.8	29.1	35.3	NF
SD3605	ST3606	ST3605	S_FORK_MERIDIAN_CR	22	4	530	184.96	167.5	3.31	0.035	16.8	25.0	29.3	35.5	NF	16.8	25.0	29.4	35.6	NF
SD4206	ST4000	ST4205	SEALY_DITCH	80	3.5	1450	138.45	138.0	0.03	0.035	238.1	298.7	322.9	432.6	2-yr, 24-hr	347.9	459.9	437.7	382.8	2-yr, 24-hr
SD4000	ST4001	ST4000	SEALY_DITCH	80	3.5	1600	138.95	138.5	0.03	0.035	231.5	286.9	307.7	330.4	2-yr, 24-hr	291.9	318.2	340.1	370.9	2-yr, 24-hr
SD4001	ST4002	ST4001	SEALY_DITCH	80	3.5	400	139.45	139.0	0.13	0.035	240.2	269.7	286.4	320.0	2-yr, 24-hr	272.0	306.5	325.4	345.5	2-yr, 24-hr
SD4002	ST4003	ST4002	COFFEE_CR2	80	3.5	150	139.95	139.5	0.33	0.035	158.6	212.3	215.6	236.8	2-yr, 24-hr	173.2	204.2	227.8	264.8	2-yr, 24-hr
SD4003	ST4004	ST4003	COFFEE_CR2	80	3.5	1400	149.66	140.0	0.69	0.035	29.5	50.8	54.5	58.5	NF	31.1	51.5	54.8	58.8	NF
SD4004	ST4005	ST4004	CIRCULAR	3	-	75	150.66	149.7	1.33	0.024	30.5	51.7	55.3	59.1	100-yr, 24-hr	32.0	52.4	55.6	59.3	100-yr, 24-hr
SD4005	ST4006	ST4005	CIRCULAR	3	-	300	154.66	150.7	1.33	0.024	30.5	51.7	55.3	59.1	10-yr, 24-hr	32.0	52.4	55.6	59.3	10-yr, 24-hr
SD4006	ST4007	ST4006	CIRCULAR	2.5	-	390	167.15	154.7	3.08	0.024	19.0	33.6	34.2	35.1	25-yr, 24-hr	21.3	34.0	34.6	35.3	25-yr, 24-hr
SD4007	ST4008	ST4007	CIRCULAR	2.5	-	146	168.68	167.2	1.05	0.024	19.0	33.0	33.8	34.8	10-yr, 24-hr	21.3	33.5	34.1	35.3	10-yr, 24-hr
SD4008	ST4009	ST4008	CIRCULAR	2	-	88.5	172.51	168.7	3.27	0.024	7.6	11.6	12.4	14.7	10-yr, 24-hr	8.4	12.4	13.7	15.9	10-yr, 24-hr
SD4009	ST4010	ST4009	CIRCULAR	2	-	21.1	172.71	172.5	0.95	0.024	7.6	11.3	12.4	14.7	25-yr, 24-hr	8.4	12.2	13.7	16.0	10-yr, 24-hr
SD4010	ST4011	ST4010	CIRCULAR	2	-	58.9	176.05	172.7	5.59	0.024	7.6	11.2	12.5	14.8	25-yr, 24-hr	8.4	12.0	13.7	16.0	10-yr, 24-hr
SD4011	ST4012	ST4011	CIRCULAR	2	-	429.3	185.15	176.1	2.12	0.024	7.6	11.6	13.3	15.2	100-yr, 24-hr	8.4	12.7	14.4	16.5	100-yr, 24-hr
SD4012	ST4013	ST4006	CIRCULAR	3	-	29.7	156.9	154.7	5.87	0.013	14.9	21.5	25.4	30.2	10-yr, 24-hr	14.9	21.6	25.4	30.2	10-yr, 24-hr
SD4013	ST4014	ST4013	CIRCULAR	3	-	195	159.2	156.9	0.92	0.013	14.9	22.7	25.7	30.5	100-yr, 24-hr	14.9	22.0	25.7	30.5	100-yr, 24-hr
SD4014	ST4015	ST4008	CIRCULAR	2.5	-	44.1	169.86	168.7	1.00	0.024	12.5	23.5	25.0	26.8	10-yr, 24-hr	13.8	24.2	25.6	27.0	10-yr, 24-hr
SD4015	ST4016	ST4206	S_COFFEE_CR5	16	2	700	143.95	141.7	0.29	0.035	47.7	59.0	62.8	69.7	10-yr, 24-hr	58.3	65.8	70.8	75.5	2-yr, 24-hr
SD4016	ST4017	ST4016	S_COFFEE_CR6	10	2	1150	150.25	144.0	0.55	0.035	48.5	65.6	65.8	73.3	10-yr, 24-hr	62.9	68.1	74.8	78.7	10-yr, 24-hr
SD4017	ST4018	ST4017	CIRCULAR	4.92	-	40	151.01	150.3	1.90	0.013	55.0	69.3	70.4	80.9	10-yr, 24-hr	63.7	73.8	81.3	84.7	10-yr, 24-hr
SD4018	ST4019	ST4018	S_COFFEE_CR4	9	2	90	152.72	151.0	1.90	0.035	54.9	69.6	70.8	82.0	10-yr, 24-hr	64.2	74.3	82.5	85.5	10-yr, 24-hr
SD4019	ST4020	ST4019	CIRCULAR	4.25	-	35	153.4	152.7	1.94	0.013	55.3	69.9	73.8	83.2	10-yr, 24-hr	64.7	75.2	83.7	86.3	10-yr, 24-hr
SD4020	ST4021	ST4020	S_COFFEE_CR4	9	2	580	164.48	153.4	1.91	0.035	54.5	73.8	75.3	91.8	100-yr, 24-hr	67.8	78.9	92.7	94.6	25-yr, 24-hr
SD4021	ST4022	ST4021	CIRCULAR	3.5	-	30	165.05	164.5	1.90	0.013	38.7	64.1	68.6	70.9	100-yr, 24-hr	50.1	70.4	73.0	74.8	25-yr, 24-hr
SD4022	ST4023	ST4022	CIRCULAR	3.5	-	30	165.63	165.1	1.90	0.013	38.7	67.4	72.0	73.5	100-yr, 24-hr	50.1	73.6	76.9	77.5	25-yr, 24-hr
SD4023	ST4024	ST4023	S_COFFEE_CR	16	2	540	175.95	165.6	1.91	0.035	39.1	51.4	56.3	69.2	NF	50.1	60.6	74.6	93.9	100-yr, 24-hr
SD4024	ST4025	ST4024	CIRCULAR	3	-	200	176.95	176.0	0.50	0.013	39.1	51.4	56.3	70.3	25-yr, 24-hr	50.1	60.7	76.9	95.5	10-yr, 24-hr
SD4025	ST4026	ST4021	CIRCULAR	1.75	-	400	168.35	164.5	0.83	0.013	15.9	20.7	22.4	24.8	10-yr, 24-hr	19.1	22.8	24.1	27.7	2-yr, 24-hr
SD4026	ST4027	ST4026	CIRCULAR	1.75	-	410	173.35	168.4	1.20	0.013	15.9	22.1	22.8	25.9	10-yr, 24-hr	19.4	23.2	25.5	28.7	2-yr, 24-hr
SD4027	ST4028	ST4027	CIRCULAR	1.75	-	390	175.76	173.4	0.59	0.013	16.1	21.0	23.7	27.4	10-yr, 24-hr	19.7	24.3	27.2	30.8	2-yr, 24-hr
SD4028	ST4029	ST4028	CIRCULAR	1.5	-	401.5	178.5	175.8	0.66	0.024	16.1	22.3	25.4	29.9	2-yr, 24-hr	18.9	26.2	29.7	34.5	2-yr, 24-hr
SD4200	ST4200	ST6205	RECT_CLOSED	24	7	75	135.3	135.0	0.47	0.013	298.6	357.8	386.5	416.9	NF	311.2	383.8	417.8	456.5	NF
SD4201	ST4201	ST4200	COFFEE_CR3	27	4	520	135.95	135.3	0.13	0.035	298.5	357.8	386.4	430.5	100-yr, 24-hr	311.2	423.0	417.8	456.5	10-yr, 24-hr
SD4202	ST4202	ST4201	COFFEE_CR3	27	4	500	136.95	136.0	0.20	0.035	298.5	357.8	386.4	441.2	100-yr, 24-hr	311.4	448.2	451.5	456.5	10-yr, 24-hr
SD4203	ST4203	ST4202	COFFEE_CR3	27	4	300	137.15	137.0	0.07	0.035	292.6	351.6	380.3	471.9	100-yr, 24-hr	319.3	494.6	471.4	451.4	10-yr, 24-hr
SD4204	ST4204	ST4203	COFFEE_CR3	27	4	250	137.45	137.2	0.12	0.035	291.6	350.4	379.2	507.8	100-yr, 24-hr	377.4	504.2	488.8	450.1	2-yr, 24-hr
SD4205	ST4205	ST4204	COFFEE_CR3	27	4	540	137.95	137.5	0.09	0.035	288.8	347.5	376.1	466.2	100-yr, 24-hr	414.9	469.4	461.7	446.9	2-yr, 24-hr
SD4207	ST4206	ST4205	S_COFFEE_CR7	12	2	400	141.67	138.0	0.99	0.035	55.0	66.5	69.7	97.9	10-yr, 24-hr	73.2	94.5	98.2	82.1	2-yr, 24-hr
SD4208	ST4207	ST4206	CIRCULAR	3.5	-	41.4	142.21	141.7	1.30	0.024	15.1	20.0	23.6	26.7	25-yr, 24-hr	16.0	23.9	24.6	24.9	10-yr, 24-hr
SD4209	ST4208	ST4207	CIRCULAR	3.5	-	233.4	142.32	142.2	0.05	0.024	15.4	20.4	23.3	26.5	25-yr, 24-hr	16.4	23.2	24.3	24.8	10-yr, 24-hr
SD4210	ST4209	ST4208	CIRCULAR	2.25	-	65.9	142.77	142.3	0.64	0.013	15.4	20.6	23.1	25.8	100-yr, 24-hr	16.6	22.4	24.1	25.1	25-yr, 24-hr
SD4211	ST4210	ST4209	CIRCULAR	2.25	-	319.3	144.47	142.8	0.50	0.013	15.5	20.6	23.1	25.5	100-yr, 24-hr	16.6	22.5	24.1	25.3	25-yr, 24-hr
SD4212	ST4211	ST4210	CIRCULAR	2.25	-	204	145.39	144.5	0.40	0.013	15.5	20.6	23.1	27.7	100-yr, 24-hr	16.8	22.5	23.6	26.7	25-yr, 24-hr
SD4213	ST4212	ST4211	CIRCULAR	2	-	290	147.56	145.4	0.65	0.013	15.5	20.6	23.1	26.1	NF	16.9	22.5	23.7	26.1	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4214	ST4213	ST4212	CIRCULAR	2	-	57	148.95	147.6	1.91	0.013	15.5	20.6	23.1	26.3	100-yr, 24-hr	16.9	22.5	26.7	26.5	25-yr, 24-hr
SD4215	ST4214	ST4213	CIRCULAR	2	-	103.6	149.03	149.0	0.08	0.013	15.5	20.6	23.1	25.9	25-yr, 24-hr	16.9	22.5	25.5	26.9	10-yr, 24-hr
SD4216	ST4215	ST4214	CIRCULAR	2	-	317	151.3	149.0	0.72	0.013	10.5	13.6	14.9	17.9	100-yr, 24-hr	11.4	14.6	17.1	17.1	25-yr, 24-hr
SD4217	ST4216	ST4215	CIRCULAR	2	-	349.1	155.45	151.3	1.16	0.013	10.5	13.6	15.0	20.0	100-yr, 24-hr	11.3	14.6	20.1	20.0	25-yr, 24-hr
SD4218	ST4217	ST4216	CIRCULAR	2	-	265.9	159.75	155.5	1.47	0.011	5.7	6.4	8.0	16.1	100-yr, 24-hr	6.1	7.4	14.0	14.0	100-yr, 24-hr
SD4219	ST4218	ST4217	CIRCULAR	2	-	288.1	163.05	159.8	1.11	0.011	5.7	6.4	6.8	11.5	NF	6.1	6.8	8.4	10.6	NF
SD4220	ST4219	ST4218	CIRCULAR	1.5	-	39.1	164.14	163.1	1.38	0.011	5.7	6.4	6.7	8.3	NF	6.1	6.8	7.6	11.1	NF
SD4221	ST4220	ST4219	CIRCULAR	2	-	355	164.8	164.1	0.14	0.013	5.7	6.4	6.7	8.0	NF	6.1	6.8	7.6	9.3	100-yr, 24-hr
SD4222	ST4221	ST4220	CIRCULAR	2	-	355.8	165.89	164.8	0.29	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	11.4	100-yr, 24-hr
SD6207	ST4223	ST6205	CIRCULAR	4	-	82.2	138.64	135.0	0.18	0.013	33.7	54.1	60.3	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4224	ST4224	ST4223	CIRCULAR	4	-	371.1	139.59	138.6	0.20	0.013	33.7	54.1	60.4	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4225	ST4225	ST4224	CIRCULAR	4	-	365	140.31	139.6	0.20	0.013	33.7	54.2	60.4	65.3	NF	35.1	56.4	62.2	66.9	NF
SD4226	ST4226	ST4225	CIRCULAR	4	-	398.1	141.53	140.3	0.30	0.013	30.5	49.3	54.6	58.4	NF	31.3	50.5	55.2	58.8	NF
SD4227	ST4227	ST4226	CIRCULAR	3	-	361	143.64	141.5	0.58	0.013	15.8	24.8	29.9	34.6	NF	16.5	26.3	30.8	35.1	NF
SD4228	ST4228	ST4227	CIRCULAR	3	-	268.4	145.19	143.6	0.57	0.013	15.8	24.8	30.5	34.8	NF	16.5	26.3	31.4	35.1	NF
SD4229	ST4229	ST4228	CIRCULAR	3	-	68.6	145.77	145.2	0.85	0.024	2.2	3.5	4.4	5.1	NF	2.2	3.6	4.5	5.3	NF
SD4230	ST4230	ST4229	CIRCULAR	2.5	-	244	147	145.8	0.45	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.3	NF
SD4231	ST4231	ST4230	CIRCULAR	2.5	-	246.4	147.7	147.0	0.28	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.5	NF
SD4232	ST4232	ST4228	CIRCULAR	2.5	-	173.8	146.98	145.2	0.60	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4233	ST4233	ST4232	CIRCULAR	1.75	-	471.6	151.25	147.0	0.76	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4234	ST4234	ST4233	CIRCULAR	1.5	-	426	159.45	151.3	1.88	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4235	ST4235	ST4234	CIRCULAR	1.5	-	27.5	164.24	159.5	1.49	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4236	ST4236	ST4235	CIRCULAR	1.5	-	110.9	166.85	164.2	2.21	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD4241	ST4241	ST4242	CIRCULAR	2.5	-	80.5	143.45	142.1	1.74	0.013	0.6	0.7	0.9	1.3	NF	0.6	0.7	0.9	1.3	NF
SD4242	ST4242	ST4202	CIRCULAR	2.5	-	564	142.05	137.0	0.90	0.013	0.6	0.7	0.9	4.0	NF	0.6	3.1	2.7	1.3	NF
SD6413	ST4400	ST6413	CIRCULAR	4	-	100	161.45	159.5	2.00	0.013	52.4	71.8	80.9	92.7	NF	53.9	74.2	82.4	94.3	NF
SD4400	ST4401	ST4400	ARROWHEAD_CR2	28	6	400	163.45	161.5	0.50	0.035	32.7	47.0	55.5	65.6	NF	32.8	47.1	55.7	65.9	NF
SD4401	ST4402	ST4401	ARROWHEAD_CR	32	4	800	169.67	163.5	0.78	0.035	33.2	47.8	56.3	75.3	NF	33.2	47.8	56.5	76.0	NF
SD4402	ST4403	ST4402	ARROWHEAD_CR	32	4	100	170.45	169.7	0.78	0.035	25.4	35.8	42.1	58.0	NF	25.5	35.9	42.5	58.5	NF
SD4403	ST4404	ST4402	CIRCULAR	1.25	-	355	178.69	169.7	2.23	0.013	1.7	3.1	3.9	5.2	NF	1.7	3.1	3.9	5.2	NF
SD4500	ST4500	ST4204	CIRCULAR	2	-	421	143.57	137.5	1.44	0.013	8.1	13.0	15.9	21.2	NF	9.9	16.6	20.4	24.1	100-yr, 24-hr
SD4501	ST4501	ST4500	CIRCULAR	2	-	561	149.45	143.6	0.99	0.013	8.1	13.0	16.0	20.7	NF	9.9	15.6	18.9	24.4	NF
SD4502	ST4502	ST4501	CIRCULAR	1.5	-	473.6	167.3	149.5	2.81	0.013	4.4	7.6	9.5	12.5	NF	4.5	7.7	9.6	12.9	NF
SD4503	ST4503	ST4001	SEALY_CR	58	2	400	146.55	139.0	1.90	0.035	33.9	53.4	65.1	82.2	100-yr, 24-hr	63.2	94.0	110.8	133.4	25-yr, 24-hr
SD4600	ST4601	ST4600	CIRCULAR	2	-	57.2	195.67	190.2	0.49	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.3	4.7	5.8	NF
SD4601	ST4602	ST4601	CIRCULAR	2	-	101.1	195.67	195.7	0.01	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.1	4.7	5.8	NF
SD4602	ST4603	ST4602	CIRCULAR	2	-	135	195.87	195.7	0.15	0.013	3.0	4.3	4.6	5.8	NF	3.0	4.2	4.7	5.8	NF
SD4603	ST4604	ST4603	CIRCULAR	2	-	265.6	197.91	195.9	0.29	0.011	3.0	4.6	5.0	5.8	NF	3.0	4.5	5.0	5.8	NF
SD4604	ST4605	ST4604	CIRCULAR	2	-	165.8	198.78	197.9	0.40	0.011	3.0	4.5	5.3	6.1	NF	3.0	4.5	5.3	6.0	NF
SD4605	ST4606	ST4605	CIRCULAR	2	-	352.4	200.59	198.8	0.43	0.011	3.0	4.5	5.3	6.6	NF	3.0	4.5	5.3	6.6	NF
SD4606	ST4607	ST4606	CIRCULAR	1.5	-	58.5	201.4	200.6	1.04	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4607	ST4608	ST4607	CIRCULAR	1.5	-	186.5	202.57	201.4	0.41	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4612	ST4609	ST4614	CIRCULAR	2.5	-	36	196.32	196.0	0.28	0.01	7.1	8.3	8.5	11.2	NF	7.1	8.2	8.5	11.2	NF
SD4609	ST4610	ST4609	CIRCULAR	2.5	-	86	196.84	196.3	0.08	0.011	6.6	7.8	8.1	10.5	NF	6.6	7.8	8.0	10.5	NF
SD4610	ST4611	ST4610	CIRCULAR	2.5	-	125	197.42	196.8	0.16	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4611	ST4612	ST4611	CIRCULAR	2.5	-	102	198.17	197.4	0.34	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4613	ST4613	ST4609	CIRCULAR	1.5	-	42	197.53	196.3	0.50	0.01	0.5	0.6	0.6	0.8	NF	0.5	0.6	0.6	0.8	NF
SD4608	ST4614	ST4600	CIRCULAR	3	-	36	195.97	190.2	0.92	0.011	15.0	20.3	23.1	28.9	NF	15.5	20.8	24.0	29.7	NF
SD4614	ST4615	ST4600	CIRCULAR	2.5	-	103.5	195.7	190.2	0.38	0.013	5.8	8.1	9.5	12.6	NF	5.8	8.0	9.5	12.7	NF
SD4615	ST4616	ST4615	CIRCULAR	2.5	-	58.3	196.06	195.7	0.27	0.013	5.8	8.2	9.5	12.6	NF	5.8	8.1	9.5	12.8	NF
SD4616	ST4617	ST4616	CIRCULAR	2.5	-	151.3	196.68	196.1	0.28	0.013	5.8	8.5	9.5	12.6	NF	5.8	8.4	9.5	12.7	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4617	ST4618	ST4617	CIRCULAR	2.5	-	191.5	197.23	196.7	0.18	0.013	4.3	6.4	7.1	9.2	NF	4.3	6.4	7.0	9.2	NF
SD4618	ST4619	ST4618	CIRCULAR	2	-	134.6	198.35	197.2	0.68	0.011	1.4	2.2	2.5	3.2	NF	1.4	2.2	2.5	3.3	NF
SD4619	ST4620	ST4619	CIRCULAR	1.5	-	355.3	199.97	198.4	0.40	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.7	3.3	NF
SD4620	ST4621	ST4620	CIRCULAR	1.5	-	142	200.83	200.0	0.46	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4621	ST4622	ST4621	CIRCULAR	1.5	-	94.8	201.43	200.8	0.42	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4622	ST4623	ST4622	CIRCULAR	1.5	-	106.3	202.53	201.4	0.85	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4623	ST4624	ST4618	CIRCULAR	2	-	52.2	197.64	197.2	0.40	0.011	3.0	4.4	5.1	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4624	ST4625	ST4624	CIRCULAR	2	-	47.6	198.06	197.6	0.46	0.011	3.0	4.4	5.2	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4625	ST4626	ST4625	CIRCULAR	2	-	69.4	198.46	198.1	0.29	0.011	3.0	4.4	5.3	6.1	NF	3.0	4.4	5.2	6.2	NF
SD4626	ST4627	ST4626	CIRCULAR	2	-	58.4	198.89	198.5	0.39	0.011	3.0	4.4	5.3	6.2	NF	3.0	4.4	5.3	6.2	NF
SD4627	ST4628	ST4627	CIRCULAR	2	-	118.1	199.56	198.9	0.40	0.011	3.0	4.4	5.3	6.3	NF	3.0	4.4	5.3	6.3	NF
SD4628	ST4629	ST4628	CIRCULAR	1.5	-	44.5	200.15	199.6	0.88	0.011	3.0	4.4	5.3	6.5	NF	3.0	4.4	5.3	6.5	NF
SD4629	ST4630	ST4629	CIRCULAR	1.5	-	104.2	200.85	200.2	0.48	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4630	ST4631	ST4630	CIRCULAR	1.5	-	95.2	201.33	200.9	0.29	0.011	3.0	4.5	5.3	6.5	NF	3.0	4.5	5.3	6.5	NF
SD4641	ST4633	ST4634	CIRCULAR	2.5	-	18.1	190.22	190.2	0.39	0.013	10.4	18.4	24.7	35.2	NF	10.5	18.9	25.5	36.5	NF
SD4633	ST4634	ST4635	CIRCULAR	2.5	-	100.3	190.15	189.3	0.54	0.013	10.4	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4634	ST4635	ST4636	CIRCULAR	2.5	-	259.5	189.31	187.4	0.62	0.013	10.7	18.4	24.7	35.2	NF	11.6	18.9	25.5	36.5	NF
SD4635	ST4636	ST4637	CIRCULAR	3	-	262.3	187.4	189.4	-0.76	0.013	10.5	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4637	ST4638	ST4639	CIRCULAR	2.5	-	85.7	189.38	188.4	1.10	0.013	9.6	17.1	18.4	19.8	NF	9.7	17.3	18.5	19.9	NF
SD4638	ST4639	ST4403	ARROWHEAD_CR	32	4	1200	188.44	170.5	1.50	0.035	12.5	20.1	23.3	27.8	NF	12.5	20.4	23.6	28.0	NF
SD4640	ST4640	O-SDDI	CIRCULAR	3	-	3151.9	189.38	168.1	0.68	0.013	0.9	1.3	6.1	15.2	NF	0.9	1.6	6.8	16.3	NF
3594	ST4656	ST4767	CIRCULAR	2.5	-	67.9	200.74	197.9	3.89	0.013	7.9	12.3	15.1	18.5	NF	8.3	12.9	16.0	19.3	NF
SD4654	ST4767	ST4614	CIRCULAR	2.5	-	59	197.9	196.0	3.27	0.013	7.9	12.3	14.9	18.4	NF	8.3	12.9	15.8	19.1	NF
949	ST4768	ST4656	CIRCULAR	2.5	-	55.2	201.23	200.7	0.62	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
950	ST4802	ST4768	CIRCULAR	2.5	-	109.6	202.54	201.2	1.01	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4741	ST4803	ST4802	CIRCULAR	2.5	-	129.9	203.75	202.5	0.39	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4830	ST4804	ST4803	CIRCULAR	2.5	-	268.2	205.38	203.8	0.53	0.013	6.2	9.8	11.8	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4742	ST4805	ST4804	CIRCULAR	2.5	-	149.4	206.36	205.4	0.52	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4789	ST4806	ST4805	CIRCULAR	2.5	-	116.6	207.03	206.4	0.40	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.6	NF
SD4790	ST4828	ST4806	CIRCULAR	2	-	335.2	208.63	207.0	0.42	0.013	3.0	4.8	5.9	7.4	NF	3.5	5.4	6.5	8.1	NF
SD4752	ST4829	ST4828	CIRCULAR	2	-	335.2	211.99	208.6	1.00	0.013	3.0	4.9	5.9	7.4	NF	3.5	5.5	6.6	8.1	NF
SD5000	ST5000	ST5209	CIRCULAR	1	-	56	108.6	90.9	32.36	0.024	11.4	14.0	14.6	15.3	2-yr, 24-hr	11.4	14.0	14.6	15.3	2-yr, 24-hr
SD5001	ST5001	ST5000	CIRCULAR	1.25	-	120	124.12	108.6	12.89	0.024	11.4	14.3	14.7	15.3	10-yr, 24-hr	11.5	14.4	14.7	15.3	10-yr, 24-hr
SD5002	ST5002	ST5001	CIRCULAR	2	-	113	138.96	124.1	14.63	0.024	11.4	17.8	19.5	20.2	10-yr, 24-hr	11.5	17.8	19.5	20.2	10-yr, 24-hr
SD5003	ST5003	ST5002	CIRCULAR	1.5	-	34	145.4	139.0	2.44	0.024	6.5	10.0	11.3	13.3	10-yr, 24-hr	6.5	10.0	11.3	13.3	10-yr, 24-hr
SD5004	ST5004	ST5003	CIRCULAR	1.5	-	154.8	158.38	145.4	8.41	0.011	6.5	9.9	11.7	14.9	NF	6.5	9.9	11.7	14.9	NF
SD5005	ST5005	ST5004	CIRCULAR	1.5	-	129	161.19	158.4	2.02	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5006	ST5006	ST5005	CIRCULAR	1.5	-	319.1	163.74	161.2	0.74	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5007	ST5007	ST5006	CIRCULAR	1.25	-	84.1	164.9	163.7	0.43	0.011	1.2	1.7	2.0	3.1	NF	1.2	1.7	2.0	3.0	NF
SD5008	ST5008	ST5007	CIRCULAR	1.25	-	82.4	165.39	164.9	0.59	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5009	ST5009	ST5008	CIRCULAR	1.25	-	100	165.88	165.4	0.49	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5010	ST5010	ST5009	CIRCULAR	1.25	-	100	166.39	165.9	0.51	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5011	ST5011	ST5010	CIRCULAR	1	-	100	166.89	166.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5012	ST5012	ST5011	CIRCULAR	1	-	100	167.39	166.9	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5013	ST5013	ST5012	CIRCULAR	1	-	100	167.89	167.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5014	ST5014	ST5013	CIRCULAR	1	-	70.5	168.05	167.9	0.23	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5015	ST5015	ST5014	CIRCULAR	1.5	-	292.7	169.56	168.1	0.43	0.011	1.2	1.7	2.0	3.5	NF	1.2	1.7	2.0	3.5	NF
SD5016	ST5016	ST5015	CIRCULAR	1.5	-	248.9	170.98	169.6	0.49	0.011	1.2	1.7	2.0	3.7	NF	1.2	1.7	2.0	3.7	NF
SD5017	ST5017	ST5016	CIRCULAR	1.5	-	132.4	171.76	171.0	0.44	0.011	1.2	1.7	2.0	3.6	NF	1.2	1.7	2.0	3.6	NF
SD5018	ST5017	ST5018	CIRCULAR	1.5	-	169.7	171.76	171.1	0.23	0.011	0.8	1.2	1.5	1.8	NF	0.8	1.2	1.5	1.8	NF
SD5019	ST5018	ST5019	CIRCULAR	1.5	-	167.1	171.09	170.0	0.45	0.011	0.8	1.2	1.5	2.0	NF	0.8	1.2	1.5	2.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5020	ST5019	ST5020	CIRCULAR	1.5	-	109.3	170	169.4	0.38	0.011	4.2	6.3	7.2	7.6	NF	4.2	6.3	7.2	7.6	NF
SD5021	ST5020	ST3448	CIRCULAR	1.5	-	87.6	169.38	168.7	0.59	0.011	4.2	6.3	7.1	7.6	NF	4.2	6.3	7.1	7.6	NF
SD5022	ST5021	ST5017	CIRCULAR	1.25	-	100	172.92	171.8	0.96	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5023	ST5022	ST5021	CIRCULAR	1.25	-	100	173.42	172.9	0.50	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5024	ST5023	ST5019	CIRCULAR	1.5	-	154.3	171.31	170.0	0.63	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5025	ST5024	ST5023	CIRCULAR	1.25	-	159.8	172.11	171.3	0.38	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5026	ST5025	ST5002	CIRCULAR	2	-	88	145.03	139.0	0.92	0.024	4.1	6.5	6.9	7.6	10-yr, 24-hr	4.1	6.5	6.9	7.6	10-yr, 24-hr
SD5027	ST5026	ST5025	CIRCULAR	2	-	181	146.43	145.0	0.66	0.024	4.1	6.8	8.7	9.0	25-yr, 24-hr	4.1	6.8	7.7	9.0	25-yr, 24-hr
SD5028	ST5027	ST5026	CIRCULAR	1.25	-	180	152.77	146.4	3.36	0.024	4.1	6.6	7.3	7.9	25-yr, 24-hr	4.1	6.6	7.1	7.9	25-yr, 24-hr
SD5029	ST5028	ST5027	CIRCULAR	1.25	-	97	157.4	152.8	4.53	0.024	4.1	6.7	7.3	8.3	25-yr, 24-hr	4.1	6.6	7.2	8.3	25-yr, 24-hr
SD5030	ST5029	ST5028	CIRCULAR	1.25	-	27	157.89	157.4	1.37	0.024	1.9	3.0	4.1	4.9	100-yr, 24-hr	1.9	3.0	4.0	4.8	100-yr, 24-hr
SD5031	ST5030	ST5029	CIRCULAR	1.25	-	38.1	159.14	157.9	1.60	0.011	1.9	3.9	4.0	4.8	100-yr, 24-hr	1.9	3.8	4.0	4.8	100-yr, 24-hr
SD5032	ST5031	ST5030	CIRCULAR	1.25	-	88.3	160.04	159.1	0.79	0.011	1.9	3.3	3.9	4.8	NF	1.9	3.3	3.9	4.7	NF
SD5033	ST5032	ST5031	CIRCULAR	1.25	-	47.8	160.69	160.0	0.94	0.011	1.9	2.9	4.1	4.7	NF	1.9	2.9	4.1	4.7	NF
SD5034	ST5033	ST5032	CIRCULAR	1.25	-	372.1	164.77	160.7	1.04	0.011	1.9	2.9	3.8	4.7	100-yr, 24-hr	1.9	2.9	3.7	4.7	100-yr, 24-hr
SD5035	ST5034	ST5002	CIRCULAR	1.25	-	372	152.22	139.0	2.00	0.024	0.9	1.5	2.6	3.0	25-yr, 24-hr	0.9	1.5	2.6	3.0	25-yr, 24-hr
SD5036	ST5035	ST5034	CIRCULAR	1.25	-	179	161.98	152.2	5.21	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5037	ST5036	ST5035	CIRCULAR	1.25	-	119	167.87	162.0	4.74	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5038	ST5037	ST5036	CIRCULAR	1.25	-	188	169.38	167.9	0.69	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5219	ST5038	POND_LIBRARY	CIRCULAR	4	-	190	143.45	140.8	1.11	0.013	38.9	59.9	71.1	88.2	NF	43.5	66.0	78.4	96.6	NF
SD5039	ST5039	ST5038	CIRCULAR	4	-	308.1	155.16	143.5	0.92	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.4	87.5	NF
SD5200	ST5200	ST5204	BOECKMAN_CR2	40	10	1200	78.85	71.7	0.60	0.035	199.1	271.7	306.4	352.8	NF	234.8	306.3	337.9	380.4	NF
SD5201	ST5201	ST5200	BOECKMAN_CR2	40	10	930	94.45	78.9	1.68	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.1	NF
SD5202	ST5202	ST5201	KOLBE_BRIDGE	55	11	70	92.45	94.5	-2.86	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.2	NF
SD5203	ST5203	ST5202	BOECKMAN_CR2	40	10	430	94.45	92.5	0.47	0.035	158.3	210.3	236.4	299.5	NF	194.6	256.6	297.1	299.3	NF
SD5205	ST5204	ST5205	MEMORIAL_PARK_BRI	88	20	55	71.7	71.7	0.02	0.035	198.5	271.3	305.9	351.5	NF	234.6	304.8	336.3	379.1	NF
SD5206	ST5205	05200	BOECKMAN_CR2	40	10	1500	71.69	63.5	0.55	0.035	198.3	271.1	305.7	350.9	NF	234.5	304.2	335.7	378.7	NF
SD5207	ST5206	ST5200	BOECKMAN_CR	37	9	500	83.65	78.9	0.96	0.035	40.9	57.6	64.5	69.5	NF	43.2	59.3	66.3	71.8	NF
SD5208	ST5207	ST5206	BOECKMAN_CR	37	9	150	85.1	83.7	0.97	0.035	24.7	38.1	45.0	49.8	NF	26.2	39.8	46.7	52.0	NF
SD5210	ST5208	ST5207	CIRCULAR	2	-	201	87.14	85.1	1.02	0.024	11.4	14.0	14.6	15.3	NF	11.4	14.0	14.6	15.3	NF
SD5211	ST5209	ST5208	CIRCULAR	1.5	-	50	90.89	87.1	6.65	0.024	11.4	14.0	14.6	15.3	NF	11.5	14.0	14.6	15.3	NF
SD5212	ST5210	ST5206	CIRCULAR	1.75	-	164.3	102.15	83.7	5.61	0.024	19.3	20.0	21.9	21.9	NF	19.8	20.2	21.7	21.8	NF
SD5213	ST5211	ST5210	CIRCULAR	1.75	-	125	109.15	102.2	5.61	0.024	19.3	20.1	20.8	21.0	NF	20.0	20.2	21.0	20.8	NF
SD5214	ST5212	ST5211	CIRCULAR	1.75	-	105.4	115.05	109.2	5.61	0.024	19.3	20.1	20.8	21.1	NF	20.0	20.2	20.8	20.8	NF
SD5215	ST5213	ST5212	CIRCULAR	1.75	-	123.2	121.95	115.1	5.61	0.024	19.3	20.2	20.7	21.4	NF	20.0	20.2	20.7	20.7	NF
SD5216	ST5214	ST5213	CIRCULAR	1.75	-	108.9	128.05	122.0	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.9	20.9	20.9	20.8	NF
SD5217	ST5215	ST5214	CIRCULAR	1.75	-	141.1	135.95	128.1	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.8	20.9	20.9	20.8	NF
SD5501	ST5500	05500	S_FORK_MERIDIAN_CR	22	4	282.7	71.45	63.5	2.83	0.035	20.7	34.1	42.2	54.1	NF	20.7	34.1	42.3	54.2	NF
SD5502	ST5501	ST5500	S_FORK_MERIDIAN_CR	22	4	1130	111.45	71.5	3.54	0.035	20.8	34.3	42.5	54.4	NF	20.8	34.3	42.5	54.4	NF
SD5701	ST5701	05701	CIRCULAR	1.25	-	79.1	84.07	72.0	15.48	0.024	5.5	9.2	10.9	12.8	NF	5.9	9.7	11.2	13.4	NF
SD5702	ST5702	ST5701	CIRCULAR	1.25	-	158	86.6	84.1	1.60	0.013	5.5	9.2	10.9	13.1	25-yr, 24-hr	5.9	9.8	11.2	13.3	25-yr, 24-hr
SD5703	ST5703	ST5702	CIRCULAR	1.25	-	126	89.82	86.6	2.40	0.013	5.5	9.2	10.9	12.9	100-yr, 24-hr	5.9	9.8	11.3	13.0	100-yr, 24-hr
SD5704	ST5704	ST5703	CIRCULAR	1	-	103	95.76	89.8	4.68	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.3	100-yr, 24-hr
SD5705	ST5705	ST5704	CIRCULAR	1.25	-	160	96.61	95.8	0.40	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.2	25-yr, 24-hr
SD5706	ST5706	ST5705	CIRCULAR	1.25	-	199.8	97.61	96.6	0.40	0.013	3.1	5.1	6.1	7.6	25-yr, 24-hr	3.3	5.4	7.0	7.9	25-yr, 24-hr
SD5719	ST5707	ST5719	CIRCULAR	3.5	-	260	100.45	99.0	0.56	0.013	18.4	24.0	25.9	28.7	25-yr, 24-hr	19.8	24.6	27.1	29.6	10-yr, 24-hr
SD5708	ST5708	ST5707	CIRCULAR	4	-	270	101.32	100.5	0.32	0.013	18.4	24.6	28.6	33.5	25-yr, 24-hr	19.9	25.1	31.0	35.0	10-yr, 24-hr
SD5709	ST5709	ST5708	CIRCULAR	3.5	-	165	102.47	101.3	0.70	0.013	18.4	26.5	29.9	37.5	10-yr, 24-hr	19.9	27.5	33.7	39.5	10-yr, 24-hr
SD5710	ST5710	ST5709	CIRCULAR	4	-	246	107.43	102.5	1.79	0.011	10.6	18.1	19.9	24.2	NF	10.6	15.7	20.0	23.7	NF
SD5711	ST5711	ST5710	CIRCULAR	4	-	224.6	121.09	107.4	6.00	0.011	10.6	17.4	19.9	22.4	NF	10.6	17.4	19.4	22.4	NF
SD5712	ST5712	ST5711	CIRCULAR	4	-	314	137.34	121.1	5.15	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5713	ST5713	ST5712	CIRCULAR	4	-	358.4	150.79	137.3	3.73	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF
SD5714	ST5714	O5702	CIRCULAR	1.25	-	67	88.49	62.5	44.03	0.024	18.4	22.5	24.4	26.5	100-yr, 24-hr	19.7	22.9	25.0	26.9	100-yr, 24-hr
SD5209	ST5715	ST5207	BOECKMAN_CR	37	9	267	90	85.1	0.92	0.035	9.4	17.4	21.8	22.9	NF	10.9	19.1	23.5	25.0	NF
SD5715	ST5716	ST5715	CIRCULAR	2.5	-	198	90.69	90.0	0.35	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.2	23.6	25.2	NF
SD5716	ST5717	ST5716	CIRCULAR	2.5	-	131	91.23	90.7	0.26	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.3	23.6	25.2	NF
SD5717	ST5718	ST5717	CIRCULAR	2.5	-	123	91.7	91.2	0.22	0.013	9.6	17.6	21.9	23.1	NF	11.0	19.3	23.6	25.2	NF
SD5707	ST5719	ST5714	CIRCULAR	1.75	-	108	99	88.5	10.99	0.024	18.4	22.5	24.4	26.6	10-yr, 24-hr	19.7	22.9	25.1	27.0	10-yr, 24-hr
SD6000	ST6000	O6000	CIRCULAR	2.5	-	466.3	117.95	60.5	11.84	0.013	29.7	43.8	51.2	60.3	NF	29.7	43.8	51.2	60.3	NF
SD6001	ST6001	ST6000	CIRCULAR	2.5	-	182.4	122.86	118.0	4.23	0.013	29.8	43.9	51.3	60.3	NF	29.8	43.9	51.3	60.3	NF
SD6002	ST6002	ST6001	CIRCULAR	2.5	-	632.1	135.95	122.9	1.54	0.013	23.1	31.7	36.0	41.9	NF	23.1	31.7	36.1	41.9	NF
SD6003	ST6003	ST6002	CIRCULAR	2.5	-	167.5	137.28	136.0	0.79	0.013	23.1	31.8	36.1	41.5	NF	23.1	31.8	36.2	41.5	NF
SD6004	ST6004	ST6003	CIRCULAR	2.5	-	196.6	138.85	137.3	0.80	0.013	18.8	25.8	28.3	32.2	NF	18.8	25.8	28.3	32.2	NF
SD6005	ST6005	ST6004	CIRCULAR	2.5	-	68	139.17	138.9	0.47	0.013	14.0	18.2	20.0	22.6	NF	14.0	18.2	20.0	22.6	NF
SD6006	ST6006	ST6005	CIRCULAR	1.5	-	297.9	141.48	139.2	0.87	0.013	14.0	18.1	20.0	22.6	10-yr, 24-hr	14.0	18.1	20.0	22.6	10-yr, 24-hr
SD6007	ST6007	ST6006	CIRCULAR	2	-	302	142.11	141.5	0.21	0.013	14.0	18.5	20.4	23.3	10-yr, 24-hr	14.0	18.5	20.4	23.3	10-yr, 24-hr
SD6008	ST6008	ST6007	CIRCULAR	2	-	79	142.55	142.1	0.30	0.013	3.7	6.7	6.8	6.9	10-yr, 24-hr	3.7	6.5	6.8	6.9	10-yr, 24-hr
SD6009	ST6009	ST6008	CIRCULAR	2	-	112	142.9	142.6	0.31	0.013	3.7	6.2	6.1	6.2	10-yr, 24-hr	3.7	6.2	6.2	6.2	10-yr, 24-hr
SD6010	ST6010	ST6009	CIRCULAR	1.5	-	197	143.59	142.9	0.30	0.013	3.7	5.6	5.3	5.3	10-yr, 24-hr	3.7	5.6	5.4	5.3	10-yr, 24-hr
SD6011	ST6011	ST6010	CIRCULAR	1.5	-	154	144.25	143.6	0.30	0.013	3.5	4.8	4.8	5.4	10-yr, 24-hr	3.8	4.8	4.8	5.2	10-yr, 24-hr
SD6012	ST6012	ST6011	CIRCULAR	1.5	-	79	144.69	144.3	0.30	0.013	3.6	5.5	6.3	6.0	10-yr, 24-hr	4.0	5.4	5.8	6.3	10-yr, 24-hr
SD6013	ST6013	ST6012	CIRCULAR	1.5	-	177	145.43	144.7	0.31	0.013	3.5	6.2	5.5	7.5	10-yr, 24-hr	3.7	5.3	6.9	6.9	10-yr, 24-hr
SD6014	ST6014	ST6004	CIRCULAR	1.75	-	303.3	141.45	138.9	0.82	0.013	4.9	7.7	8.7	9.7	NF	4.9	7.7	8.7	9.7	NF
SD6015	ST6015	ST6014	CIRCULAR	1.5	-	290	143.21	141.5	0.52	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6016	ST6016	ST6015	CIRCULAR	1.5	-	251	144.97	143.2	0.70	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6017	ST6017	ST6016	CIRCULAR	1.5	-	89	145.42	145.0	0.51	0.013	4.9	7.8	8.8	9.7	NF	4.9	7.8	8.8	9.7	NF
SD6018	ST6018	ST6017	CIRCULAR	1.5	-	60	145.99	145.4	0.95	0.013	4.9	7.8	8.8	9.7	100-yr, 24-hr	4.9	7.8	8.8	9.7	100-yr, 24-hr
SD6019	ST6019	ST6018	CIRCULAR	1.5	-	160	147.08	146.0	0.68	0.013	4.9	7.8	8.8	9.8	100-yr, 24-hr	4.9	7.8	8.8	9.8	100-yr, 24-hr
SD6020	ST6020	ST6019	CIRCULAR	1.5	-	177	147.97	147.1	0.50	0.013	4.9	7.8	8.8	10.0	100-yr, 24-hr	4.9	7.8	8.8	10.0	100-yr, 24-hr
SD6021	ST6021	ST6020	CIRCULAR	1.25	-	114	148.43	148.0	0.18	0.013	4.9	7.8	8.8	10.3	25-yr, 24-hr	4.9	7.8	8.8	10.3	25-yr, 24-hr
SD6022	ST6022	O6001	I5	16	2	300	108.45	73.5	11.75	0.035	26.3	39.3	45.8	54.5	NF	26.3	39.3	45.9	54.4	NF
SD6023	ST6023	ST6022	I5	16	2	80	111.36	108.5	3.64	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6024	ST6024	ST6023	CIRCULAR	3.5	-	50	120.41	111.4	18.40	0.013	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6025	ST6025	ST6024	I5	16	2	20	123.14	120.4	13.78	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6026	ST6026	ST6025	I5	16	2	700	132.99	123.1	1.41	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6027	ST6027	ST6026	CIRCULAR	3.5	-	33	133.08	133.0	0.27	0.013	19.3	28.5	32.0	38.0	NF	19.3	28.5	32.0	38.0	NF
SD6028	ST6028	ST6027	CIRCULAR	3.5	-	394	134.09	133.1	0.26	0.013	19.3	28.5	32.0	38.1	NF	19.3	28.5	32.0	38.0	NF
SD6029	ST6029	ST6028	CIRCULAR	3.5	-	394	135.08	134.1	0.25	0.013	19.3	28.6	32.1	38.1	NF	19.3	28.6	32.1	38.1	NF
SD6030	ST6030	ST6029	CIRCULAR	3.5	-	394	136.06	135.1	0.25	0.013	19.3	28.7	32.1	38.3	NF	19.3	28.7	32.2	38.2	NF
SD6031	ST6031	ST6030	CIRCULAR	3.5	-	394	137.05	136.1	0.25	0.013	19.4	28.7	32.1	38.4	NF	19.4	28.7	32.2	38.4	NF
SD6032	ST6032	ST6031	CIRCULAR	3.5	-	394	138.03	137.1	0.25	0.013	14.1	21.1	23.4	27.6	NF	14.1	21.1	23.1	27.5	NF
SD6033	ST6033	ST6032	CIRCULAR	3.5	-	246	138.62	138.0	0.24	0.013	14.1	21.1	23.5	27.7	NF	14.1	21.1	23.3	27.6	NF
SD6034	ST6034	ST6033	CIRCULAR	3.5	-	254.4	139.24	138.6	0.24	0.013	14.1	21.2	23.8	27.8	NF	14.1	21.2	23.4	27.6	NF
SD6035	ST6035	ST6034	CIRCULAR	3	-	131	139.88	139.2	0.49	0.013	14.1	21.2	24.1	27.9	NF	14.1	21.2	23.5	27.7	NF
SD6036	ST6036	ST6035	CIRCULAR	2.25	-	131	142.21	139.9	1.40	0.013	14.1	21.2	24.3	28.0	NF	14.1	21.2	23.6	27.8	NF
SD6200	ST6200	O6200	COFFEE_CR4	27	4	650	79.45	62.2	2.66	0.035	370.6	484.3	525.3	529.3	NF	427.5	479.5	515.4	633.0	NF
SD6201	ST6201	ST6200	COFFEE_CR4	27	4	420	88.45	79.5	2.14	0.035	370.7	484.3	525.4	529.3	NF	427.6	479.7	515.6	633.1	NF
SD6202	ST6202	ST6201	ARROWHEAD_CR2	28	6	850	125.45	88.5	4.36	0.035	60.8	86.5	97.5	111.9	NF	64.3	92.2	102.9	117.2	NF
SD6203	ST6203	ST6202	ARROWHEAD_CR2	28	6	900	143.45	125.5	2.00	0.035	61.2	86.7	97.5	111.9	NF	64.5	92.4	103.0	117.3	NF
SD6205	ST6204	ST6201	COFFEE_CR4	27	4	900	123.95	88.5	3.95	0.035	323.6	384.7	413.8	443.0	NF	347.4	399.3	437.7	479.8	NF
SD6206	ST6205	ST6204	COFFEE_CR4	27	4	1300	134.95	124.0	0.85	0.035	323.6	384.7	413.8	443.1	NF	347.5	399.3	437.7	479.8	NF
SD6400	ST6400	O6400	CIRCULAR	2.5	-	10	146.95	145.0	20.41	0.011	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD6401	ST6401	ST6400	CIRCULAR	2.5	-	109	148.55	147.0	0.59	0.013	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF
SD6402	ST6402	ST6401	CIRCULAR	2.5	-	229.6	149.5	148.6	0.25	0.013	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6403	ST6403	ST6402	CIRCULAR	2.5	-	217.4	150.99	149.5	0.46	0.011	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6404	ST6404	ST6403	CIRCULAR	2.5	-	207	151.76	151.0	0.33	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6405	ST6405	ST6404	CIRCULAR	2	-	75.4	152.6	151.8	0.85	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6406	ST6406	ST6405	CIRCULAR	2	-	89	153.47	152.6	0.98	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6407	ST6407	ST6406	CIRCULAR	2	-	172.2	155.78	153.5	1.34	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6408	ST6408	ST6407	CIRCULAR	1.5	-	109.3	158.01	155.8	1.47	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6409	ST6409	ST6408	CIRCULAR	1.5	-	45.3	158.66	158.0	1.35	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6410	ST6410	ST6409	CIRCULAR	1.25	-	219.7	161.47	158.7	1.17	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6411	ST6411	ST6410	CIRCULAR	1.25	-	346	164.48	161.5	0.81	0.011	2.6	4.3	5.2	6.6	NF	2.6	4.3	5.2	6.6	NF
SD6204	ST6412	ST6203	CIRCULAR	4	-	70	149.45	143.5	8.60	0.013	61.4	86.8	97.5	111.9	NF	64.6	92.5	103.0	117.3	NF
SD6414	ST6413	ST6414	ARROWHEAD_CR2	28	6	50	159.45	158.7	1.56	0.035	51.8	71.4	80.6	92.6	NF	53.1	73.8	82.6	94.2	NF
SD6415	ST6414	ST6415	CIRCULAR	3.5	-	100	158.67	157.1	1.56	0.024	51.2	71.3	80.0	92.6	NF	52.2	73.6	82.2	94.2	NF
SD6412	ST6415	ST6412	ARROWHEAD_CR2	28	6	490	157.1	149.5	1.56	0.035	50.9	71.2	80.0	92.6	NF	51.8	73.6	82.2	94.2	NF
SD6601	ST6601	O6600	CIRCULAR	1.5	-	37.1	100.63	97.1	9.58	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6602	ST6602	ST6601	CIRCULAR	1.5	-	53.4	114.29	100.6	26.04	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6603	ST6603	ST6602	CIRCULAR	1.5	-	149.2	129.78	114.3	10.30	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6604	ST6604	ST6603	CIRCULAR	1.75	-	233.4	139.31	129.8	4.00	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6605	ST6605	ST6604	CIRCULAR	1.75	-	178.1	147.4	139.3	4.43	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6606	ST6606	ST6605	CIRCULAR	0.83	-	144.2	150.98	147.4	2.35	0.013	4.2	5.3	5.9	6.8	10-yr, 24-hr	4.3	5.4	6.0	6.9	10-yr, 24-hr
SD6607	ST6607	ST6606	CIRCULAR	1	-	120.7	153.15	151.0	1.62	0.013	4.2	5.4	6.1	7.1	10-yr, 24-hr	4.3	5.5	6.3	7.3	10-yr, 24-hr
SD6608	ST6608	ST6607	CIRCULAR	1	-	245	156.07	153.2	1.10	0.013	4.2	5.7	6.4	7.6	10-yr, 24-hr	4.3	5.8	6.6	7.8	10-yr, 24-hr
SD6609	ST6609	ST6608	CIRCULAR	1	-	165.6	158.29	156.1	1.08	0.013	4.2	6.0	7.1	8.6	10-yr, 24-hr	4.3	6.2	7.3	8.8	10-yr, 24-hr
SD6610	ST6610	ST6609	CIRCULAR	1	-	77	159.64	158.3	1.40	0.013	4.2	6.4	7.7	9.6	10-yr, 24-hr	4.4	6.7	8.0	9.8	10-yr, 24-hr
SD6630	ST6618	ST6619	CIRCULAR	0.83	-	117.9	160.03	155.8	3.32	0.013	0.0	0.0	0.1	0.4	NF	0.0	0.0	0.2	1.9	NF
SD6632	ST6619	ST6606	CIRCULAR	0.83	-	348.8	155.79	151.0	1.35	0.013	0.0	1.1	1.2	1.5	NF	0.0	1.2	1.2	1.5	100-yr, 24-hr
SD6616	ST6653	ST6654	CIRCULAR	1.5	-	210.7	171.05	167.7	1.57	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6617	ST6654	ST6655	CIRCULAR	1.5	-	197	167.65	161.9	2.89	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6619	ST6655	STD6604	CIRCULAR	2	-	213.9	161.85	161.0	0.42	0.013	3.4	5.1	6.1	7.4	NF	3.4	5.2	6.2	7.6	NF
SD9000	ST9001	09000	CIRCULAR	3	-	74	100.78	100.6	0.24	0.024	34.8	51.9	62.5	71.6	NF	34.8	51.9	62.5	70.7	NF
SD9001	ST9002	ST9001	CIRCULAR	3.5	-	317	101.89	100.8	0.32	0.024	34.8	51.9	62.5	71.6	10-yr, 24-hr	34.8	51.9	62.5	70.7	10-yr, 24-hr
SD9002	ST9003	ST9002	CIRCULAR	3.5	-	504.5	109.78	101.9	1.54	0.024	35.2	55.0	65.2	72.1	25-yr, 24-hr	35.2	55.0	65.2	71.1	25-yr, 24-hr
SD9003	ST9004	ST9003	CIRCULAR	3	-	436.8	119.75	109.8	2.17	0.013	21.1	33.2	40.0	45.9	NF	21.1	33.2	40.0	46.4	NF
SD9004	ST9005	ST9004	CIRCULAR	3	-	498	126.25	119.8	1.29	0.013	21.1	33.2	40.4	45.9	NF	21.1	33.2	40.4	46.6	NF
SD9005	ST9006	ST9005	CIRCULAR	3	-	460	127.45	126.3	0.24	0.013	21.1	33.2	40.5	53.2	NF	21.1	33.2	40.5	53.4	100-yr, 24-hr
SD9006	ST9007	ST9006	CIRCULAR	3	-	402.2	139.5	127.5	2.97	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.9	NF
SD9007	ST9008	ST9007	CIRCULAR	3	-	283.7	141.13	139.5	0.57	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.7	NF
SD9008	ST9009	ST9008	CIRCULAR	3	-	86.3	141.35	141.1	0.26	0.013	14.6	22.7	27.3	31.7	NF	14.6	22.7	27.3	31.7	NF
SD9009	ST9010	ST9009	CIRCULAR	3	-	379.9	143.25	141.4	0.50	0.013	14.6	22.7	27.4	31.7	NF	14.6	22.7	27.4	31.7	NF
SD9010	ST9011	ST9010	CIRCULAR	3	-	432.6	144.96	143.3	0.40	0.013	14.6	22.8	27.5	31.9	NF	14.6	22.8	27.5	31.9	NF
SD9011	ST9012	ST9011	CIRCULAR	2	-	315	147.48	145.0	0.27	0.013	14.7	22.9	27.6	31.9	NF	14.7	22.9	27.6	31.9	NF
SD9012	ST9013	ST9012	CIRCULAR	2	-	332	148.38	147.5	0.27	0.013	14.7	22.9	27.6	31.9	100-yr, 24-hr	14.7	22.9	27.6	31.9	100-yr, 24-hr
SD9013	ST9014	09001	CIRCULAR	2.5	-	117	97.82	93.0	4.11	0.018	54.8	83.2	88.4	94.1	100-yr, 24-hr	54.8	83.2	88.1	94.2	100-yr, 24-hr
SD9014	ST9015	ST9014	CIRCULAR	3	-	217	100.35	97.8	0.76	0.011	40.2	62.1	64.8	70.3	25-yr, 24-hr	40.3	62.2	64.5	70.4	25-yr, 24-hr
SD9015	ST9016	ST9015	CIRCULAR	3	-	701.7	109.33	100.4	1.70	0.011	14.4	19.6	22.5	27.6	NF	14.5	19.7	22.3	27.6	NF
SD9016	ST9017	ST9016	CIRCULAR	3	-	311	113.58	109.3	0.31	0.011	14.5	19.6	21.2	24.0	NF	14.5	19.7	21.2	24.0	NF
SD9017	ST9018	ST9017	CIRCULAR	1.75	-	240	115.7	113.6	0.84	0.024	14.5	19.7	21.2	23.7	2-yr, 24-hr	14.5	19.7	21.2	23.7	2-yr, 24-hr
SD9060	ST9019	ST9018	CIRCULAR	1.75	-	121.7	116.62	115.7	0.67	0.024	14.8	20.0	21.5	24.5	2-yr, 24-hr	14.8	20.0	21.5	24.6	2-yr, 24-hr
SD9018	ST9020	ST9019	CIRCULAR	1.5	-	309	118.6	116.6	0.56	0.013	3.9	6.1	6.3	7.4	10-yr, 24-hr	3.8	6.2	6.4	7.5	10-yr, 24-hr
SD9019	ST9021	ST9020	CIRCULAR	1.25	-	395	130.67	118.6	2.99	0.013	2.9	5.3	5.6	6.5	10-yr, 24-hr	3.0	5.4	5.7	6.5	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD9020	ST9022	ST9021	CIRCULAR	1.25	-	351	140.33	130.7	2.72	0.013	2.9	4.9	6.2	8.0	25-yr, 24-hr	3.0	4.9	6.3	8.0	25-yr, 24-hr
SD9021	ST9023	ST9022	CIRCULAR	1.25	-	453.5	145.89	140.3	1.20	0.013	3.0	4.9	6.2	7.9	100-yr, 24-hr	3.0	4.9	6.3	7.9	100-yr, 24-hr
SD9022	ST9024	ST9015	CIRCULAR	3	-	159.4	103.27	100.4	1.51	0.011	27.0	43.2	46.6	50.3	25-yr, 24-hr	27.0	43.5	46.4	62.5	25-yr, 24-hr
SD9023	ST9025	ST9024	CIRCULAR	3	-	238.4	106.07	103.3	1.17	0.011	18.8	29.5	30.4	34.5	100-yr, 24-hr	18.8	29.7	32.9	45.9	100-yr, 24-hr
SD9024	ST9026	ST9025	CIRCULAR	2.5	-	175.8	110.34	106.1	2.39	0.011	18.9	29.2	30.2	34.5	100-yr, 24-hr	18.9	29.4	32.9	38.3	25-yr, 24-hr
SD9025	ST9027	ST9026	CIRCULAR	2.5	-	271.6	117.35	110.3	2.58	0.011	18.9	29.1	30.2	35.0	NF	18.9	29.1	32.8	34.8	NF
SD9026	ST9028	ST9027	CIRCULAR	2	-	142	121.35	117.4	2.75	0.024	14.7	21.9	23.1	25.7	100-yr, 24-hr	14.7	21.9	23.0	25.7	100-yr, 24-hr
SD9027	ST9029	ST9028	CIRCULAR	2	-	160	125.35	121.4	2.44	0.024	14.7	21.9	23.1	25.9	100-yr, 24-hr	14.7	21.9	23.0	25.8	100-yr, 24-hr
SD9028	ST9030	ST9029	CIRCULAR	2	-	258	131.45	125.4	2.33	0.024	14.7	21.9	23.1	26.5	10-yr, 24-hr	14.7	21.9	23.0	26.4	10-yr, 24-hr
SD9029	ST9031	ST9030	CIRCULAR	2.5	-	296	135.35	131.5	1.28	0.024	14.7	22.9	27.0	28.8	25-yr, 24-hr	14.7	22.9	26.9	28.8	25-yr, 24-hr
SD9030	ST9032	ST9014	CIRCULAR	3	-	263.3	102.61	97.8	1.49	0.011	15.4	22.3	25.1	27.5	100-yr, 24-hr	15.4	22.3	25.1	30.4	100-yr, 24-hr
SD9031	ST9033	ST9032	CIRCULAR	1.75	-	202.4	103.63	102.6	0.45	0.024	7.7	10.9	13.1	16.7	100-yr, 24-hr	7.7	10.9	13.1	17.2	100-yr, 24-hr
SD9032	ST9034	ST9033	CIRCULAR	1.75	-	306.4	105.2	103.6	0.48	0.024	7.7	10.9	13.1	13.6	25-yr, 24-hr	7.7	10.9	13.1	14.9	25-yr, 24-hr
SD9033	ST9035	ST9034	CIRCULAR	1.5	-	118.7	107.06	105.2	0.40	0.013	7.7	10.9	12.8	12.6	25-yr, 24-hr	7.7	10.9	12.8	12.7	10-yr, 24-hr
SD9034	ST9036	ST9035	CIRCULAR	1.5	-	276	108.14	107.1	0.39	0.013	7.7	10.9	12.1	12.5	10-yr, 24-hr	7.7	10.9	12.1	12.5	10-yr, 24-hr
SD9035	ST9037	ST9036	CIRCULAR	1.5	-	242	108.87	108.1	0.39	0.013	7.7	10.6	12.5	13.5	10-yr, 24-hr	7.7	10.6	12.5	13.5	10-yr, 24-hr
SD9036	ST9038	ST9037	CIRCULAR	1.25	-	212.2	109.62	108.9	0.22	0.013	7.7	11.2	13.5	14.7	2-yr, 24-hr	7.7	11.2	13.5	14.7	2-yr, 24-hr
SD9037	ST9039	ST9038	CIRCULAR	1.25	-	260.1	110.29	109.6	0.22	0.013	7.9	12.4	15.1	16.6	2-yr, 24-hr	7.9	12.4	15.1	16.6	2-yr, 24-hr
SD9058	ST9040	ST9041	CIRCULAR	2.5	-	203	111.71	108.3	1.51	0.013	15.5	24.9	29.8	37.0	NF	15.5	24.9	29.8	37.0	NF
SD9057	ST9041	ST9068	CIRCULAR	2.5	-	275	108.31	104.0	1.21	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9038	ST9042	ST9040	CIRCULAR	2	-	294.3	114.63	111.7	0.98	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9053	ST9043	ST9066	CIRCULAR	1.5	-	961	122.65	108.0	1.51	0.013	4.0	6.0	6.7	8.0	NF	4.0	6.1	6.8	8.1	NF
SD9045	ST9044	ST9042	CIRCULAR	2	-	250	116.13	114.6	0.60	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9054	ST9045	ST9044	CIRCULAR	1.5	-	249.8	117.91	116.1	0.51	0.013	3.0	4.9	6.1	7.5	NF	3.0	4.9	6.1	7.5	NF
SD9056	ST9046	ST9045	CIRCULAR	1.5	-	150	118.6	117.9	0.33	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9055	ST9047	ST9046	CIRCULAR	1.25	-	168.6	120.31	118.6	0.87	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9046	ST9048	ST9047	CIRCULAR	1.25	-	148.2	121.19	120.3	0.59	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9047	ST9049	ST9040	CIRCULAR	2.25	-	217.2	114.26	111.7	1.06	0.013	8.8	13.8	16.2	20.2	NF	8.8	13.8	16.2	20.2	NF
SD9048	ST9050	ST9049	CIRCULAR	2	-	200.7	115.86	114.3	0.80	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9049	ST9051	ST9050	CIRCULAR	2	-	118	116.69	115.9	0.70	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9050	ST9052	ST9051	CIRCULAR	1.75	-	208	118.6	116.7	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9044	ST9053	ST9052	CIRCULAR	1.75	-	143	119.74	118.6	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9051	ST9054	ST9053	CIRCULAR	1.75	-	157	120.84	119.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9040	ST9055	ST9054	CIRCULAR	1.75	-	180	121.74	120.8	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9043	ST9056	ST9055	CIRCULAR	1.5	-	125	122.87	121.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9041	ST9057	ST9056	CIRCULAR	1.5	-	150	123.62	122.9	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9042	ST9058	ST9057	CIRCULAR	1.5	-	150	124.37	123.6	0.50	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9039	ST9059	ST9058	CIRCULAR	1.25	-	135	125.5	124.4	0.65	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9059	ST9060	ST9061	CIRCULAR	1.25	-	248.8	129.87	124.3	2.25	0.013	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.2	NF
SD9052	ST9061	ST9043	CIRCULAR	1.25	-	65.9	124.27	122.7	2.26	0.024	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.1	NF
SD9061	ST9062	ST9063	CIRCULAR	1.5	-	265.8	97.57	95.7	0.70	0.011	4.2	7.5	8.1	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9067	ST9063	ST9069	CIRCULAR	1.5	-	128	95.65	94.8	0.75	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.1	NF
SD9062	ST9064	ST9062	CIRCULAR	1.5	-	138.1	99.06	97.6	1.08	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.5	11.0	NF
SD9063	ST9065	ST9064	CIRCULAR	1.25	-	98.2	99.89	99.1	0.54	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.6	11.0	NF
SD9064	ST9066	ST9067	CIRCULAR	2.5	-	205	107.95	103.8	2.00	0.013	10.7	16.2	18.8	21.7	NF	10.7	16.3	18.9	21.8	NF
SD9065	ST9067	09003	CIRCULAR	3	-	145	103.75	100.0	2.60	0.013	26.2	40.9	48.4	58.6	NF	26.2	40.9	48.5	58.7	NF
SD9066	ST9068	ST9067	CIRCULAR	3	-	10	103.95	103.8	2.00	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9068	ST9069	ST9070	CIRCULAR	1.5	-	110	94.81	92.8	1.44	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9069	ST9070	09002	CIRCULAR	1.5	-	30	92.83	92.9	-0.27	0.011	4.1	7.5	8.0	10.6	NF	4.4	7.8	8.5	11.0	NF
1207	STD3400	ST4221	CIRCULAR	1.5	-	290.7	169.61	165.9	1.11	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	9.7	NF
SD4592	TOOZE_POND	ST4503	CIRCULAR	2	-	264	147.24	146.6	0.26	0.013	3.6	5.8	7.0	8.7	NF	3.8	6.0	7.3	9.0	NF

Table B-3. Hydaulic Model Inputs and Results																				
Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions					
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
1323	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1	-	38	146.45	141.5	1.32	0.013	1.8	2.7	3.5	22.9	100-yr, 24-hr	1.8	2.7	3.5	22.9	100-yr, 24-hr
4826	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1.5	-	30	146.45	141.5	22.88	0.024	14.9	22.9	22.3	4.4	100-yr, 24-hr	14.9	22.9	22.3	4.4	100-yr, 24-hr

NF = No Flooding

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

WATERWAYS CONSULTING, INC.
Ecological Restoration Design ~ Civil Engineering ~ Natural Resource Management

TECHNICAL MEMORANDUM - FINAL UPDATED

To: Angela Wieland, Brown and Caldwell

From: Waterways Consulting, Inc.

Date: January 30, 2024

Re: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead Creeks, Newland, and Kruse Creeks

Introduction

Brown and Caldwell (BC) was hired by the City of Wilsonville (COW) to prepare an updated Stormwater Master Plan that will develop an integrated and long-term approach for managing stormwater in the city. Wilsonville is one of Oregon's fastest growing cities, and its rapid growth has necessitated updates to previous Stormwater Master Plans (URS, 2012) to reflect changes in land use and improvements to stormwater management practices.

As part of this process BC requested that Waterways Consulting, Inc. (Waterways) conduct geomorphic stream assessments of a subset of stream segments within and adjacent to the City of Wilsonville to inform the updated Stormwater Master Plan. The assessments are meant to improve the understanding of stream processes in the selected reaches and to identify infrastructure risks associated with changes in creek hydrology as the city develops. The assessment was conducted in two phases with an initial phase that included evaluations of portions of Boeckman, Meridian and Arrowhead Creeks. The second phase, conducted in Fall 2023, included evaluations of portions of Newland Creek and an unnamed tributary to the Willamette River, referred to as Kruse Creek in this report.

Boeckman, Meridian, Arrowhead creeks (tributary to Coffee Lake Creek), Newland, and Kruse Creeks are small tributaries of the Willamette River flowing in narrow canyons bordered by thick deposits of fine-grained sediment deposited by the Missoula Floods. These creeks flow in confined valleys with steep, landslide-prone valley walls. In some areas, residential development encroaches to the edge of the adjacent terraces[1], while in other areas, including the assessed portions of Arrowhead Creek, Newland Creek, and Kruse Creek, the adjacent land use is agricultural, rural residential, or industrial. Large portions of the watersheds upstream of the assessment reaches have, are in the process of, or will be converted from open space to suburban residential neighborhoods. These land use changes have, and will continue to have, the potential to impact the morphology of these streams as the channels respond to changes in flow, direct modifications, and changes in sediment supply. This assessment focuses on evaluating the current condition of the channels within the study reach, identifies any ongoing infrastructure concerns associated with past hydromodification impacts, and evaluates the susceptibility of the streams to future hydromodification impacts.

[1] This assessment focuses only on stream-based hazards and concerns and does not address landslide risks on the valley walls.

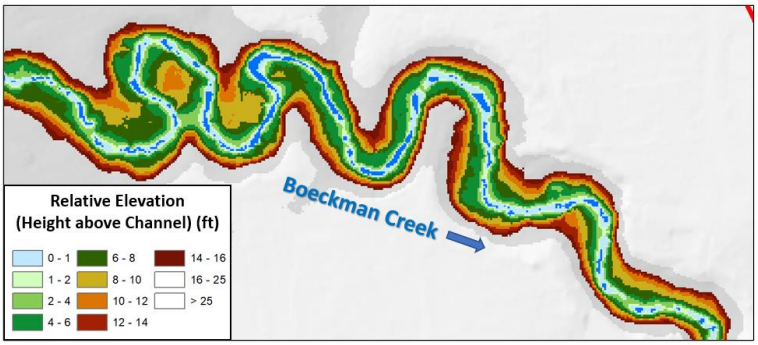
Approach

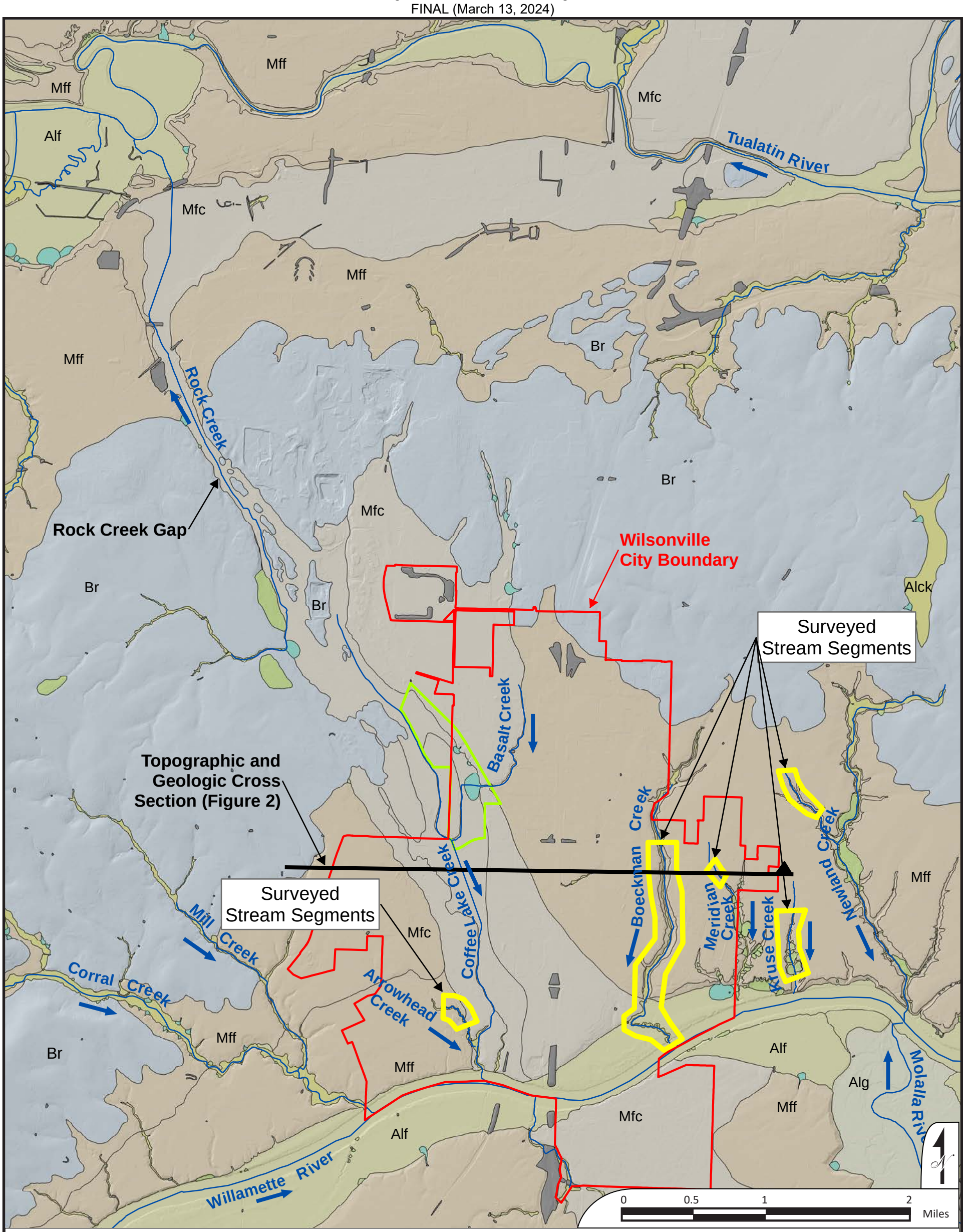
The purpose of the assessment is to understand and map the dominant geomorphic processes in the assessment reaches and identify any infrastructure-related issues that should be considered within the context of the updated Stormwater Master Plan. A key component of the assessment is the understanding that the reaches may be impacted by further hydromodification in the near future as a result of new upstream residential development or changes in other land use, such as agriculture or road development. Future efforts will include using the assessment information to identify potential Capital Improvement Projects (CIPs) or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The assessments consisted of reconnaissance-level field observations supported by desktop mapping and analysis. The field protocols involved an experienced geomorphologist walking a designated stream reach twice in one day, starting and ending at the same location. In the first pass, the geomorphologist traversed the channel by wading, mapping and collecting georeferenced photographs of individual point features of interest, such as beaver dams, bridges, culverts, exposed pipes, affected roads and trails, headcuts, bedrock outcrops, heavily eroding banks, etc. The locations of these point-scale features were recorded in a tabular format and later digitized (these point-scale observations are presented in the tables in **Appendix A** of this report). During the first pass, the geomorphologist subdivided the stream into mappable "subreaches," typically several hundreds to thousands of feet long, within which geomorphic conditions are relatively consistent and could be characterized. The second pass consisted of walking back through the reach and evaluating the subreaches' key geomorphic features, conditions, infrastructure risks, restoration opportunities, etc. The reach-scale observations were recorded in a matrix-based field form specifically developed for this project. Subreach summary tables for the surveyed reaches are provided later in this report.

The desktop component of this assessment included compilation and analysis of geospatial data, including infrastructure data, topographic data, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for each of the creeks within the assessment area. An REM is a topographic model created from a LiDAR elevation surface that shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream (e.g., **Figure 1**). The REMs for the creeks are provided as .tif files in a digital appendix to this report (**Appendix B**). In addition, as part of the desktop portion of the assessment Waterways created and analyzed topographic and geologic cross sections and stream longitudinal profiles and produced a set of field maps identifying streams and stormwater infrastructure identified during the field component. The field maps are provided as **Appendix C**.

Figure 1. *Example of Relative Elevation Model of Part of Lower Boeckman Creek*





Legend

City Limits

Stream Centerline

Coffee Lake Wetlands (City of Wilsonville)

Surficial Geology (from compilation by Ma et al., 2012)

- Af - Artificial Fill
- Alck - Creek Alluvium
- Alf - Fine Alluvium
- Alg - Coarse Alluvium
- Br - Columbia River Basalts
- Df - Debris Flow Fans
- Ls - Large Landslides
- Mfc - Missoula Flood Coarse Bedload Deposits
- Mff - Missoula Fine Flood Deposits

Ma, L., Madin, I.P., Duplantis, S., and K.J. Williams. 2012. LiDAR- Based Surficial Geologic Map and Database of the Greater Portland Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington. State of Oregon Department of Geology and Mineral Industries, Open File Report O-12-02.

Geologic and Geomorphic Setting Overview Map

Geomorphic Assessment of Wilsonville Creeks

WATERWAYS CONSULTING, INC.
Santa Cruz, CA | watways.com | Portland, OR

FIGURE 2

Geologic and Geomorphic Setting

Geomorphic processes in the creeks that dissect the Wilsonville area are influenced by their recent geologic history (**Figure 2**). Wilsonville sits on sedimentary deposits laid down by the Missoula Floods (Bretz, 1969), a series of dozens of gigantic floods that inundated the Willamette Valley between approximately 20,000 and 14,000 years ago (O'Connor et al., 2020). These cataclysmic floods originated from Glacial Lake Missoula in Montana and traveled down the Columbia River valley. A constriction downstream from Portland hydraulically impounded these flows, causing backwater flooding up the Willamette Valley. One of the main flow pathways for the Missoula Floods into the Willamette Valley was through a path that includes Lake Oswego and the "Rock Creek Gap" north of Wilsonville (O'Connor et al., 2001) (**Figure 3**). At these locations, huge flows moving south into the Willamette Valley were concentrated through narrow gaps in bedrock, forming underwater vortices powerful enough to carve deep channels ("scablands") and lakes ("kolks") in the resistant basalt bedrock in these locations.

The City of Wilsonville lies on an alluvial fan that formed in these floods where concentrated floodwater moving into the Willamette Valley spread out after moving through the Rock Creek Gap. The sudden widening downstream of the gap caused giant lobes of poorly sorted gravel and boulders to deposit along a pathway that bisects the City of Wilsonville (**Figure 2**). Drill logs from Canby and Wilsonville indicate that these coarse-grained, poorly sorted Missoula Flood deposits (labeled ***Mfc*** on **Figure 2**) range from 50 to 120 feet thick and are typically covered with 5-15 feet of sand and silt (Allison, 1978). In Wilsonville, the north-south oriented swath of ***Mfc*** is bounded on both sides by finer grained Missoula Flood deposits (***Mff*** in **Figure 2**). These sediments are thick, stratified silt and clay deposits that cover much of the lowland Willamette Valley floor. The finer-grained sediments (***Mff***) were laid down at a later phase in the Missoula Floods when the Willamette Valley was ponded as the main floods moved through the Columbia River.

Figure 4 is an east-west topographic and geologic profile through the main creeks of Wilsonville, passing through several of the reaches included in this assessment. The profile illustrates the differences between the parallel north-south creeks flowing through Wilsonville. Coffee Lake Creek, the largest creek in the city, flows in an "underfit" valley created by the Missoula Floods, and is underlain by coarse Missoula Flood sediments (***Mfc***). This geological setting explains why the Coffee Lake Creek valley is a wide, flat valley containing ecologically important wetlands, along with other unique geologic features of Wilsonville area, such as scablands and kolks, including the ecologically important Coffee Lake Wetlands as well as the 3.5-acre kolk pond at the Tonquin geologic area managed by Metro.

In contrast with Coffee Lake Creek, Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks carved deeper canyons in thick deposits of fine-grained Missoula Flood deposits (***Mff***) (**Figure 4**). Boeckman Creek is in a narrow canyon as much as 100 feet deep, with steep, unstable hillslopes prone to landslides. Boeckman, Meridian, Arrowhead, and Newland Creeks appear to have incised through the softer deposits to the point where their beds have encountered more consolidated clay deposits, or in the case of Arrowhead, where it reached the base level established by Coffee Lake Creek. Th presence of marginally resistant, consolidated clay in the streambed in some locations on all of these creeks provides a degree of base level stability. In some cases, including Boeckman and Arrowhead, the creeks appear to be no longer incising, especially in the lower reaches of these watersheds. Conversely, the headwater reaches assessed on Meridian and Newland Creek, appear to be experiencing incision despite exposures of more consolidated substrates. The morphology of the channel and valley on Kruse Creek is more dominated by the presence of valley-wide landslides and a high groundwater table.

Figure 3. *Pathway of Missoula Floods into the Willamette Valley through Wilsonville (modified from Minervini et al., 2003)*

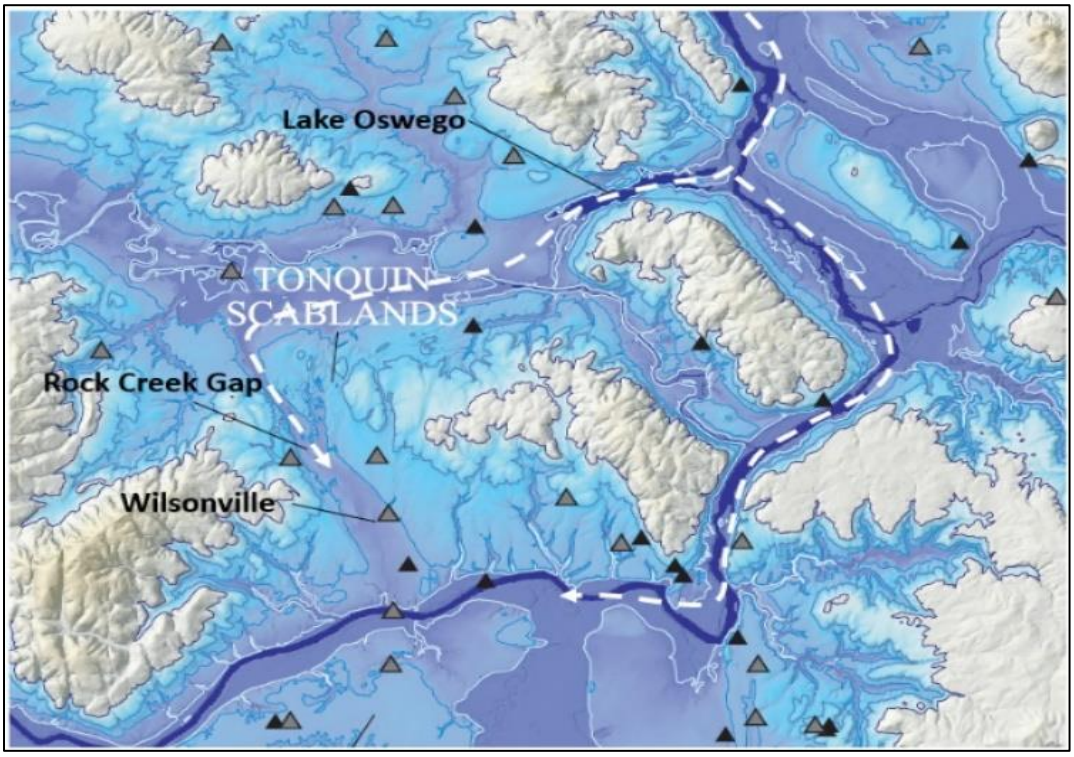
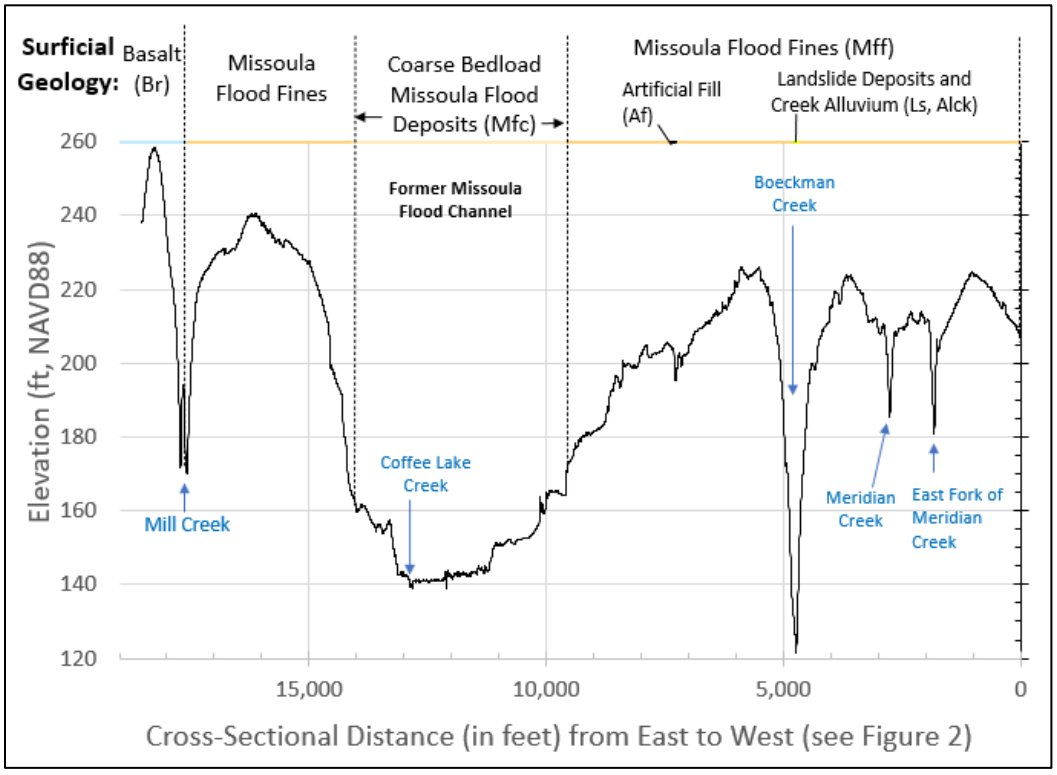


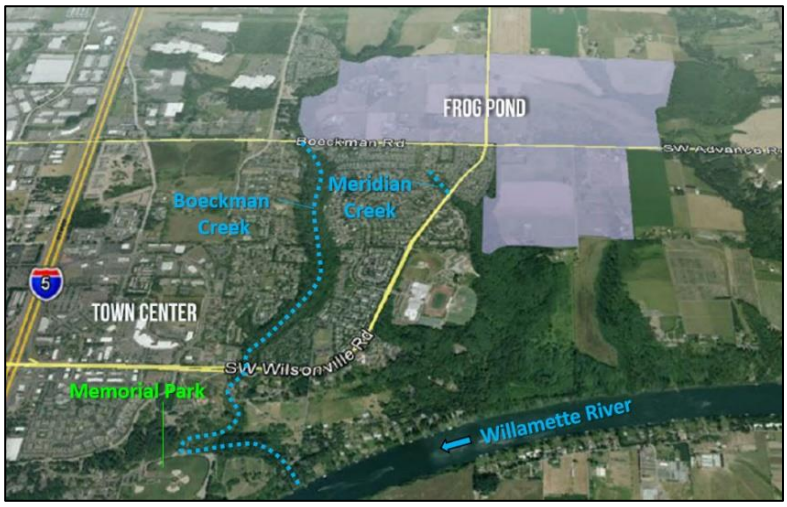
Figure 4. *Topographic and Geologic Cross Section Across the Wilsonville Area (See Fig. 2 for Profile Location)*



Human Impacts and Infrastructure

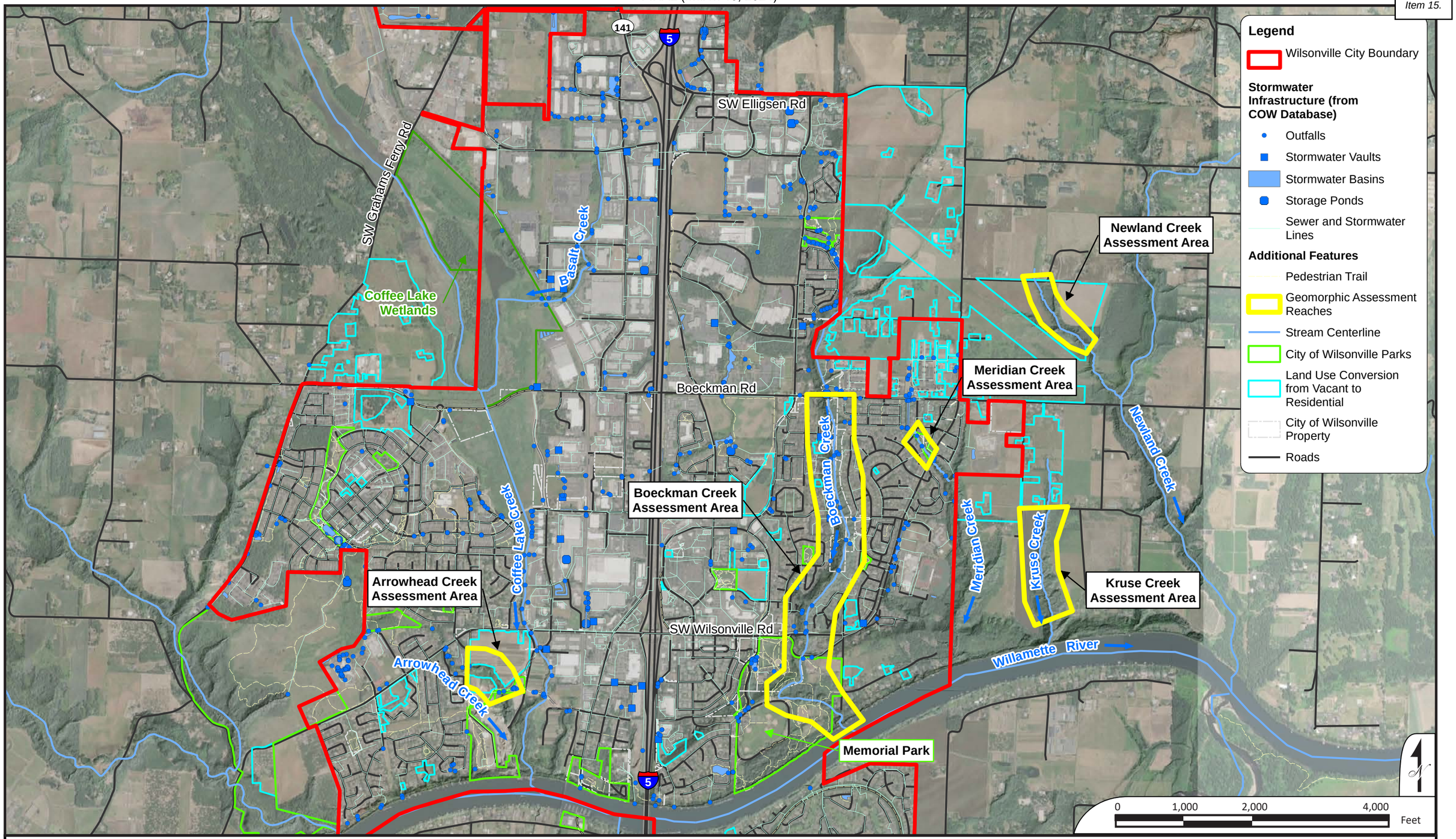
Most of the assessment reaches are adjacent to existing developed areas or are downstream of zones in the process of, or anticipated to be, converted from agricultural uses to residential developments (***Figure 5***). Hydromodification impacts in the assessment reaches are not limited to impacts associated with urban and residential development. Hydromodification impacts on these stream channels have been ongoing for over a century when the forested landscape was converted to agriculture, roads were built, culverts were installed, and fields were tile drained. These land use changes specifically intended to reduce water storage on the landscape while increasing the efficiency of runoff to adjacent waterbodies.

Figure 5. *Location of Phase 1 Assessment Reaches (dashed blue lines) relative to Existing and Planned Developed Areas (modified from APG. 2015)*



In the assessment reaches, Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks flow in incised canyons. Along Boeckman and Meridians Creeks, residences are built to the edges of the canyons and the streams flow in confined valleys 20 to 100 feet deep. Water enters the streams from paved areas through a complex network of stormwater pipes that discharge along the steep valley walls (***Figure 6***).

The assessment reaches in Boeckman and Meridian are downstream of recently developed areas within the Frog Pond Development Area, a 500-acre residential neighborhood under construction within the urban growth boundary (**Figure 5**). The Newland and Kruse Creek assessment reaches are located downstream of an undeveloped portion of the Frog Pond Development area located to the east of Wilsonville and Stafford Roads. The long-planned development will include residences, schools, parks, transit, and trails, including a new regional trail following Boeckman Creek along the assessment reach (APG, 2015). To mitigate for potential hydromodification impacts from the existing and proposed portions of the Frog Pond Development area on the assessment reaches and other receiving streams, the developments are implementing Best Management Practices (BMP's) that are specifically designed to maintain the natural hydrology and limit the discharge of stormflow off of newly created impervious surfaces. Both "upland" and "in-stream" strategies for mitigating hydromodification risks have been adopted by the City and are being implemented within newly developed portions of Wilsonville, including the Frog Pond area (Brown and Caldwell, 2015). Those BMP's include infiltration and detention facilities, neighborhood-based Low Impact Development strategies, retrofitting existing stormwater detention basins, rehabilitating stormwater outfalls along the creek, culvert upgrades, and riparian vegetation improvements. The assessment reaches, especially along Newland and Kruse Creeks, provides an opportunity to establish a baseline of channel conditions prior to development occurring in the contributing watershed.



Human Impacts and Infrastrucure Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 6

Field Observations

The assessment included 5 days of field time to document conditions in priority reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks. These reaches were prioritized by the City of Wilsonville based on the importance of the streams, likelihood of hydromodification impacts, land access, and available budget. Additional reaches may be added to the assessment in the future.

The highest priority reach was the section of Boeckman Creek from Boeckman Road to the Willamette River, an along-stream distance of 12,200 feet (2.3 miles) (**Figure 7**). The second priority for the assessment was the 600-foot-long (0.1-mile) reach of Meridian Creek adjacent to Willow Creek/Landover Park (also shown in the top right corner of **Figure 7**). Sections of Basalt Creek and Arrowhead Creek were also identified as potential assessment reaches. Arrowhead was prioritized for the assessment over Basalt Creek due to the lack of landowner agreements along Basalt Creek.

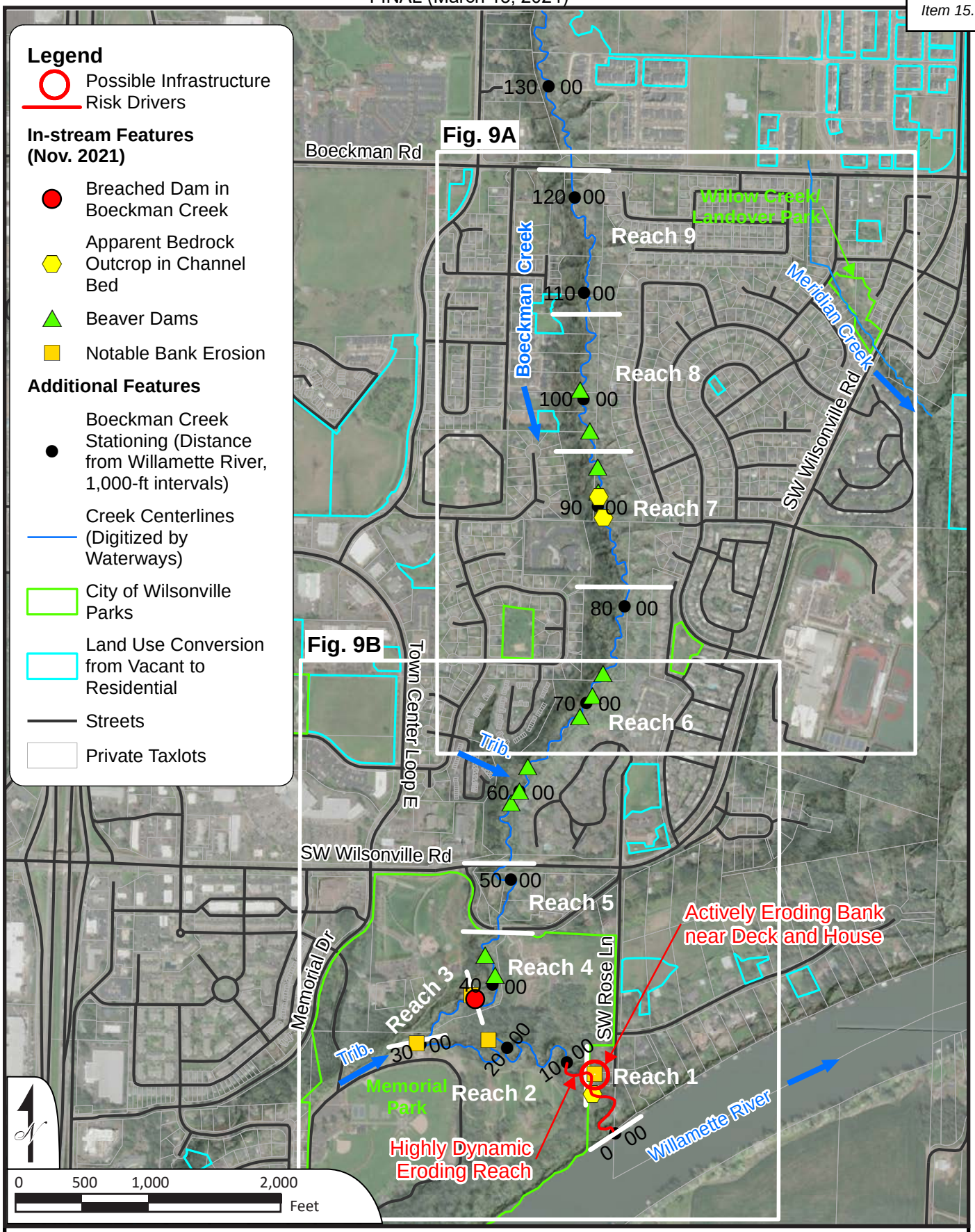
Approximately 1,000 feet (0.2 miles) was assessed on Arrowhead Creek. In Fall 2023, portions of Newland and Kruse Creeks that have the potential to be impacted by the Frog Pond Development or any additional eastward expansion of Wilsonville were also included in the assessment. Approximately 1,700 feet (0.3 miles) of Newland Creek and 2,200 feet (0.4 miles) of Kruse Creek was evaluated.

Boeckman Creek

The field assessment for Boeckman Creek occurred on November 19 and 24, 2021. The first day covered the lower reach within Memorial Park, from the private property boundary at Station 750 to Kolbe Lane (Sta. 4,500). The second day covered the reach from Wilsonville Road (Sta. 5,300) to Boeckman Road (Sta. 12,200). Two sections between the Willamette River and the private property boundary (Sta. 0 to 750) and between Kolbe Lane and Wilsonville Road (Sta. 4,500 to 5,300) were not accessed because those sections were on private property and Waterways did not have access permission. Permissions for the portion of private property located near the Willamette River were received in January 2022 and this section of channel (from Sta. 0 to 750) was assessed on January 25, 2022.

General Observations and Interpretations

- Specific point-scale observations of this section of Boeckman Creek are listed in **Appendix A1**.
- Boeckman Creek is confined within a narrow canyon bounded by steep valley walls prone to erosion and landsliding. At the bottom of the canyon, there is a meandering channel and a narrow, discontinuous floodplain covered by dense invasive species, especially Himalayan blackberry, reed canary grass, and English ivy. Very dense blackberry made for a difficult and slow traverse of the channel.
- Within the assessment reaches, Boeckman Creek has incised to a stable base level with a straight profile and relatively low gradient (about 0.6%), as illustrated in the longitudinal profile (**Figure 8**). The valley is graded to the Willamette River, and Boeckman Creek appears to no longer be actively incising, except in the most downstream reach at the confluence with the Willamette.
- The assessment area was subdivided into nine geomorphic sub-reaches ranging in length from 750 feet to 2,850 feet, within which geomorphic conditions and processes are relatively consistent. The subreaches are shown on the overview map (**Figures 7**), longitudinal profile (**Figure 8**), and detailed maps (**Figures 9a and 9b**). **Table 1** provides information and observations that characterize the geomorphic conditions and infrastructure features within each reach.



Boeckman Creek Geomorphic Survey Overview

Geomorphic Assessment of Wilsonville Creeks

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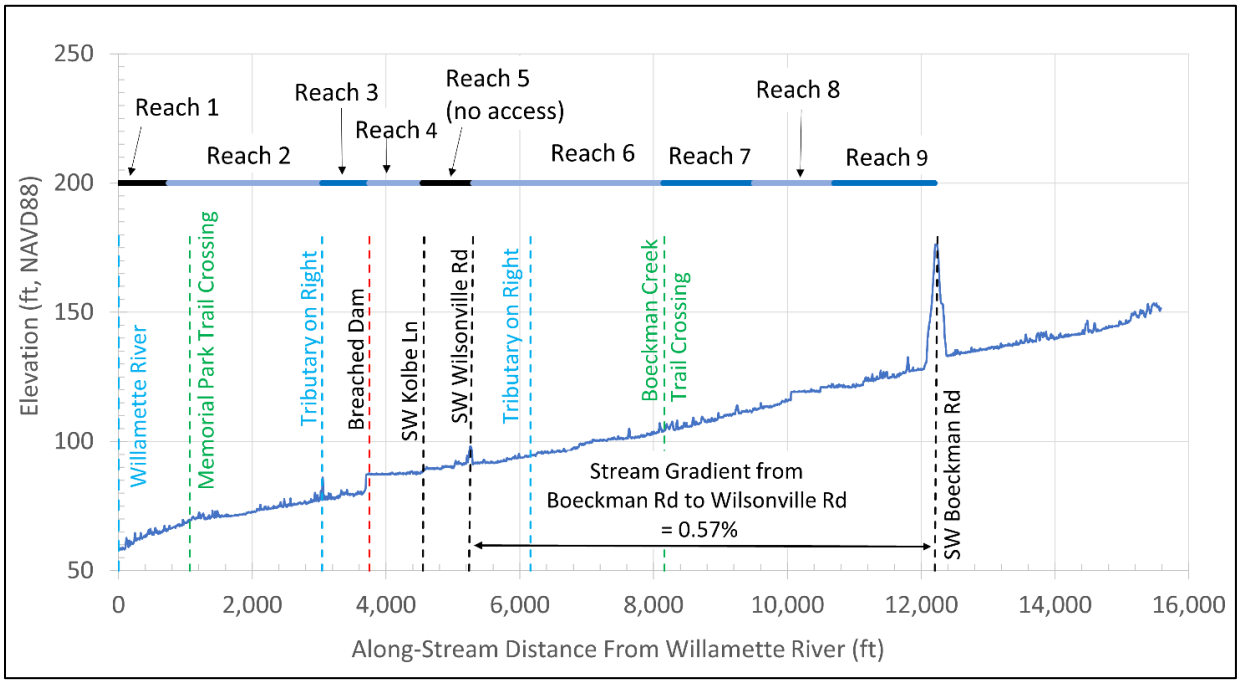
FIGURE 7

Figure 8. *Longitudinal Profile of Boeckman Creek (from 2014 LiDAR data)*



- Beaver are abundant throughout most of the assessment reaches and have a dominant impact on processes along Boeckman Creek. The most obvious impacts are from the channel-spanning dams that create a stairstep of flat water environments. Most of the grade control features shown on the field result map (**Figures 9a and 9b**) are beaver dams. The beaver dams range in height from about 1 foot to about 5 feet and pond long, continuous sections of the assessment area. The dams are actively maintained by beaver and most of them appear to be stable through typical floods in Boeckman Creek. Beaver are less prevalent or absent in the lower reaches of Boeckman Creek (Reaches 1 and 2), and are most abundant in the upper section (Reaches 6 through 9).
- The lack of stable beaver dams and seasonal variability in the backwater extent of the Willamette River along lower Boeckman Creek creates a highly dynamic condition with increased risk of erosion of the bed and banks. Dams throughout the Willamette River watershed, and the associated flow storage that those dams provide, results in a low stage in the Willamette River, relative to historic condition. Hydromodification impacts can potentially exacerbate channel instability by producing high flow events in early fall when the Willamette River is still low and the backwater influence is absent. This reach of Boeckman Creek is the most at-risk from hydrologic changes in the watershed.
- The breached former dam at Sta. 3,750 has an important reach-scale influence on the geomorphology in Boeckman Creek. Although the dam is breached, the remaining concrete and boulders are still present and provide a significant grade control feature, holding about 7 feet of grade (**Figure 8**). A wedge of fine sediment deposited upstream of the dam is covered with reed canary grass and extends as much as 800 feet upstream to the SW Kolbe Lane bridge.

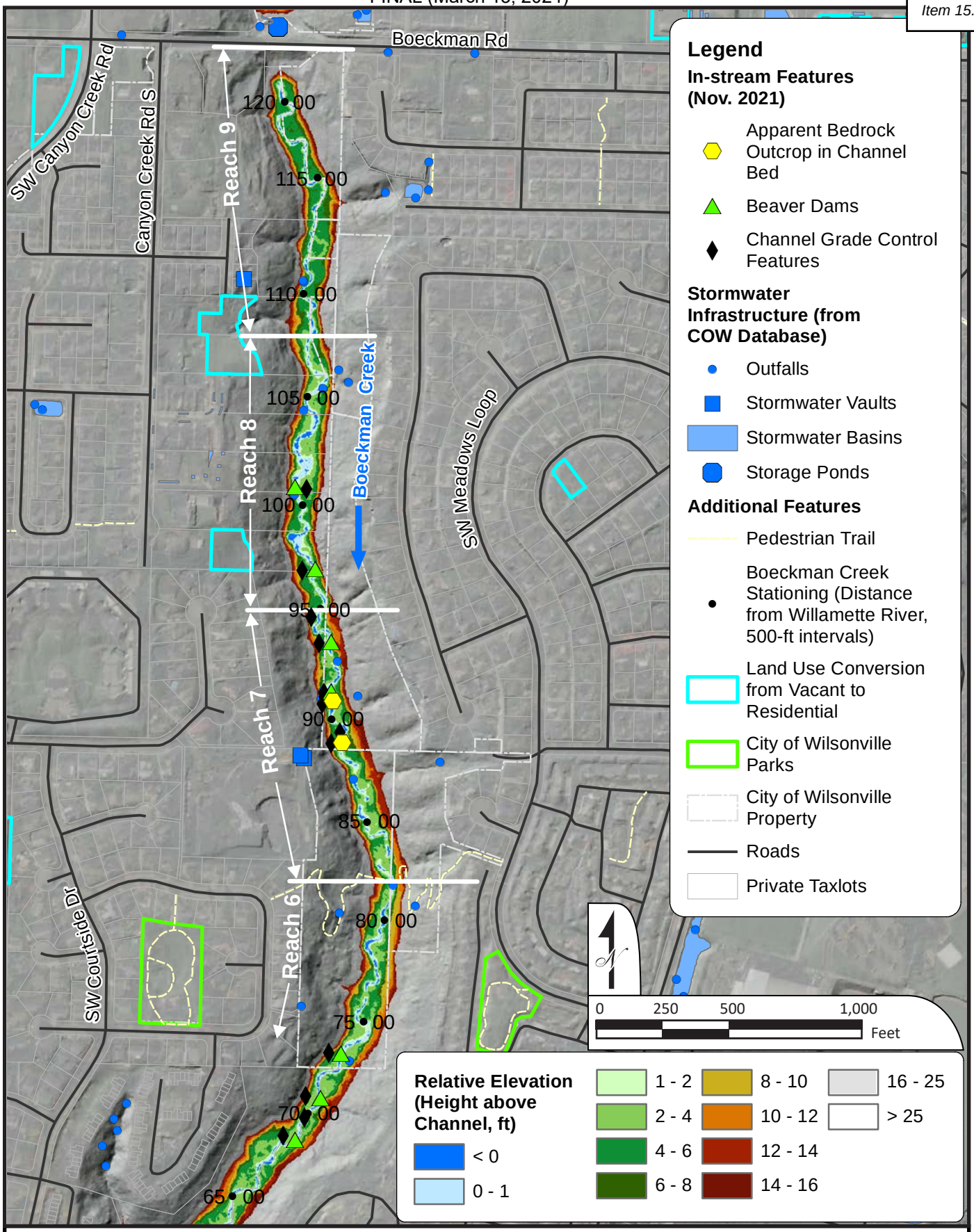
- There are at least three places where consolidated bedrock or other resistant material was observed within the channel bed in Boeckman Creek. These were noted by feel underfoot while wading. It was not possible to observe these resistant bed features due to the presence of turbid water about two to three feet deep at the time of the site visit.
- The presence of stable grade control – including resistant bed material, abundant stable beaver dams, fallen logs, boulders, and the 7-foot-high concrete and boulder grade control at the former dam – distributed throughout the project reach implies that much of Boeckman Creek cannot continue to incise. Collectively these features stabilize most of the channel bed, which is not susceptible to further incision due to hydromodification (**Figures 9a and 9b; Appendix A**).
- Waterways' geomorphologist also inspected the lower portions of two tributaries that enter Boeckman Creek from the west: one at Station 3,050 in Memorial Park, and one at Station 6,020 draining a residential area upstream of Wilsonville Road. Both tributaries appeared to be stable with no obvious infrastructure-related concerns:
    - The downstream tributary enters Boeckman Creek on river-right through a culvert under a road crossing in Memorial Park. The lower section of this tributary is deeply incised, low-gradient, gravel- and sand-bed stream in a dense blackberry thicket. Some bank erosion was observed along the steep banks but was not identified as an infrastructure concern. There is a partially clogged culvert on this tributary at a road crossing several hundred feet upstream of the confluence with Boeckman Creek. The clogged culvert backs water up to a footbridge in a grassy field in the park but does not appear to have any detrimental impacts. More descriptions are provided in **Appendix A1,** and photographs of this tributary can be found in the photo log (**Figure 10a**).
    - The upstream tributary drains the residential area along the west side of the creek north of Wilsonville Road. The tributary was only accessible at one location due to dense blackberry. At that location the channel bed was alluvial fine gravel and appeared stable.

Summary Conclusions from Boeckman Creek

- With the exception of Reach 1, the field reconnaissance did not identify any obvious concerns or infrastructure risk drivers related to geomorphology and hydromodification in the assessed portion of Boeckman Creek. No infrastructure appears at risk in the valley bottom. The stream in the assessment reach is laterally confined and vertically stable, and relatively little infrastructure is in the stream. Any increases to stormwater related to land use changes at the Frog Pond Development area are not expected to pose significant specific infrastructure risks. (*Note that the assessment area did not include the Boeckman Road crossing above the upstream extent of the assessment reach*).
- Within Reach 1, there is a risk of continued channel incision and bank erosion. Several properties have experienced bank failures and loss of land over the past several decades, and an active bank failure is impacting the backyard and deck of one of the properties. This study does not make any findings regarding the cause(s) and extent of bank failure in Reach 1. Further investigation of the bank failure should be conducted by a geotechnical engineer to determine if the source is associated with fill placed behind a now failed retaining wall, or if there is a larger slope stability issue at the site. If a further investigation to determine cause(s), extent, and possible remediation is conducted, then the investigation should consist of a slope stability analysis along with recommendations to address the instability within the context of existing site conditions. There is currently insufficient data to understand erosion rates and associated

risks. Longer-term geomorphic monitoring of this reach might be warranted, which would include establishing cross-sections that would be resurveyed every three to five years to document erosional or depositional trends over time.

- The most significant risks in the canyons may relate to instability of the valley walls, which is outside the scope of this study. In a large rainstorm or possibly during an earthquake, mass wasting (landslides) from the valley wall could potentially occur, possibly blocking the channel, potentially endangering infrastructure near the top of the canyon walls.
- It is possible that a large flood could breach one or more of the apparently stable beaver dams. If that were to happen, one or more waves of incision could move upstream through parts of the assessment reach. However, the consequences of such an event appear to be relatively low given the stable base level, lack of infrastructure in the valley bottom, and the likelihood that the beaver would reestablish impacted dam sites.
- Collapses of individual beaver dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the beaver dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy riparian corridor consisting of a mix of native riparian species in Boeckman Creek would be a beneficial long term management strategy to maintain the beaver population.
- **Figures 10a and 10b** provides some summary photographs showing conditions within the assessed portion of Boeckman Creek in November 2021 and January 2022.



Boeckman Creek Geomorphic Survey (Upstream)

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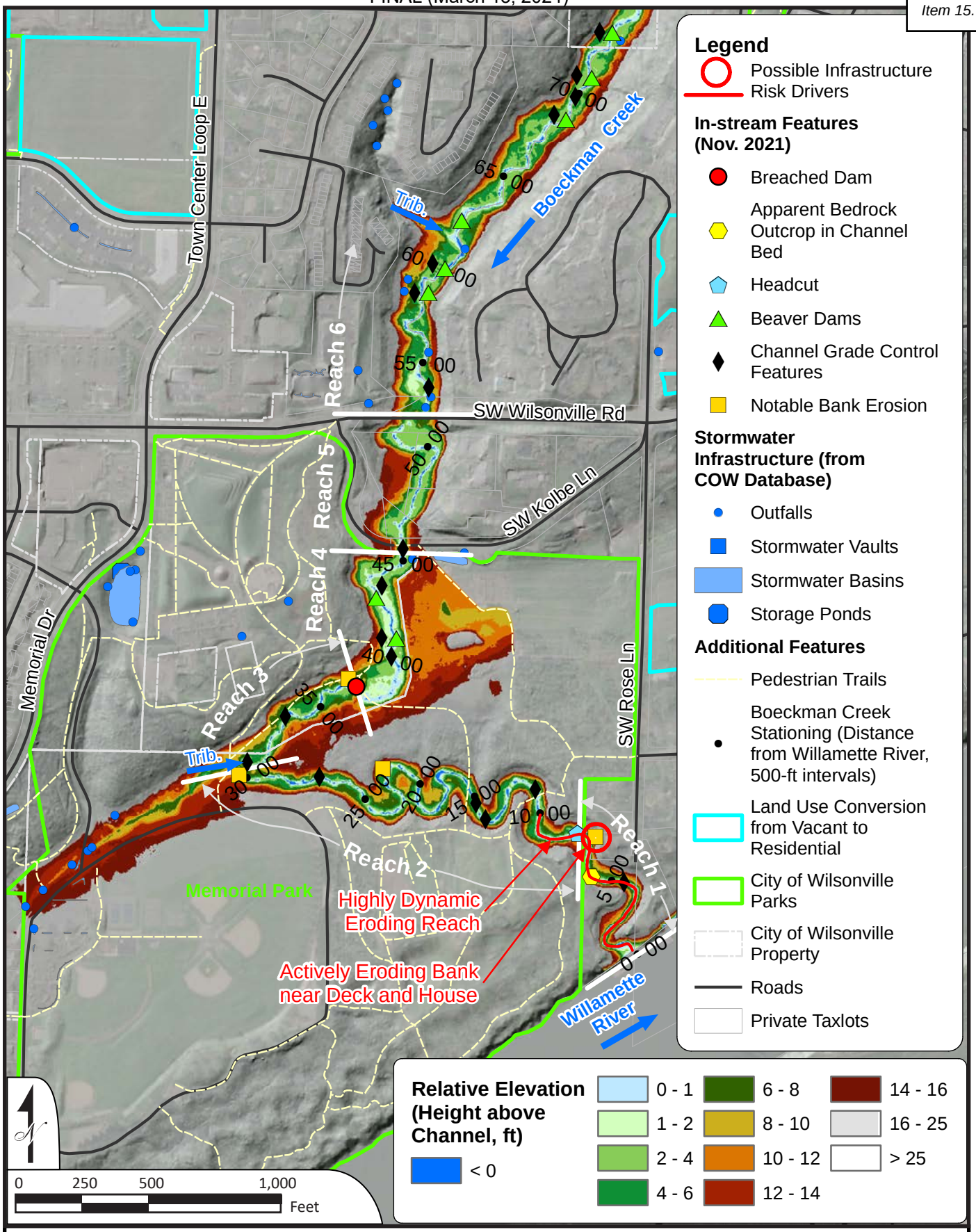
FIGURE 9A



Boeckman Creek Geomorphic Survey (Downstream)

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FIGURE 9B

Table 1. *Field Observations for Geomorphic Subreaches Within Boeckman Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	0	750	Dynamic reach with seasonal backwater from Willamette River	1.07%	Pool-Riffle	gravel / fines	Incised	Willamette River	Valley walls susceptible to mass wasting	Yes, but no dams	Incising and wideneing	4	3	5	5	Grade control and bank stabilization	Actively incising and eroding, especially upper extent of reach where active small headcuts still migrating. Lower Willamette water level combined with high intensity rainfall in fall cause incision and widening. Recommend detailed geotechnical slope stability analysis in locatoin of active bank erosion and landsliding.
2	750	3,050	Incised Meandering Reach in Willamette Floodplain	0.44%	Pool riffle	Mud, wood, boulder, cobble	Incised, Stable	Some boulder steps, downed logs, Willamette base level	High mud terraces; tree roots	Yes upstream of 2,400' ; Maybe downstream of 2,400'	Stable	2	3	2	1	Remove invasive blackberry and ivy	From property boundary at downstream end to the tributary on right in Memorial Park. Reach is within the historic Willamette River floodplain and river terrace. Single-thread, incised meanders with banks between 6 feet and 40 feet high. Generally the amount of incision increases in the downstream direction. Banks are massive mud deposits from Missoula Flood fines and/or Willamette River floodplain deposits. Bed contains mud, wood, and some gravel reaches. From about Station 1,400' downstream, Willamette River bedload deposits are visible in the banks. Little to no beaver presence below Sta 2,400'; beaver present between 2,400 and 3,040'.
3	3,050	3,700	Meander Reach below Breached Dam	0.37%	Pool riffle	Mud, wood	Incised, Stable	Beaver dams, downed logs	Valley walls, reed canary grass root mass	Yes, abundant	Stable	2	2	2	1	Remove invasives, add wood	From right bank tributary in Memorial Park to site of breached dam. Meandering channel with stable banks, beaver dams, relatively low floodplains covered in reed canary grass. Inundated areas are mostly reed canary grass, less blackberry than in other parts of the creek.
4	3,700	4,500	Low Gradient Depositional Reach above Former Dam	0.01%	Pool riffle	Mud, wood	Stable	Breached dam; beaver dam	reed canary grass in floodplain	Yes	Stable	1	2	1	1	Good reach for potential floodplain restoration	Reach from breached dam to SW Kolbe Lane in Memorial Park. Low gradient, meandering reach with relatively low, frequently inundated floodplain. Abundant beaver presence consisting of dams, canals, burrows, slides, and lot of chewed wood. Banks heavily covered with reed canary grass. Water is about 2 to 3 feet dep at this flow (moderately high flow), with mud dominated bed. A floodplain vegetation restoration project to replace reed canary grass with willow and alder could work well here.
5	4,500	5,300	Not Surveyed														Skipped this reach due to property access constraints

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
6	5,300	8,150	Stepped Beaver Pond Reach above Wilsonville Road	0.47%	Ponded by beaver dams	Mud, gravel, some bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1 (some trail erosion)	Remove invasives, add wood	Reach from Wilsonville Road to Boeckman Trail footbridge. Reach is mostly ponded by a series of beaver dams, most are small but with at least 2 large dams at Sta 6,250 and 7,300. The dams are built so that ponds are mostly continuous throughout the entire reach, with the toe of each dam close to the head of each pool of the downstream beaver pond. Reach is moderately incised but not as much as in other reaches of Boeckman Creek.
7	8,150	9,500	Mostly Free-Flowing Reach between Beaver Dammed Reaches	0.59%	Pool riffle	Gravel, mud	Stable, little to moderate incision	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	1	1 (some trail erosion)	Remove invasives, add wood	From Boeckman Trail footbridge to big beaver dam at Sta 9,500. Free flowing reach without much beaver activity. Riffle pool, gravel bed with some resistant bedrock in channel bed within the upper part of the reach. Some small beaver dams present but are not dominant.
8	9,500	10,700	Floodplain Inundated by Ponding at Several Large Beaver Dams	0.86%	Ponded by beaver dams	Mud	Stable, low banks	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1	Remove invasives, add wood	From beaver dam at Sta 9,500 to transition to more free-flowing reach. Deep ponded reach, with inundated floodplain over large areas. It is like this because either (1) dams are larger than those inreaches 6 and 9; and/or (2) the reach is less incised with lower banks. Viewed from trail on river left with some stops; unlike downstream reaches, I did not traverse the channel through this entire reach due to difficult access and need to speed up assessment. Did not visit outfall at Sta. 10,500
9	10,700	12,200	Incised Beaver Pond Reach	0.61%	Ponded, pool riffle	Mud, gravel, possible bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	3	1	Remove invasives, add wood	Similar to Reach 6, but deeper incision. Reach dominated by a series of beaver dams, not all were mapped due to difficult access. Did not visit crossing under Boeckman Road due to apparent private property

Selected Photos From Boeckman Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE
10A

Selected Photos From Boeckman Creek, January 2022

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FIGURE 10B

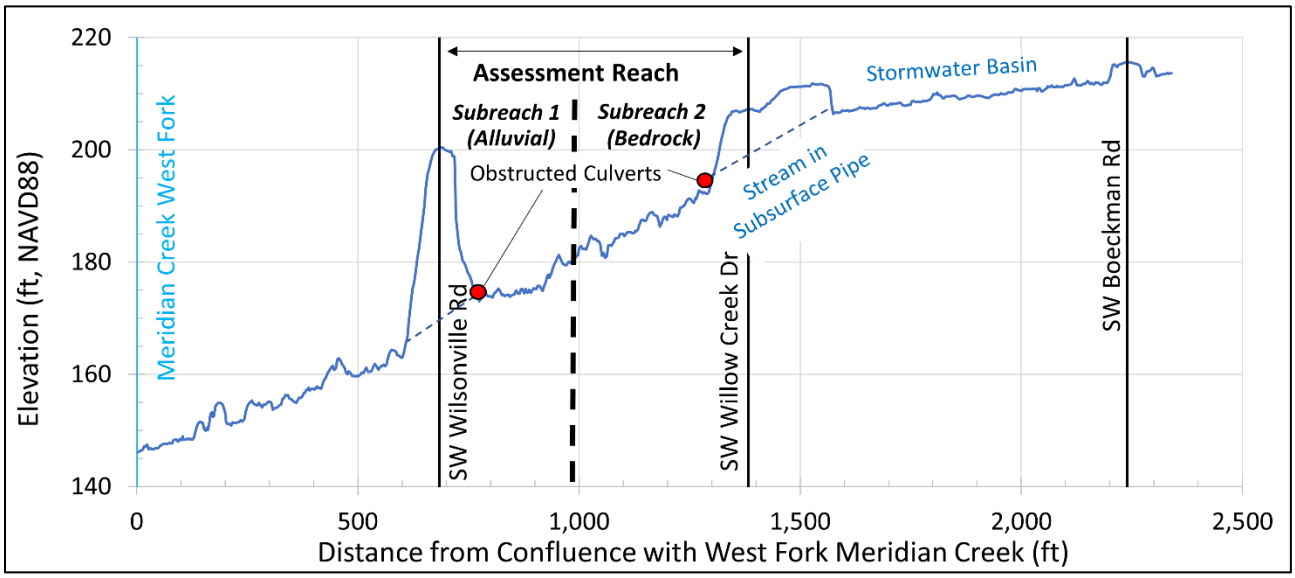
Meridian Creek in Landover Park

The field assessment for Meridian Creek occurred on November 26, 2021. The assessment included a 600-foot-long section of Meridian Creek between Wilsonville Road and SW Willow Creek Drive (**Figure 11**). This reach is immediately downstream of part of the Frog Pond Development Area. **Figure 12** is a longitudinal profile of the creek. **Table 2** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A2**. **Figure 13** contain photographs from this section of Meridian Creek.

General Observations and Interpretations

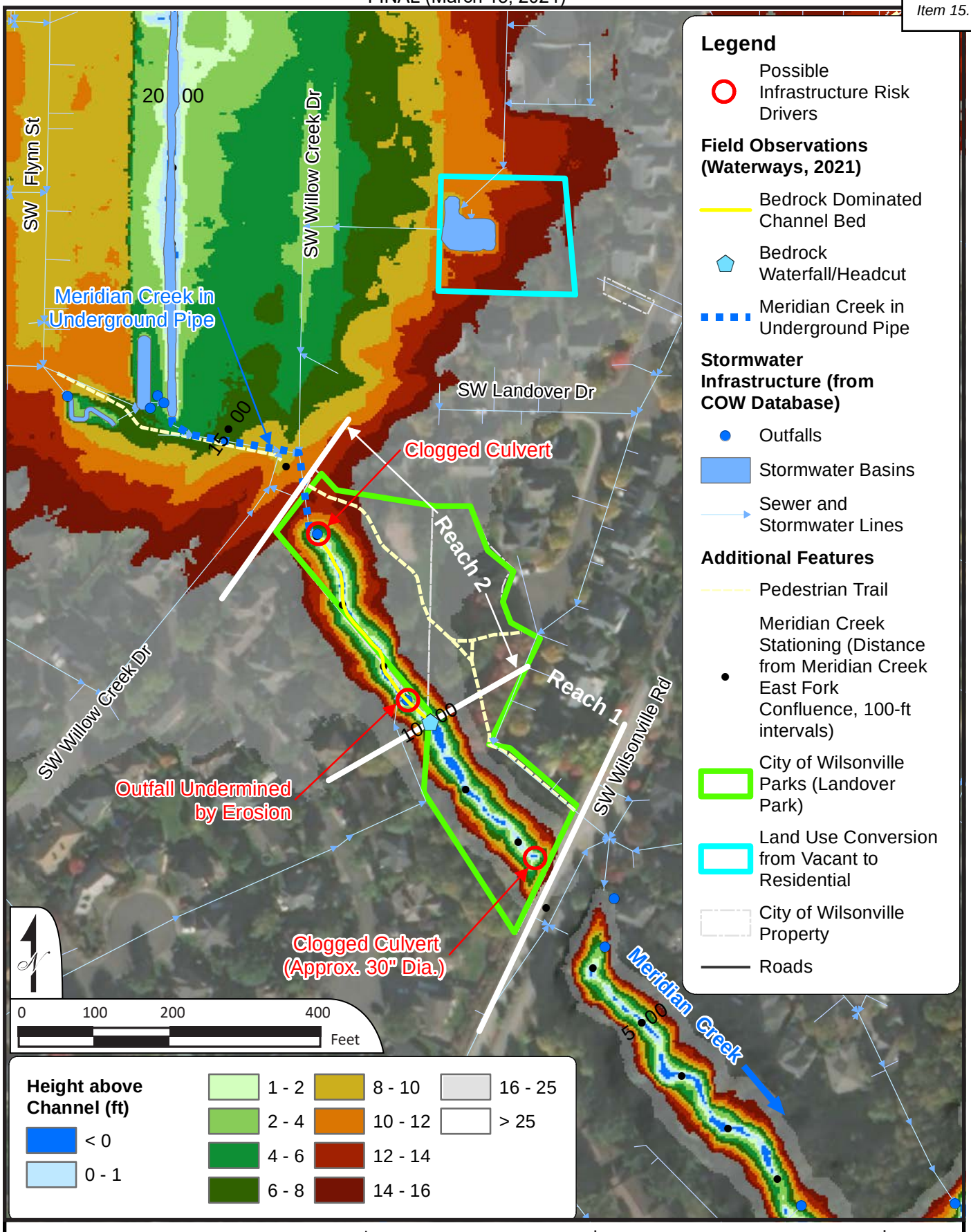
- This portion of Meridian Creek is incised in a very narrow canyon without any floodplains, whose steep slopes bound one side of the channel with a developed park on the other. The canyon is not as deep as the Boeckman Creek canyon, as can be seen in **Figure 4,** but the valley walls are steep with potentially unstable slopes underlain by fine-grained sediments and covered with dense blackberry thickets. The western valley wall is more at risk of landslides because Meridian Creek flows along the western margin of the canyon (right bank looking downstream).
- There are two distinct subreaches within the assessed area, delineated at a 4-foot-high bedrock/hardpan waterfall at Station 1,000 (**Figure 12**). The waterfall does not appear to be an active headcut advancing upstream and appears relatively stable. Downstream of the waterfall, the channel has an alluvial bed and is influenced by an obstructed culvert at Wilsonville Road. Upstream of the waterfall, a resistant layer of consolidated fine-grained sediment is exposed over most of the channel bed.
- The culvert at SW Willow Creek Drive appears to be undersized which may limit more significant hydromodification impacts from occurring downstream. Rock placed downstream of the culvert suggests that streambed erosion has been a concern in the past. This reach likely experienced significant channel incision and headcutting in the past but the active headcutting has been mostly arrested by the presence of hardpan material in the streambed. The discontinuity in the longitudinal profile across SW Willow Creek Drive (**Figure 12**) provides evidence for this field-based interpretation.

Figure 12. *Longitudinal Profile of portion of Meridian Creek (from 2014 LiDAR data)*



SUMMARY CONCLUSIONS FROM MERIDIAN CREEK

- The stream is stable in this reach due to the bedrock base level control and being confined laterally by valley walls and culverts at the upstream and downstream end.
- The main risk drivers are the culverts at the downstream and upstream ends of the reach:
  - There is a sediment-clogged culvert at the Meridian Creek crossing at Wilsonville Road (Station 775). The culvert under the high road prism is mostly obstructed and appears to cause ponding during storm runoff (**Figure 12**). It is unlikely that ponded water would overtop Wilsonville Road, but backwatering behind the road could result in significant ponding and potential for piping through the road prism, which was not likely designed to act as a dam. The risks at the crossing should be further evaluated as part of the Stormwater Master Plan. Hydraulic modeling may provide an opportunity to understand maximum inundation depths if the culvert were to plug.
  - The grate at the outlet of the culvert at the Willow Creek Drive appears to have been modified to address past channel incision and headcut migration. This location should be monitored to determine if the stabilization measures installed downstream of the culvert provide adequate, long-term grade stabilization.
- The PVC stormwater outfall on the creek at Station 1,100 is undermined and a 6-foot section has washed out and moved downstream.



Meridian Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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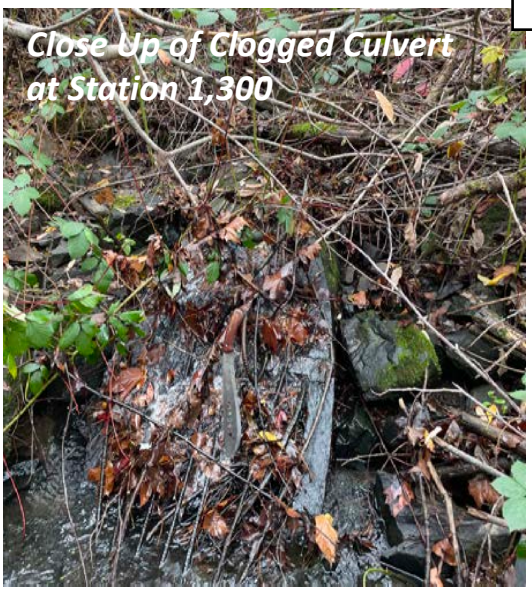
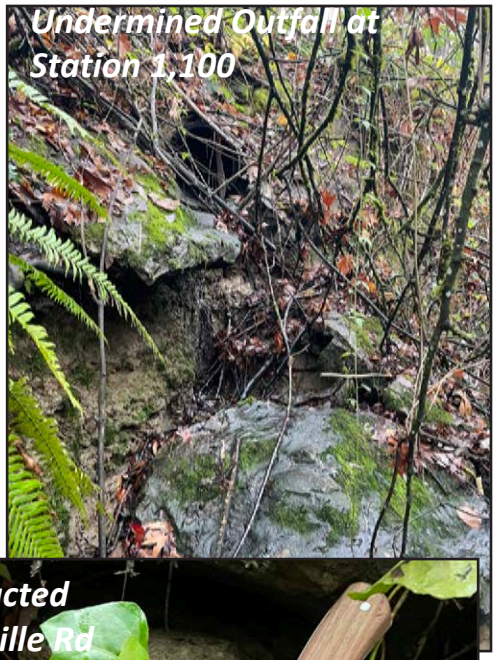
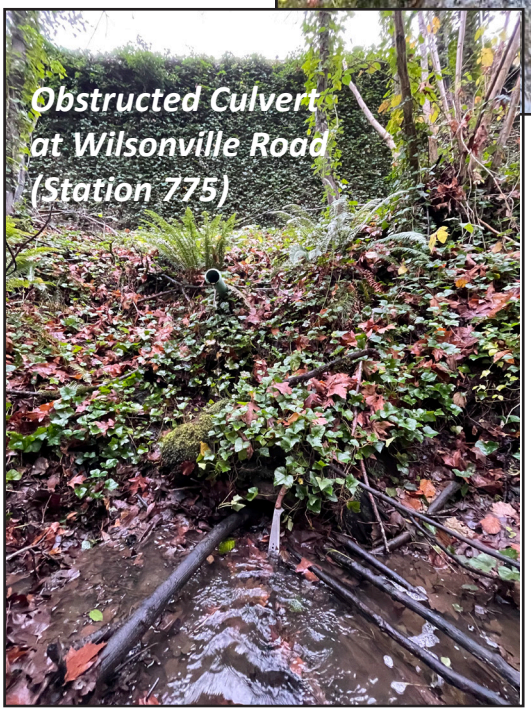
FIGURE 11

Table 2. *Field Observations for Geomorphic Subreaches Within Meridian Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	775	1,000	Gravel depositional reach behind clogged culvert	1.05%	Step Pool	Gravel, fines, wood	Incised, Stable	Culvert at Wilsonville Road	Narrow valley wall	No	Stable or aggrading	1	3	4	4	Address downstream drainage, invasives removal	Short alluvial reach behind the obstructed culvert at Wilsonville Road. Gravel bed, one or more small steps formed by fallen logs. Channel is incised to base level at the culvert, but could incise more if culvert is cleared. Small incised channel in narrow valley with unstable mud valley walls subject to landsliding. Obstructed culvert at Wilsonville road could become a problem, and should be evaluated further as to whether it is a risk that should be addressed.
2	1,000	1,300	Reach incised to bedrock above waterfall	3.74%	Plane Bed	Bedrock (consolidated mud)	Incised, Stable	Bedrock channel bed	Narrow valley wall	No	Stable	1	3	3	3	Address upstream culvert drainage, invasives removal	Bedrock reach upstream of a 4'-high waterfall. Reach incised to consolidated mud bedrock. There are at least 2 waterfalls in reach, and at least one boulder step h from probable artificially placed boulders. Dense blackberry throughout reach. The culvert at the upstream end of reach is clogged and backs up water underneath Willow Creek drive.







Selected Photos From Meridian Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 13

Arrowhead Creek

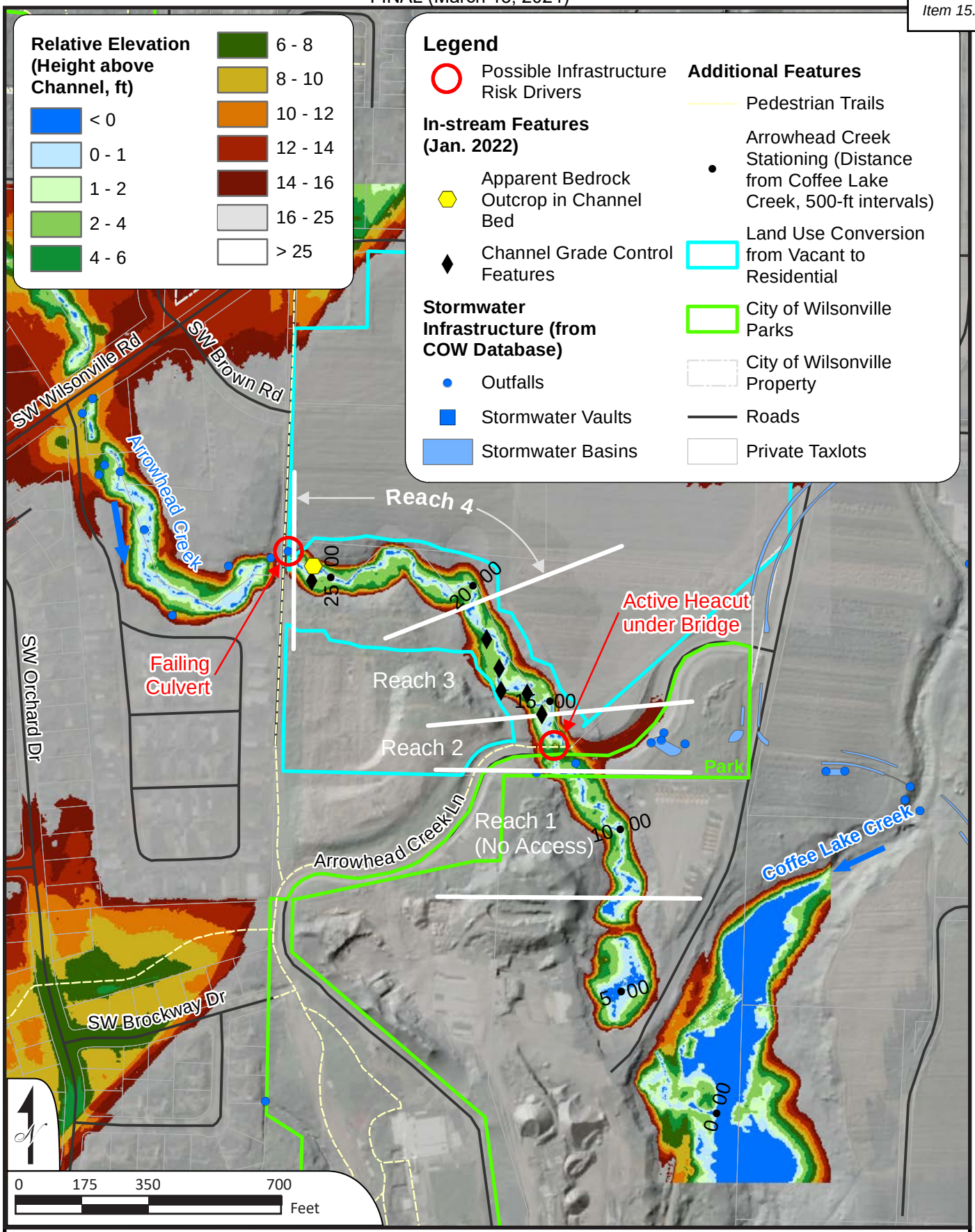
The field assessment for Arrowhead Creek occurred on January 25, 2021. The assessment included a 1,400-foot-long section of Arrowhead Creek between an asphalt pedestrian crossing and Arrowhead Creek Road (**Figure 14**). **Figure 15** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A3**. **Figure 16** contain photographs from this section of Arrowhead Creek.

General Observations and Interpretations

- The assessment area on Arrowhead Creek was divided into three subreaches based primarily on where beaver are active and have established stable dams that act as both local and regional grade control for the channel at the time of the assessment.
- Throughout the assessment area Arrowhead Creek consists of a meandering channel that is moderately incised within a broad floodplain that ranges between 40 and 80 feet. The channel and floodplain are inset 30 to 40 feet into the fine Missoula Flood deposits.
- Moderate incision of the channel limits high flow access to much of the broad floodplain except where beaver have built dams across the channel, and in some cases across the entire floodplain. In Reach 3, where the beaver dams create continuous backwater conditions along the entire reach, water engages the floodplain creating a complex mosaic of backwater and secondary channels.
- The culvert located at the pedestrian crossing at the upstream extent of the assessment area is in the process of failing and should be considered for replacement. It appeared from the downstream end that water may be piping through the fill and creating void spaces that are causing the culvert to fail. We did not evaluate the upstream end of the culvert due to lack of landowner permissions.
- English ivy dominates much of the project area and has the potential to limit the food and dam building resources for the beaver which could be detrimental to the beaver population and associated channel stability over the longer term. The ivy has already killed, or is at risk of killing, many of the alder and maple throughout the project area.

Summary Conclusions from Arrowhead Creek

- The stream is stable in this reach due to the presence of shallow hardpan and abundant beaver dams that act as local base level control and the fact that the channel is small and meanders across a broad floodplain with stable valley wall confinement.
- The main risk drivers consist of the following:
  - Failing condition of the upstream culvert. The fill prism appears to consist of relatively coarse material and therefore may be somewhat porous, limiting the potential for catastrophic failure of the prism. Further investigation by a geotechnical engineer is recommended.
  - Some instability was observed where Arrowhead Creek flows under the Arrowhead Creek Road bridge that appears to be related to construction of the channel under the crossing. Given the degree of channel stability observed upstream and downstream of the crossing the poor conditions at the crossing was determined to be relatively low risk unless there are significant changes to the active maintenance of the beaver dams.
  - Long-term, the loss of riparian trees and understory associated with dominance of English ivy does present some risk if there is a significant loss of food resources and dam building material for beaver.



Arrowhead Creek Geomorphic Survey

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FIGURE 14

Figure 15. *Longitudinal Profile of portion of Arrowhead Creek (from 2014 LiDAR data)*

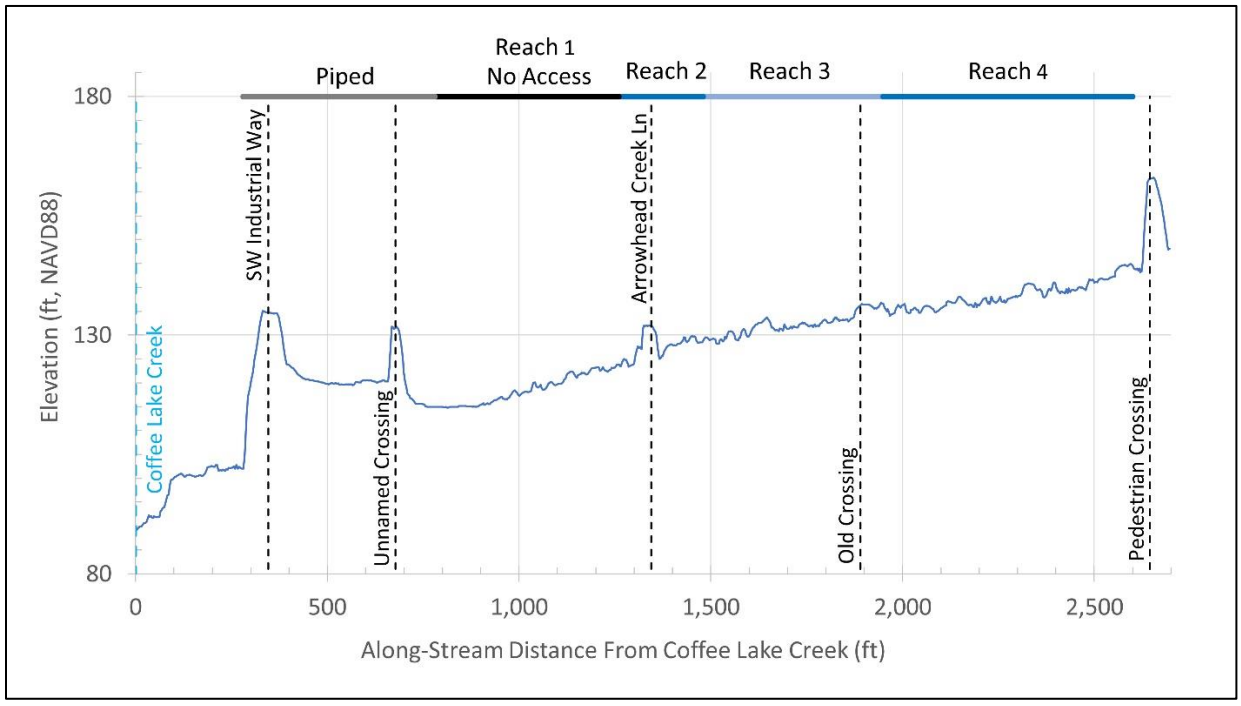

Table 3. *Field Observations for Geomorphic Subreaches Within Arrowhead Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	7+80	12+60	Not Surveyed														Did not visit this reach due to property access constraints.
2	12+60 (GPS 11)	14+80	Unstable reach associated with bridge replacement at Arrowhead Creek Road but low risk due to good stability in upstream and downstream reaches	1.95%	plane bed meandering	gravel	incised	limited. Could impact upstream reach	bridge and valley walls	Y, but limited by vegetation	incising but limited activity	3	1	3	3 - irrigation pipe at risk	remove blackberry and revegetate	Bridge reach at Arrowhead Road. Construction of crossing appears to have impacted channel with limited mitigation measures. Riparian not restored so blackberry dominates. Irrigation line crosses channel unburied.
3	14+80	19+50	Meandering channel in highly stable reach associated with actively maintained beaver dams	1.44%	plane bed meandering	hardpan bedrock gravel	incised but stable	bedrock hardpan and beaver dams	valley wall ~25'-30' with low energy	Y	stable	1	2	2	1	Ivy removal and riparian	Beaver dominated. Very similar to Reach 1, but beaver present which have built successive dams backwatering channel. Increased floodplain engagement. Poor ripariain condition long-term. Cottonwood/maple dominated.
4	19+50	26+00	Stable reach with hardpan grade control. Culvert at upstream extent of reach is in the process of failing	1.31%	plane bed meandering	hardpan bedrock gravel	incised but stable	shallow alluvium intermittent on hardpan bedrock	valley walls ~25-ft high with low energy	N	stable	1	2	2	2	Ivy removal and riparian restoration	Subreach consists of 50'-75' valley bottom confined by 25'-30' of 1:1 valley walls. Channel incised 2'-5' into valley bottom with some active inset foodplains. Creek flows on hardpan bedrock. Cottonwood/alder/fir canopy threatened by ivy which dominates groundcover.

Selected Photos From Arrowhead Creek, January 2022

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 16

Newland Creek

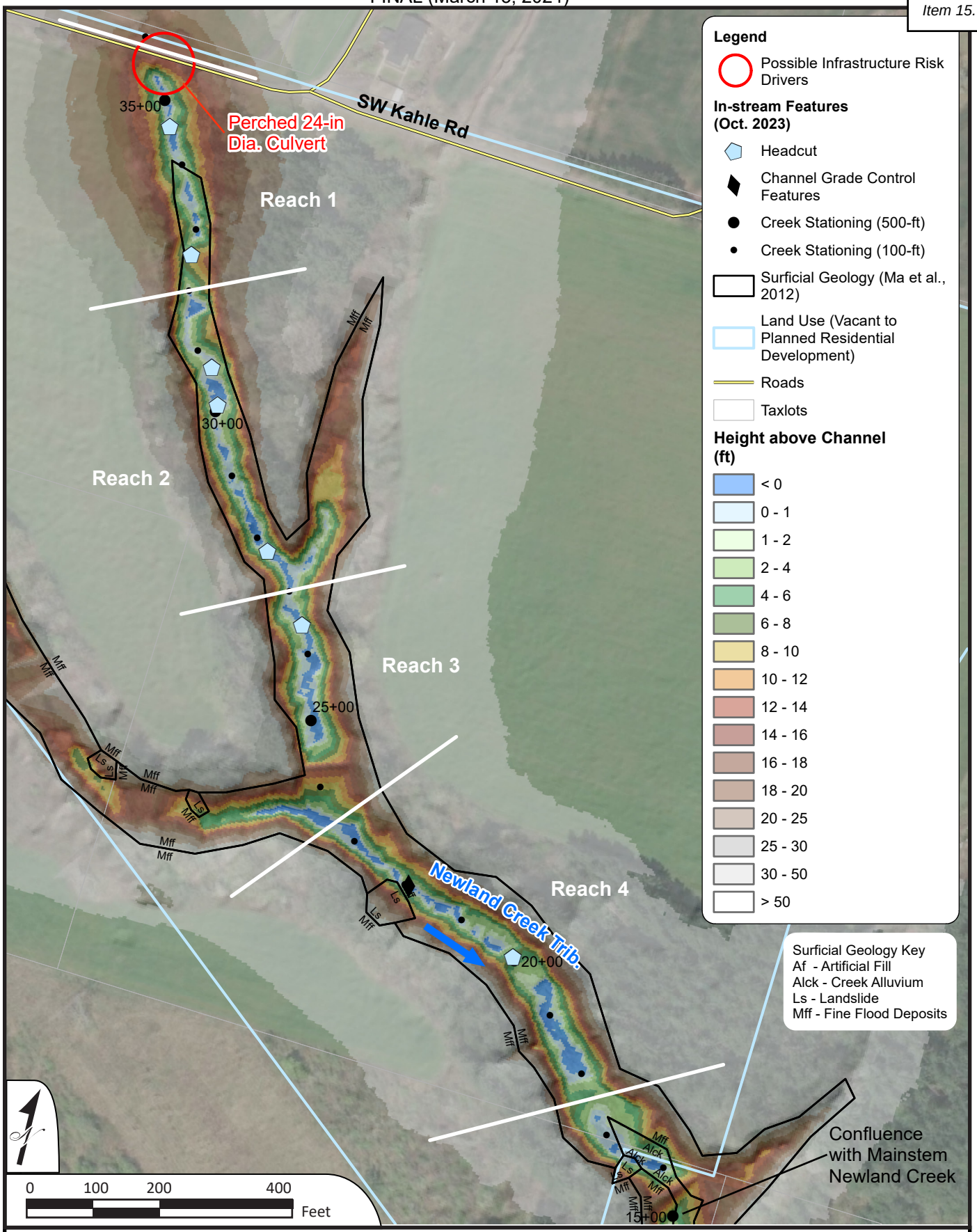
The field assessment for Newland Creek occurred on October 26, 2023. The assessment included a 1,700-foot-long section of a tributary to the mainstem of Newland Creek with the Urban Growth Boundary (UGB) with the upstream extent located at SW Kahle Road (**Figure 17**). **Figure 18** is a longitudinal profile of the creek. **Table 4** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A4**. **Figure 19** contain photographs from this section of Newland Creek.

General Observations and Interpretations

- The assessment area on Newland Creek was divided into four subreaches based primarily on the assessment boundaries and two tributaries that entered that had an influence on channel size.
- The culvert located at SW Kahle Road looked relatively new, consisting of a 24" corrugated plastic pipe. The culvert is significantly perched with about a 6-ft drop to the channel bed. Moderately sized angular rock was placed to dissipate energy. SW Kahle Road likely has prevented continued upstream movement of a large headcut by acting as a grade control.
- Upstream of SW Kahle Road the channel is small and the adjacent fields have been tiled and the tile drains closest to the road are exposed and eroding. The road probably also contributes a significant amount of stormwater.
- Reach 1 and 2 are highly incised with a least a half dozen headcuts that are eroding into erodible hardpan material. The channel is a notch in many places, characterized by a channel that is 3 to 4 feet wide and equally as deep cut into a narrow, confined valley that is 20 to 30 feet deep.
- The tributary entering from river left is also very incised.
- The gradient of Reach 4 is much flatter, after a larger tributary enters from river right. The channel is larger but still very incised and a deeper valley.
- Only one large headcut was observed in Reach 4. This reach may be in a widening phase in response to past incision as more bank instability was observed.
- More in-channel wood was observed in Reach 4 along with several debris jams that were holding grade.
- The riparian corridor is in good condition with a mix of mature coniferous and deciduous trees.
- Blackberry is the dominant understory in some areas though there are also significant stands of dogwood and vine maple.

Summary Conclusions from Newland Creek

- Reaches 1, 2, and 3 are highly unstable and likely to incise further and widen over time independent of additional upstream development.
- Reach 4 is at risk of bank instability.
- All reaches were considered to be at risk from hydromodification.
- The main risk drivers consist of the following:
  - Condition of the culvert at SW Kahle Road. Although the risk of failure of this culvert does not appear to be imminent, future development will likely increase downstream risks. As mentioned above, the culvert is likely acting as a grade control, preventing the downstream channel incision from moving upstream. Any future replacement of the crossing will need to incorporate grade control to prevent future upstream channel incision.
  - Instability in the tributaries entering Reach 2 and 3 should be considered if adjacent agricultural lands are developed. The riparian buffers on these tributaries are narrower.



Newland Creek Geomorphic Survey

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FIGURE 17

Figure 18. *Longitudinal Profile of portion of Newland Creek (from 2014 LiDAR data)*

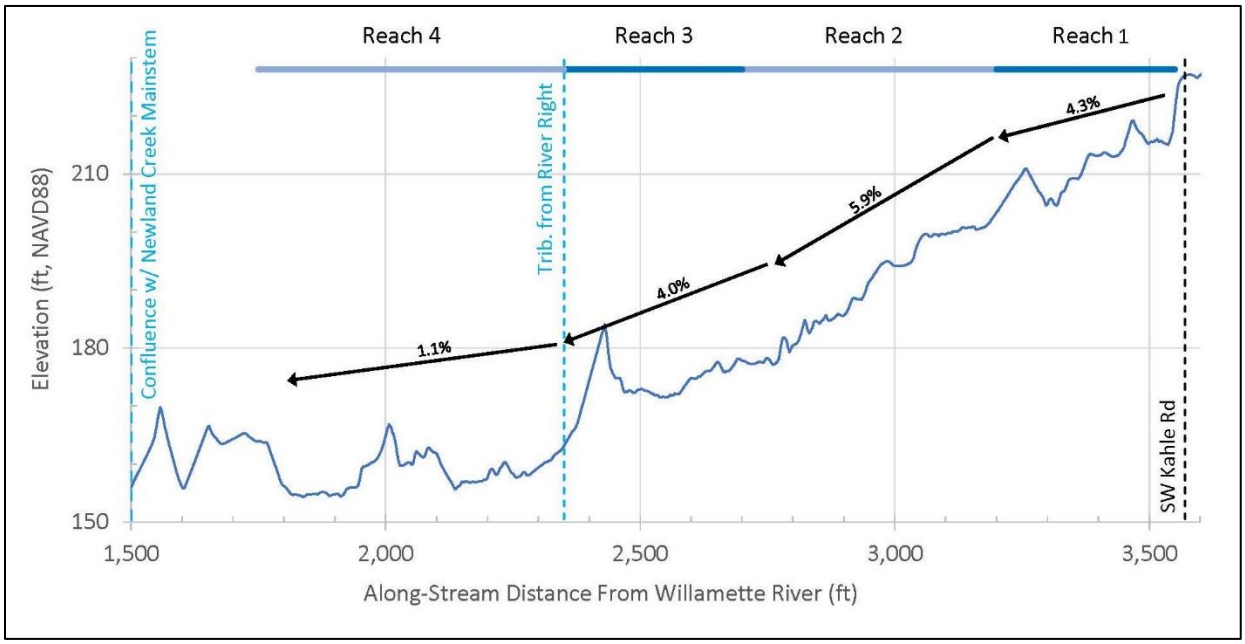

Table 4. *Field Observations for Geomorphic Subreaches Within Newland Creek Tributary*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LIDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	32+00	35+50	4.31%	bedrock/hardpan; confined	hardpan	incised	none	steep hillslopes	No	incising	5	3, but maybe not in widening phase	5	4, upstream culvert and road	Address profile instability if culvert is replaced	Steep, actively incising reach with several large to moderate headcuts. Early stage of channel evolution.
2	27+00	32+50	5.92%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	Headcuts should be monitored and addressed if results suggest rapid incision	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	23+50	27+00	4.03%	bedrock/hardpan; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Headcuts should be monitored and addressed if results suggest rapid incision	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.
4	17+50	23+50	1.12%	plane bed; confined	hardpan w/ angular cobble	incised	hardpan but only limited effectiveness	steep valley walls	No	incising	4	4, some softer bank material, maybe landslides	5	same as previous reaches	Consider adding large wood to channel to improve profile stability channel; though access is poor	Hardpan is more solid in this reach. Hillslopes not as steep though bank material is less consolidated. Maybe old landslides. Most of bed is hardpan though some coarse substrate consisting of basalt from tributary. More wood in channel.

Selected Photos From Newland Creek, October 2023

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FIGURE 19

Kruse Creek

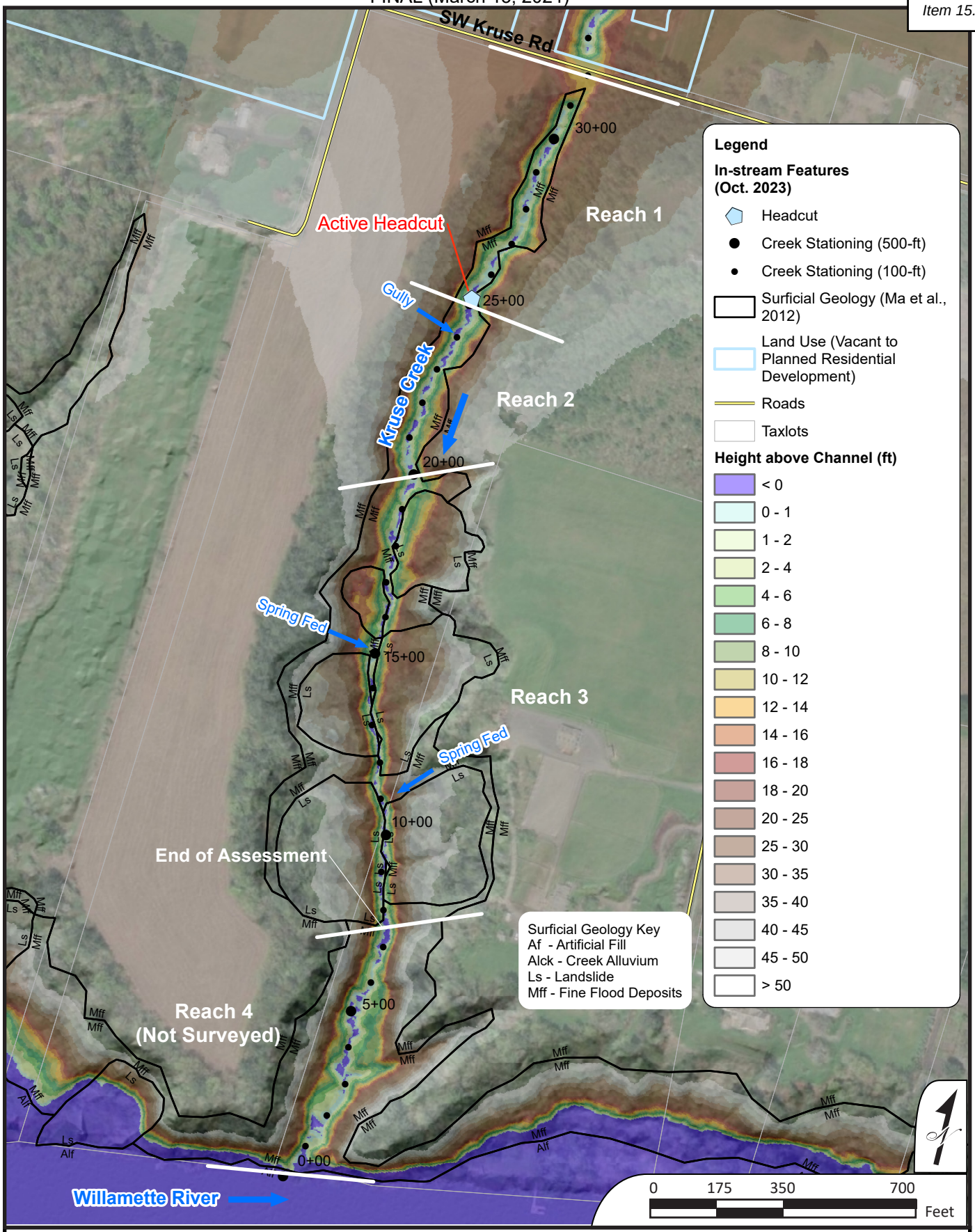
The field assessment for Kruse Creek occurred on October 26, 2023. The assessment included a 2,500-foot-long section of Kruse Creek between SW Kruse Road and the confluence with the Willamette River (**Figure 20**). **Figure 21** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A5**. **Figure 22** contains photographs from this section of Kruse Creek.

General Observations and Interpretations

- Reaches 1 and 2 are geomorphically distinct from Reach 3 and 4 due to the presence of large landslides from both the western and eastern hillslopes that extend continuously along approximately 1,400 feet of Kruse Creek.
- Although the channel is moderately incised in both Reaches 1 and 2, only one headcut was observed with the rest of the channel being relatively stable. This is likely due to the downstream landslides, which begin at the Reach 2 to 3 transition, and act as a downstream base level for these upstream reaches.
- The culvert at SW Kruse Road was difficult to access due to heavy growth of vegetation but it was perched which suggests some past channel incision that was likely arrested at the crossing.
- Reach 3 and 4 were very inaccessible due to deep channel incision and unstable banks associated with the adjacent large landslides.
- Active landslides and bank failures followed by subsequent channel incision through unconsolidated landslide debris is indicative of channel conditions through all of Reach 3 and potentially Reach 4. High ground water tables and seeps and springs through much of Reach 3 adds to the instability.
- The riparian corridor is in relatively good condition and consists of a mix of mature coniferous and deciduous trees with a good understory. Ivy is prevalent throughout the assessment reach and is climbing up many of the trees.
- On the eastern terrace in Reach 1 there is an extensive area of non-native English holly that was likely part of a former commercial holly farm.

Summary Conclusions from Kruse Creek

- Due to the presence of active landslides through Reach 3, Kruse Creek could be considered naturally unstable. This fact should be considered if the area were to develop in the future with riparian buffers adjusted to account for existing landslide activity and the potential for landward movement of the landslide scarps.
- It is unclear what the risk of hydromodification would be on this section of Kruse Creek. In Reaches 1 and 2 there would likely be additional channel incision and widening. A geotechnical engineer should be consulted to better understand the risk of increased sediment transport in Reach 3 that could cause rapid channel incision and destabilization of the toes of the existing landslides.
- Protection of the existing mature forest should be a priority in this area including management of ivy and removal of holly.
- Profile stabilization will need to be considered if the crossing at SW Kruse Road is upgraded.



Kruse Creek Geomorphic Survey

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FIGURE 20

Figure 21. *Longitudinal Profile of portion of Kruse Creek (from 2014 LiDAR data)*

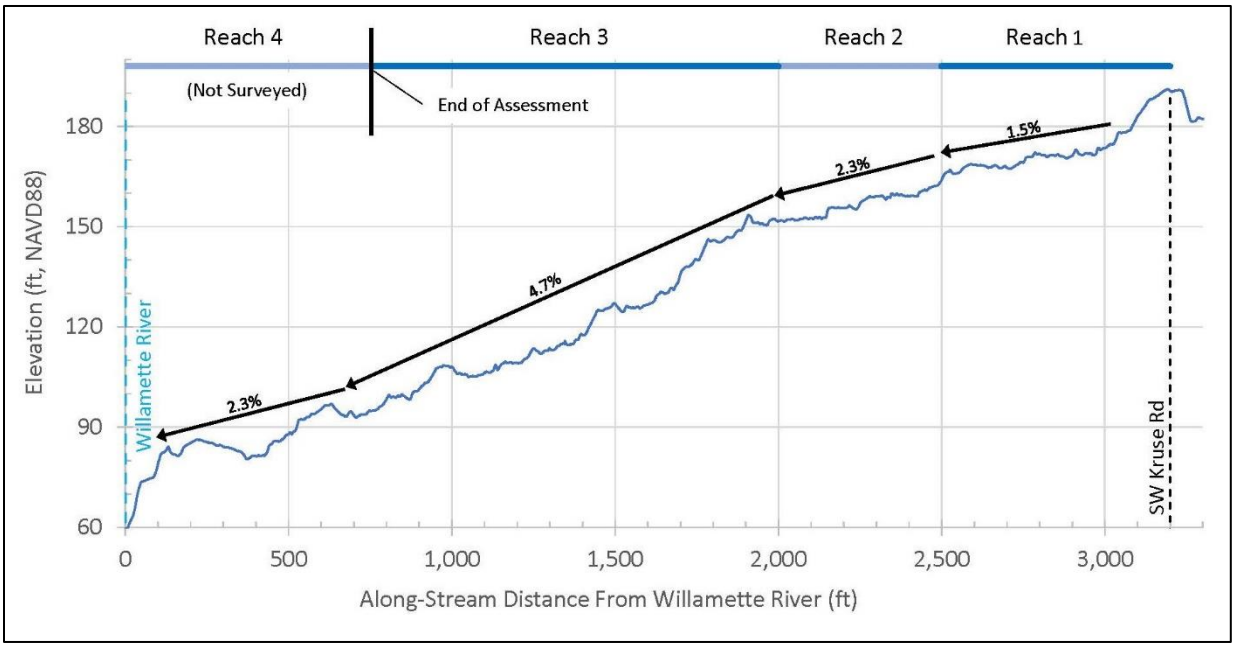

Table 5. *Field Observations for Geomorphic Subreaches Within Kruse Creek*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LiDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	25+00 (PM 3)	32+00 (at culvert)	1.51%	plane bed; confined	fines with some gravel	stable	none, some wood debris	valley slopes adjacent to small floodplain	No	stable, headcut downstream reach boundary	1, high incision potential	2, stable but rate of movement of downstream headcut could increase risk	4	No	ivy removal to save large trees	Low to moderate gradient channel. Small with adjacent low floodplain. Channel 6-ft top, 0.5-ft depth. Overall valley bottom width 20-ft. Lots of blackberry and ivy. Good canopy of douglas fir, cedar, but ivy is growing up a lot of trees. Reach break at headcut.
2	20+00 (PM 5)	25+00	2.29%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	ivy removal to save large trees	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	7+50	20+00	4.66%	colluvial; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Access is poor; Establish valley wide buffer to limit future infrastructure impacts	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.

Selected Photos From Kruse Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 22

Summary of Findings

Boeckman Creek

Boeckman Creek flows in a deep valley that appears to have formed quickly following the Missoula Floods, which ended about 15,000 years ago. The creek appears to have achieved a stable base level thousands of years ago, with a flat slope graded to the Willamette River. The assessment identified several smooth, hard surfaces in the channel bed that may be resistant bedrock or hardpan, which would prevent further downcutting and indicate that the stream has reached its limit of incision.

A major base level control in the reach is at the site of a breached concrete dam within Memorial Park (**Figure 9b**). The remnants of the dam are large concrete and boulders, creating a cascade, which should remain stable under future flood scenarios.

Upstream of the dam, and especially above Wilsonville Road, beaver are the primary controller of the morphology of the Boeckman Creek channel. Although the channel itself is moderately incised, beaver dams create a stair-stepped backwater condition that allow high flows to access the floodplain and reduce stream power and associated erosional forces. Numerous large and small dams were identified during the field investigation. The beaver dams create ponded areas and form complex environments and habitats in addition to providing base level stability in Boeckman Creek. Most of the dams appear stable, although they may be more likely to collapse as a result of larger or more frequent floods. The collapse of individual dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy beaver population in Boeckman Creek would be a beneficial long term management strategy. Riparian restoration, which would include removal of blackberry and ivy, would benefit beaver and improve the long-term resiliency of the reaches dominated by beaver.

The most at-risk area to past and future changes in the hydrology associated with hydromodification within the watershed is near the confluence with the Willamette River (**Figure 9b**). In this reach the combination of high flow conditions, an incised channel, and seasonal backwatering from the Willamette River appear to limit the long-term stability of beaver dams that provide local grade control elsewhere along Boeckman Creek. Although seasonally the Willamette River does provide base level control, hydromodification impacts, especially in fall when the Willamette River is typically low, has led to channel incision and widening in the reach downstream of Memorial Park.

Meridian Creek

Meridian Creek is incised in a small canyon between houses on the west and Landover Park on the east. Meridian Creek is incised to “bedrock,” which is a resistant layer of consolidated fine-grained sediment. The valley walls confine the channel on both sides. The valley slopes are covered with dense blackberry and are prone to landsliding, which could affect some backyards. A stormwater outfall pipe on the west side of the stream, near the Reach 1 and Reach 2 boundary, is undermined and a section has washed away (**Figure 11; Photo on Figure 13**).

The primary infrastructure issue in this reach is the crossing of Meridian Creek under Wilsonville Road (**Figure 11; Photos on Figure 13**). The culvert appears to be undersized and is nearly clogged with fine sediment. This obstruction caused a wedge of sediment to accumulate in the channel upstream. The lack of drainage appears to cause some ponding under current conditions, and complete plugging of the culvert seems like a reasonable possibility. It is unlikely that ponded water would overtop Wilsonville Road, but repeated ponding behind the road could cause geotechnical instability through other

mechanisms. The risks at this crossing should be further evaluated as part of the Stormwater Master Plan.

Secondary infrastructure issues in this reach are:

- The debris rack at the outlet of the culvert under Willow Creek Drive is clogged with leaves, debris and sediment, backing up water under Willow Creek Drive (**Figure 11; Photo on Figure 13)**. The undersized culvert at Willow Creek Drive may limit future hydromodification impacts downstream.

Arrowhead Creek

The Arrowhead Creek channel meanders across a broad floodplain that is inset approximately 30-40 feet from the upper Missoula Flood terraces. Grade control is provided through a combination of localized exposures of hardpan "bedrock" and beaver dams that are continuous and redundant along more than 60% of the project reach.

The primary infrastructure risk observed through the project reach is the condition of the culvert at the pedestrian pathway at the upstream extent of the assessment area, which is piping and failing and should be evaluated further by a structural engineer (**Figure 14; Photo on Figure 16**). An additional risk factor that was considered low to moderate and should be monitored in the future was the potential for instability and headcut migration within the vicinity of the Arrowhead Creek Lane crossing. The constructed streambed under the relatively new bridge crossing lacks adequate grade control and has the potential to incise further and threaten the series of beaver dams in the upstream, stable reach (**Figure 14).** The lack of grade control may be due to downstream mobilization of the streambed substrate that was installed during construction of the crossing. A pile of angular cobble was noted approximately 200 feet downstream of the crossing that may have been eroded from the channel at the bridge. An indirect risk factor in the assessment area relates to the condition of the riparian corridor. Much of the riparian vegetation is being impacted by the growth of English ivy, which has the potential to impact long-term beaver use of this section of creek, which could impact the primary source for grade control in this section of Arrowhead.

Newland Creek

The assessment reach included a portion of a tributary to the mainstem of Newland Creek within the existing Urban Growth Boundary. The channel is highly incised, and relatively steep, and flows within a canyon that increases in width in the downstream direction as it incises into a broader terrace surface. Past and active channel incision has resulted in a highly perched condition at the culvert at SW Kahle Road which is the upstream boundary of the assessment area. A half dozen headcuts were mapped through the project reach that ranges from 2 feet to 4 feet high with likely low to moderate rates of upstream movement as the bed of the channel flows over hardpan material.

The primary infrastructure risk identified in the project reach is the perched culvert at SW Kahle Road (**Figure 17; Photo on Figure 19**). Although this culvert isn't immediately at risk due to placement of energy dissipation rock at the outlet, upgrades to the road will need to address the profile discontinuity and also consider the likelihood of additional channel incision associated with future headcut migration. This reach lacks grade control other than exposure of hardpan material in the bed, which will slow channel incision, but not eliminate it, especially if there are significant flow increases that occur in the future associated with development. Channel incision and active headcuts along the two tributary channels entering the assessment reach should also be considered in any future development planning.

Kruse Creek

Geomorphic conditions in the assessed portion of Kruse Creek are dominated by the presence of the presence of large landslides through the lower quarter mile of the canyon. These landslides are associated with a high water table, active springs and seeps along the entire lower canyon, and sets the base level control for the upper sub reaches of the assessment area. Active slumping into and across the Kruse Creek channel, followed by reincision into landslide debris characterizes channel conditions which were difficult to directly access during the assessment.

The primary infrastructure risk observed through the project reach is the condition of the culvert at W Kruse Road (**Figure 20**). The corrugated metal pipe is perched and, although not immediately at risk of failure, would need to be addressed, along with the apparent profile discontinuity, if the crossing was replaced during upgrades to the road, which is currently a narrow, relatively undeveloped asphalt road. Although there is no direct infrastructure risk associated with the mapped landslides, any planned development might have an impact on their rate of movement. Creating large buffers along Kruse Creek that considers existing geologic and geotechnical conditions as well as how those might be exacerbated by changes to watershed hydrology will be important to limit future impacts to infrastructure. Addressing non-native species, especially the potential for English ivy to impact mature trees, would also benefit the Kruse Creek corridor.

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APPENDIX A

Field Observations in Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks

Appendix A1 *: Record of Field Observations in Boeckman Creek*

Dates: 11/19/2021, 11/24/2021 and 01/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
450	1										Steel beam, full span			3	Rock grade control in channel		Private bridge at upstream extent of Willamette backwater. Accesses 1 property. Landowner there since 1976. Creek has incised and widened when Memorial Park bridge replaced culvert. Rock grade control provides limited protection. Rocks are small and could get flanked.
580	2						X										Bedrock exposed in bed along right bank. Shale. May not be continuous across bed. Overlain by fine sediments.
700	3	L	Active, 50'x25'	5	None								Deck and House	5			Actively eroding bank. Local incision and widening of channel undermined bank. May be exacerbated by fill/retaining wall at house. Retaining wall has since failed.
780	4							18"					Old crossing				Old crossing. Some road fill still present. Upstream extent of ??? headcut migration. Possibly associated with debris log jam.
1000-800	2115-2121																Reach below bridge to private property boundary consist of a 100' section with boulders and gravel, followed downstream by a 100' section of mud and wood bed before reaching property boundary. Appears to be significant bank erosion in the downstream section underneath the private homes (see photo 2121)
1050	2109, 2111, 2127-2129										Trail footbridge						High foot bridge over creek. Low chord is about 20 feet above creek, well engineered. A few boulders and rounded gravel lag deposits in the channel under the bridge
1100	2107, 2112-2113							12" boulder drop							X		Small step with boulder rip rap just upstream of bridge
1400	2096-2100						Willamete River bed material								X		Outcrop of a contact between overlying fine-grained sediments and underlying partially cemeted gravel close to the current water level. Gravel is well rounded basalt pebbles and cobbles, looks like probably old Willamette River bed material. This suggests stream from here down is probably not susceptible to much further incision due to exposing the coarser bed material and also as approaching the base level of the Willamette River
1500	2093-2094														X		Large, recently fallen cedar tree in channel. Log jam beginning to form, accumulating wood, and will probably persist for many years
2000 - 1500	2080-2093																Deeply incised meanders in low gradient channel. Not actively moving meanders. Bank walls as high as 40' and as low as 12 feet above channel Steps are formed at several fallen logs, mostly featureless runs. Abandoned floodplain is covered with mostly ivy (not as much blackberry here)
2050	2079-2080							30" high step, log							X		step from fallen log and debris. Doesn't appear to be a beaver dam

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
2200	2069-2071	L	50' Long by 30' high	2													Bank erosion on outside of a sharp bend in incised meandering reach. 30' high near-vertical brank held up by several large fir trees composed of Missoula Flood fines. There's foot traffic at top of bank, trail may be endangered from erosion (didn't climb up to top to be sure)
2700-2200	2069-2078																Mud and wood channel bottom, 2' to 4' deep at current high flows. Channel bed about 12 feet wide, mostly runs. Ivy/blackberry floodplain, incised. Floodplain is about 6 to 12 feet above floodplain
2700	2066-2068								18"						X		Small step within mud reach, likely beaver dam but not clearly so. Could be a downed log covered with debris. Low gradient, mud reach. Lots of ivy on floodplain
3000	2026-2031	R				Tributary enters from River Right											Tributary enters from river right through a large (>36") corrugated metal culvert under a road fill. Culvert is open but backwatered by Boeckman Creek about 24" deep. Scour pool at mouth of tributary
3050 to 2700	2059-2065; 2132-2134														X		Relatively featureless reach below tributary junction; incised, heavy blackberry and ivy on terraces; mud bed; lots of wood in channel bed
3050	2058	R	75' long by 6' high	3													Bank erosion and incision on river right below fence and facility on the top of bank downstream of tributary.
3050	**TRIBUTARY DESCRIPTION**																Inspected the lower end of tributary at request from B&C. Visited lower portion of tributary up to the road crossing in Memorial Park. Low gradient, deeply incised. For the first 200 to 300 feet upstream of confluence, upstream of access road, the channel is incised in blackberry thicket with no floodplain. Channel is about 5-10' bottom width, about 20' top width. Occasional lower benches, mud in channel
3350	2016, 2024														X		100-foot-long boulder riffle with boulder bank protection on river right @ 3350. Some of the boulders transported a short distance downstream forming a stable base level control over about 50-100' distance
3450	2019-2023; 2135-2138	R															Relatively broad floodplain surface covered with blackberry
3675	2003-2004	R	50' long by 16' high	5													Big eroding bank on right bank just downstream of dam. Banks composed of Missoula Flood fine facies

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
3700	1990-1999, 2145-2147														X		Breached dam in creek. Dam made from stone and mortar, about 15' wide. Even though it is breached it is still a 4 to 5 foot drop over a distance of about 30 feet, and provides a stable base level control. Boulders on the downstream side of dam. Possible fish passage barrier at low flows (not at the current high flow). Currently an aluminum pipe ~8" crosses above channel at former dam, looks like it is no longer used.
3700 to 4000	2148-2156	R											depositional floodplain				Relatively broad, flat surface covered in reed canary grass. Appears to be a deposit in an impoundment behind former dam at 3700
4000	1983	R			2 to 3' boulders								boulder riffle		X		Boulder bank protection and boulders in streambed. It looks like the boulders were installed to protect the right bank and provide grade control. There is about a 2 foot drop over the riffle
4100	1975-1979								2 to 3'						X		2 to 3' high beaver dam. Exact height not clear due to high flows. Appears to be stable
4300	2157, 1968, 1970								18"						X		Beaver dam (?) with reed canary grass root mat. Unclear height due to high flow. Chewed sticks. RCG is providing added strength to apparent damn
4450	1965, 1966	L								30" PVC							Stormwater outfall from parking lot in park. Discharges onto slope about 4 feet above channel. Rocked around outfall, no notable erosion
4500	1960 - 1964										SW Kolbe Lane Single lane vehicle bridge				X		Single lane auto bridge at Kolbe lane. Wood single span lower chord about 12 to 15 feet above channel. Headcuts or small beaver dams under the bridge
11/24/2021 - Wilsonville Road to SW Boeckman Road																	
5250	2168, 2183	R								18"	SW Wilsonville Road Bridge						High bridge with 4 sets of 3 large concrete piers about 40-50' above the streambed. No apparent hazards related to the stream. There is a record of a past stream realignment project here but no obvious evidence of what was done here. Old concrete stormwater outfall into the channel on river right under the bridge
5350	no photo	R															Drainage off senior living community parking lot creates a ponded area on the floodplain on river right, at least during wet season.
5400	2186								2'						X		Small beaver dam a short distance upstream of bridge backs up water around 400 feet. The pond is confined within banks about 15' wide, only about 2' above water level.
5800	2199																Upstream end of beaver pond from dam at 5400' . Flow into pond comes from a beaver dam just 50' upstream of top of pool. Beaver clearly know how to build dams so that the pond ends just below the toe of next upstream dam.

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
5850	2201-2202								2'						X		2 foot high beaver dam just above ponded area from downstream dam
5900	2205	R								Surface water from outfall							Trickle of water entering from gully which begins at a stormwater outfall high up on hillslope/valley wall. The gully is protected with sandbags, minor erosion
6000	2206-2208								1.5'						X		Beaver dam around 18" high at upstream end of pond from the dam at 5850
6200	2220-2226	R				Small tributary											Small tributary from river right, incised in dense blackberry, enters just downstream of the small tributary. I was only able to reach the stream in one spot about 100' from Boeckman Creek confluence due to blackberry. Creek has pebble gravel bed and appears reasonably stable. No clear hazards noted
6250	2213-2216								**4 to 5' high**						X		Big (4 to 5' high) beaver dam inundating lot of area upstream from here. High dam spreads water onto floodplain for as much as 500' upstream
6200-6600	2217-2234																Ponded, meandering reach upstream of large beaver dam at 6250. Water spreads out onto floodplain. Lots of blackberry, slow walking through here.
6550	2233-2235																Large fallen cedar tree across channel. 3'-4' DBH within the ponded area upstream of dam at 6250. Seems certain to trap any wood traveling through this reach for many years to come.
6650	2240-2242								1'						X		Small beaver dam just upstream of the pond behind the dam at 6250
7000	2245-2246							2' high step							X		Small (2') step or beaver dam. Could be behind a collapsed block of root mats, or a fallen tree. Unclear due to accumulated debris, but it's backing up water similar to beaver dam
7100	2248								2'						X		Apparently stable 2' high step in channel as a rsult of a beaver dam reinforced by reed canary grass sod. Looks very stable and long lived
7300	2259-2267								**3-4'**						X		Big beaver dam with lots of reed canary grass covered floodplain that is flooded by this dam
7300-8000	2270-2282																Reach mostly impounded by the big dam at 7300. Impounded area continues almost up to the footbridge. Impenetrable blackberry throughout this reach
8150	2284-2286										Boeckman Creek Trail Bridge						Boeckman Creek trail footbridge crosses over creek. At this location, stream is flowing, not ponded; gravel, with riffle-pool morphology and small wood. Lots of blackberry

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
8150-8650																	Mostly gravel riffle-pool reach from bridge to 8650; low floodplain with blackberries, not ponded reach
8650	2299-2303	L															Gully and drainage from river left. It appears that a PVC culvert pipe under the trail had washed out and was moved out of the way. Former homeless encampment here.
8890															X		Resistant bedrock in channel underwater near the dam.
8900	2308								2' high dam						X		Beaver dam, around 2 feet high. Lots of blackberry
9070															X		Apparent bedrock under water
9075	2315								2' high dam						X		Another beaver dam short distance upstream of the one at 8900, also resistant bed here underwater based on feel (not visible due to turbid water). Clearly a stable base level here
9100	2317-2324									18" pipe and box							Stormwater outfall and energy dissipator on the right bank, just above the beaver dam. It appears to be sitting on basalt bedrock. It remains clear of debris. Appears to be working well, no concerns or hazards noted
9300	2329-2331								2' high dam						X		Small beaver dam ~2' high; pond backs up to toe of the next upstream dam
9500	2335-2337								**5' high**						X		Tall but narrow beaver dam. Dam is built off of one large fallen log. 5 feet high by 15 feet wide
9700	2343-2344								**3-4' high beaver dam**						X		Large beaver dam, difficult to access. Ponds water a far distance upstream.
10000	2345-2346								2' high dam						X		Beaver dam near mapped outfall. Only viewed from the trail, did not get close to it. Difficult access
10000-10500	2350-2351																Reach with mostly ponded water. Beaver pond is effectively inundating much of the valley floor throughout this reach
10500		R								plastic pipe							Large pipe down long hillside on river right valley wall. Did not visit except from trail across the valley

***Appendix A2** : Record of Field Observations in Meridian Creek*

Date: 11/26/2021

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
11/26/2021 - SW Wilsonville Road to SW Willow Creek Dr																	
775	2372-2383										Wilsonville Road				X	Fix drainage at culvert	Meridian Creek crossing at Wilsonville Road. Clogged, apparently undersized (approx 30") culvert under high road prism under Wilsonville Road. Culvert is clogged on the upstream end with about 2 feet of sediment which is backing up a wedge of sediment for about 50 feet. There is a outfall (or possibly overflow pipe inlet) above main culvert, 6" plastic pipe. This is a hydromodification risk factor that should be evaluated. Unlikely there's enough water that it could overtop the road. But could plugging the culvert and an extended period of standing water following a storm destabilize the road embankment?
850	2388-2392									18" PVC							Section of corrugated plastic culvert pipe, about 6' long, along side of the channel. It appears to have been washed down from upstream
875	2393							18" step							X		Small log jam forming a 1.5' foot high step in the channel. Gravel sediment stored in a wedge behind it. If this were to fail or collapse, sediment could easily clog the rest of the culvert at Wilsonville road
1000	2415-2417							4' high waterfall in bedrock`							X		Waterfall in consolidated fine-grained bedrock. Marks transition from alluvial bed below and a bedrock stream above the waterfall.
1050	2421-2425									18" PVC							Stormwater outfall, 18" PVC on river right, about 6' above where the channel is in bedrock.There is a concrete support under the outfall which is undermined and failing. This is where the 6' long piece of pipe at Sta. 850 came from
1200	2448-2452							2' step							X		Boulder step in consolidated mud bedrock. Boulders may have been placed here for some reason,. Perhaps they were installed as bank protection and fell into the creek.
1300	2456-2466														X		Culvert outlet at top of reach under SW Willow Creek Drive. Culvert has a metal grate at the outlet that is clogged mostly by leaves. Some water is leaking through but this is a low flow. It is probably backwatered during storm flow. Currently, there is standing water about 2' deep under Willow Creek Drive behind the clogged grate. The channel upstream of Willow Creek drive is a stormwater basin which may reduce the amount of runoff from the developed area, but this culvert should be evaluated in the context of hydromodification upstream.

Appendix A3 *: Record of Field Observations in Arrowhead Creek*

Date: 1/25/2022

Location		Bank Features				Tribu-tary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
13+50	10							3 (2')			Arrowhead Road; freespan truss			3			Arrowhead Road. Freespan concrete truss. Active headcutting at creek under bridge. Mitigated somewhat by beaver activity upstream. Unknown irrigation line (6" PVC) in channcel crosses creek several times.
18+50	5-9								Series of 5 beaver dams. See notes for locations and height								Series of beaver dams. Ramps and chew suggest active site. Dams (Stationing and Height): 18+50 and 17+30 = 18" high; 16+80 = 24" high; 15+90 = 12" high; 14+80=30" high
18+80	4												old crossing	1			Old road bed/crossing. Approach fill still present and evident in LiDAR. Crossing not evident.
23+00	3												rock groin on left bank				Boulder groin on left bank at toe at apex of meander bend. Upper bank ~55' high but no evidence of active erosion. Remnant training structure.
25+50	2						hardpan										Channel flowing on hardpan. Channel 6' wide incised 2'-3' feet into floodplain. No evidence of floodplain activation. Stable channel profile.
26+00	1									Culvert at trail				3			Double concrete box cultert 5'x5' (x2). Only looked at outlet. Drop of 2'-3' to channel. Concrete base of culvert failing. Water subbing under structure. High risk to infrastructure.

Reach Name: Newland Creek Trib. - Reach 1 Date: 10/26/2023 **Appendix A4**

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
35+50	PM 1									24" Dia CPP							Culvert at Kahle Rd 24-in CPP perched 6-ft above channel bed. Stormwater from road enters uncontrolled. Concrete rubble placed at culvert outlet. Outfall relatively stable though channel downstream is highly incised compared to upstream.
34+50	PM 2							3-ft over 10-ft (4)									Channel highly incised into erodible hardpan. Steep on both banks with a narrow channel notch 4-ft wide by 4-ft deep. Headcut 3-ft distributed over 10-ft channel not even deeper and narrower downstream of headcut.
32+50	PM 3							4-ft over 6-ft (5)									Larger headcut 4-ft over 6-ft incised into erodible hardpan. Steep banks.
30+75	PM 5							3-ft (3)									Headcut 3-ft held up by maple roots.
30+00	PM 6							4-ft over 15-ft (3)									Two closely spaced headcuts. 4-ft over 115-ft. Harder bedrock exposure along right bank. Unsure if its continuous across channel.
28+00	PM 7							4-ft (5)									Headcut 4-ft tall. Risk level 5.
26+50	PM 9							3-ft (5)									Headcut 3-ft tall. Risk is 5.
22+00	PM 12								debris jam of small wood								Debris jam holds 18-in of grade. Fine sediment accumulated upstream.
20+00	PM 14							2-ft (3)									Downstream extent of assessment

Reach Name: Kruse Creek

Date: 10/26/2023

Appendix A5

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
32+00	PM 1									24" Dia CMP							Culvert 24-in CMP perched 4-ft above channel. Large scour hole and circular erosion. Undercut.
25+00	PM 3							4-ft (5)									Headcut 4-ft. Risk 5
24+00	PM 4					right gully											Small gully entering from right bank 2-ft wide, 3-ft wide. Appears to be stormwater runoff. Extends to conifers 40-ft upslope.
15+00	PM 6					right spring fed											Drainage from landslide area enters from right bank. Flow equal to or exceeds main channel flow. Flow is piping through landslide along bank.
11+00	PM 7					left spring fed											Tributary or drainage input from left bank. Might be from landslide. Steep drainage. Could be highly erosive if additional water is delivered to the drainage.

APPENDIX B

Field Maps for

Boeckman, Meridian, Arrowhead,

Newland, and Kruse Creeks

Secondary Location
Basalt Creek north of Day Rd

Sheet 7

Basalt Creek

W RailRoad

Coffee Creek

Sheet 6

Secondary Location
Boeckman Creek north of Boeckman Rd

Sheet 4

Priority Location
Basalt Creek South of Ridder Rd to wetlands

Secondary Location
Meridian Creek at Landover Park

Sheet 3

Advance Rd

Villebois

Priority Location
Boeckman Creek between Wilsonville Rd and Boeckman Rd

Sheet 2

Sheet 5

Town Center

Priority Location
Boeckman Creek near Memorial Park

Secondary Location
Arrowhead Creek south of Wilsonville Rd

Maxar

Legend

Hydromodification-Related Capital Projects

- Erosion Prevention/Flow Bypass
- Instream Channel Improvement
- Upland Flow Control (Detention or Infiltration)
- Completed
- Field Observation Locations
- 43 E&S Problem Area ID
- COW Property
- Easements
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Stream Line
- Streets

Accessed By: MGLASS at 08/23/2021

Path: Q:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\Modeling Workshop\Stream Assessment.aprx

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Planning Commission Meeting - March 13, 2024
Stormwater Master Plan

Date: 8/23/2021

Stream Assessment

Legend

- Boeckman Creek Stationing (500-ft)
- Boeckman Creek Stationing (100-ft)
- Surficial Geology (Ma et al., 2012)
- Completed
- Instream Channel Improvements
- Erosion Prevention/Flow Bypass
- Field Observation Locations
- Outfall (COW)
- Stormwater Vault (COW)
- Stormwater Basin (COW)
- Storage Ponds (COW)
- Culvert
- Sewer Line (COW)
- Swales (COW)
- Problem Areas
- Land Use (Vacant to Planned Residential Development)
- COW Property
- Roads
- Taxlots

Matchline

SW Wimbledon Cir S
SW Courtside Dr
SW Valley St
Boeckman Creek
SW Rose Ln
SW Wilsonville Rd
SW Kolbe Ln
SW Schroeder Way
SW Montgomery Way
012
Memorial Park

Surficial Geology Key
Af - Artificial Fill
Alf - Fine Alluvium
Alck - Creek Alluvium
Ls - Landslide
Mfc - Coarse Flood Deposits
Mff - Fine Flood Deposits

0 150 300 600 Feet

Legend

Matchline

Height above Channel (ft)

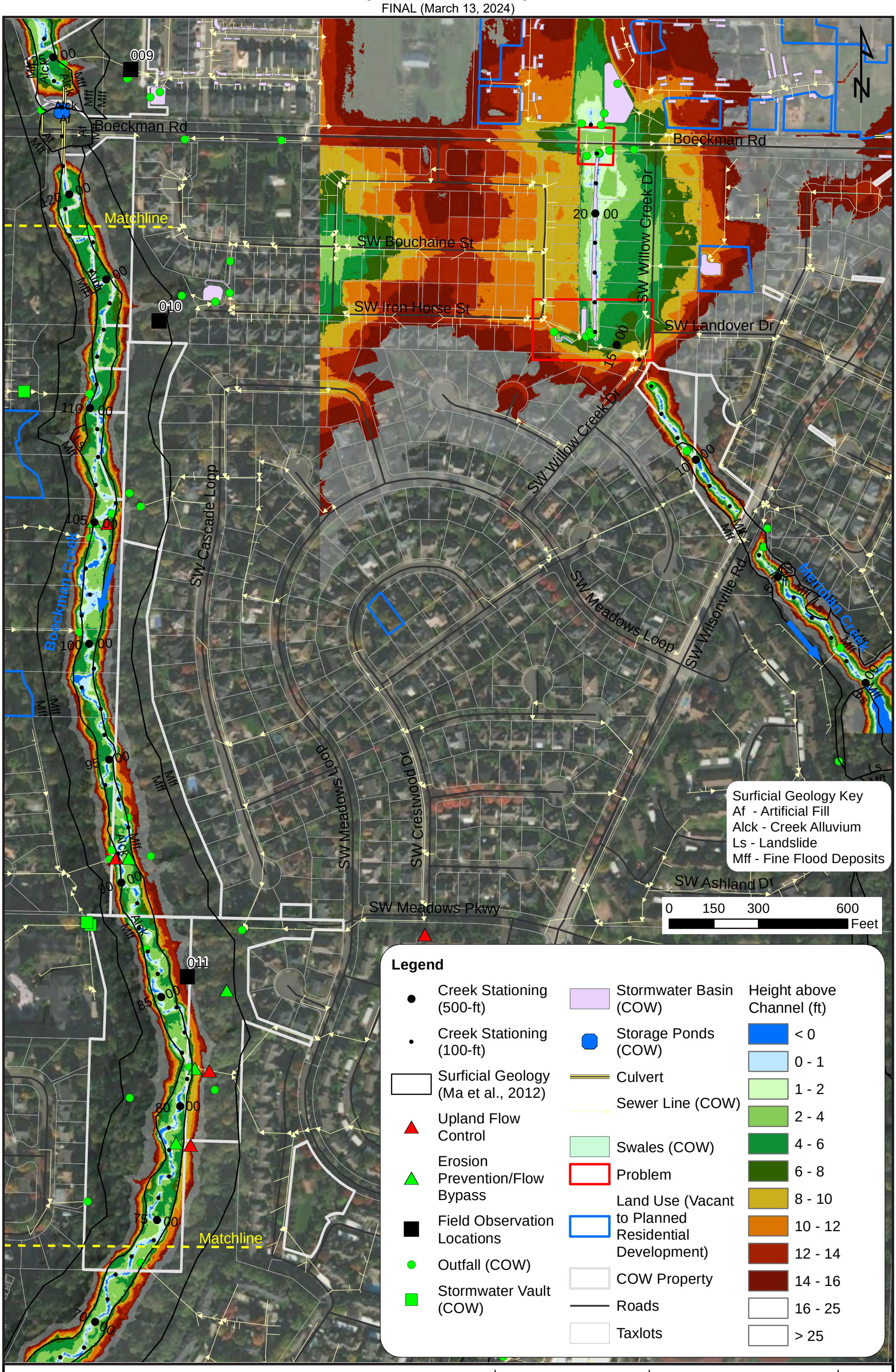
< 0 | 0 - 1 | 1 - 2 | 2 - 4 | 4 - 6 | 6 - 8 | 8 - 10 | 10 - 12 | 12 - 14 | 14 - 16 | 16 - 25 | > 25

Boeckman Creek Downstream (1 of 3) - Priority Location

Wilsonville Stormwater Master Plan

WATERWAYS CONSULTING, INC. Santa Cruz, CA | watways.com | Portland, OR

FIGURE 2

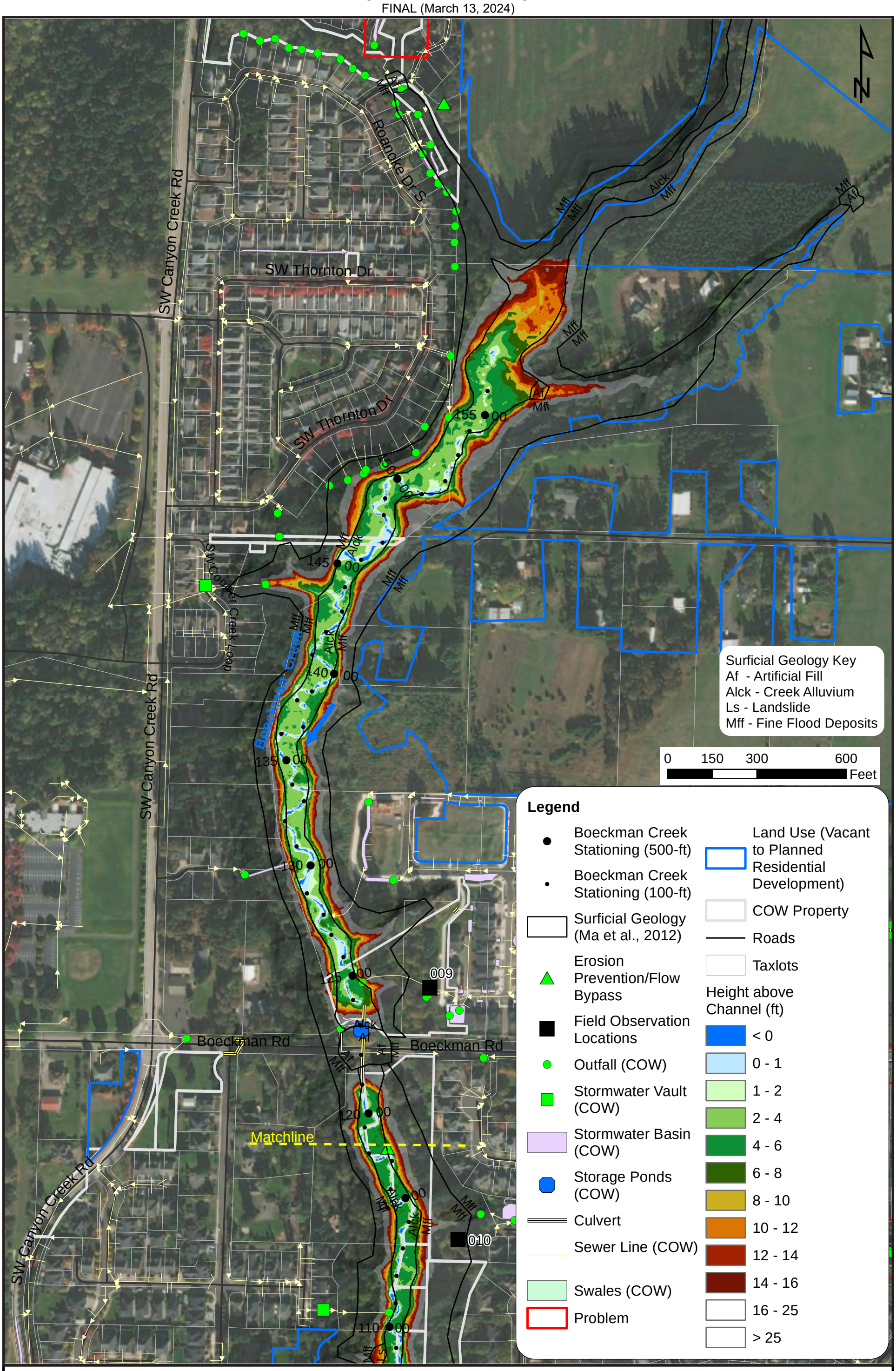


Boeckman Creek Mid (2 of 3) - Priority Location

Wilsonville Stormwater Master Plan

WATERWAYS CONSULTING, INC. Santa Cruz, CA | watways.com | Portland, OR

FIGURE 3



Boeckman Creek Upstream (3 of 3) - Secondary Location

Wilsonville Stormwater Master Plan

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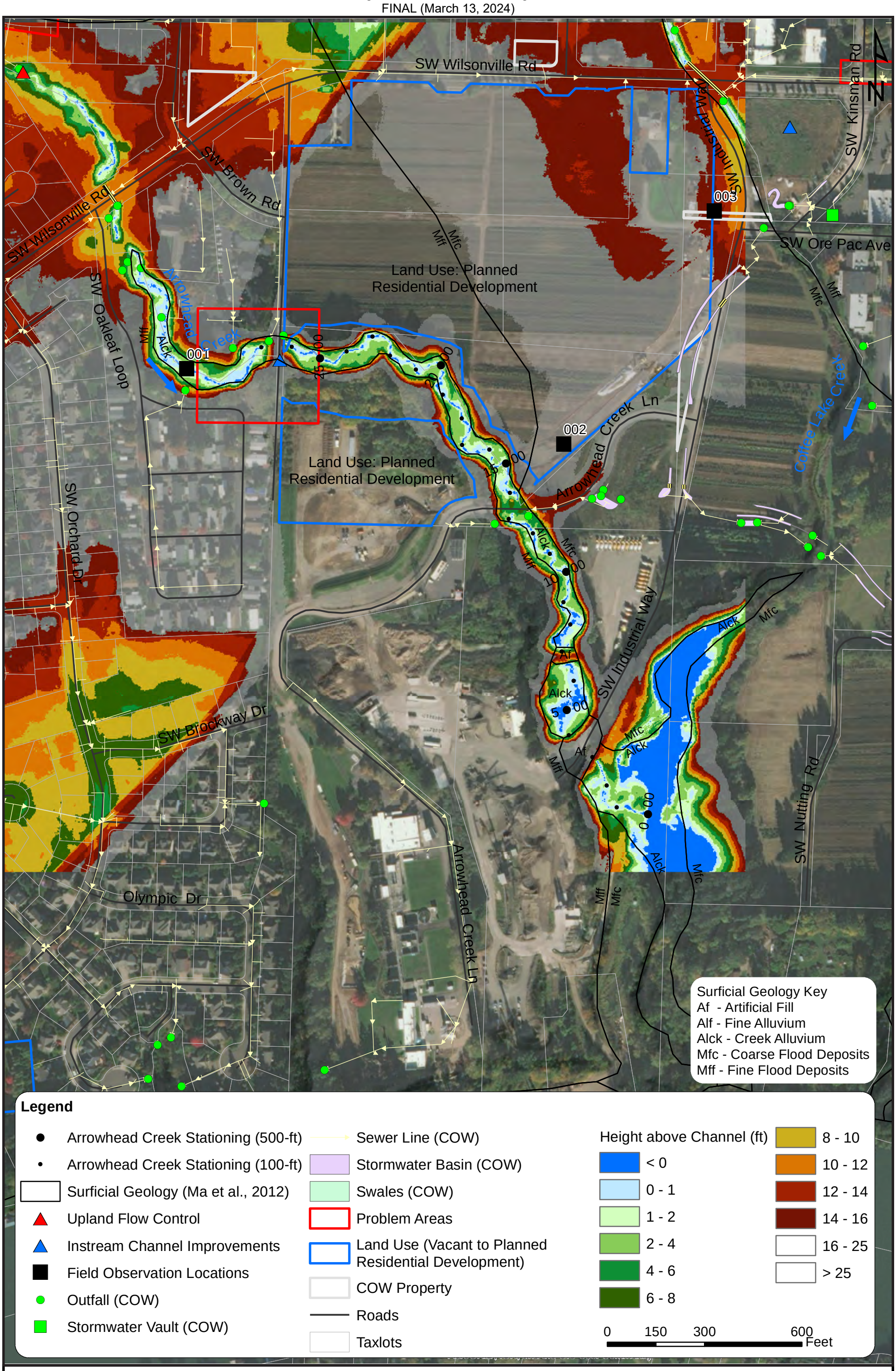
FIGURE 4



Arrowhead Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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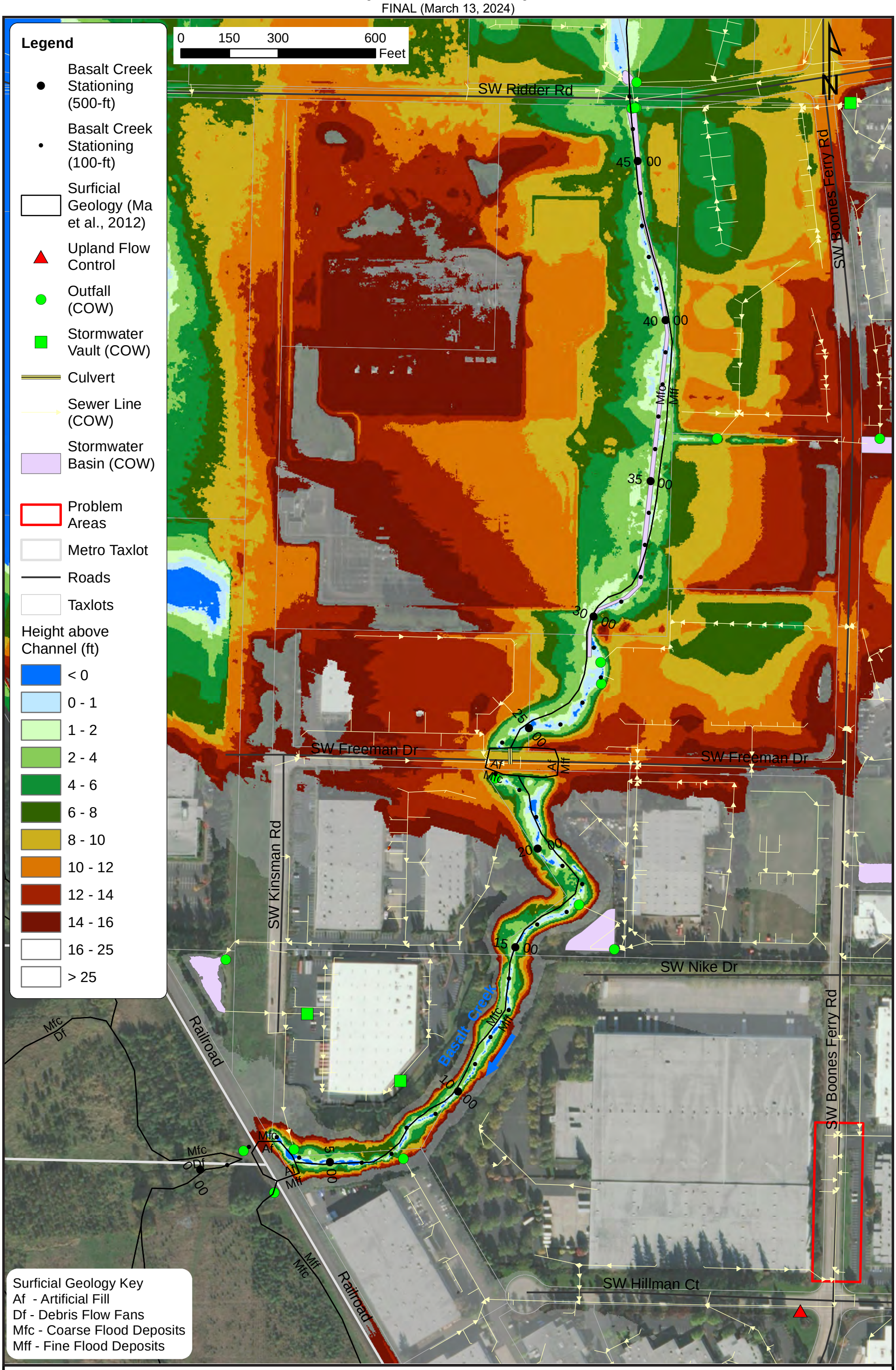
FIGURE 5



Basalt Creek Overview - Priority Location

Wilsonville Stormwater Master Plan

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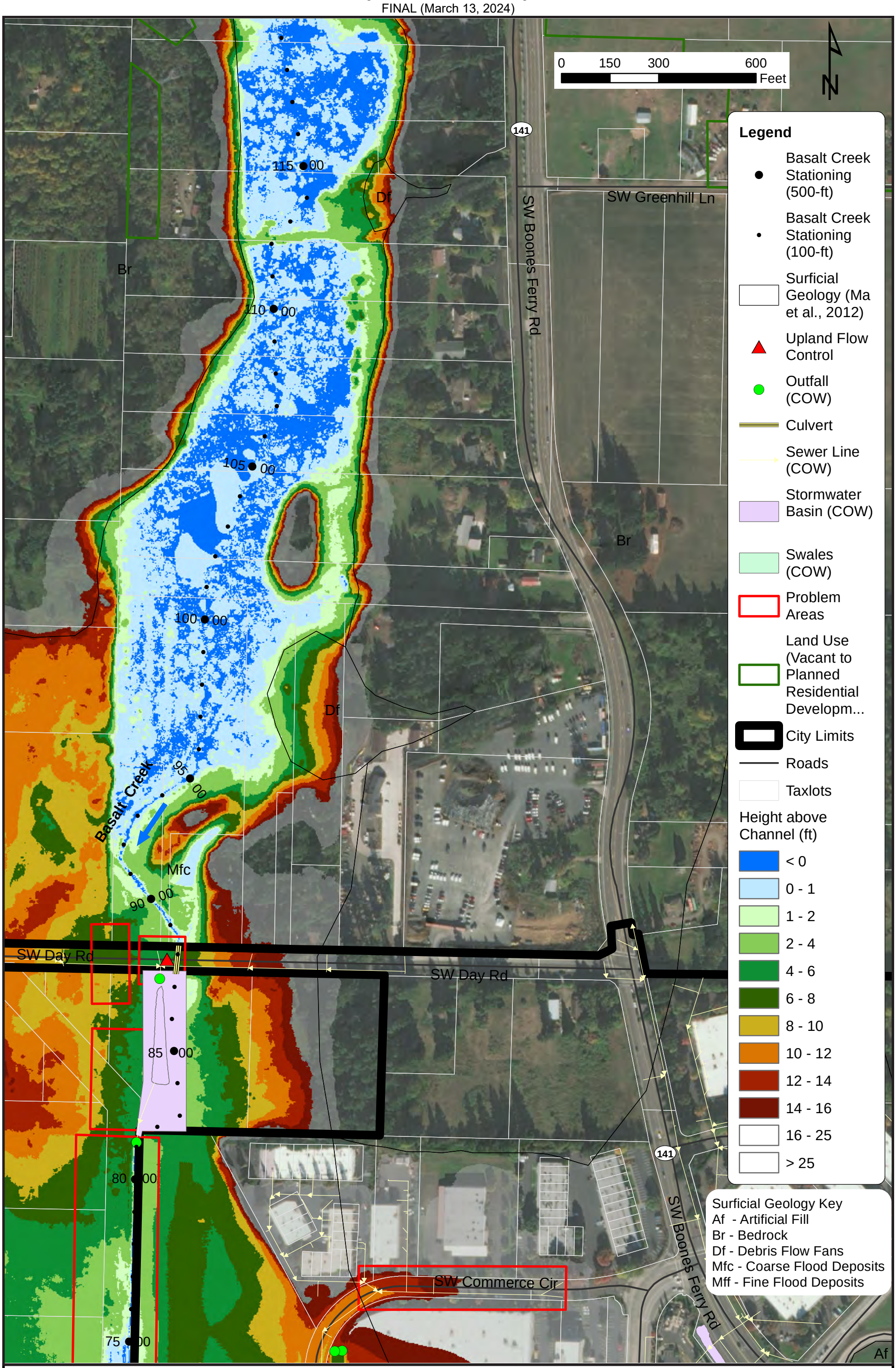
FIGURE 6



Basalt Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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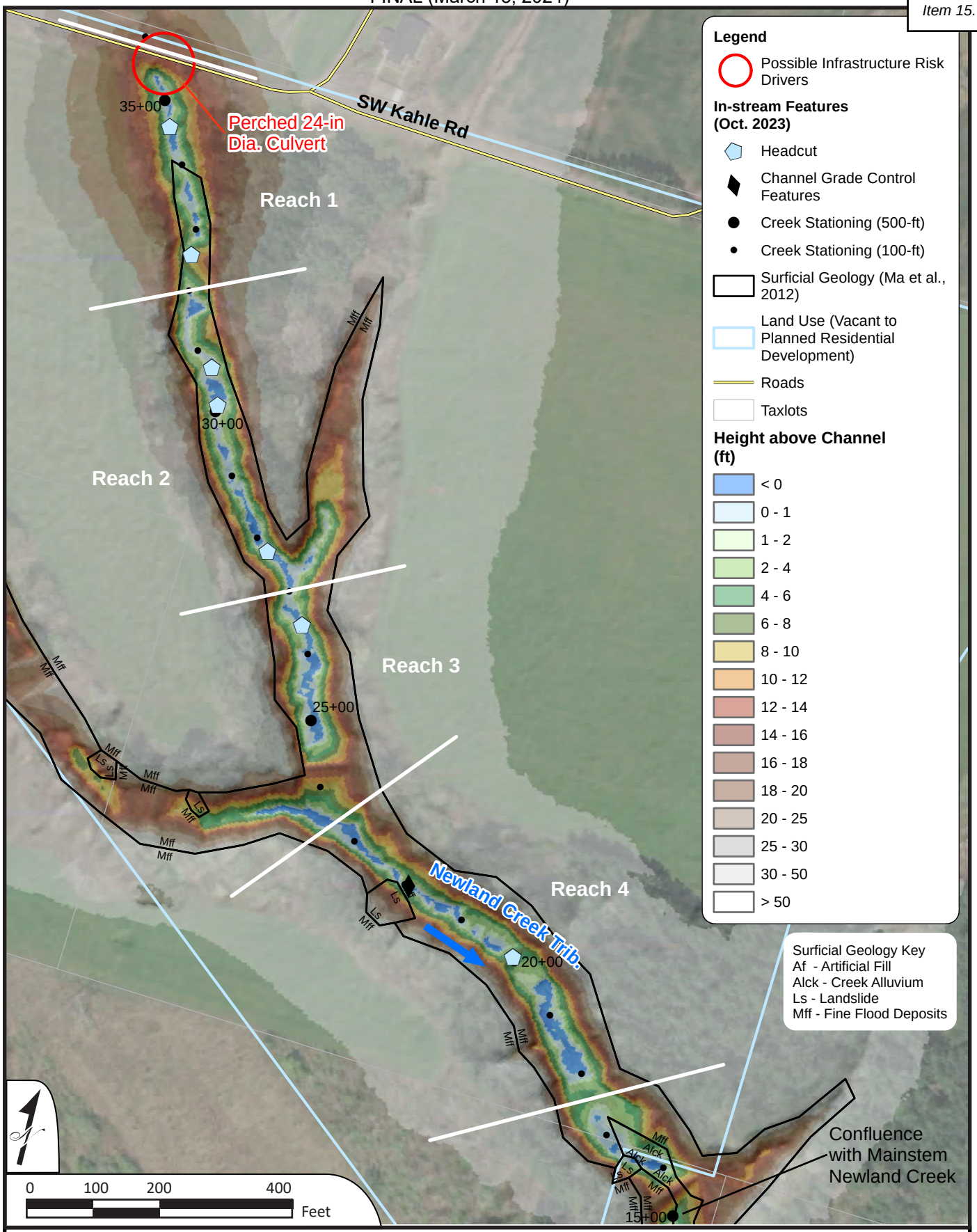
FIGURE 7



Newland Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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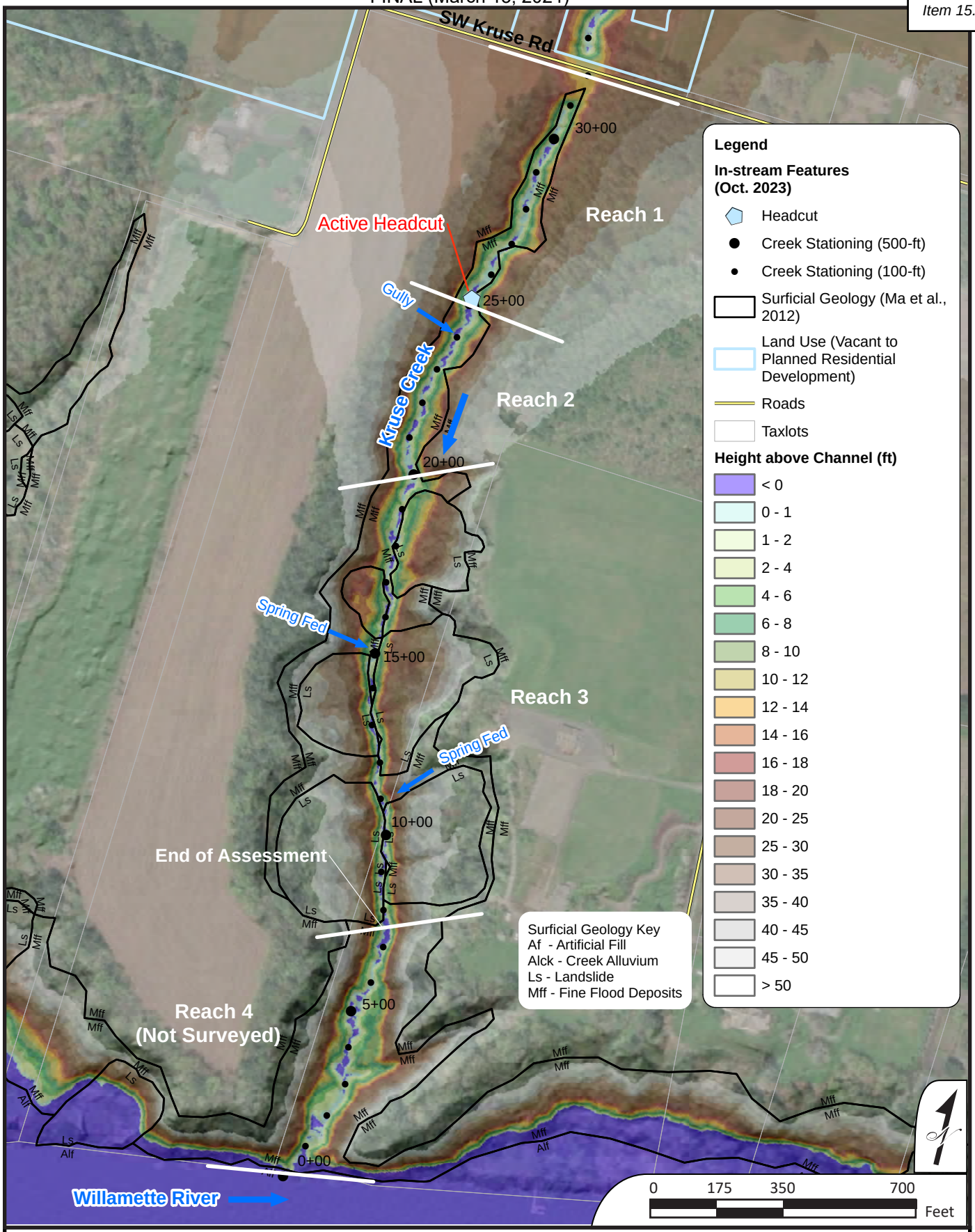
FIGURE 8



Kruse Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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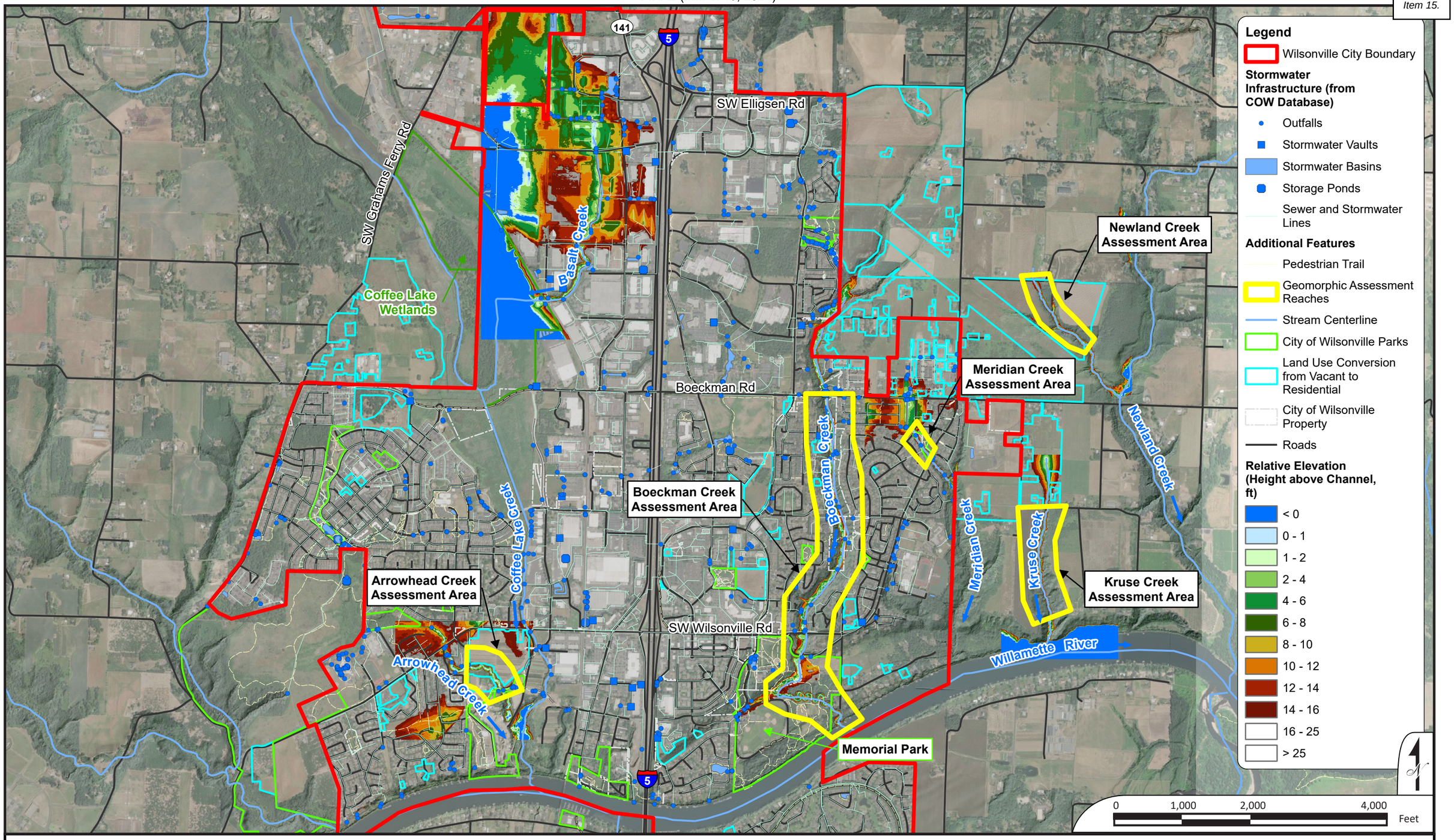
FIGURE 9

APPENDIX C

Relative Elevation Maps for Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks in Wilsonville Oregon

(Overview PDF; full data sets are provided as .tif digital files)



Relative Elevation (Height above Channel) Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE C1

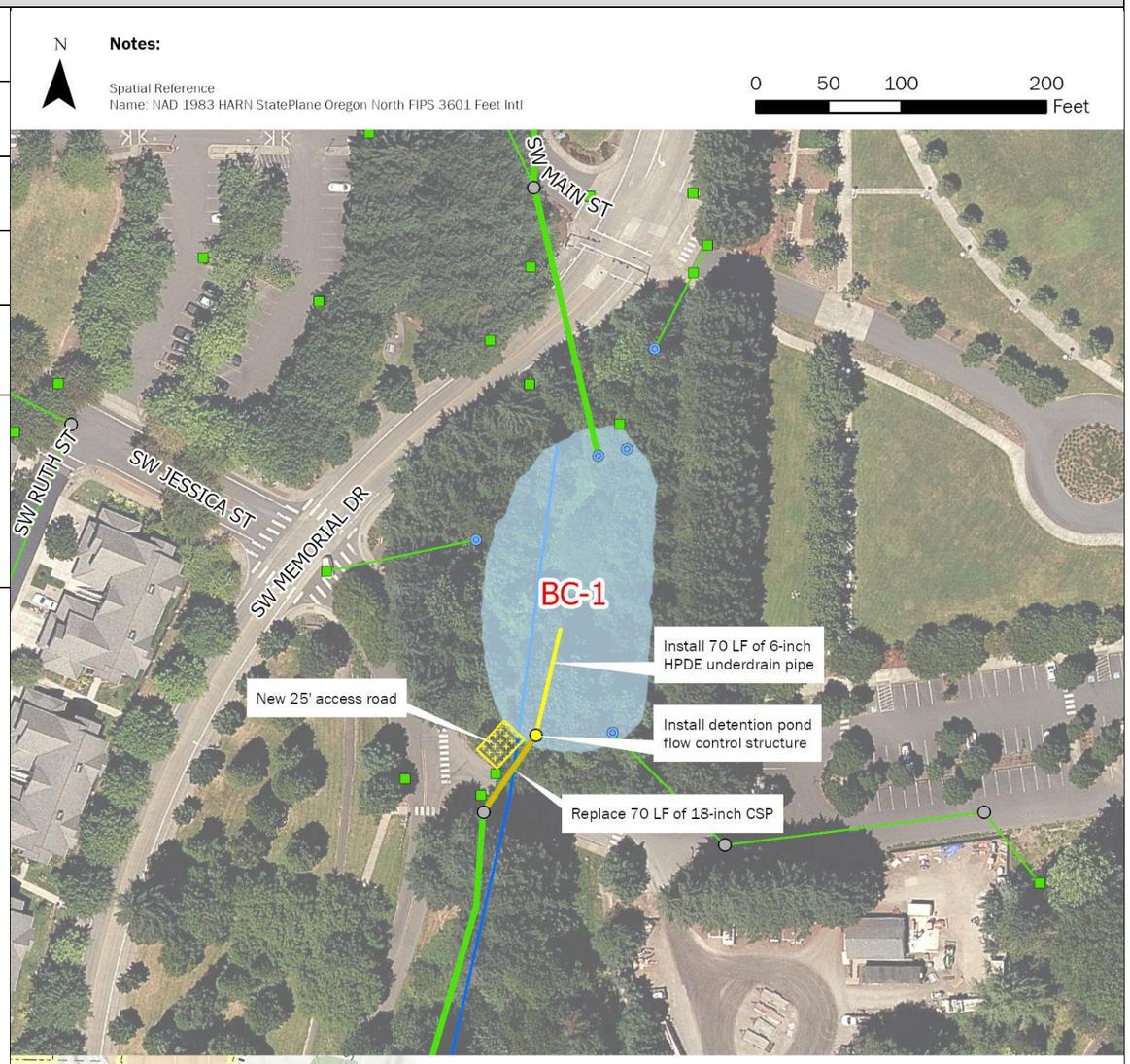
APPENDIX D (provided separately)

Digital Folders Containing Georeferenced Photographs from Boeckman and Meridian Creeks (including .kmz files with geolocated thumbnails)

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



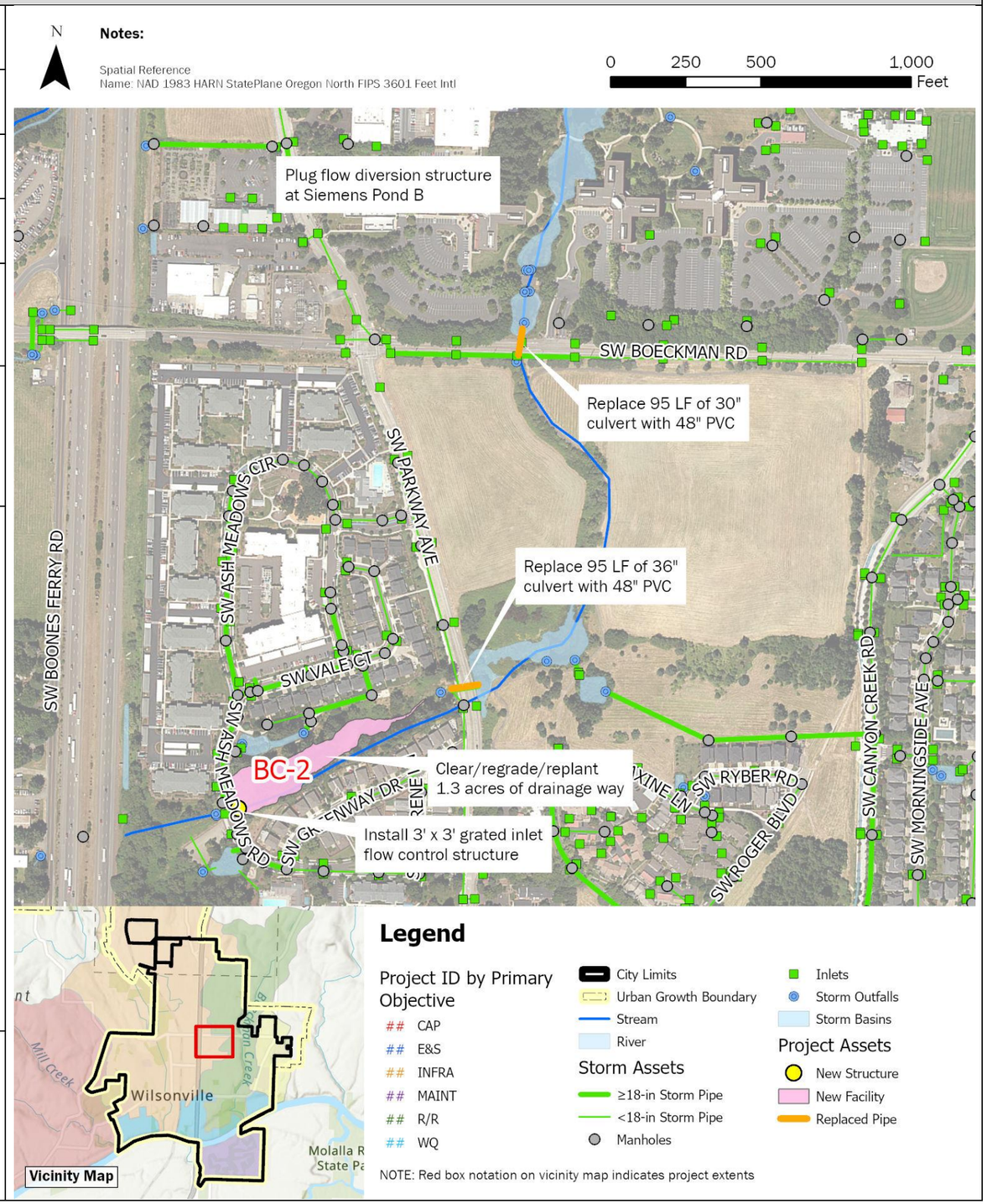
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$1,407,000
	Design / Construction Admin. (13.5%)	$190,000
	Engineering & Permitting (20%)	$281,000
	Total Cost	**$1,880,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Upsize 80 LF of 36-inch culvert at Parkway Ave (main barrel) to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		



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Wilsonville Stormwater Master Plan

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Capital Project Fact Sheet

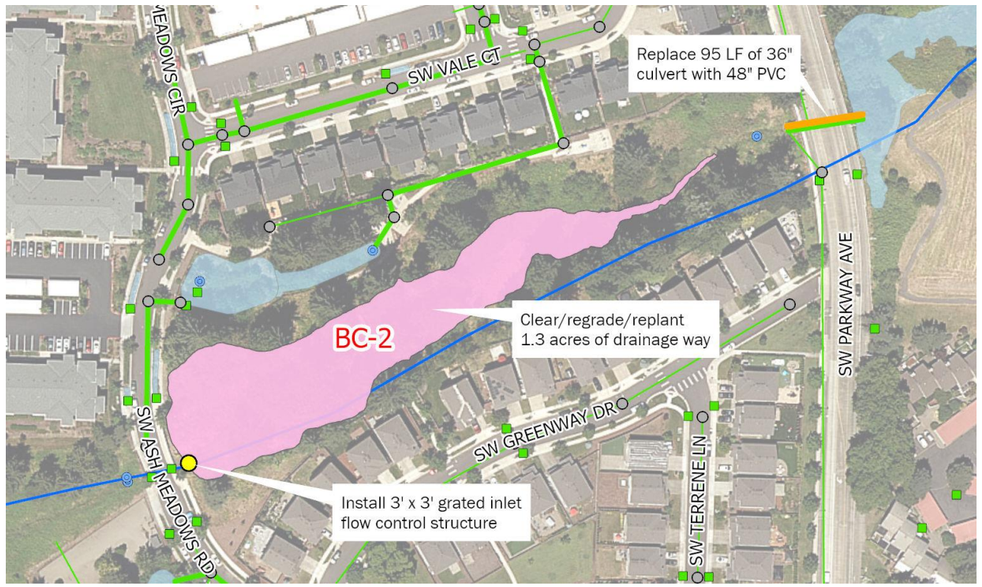
BC-2 – Ash Meadows Flow Mitigation

BC-2	Ash Meadows Flow Mitigation	
Design Considerations / Assumptions	• This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions. • This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road. • Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet. • This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions. • The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.	
Estimated Project Cost	Capital Expense Total	$1,737,000
	Design / Construction Admin. (13.5%)	$234,000
	Engineering & Permitting (50%)	$869,000
	Geotechnical	$100,000
	Total Cost	**$2,940,000**
Project Cost Notes	• The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area. • Clearing and plant restoration is necessary for entire area to 190 ft elevation. • Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project. • A 50% Engineering and Permitting multiplier was applied based on design cost estimate. • A 15% Traffic Control/Utility Relocation multiplier was applied based on design cost estimate. • A 20% Surveying multiplier was applied based on design cost estimate. • A $100,000 lump sum cost was included for Geotechnical work based on design cost estimate.	

Additional Figures

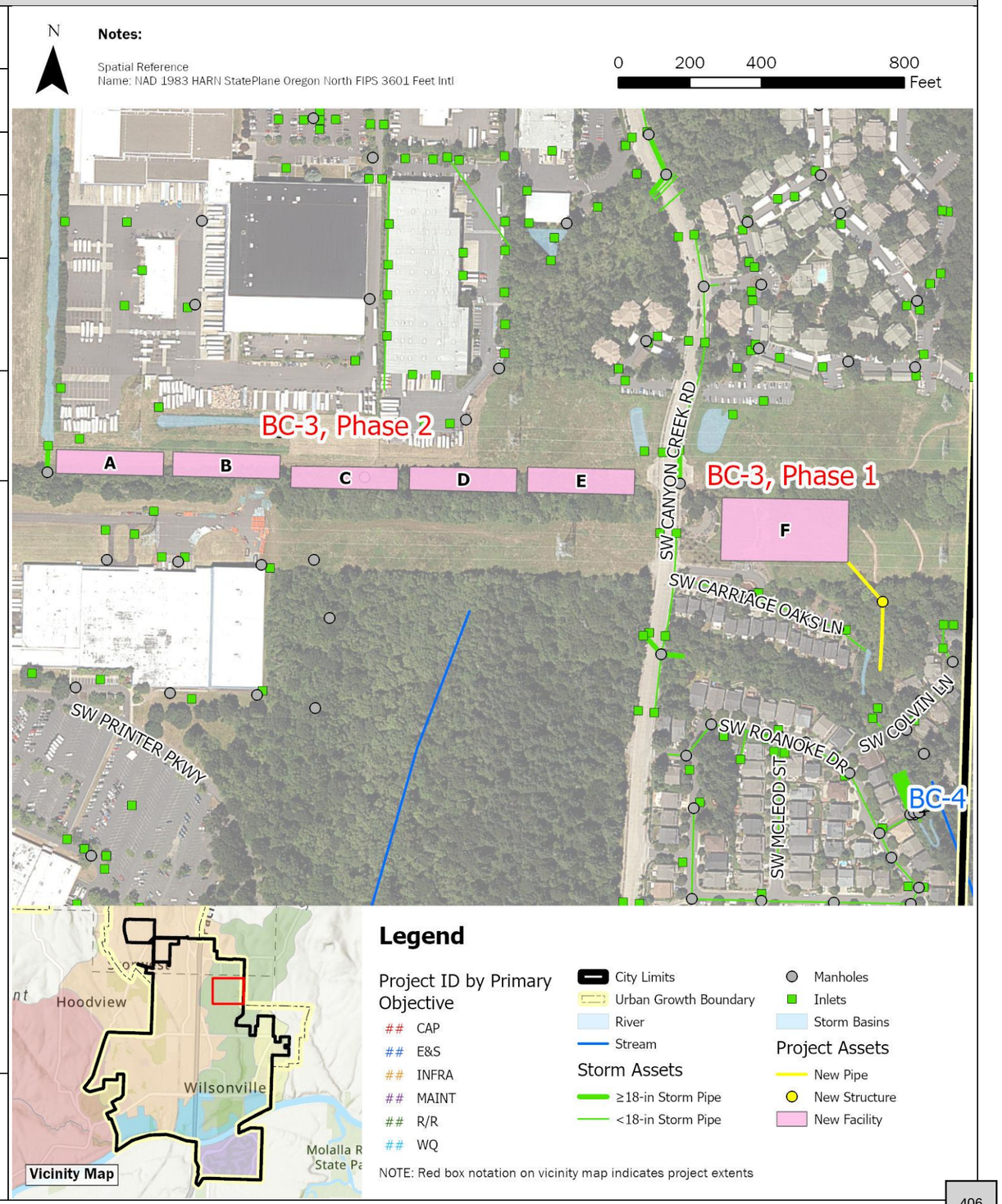
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$3,491,000	$5,253,000
Design / Construction Admin. (3.5% + $200K)	$322,000	$384,000
Engineering & Permitting (30%)	$1,047,000	$1,576,000
Total Cost	**$4,860,000**	**$7,210,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

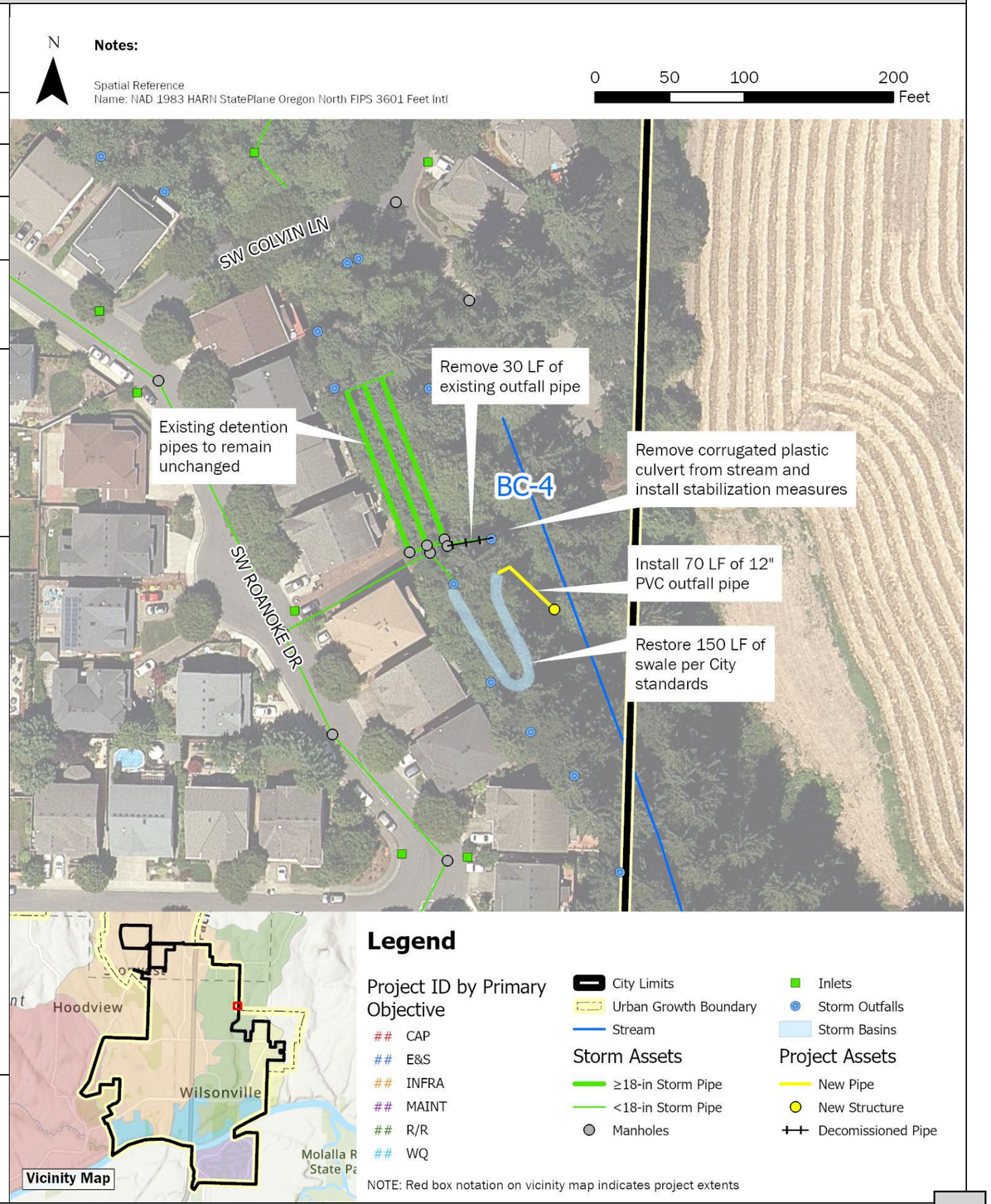
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

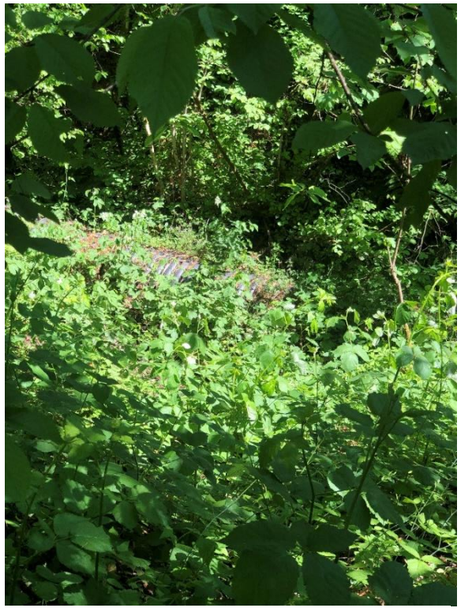
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$282,000
	Design / Construction Admin. (13.5%)	$38,000
	Engineering & Permitting (30%)	$85,000
	Total Cost	**$410,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

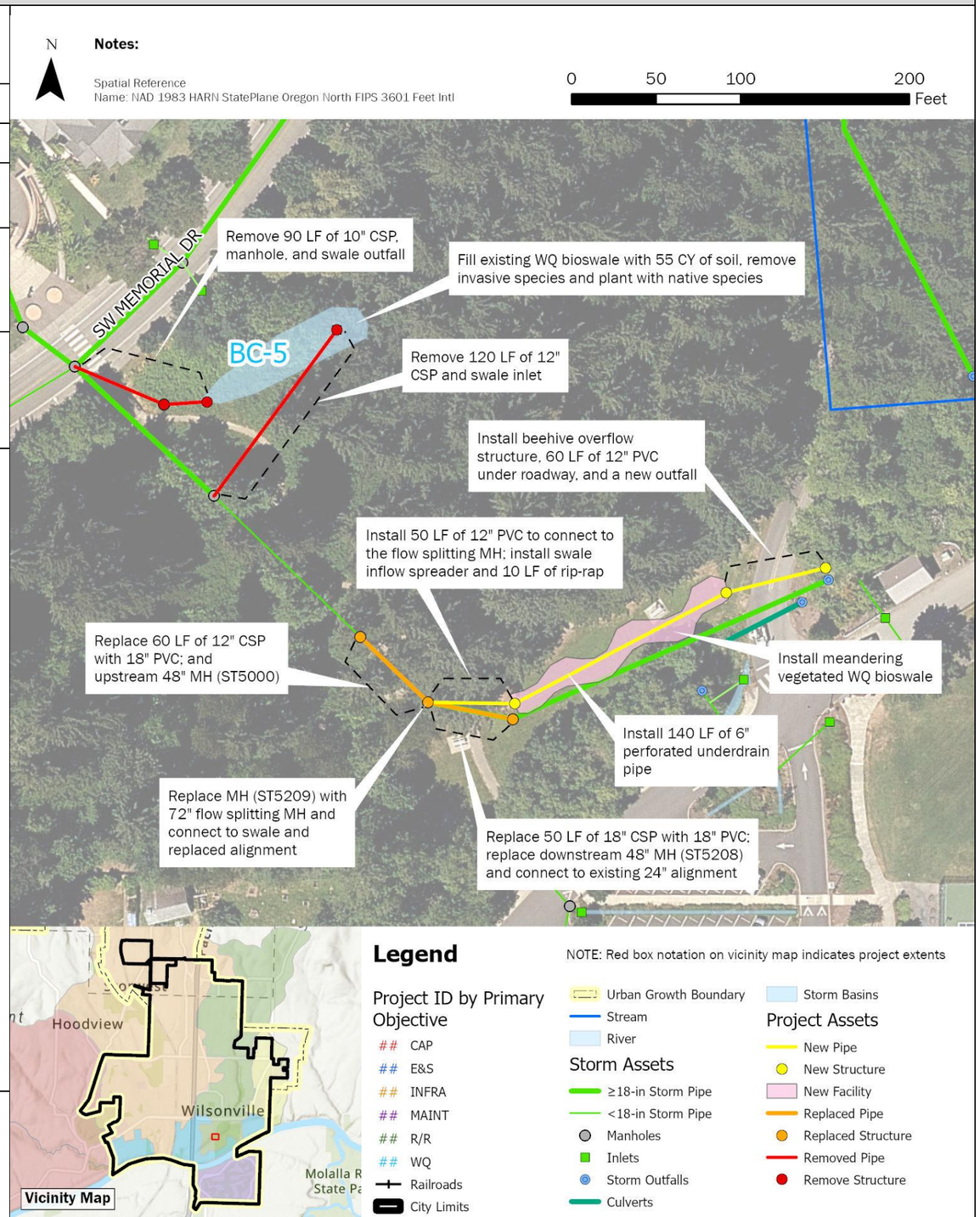


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



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Capital Project Summary

BC-5 - Memorial Park Swale Retrofit

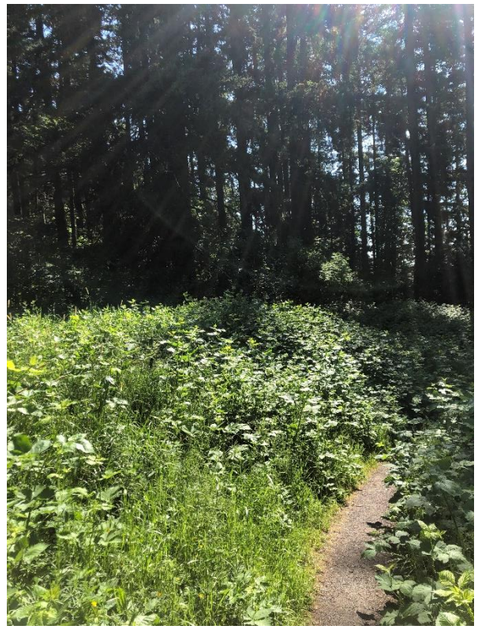
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$631,000
	Design / Construction Admin. (13.5%)	$85,000
	Engineering & Permitting (30%)	$189,000
	Total Cost	**$910,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

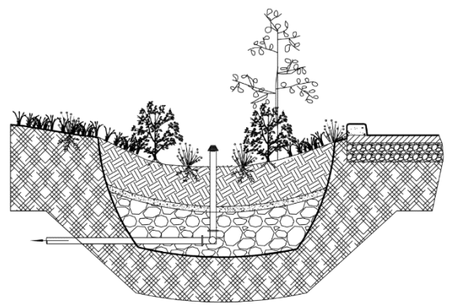
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



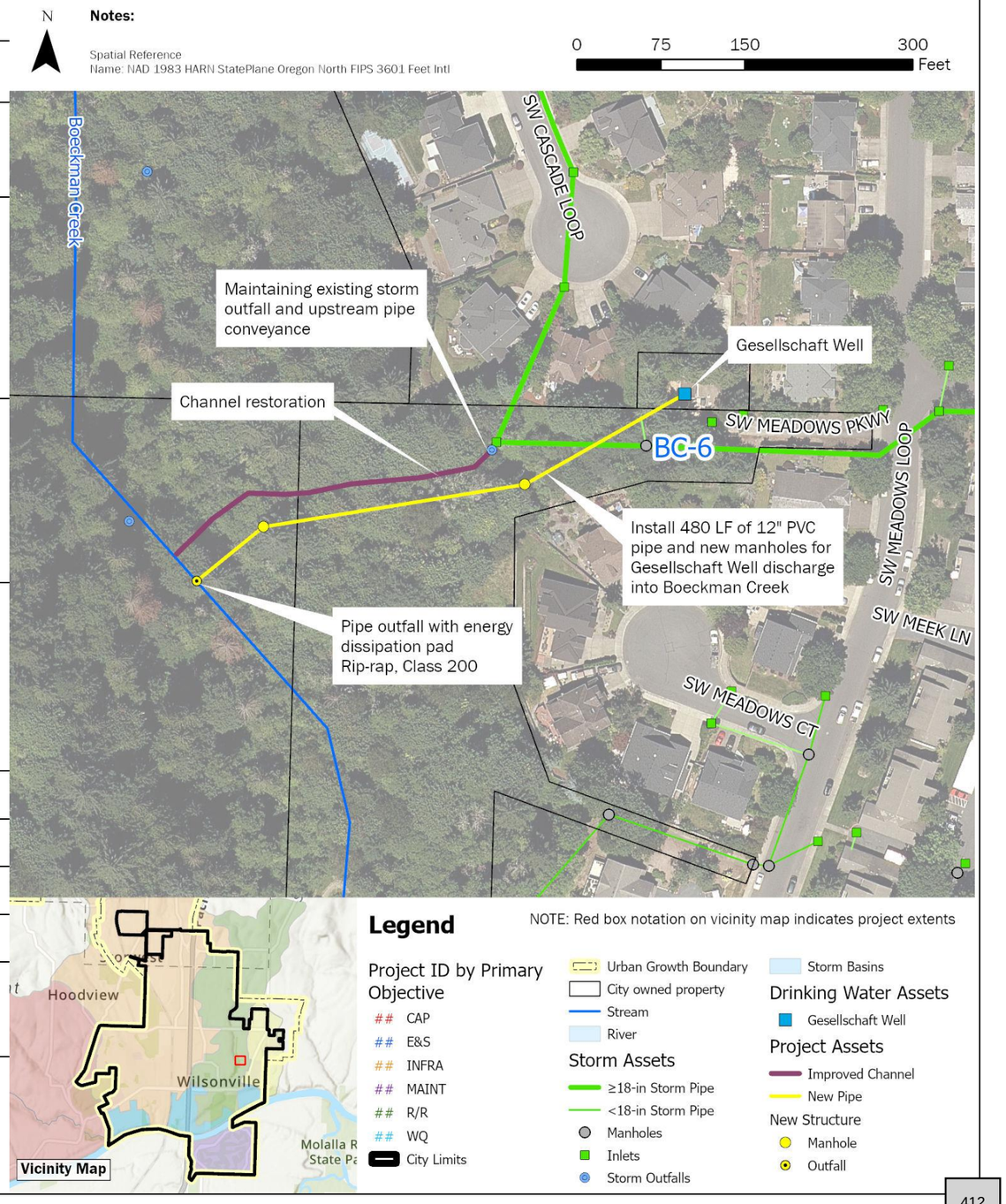
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$279,000	
	Design / Construction Admin. (13.5%)	$38,000	
	Engineering & Permitting (30%)	$84,000	
	Total Cost	**$400,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



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City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

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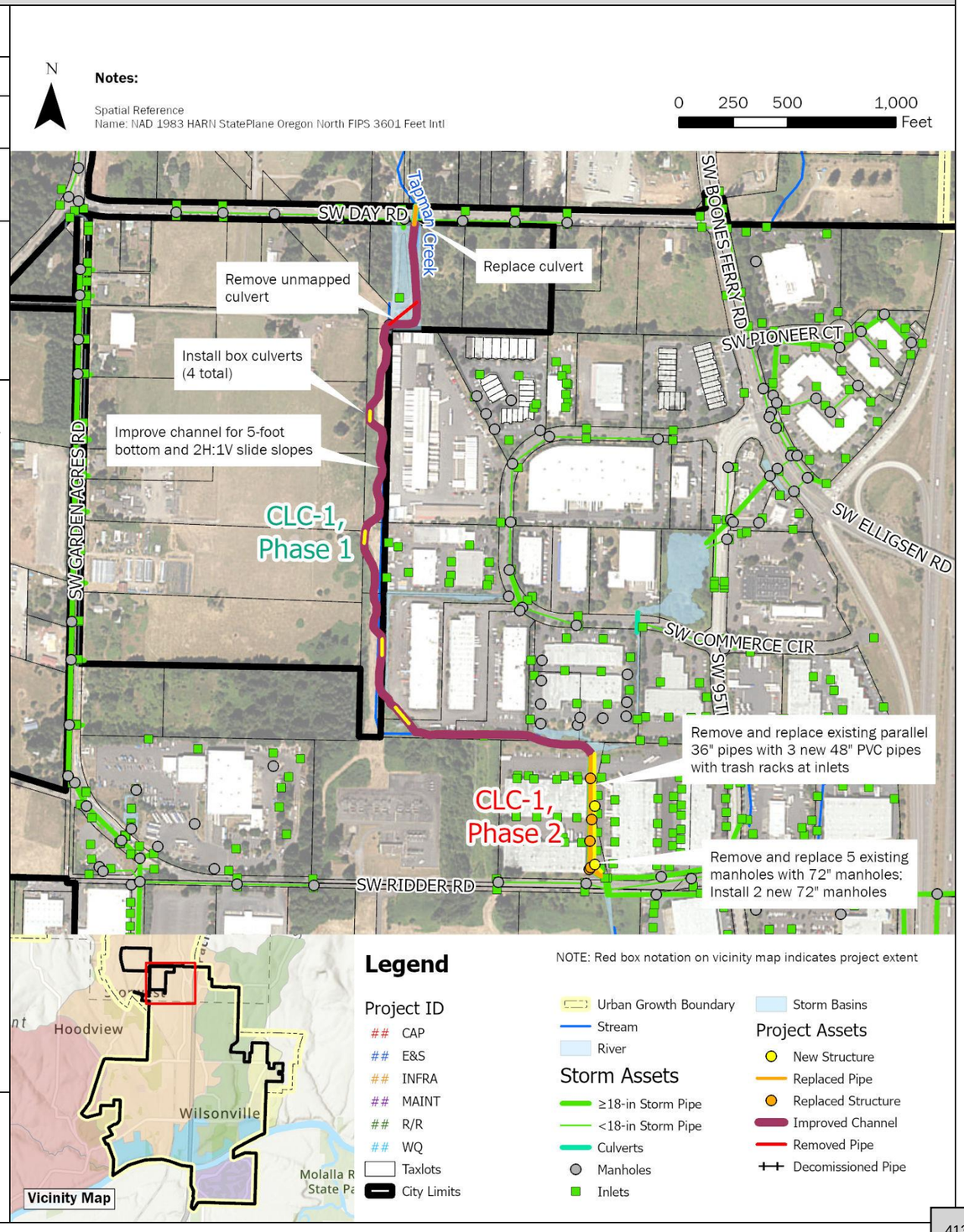
Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9	**Contributing Drainage Area**	944 acres
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing, approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF, 48-inch PVC parallel storm pipes. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1 Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

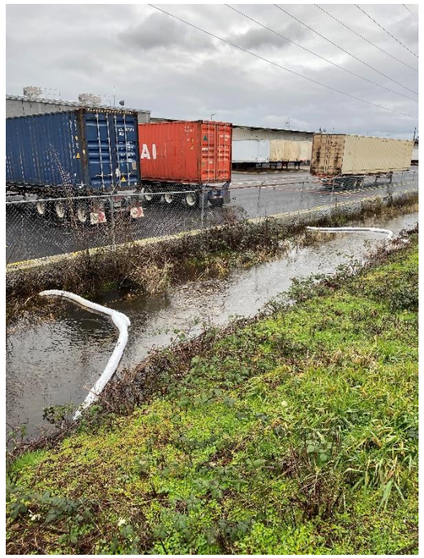
	Phase 1	*Phase 2*
Capital Expense Total	$5,860,000	$2,738,000
Design / Construction Admin. Phase 1: 3.5% + $200K Phase 2: 13.5%	$405,000	$370,000
Engineering & Permitting (30%)	$1,758,000	$821,000
Total Cost	**$8,020,000**	**$3,930,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

Additional Figures

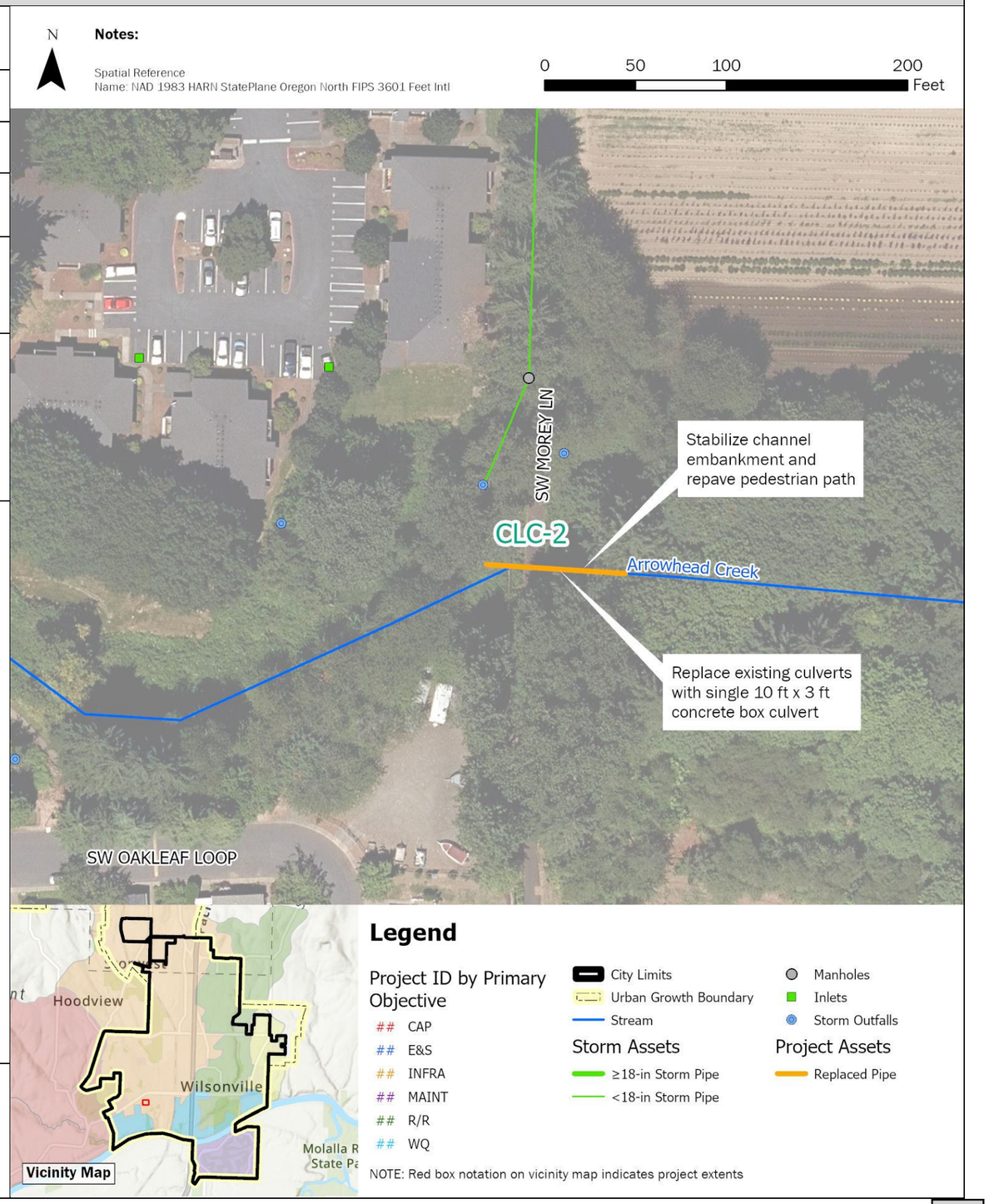
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



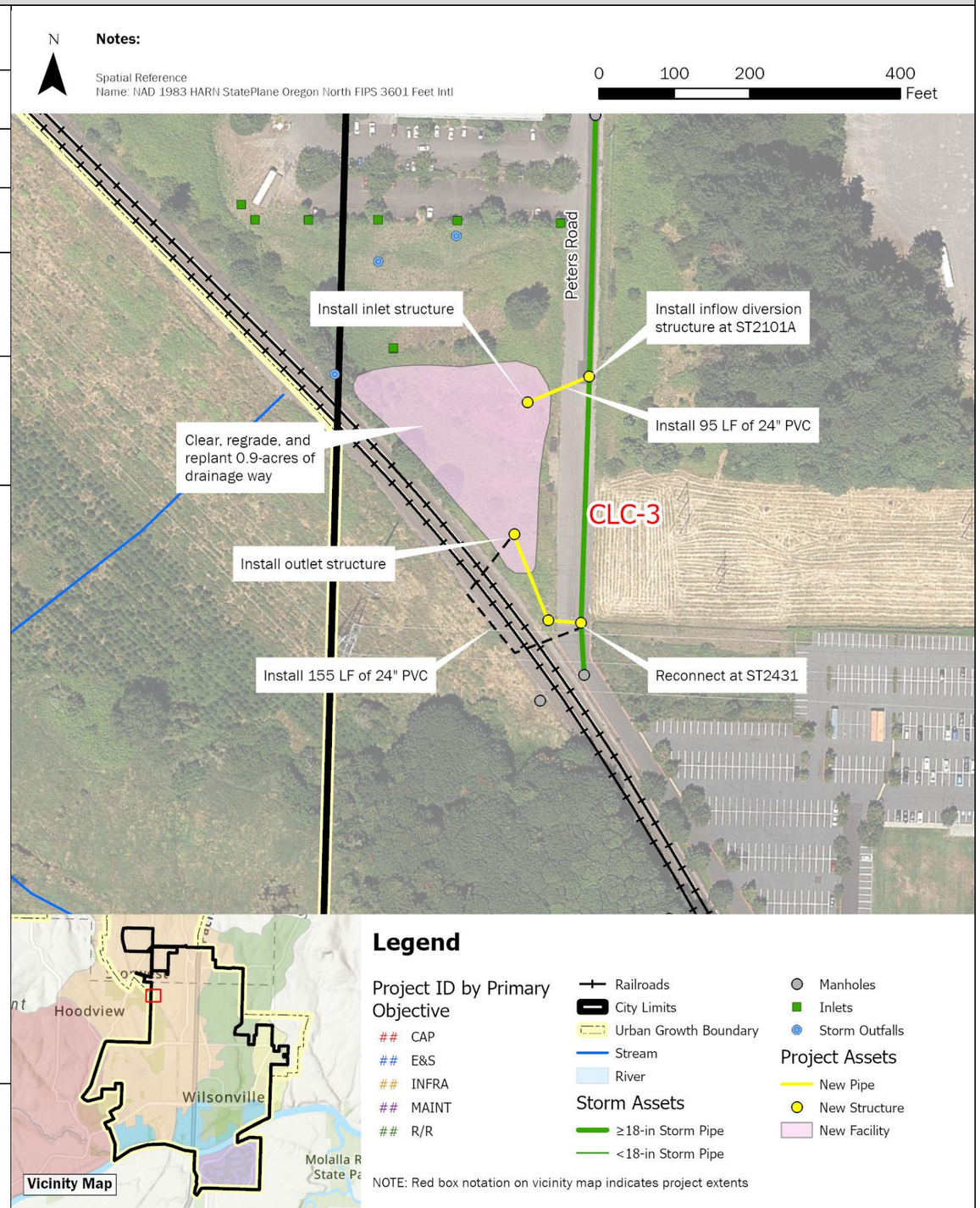
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	
Design Considerations / Assumptions	• Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts. • Culvert sizing to be confirmed with final design. • Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.	
Estimated Project Cost	Capital Expense Total	$179,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$290,000**
Project Cost Notes	• Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction. • No costs included for access - assumed access can be attained through pedestrian path. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,200 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 26,000 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install 50 LF of 6-inch HDPE underdrain pipe. • Install pond underdrain media in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.		



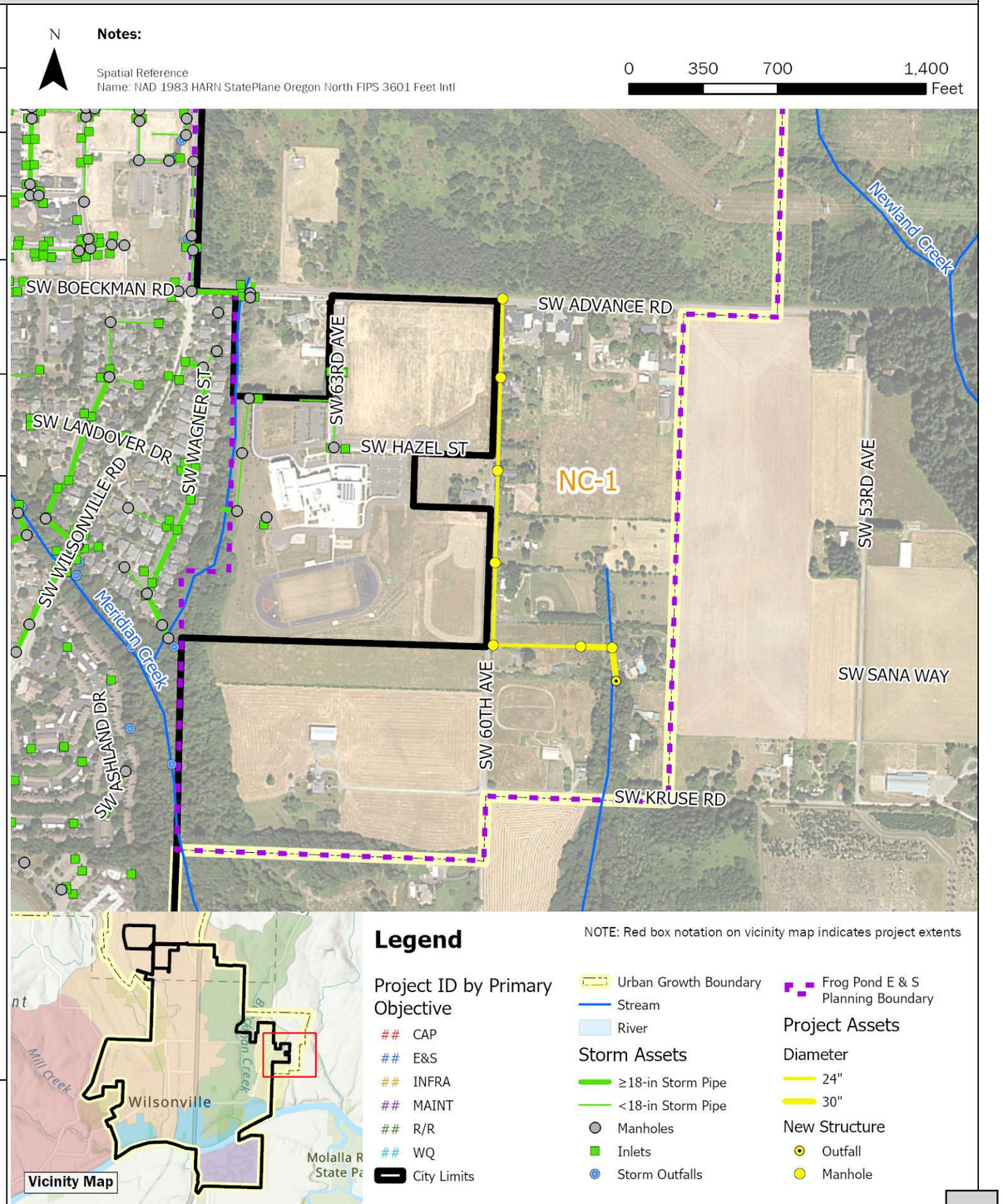
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$2,897,000
	Design / Construction Admin. (3.5% + $200K)	$301,000
	Engineering & Permitting (20%)	$579,000
	Total Cost	**$3,780,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing. • A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

Garden Acres Detention Pond (May 2023)

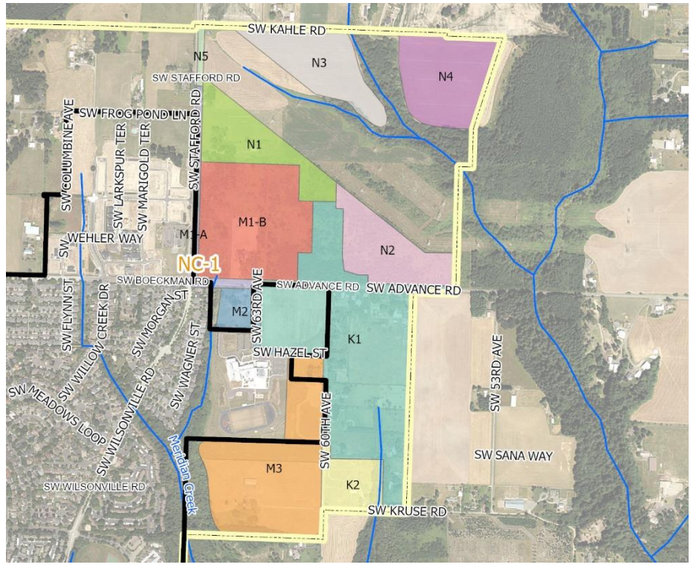
NC-1	Frog Pond East and South Conveyance Piping (Basin K1 only)		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	61 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	The full 2022 Frog Pond East and South Master Plan stormwater conveyance layout has been simplified for this CP to only include the storm main and outfall along SW 60th Ave to outfall near unnamed tributary (under SW Kruse Rd). This drainage basin is referred to in the Master Plan as K1 (encompassing approx. 61 acres). Project details are as follows: • Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.		



NC-1	Frog Pond E and S Conveyance Piping	
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure by basin is detailed below: ○ **K1**: install 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; 3- 48-inch manholes, 7-60-inch manholes and 1 outfall. ○ **K2**: install 220 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M1-A**: install 2,630 LF of 12-inch PVC pipe, 8- 48-inch manholes, and 1 outfall. ○ **M1-B**: install 1,050 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **M2**: install 400 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M3**: install 1,160 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **N1**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N2**: install 7,670 LF of 18-inch PVC pipe, 3- 48-inch manholes, and 1 outfall. ○ **N3**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N4**: install 1,150 LF of 18-inch PVC pipe, 5- 48-inch manholes, and 1 outfall. ○ **N5**: install 730 LF of 12-inch PVC pipe, 3- 48-inch, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$3,064,000
	Design / Construction Admin. (13.5%)	$414,000
	Engineering & Permitting (20%)	$613,000
	Total Cost	**$4,090,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only the main stormwater pipes along SW 60th Ave towards the outfall (24-inch and 30-inch in diameter) are included in the project estimate, per City direction. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate.	

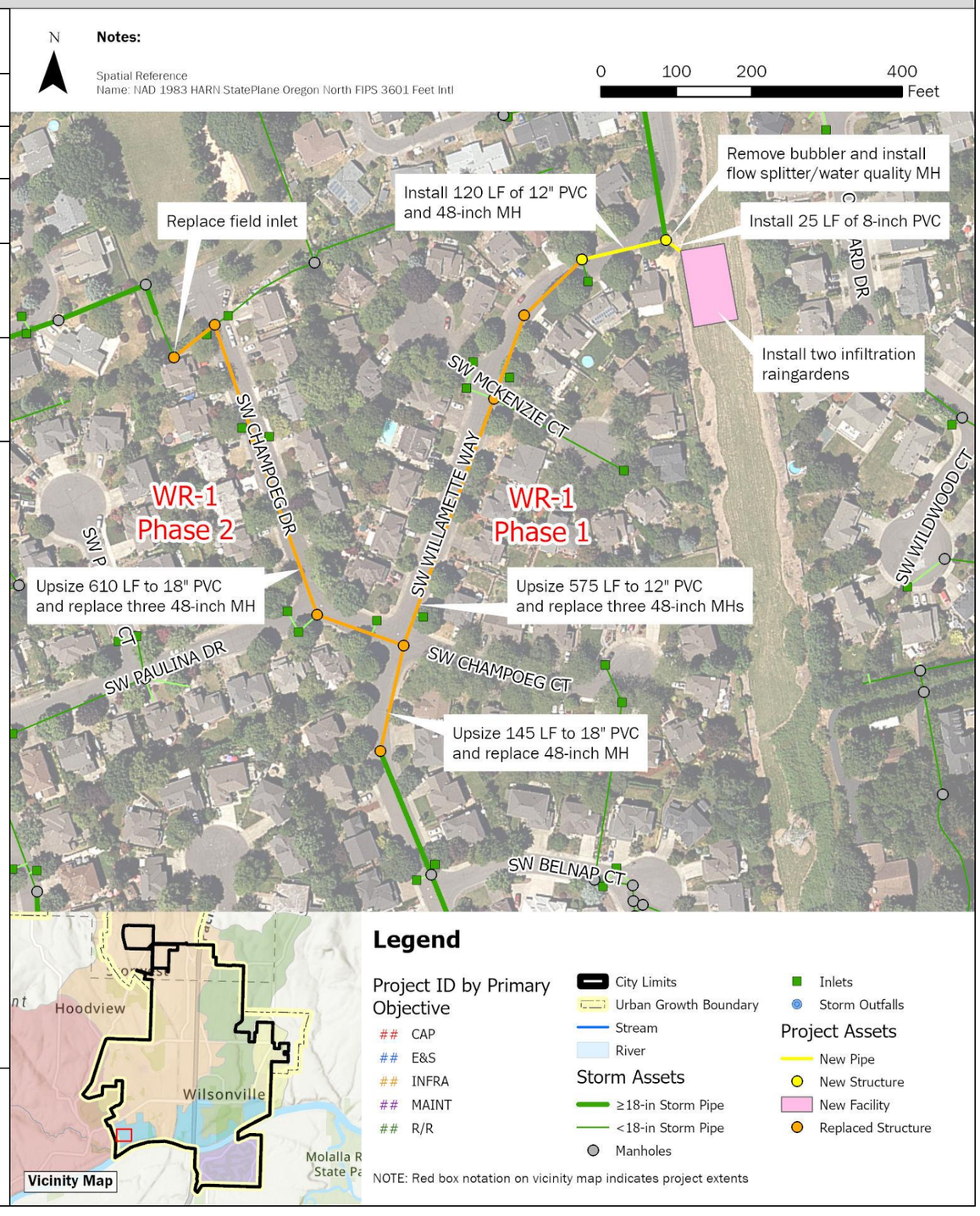
Additional Figures

Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Page 1 of 2

Capital Project Summary

WR-1 – SW Willamette Way / Morey's Landing Stormwater Improvements

WR-1 SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

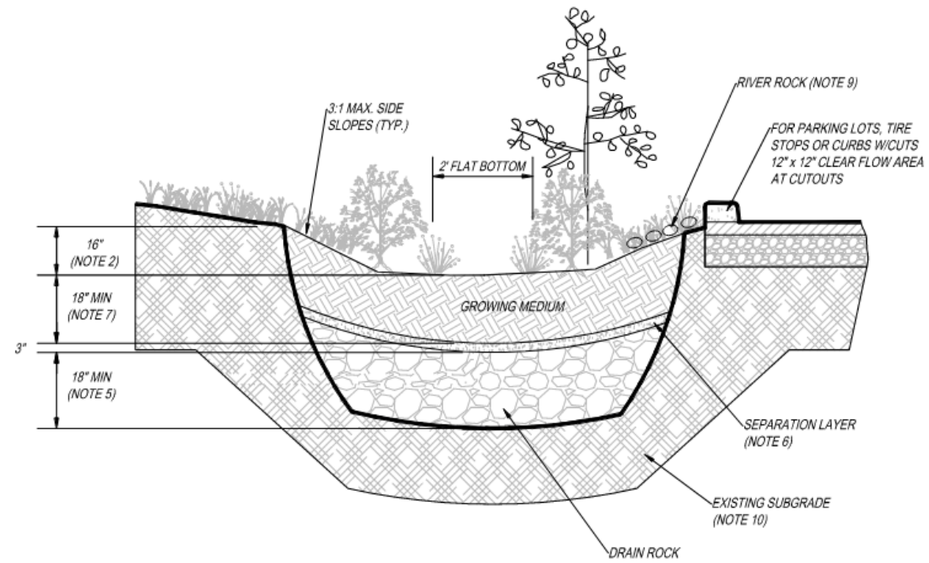
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,729,000	$811,000
Design / Construction Admin. (13.5%)	$233,000	$109,000
Engineering & Permitting (20%)	$ 346,000	$162,000
Total Cost	**$2,310,000**	**$1,080,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

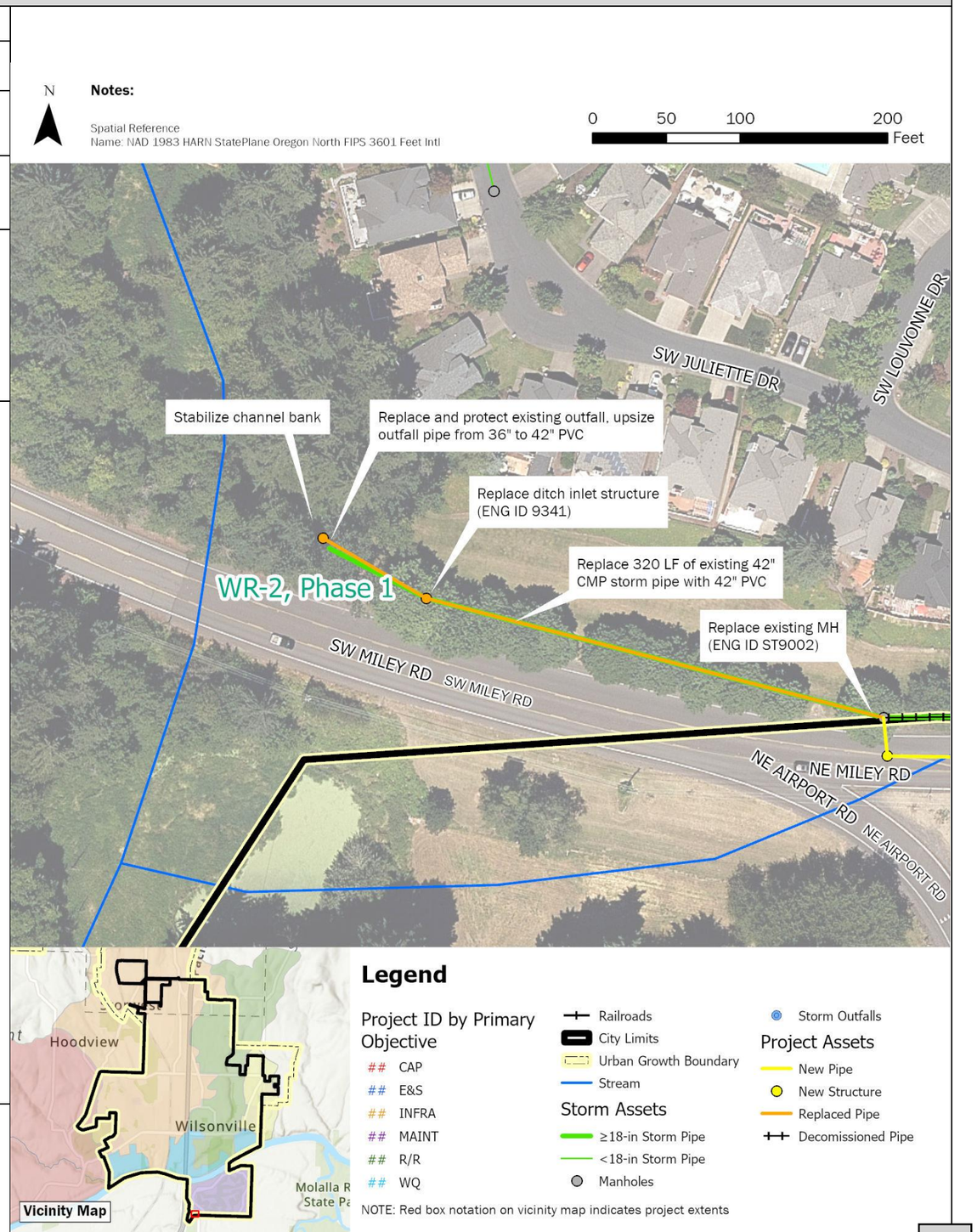
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5	**Contributing Drainage Area**	138.0 acres
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

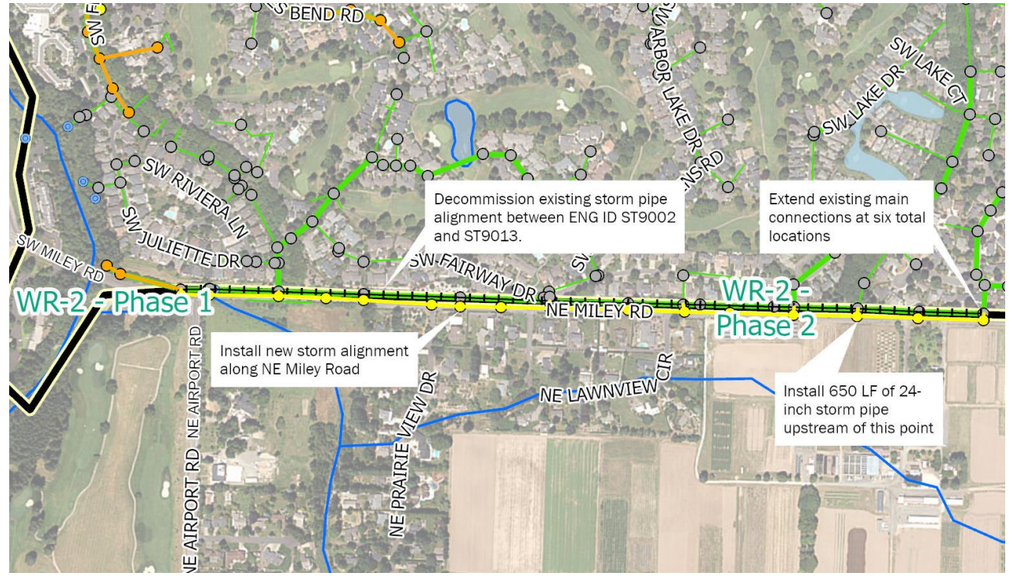
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$574,000	$7,720,000
Design / Construction Admin. Phase 1: 13.5% Phase 2: 3.5% + $200K	$77,000	$470,000
Engineering & Permitting (30%)	$172,000	$2,316,000
Total Cost	**$820,000**	**$10,510,000**

Project Cost Notes

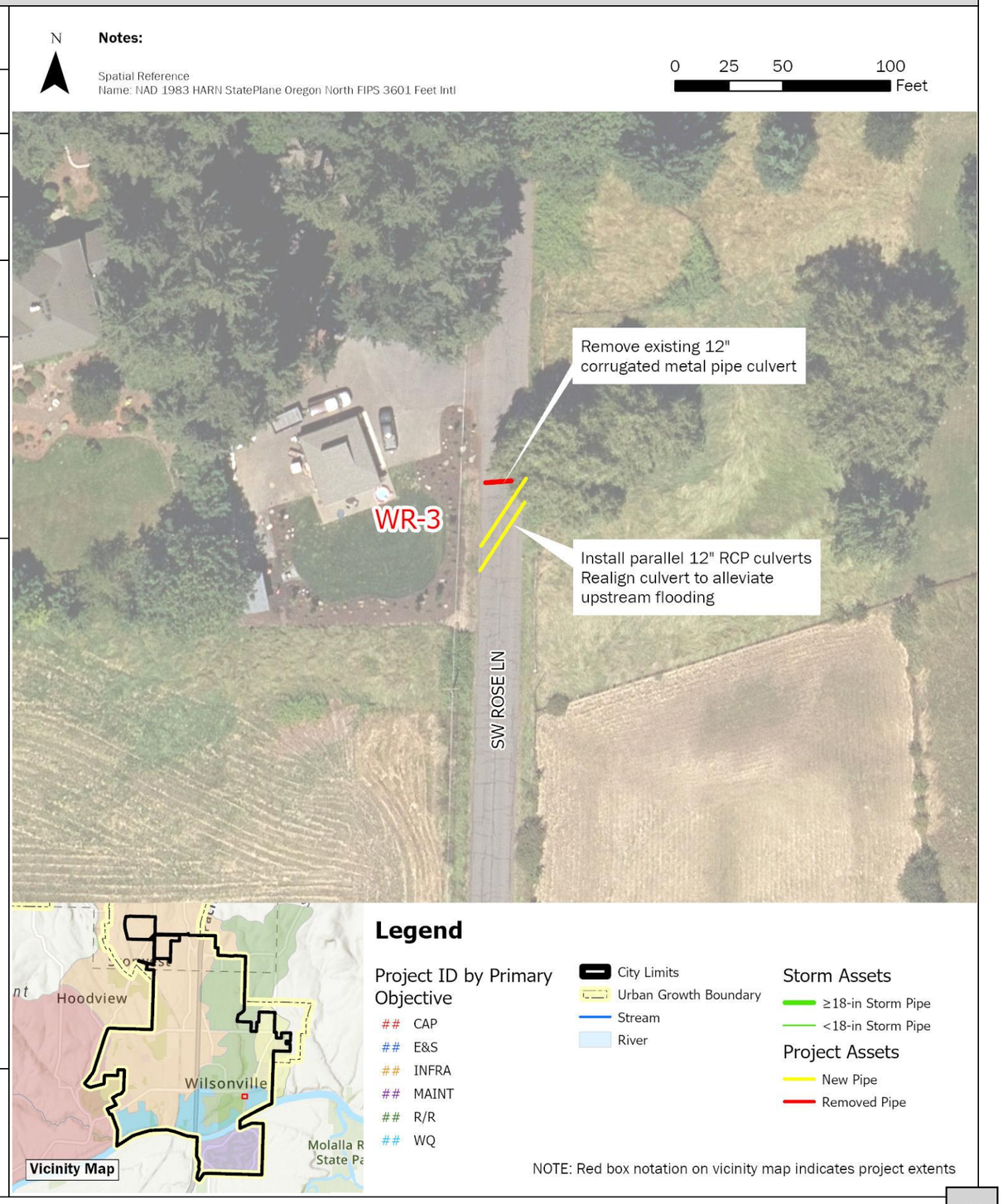
- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.



Sinkhole observed at upstream end of Miley Road alignment

Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		

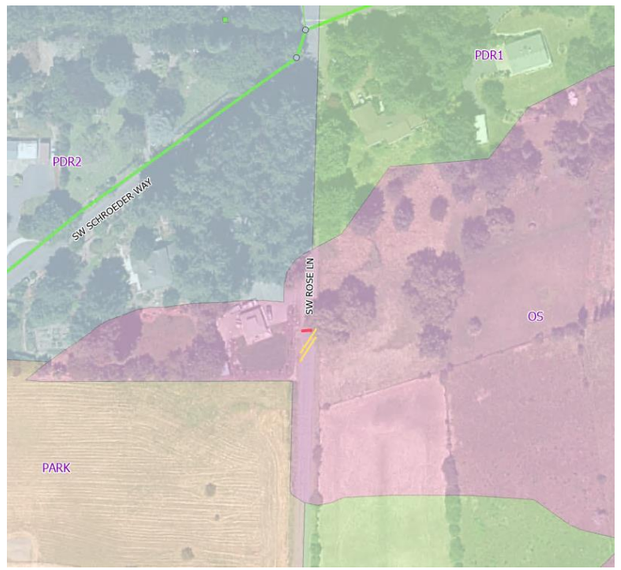


WR-3	Rose Lane Culvert Replacement	
Design Considerations / Assumptions	• Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover. • Minimum 12-inch cover on top of culvert. • Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway. • Maximum allowable depth for roadside ditches is 2-feet. • Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe. • Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP. • Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.	
Estimated Project Cost	Capital Expense Total	$86,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$200,000**
Project Cost Notes	• Modifications to the roadway beyond trenching were not developed as part of the cost estimate. • Surveying is required. • Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

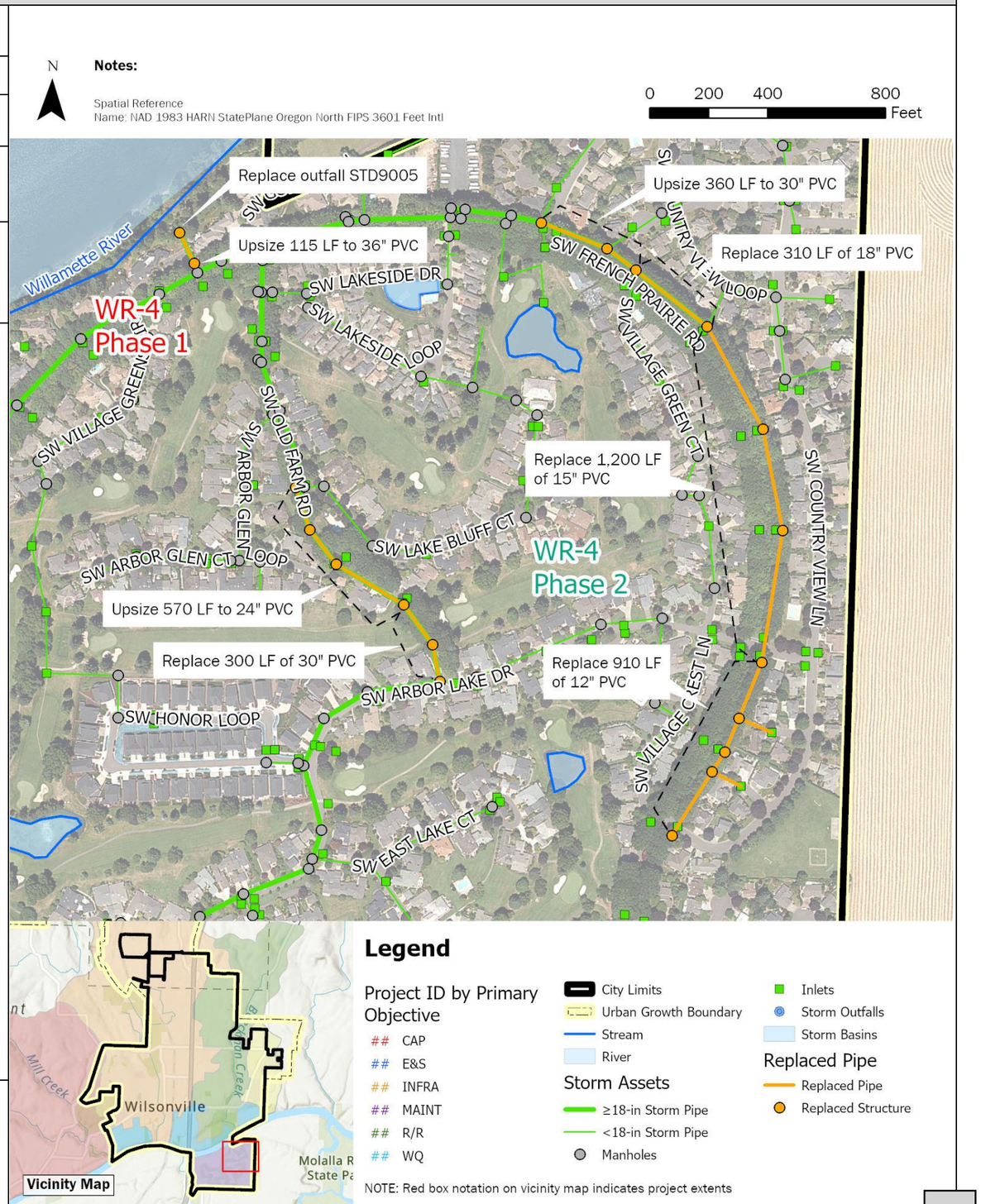
Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30	**Contributing Drainage Area**	159 acres
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Replace existing Charbonneau East Outfall (STD9005). • Replace one 72-inch manhole (ST9014). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes (ST9020 to ST9242). • Replace nine 60inch manholes (ST9017 to ST9019, and ST9027 to ST9031).		



WR-4 Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

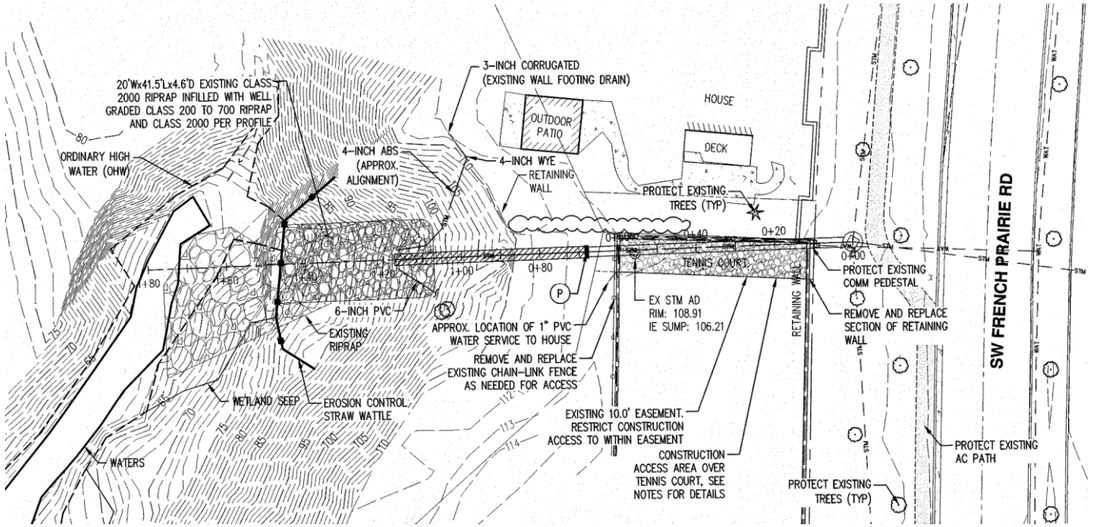
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$201,000	$3,325,000
Design / Construction Admin. Phase 1: 25% Phase 2: 13.5%	$50,000	$449,000
Engineering & Permitting Phase 1: 50% Phase 2: 20%	$101,000	$665,000
Outreach Coordination (Flat Rate - Phase 1 only)	$250,000	N/A
Total Cost	**$600,000**	**$4,400,000**

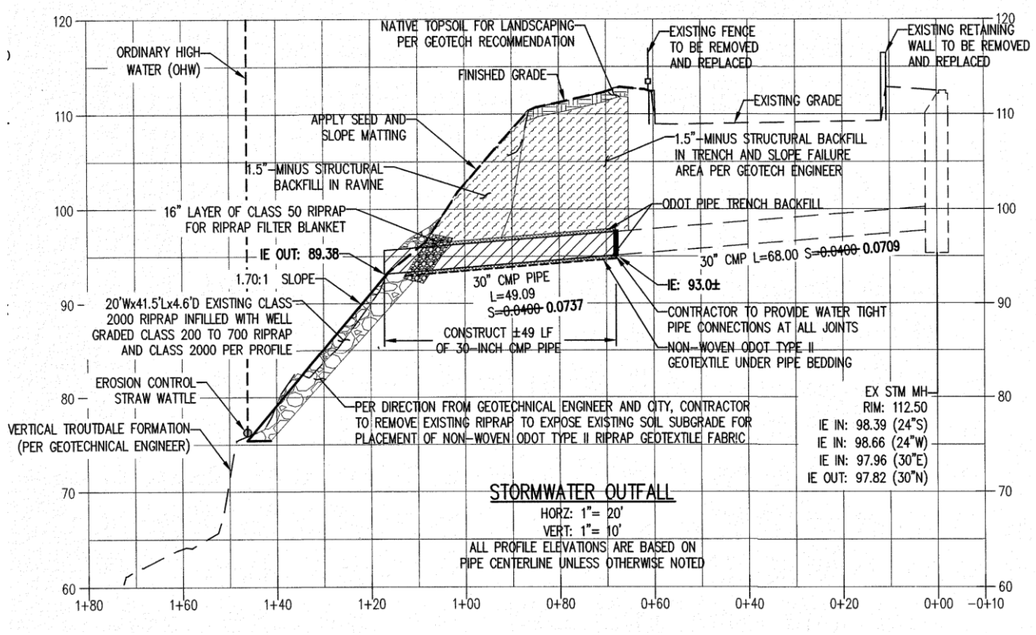
Project Cost Notes

- Due to in-water work and private property constraints, Phase 1 engineering and permitting multiplier was set to 50%. Design/Construction Administration multiplier was set to 25% per direction from the City.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures



Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		

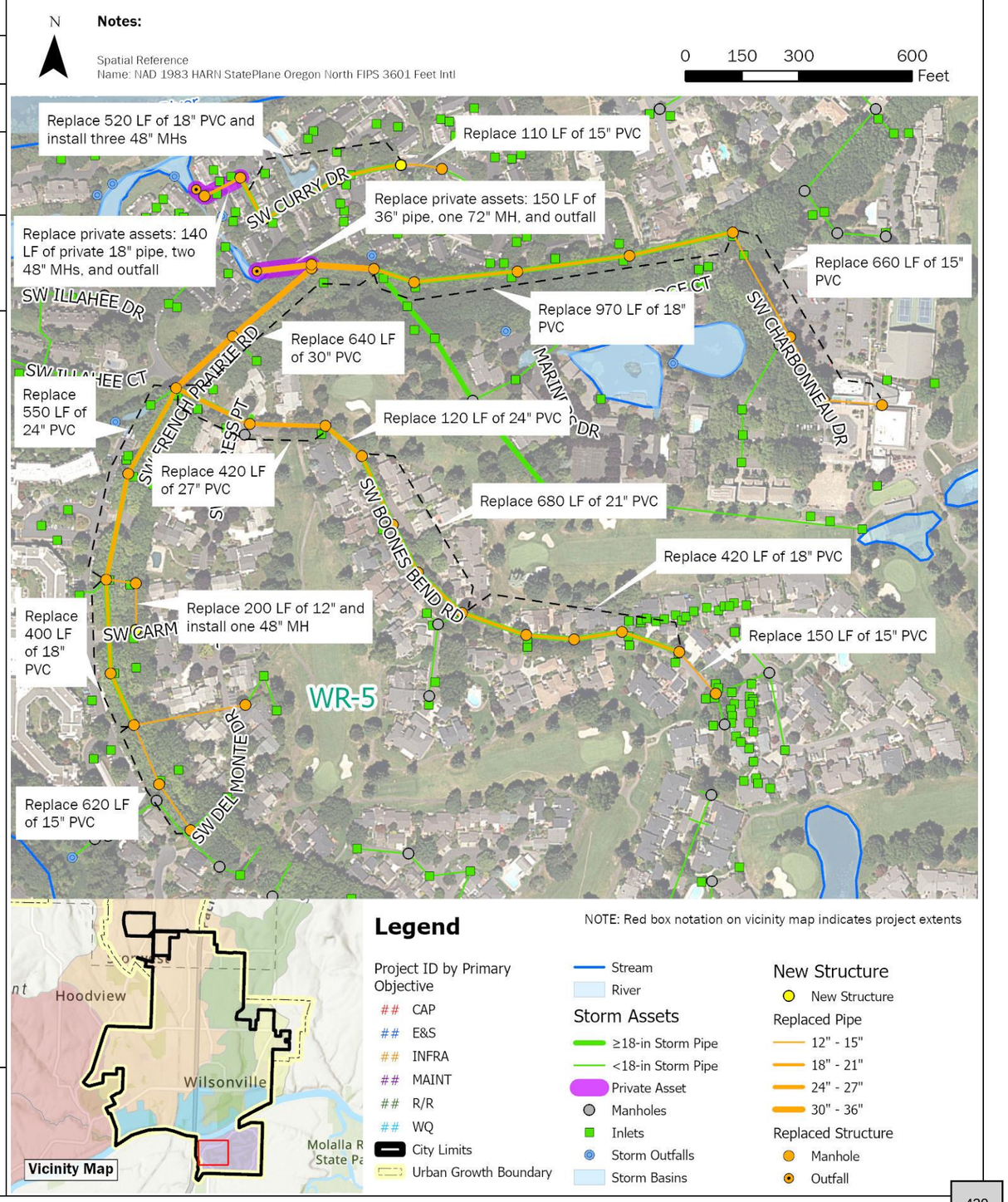
Project Description

This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping.

Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available):

- Pipe replacement along SW Curry Drive:
  - Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole).
  - Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892).
  - Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15).
  - Replace private outfall (CARTE ID: 15).
  - Replace two private 48-in manholes (CARTE ID 1892 and 1383).
  - Install three 48-inch manholes.
- Pipe replacement along SW French Prairie Road:
  - Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044)
  - Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043).
  - Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown)
  - Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040).
  - Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041).
  - Replace 20 LF of 36-in pipe with PVC (unknown to ST9067).
  - Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown).
  - Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes.

Continued on page 2.



WR-5	Charbonneau West Stormwater Improvements	
Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road: ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). ○ Replace eight 48-in manholes; and replace three 60-in manholes.	
Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated. • Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe. • Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters. • The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement: ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892). ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041. ○ Two 72-in: ST9067 and ST9041	
Estimated Project Cost	Capital Expense Total	$8,235,000
	Design / Construction Admin. (3.5% + $200K)	$488,000
	Engineering & Permitting (20%)	$1,647,000
	Total Cost	**$10,370,000**
Project Cost Notes	• A modified Design/Construction Administration multiplier was applied per direction from the City. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Appendix E: Capital Project Cost Estimates

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Earthwork			
General Earthwork/Excavation	CY	78	City of Wilsonville, provided by Zach Weigel December 2023
Excavation, to onsite stockpile	CY	20	For site grading (not structural). Source: BC Assembly using RSMeans pricing.
Fill, imported clean	CY	115	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Fill, from onsite stockpile	CY	60	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Embankment	CY	35	City of Wilsonville, provided by Zach Weigel December 2023
Structural Earth Wall	SF	50	City of Wilsonville, provided by Zach Weigel December 2023
Clear and Grub brush including stumps	AC	22,000	Source: ODOT 2022Q4, Item 0320-010000R, avg award + 10%. This item INCLUDES stump removal
Clearing and Grubbing	AC		ODOT does not have a bid item without stump removal.
Amended Soils and Mulch	CY	165	Source: ODOT 2022Q3, Item 1040-0194000K (Compost mulch), avg award + 10%
Jute Matting, Biodegradeable	SY	8	Source: ODOT 2022Avg, Item 0280-0105010,20,30,40 avg, avg award + 10%
Tree removal	EA	1,200	City of Wilsonville, provided by Zach Weigel December 2023
Geotextile	SY	7	Source: ODOT 2022Q4, Item 0350-010000J (drainage geotex Type 1), avg award + 10%
Energy dissapation pad - Rip-Rap, Class 50	CY	161	Source: ODOT 2022Avg, Item 0390-010500K, avg award + 10% - **ANDREW SAID NOT TO USE THIS ONE**
Energy dissapation pad - Rip-Rap, Class 100	CY	124	Source: ODOT 2022Avg, Item 0390-010800K, avg award + 10%
Energy dissapation pad - Rip-Rap, Class 200	CY	81	Source: ODOT 2022Avg, Item 0390-011000K, avg award + 10%
Dewatering (pipeline construction)	DAY	550	Recommend $550/day minimum for pipeline construction
Dewatering (other)	LS	5,000 - 50,000	Select as needed based on project needs (T. Suesser April 2023)
Drain Rock	CY	110	City of Wilsonville, provided by Zach Weigel December 2023
Streambed Cobble	TON	120	City of Wilsonville, provided by Zach Weigel December 2023
Water Quality Facility Installation			
Outflow Control Structure	EA	20,000	City of Wilsonville, provided by Zach Weigel December 2023
Swale Flow Spreader	EA	20,000	Unique facility (ditch inlet + outflow control) - City spec S-2225
Facility Inlet Structure	EA	10,000	Same as Outflow Control Structure
Water Quality Facility Plantings with Trees	SF	40	City of Wilsonville, provided by Zach Weigel January 2024
Rain Garden/ Swale	SF	130	City of Wilsonville, provided by Zach Weigel December 2023
Stormwater Planter	SF	180	City of Wilsonville, provided by Zach Weigel December 2023
Gravel Access Road	SF	5	2023RSMeans, for 9" thick gravel with geotextile
Beehive Overflow	EA	6,100	City of Wilsonville, provided by Zach Weigel December 2023
Structure Installation			
Field Ditch Inlet	EA	5,600	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 9-12' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	City of Wilsonville, provided by Zach Weigel December 2023
8'x8'x10' Concrete Vault	EA		
Precast Concrete Manhole (72", >12' deep)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Contech CDS (Model CDS3025, 72")	EA		
StormFilter (2-cartridge catch basin unit, 18" cartridges)	EA		
Drywell (48", 20-25' deep)	EA	14,100	Source: BC Assembly using RSMeans pricing
Curb Inlet	EA	8,300	Source: ODOT 2022Q4, Item 0470-0304000E (Concrete inlet, Type CG-1), avg award + 10%
ADA Ramp	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Catch Basin, all types	EA	8,300	Same as Curb Inlet
Concrete Fill - UIC Decomissioning	EA		
Connection to Existing Lateral	EA	6,000	City of Wilsonville, provided by Zach Weigel December 2023
Connection to Existing Structure, standard	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Abandon Existing Pipe, no excavation (12")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (15"-18")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (21"-24")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (27"-36")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, fill with grout	CF	8	Source: BC Assembly using previous bid pricing
Abandon Existing Structure	EA	3,400	Source: ODOT 2022Q4, Item 0490-0117000E (filling abandoned structures), avg award + 10%
Demo pipe	LF	30	Assumes 12" RCP pipe. Does not include excavation. Source: BC Assembly using RSMeans pricing
Remove existing pavement	SY	120	City of Wilsonville, provided by Zach Weigel January 2024
Remove structure	EA	1,700	Source: ODOT 2022Q4, Item 0310-0105000E (removal of manholes), avg award + 10%
Plug Existing Pipe, up to 18" dia, at manhole	EA	1,800	Source: BC Assembly using RSMeans pricing.
Plug Existing Pipe, up to 36" dia, at manhole	EA	2,300	Source: BC Assembly using RSMeans pricing.
Retrofit diversion structure	EA	50,000	Conservative estimate to retrofit diversion structure on seimens property. Options include raising invert elevation, plugging altogether, etc.
Check dams	EA	570	Aggregate Type 1 (Erosion Control) check dam. Source: ODOT 2022Q4, Item 0280-0106010E, avg award + 10%
Stem wall check dam	LF	600	Assume similar to retaining wall, 4' wide footing x 1' deep (buried 1' deep) with 4' tall wall x 12" th. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, larger than 48" pipe	EA	35,000	Assume approx 8' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA	25,000	Assume approx 5' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA		
Outfall Improvements	EA		
Restoration/Resurfacing			
Non-Water Quality Facility Landscaping	AC	27,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (Non-irrigated)	AC	36,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	City of Wilsonville, provided by Zach Weigel December 2023
Planting and Bioengineered Restoration	SY	60	City of Wilsonville, provided by Zach Weigel December 2023
4-foot Chain Link Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Split Rail Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Hydroseed, large quantities	AC	22,000	Source: ODOT 2022Avg, Item 1030-0110000R (Perm seeding, mix No. 2), avg award + 10%
Seeding, small quantities (< 5,000 sf)	SF	0.68	Source: ODOT 2022Q4, Item 1030-0138000J (lawn seeding), avg award + 10%
Sidewalk Installation	SF	17	Source: ODOT 2022Avg, Item 0759-0128000J (concrete walks), avg award + 10%
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	Source: ODOT 2022Avg, Item 0495-0100000J, avg award + 10%

Unit Cost Table			
Item	Unit	Proposed Unit Cost Mar 2023	Notes, Unit Cost Mar 2023
Permeable Paver Installation	SF	46	Source: ODOT 2022Avg, Item 0760-010000J (Unit pavers), avg award + 10%
Porous Asphalt Paving	SF	5	Source: 2023RSMeans, Item 32-12-16.13, 0600 (1" porous friction course over 3" bit course) adjusted to include hauling
Concrete Curbs	FT	74	Source: ODOT 2022Avg, Item 0759-0103000F (conc curb & gutter), avg award + 10%
Retaining wall, block	SF	119	Source: ODOT 2022Avg, Item 0596-B002000A (Retaining wall, prefab modular gravity), avg award + 10%
Retaining wall, CIP concrete	SF	250	City of Wilsonville
Retaining wall, sheet pile	SF	190	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Retaining wall, soldier pile	SF	210	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Root wad	EA	61	Source: Oregon, OH bid tab 2019 escalated
Trash rack	EA	5,600	Same as Field Ditch Inlet. City of Wilsonville, provided by Zach Weigel December 2023
Pipe Unit Cost			
Underdrain Pipe, 4"	LF	55	City of Wilsonville
Underdrain, 6" perforated HDPE	LF	60	City of Wilsonville
HDPE, 12", 10' to invert, not in road	FT	171	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, not in road	FT	179	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 10' to invert, in road	FT	470	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, in road	FT	567	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, not in road	FT	298	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, not in road	FT	310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, in road	FT	649	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, in road	FT	778	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 8", 10' to invert, not in road	FT	136	Interpolated
PVC, 12", 10' to invert, not in road	FT	206	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 10' to invert, not in road	FT	293	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 15' to invert, not in road	FT	215	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 15' to invert, not in road	FT	304	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 10' to invert, in road	FT	506	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 12", 15' to invert, in road	FT	602	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 15", 10' to invert, in road	FT	535	Interpolated from equivalants at 12" and 18" diam, MT 7/7/24
PVC, 15", 15' to invert, in road	FT	666	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 10' to invert, not in road	FT	249	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 15' to invert, not in road	FT	259	Interpolated from equivalants at 12" and 18" diam, SG 1/23/25
PVC, 18", 10' to invert, in road	FT	563	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 18", 15' to invert, in road	FT	731	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 24", 10' to invert, not in road	FT	381	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, not in road	FT	393	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 21", 10' to invert, in road	FT	647	Interpolated from equivalants at 18" and 24" diam, MT 7/7/23
PVC, 21", 15' to invert, in road	FT	796	Interpolated from equivalants at 18" and 24" diam, SG 1/23/24
PVC, 21", 15' to invert, not in road	FT	348	Interpolated from equivalants at 18" and 24" diam, SG 1/23/25
PVC, 24", 10' to invert, in road	FT	732	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, in road	FT	860	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 27", 10' to invert, in road	FT	805	Interpolated from equivalants at 24" and 30" diam, MT 7/7/23
PVC, 30", 10' to invert, not in road	FT	477	Interpolated from equivalants at 24" and 36" diam, MT 6/29/23
PVC, 30", 10' to invert, in road	FT	879	Interpolated from equivalants at 24" and 36" diam, MT 6/29/24
PVC, 36", 10' to invert, not in road	FT	573	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, not in road	FT	591	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 10' to invert, in road	FT	1,027	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, in road	FT	1,220	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 42", 10' to invert, not in road	FT	703	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 42", 10' to invert, in road	FT	1,169	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 48", 10' to invert, not in road	FT	834	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, not in road	FT	855	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 10' to invert, in road	FT	1,310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, in road	FT	1,536	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, not in road	FT	198	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, not in road	FT	207	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, in road	FT	498	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, in road	FT	594	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 15", 15' to invert, in road	FT	326	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 18", 15' to invert, in road	FT	391	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 24", 10' to invert, not in road	FT	303	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, not in road	FT	315	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 10' to invert, in road	FT	653	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, in road	FT	782	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 27", 15' to invert, in road	FT	766	Interpolated from equivalants at 24" and 36" diam, MT 7/06/23
RCP, 30", 10' to invert, in road	FT	866	Interpolated from equivalants at 24" and 36" diam, MT 6/30/23
RCP, 36", 10' to invert, not in road	FT	625	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, not in road	FT	642	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 10' to invert, in road	FT	1,079	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, in road	FT	1,272	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, not in road	FT	877	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, not in road	FT	898	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, in road	FT	1,353	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, in road	FT	1,579	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, not in road	FT	1,375	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, not in road	FT	1,401	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, in road	FT	1,861	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, in road	FT	2,151	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
Box Culvert (8' x 3')	FT	705	Source: 2023RSMeans, Item 33-42-11.60, 0200, excavation/backfill not included
Box Culvert (10' x 3')	FT	950	Source: 2023RSMeans, Item 33-42-11.60, 0300, excavation/backfill not included
Box Culvert (12' x 3')	FT	2070	Source: 2023RSMeans, Item 33-42-11.60, 0400, excavation/backfill not included
Contingencies and Multipliers			
Mobilization/Demobilization	LS	10%	
Erosion and Sediment Control	LS	3%	
Contingency	LS	40%	Updated per City of Wilsonville
Traffic Control/Utility Relocation	LS	5-10%	Dependent on work in ROW
Surveying	LS	5%	
Clackamas County Permitting	LS	8.83%	Applicable to Miley Road, added 6/22/23 per Kerry's instructions
Capital Expense Total (including contingency)			

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Design/Construction Administration (%)	LS	13.5%	Reflects City staff technical and administrative needs to execute the project. Per City of Wilsonville, assume minimum of $35,000.
Engineering and Permitting (%)	LS	20-30%	In-water dependent and capped on a case-by-case basis at $500,000 per City of Wilsonville. Per City of Wilsonville, minimum of $75,000.

BC-1: Library Pond

Key Project Elements

- Retrofit the existing Library Pond stormwater detention facility to meet current City PWS and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years.
- Install a pond outlet structure in compliance of current design standards.
- Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media.
- Install 15-ft wide, 25-ft long access road for maintenance access. Assume existing gate can be maintained.
- Remove and replace 70 LF of 18" CSP pipe at new design depth, approx. 15' deep.

Design Assumptions

- The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V.
- Facility sizing is based on adherence to the City's Public Works Standards (PWS), Chapter 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool.
- To size the pond in accordance with PWS design standards, approximately 48 acres require onsite treatment and flow control prior to discharge into Library Pond detention facility.
- Total pond depth includes drain rock (15"), separation layer (3"), and growing media (18"), in accordance with the 2015 PWS Section 3, Appendix A landscape and soil media requirements.
- Inlet and outlet pipe sizes are anticipated to remain unchanged. The outlet structure (standard drawing ST-6110) assumes an additional field inlet for 100-year overflow event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,350	$47,000
Fill, from onsite stockpile	CY	60	1,289	$77,340
Clear and Grub brush including stumps	AC	22,000	0.70	$15,400
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	324	$35,648
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Gravel Access Road	SF	5	375	$1,875
Water Quality Facility Plantings with Trees	SF	40	13,550	$542,000
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Demo pipe	LF	30	70	$2,100
Remove existing pavement	SY	120	210	$25,200
Remove structure	EA	1,700	1	$1,700
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	70	$4,200
PVC, 18", 15' to invert, not in road	FT	304	70	$21,252
Project Sub-Total				$863,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$86,300
Erosion and Sediment Control	LS	3%		$25,890
Contingency	LS	40%		$345,200
Traffic Control/Utility Relocation	LS	5%		$43,150
Surveying	LS	5%		$43,150
Capital Expense Total (including contingency)				$1,407,000
Design/Construction Administration (%)	LS	13.5%		$190,000
Engineering and Permitting (%)	LS	20%		$281,000
			TOTAL	$1,880,000

BC-2: Ash Meadows Flow Mitigation

Key Project Elements

- Plug flow diversion structure at Siemens Pond B.
- Upsize culvert under Boeckman Road from 30" to 48" PVC.
- Upsize culvert under SW Parkway Ave. from 36" to 48" PVC.
- Construct flow control structure at upstream end of culverts under Ash Meadows Road.
- Regrade and restore drainage way between Ash Meadows Road and Parkway Avenue.

Design Assumptions

- Excavate 18" depth for amended soils for entire 55,000 sq ft footprint area, per City Standards.
- Final design will include confirmation of flow control structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,056	$238,368
Clear and Grub brush including stumps	AC	22,000	1.3	$28,600
Amended Soils and Mulch	CY	165	1,019	$168,135
Tree removal	EA	1,200	30	$36,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	40	$3,240
Dewatering (other)	LS	50,000	1	$50,000
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Demo pipe	LF	30	175	$5,250
Retrofit diversion structure	EA	50,000	1	$50,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.3	$78,000
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, in road	FT	1,310	175	$229,268
Project Sub-Total				$924,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$92,400
Erosion and Sediment Control	LS	3%		$27,720
Contingency	LS	40%		$369,600
Traffic Control/Utility Relocation	LS	15%		$138,600
Surveying	LS	20%		$184,800
Capital Expense Total (including contingency)				$1,737,000
Design/Construction Administration (%)	LS	13.5%		$234,000
Engineering and Permitting (%)	LS	50%		$869,000
Geotechnical	LS	Flat Rate		$100,000
			TOTAL	$2,940,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1

Key Project Elements

- Construct a detention pond at Canyon Creek Park that would receive drainage from the wetland complexes described under Phase 2.

Design Assumptions

- Canyon Creek (phase 1) work includes only the installation of a vegetated facility at Canyon Creek Park and necessary conveyance.
- Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	13,900	$1,084,200
Clear and Grub brush including stumps	AC	22,000	1.6	$34,470
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.6	$94,008
4-foot Chain Link Fence	LF	60	1,130	$67,800
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$2,142,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$214,200
Erosion and Sediment Control	LS	3%		$64,260
Contingency	LS	40%		$856,800
Traffic Control/Utility Relocation	LS	5%		$107,100
Surveying	LS	5%		$107,100
Capital Expense Total (including contingency)				$3,491,000
Design/Construction Administration (%)	LS	3.5% + $200K		$322,000
Engineering and Permitting (%)	LS	30%		$1,047,000
			TOTAL	$4,860,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2

Key Project Elements

• Construct a series of linear wetland complexes to replace the existing Wiedemann ditch. Existing ditch would be enhanced to provide additional floodplain storage and mitigate flows received from Sysco ditch.

Design Assumptions

• Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
• Final design will include confirmation of weir sizing and layout.
• Final design will include confirmation of vegetated facility plantings and structure sizing.
• Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	25,600	$1,996,800
Clear and Grub brush including stumps	AC	22,000	3.6	$79,924
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Facility Inlet Structure	EA	10,000	1	$10,000
Structure Installation				
Gravel Access Road	SF	5	18,000	$90,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.6	$217,975
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$3,223,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$322,300
Erosion and Sediment Control	LS	3%		$96,690
Contingency	LS	40%		$1,289,200
Traffic Control/Utility Relocation	LS	5%		$161,150
Surveying	LS	5%		$161,150
Capital Expense Total (including contingency)				$5,253,000
Design/Construction Administration (%)	LS	3.5% + $200K		$384,000
Engineering and Permitting (%)	LS	30%		$1,576,000
			TOTAL	$7,210,000

BC-4: Boeckman Creek Stabilization at Colvin Lane

Key Project Elements

- Remove existing outfall pipe.
- Install approx. 70 LF of new outfall pipe with angle closer to parallel with creek channel.
- Install bioengineered plantings to stabilize streambank.
- Remove corrugated plastic pipe in existing channel bottom.

Design Assumptions

- Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. No cost included for access.
- Exact stabilization measures to be determined during project design.
- Assumes clearing/grubbing including stumps can include removal of existing corrugated pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	194	$15,132
Clear and Grub brush including stumps	AC	22,000	0.20	$4,400
Jute Matting, Biodegradeable	SY	8	90	$720
Embankment	CY	35	50	$1,750
Amended Soils and Mulch	CY	165	83	$13,695
Tree removal	EA	1,200	5	$6,000
Energy dissapation pad - Rip-Rap, Class 100	CY	124	10	$1,240
Drain Rock	CY	110	56	$6,160
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	1,500	$60,000
Structure Installation				
Demo pipe	LF	30	30	$900
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	360	$21,600
Pipe Unit Cost				
HDPE, 12", 15' to invert, not in road	FT	179	150	$26,895
PVC, 12", 10' to invert, not in road	FT	206	70	$14,399
Project Sub-Total				$173,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,300
Erosion and Sediment Control	LS	3%		$5,190
Contingency	LS	40%		$69,200
Traffic Control/Utility Relocation	LS	5%		$8,650
Surveying	LS	5%		$8,650
Capital Expense Total (including contingency)				$282,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$85,000
			TOTAL	$410,000

BC-5 Memorial Park Swale Retrofit

Key Project Elements

- Remove the existing WQ swale and relocate it at the bottom of the hill.
- Only designing for the WQ storm event (treatment only in the BMP Sizing Tool).
- Swale design is based on a retrofit approach. Facility sizing per PWS is not possible within available space. Design of swale with variance from design criteria (top width maximum) may allow for optimization of available space.
- Ideally keep swale outside of the 100-yr floodplain, but not a permit issue if within since it is not infiltration based.

Design Assumptions

- Remove 90 LF of 10-inch corrugated steel pipe (SD5041 and SD5042).
- Remove 120 LF of 12-inch corrugated steel pipe (SD5044).
- Remove: manhole (ST5098); inlet structure (CARTE ID 568); and outfall structure (CARTE ID 19).
- Fill existing swale and revegetate area.
- Replace 60 LF of 12" CSP with 18" PVC (SD5046); replace 2 48" MHs (ST5200 and ST5208).
- Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206).
- Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole.
- Install 50 LF of 12-inch PVC.
- Install 140 LF of 6-inch perforated HDPE underdrain pipe.
- Install inflow spreader with rip-rap pad, beehive overflow structure, and outfall to the creek.
- Install a new meandering water quality swale with 1 ft of drain rock and 1.5 ft of amended soil.
- Install split rail fence along pedestrian path north of the swale.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	55	$1,100
Fill, from onsite stockpile	CY	60	55	$3,300
General Earthwork/Excavation	CY	78	265	$20,670
Energy dissapation pad - Rip-Rap, Class 200	CY	81	2.2	$178
Drain Rock	CY	110	90	$9,900
Amended Soils and Mulch	CY	165	135	$22,275
Water Quality Facility Installation				
Beehive Overflow	EA	6,100	1	$6,100
Swale Flow Spreader	EA	20,000	1	$20,000
Facility Inlet Structure	EA	10,000	1	$10,000
Water Quality Facility Plantings with Trees	SF	40	2,400	$96,000
Structure Installation				
Demo pipe	LF	30	210	$6,300
Remove structure	EA	1,700	3	$5,100
Connection to Existing Structure, standard	EA	10,000	2	$20,000
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Outfall Improvements	EA	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Non-Water Quality Facility Landscaping	AC	27,000	0.5	$13,500
Split Rail Fence	LF	60	160	$9,600
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	140	$8,400
PVC, 12", 10' to invert, not in road	FT	206	50	$10,285
PVC, 12", 10' to invert, in road	FT	506	60	$30,360
PVC, 18", 10' to invert, not in road	FT	293	110	$32,247
Project Sub-Total				$387,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$38,700
Erosion and Sediment Control	LS	3%		$11,610
Contingency	LS	40%		$154,800
Traffic Control/Utility Relocation	LS	5%		$19,350
Surveying	LS	5%		$19,350
Capital Expense Total (including contingency)				$631,000
Design/Construction Administration (%)	LS	13.5%		$85,000
Engineering and Permitting (%)	LS	30%		$189,000
			TOTAL	$910,000

BC-6 - Gesellschaft Water Well Channel Restoration

Key Project Elements

- Existing outfall (STD3008) and upstream stormwater pipes can remain unchanged for the contributing 25 acres.
- Bypass the channel entirely by piping the weekly discharge from the well to the bottom of the slope into Boeckman Creek.
- Pipe is sized using PWS, smallest diameter (12-inch) to convey the flows.
- Weekly discharge of well volume is unknown, ODWR well logs were reviewed to verify that pipe size works with likely flows.
- Water discharge conveyance designed to comply with stormwater conveyance standards.

Design Assumptions

- Install approx. 480 LF of 12-inch PVC.
- Install 2 MHs along the new pipe alignment.
- Intall outfall and energy dissipation pad with Class 200 riprap.
- Restore the eroded discharge channel (approx. 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	214	$16,692
Energy dissapation pad - Rip-Rap, Class 200	CY	81	8	$648
Structure Installation				
Outfall Improvements	LS	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	345	$20,700
Pipe Unit Cost				
PVC, 12", 10' to invert, not in road	FT	206	480	$98,736
Project Sub-Total				$171,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,100
Erosion and Sediment Control	LS	3%		$5,130
Contingency	LS	40%		$68,400
Traffic Control/Utility Relocation	LS	5%		$8,550
Surveying	LS	5%		$8,550
Capital Expense Total (including contingency)				$279,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$84,000
			TOTAL	$400,000

CLC-1: Day Road Stormwater Improvements, Phase 1

Key Project Elements

- Replace the double-barrel 36-inch culverts that cross Day Road.
- Construct the channel improvements and culvert installations proposed by AKS in 2019 report (concept A-3).

Design/ Cost Assumptions

- The AKS concept was modeled and incorporated into BC's updated InfoSWMM model, which included updated hydrology.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers were maintained in this estimate for consistency with other capital project estimates.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	26,500	$2,067,000
Structural Earth Wall	SF	50	16,900	$845,000
Clear and Grub brush including stumps	AC	22,000	3	$66,000
Jute Matting, Biodegradeable	SY	8	4,950	$39,600
Energy dissapation pad - Rip-Rap, Class 100	CY	124	125	$15,500
Streambed Cobble	TON	120	900	$108,000
Water Quality Facility Installation				
Gravel Access Road	SF	5	15,000	$75,000
Structure Installation				
Demo pipe	LF	30	50	$1,500
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.2	$192,000
Pipe Unit Cost				
PVC, 36", 10' to invert, in road	FT	1,027	180	$184,932
Box Culvert (10' x 3')	FT	950	200	$190,000
Project Sub-Total				$3,595,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$359,500
Erosion and Sediment Control	LS	3%		$107,850
Contingency	LS	40%		$1,438,000
Traffic Control/Utility Relocation	LS	5%		$179,750
Surveying	LS	5%		$179,750
Capital Expense Total (including contingency)				$5,860,000
Design/Construction Administration (%)	LS	3.5% + $200K		$405,000
Engineering and Permitting (%)	LS	30%		$1,758,000
			TOTAL	$8,020,000

CLC-1: Day Road Stormwater Improvements, Phase 2

Key Project Elements

- Upsize the two existing parallel storm pipes located beneath the parking lot of Tax Lot 500, from 36-inch to 48-inch.
- Install a third, parallel 48-inch storm pipe.

Design/ Cost Assumptions

- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits. The establishment of similar onsite retention standards for Tualatin discharge may mitigate future flooding of this area.
- The small ponds at inlet of culverts across Ridder was not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	7	$126,000
Demo pipe	LF	30	1,200	$36,000
Restoration/Resurfacing				
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, not in road	FT	834	1,800	$1,500,840
Project Sub-Total				$1,680,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$168,000
Erosion and Sediment Control	LS	3%		$50,400
Contingency	LS	40%		$672,000
Traffic Control/Utility Relocation	LS	5%		$84,000
Surveying	LS	5%		$84,000
Capital Expense Total (including contingency)				$2,738,000
Design/Construction Administration (%)	LS	13.5%		$370,000
Engineering and Permitting (%)	LS	30%		$821,000
			TOTAL	$3,930,000

CLC-2: Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Key Project Elements

- Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert.
- Stabilize and restore embankment and channel after culvert replacement.
- Repave pedestrian path after culvert replacement.

Design Assumptions

- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	45	$3,510
Fill, imported clean	CY	115	45	$5,175
Embankment	CY	35	90	$3,150
Clear and Grub brush including stumps	AC	22,000	0.10	$2,200
Energy dissapation pad - Rip-Rap, Class 200	CY	81	10	$810
Structure Installation				
Demo pipe	LF	30	70	$2,100
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	270	$16,200
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
Box Culvert (10' x 3')	FT	950	70	$66,500
Project Sub-Total				$110,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,000
Erosion and Sediment Control	LS	3%		$3,300
Contingency	LS	40%		$44,000
Traffic Control/Utility Relocation	LS	5%		$5,500
Surveying	LS	5%		$5,500
Capital Expense Total (including contingency)				$179,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$290,000

CLC-3: Garden Acres Pond Retrofit

Key Project Elements

• Retrofit existing detention pond to increase storage capacity and water quality treatment along Peters Road and provide detention during high flow events.

Design Assumptions

• Install an inflow diversion structure at Peters Road (ST2101A).
• Install 95 LF of 24-inch PVC culvert at inlet of upsized detention pond.
• Increase existing detention pond capacity by 25,600 ft3 and lower pond invert to 196-ft elevation.
• Clear, regrade, and replant 0.9-acres of drainage way to ensure a low-flow drainage path and healthy vegetation.
• Install 155 LF of 24-inch PVC culvert at outlet of upsized detention pond.
• Install an outlet control structure at Peters Road (ST2431).
• Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,220	$251,160
Clear and Grub brush including stumps	AC	22,000	0.9	$19,800
Amended Soils and Mulch	CY	165	1,240	$204,600
Drain Rock	CY	110	1,030	$113,300
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	22,310	$892,400
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	980	$58,800
Pipe Unit Cost				
Field Ditch Inlet	EA	5,600	1	$5,600
Connection to Existing Structure, standard	EA	10,000	4	$40,000
PVC, 24", 10' to invert, not in road	FT	381	205	$78,023
PVC, 24", 10' to invert, in road	FT	732	45	$32,918
Project Sub-Total				$1,777,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$177,700
Erosion and Sediment Control	LS	3%		$53,310
Contingency	LS	40%		$710,800
Traffic Control/Utility Relocation	LS	5%		$88,850
Surveying	LS	5%		$88,850
Capital Expense Total (including contingency)				$2,897,000
Design/Construction Administration (%)	LS	3.5% + $200K		$301,000
Engineering and Permitting (%)	LS	20%		$579,000
			TOTAL	$3,780,000

NC-1: Frog Pond E and S Conveyance Pipe Installation

Key Project Elements

- Install stormwater collection system for main alignments in basin K1 identified in the Frog Pond East and South Master Plan.

Design Assumptions

- Pipe sizes and alignment was taken directly from the Frog Pond E and S Master Plan. This area was not included in the InfoSWMM modeling effort for this SMP.
- Install 2,050 LF of 24-inch PVC pipe.
- Install 310 LF of 30-inch PVC pipe.
- Install seven 60-inch manholes.
- Install 1 outfall.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Outfall Improvements	EA	10,000	1	$10,000
Pipe Unit Cost				
PVC, 24", 10' to invert, in road	FT	732	2,050	$1,499,575
PVC, 30", 10' to invert, in road	FT	879	310	$272,630
Project Sub-Total				$1,880,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$188,000
Erosion and Sediment Control	LS	3%		$56,400
Contingency	LS	40%		$752,000
Traffic Control/Utility Relocation	LS	5%		$94,000
Surveying	LS	5%		$94,000
Capital Expense Total (including contingency)				$3,064,000
Design/Construction Administration (%)	LS	13.5%		$414,000
Engineering and Permitting (%)	LS	20%		$613,000
			TOTAL	$4,090,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 1

Key Project Elements

- Remove existing Morey's Landing Bubbler (STD6604).
- Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement.
- Install a flow control diversion structure and low flow pipe at Willamette Way E to route water quality events to new raingardens and high flow events to the stormwater collection system along SW Willamette Way.
- Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall.
- Install 120 LF of 12-inch PVC on SW Willamette Way for flow exceeding the water quality event.
- Upsize 575 LF of 10-inch CPS to 12-inch PVC on SW Willamette Way (SD6629, SD6630, SD6632).
- Upsize 145 LF of 10-inch CSP to 18-inch PVC on Willamette Way (SD6638).
- Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).

Design Assumptions

- The raingardens (Phase 1) were sized as a filtration facility using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP will be constructed as an infiltration facility, pending infiltration testing. It is to be designed per the City's standard details for the selected BMP structure and used to treat the 1" water quality event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,055	$41,100
Fill, from onsite stockpile	CY	60	1,289	$77,340
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	376	$41,360
Water Quality Facility Installation				
Rain Garden/ Swale	SF	130	120	$15,600
Geotextile	SY	7	2.5	$18
Energy dissapation pad - Rip-Rap, Class 100	CY	124	1	$124
Water Quality Facility Plantings with Trees	SF	40	5,782	$231,280
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	305	$18,300
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Structure Installation				
Remove structure	EA	1,700	6	$10,200
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	5	$60,000
Pipe Unit Cost				
PVC, 8", 10' to invert, not in road	FT	136	25	$3,394
PVC, 12", 15' to invert, not in road	FT	215	120	$25,740
PVC, 12", 10' to invert, in road	FT	506	575	$290,950
PVC, 18", 10' to invert, in road	FT	563	145	$81,635
Connection to Existing Structure, standard	EA	10,000	4	$40,000
Project Sub-Total				$1,029,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$102,900
Erosion and Sediment Control	LS	3%		$30,870
Contingency	LS	40%		$411,600
Traffic Control/Utility Relocation	LS	10%		$102,900
Surveying	LS	5%		$51,450
Capital Expense Total (including contingency)				$1,729,000
Design/Construction Administration (%)	LS	13.5%		$233,000
Engineering and Permitting (%)	LS	20%		$346,000
			TOTAL	$2,310,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 2

Key Project Elements

- Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637).
- Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).

Design Assumptions

- Flows over the water quality event will be routed to the Belknap Court outfall (part of Phase 2 network).
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Demo pipe	LF	30	610	$18,300
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	3	$36,000
Pipe Unit Cost				
PVC, 18", 10' to invert, in road	FT	563	610	$343,430
Connection to Existing Structure, standard	EA	10,000	8	$80,000
Project Sub-Total				$483,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$48,300
Erosion and Sediment Control	LS	3%		$14,490
Contingency	LS	40%		$193,200
Traffic Control/Utility Relocation	LS	10%		$48,300
Surveying	LS	5%		$24,150
Capital Expense Total (including contingency)				$811,000
Design/Construction Administration (%)	LS	13.5%		$109,000
Engineering and Permitting (%)	LS	20%		$162,000
			TOTAL	$1,080,000

WR-2: Miley Road Stormwater Improvements - Phase 1

Key Project Elements

- Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall.
- Restore approx. 30 ft of channel bank on either side of new outfall.
- Replace area drain (ENG ID 9341).
- Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002).
- Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH.

Design Assumptions

- Access to outfall for removal and replacement is assumed feasible - costs have not been included for access requirements

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	100	$7,800
Embankment	CY	35	100	$3,500
Clear and Grub brush including stumps	AC	22,000	0.1	$2,200
Jute Matting, Biodegradeable	SY	8	100	$800
Energy dissapation pad - Rip-Rap, Class 200	CY	81	50	$4,050
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Demo pipe	LF	30	400	$12,000
Outfall Improvements	EA	10,000	1	$10,000
Remove structure	EA	1,700	2	$3,400
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	55	$3,300
Pipe Unit Cost				
PVC, 42", 10' to invert, not in road	FT	703	400	$281,380
Project Sub-Total				$352,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$35,200
Erosion and Sediment Control	LS	3%		$10,560
Contingency	LS	40%		$140,800
Traffic Control/Utility Relocation	LS	5%		$17,600
Surveying	LS	5%		$17,600
Capital Expense Total (including contingency)				$574,000
Design/Construction Administration (%)	LS	13.5%		$77,000
Engineering and Permitting (%)	LS	30%		$172,000
			TOTAL	$820,000

WR-2: Miley Road Stormwater Improvements - Phase 2

Key Project Elements

- Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road.
- Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road.
- Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011.
- Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral.
- Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall.
- Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.

Design Assumptions

- Costs for connections to existing system under brick wall have been assumed for connections and pipe length only. Constructability to be verified during detailed design.
- Costs assume that existing pipe alingment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	10	$140,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	3	$54,000
Connection to Existing Lateral	EA	6,000	19	$114,000
Abandon Existing Pipe, fill with grout	CF	8	3705	$29,640
Pipe Unit Cost				
PVC, 12", 15' to invert, in road	FT	602	80	$48,136
PVC, 18", 15' to invert, in road	FT	731	80	$58,476
PVC, 24", 10' to invert, in road	FT	732	650	$475,475
PVC, 24", 15' to invert, in road	FT	860	40	$34,408
PVC, 36", 10' to invert, in road	FT	1,027	3055	$3,138,707
PVC, 42", 10' to invert, in road	FT	1,169	530	$619,438
Project Sub-Total				$4,736,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$473,600
Erosion and Sediment Control	LS	3%		$142,080
Contingency	LS	40%		$1,894,400
Traffic Control/Utility Relocation	LS	5%		$236,800
Surveying	LS	5%		$236,800
Clackamas County Permitting	LS	8.83%		$418,189
Capital Expense Total (including contingency)				$7,720,000
Design/Construction Administration (%)	LS	3.5% + $200K		$470,000
Engineering and Permitting (%)	LS	30%		$2,316,000
			TOTAL	$10,510,000

WR 3 - Rose Lane Culvert Replacement

Key Project Elements

- Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available).
- Install approximately 40 LF of parallel 12-inch RCP culverts.
- Reconfiguring culvert diagonally across roadway to move it away from the residental building (garage) and remove hard bends.
- Maintain 12-inch pipe cover in roadway (minimum amount).

Design Assumptions

- Assuming recommended culvert sizing is sufficent to convey H/H flows. Unable to easily model due to lack of stream information (seasonal stream in wetland).
- Survey required.
- Roadwork beyond trenching not evaluated.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Clear and Grub brush including stumps	AC	22,000	0.05	$1,100
Structure Installation				
Demo pipe	LF	30	25	$750
Field Ditch Inlet	EA	5,600	2	$11,200
Pipe Unit Cost				
RCP, 12", 10' to invert, in road	FT	498	80	$39,864
Project Sub-Total				$53,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$5,300
Erosion and Sediment Control	LS	3%		$1,590
Contingency	LS	40%		$21,200
Traffic Control/Utility Relocation	LS	5%		$2,650
Surveying	LS	5%		$2,650
Capital Expense Total (including contingency)				$86,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$200,000

WR-4: Charbonneau East Stormwater Improvements, Phase 1

Key Project Elements

- Upsize and replace the existing stormwater outfall (serving Charbonneau development) along the Willamette River.

Design Assumptions

- Remove and replace existing Charbonneau East Outfall.
- Upsize 115 LF of 30-inch pipe discharging to Willamette River to 36-inch diameter PVC.
- Replace 72-inch manhole (ST9014).

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Connection to Existing Structure, standard	EA	10,000	1	$10,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	145	$11,745
Restoration/Resurfacing				
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	115	$65,907
Project Sub-Total				$116,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,600
Erosion and Sediment Control	LS	3%		$3,480
Contingency	LS	50%		$58,000
Traffic Control/Utility Relocation	LS	5%		$5,800
Surveying	LS	5%		$5,800
Capital Expense Total (including contingency)				$201,000
Design/Construction Administration (%)	LS	25.0%		$50,000
Engineering and Permitting (%)	LS	50%		$101,000
Outreach Coordination	LS	Flat Rate		$250,000
			TOTAL	$600,000

WR-4: Charbonneau East Stormwater Improvements, Phase 2

Key Project Elements

- Upsize and replace stormwater network along SW French Prairie Rd or SW Old Farm Rd.

Design Assumptions

- Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end).
- Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242).
- Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020).
- Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019).
- Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017).
- Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027).
- Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).
- Replace eight 48-inch manholes.
- Replace nine 60-inch manholes.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	4	$48,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	4	$60,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	5	$70,000
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	4	$88,000
Connection to Existing Structure, standard	EA	10,000	12	$120,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	910	$460,460
PVC, 15", 10' to invert, in road	FT	535	1,200	$641,400
PVC, 18", 10' to invert, in road	FT	563	310	$174,530
PVC, 30", 10' to invert, in road	FT	879	360	$316,602
PVC, 24", 10' to invert, in road	FT	732	570	$416,955
PVC, 30", 10' to invert, in road	FT	879	300	$263,835
Project Sub-Total				$1,979,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$197,900
Erosion and Sediment Control	LS	3%		$59,370
Contingency	LS	40%		$791,600
Traffic Control/Utility Relocation	LS	10%		$197,900
Surveying	LS	5%		$98,950
Capital Expense Total (including contingency)				$3,325,000
Design/Construction Administration (%)	LS	13.5%		$449,000
Engineering and Permitting (%)	LS	20%		$665,000
			TOTAL	$4,440,000

WR-4: Charbonneau West Stormwater Improvements

Key Project Elements

- Replace stormwater network along SW French Prairie Road, SW Curry Drive, SW Boones Bend Road

Design Assumptions

- Replace 200 LF of 12-inch pipe along SW French Prairie Road with PVC (ENG ID: ST9048 to ST9281)
- Replace a total of 1,540 LF of 15-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace a total of 2,450 LF of 18-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace 680 LF of 21-inch pipe along SW Boones Bend Road with PVC.
- Replace 670 LF of 24-inch pipe along SW French Prairie Road and SW Boones Bend Road with PVC.
- Replace 420 LF of 27-inch pipe along SW Boones Bend Road with PVC.
- Replace 640 LF of 30-inch pipe along SW Boones Bend Road with PVC.
- Replace 170 LF of 36-inch pipe along SW Boones Bend Road with PVC.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	29	$348,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	2	$36,000
Connection to Existing Lateral	EA	6,000	15	$90,000
Outfall Improvements	EA	10,000	2	$20,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	200	$101,200
PVC, 15", 10' to invert, in road	FT	535	1,540	$823,130
PVC, 18", 10' to invert, in road	FT	563	2,450	$1,379,350
PVC, 21", 10' to invert, in road	FT	647	680	$440,130
PVC, 24", 10' to invert, in road	FT	732	670	$490,105
PVC, 27", 10' to invert, in road	FT	805	420	$338,300
PVC, 30", 10' to invert, in road	FT	879	640	$562,848
PVC, 36", 10' to invert, in road	FT	1,027	170	$174,658
Project Sub-Total				$4,902,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$490,200
Erosion and Sediment Control	LS	3%		$147,060
Contingency	LS	40%		$1,960,800
Traffic Control/Utility Relocation	LS	10%		$490,200
Surveying	LS	5%		$245,100
Capital Expense Total (including contingency)				$8,235,000
Design/Construction Administration (%)	LS	3.5% + $200K		$488,000
Engineering and Permitting (%)	LS	20%		$1,647,000
			TOTAL	$10,370,000

Charbonneau R&R Program

Key Project Elements

- Replace pipe in Charbonneau District that isn't being replaced by another CIP or hasn't been recently replaced. Recently replaced pipe was designated by the City as anything replaced between 2015-2022.
- Assume minimum pipe size of 12-inch. Assume all other pipe is replace-in-place.
- Assume replacements of all manholes (except those excluded from above mentioned projects).

Design Assumptions

- Replace 19,460 LF of 12-inch diameter PVC pipe.
- Replace 4,590 LF of 15-inch diameter PVC pipe.
- Replace 3,620 LF of 18-inch diameter PVC pipe.
- Replace 1,210 LF of 21-inch diameter PVC pipe.
- Replace 750 LF of 24-inch diameter PVC pipe.
- Replace 180 LF of 27-inch diameter PVC pipe.
- Replace 340 LF of 30-inch diameter PVC pipe.
- Replace 470 LF of 36-inch diameter PVC pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	120	$1,440,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	13	$195,000
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	3	$54,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	15	$210,000
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	2	$46,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	13,470	$6,815,820
PVC, 12", 15' to invert, in road	FT	602	2,500	$1,504,250
PVC, 12", 10' to invert, not in road	FT	206	3,210	$660,297
PVC, 12", 15' to invert, not in road	FT	215	280	$60,060
PVC, 15", 10' to invert, in road	FT	535	2,220	$1,186,590
PVC, 15", 15' to invert, in road	FT	666	570	$379,805
PVC, 15", 10' to invert, not in road	FT	249	1,680	$419,034
PVC, 15", 15' to invert, not in road	FT	259	120	$31,086
PVC, 18", 10' to invert, in road	FT	563	1,870	$1,052,810
PVC, 18", 15' to invert, in road	FT	731	880	$643,236
PVC, 18", 10' to invert, not in road	FT	293	630	$184,685
PVC, 18", 15' to invert, not in road	FT	304	240	$72,864
PVC, 21", 10' to invert, in road	FT	647	670	$433,658
PVC, 21", 15' to invert, in road	FT	796	520	$413,699
PVC, 21", 15' to invert, not in road	FT	348	20	$6,963
PVC, 24", 10' to invert, in road	FT	732	410	$299,915
PVC, 24", 10' to invert, not in road	FT	381	340	$129,404
PVC, 27", 10' to invert, in road	FT	805	180	$144,986
PVC, 30", 10' to invert, in road	FT	879	340	$299,013
PVC, 36", 10' to invert, not in road	FT	573	240	$137,544
PVC, 36", 15' to invert, in road	FT	1,220	230	$280,577
Project Sub-Total				$17,101,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$1,710,100
Erosion and Sediment Control	LS	3%		$513,030
Contingency	LS	40%		$6,840,400
Traffic Control/Utility Relocation	LS	10%		$1,710,100
Surveying	LS	5%		$855,050
Capital Expense Total (including contingency)				$28,730,000
Design/Construction Administration (%)	LS	13.5%		$3,879,000
Engineering and Permitting (%)	LS	20%		$5,746,000
			TOTAL	$38,360,000

Appendix F: Library Pond Analysis

Technical Memorandum

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan Update

Project No.: 156157

Technical Memorandum

Subject: Library Pond Evaluation

Date: June 14, 2023

To: Kerry Rappold, City of Wilsonville

From: Brown and Caldwell

Prepared by: Shelby Gilmartin, E.I.T

Reviewed by: Angela Wieland, P.E.

Limitations:

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Library Pond Evaluation

Executive Summary

This Technical Memorandum (TM) describes a sizing evaluation conducted on the Library Pond stormwater detention facility (also referred to as the Memorial Park Pond). This evaluation was conducted as part of the City's 2023 Stormwater Master Plan (SMP) Update to determine capital project needs (specific to retrofit of the Library Pond), as well as policy recommendations (to be documented in the SMP) related to redevelopment of the Wilsonville Town Center, which contributes stormwater to the Library Pond.

This evaluation utilized the City of Wilsonville's BMP Sizing Tool, which is intended for use in conjunction with the *2015 Stormwater & Surface Water Design & Construction Standards,* as well as historic as-built drawings, results from the InfoSWMM model, Geographic Information System (GIS) data, and the *2019 Wilsonville Town Center Plan* to analyze pond sizing and ability to effectively mitigate stormwater flows under three development scenarios. The development scenarios reflect unique land cover and impervious conditions specific to pre-development (Oak Savanna) land use conditions, existing (current) land use conditions, and future (Town Center build-out) land use conditions.

Section 1: Background

The Library Pond Stormwater Detention Facility (Library Pond) was originally constructed in the 1980s. Modifications were made to the pond in 1992 as part of the Memorial Park site improvements. These improvements include enlarging the pond, installing new stormwater piping, an outfall, and inlet, as well as enclosing the pond with a chain-link fence.

The Library Pond receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, east of Interstate 5 and adjacent to Wilsonville Road. The Library Pond discharges to a piped collection system, which outfalls to an unnamed tributary to Boeckman Creek approximately 750 feet downstream of the Library Pond. Boeckman Creek is a tributary to the Willamette River. Water quality monitoring has been conducted at the Library Pond since the late 1990's in accordance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit. Although operating as a regional stormwater facility, there are several notable characteristics of the pond that may contribute to observed capacity and water quality issues:

- There is no flow control/orifice structure or emergency overflow type structure, thus providing limited detention benefit.
- Vegetation is overgrown with invasive species and sediment has accumulated along the pond bottom, limiting pond capacity and water quality function.
- As shown in the as-builts and verified on-site, the facility has very steep side slopes (estimated to be 2H:1V), limiting facility access and maintenance.
- City staff have experienced ongoing challenges with debris removal at existing ditch inlet, which serves as the outlet from the pond so impounded trash can quickly result in a flooding issue.

Hydraulic analysis of the Library Pond conducted for the SMP in 2022 indicates that flooding occurs during the 25-year future development condition. This finding is confirmed by City staff who have observed flooding of the Wilsonville Public Library parking lot and Memorial Drive near the entrance to Memorial Park. The contributing drainage area to the Library Pond is subject to redevelopment in both the near term and long term as part of the Wilsonville Town Center Plan (adopted May 6, 2019).

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The three phases of the Willamette Town Center Plan include:

- Phase I - infill and redevelopment of vacant and/or underutilized land over the next 10 years (approx. 2019-2029). This will focus on areas where landowners can develop new buildings on vacant or underused parking without impacting existing businesses. The mostly likely type of redevelopment occurring will be existing retail and commercial buildings, multifamily residential, and some mixed-use development.
- Phase 2 - redevelopment, multiuse, and parking garage integration in the next 10-20 years (approx. 2029-2039). This phase includes office and mixed-use development with attached structured parking leading to the redevelopment of surface lots, redesign of the street grid because of development, and streetscape management.
- Phase 3 – the full build out will include high-density, mixed-use buildings, completion of pedestrian networks and vehicle roadways, and reallocation of parking facilities behind or integrated into buildings. This phase is anticipated to occur in the next 20+ years (approx. 2039-TBD).

The City anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with private redevelopment and public improvements in the Town Center Plan area. Design and construction of the Library Pond retrofit may be funded exclusively through system development charges (SDCs) applied to Town Center redevelopment, allowing the City to charge Town Center development a fee-in-lieu.

Section 2: City of Wilsonville Stormwater Design Standards

Over the past decade, stormwater management practices in Oregon have evolved to require consideration of hydromodification as well as more traditional water quality and peak flow (detention) requirements. Hydromodification is the change in runoff patterns caused by land use and impervious area changes that result in the degradation of stream channels and water quality (i.e., stream erosion from the extended duration of peak flows). Traditional stormwater treatment and detention design practices typically analyze pre- and post-development peak flows associated with a standard (i.e., 24-hour) synthetic design storm. A hydromodification standard requires continuous simulation flow modeling to evaluate both peak flow but also the duration of flows exceeding a specific recurrence interval. Adherence to a hydromodification standard assumes that peak flow and flow duration for the post-development condition does not exceed the pre-developed condition for a range of geomorphically significant flows—those capable of moving sediment and eroding streambanks. For the City of Wilsonville, the range of geomorphically significant flows is established as 42 percent of the 2-year flow to the 10-year flow.

Given the complexity of evaluating stormwater controls to adhere to a hydromodification standard, municipalities that have adopted a hydromodification standard have also developed tools to aid developers with design.

2.1 Design Standards

The City's Public Works Design Standards (PWS) (i.e., *City of Wilsonville's 2015 Stormwater & Surface Water Design & Construction Standards, Section 3*) were updated in December 2015 to emphasize low-impact development (LID) facilities that incorporate infiltration to address both pollutant reduction and flow control as well as develop facility sizing to address hydromodification impacts.

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2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater facilities for hydromodification-based standards. The BMP Sizing Tool (last updated in 2017) is used in conjunction with the City's PWS and by developers and engineers to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate the following BMP types:

- Rain Garden - Filtration and Infiltration
- Stormwater Planter - Filtration and Infiltration
- Vegetated Swale - Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The tool was developed based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration is based on the facility soil subgroup. Groups A1 – B3 include infiltration rates greater than 0.50 in/hr and are considered acceptable for use with infiltration facilities. Groups C1 – D1 reflect infiltration rates from 0.02 – 0.49 in/hr and are considered acceptable for use with filtration facilities. Infiltration facilities use only infiltration to manage runoff. Filtration facilities include piped underdrain systems and orifice controls.

The following table is an excerpt from the *User's Guide for the BMP Sizing Tool* which shows the BMP sizing dimension for each facility type. The focus for this analysis will be on the capabilities of the Detention Pond for treatment and flow control settings in the tool.

Table 4. BMP Dimensions Required for the Sizing Tool to Apply

Facility	Drain Rock, min. in.	Separation Layer, in.	Growing Media, min. in.	Ponding Depth, in.	Freeboard, min. in.	Side Slope, ratio	Bottom Width, min. in.	Liner
Stormwater Planter - Filtration	12	3	18	12	4	0	18	If required
Stormwater Planter - Infiltration	28	3	18	12	4	0	30	No
Rain Garden - Filtration	18	3	18	12	4	3:1 max	24	If required
Rain Garden - Infiltration	18	3	18	16	N/A	3:1 max	24	No
Vegetated Swale - Filtration	12	3	18	12	4	3:1 max	24	If required
Vegetated Swale - Infiltration	18	3	18	12	N/A	3:1 max	24n	No
Detention Pond	15	3	18	Per sizing model (12 in. min.)	12[a]	3:1 max	N/A	If required

a. The surface area of the detention pond, the filtration rain garden and the filtration swale sized by the tool does not take freeboard into account. In addition, see Note 12 on the Detention Pond detail regarding an emergency spillway.

Although the table states a side slope ratio of 3H:1V max for detention ponds, the 2015 PWS section 301.4.09 states a General Facility Design Requirement that stormwater management facilities shall not exceed 4H:1V up to the maximum design water elevation. The initial analyses used 4H:1V sizing requirements. After review by the City, the scenarios were refined to optimize pond sizing and incorporated a 3H:1V side slope to maximize potential storage at Library Pond.

For detention ponds, the tool can be used to either calculate a simple geometry or a custom geometry. A simple geometry uses a known surface area or depth and entered slope to calculate the bottom area and depth or surface area (whichever was initially an unknown variable). While the custom geometry relies on known depth, area, and flow values. For each configuration option, the BMP Sizing Tool routes the post-development flow through the pond, performs statistical analyses for flow duration and peak flow criteria, and reports if the pond is sized adequately.

For ponds sized using simple geometry, the required outlet dimensions for the pond will be calculated. This includes inverts and dimensions of lower orifice, upper orifice, and overflow weir which correspond to the provided facility schematic (see Figure 1). Figure 1 depicts the main features of the outlet structure with the locations of their inverts. The overflow weir is at 1 foot below the 10-year pond water surface elevation. It is assumed that the pond will need to include additional freeboard (typically 1 foot) above the 10-year water surface elevation.

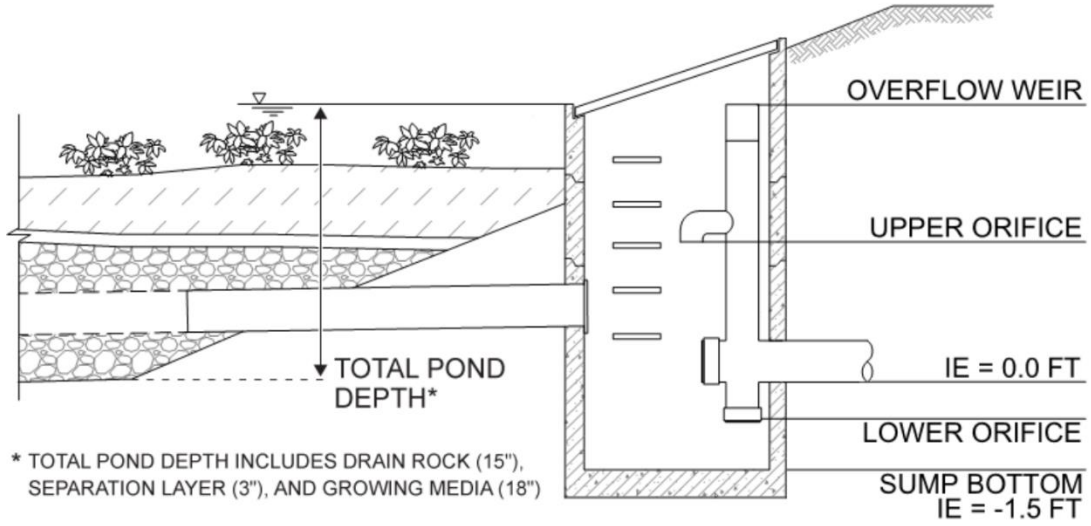

Figure 1. Detention pond facility schematic

The BMP Sizing Tool also calculates flow duration and peak flow frequency curves to compare pre-development to post-project flows. The curves represent the flow and duration over the range of geomorphically significant flows (i.e., lower threshold of 42 percent of the 2-yr storm and an upper threshold of the 10-yr storm). When a pond is adequately sized the mitigated post-development curve (blue per the BMP Sizing Tool output) falls below the pre-development curve (red per the BMP Sizing Tool output). It will also be sized to ensure treatment of 80 percent of the average annual runoff.

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Section 3: Evaluation and Methodology

With the 2015 updates to the PWS, the Library Pond as it exists today does not meet the City's current stormwater design and construction specifications. This TM documents the evaluation of the existing pond location and footprint against several pre- and post- development scenarios. The process used for this evaluation of the facility includes:

1. Utilize facility as-builts, the InfoSWMM model, and the Town Center Plan to determine the current pond facility size, contributing drainage area and land use, and the pond's stage storage curve;
2. Determine if the current pond storage volume and outlet structure address current flows reflective of existing development conditions and pre-development flows reflective of historic land use conditions, as required in the 2015 PWS;
3. Use the BMP Sizing Tool to compare pond sizing and outlet adjustments, assuming existing development conditions and historic land use conditions, to meet the minimum criteria in the City's design standards;
4. Locate potential impervious areas within the Town Center redevelopment for upstream, low impact development (LID) planter facilities to meet the City's water quality treatment and flow control requirements associated with the City's established hydromodification standard;
5. Use the BMP Sizing Tool to iterate and optimize pond sizing and outlet configurations in conjunction with LID sizing/placement to meet the City's design standards in conjunction with future development of the Town Center and associated site constraints, and
6. Document LID placement needs associated with future development to determine fee-in-lieu policy implications.

To evaluate Library Pond sizing in conjunction with the above-mentioned process, the 11 subbasins (delineated as part of the SMP) that drain into the Library Pond were subdivided based on various land cover and impervious conditions reflective of pre-development, existing, and future development conditions. Under future development conditions, the Town Center development plans include demolition of existing stormwater infrastructure and installation of new pipes to convey stormwater drainage in conjunction with the proposed roadway configuration.

Because the existing footprint of the pond, approximately 0.7 acres, is constrained by limitations (roadways, trees, etc.), simple pond sizing was employed by holding the pond surface area constant and allowing the BMP Sizing Tool to calculate a required pond depth and bottom surface area.

3.1 Discharge Management Areas

The BMP Sizing Tool requires users to first delineate Discharge Management Areas (DMAs), also referred to as subcatchments, which are used to define a contributing drainage area to each planned BMP facility on a site. The BMP Sizing Tool has limitations on the size of individual DMAs to individual LID facilities. In addition, to facilitate iteration of scenarios related to BMP sizing, flexibility had to be incorporated into the DMAs. Therefore, the contributing drainage area to the Library Pond had to be categorized and subdivided.

The DMAs were initially developed by subdividing each of the 11 subbasins (totaling 179.8 acres) into their respective Hydrologic Soil Groups (HSGs) - either B, C, or D (note: soils that fell into a dual-HSG category are reflected by the less infiltrating soil. For example, a soil in group C/D was calculated as HSG D). The total area of analysis was found to be 35% HSG B, 42% HSG C, and 23% HSG D, with the actual site of Library Pond in HSG B soils.

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The areas were then further subdivided by land cover to separate existing roadways/Right-of-ways (ROWs) from private property. Existing ROW areas were confirmed against the future Town Center Plan to ensure the area would remain roadways in the future development condition. Similarly, building (rooftop) area and pavement areas were also designated and digitized to inform the delineation of DMAs. An example of how this hierarchy was implemented is shown in Figure 2.

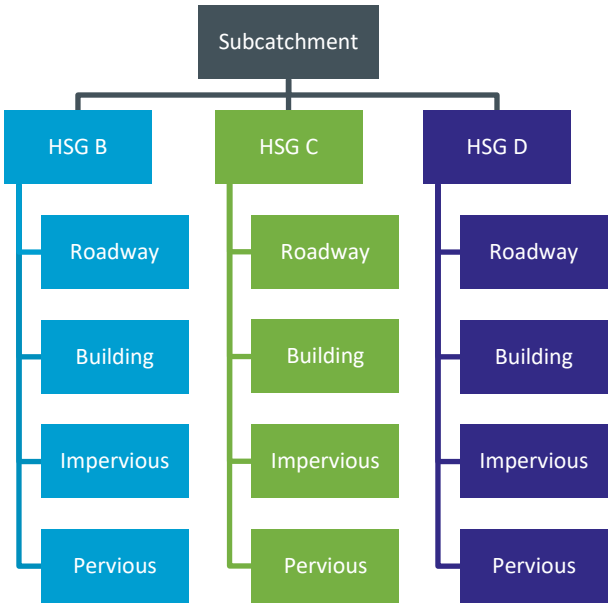

Figure 2. Example hierarchy of how the subcatchments were divided into DMAs

The DMAs were set-up to meet each of the three (3) initial scenarios for evaluation:

1. Pre-development (Oak Savanna) to existing conditions (today)
2. Pre-development (Oak Savanna) to future conditions (Town Center build out)
3. Existing conditions (today) to future conditions (Town Center build out)

To accommodate each of these scenarios, a total of 98 individual DMAs were established to represent the soil characteristics and development types over the 11 subcatchments. Each of the DMAs has a unique pre-development and post-development surface types associated with a specific soil type.

A database and specific naming convention was used to track DMAs and associated information. DMAs were named by subcatchment number, HSG letter, the existing development type, and the future development type. For example, a DMA from scenario 3 may read as 3414_D_Ex_Perv_Fu_Imp with an area of 3,995 square feet. This naming convention indicates that this DMA is currently a pervious surface (noted as Grass in the tool) but is anticipated to become an impervious surface (Conventional Concrete or Asphalt) under the full Town Center development.

3.2 Best Management Practices

Although the BMP Sizing Tool has eight (8) available facility types to develop sizing, this analysis focused on the Detention Pond with treatment and flow control to represent the Library Pond. Since the Library Pond is located in HGL B soils, the more conservative group B value (called B3 in the tool) with an infiltration rate of 0.50-0.99 in/hr was used to represent these soils. This range was verified against data from the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) soil survey database which identified the soil in this area to be primarily Willamette silt loam with a saturated hydraulic conductivity (Ksat) between 0.57-1.98 in/hr.

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The pond was modeled using both custom and simple geometry in the tool in order to compare existing pond sizing as well as determine sizing and outlet control adjustments. The custom geometry was used in the BMP Sizing Tool to represent the existing facility under current and future conditions to confirm if it meets design standards. For the custom sizing, the geometry data was extracted from the InfoSWMM model (based on the 1992 as-built data) to determine the depth in feet (ft), area in square feet (sq ft), and flow in cubic feet per second (cfs) based on modeled stage storage for the 10-year storm event. The stage storage information extracted from InfoSWMM is listed in Table 1.

Table 1. Library Pond Stage Storage

Depth (ft)	Area (sq ft)	Flow (cfs)
0	0	0
1	10,018	9.4
2	17,859	14.3
5	23,522	19.7
9	32,670	Not reached in 10-year storm
10	34,848	Not reached in 10-year storm

It is assumed that usable storage within the pond must remain below the elevation of the chain link fence at its lowest position (near the outlet structure where it passes under the road). This elevation contour of 147 ft is considered the upper limit of the pond with a calculated surface area of 30,130 sq ft. The lowest full elevation contour of the pond was calculated to be 137 ft with a surface area of 17,800 sq ft. It was assumed that the existing footprint of the pond is a hard constraint, and the surface area of the pond could not be expanded.

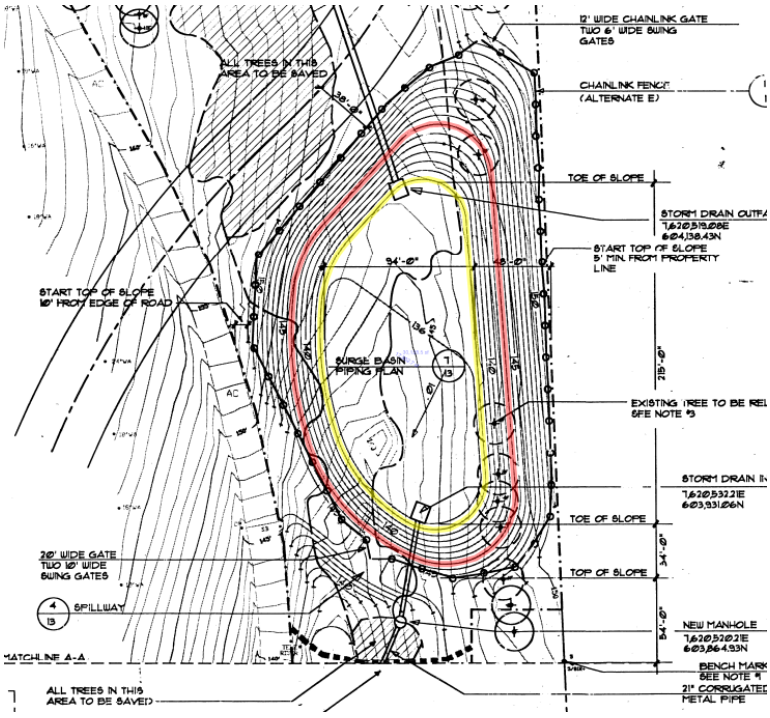

Figure 3. Library Pond 1992 as-builts, upper 147 ft contour (red) and lower 137 ft contour (yellow)

Alternatively, the simple geometry calculation was used to confirm modifications needed to retrofit the pond to current PWS design standards, based on each of the scenarios. The simple geometry could be run with either a known pond surface area, a known depth, or both. If one variable is unknown the tool calculates it based on the provided information for the surface area and/or depth and slope (H:V), as well as calculated the bottom area of the pond. Values for the surface area and slope were rounded to the nearest whole number for calculations.

Since the detention pond is being evaluated to meet both the water quality and flow control criteria, the BMP Sizing Tool was used to evaluate and size the pond facility to address peak flow duration matching for flows ranging from 42 percent of the 2-year peak flow to the 10-year peak flow as well as ensure treatment of 80 percent of the average annual runoff.

Section 4: Scenarios

The following three (3) scenarios were established to compare past, present, and future conditions of the Town Center Development area and associated sizing of the Library Pond. Each scenario was input into the BMP Sizing Tool to see how the system (pond) would respond under the varying development assumptions, with accompanying scenarios evaluated to confirm what level of retrofit or policy change regulating upstream LID installations are needed to meet the City's design standards.

4.1 Scenario 1: Pre-development to Existing Conditions

This scenario simulated pre-development conditions, referred to as Oak Savanna in the 2015 PWS, and existing development conditions to confirm whether the existing Library Pond sizing is adequate to meet design standards. The contributing drainage area under existing conditions is 47 percent impervious. In comparison, Oak Savanna is considered 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type.

Simply comparing the aerial photography from 1992 (which is not representative of Oak Savanna but represents the oldest web accessible archived image) to aerial imagery from 2022, it is evident that this area has experienced a large amount of development over the past 30 years.

Figure 4. Aerial images of site and surrounding area

Left: after retrofit in June 1994

Right: July 2022, representative of existing condition.

4.1.1 Pond Sizing Evaluation

Simulation of the Library Pond configuration in the BMP Sizing Tool indicates that the existing pond does not meet the current stormwater design standards per the 2015 PWS. The existing pond geometry was entered into the tool using stage storage information from the 1992 as-builts and SMP InfoSWMM model. As seen in Figure 5, the blue line represents the discharge occurring from the pond and it is consistently higher than the red, pre-development (Oak Savannah) flow frequency and flow duration curves. Library Pond in its current configuration does not adequately match the pre-development curves and additional pond storage is needed.

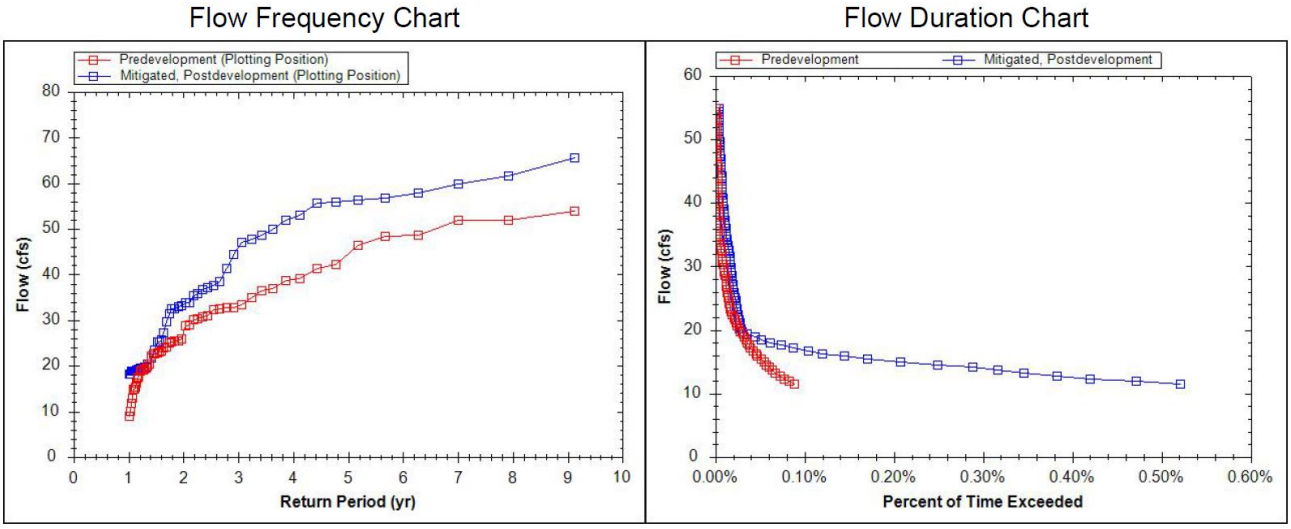

Figure 5. Curves based on existing stage storage information from as-builts

Pre-development shown in red. Mitigated, Post-Development shown in blue.

4.1.2 Pond Retrofit Evaluation

The BMP Sizing Tool was used to simulate additional scenarios associated with the pond configuration and size, as outlined in Table 2, to calculate pond retrofits required to meet current design standards. The BMP Sizing Tool calculations show that significant design modifications are required to ensure the pond is adequately sized; specifically the pond would need to be retrofit to have 1H:1V side slopes with a depth of nearly 24 feet (Figure 6) to adhere to the City's hydromodification standard (see Attachment A, Scenario 1A). This design fails to meet the design criteria for detention ponds having 3H:1V slopes and results in an excessively deep detention facility. Retrofit of the pond to meet City design standards based on existing development conditions is considered infeasible.

Table 2. Scenario 1 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information per as-builts				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, geometry doesn't work
	1:1	Auto calculate depth	23.98	15,780	Yes, sized adequately

Note: there is some variation between calculated depths with the same slope based on the tool and the outset structure sizing/configuration.

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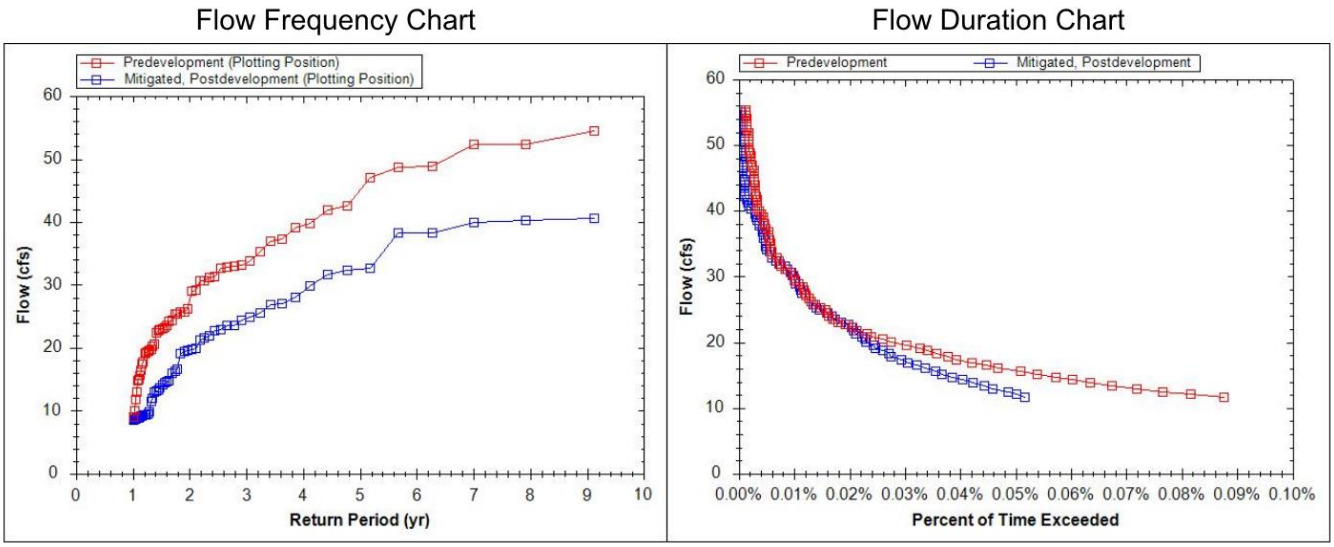

Figure 6. Flow frequency and duration curves if retrofit is to have 1H:1V side slopes and a depth of nearly 24 feet

Pre-development (red) to Existing condition (blue)

4.1.3 Onsite Flow Mitigation Evaluation

An additional, theoretical investigation was conducted to see how much of the current contributing drainage area to Library Pond would need to be managed onsite (i.e., routed to onsite LID) for the pond to meet current design standards.

To evaluate, the BMP Sizing Tool was used to automatically size the detention pond, maintaining the existing pond surface area of 30,130 sq. ft., and adjusting the side slopes to meet the PWS of 3H:1V. The automatic sizing mode to calculate the depth and bottom area of the pond. DMAs were then selectively removed from contributing area to the detention pond with the assumption that removed DMAs would require onsite stormwater management (retention) and use of LID such as planters or raingardens.

By removing approximately 20 percent of the existing total drainage area (roughly 36 acres of impervious surface or 43% of the contributing impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. This reduces the total drainage area to the Library Pond to 143.3 acres. The resulting pond sizing requires deepening the Library Pond to 15.08 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,906 sq. ft. See Attachment A, Scenario 1B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.08 feet and 3H:1V side slopes is as follows in Figures Figure 7 and Figure 8.

Structure	Size
Lower Orifice Diameter	9.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	25.2 in
Upper Orifice Invert	9.8 ft
Weir Length	6.3 ft
Weir Invert	13.6 ft

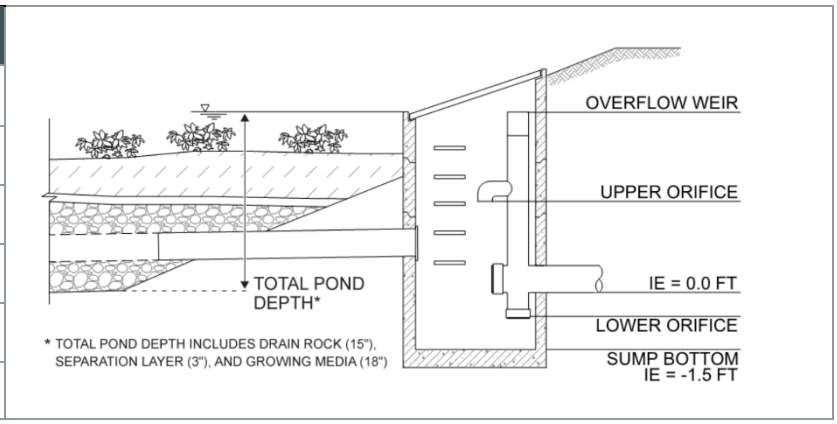

Figure 7. Scenario 1 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

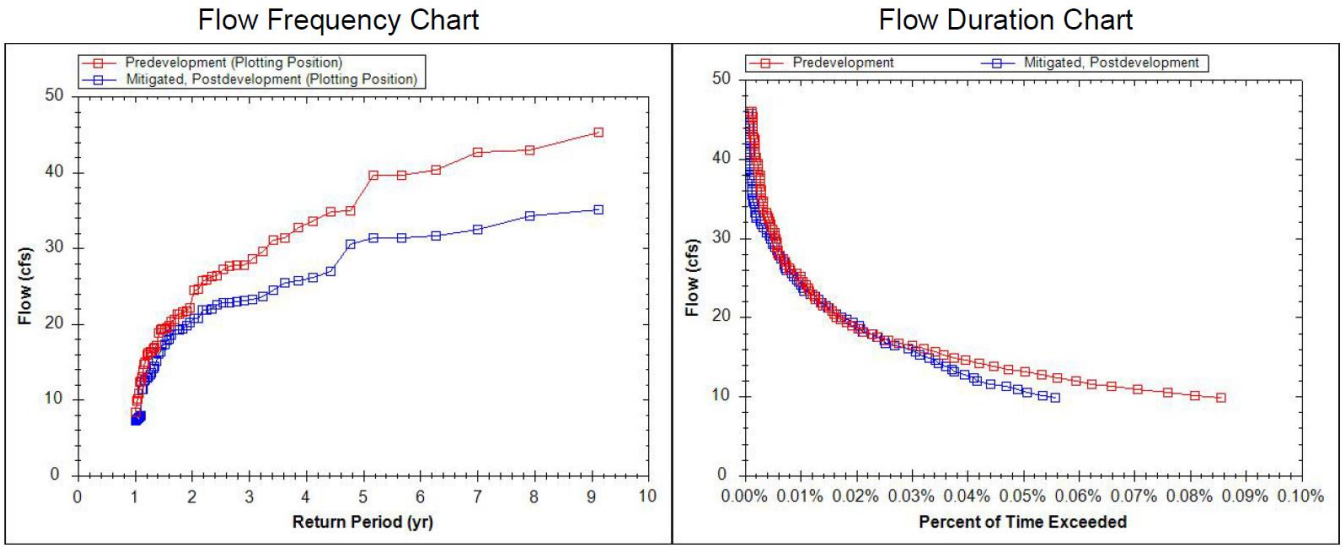

Figure 8. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to existing condition (blue)

4.2 Scenario 2: Pre-development to Future Conditions

The second scenario was simulated in the BMP Sizing Tool, comparing pre-development conditions, referred to as "Oak Savanna" in the 2015 PWS, to the future development conditions outlined in the Town Center Plan at full build out (20+ year planning horizon) to confirm sizing needs for the Library Pond. The contributing drainage area under future conditions is 53 percent impervious. In comparison, Oak Savanna is 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type. Like Scenario 1, expansion of the existing footprint of the pond, approximately 0.7 acres, is not possible due to constraining site limitations (roadways, trees, etc.).

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4.2.1 Pond Sizing and Retrofit Evaluation

Based on Scenario 1 findings, it is assumed that the existing pond sizing would not meet the City's design standards as is in conjunction with future redevelopment of the Town Center area (Figure 9). Since the existing pond configuration does not meet the City's design standards for existing development conditions, it was not expected that the pond is adequately sized for future development conditions either.

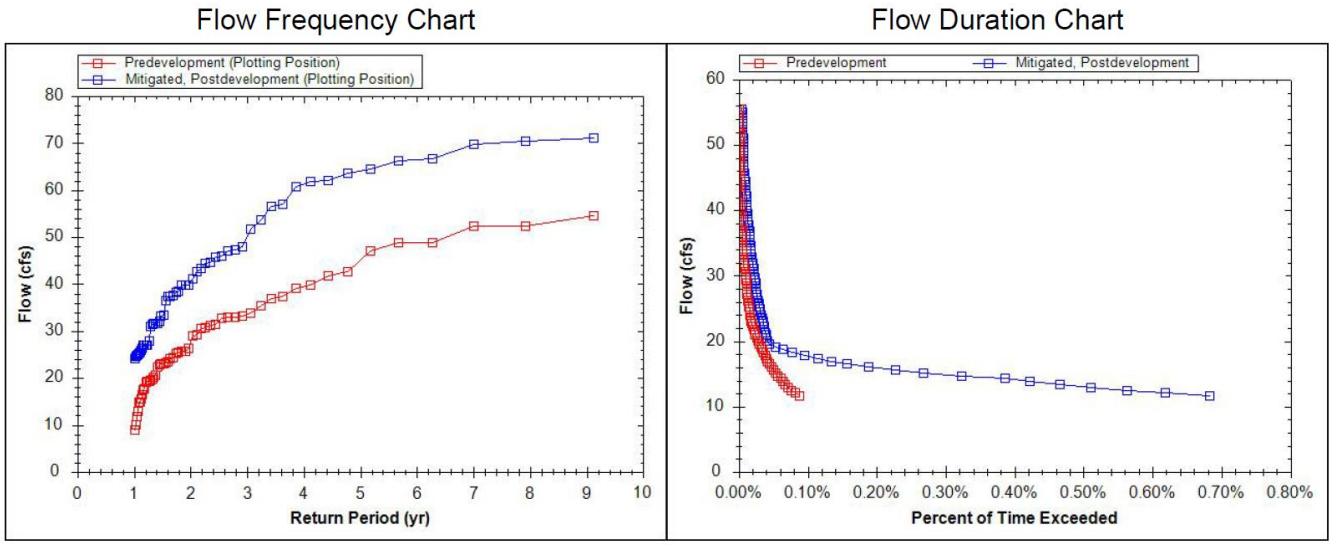

Figure 9. Flow frequency and duration curves based on existing stage storage information from as-builts

Pre-development shown in red and future development conditions shown in blue.

The BMP Sizing Tool was simulated for the additional scenarios outlined in Table 3 to calculate the required pond sizing and retrofit needs. As shown in Table 3 and Figure 10, like with the previous scenario, the BMP Sizing Tool calculated that the pond would have to be retrofit to have 1H:1V side slopes with a depth of approximately 30.4 feet and a bottom geometry of over just over 12,700 sq. ft to meet current design standards (see Attachment A, Scenario 2A). However, these detention pond design criteria do not meet the 2015 PWS requirements.

Table 3. Scenario 2 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, not large enough
	1:1	Auto calculate depth	30.40	12,719	Yes, sized adequately

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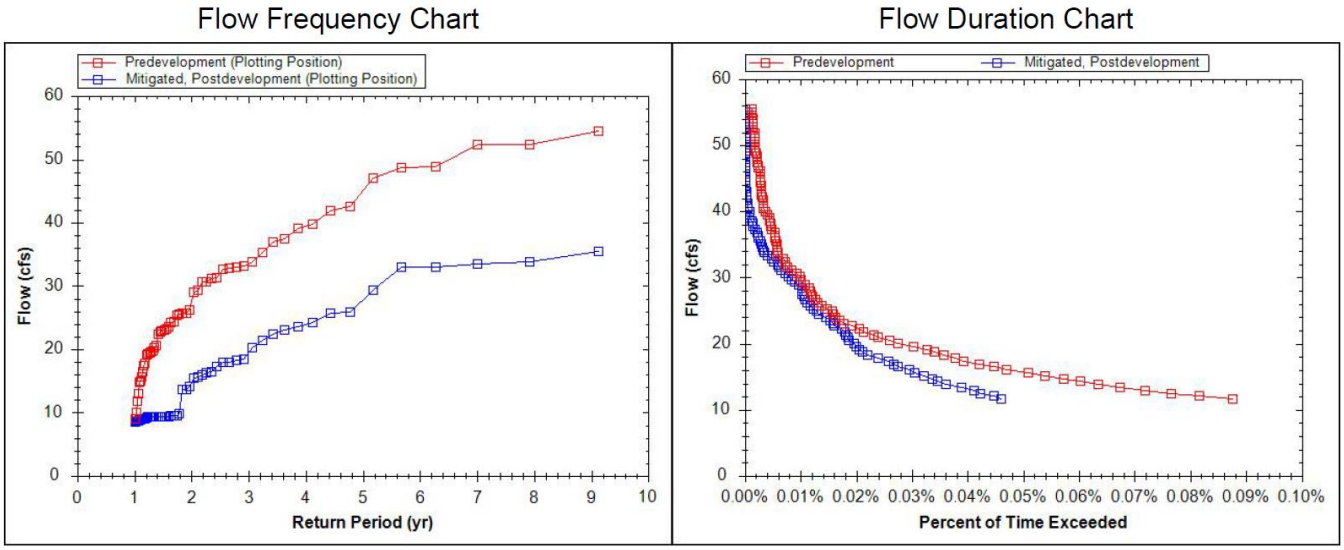

Figure 10. Flow and durations curves if retrofit was to have 1H:1V side slopes with a depth of over 30 feet.

Pre-development (red) to future development conditions (blue).

4.2.2 Onsite Flow Mitigation Evaluation

Based on these findings, a secondary analysis for Scenario 2 was developed. Similar to Scenario 1, this analysis removed select DMAs from contributing to the pond, assuming that these areas could be treated by additional LID facilities, to determine how much of Town Center property would require onsite stormwater management in order for Library Pond to meet City design standards.

Again, to evaluate the reduction in DMAs, the BMP Sizing Tool maintained the existing surface area of 30,130 sq. ft., set the slope to meet the City directed use of the PWS maximum of 3H:1V, and used the automatic sizing mode to calculate the depth and bottom area of the pond.

By removing approximately 27 percent of the total contributing drainage area (approximately 48 acres impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. All 48 acres of removed DMAs were impervious surfaces and represents all roadways (approximately 27 acres) plus an additional 21 acres of impervious area. **The removed impervious surfaces to be redirected constitutes 50 percent of the total new or redeveloped impervious surfaces contributing to the pond.** This removed area was assumed rerouted to infiltration planters onsite and modeled in the BMP Sizing Tool through a series of Stormwater Water Planter BMPs that connect to Library Pond as upstream LIDs. Although site-specific infiltration testing would be needed to confirm whether an infiltration or filtration-based LID is needed, for integration into the BMP Sizing Tool an infiltration planter that provides treatment and flow control was selected. Since the facility infiltration rate at Library Pond is associated with HSG B3 (0.50-0.99 in/hr), for purposes of this initial analysis the same infiltration rate was assumed as a representative of the soils for the LID facilities. With a portion of contributing drainage area removed, the total drainage area to Library Pond to 131.8 acres. The resulting pond sizing requires deepening the Library Pond to 15.04 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,946 sq. ft. See Attachment A, Scenario 2B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.04 feet and 3H:1V side slopes is as follows in Figure 11 and Figure 12.

Structure	Size
Lower Orifice Diameter	10.6 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	27.4 in
Upper Orifice Invert	10.1 ft
Weir Length	6.3 ft
Weir Invert	14.0 ft

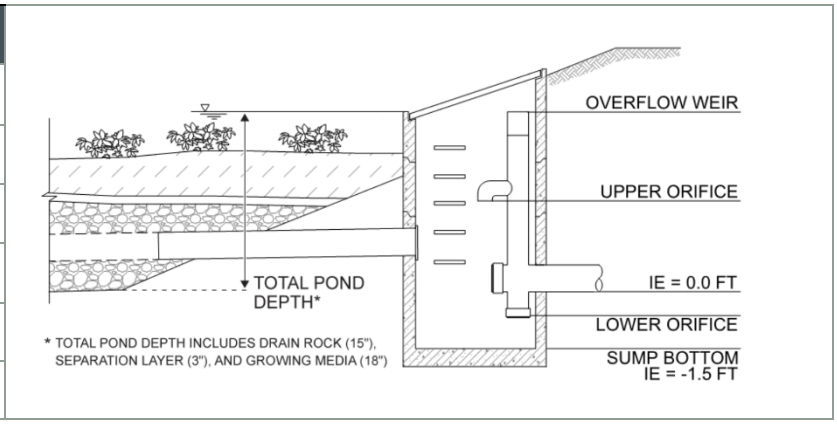

Figure 11. Scenario 2 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

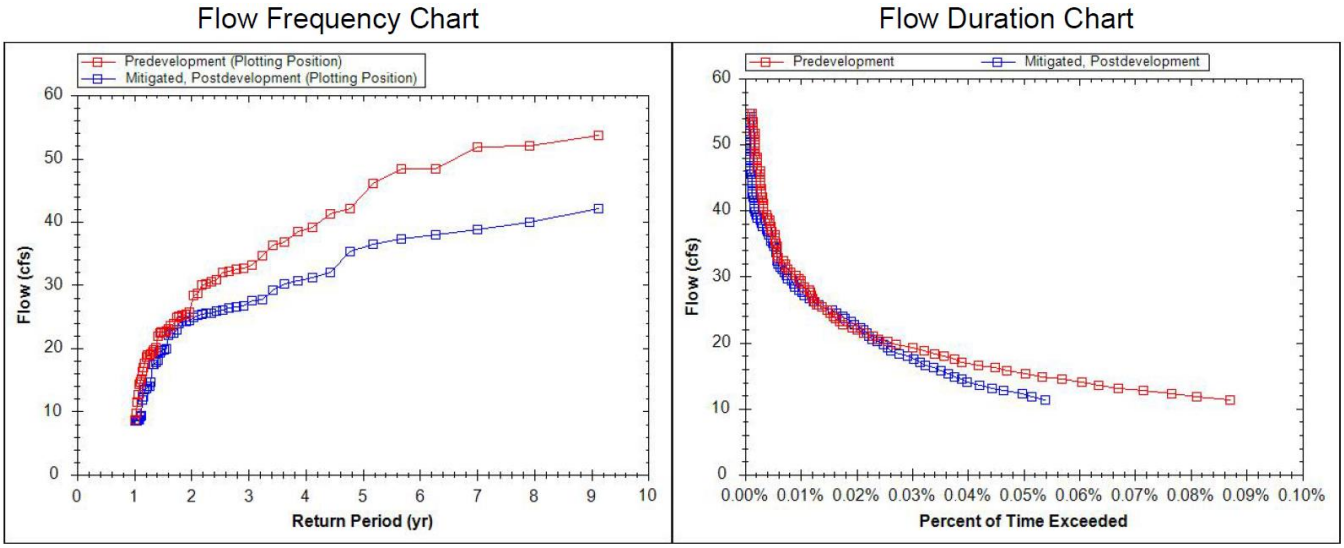

Figure 12. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to future development condition (blue).

4.3 Scenario 3: Existing to Future Conditions

The last scenario assumes that adherence to the City's design standards could be accomplished by allowing redevelopment of Town Center to adhere to predevelopment flows reflecting existing land use conditions as opposed to historic (Oak Savannah) land cover conditions. The contributing drainage area under existing conditions is 47 percent impervious and under future conditions increases to 53 percent impervious through both redevelopment and the addition of approximately 10 acres of impervious surface. As seen in Figure 13, the Town Center development plans anticipate redevelopment of many currently developed and impervious areas, which is why the amount of impervious area only increases by about 7 percent. However, all redevelopment area is subject to the City's design standards including utilization of Green Infrastructure and Low Impact Development (GI/LID) strategies to mitigate stormwater.

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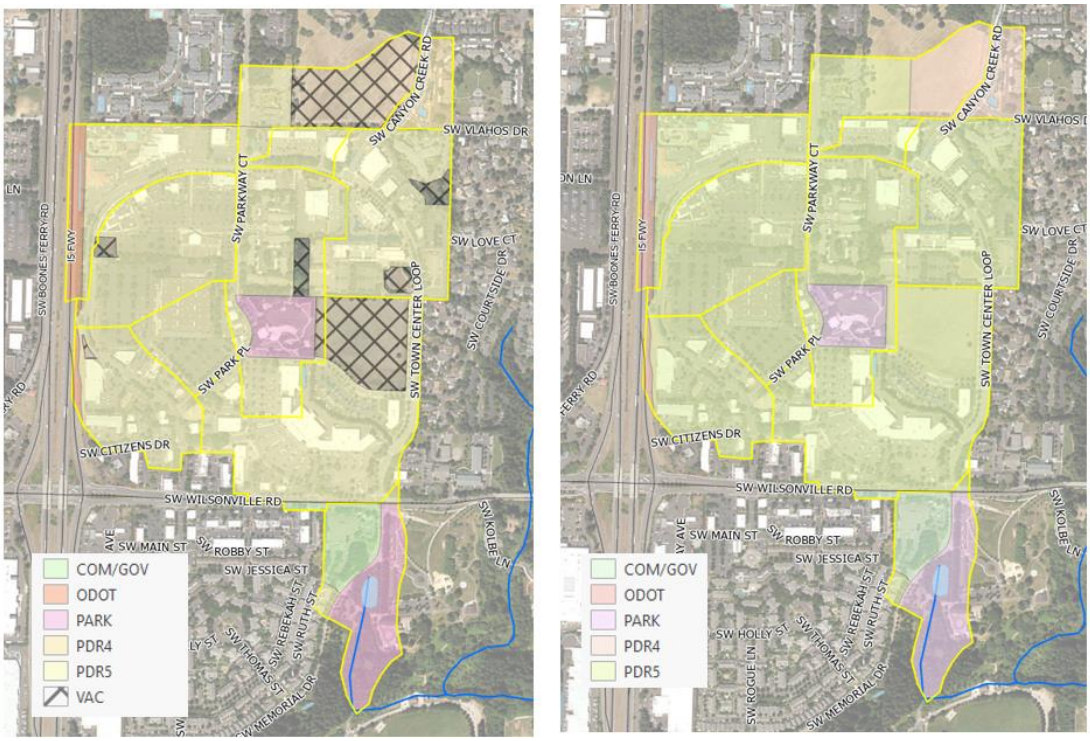

Figure 13. Existing land use at 47% impervious (left); future land use at 53% impervious (right)

The BMP Sizing Tool was run through the following scenarios outlined in Table 4 to calculate how the existing pond may handle future flows as well as design modifications that would be required.

Assuming pre-development conditions reflect existing land use, the pond as-is does not adequately meet City design standards for sizing. Some modifications to Library Pond are required, specifically the pond needs to be deepened to approximately 7.1 feet, which includes 3 feet of media at the bottom of the facility and adjustment of side slopes to 4:1 is required. Utilizing this comparison methodology, this approach requires a policy change since for the City since it redefines "pre-development" from historic (Oak Savanna) land coverage to current land use conditions.

Table 4. Scenario 3 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	7.09	13,656	Yes, sized adequately
	3:1	Auto calculate depth	6.24	18,534	Yes, sized adequately

Note: Additional analysis of slopes 2H:1V and 1H:1V were not recorded as the 4H:1V and 3H:1V slope design standard slope meets sizing requirements.

The pond schematic and structure sizing reflect a depth of 7.09 feet and 4H:1V side slopes is as follows in Figure 14 and Figure 15.

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Structure	Size
Lower Orifice Diameter	16.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	40.9 in
Upper Orifice Invert	4.8 ft
Weir Length	6.3 ft
Weir Invert	6.1 ft

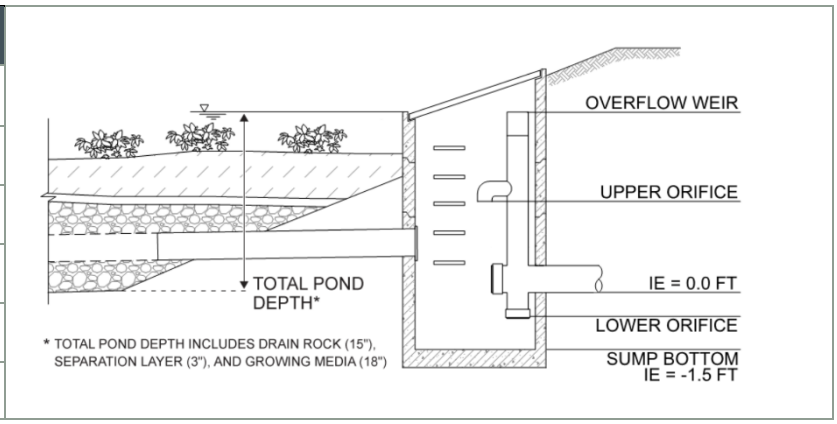

Figure 14. Scenario 3 outfall structure sizing and schematic for reduced contributing drainage area and 4H:1V sides slopes

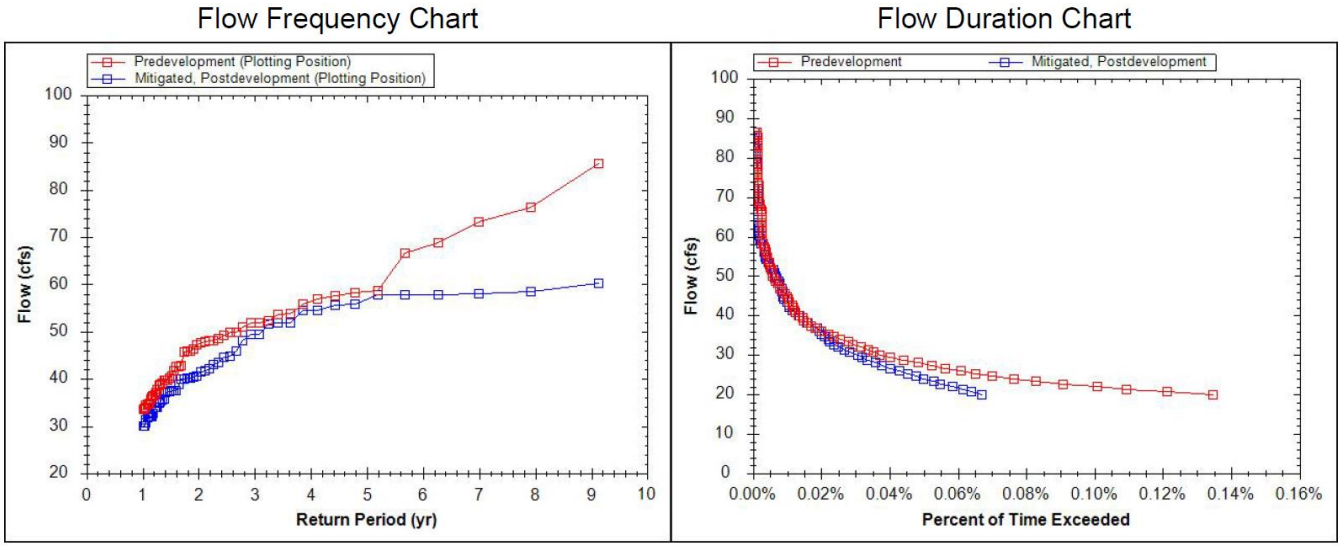

Figure 15. Flow and durations curves show adequate sizing for 4H:1V side slopes at 7.09 feet deep

Existing development conditions (red) to future development conditions (blue).

Section 5: Conclusions

Scenarios simulated using the BMP Sizing Tool for Library Pond indicate there are limited options to retrofit the pond to meet the existing stormwater design standards. Table 5 summarizes the scenarios iterated and the resulting design adjustments (retrofit) required for Library Pond based on assumptions discussed in Section 4.

Table 5. Scenario Summary							
Scenario No.	Scenario Description and Land Cover Conditions	Total Contributing Area (acres)	Meets Hydraulic Requirements?	Pond Retrofit Requirements		Meets Pond Design Criteria?	Notes
				Slope (H:V)	Depth (feet)		
1.A	Pre-Development Land Cover to Existing Land Cover	179.8	Yes	1:1	21.33	No	Pond sides are too steep and pond is too deep
1.B	Pre-Development Land Cover to Existing Land Cover	143.3	Yes	3:1	15.08	Yes	Requires onsite mitigation (retention) for 36 acres of existing impervious area
2.A	Pre-Development Land Cover to Future Land Cover	179.8	Yes	1:1	32.01	No	Pond sides are too steep, and pond is too deep
2.B	Pre-Development Land Cover to Future Land Cover	131.8	Yes	3:1	15.04	Yes	Requires onsite mitigation (retention) for 48 acres of existing impervious area
3	Existing Land Cover to Future Land Cover	179.8	Yes	4:1	7.09	Yes	Requires an established policy adjusting the definition of pre-developed land cover for Town Center redevelopment.

As seen in Table 5, Scenarios 1A and 2A are unable to meet the 2015 PWS stormwater design standards for ponds, specific to side slope (both are 1H:1V and the standard is 3H:1V) and depth. Only if onsite retention occurs for a portion of the upstream contributing drainage area will pond retrofit be able to meet the City's design standards. Only Scenario 3 allows for the entire upstream contributing drainage area to be managed by Library Pond and the pond adhere to design criteria outlined in the PWS. This pond retrofit can be designed with a more gradual 4H:1V slope, and results in a reasonable pond depth of 7.09 feet deep, which is shallower than the existing Library Pond with the 3 feet of required media in the bottom.

However, Scenario 3 mandates a policy change to adjust pre-development land cover from historic Oak Savanna to current land use conditions. This consideration will need to be evaluated by the City.

If a policy change related to the pre-development condition associated with Town Center is not possible, Scenarios 1B and 2B reflect the percentage and acreage of impervious area that would need to be retained or managed onsite using GI/LID BMP facilities and no longer routed to Library Pond. The following assumptions were made to estimate the amount of onsite infiltration planters required to offset 48 acres of impervious surfaces in the future condition (or 50% of the total new or redeveloped impervious area to Library Pond).

- Pre-development conditions are grass cover per PWS Oak Savanna designation with soil conditions reflective of the associated HSG;
- Soil and infiltration characteristics for the LID facilities are similar to that of the Library Pond, characterized as B3 (0.5-0.99 in/hr infiltration), which prompts use of an infiltration facility;
- Per Appendix B of the BMP Sizing Tool User Manual, onsite LID sizing would equate to a sizing factor of approximately 7.4, based on an area weighted average of sizing factors and soil characteristics for area removed from the Library Pond drainage area.

Using the above assumptions, onsite retention of 48 acres of impervious surface is possible using approximately 154,725 sq. ft. (3.6 acres) of infiltration planters located throughout the Town Center development. It should be noted that site-specific infiltration testing may result in adjustment of the LID sizing and/or need for a filtration-based facility to be used instead.

Retrofit of the Library Pond would require regrading and structural improvements, resulting in a 3:1 side slope and depth of 15.04 feet. This is a conservative design approach and conservative design assumptions based on onsite management of approximately 48 acres of the contributing drainage area to Library Pond onsite. Pond sizing may vary depending on the use and characteristics of upstream LID.

References

Stormwater & Surface Water Design & Construction Standards, Section 3, "Public Works Standards," City of Wilsonville, 2015, pp.1-104.

User's Guide for the BMP Sizing Tool, City of Wilsonville and City of Oregon City, 2017, pp. 1-23.

Wilsonville Town Center Plan, City of Wilsonville, 2019, pp. 1-104.

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Attachment A: BMP Sizing Tool Scenario Reports

1. Scenario 1 – Stage Storage Report
2. Scenario 1A – Automatically Calculated Depth Report
3. Scenario 1B – Automatically Calculated Depth Report – Reduced Area
4. Scenario 2 – Stage Storage Report
5. Scenario 2A – Automatically Calculated Depth Report
6. Scenario 2B – Automatically Calculated Depth Report – Reduced Area
7. Scenario 3 – Stage Storage Report
8. Scenario 3A – Automatically Calculated Depth Report

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WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Existing

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	5.00	30,130.0	0	150,650.0	96,416.0	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

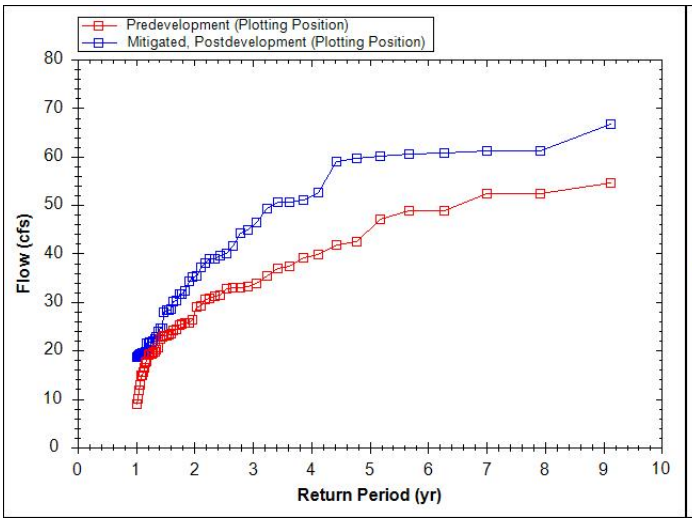
Custom Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

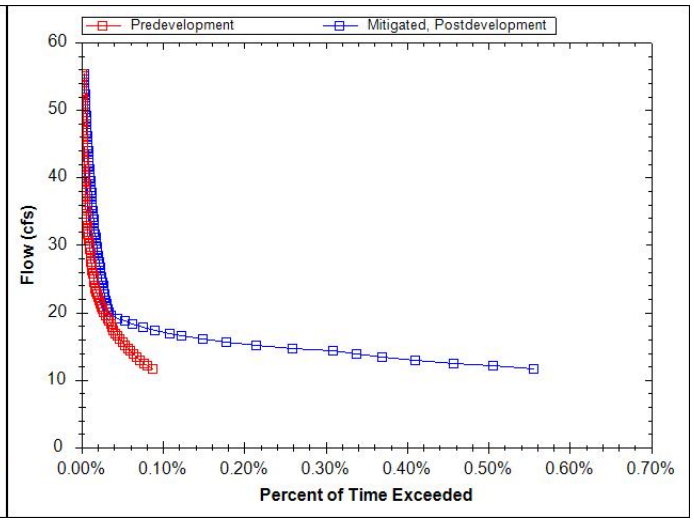
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Existing

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	23.98	30,130.0	1	541,267.4	511,485.0	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

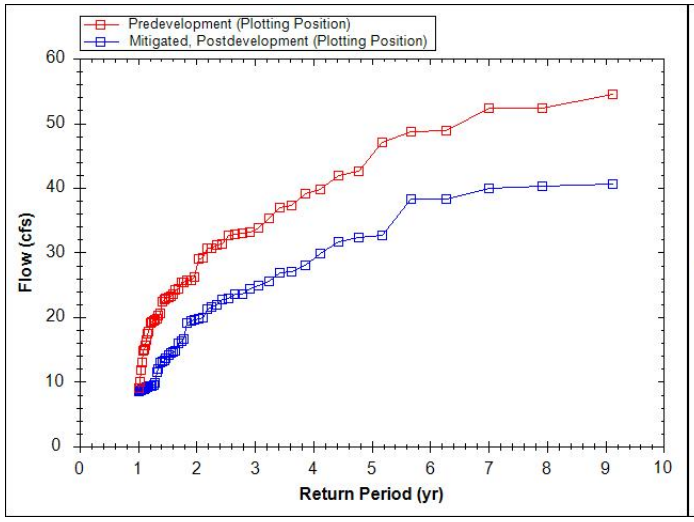
Shape Curve

Depth (ft)	Area (sq ft)
24.0	30,130.0

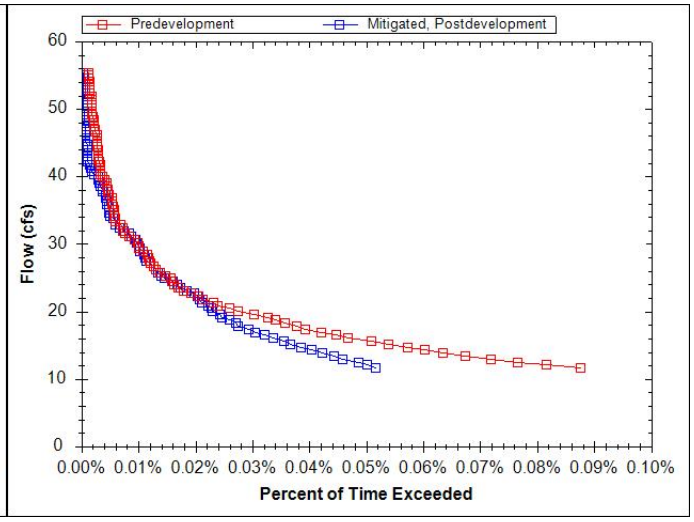
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.5
Upper Orifice Invert(ft)	16.1
Upper Orifice Dia (in)	24.5
Overflow Weir Invert(ft)	23.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	NA
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	NA
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	NA
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	NA
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	NA

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	NA
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	NA
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	NA
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	NA
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	NA
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	NA
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	NA
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	NA
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	NA
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	NA
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	NA
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	NA
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	NA

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	NA
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	NA
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	NA

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	15.08	30,130.0	3	258,676.8	243,359.2	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

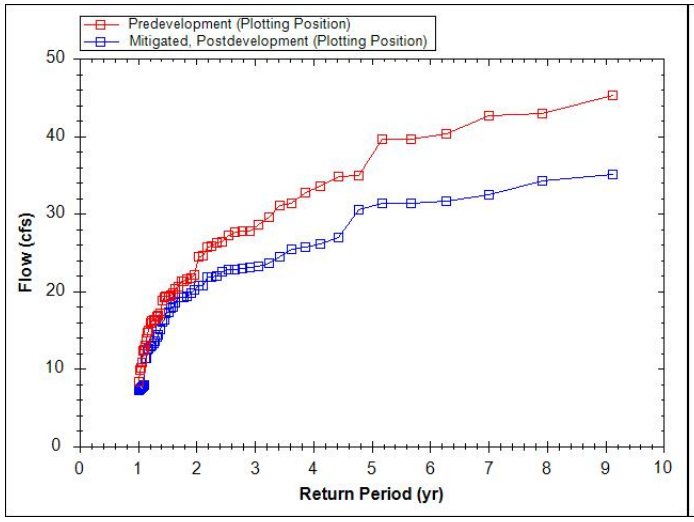
Shape Curve

Depth (ft)	Area (sq ft)
15.1	30,130.0

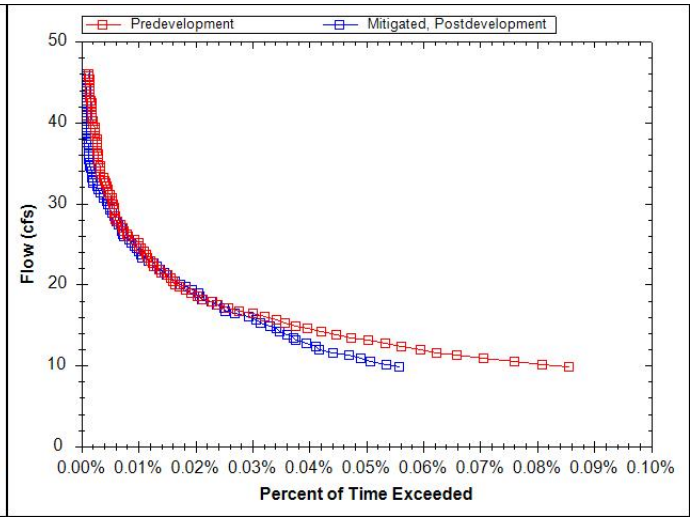
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.9
Upper Orifice Invert(ft)	9.8
Upper Orifice Dia (in)	25.2
Overflow Weir Invert(ft)	13.6
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

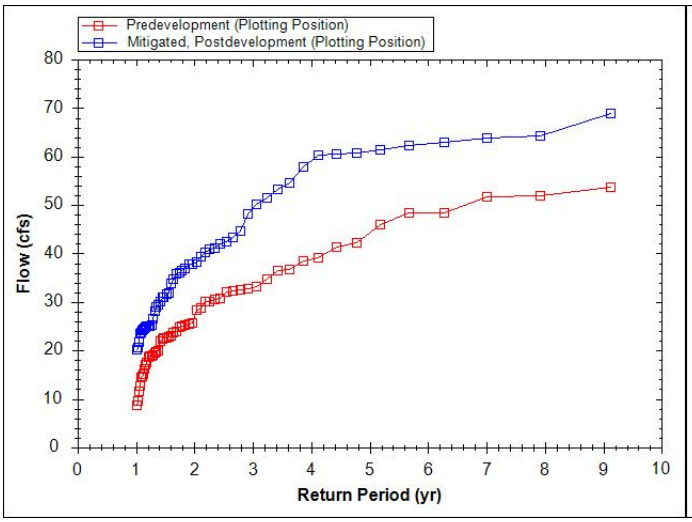
Custom Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

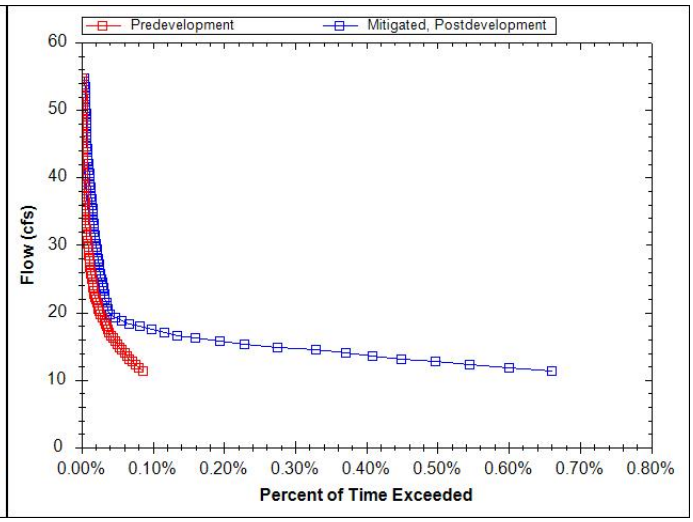
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

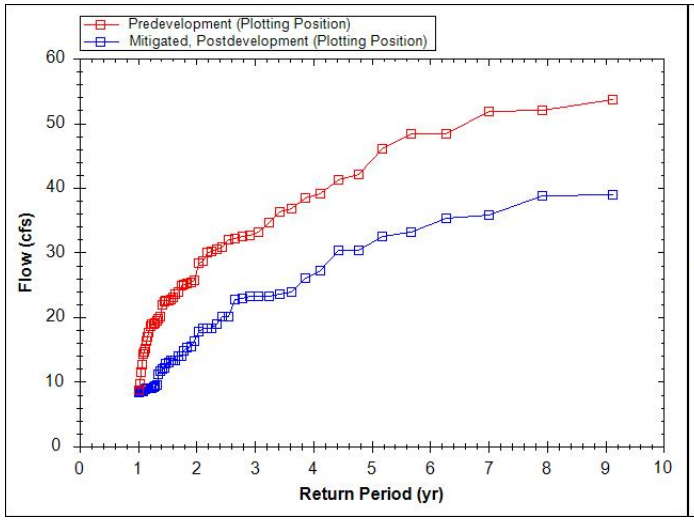
Shape Curve

Depth (ft)	Area (sq ft)
30.4	30,130.0

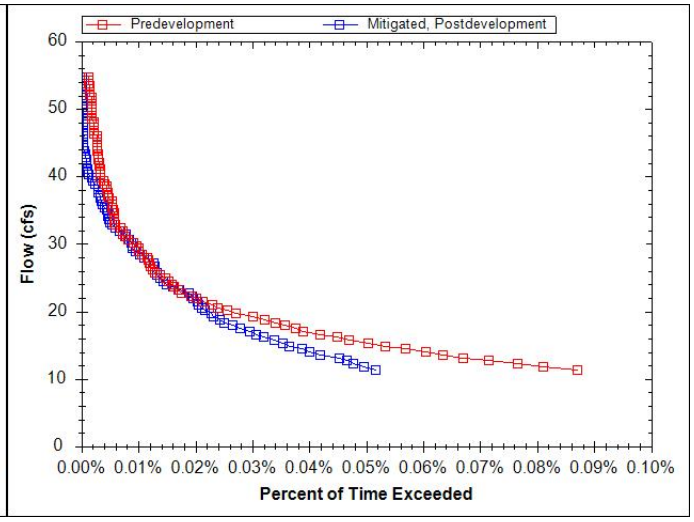
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	7.5
Upper Orifice Invert(ft)	38.8
Upper Orifice Dia (in)	19.5
Overflow Weir Invert(ft)	56.9
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Planter 2
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Planter 2
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Planter 3
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Planter 2

			ncrete		
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Planter 4
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Planter 3
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Planter 1
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Planter 3
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Planter 3
3420_B_Bdg	13,450	Grass	Roofs	B	Planter 6
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Planter 4
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Planter 3

3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Planter 2
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Planter 3
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Planter 2
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Planter 3
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Planter 3
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Planter 2
3402_C_Bdg	250,938	Grass	Roofs	C	Planter 6
3402_B_Perv	385,991	Grass	Grass	B	Library

					Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Planter 1
3402_B_Bdg	330,195	Grass	Roofs	B	Planter 5
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Planter 1
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Planter 4

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Planter 1	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	31,696.4	31,697.0	0.0
Planter 2	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	43,376.2	43,377.0	0.0
Planter 3	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	23,933.0	23,933.0	0.0
Planter 4	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	14,129.5	14,357.0	0.0
Planter 5	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	49,529.3	54,273.0	0.0
Planter 6	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	12,055.0	12,247.0	0.0

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	15.04	30,130.0	3	258,400.3	243,002.9	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

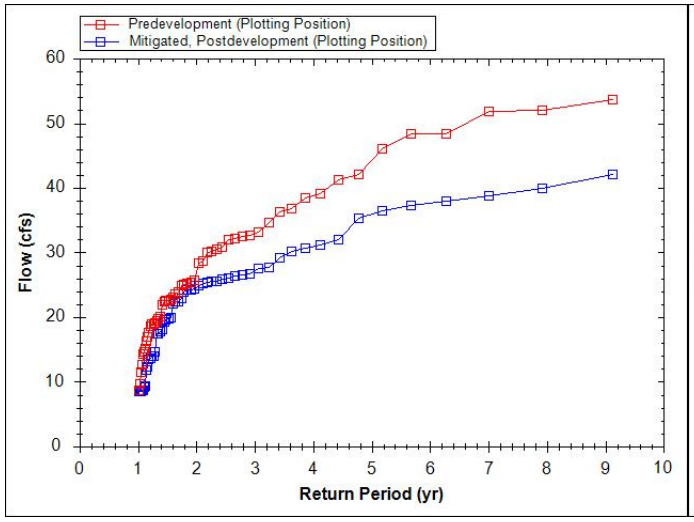
Shape Curve

Depth (ft)	Area (sq ft)
15.0	30,130.0

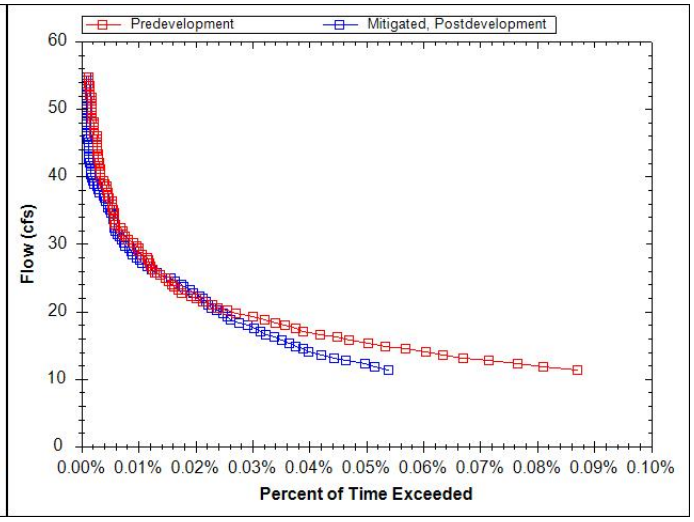
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	10.6
Upper Orifice Invert(ft)	10.1
Upper Orifice Dia (in)	27.4
Overflow Weir Invert(ft)	14.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

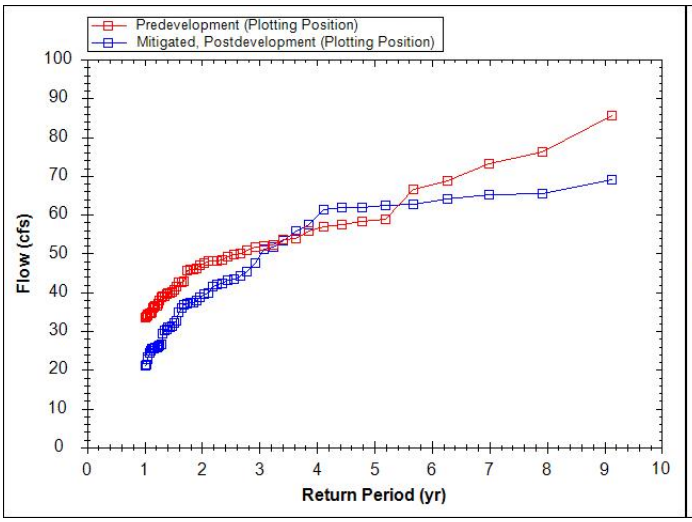
Custom Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

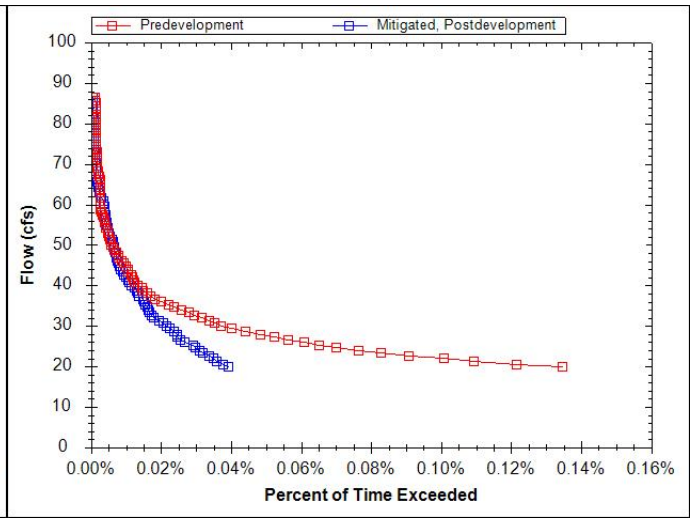
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

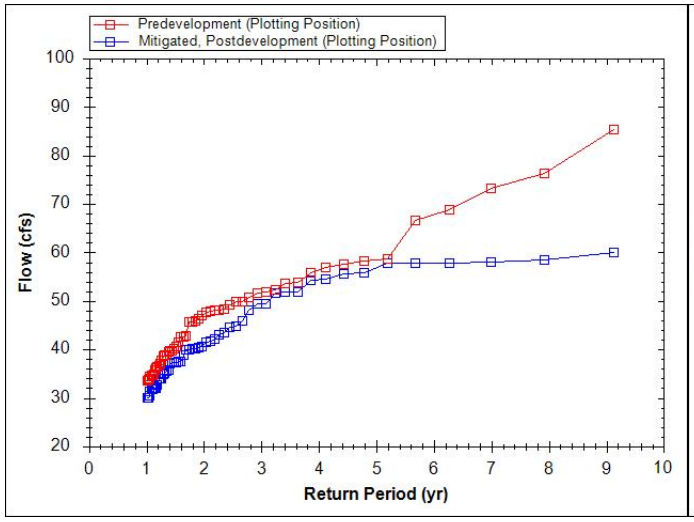
Shape Curve

Depth (ft)	Area (sq ft)
7.1	30,130.0

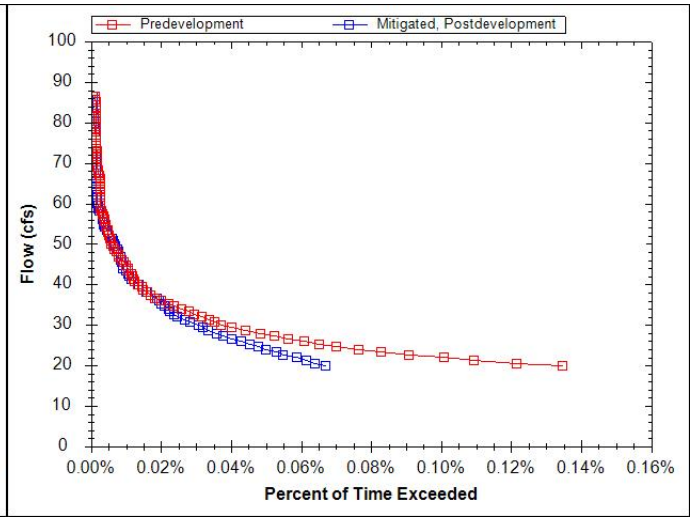
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	16.9
Upper Orifice Invert(ft)	4.8
Upper Orifice Dia (in)	40.9
Overflow Weir Invert(ft)	6.1
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



Appendix G: Staffing Evaluation

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan

Project No.: 156157.002.001

Staff Analysis Tables

Subject: Stormwater Staffing Analysis

Date: January 24, 2024

To: Kerry Rappold, City of Wilsonville

From: Angela Wieland, Brown and Caldwell

Prepared by: Shelby Gilmartin, EIT

Reviewed by: Angela Wieland, PE

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List of Abbreviations

BMP	Best Management Practice
CCTV	Closed-circuit Television
City	City of Wilsonville
CP	Capital Project
CREST	Center for Research in Environmental Sciences & Technologies
DEI	Diversity, Equity, and Inclusion
EC	Construction Site Runoff Control
Ft	Feet
FTE	Full-Time Employee
FY	Fiscal Year
Hr	Hour
HPSE	High Pollutant Source Facilities
ILL	Illicit Discharge Detection and Elimination
IND	Industrial and Commercial Facilities
IPM	Integrated Pest Management
LF	Linear Feet
NPDES	National Pollution Discharge Elimination System
OM	Pollution Prevention and Good Housekeeping for Municipal Operations
OSHA	Occupational Safety and Health Administration
PC	Post-Construction Site Runoff for New Development and Redevelopment
PEO	Public Education and Outreach
PI	Public Involvement
SF	Square Feet
SMP	Stormwater Master Plan
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TBD	To Be Determined
TM	Technical Memorandum (Tech Memo)
WERK	Wilsonville Environmental Resource Keepers

Assumptions

A. This staffing analysis assumes that existing City staff is able to implement the current stormwater program (pre-2022 conditions). Additional activities not previously conducted by the City under current staffing were used to create the estimates of additional staff resource needs. Additional activities include those associated with the reissued NPDES MS4 permit (2021) and implementation of the proposed Capital Projects (CP) in the Stormwater Master Plan (2023).

B. One (1) FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year.

C. Assume that 100 percent of Engineering and Permitting Costs are for use of a consultant, and 100 percent of Design/Construction Administration Costs are required for internal City staff.

D. The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021 – Sept. 30, 2026) – reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.

E. Stormwater Master Plan (SMP) implementation is projected on an annual basis and assumes a 20-year CP implementation schedule from 2024-2043, with higher project projects occurring sooner:

- High Priority (2024-2028); Medium Priority (2029-2033); and Low Priority (2034-2043).
- Capital Projects costs are averaged over the 20-year implementation period and shown as a standard annual value. While in practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.

Where applicable the following asset assumptions are divided between 1) those needed to maintain existing assets and commitments under the Stormwater Management Program (SWMP) BMPs and meet the requirements of the NPDES MS4 permit and 2) those for future assets constructed as part of the SMP Capital Projects. If not distinguished, the assumption applies to newly constructed assets.

F. **Piped Conveyance System**

- *For SWMP BMPs*: CCTV and cleaning activities were evaluated as part of the maintenance evaluation in SMP TM#1 and this program requires an additional 0.5 FTE to meet current maintenance needs.
- *For SMP CPs*: 250 ft of pipe cleaning can be accomplished per hour, and 200 ft of closed-circuit television inspections (CCTV) can be accomplished per hour. Inspection and maintenance to occur on at least 15 percent of City pipes annually (assuming cleaning/inspection will occur four times over 20-year CP cycle).
    - Perforated pipe does not require regular cleaning and inspection and is anticipated to only occur if needed.
    - Pipe connections/laterals are not included in the annual maintenance estimate.
    - Pipe inspection and maintenance activities require a 2-person crew.

G. **Manholes**

- *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
- For *SMP CPs:* 0.5 hr/facility/year is needed for maintenance of a standard manhole. 1.0 hr/facility/year is needed for inspection and maintenance of a water quality manhole.
    - Manhole inspection and maintenance activities require a 2-person crew.

H. **Catch Basins**
   - *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
   - *For SMP CPs:* 0.5 hr/facility/year is needed for maintenance.
     - Catch basin maintenance requires a 2-person crew.

I. **Vegetated Systems (swales, rain gardens, planters, etc.):**
   - *For SWMP BMPs:* Maintenance activities associated with vegetated system were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 1.25 FTE to meet maintenance needs.
   - *For SMP CPs:* 8 hr/facility/year for inspection and maintenance for public systems.
     - Vegetated system inspections and maintenance requires a 2-person crew.

J. **Ditches**: 20 ft of ditch maintenance can be accomplished per hour.
   - Maintenance is required once every 5 years.
   - Ditch maintenance requires a 2-person crew.

K. **Outfalls**: 0.5 hr/facility/year is needed for inspection and maintenance of outfalls.
   - Outfall inspection and maintenance requires a 2-person crew.

L. **Inlets/Outlets**: 0.5 hr/facility/year is needed for inspection and maintenance of inlets/outlets.
   - Inlet/outlet inspection and maintenance requires a 2-person crew.

M. **Detention Pond**: 16 hrs/facility/year is needed for inspection and maintenance of detention ponds.
   - Detention pond inspection and maintenance requires a 2-person crew.

N. **Culverts:** 2 hr/facility/year is needed for culvert cleaning and inspection.
   - Culvert inspection and cleaning requires a 2-person crew.

O. **Private Water Quality Facilities:** 4 hr/facility/year is required for inspections.
   - The City holds *Stormwater Maintenance and Access Easement Agreements* with private water quality facilities owners to actively maintain facilities in conformance with City of Wilsonville's Public Work Standards and annually inspect and report on the facility.
   - Private water quality facility inspections require a 1-person crew.

P. **Restoration/Stabilization:** Planting and bioengineered restoration/stabilization is a single installation and does not require annual maintenance.

Q. **Replacement or Removal:** Replacement or removal of assets does not require continued maintenance and is not accounted for as additional annual maintenance activity.

R. **Driveways/Pathways:** Addition of, or modifications to driveways, accessways, or paths does not require annual maintenance. These facilities will be maintained only when identified as needed.

S. **Street Sweeping:** 165 hr/year is needed for street sweeping of all curbed areas. This work is completed by a contractor.

T. **Training:** Assume general training includes 3 staff and industrial/commercial training includes 1 staff.

NOTE: Recommended Programs developed for the SMP (P-1 to P-3, and P-5 to P-6) are outlined in the SMP Table 7-1 as an annual cost only and not staff hours which is why it was removed from the Public Works/Maintenance Staffing and Community Development/Engineering Staffing sections. Program P-4 is included in *SMP Implementation - Community Development/Engineering Staffing Assessment* analysis.

NPDES MS4 Permit Driven Activities (per 2022 SWMP)

Public Works/Maintenance Staffing Assessment

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr).	3	2 hrs/yr 6 hrs/permit term	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/ equipment costs	• Organizing public outreach programs such as Adopt-a-Road and WERK Day. • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	N	No Change.			N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.						
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	N	No Change.			N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
OM-2	Routine Road Maintenance	Conduct street sweeping, maintenance, and winter weather protocols.	N	No Change.			N	• Sweep all curbed City streets monthly. • Schedule and conduct street maintenance activities during dry weather conditions. • Continue to sponsor the Adopt-a-Road program, Bulky Waste Day, and Fall Leaf Collection Day.						
			Y	Implement Winter Weather Response Plan (2021) – including snow removal, sanding, chemical application, and proper management of materials. Staff time is winter conditions dependent, assume additional 40-hrs for additional tracking of materials and activities per year.	1	40 hrs/yr	N	N/A – New requirement.	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)
OM-3	Pest Management	Follow the IPM Plan (2018) principles for public landscape maintenance.	N	No Change.			N	• Track the amount of pesticides and fertilizers applied to public property and general areas of application. • Estimate number and area of sites where the planting of native vegetation was incorporated into the maintenance activities.						
			Y	Publish annual IPM activity on City website (assume 1-hr/year).	1	1 hr/yr	N	N/A – New requirement.	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)
OM-4	Conveyance System Cleaning	Maintain and repair public stormwater conveyance system components including the storm sewer pipes,	Y	• Conduct CCTV inspection of approximately 15% of the public stormwater conveyance system (>6-inch pipe) annually. • Inspect other public conveyance systems as required.	Analysis in SMP TM#1		N	• Inspect public conveyance system annually for maintenance needs. • Maintain and repair public conveyance system as needed based on inspections.	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		manholes, outfalls, culverts, and swales.	Y	Refine the internal inspection guidelines annually to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hr/permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-5	Catch Basin Cleaning	Inspect, maintain, and repair public stormwater catch basins annually during dry season.	N	No Change.	Analysis in SMP TM#1		N	• Clean all high-priority public catch basins annually and remaining public catch basins over a 4-year period. • Inspect catch basins for maintenance and repair needs during catch basin cleaning activities. Schedule repair activities as needed, based on inspections.	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)
			Y	Refine the internal inspection guidelines to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hrs/ permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
			Y	Update tracking database during each maintenance cycle (assume 10-hr/year).	1	10 hrs/yr	N	N/A	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.	Analysis in SMP TM#1		N	• Inspect public structural controls annually; maintain and repair as needed. • Maintain GIS “atlas” for both public and private.	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)
			Y	In conjunction with post-construction standards updates, by Dec. 1, 2024, update the City’s internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) used in the City (assume 40-hr for refinement, review and periodic update).	1	40 hrs by Dec. 2024	N	N/A	20 hrs (0.012 FTE)	20 hrs (0.012 FTE)	--	--	--	8 hrs (0.005 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) annually over the permit term.	1	6 hrs/permit term	N	N/A	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)
NPDES MS4 Driven Activities Subtotal of Public Works/Maintenance Staff Cost								Annual Staff Time (Hours)	3,395.4	3,395.4	3,375.4	3,375.4	3,375.4	3,383.4
								Annual Staff Time (FTE)	2.06	2.06	2.05	2.05	2.05	2.05
								Staffing contingency (FTE) (estimated at 20% to account for unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
								NPDES MS4 Public Works/Maintenance Activities Sub-Total staff cost (FTE)	2.47	2.47	2.46	2.46	2.46	2.46

Community Development/Engineering Staffing Assessment

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-1	Public Education Participation	• Promote public awareness through City newsletters, doorhangers, social media, and website. • Annually publish 2 articles/year in the Wilsonville Business Newsletter and 3 articles/year educating the public on stormwater issues.	N	No change.			Y – printing	During the 2021-22 reporting year, 5 educational/informational articles were published in the City newsletter and 4 were posted to the City's social media pages.						
		Engage the City's DEI Committee to identify additional language translations needs of the public, if necessary.	Y	Twice over permit term engage with the DEI Committee to verify that materials are translated into representative languages for the public. Assume two 1-hour meetings.	1	2 hrs/ permit term	N	N/A – Committee was formed in 2021.	--	1 hr (0.001 FTE)	--	1 hr (0.001 FTE)	--	0.4 hrs (0.001 FTE)
		Support regional public education campaigns and programs.	N	No change (varies by year).			Y - financial support	• Financially support regional public education campaigns and programs. • During the 2021-22 reporting year, the City contributed $15,000 to Friends of Trees.						
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr). Assume 40-hr/yr to develop trainings.	2	40 hrs/yr	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Staff attend Clackamas County co-permittee meetings to engage in collective efforts related to education, monitoring, and NPDES requirements.	N	No change.			Y – Cost sharing (as applicable).	Coordinate with other Clackamas County co-permittees regarding regional water quality efforts through scheduled co-permittee meetings.						
PI-1	Public Involvement and Participation	Provide opportunity for public participation in the development, implementation, and modification of the City's stormwater management program.	Y	• Maintain a publicly accessible website with the SWMP, Monitoring Plan, annual reports, program contact information, educational/reference materials, and reporting requirements for illicit discharges. • Provide a 30-day public comment period, and consider comments received for updates to the Monitoring Plan, the SWMP, and other strategy documents as required. • Maintain MS4 Document Library on website. Assume 8 hr/year for website management.	1	8 hrs/yr	N	N/A – new requirement.	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/equipment costs	• Organizing public outreach programs (e.g., Adopt-a-Road and WERK Day). • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
		Review and update the City's IDDE SOP to clarify enforcement procedures and response timeframes in conjunction with the NPDES MS4 permit.	Y	Review and update IDDE SOP by Dec. 1, 2023. Assume 8-hrs to review and update annually. Consult will support 2023 update.	1	8 hr/yr	N	Implement existing IDDE SOP (2012).	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
								and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-3	MS4 Mapping	Continually maintain the online GIS mapping and digital inventory.	Y	• Continually maintain the online GIS mapping for public viewing. • Add municipal structural stormwater controls within 1 year of receiving the as-builts. • As necessary, create a tracking system for repeat illicit discharges. Assume 24-hr/year for updates.	1	24 hr/yr	N	N/A – new requirement.	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	Y	By Dec. 1, 2023, review and update high priority locations and criteria, as necessary, based on outcomes from inspections and other public reporting. Update locations on mapping and in the IDDE SOP (assume 10 hours for review).	1	10 hrs by Dec. 2023	N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.	10 hrs (0.006 FTE)	--	--	--	--	2 hrs (0.001 FTE)
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	Y	Report any updates or modifications to the 2020 Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (assume 20 hrs for review).	1	20 hrs by Dec. 2024	N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	--	--	--	4 hrs (0.002 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment

Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need: Number of City Staff	Implementation Need: Total Staff Time	Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
		Update enforcement response procedures and escalating enforcement language.	Y	By Dec. 1, 2023, review and, if necessary, update enforcement response procedures and escalating enforcement specific to erosion and sediment control in City Code and Public Works Standards (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
PC-1	Stormwater Planning and Development Review	The City provides land use and planning review to meet goals related to the management of natural resources, transportation, housing, public facilities and services, and open spaces and parks.	N	Continue to require all new and redevelopment projects that add or replace 5,000 SF or more of impervious surface to implement the City's Stormwater and Surface Water Design and Construction Standards Review plans for compliance with stormwater requirements.			N	• Track number of development applications reviewed for compliance with the City's stormwater requirements. • Track new and redeveloped impervious surface in conjunction with annual reporting requirements.						
			Y	By Dec. 1, 2023, as necessary, review and document updates to the City's LID Guidebook and Public Works Standards to refine preferred LID/GI approaches and strategies for development within the ROW (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
			Y	By Dec. 1, 2024, as necessary, update Section 3 of the Public Works Standards to include reference to either the Numeric Stormwater Retention Requirement (NSSR) or Alternative Site Performance Standards (assume 100-hrs for review). Consultant will support update.	2	100 hrs by Dec. 2024	N	N/A	50 hrs (0.03 FTE)	50 hrs (0.03 FTE)	--	--	--	20 hrs (0.012 FTE)
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
			Y	Ensure litter control language is included in new event contracts and facility rental agreements (assume 8-hr for language draft and inclusion).	1	8 hrs (immediate update)	N	N/A – New requirement.	8 hrs (0.005 FTE)	--	--	--	--	1.6 hrs (0.001 FTE)
			Y	By Dec. 1, 2024, review and update the SWPPP for consistency with current use, practices, and new facility installations (assume 40-hr for review and 8-hr per year for updates). Consultant will support update.	1	40 hrs by Dec. 2024 + 8 hrs/yr	N	N/A	28 hrs (0.017 FTE)	28 hrs (0.017 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	16 hrs (0.010 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.			N	• Inspect public structural controls annually and maintain and repair as needed. • Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.						
			Y	In conjunction with updates to post-construction standards, by Dec. 1, 2024, update the City's internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) being used in the City (assume 120-hr for review).	1	120 hrs by Dec. 2024	N	N/A	60 hrs (0.036 FTE)	60 hrs (0.036 FTE)	--	--	--	24 hrs (0.015 FTE)
OM-7	Private Structural Facility Operation and Maintenance	The City requires maintenance of private structural stormwater controls through implementation of the Stormwater Maintenance and Access Easement agreements and submittal of a Stormwater Operations and Maintenance Plan.	N	No Change.			N	• Track agreements on file for private structural control facilities. • Track number of private annual inspection and maintenance reports received annually. • Maintain GIS database for private structural facilities.						
			N	No change, but as additional development and new facilities are added, additional time will be needed for tracking and inspection documentation (assume 8-hr/year for additional facility tracking).	1	8 hrs/yr	N	• Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-8	Develop Planning Documents in Support of Water Quality	The City assesses flood control, transportation, and other infrastructure projects during planning stages to identify and mitigate potential negative impacts and/or enhance benefits for the water quality of receiving water bodies.	Y	• By Dec. 1, 2023, complete public outreach related to the updated 2023 Stormwater Master Plan (assume 30-hr for outreach).	1	30 hrs by Dec. 2023	N	N/A	30 hrs (0.018 FTE)	--	--	--	--	6 hrs (0.004 FTE)
			Y	• Implement water quality, flood control, and natural resource CIPs in accordance with the effective Stormwater Master Plan. • Track the status of the City's Stormwater Master Planning efforts. • Track the number of CIP/retrofit projects implemented each year and discuss the added benefit (water quality,	1	40 hrs/yr	N	N/A	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
				hydromodification, habitat restoration, etc.) of each. • Map the location and drainage area of water quality CIPs/retrofits as they are constructed. Assume 40-hrs/year for CIP implementation and tracking.										
			Y	By Dec. 1, 2023, document and submit a summary of outcomes the City's 2015 Retrofit Strategy and 2015 Hydromodification Assessment, in accordance with the 2023 Stormwater Master Plan (assume 20-hrs for review).	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) over permit term. • Assume 6-hrs annually for engineer.	1	6 hrs/yr	N	N/A	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)
NPDES MS4 Permit Driven Activities Subtotal of Community Development/Engineering Staff Cost								Annual Staff Time (Hours*)	430	322	182	182	182	260
								Annual Staff Time (FTE)	0.26	0.19	0.11	0.11	0.11	0.16

**Summary values rounded to nearest whole hour.*

Note: No staffing contingency includes for Community Development/Engineering NPDES MS4 Permit Driven Activities .

NPDES MS4 Permit Driven Activities (per 2022 SWMP) Summary

NPDES MS4 Permit Driven Activities – Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Annual NPDES MS4 Activities Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	Public Works/Maintenance Annual Staff Time	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for Public Works/Maintenance (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	Community Development/Engineering	0.26	0.19	0.11	0.11	0.11	0.16
	Total Staff Time (NPDES MS4 Activities)	2.73	2.66	2.57	2.57	2.57	2.62

Stormwater Master Plan Implementation

Master Plan implementation staffing timing varies based on CP implementation schedule and prioritization. Staffing assessment tables averages projects over 20-year planning period.

Public Works/Maintenance Staffing Assessment

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
BC-1	Library Pond Retrofit	Clear, regrade, and replant 0.7-acre detention pond.	Y	M	16 .0	2	32.0	Y	33.0	0.02
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 70 LF of new perforated pipe.	N	F						
		Replace 70 LF of pipe.		Q						
		Install driveway for maintenance access.		R						
BC-2	Ash Meadows Flow Mitigation	Clear, regrade, and replant 1.3-acres of drainageway.	Y	M	16.0	2	32.0	Y	33.0	0.02
		Install 1 inlet.		L	0.5	2	1.0			
		Replace 175 LF of pipe.		Q						
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	Clear, regrade, and replant 1.6-acres of storage facility (detention pond).	Y	M	16.0	2	32.0	Y	115.3	0.07
		Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes).		I	40.0	2	80.0			
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 350 LF of pipe.		F	0.6	2	1.3			
		Install 1 new manhole.		G	0.5	2	1.0			
BC-4	Boeckman Creek Stabilization at Colvin Lane	Install 70 LF of new pipe.	Y	F	0.1	2	0.2	Y	16.2	0.01
		Reconstruct 150 LF of vegetated swale.		I	8.0	2	16.0			
		Install planting and bioengineered restoration of 600 LF of stream corridor.	N	P						
		Remove 30 LF of existing outfall pipe.		Q						
BC-5	Memorial Park Swale Retrofit	Install 2,400 SF vegetated water quality swale.	Y	I	8.0	2	16.0	Y	21.2	0.013
		Install 50 LF of new pipe.		F	0.1	2	0.2			
		Install 1 swale inflow spreader.		L	0.5	2	1.0			
		Install 1 overflow structure.		L	0.5	2	1.0			
		Install 1 new outfall.		K	0.5	2	1.0			
		Replace 1 manhole with a flow splitting/WQ manhole.		G	1.0	2	2.0			
		Replace 110 LF of pipe.	N	Q						
		Install 140 LF of perforated pipe.		F						
		Replace 2 manholes.		Q						
		Fill existing 1,500 SF swale and revegetate area.		P						

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Remove 210 LF of existing pipe.		Q						
		Remove 1 manhole.		Q						
		Remove 1 swale inlet structure.		Q						
		Remove 1 outlet structure.		Q						
BC-6	Gesellschaft Water Well Channel Restoration	Install 480 LF of new pipe.	Y	F	0.9	2	1.7	Y	4.7	0.003
		Install 2 new manholes.		G	1.0	2	2.0			
		Install 1 outfall.		K	0.5	2	1.0			
		Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	N	P						
CLC-1	Day Road Stormwater Improvements	Install 200 LF of open-bottom or box culverts (4 total).	Y	N	8.0	2	16.0	Y	27.1	0.016
		Install 180 LF of culverts (1 total).		N	2.0	2	4.0			
		Install 600 LF of pipe.		F	1.1	2	2.2			
		Install 2 manholes.		G	0.5	2	2.0			
		Install 3 trash racks at pipe inlets.		L	0.5	2	3.0			
		Regrade and reconstruct approx. 4,500 feet of open channel.	N	P						
		Replace 1,800 LF of pipe with 600 LF of pipe.		Q						
		Replace 7 manholes.		Q						
		Remove 50 LF of existing culvert.		Q						
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	Replace 70 LF of box culvert.	N	N				Y	0.0	0.0
		Install 70 LF of planting and bioengineered restoration/stabilization measures along path.		P						
		Repave 600 SF of pedestrian path.		R						
CLC-3	Garden Acres Pond Retrofit	Install 1 flow diversion structure.	Y	L	0.5	2	1.0	Y	35.0	0.021
		Install 250 LF of new pipe.		F	0.5	2	1.0			
		Install 1 outlet control structure.		L	0.5	2	1.0			
		Clear, regrade, and replant 0.9-acres of pond.		M	16.0	2	32.0			
		Remove 25,600 CY of fill from existing pond.	N	Q						
		Install 50 LF of perforated pipe.		F						
NC-1	Frog Pond East and South Conveyance Pipe Installation	Install 2,360 LF of new pipe.	Y	F	4.2	2	8.5	Y	10.5	0.006
		Install 1 outfall.		K	0.5	2	1.0			
		Install 7 manholes.		G	0.5	2	1.0			
WR-1	SW Willamette Way/ Morey's Landing Stormwater Improvements	Clear, grade, and replant 0.12-acres of raingarden.	Y	I	8.0	2	16.0	Y	18.4	0.011
		Install 1 flow control diversion structure.		L	0.5	2	1.0			
		Install 120 LF of new pipe.		F	0.2	2	0.4			

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Install 1 manhole.		G	0.5	2	1.0			
		Replace 1,330 LF of pipe.	N	Q						
		Remove existing bubbler.		Q						
		Replace 7 manholes.		Q						
		Replace field inlet.		Q						
WR-2	Miley Road Stormwater Improvements	Install 4,195 of new pipe.	Y	F	7.6	2	15.1	Y	30.1	0.018
		Install 15 manholes.		G	7.5	2	15.0			
		Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert.	N	P						
		Replace 400 LF of pipe.		Q						
		Replace 1 manhole.		Q						
		Replace 1 area drain.		Q						
		Extend 240 LF of existing main connections to the new pipe alignment.		F						
		Reconnect 13 existing curb inlets.		F						
WR-3	Rose Lane Culvert Replacement	Install 80 LF of new pipe.	Y	F	0.1	2	0.2	Y	2.2	0.001
		Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch.		J	1.0	2	2.0			
		Remove 25 LF of pipe.	N	Q						
WR-4	Charbonneau East Stormwater Improvements	Replace 3,765 LF of pipe.	N	Q				Y	0.0	0.0
		Replace 18 manholes.		Q						
		Replace 1 outfall.		Q						
WR-5	Charbonneau West Stormwater Improvements	Install 4 manholes.	Y	G	2.0	2	4.0	Y	4.0	0.002
		Replace 34 manholes.	N	Q						
		Replace 6,770 LF of pipe.		Q						
		Replace 2 outfalls.		Q						
City-1	Flow Monitoring and Rain Gauge Installation Hydromodification Assessment and Stream Survey	Install 1 rain gauge.	Y	Consultant Support				Y	Consultant Support	
		Install 3+ flow meters.								
City-2	Porous Pavement Pilot Study	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	Consultant Support				Y	Consultant Support	
City-3	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
City-4	Flow Monitoring and Rain Gauge Installation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
						SMP Implementation Subtotal of Public Works/Maintenance Staff Cost	Average Annual Staff Time (hours)		350.7	
							Average Annual Staff Time (FTE)		0.21	

Community Development/Engineering Staffing Assessment

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
BC-1	Library Pond Retrofit	• Clear, regrade, and replant 0.7-acre detention pond. • Install 1 new outlet structure. • Install 70 LF of new perforated pipe. • Replace 70 LF of pipe. • Install driveway for maintenance access.	Y	$1,880,000	$190,000	0.95	0.048	1,567.5	78.4
BC-2	Ash Meadows Flow Mitigation	• Clear, regrade, and replant 1.3-acres of drainageway. • Install 1 inlet. • Replace175 LF of pipe.	Y	$2,940,000	$234,000	1.17	0.059	1,930.5	96.5
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	• Clear, regrade, and replant 1.6-acres of storage facility (detention pond). • Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes). • Install 1 new outlet structure. • Install 350 LF of pipe. • Install 1 new manhole.	Y	Ph 1: $4,860,000	Ph 1: $322,000	1.61	0.081	2,656.5	132.8
				Ph 2: $7,210,000	Ph 2: $384,000	1.92	0.096	3,168.0	158.4
BC-4	Boeckman Creek Stabilization at Colvin Lane	• Install 70 LF of new pipe. • Reconstruct 150 LF of vegetated swale. • Install planting and bioengineered restoration of 600 LF of stream corridor. • Remove 30 LF of existing outfall pipe.	Y	$410,000	$38,000	0.19	0.010	313.5	15.7
BC-5	Memorial Park Swale Retrofit	• Install 2,400 SF vegetated water quality swale. • Install 50 LF of new pipe. • Install 1 swale inflow spreader, 1 overflow structure and 1 new outfall. • Replace 1 manhole with a flow splitting/WQ manhole. • Replace 110 LF of pipe. • Install 140 LF of perforated pipe. • Replace 2 manholes. • Fill existing 1,500 SF swale and revegetate area. • Remove 210 LF of existing pipe. • Remove 1 manhole, 1 swale inlet structure, and 1 outlet structure.	Y	$910,000	$85,000	0.43	0.021	701.3	35.1
BC-6	Gesellschaft Water Well Channel Restoration	• Install 480 LF of new pipe. • Install 2 new manholes. • Install 1 outfall. • Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	Y	$400,000	$38,000	0.19	0.010	313.5	15.7

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
CLC-1	Day Road Stormwater Improvements	• Install 200 LF of open-bottom or box culverts (4 total). • Install 180 LF of culverts (1 total). • Install 600 LF of pipe. • Install 2 manholes. • Install 3 trash racks at pipe inlets. • Regrade and reconstruct approx. 4,500 feet of open channel. • Replace 1,800 LF of pipe with 600 LF of pipe. • Replace 7 manholes. • Remove 50 LF of existing culvert.	Y	Ph 1: $8,020,000	Ph 1: $405,000	2.03	0.101	3,341.3	167.1
				Ph 2: $3,930,000	Ph 2: $370,000	1.85	0.093	3,052.5	152.6
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• Replace 70 LF of box culvert. • Install 70 LF of planting and bioengineered restoration/stabilization measures along path. • Repave 600 SF of pedestrian path.	Y	$290,000	$35,000	0.18	0.009	288.8	14.4
CLC-3	Garden Acres Pond Retrofit	• Install 1 flow diversion structure. • Install 250 LF of new pipe. • Install 1 outlet control structure. • Install 50 LF of perforated pipe. • Clear, regrade, and replant 0.9-acres of pond. • Remove 26,500 CY of fill from existing pond.	Y	$3,780,000	$302,000	1.51	0.076	2,491.5	124.6
NC-1	Frog Pond East and South Conveyance Pipe Installation	• Install 2,360 LF of new pipe. • Install 1 outfalls. • Install 7 manholes.	Y	$4,090,000	$414,000	2.07	0.104	3,415.5	170.8
WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements	• Clear, grade, and replant 0.12-acres of raingarden. • Install 1 flow control diversion structure. • Install 120 LF of new pipe. • Install 1 manhole. • Replace 1,330 LF of pipe. • Remove existing bubbler. • Replace 7 manholes. • Replace field inlet.	Y	Ph 1: $2,310,000	Ph 1: $233,000	1.17	0.058	1,922.3	96.1
				Ph 2: $1,080,000	Ph 2: $109,000	0.55	0.027	899.3	45.0

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
WR-2	Miley Road Stormwater Improvements	• Install 4,195 of new pipe. • Install 15 manholes. • Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert. • Replace 400 LF of pipe. • Replace 1 manhole. • Replace 1 area drain. • Extend 240 LF of existing main connections to the new pipe alignment. • Reconnect 13 existing curb inlets.	Y	Ph 1: $820,000	Ph 1: $77,000	0.39	0.019	635.3	31.8
				Ph 2: $10,510,000	Ph 2: $470,000	2.35	0.118	3,877.5	193.9
WR-3	Rose Lane Culvert Replacement	• Install 80 LF of new pipe. • Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch. • Remove 25 LF of pipe.	Y	$200,000	$35,000	0.18	0.009	288.8	14.4
WR-4	Charbonneau East Stormwater Improvements	• Replace 3,765 LF of pipe. • Replace 18 manholes. • Replace 1 outfall.	Y	Ph1: $600,000	Ph 1: $50,000	0.25	0.013	412.5	20.6
				Ph 2: $4,440,000	Ph 2: $449,000	2.25	0.112	3,704.3	185.2
WR-5	Charbonneau West Stormwater Improvements	• Install 4 manholes. • Replace 34 manholes. • Replace 6,770 LF of pipe. • Replace 2 outfalls.	Y	$10,370,000	$488,000	2.44	0.122	4,026.0	201.3
P-4[E]	Charbonneau Repair/ Replacement Program	• Replace 30,620 LF of pipe. • Replace 153 manholes.	Y	$38,360,000	$3,879,000	19.40	0.970	32,001.8	1,600.1
City-1	Flow Monitoring and Rain Gauge Installation	• Install 1 rain gauge. • Install 3+ flow meters.	Y	TBD, project will vary		Consultant Support			
City-2	Hydromodification Assessment and Stream Survey	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	TBD, project will vary		Consultant Support			
City-3	Porous Pavement Pilot Study	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
City-4	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
SMP Implementation Subtotal of Community Development/Engineering Staff Cost				Total Staff Time		43.04 FTE / (71,008 hrs)			
				Annual Average Staff Time [B]		2.15 FTE / (3,550 hrs)			
				City Engineering Staff already designated for Capital Project work [C]		*1.0 FTE*			
				Additional Annual Average Community Development/Engineering Staff Time Needed [D]		**1.15 FTE**			

[A] *Most projects use a 13.5% multiplier for Design/Construction Administration, but a select group of projects were designated by the City to use a 3.5% + $200K value instead to better represent anticipated conditions.*

The projects with the adjusted multiplier include BC-3 Phases 1 & 2, CLC-1 Phase 1, CLC-3, WR-2 Phase 2, and WR-5.

WR-4 Phase 1 was designated by the City to use a 25% multiplier for Design/Construction Administration.

[B] *Summary values rounded to nearest whole hour.*

[C] *The City already has 1.0 FTE designated to work on Capital Projects, this amount was subtracted from the total calculated staff time.*

[D] *This value represents the additional annual average Community Development/Engineering staffing need of the City to complete the Capital Projects.*

[E] *Proposed program efforts are generally anticipated to be conducted using existing staffing resources or within allocated annual budgets. The Charbonneau R/R Program (P-4) will require dedicated City Engineering resources to schedule and manage specific contracts to adhere to the anticipated 20-year program duration. As such, Design/ Construction Administration costs were specifically calculated for this program and used to inform the required staffing needs.*

Stormwater Master Plan Staffing Summary

SMP Implementation - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary						
	Annual SMP Implementation Staff Cost Schedule (FTE)					
	2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	0.21	0.21	0.21	0.21	0.21	0.21
Community Development/Engineering	1.15	1.15	1.15	1.15	1.15	1.15
Total Staff Time	1.36	1.36	1.36	1.36	1.36	1.36

Combined Staffing Assessment Summary

Combined - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Combined Annual Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for NPDES MS4 Driven Activities (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	SMP Implementation	0.21	0.21	0.21	0.21	0.21	0.21
	Public Works/Maintenance Staffing Summary (FTE)	2.68	2.68	2.67	2.67	2.67	2.67
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.26	0.19	0.11	0.11	0.11	0.16
	SMP Implementation	1.15	1.15	1.15	1.15	1.15	1.15
	Community Development/Engineering Staffing Summary (FTE)	1.41	1.34	1.26	1.26	1.26	1.31

Appendix H: Comprehensive Plan Review

Comment Log

6500 SW Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville
Project Title: Stormwater Master Plan
Project No.: 156157
Subject: Review of Wilsonville Comprehensive Plan
Date: December 16, 2021

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
1	K. Reininga	C-8	Storm Drainage Plan Paragraph 2, Line 2	Add other parameters here [currently includes temperature and turbidity] like metals, toxics, nutrients…
2	K. Reininga	C-8	Storm Drainage Plan Paragraph 3, Line 2	Remove word 'detention.'
3	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 2	Include mention of water quality.
4	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 3	Add "Prepared in X and updated in X" after Stormwater Master Plan.
5	K. Reininga	C-8	Policy 3.1.7	The need to prioritize green infrastructure and infiltration should be reflected in the policy statement. It may be preferred to keep language general and say compliance with the City's standards is required and then those priorities reside there. Or, an implementation measure could be added to address the new permit requirements for LID and retention. Numbering appears to be incorrect, as this should be Policy 3.1.9.
6	K. Reininga	C-8	Policy 3.1.7 Paragraph 1, Line 6	Add "peak rate" after "volume".
7	K. Reininga	C-9	Implementation Measure 3.1.7.b, Line 3	Add Municipal Separate Storm Sewer System (MS4) before the word permit as there are other types of NPDES permits.
8	K. Reininga	C-9	Implementation Measure 3.1.7.c, Line 9	Remove word 'detention.'
9	K. Reininga	C-9	Implementation Measure 3.1.7.e	City to confirm this implementation measure is still applicable.
10	K. Reininga	C-9	Implementation Measure 3.1.7.f, Line 3	Clarification need. It is not clear what Option A is referring to.
11	K. Reininga	C-10	Implementation Measure 3.1.7.h, Line 3	"Development Review Board" - Is this still the appropriate reference?

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
12	K. Reininga	C-10	Implementation Measure 3.1.7.k, Line 5	Has this now been done? Reference: "For that area along Coffee Lake Creek, a hydrology study to establish the 100-year flood elevation will be required prior to development approval."
13	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 1	Insert word "peak" in single-storm drainage runoff.
14	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 5	Revise to say stormwater management facilities here instead of detention or retention facilities.
15	K. Reininga	C-11	Implementation Measure 3.1.7.n, Line 7	Has this been done? "The appropriate criteria will be established and implemented through the City's Public Works Standards."
16	K. Reininga	C-11	Implementation Measure 3.1.7.r, Line 3	Replace "detention/retention basin" with the term stormwater management facility.

CONCLUSIONARY FINDINGS

The updated Stormwater Master Plan has been found to be consistent with the applicable criteria as follows.

COMPREHENSIVE PLAN COMPLIANCE

Standards for Approval of Plan Amendments

In order to grant a Plan amendment, the City Council shall after considering the recommendation of the Development Review Board (quasi-judicial) or Planning Commission (legislative), find that:

a. Conformance with Other Portions of the Comprehensive Plan

CP1. **Review Criteria:** "The proposed amendment is in conformance with those portions of the Plan that are not being considered for amendment."
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan has been found to be in conformance with the Comprehensive Plan. See Findings CP2 through CP27 below.

b. Amendment is in the Public Interest

CP2. **Review Criterion:** "The granting of the amendment is in the public interest."
Finding: This criterion is satisfied.
Explanation of Finding: Development Code Subsection 4.198 (.01) A. implements this standard. It is in the public interest to periodically update the master plans for critical public facilities such as the public stormwater infrastructure to ensure the system provides for adequate service for current and future residents and businesses.

c. Public Interest and Timing of Amendment

CP3. **Review Criterion:** "The public interest is best served by granting the amendment at this time."
Finding: This criterion is satisfied.
Explanation of Finding: Master plans such as stormwater must be updated periodically to provide current condition information and new data to forecast future needs. The last update to the Stormwater Master Plan was in 2012, so the public interest is best served by updating the master plan as soon as possible making the current timing appropriate.

d. Adequately Addressing Specific Factors

CP4. **Review Criteria:** "The following factors have been adequately addressed in the proposed amendment: the suitability of the various areas for particular land uses and improvements; the land uses and improvements in the area; trends in land improvement; density of development; property values; the needs of economic enterprises in the future development of the area; transportation access; natural resources; and the public need for healthful, safe and aesthetic surroundings and conditions."
Finding: These criteria are satisfied.
Explanation of Finding:
Suitability of the Various Areas for Particular Land Uses and Improvements: The master plan considers existing and future growth areas. Capital projects serving future growth areas have been identified in the master plan.

Land Uses and Improvements in the Area: The master plan considers the current land uses throughout the city as well as potential land uses in future growth areas.

Trends in Land Improvement: The master plan supports the trends identified in other master plans and studies.

Density of Development: The master plan considers planned densities throughout the City and growth areas over the planning horizon.

Property Values: Planning for an adequate stormwater system helps enable a functional system long term which supports water quality and management objectives. Lack of proper stormwater management would negatively affect property values.

The Needs of Economic Enterprises in the Future Development of the Area: Planning for an adequate stormwater system helps support economic enterprise in areas planned for business growth by planning adequate capacity and service.

Transportation Access: No transportation access is impacted by the plan.

Natural Resources: The master plan assessed the natural (stream) system to identify risks to infrastructure and natural resources. Capital projects will be implemented to address water quality and instream erosion/sediment control.

Public Need for Healthful, Safe and Aesthetic Surroundings and Conditions: A functional stormwater system, which is the aim of the updated Stormwater Master Plan, supports healthful, safe, and aesthetic surroundings by preventing water quality degradation and negative impacts to local receiving waters.

e. Conflict with Metro Requirements

CP5. **Review Criteria:** "Proposed changes or amendments to the Comprehensive Plan do not result in conflicts with applicable Metro requirements."
Finding: These criteria are satisfied.
Explanation of Finding: No conflicts with Metro requirements have been identified.

Citizen Involvement

Goal 1.1: To encourage and provide means for interested parties to be involved in land use planning processes, on individual cases and City-wide programs and policies.

Policy 1.1.1: Wide Range of Public Involvement

CP6. **Review Criterion:** "The City of Wilsonville shall provide opportunities for a wide range of public involvement in City planning programs and processes."
Finding: This criterion is satisfied.
Explanation of Finding: A number of different media and venues have been used to encourage public involvement. Stormwater management tends to be a subject in which the community does not express a lot of interest as long as the system is functioning well. Information was published in the Boones Ferry Messenger, a community newsletter mailed to every address within Wilsonville's 97070 zip code, the Planning Commission held work sessions, and project staff made information about the project available on the City's website including a survey of residents and businesses. Required public noticing for the Planning Commission and upcoming City Council public hearings has occurred.

Implementation Measure 1.1.1.a. Early Public Involvement

CP7. **Review Criterion:** "Provide for early public involvement to address neighborhood or community concerns regarding Comprehensive Plan and Development Code changes. Whenever practical to do so, City staff will provide information for public review while it is still in "draft" form, thereby allowing for community involvement before decisions have been made."
Finding: This criterion is satisfied.
Explanation of Finding: The City solicited feedback from the Planning Commission and public early in the planning process while the plan was being developed. Any feedback has been considered in preparation of the master plan.

Goal 1.2: For Wilsonville to have an interested, informed, and involved citizenry.

Policy 1.2.1: User Friendly Information

CP8. **Review Criterion:** "The City of Wilsonville shall provide user-friendly information to assist the public in participating in the City planning programs and processes."
Finding: This criterion is satisfied.
Explanation of Finding: The City has produced user-friendly notices for the project, as well as provided other information, and opportunities to examine the materials related to the master plan.

Implementation Measures 1.2.1.a.-c. Clarification, Publicity, and Procedures for Public Involvement

CP9. **Review Criteria:** These measures address the City's responsibility to help clarify the public participation process, publicize ways to participate, and establish procedures to allow reasonable access to information.
Finding: These criteria are satisfied.
Explanation of Finding: The City has produced user-friendly notices for the project, as well as provided other information, and opportunities to examine the materials related to the updated Stormwater Master Plan.

Policy 1.3.1. Implementation Measures 1.3.1.b. Clarification, Publicity, and Procedures for Public Involvement

CP10. **Review Criteria:** "The City of Wilsonville shall coordinate with other agencies and organizations involved with Wilsonville's planning programs and policies." "Where appropriate, the City shall continue to coordinate its planning activities with affected public agencies and private utilities. Draft documents will be distributed to such agencies and utilities and their comments shall be considered and kept on file by the City."
Finding: These criteria are satisfied.
Explanation of Finding: The appropriate agencies have been notified through the DLCD notice and/or the Public Hearing Notice. Any comments will be entered into the public hearing record to be considered.

Urban Growth Management

Goal 2.1: To allow for urban growth while maintaining community livability, consistent with the economics of development, City administration, and the provision of public facilities and services.

Implementation Measure 2.1.1.d. Establish and Maintain Revenue Sources for Public Services and Facilities

CP11. **Review Criterion:** "Establish and maintain revenue sources to support the City's policies for urbanization and maintain needed public services and facilities."
Finding: This criterion is satisfied.
Explanation of Finding: While the scope of the master plan includes prioritizing short-term, mid-term and long-term projects for the Capital Improvement Program and developing budget level cost estimates, the update does not evaluate funding tools. The City is examining and will continue to examine revenue sources to support the CIP.

Implementation Measure 2.1.1.e. Concurrency of Facilities and New Development

CP12. **Review Criterion:** "Allow new development to proceed concurrently with the availability of adequate public services and facilities as specified in Public Facilities and Services Section (Section C) of the Comprehensive Plan."
Finding: This criterion is satisfied.
Explanation of Finding: The City's current policies supporting concurrency of public services and facilities with new development are not altered by the proposed update to the Stormwater Master Plan.

Policy 2.2.1. Plan for Urbanization

CP13. **Review Criterion:** "The City of Wilsonville shall plan for the eventual urbanization of land within the local planning area, beginning with land within the Urban Growth Boundary."
Finding: This criterion is satisfied.
Explanation of Finding: By updating the master plan for stormwater infrastructure, including ensuring adequate capacity and service to land within the Urban Growth Boundary and Urban Reserves around the City, the City is supporting the effort to plan for the eventual urbanization of these areas.

Implementation Measure 2.2.1.b. Fair Share to Increase Development Capacity

CP14. **Review Criterion:** "The City of Wilsonville, to the best of its ability based on infrastructure provided at the local, regional, and state levels, shall do its fair share to increase the development capacity of land within the Metro UGB."
Finding: This criterion is satisfied.
Explanation of Finding: By updating the master plan for stormwater infrastructure, including ensuring adequate capacity and service for planned densities, the City is supporting the effort to provide for its fair share of development within the UGB.

Public Facilities and Services

Goal 3.1 To assure that good quality public facilities and services are available with adequate, but not excessive, capacity to meet community needs, while also assuring that growth does not exceed the community's commitment to provide adequate facilities and services.

Policy 3.1.1. The City to Provide Public Facilities

CP15. **Review Criterion:** "The City of Wilsonville shall provide public facilities to enhance the health, safety, educational, and recreational aspects of urban living."
Finding: This criterion is satisfied.
Explanation of Finding: By updating the master plan for stormwater infrastructure, including ensuring adequate capacity for land within the Urban Growth Boundary, the City is supporting the effort to continue to provide for all aspects of urban living affected by stormwater management.

Implementation Measure 3.1.1.a. City to Prepare and Implement Facility/Services Master Plans

CP16. **Review Criterion:** "The City will continue to prepare and implement master plans for facilities/services, as sub-elements of the City's Comprehensive Plan. Facilities/services will be designed and constructed to help implement the City's Comprehensive Plan."
Finding: This criterion is satisfied.
Explanation of Finding: The City is continuing the practice to prepare and implement facility/services master plans as sub-elements of the Comprehensive Plan by updating the Stormwater Master Plan.

Implementation Measure 3.1.1.d. City to Review Development Densities and Facilities/Services Capacity

CP17. **Review Criterion:** "The City shall periodically review and, where necessary, update its development densities indicated in the land use element of the Plan, based on the capacity of existing or planned services and/or facilities."
Finding: This criterion is satisfied.
Explanation of Finding: The updated Stormwater Master Plan incorporates the most up to date land use information to plan enough capacity for the expected growth.

Policy 3.1.2. Concurrency

CP18. **Review Criterion:** "The City of Wilsonville shall provide, or coordinate the provision of, facilities and services concurrent with need (created by new development, redevelopment, or upgrades of aging infrastructure)."
Finding: This criterion is satisfied.

Explanation of Finding: By updating the Stormwater Master Plan the City is coordinating its efforts over the planning horizon to provide stormwater management services concurrent with need, whether it involves new development, redevelopment, or upgrading aging infrastructure.

Implementation Measure 3.1.2.a.Urban Development only in Serviceable Areas

CP19. **Review Criterion:** "Urban development will be allowed only in areas where necessary facilities and services can be provided."
Finding: This criterion is satisfied.
Explanation of Finding: In addition to analyzing the condition of existing infrastructure the updated Stormwater Master Plan identifies deficiencies and needed improvements to serve areas expected to develop. The City will continue to follow concurrency policies for public facilities and development and thus allow development only in areas where stormwater management services can be provided.

Policy 3.1.3. Payment for and Benefits from Facilities and Services

CP20. **Review Criterion:** "The City of Wilsonville shall take steps to assure that the parties causing a need for expanded facilities and services or those benefiting from such facilities and services, pay for them."
Finding: This criterion is satisfied.
Explanation of Finding: The City's current practices to require parties causing a need for expanded facilities pay for them are not changed by the scope of the updated Stormwater Master Plan.

Implementation Measure 3.1.3.a. Developers and SDC's

CP21. **Review Criterion:** "Developers will continue to be required to pay for demands placed on public facilities/services that are directly related to their developments. The City may establish and collect systems development charges (SDCs) for any or all public facilities/services, as allowed by law. An individual exception to this standard may be justified, or SDC credits given, when a proposed development is found to result in public benefits that warrant public investment to support the development."
Finding: This criterion is satisfied.
Explanation of Finding: The City's current SDC practices are not affected by the updated Stormwater Master Plan.

Implementation Measure 3.1.3.b. Capital Improvement Program

CP22. **Review Criterion:** "The City will continue to prepare and implement a rolling five- year Capital Improvement Program, with annual funding decisions made as part of the municipal budget process."

Finding: This criterion is satisfied.
Explanation of Finding: The updated Stormwater Master Plan is part of the City's continuing effort to prepare and implement a rolling five-year Capital Improvement Program by prioritizing short-term, mid-term, and long-term stormwater projects for the CIP.

Implementation Measure 3.1.3.c. Pay-back Agreements

CP23. **Review Criterion:** "The City shall continue to employ pay-back agreements, development agreements, and other creative solutions for facilities that are over-sized or extended from off-site at the expense of only some of the benefited properties."
Finding: This criterion is satisfied.
Explanation of Finding: The City's policies regarding pay-back agreements, development agreements, and other creative infrastructure financing solutions are not affected by the updated Stormwater Master Plan.

Policy 3.1.7. The City of Wilsonville shall develop and maintain an adequate storm drainage system.

Implementation Measure 3.1.7.a. The City to adequately provide for urban development

CP24. **Review Criterion:** "In order to adequately provide for urban development, the City has established and will maintain a Stormwater Master Plan, development policies/standards for control of an on and off-site drainage, Public Works Standards, and a Capital Improvements Program to upgrade deficient structures and drainage ways.
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan and Capital Improvement Program will continue to allow the stormwater system to operate to applicable standards.

Implementation Measure 3.1.7.c. A Systems Development Charge

CP25. **Review Criteria:** "A storm drainage systems development charge shall continue to be collected from developers prior to issuance of a building permit. The Stormwater Master Plan and the Capital Improvements Program will continue to be the basis of establishing Systems Development Charges for storm drainage. The funds are used to upgrade the storm drainage system beyond those improvements required to serve individual developments. Provision of drainage control within a given development shall remain the responsibility of the developer, with the City assisting only insofar as the system will also accommodate off-site drainage. In reviewing planned improvements, the City Engineer may specify the use of on-site or off-site storm water detention, based on specific site characteristics and drainage patterns of the area."
Finding: These criteria are satisfied.

Explanation of Finding: The updated Stormwater Master Plan and Capital Improvement Program will not change the basis for establishing Systems Development Charges and the requirements for drainage control.

Implementation Measure 3.1.7.j. The Natural System Improved and Maintained

CP26. **Review Criteria:** "The natural system must also be improved and maintained to handle the anticipated run-off in a manner that meets the requirements of the Stormwater Master Plan. Where wetlands are constructed for the purpose of accommodating storm drainage, certain areas of those wetlands may be designed to accumulate sediment. The City will periodically dredge and maintain those areas in constructed wetlands, or will permit others to do so, as necessary to maintain the storm drainage functions of those constructed wetlands."
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan addressed the improvement and maintenance of the natural system (stream and wetlands) to accommodate current and future stormwater runoff.

Parks/Recreation/Open Space, Environmental Resources and Community Design

Policies 3.1.11., 4.1.5. and Implementation Measures 3.1.11.a., 4.1.5.d.-g., o, aa, gg. Conservation of Natural, Scenic, and Historic Areas

CP27. **Review Criteria:** These policies and implementation measures require and encourage conservation of natural resources, as well as scenic and historic areas.
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan addresses the maintenance and restoration of the natural system within the City of Wilsonville. The Capital Improvement Program includes programs and projects to stabilize stream reaches and maintain and restore riparian vegetation.

COMPLIANCE WITH PLANNING AND LAND DEVELOPMENT ORDINANCE

Section 4.003 Consistency with Plans and Laws

PL1. **Review Criterion:** "Actions initiated under this Code shall be consistent with the Comprehensive Plan and with applicable State and Federal laws and regulations as these plans, laws and regulations now or hereafter provide."
Finding: This criterion is satisfied.
Explanation of Finding: Consistency with the Comprehensive Plan and applicable state laws has been reviewed and summarized in this report.

Section 4.008 General Application Procedures

PL2. **Review Criterion:** "The general application procedures listed in Section 4.008 through 4.024 apply to all land use and development applications governed by Chapter 4 of the Wilsonville Code. These include applications for all of the following types of land use or development approvals:

H. Changes to the text of the Comprehensive Plan, including adoption of new Plan elements or sub-elements, pursuant to Section 4.198;"

Finding: This criterion is satisfied.

Explanation of Finding: Adoption of the updated Stormwater Master Plan is being reviewed pursuant to Section 4.198.

Subsection 4.009 (.02) Who Can Initiate Application

PL3. **Review Criterion:** "Applications involving large areas of the community or proposed amendments to the text of this Chapter or the Comprehensive Plan may be initiated by any property owner, business proprietor, or resident of the City, as well as the City Council, Planning Commission, or Development Review Board acting by motion."

Finding: This criterion is satisfied.

Explanation of Finding: The application has been initiated by the City as part of its responsibility to periodically update facility master plans.

Subsection 4.032 (.01) B. Authority of Planning Commission

PL4. **Review Criterion:** This Section states that the Planning Commission has authority to make recommendations to the City Council on "legislative changes to, or adoption of new elements or sub-elements of the Comprehensive Plan."

Finding: This criterion is satisfied.

Explanation of Finding: The proposed legislative change is being considered by the Planning Commission as a recommendation to the City Council. The issue before the Planning Commission is a legislative review of an amended sub-element of the Comprehensive Plan.

Subsection 4.033 (.01) B. Authority of City Council

PL5. **Review Criterion:** This Section states that the City Council has final decision-making authority on "applications for amendments to, or adoption of new elements or sub-elements to the maps or text of the Comprehensive Plan, as authorized in Section 4.198."

Finding: This criterion is satisfied.

Explanation of Finding: Final action will be taken by the City Council following a recommendation from the Planning Commission.

Subsection 4.198 (.01) A. Comprehensive Plan Changes: Public Need

PL6. **Review Criterion:** "That the proposed amendment meets a public need that has been identified;"
Finding: This criterion is satisfied.
Explanation of Finding: It is in the public interest to periodically update the master plans for critical public infrastructure to ensure the system provides for adequate service for current and future residents and businesses.

Subsection 4.198 (.01) B. Comprehensive Plan Changes: Meets Public Needs As Well As Other Options

PL7. **Review Criterion:** "That the proposed amendment meets the identified public need at least as well as any other amendment or change that could reasonably be made;"
Finding: This criterion is satisfied.
Explanation of Finding: As a sub-element of the Comprehensive Plan the Stormwater Master Plan aims to provide for the public need to maintain and improve the stormwater system. An updated Stormwater Master Plan better meets the public need than the current plan by using updated information about the condition of existing infrastructure and projections for future growth and increases in stormwater runoff.

Subsection 4.198 (.01) C. Comprehensive Plan Changes: Statewide Planning Goals

PL8. **Review Criterion:** "That the proposed amendment supports applicable Statewide Planning Goals or a Goal exception has been found to be appropriate; and;"
Finding: This criterion is satisfied.
Explanation of Finding: Please see compliance with Statewide Planning Goals section below.

Subsection 4.198 (.01) D. Comprehensive Plan Changes: Conflict with Other Portions of the Comprehensive Plan

PL9. **Review Criterion:** "That the proposed change will not result in conflicts with any portion of the Comprehensive Plan that is not being amended."
Finding: This criterion is satisfied.
Explanation of Finding: No conflicts between the updated Stormwater Master Plan and other portions of the Comprehensive Plan have been identified.

COMPLIANCE WITH OREGON STATEWIDE PLANNING GOALS

Statewide Planning Goals

Goal 1 Citizen Involvement

OR1. **Review Criterion:** "To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process."
Finding: This criterion is satisfied.
Explanation of Finding: The citizen involvement process defined in Wilsonville's Comprehensive Plan has been acknowledged to be in conformance with Goal 1. Findings CP6 through CP10 demonstrate compliance with the citizen involvement component of the Comprehensive Plan and therefore Goal 1.

Goal 2 Land Use Planning

OR2. **Review Criterion:** "To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions."
Finding: This criterion is satisfied.
Explanation of Finding: The City is currently in compliance with Goal 2 because it has an acknowledged Comprehensive Plan and regulations implementing the plan. The Stormwater Master Plan is a sub-element supporting this plan. A Stormwater Master Plan will continue to be a sub-element of the Comprehensive Plan and the scope of the update does not change conformance with this goal, but rather provides updated information to better support land use planning in Wilsonville.

Goal 5 Natural Resources, Scenic and Historic Areas, and Open Spaces

OR3. **Review Criterion:** "To protect natural resources and conserve scenic and historic areas and open spaces."
Finding: This criterion is satisfied.
Explanation of Finding: The updated Stormwater Master Plan addresses the maintenance and restoration of the natural system within the City of Wilsonville. The Capital Improvement Program includes programs and projects to stabilize stream reaches and maintain and restore riparian vegetation.

Goal 6 Air, Water and Land Resource Quality

OR4. **Review Criteria:** "To maintain and improve the quality of the air, water and land resources of the state."
Finding: These criteria are satisfied.

Explanation of Finding: The updated Stormwater Master Plan provides for the management of stormwater runoff and improvements to public infrastructure, including natural systems, to prevent contaminants and increased runoff from degrading water and land resources.

OAR 660-11-0020 Public Facility Inventory and Determination of Future Facility Projects

OR5. **Review Criteria:** This OAR identifies components of public facility inventories.
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan includes an inventory of the City's stormwater system including all the required components listed in this OAR: information on capacity and size, assessment of conditions, identification of projects supportive of the City's Comprehensive Plan land use designations, and acknowledgment of future flexibility based on impact studies, facility design, and further master planning efforts.

OAR 660-11-0025 Timing of Required Public Facilities

OR6. **Review Criteria:** This OAR requires public facility plans include a general estimate of the timing for planned public facility projects.
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan includes information on short-term, mid-term, and long-term projects in Chapter 7.

OAR 660-11-0030 Location of Public Facility Projects

OR7. **Review Criteria:** This OAR requires public facility plans include a general location of projects
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan includes information on project locations.

OAR 660-11-0035 Determination of Rough Cost Estimates

OR8. **Review Criteria:** This OAR requires public facility plans include rough cost estimates for projects.
Finding: These criteria are satisfied.
Explanation of Finding: The updated Stormwater Master Plan includes budget level cost estimates for identified projects.

OAR 660-11-0045 Adoption and Amendment Procedures for Public Facility Plans

OR9. **Review Criteria:** This OAR identifies public facility plans as supporting documents to the comprehensive plan and identifies related items to be in the comprehensive plan.
Finding: These criteria are satisfied.
Explanation of Finding: The Stormwater Master Plan is a sub-element of the City of Wilsonville's Comprehensive Plan and includes a list of projects, a map of projects, and policies on urban growth and the provision of public facilities. The updated Master Plan is being considered a land use decision with the appropriate noticing and hearing processes being followed.

LP24-0002
Stormwater Master Plan
Planning Commission Public Hearing Record Index
DRAFT (March 13, 2024)

PLANNING COMMISSION AND CITY COUNCIL MEETINGS

March 13, 2024 - Planning Commission Public Hearing
- Resolution LP24-0002 *(included above, adoption pending)*
- Staff Report and Attachments *(included above, adoption pending)*
- Presentation *(not included at this time)*
- Affidavit of Notice of Hearing

February 22, 2024 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

February 14, 2024 - Planning Commission Work Session
- Staff Report and Attachments
- Presentation
- Minutes Excerpt

November 6, 2023 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

October 11, 2023 - Planning Commission Work Session
- Staff Report and Attachments
- Presentation
- Minutes Excerpt

January 4, 2021 - City Council Work Session
- Staff Report and Attachments
- Presentation
- Action Minutes

PUBLIC ENGAGEMENT

Project webpages: Let's Talk Wilsonville (English & Spanish) (2021-present

Surveys: Take Our Stormwater Survey (English & Spanish) (2021)

Open House: Virtual Open House (2021)

Boones Ferry Messenger: April 2021 excerpt

COMMENTS/ARTICLES

Vu Nguyen, AKS Engineering & Forestry, Email: February 26, 2024

The Stormwater Master Plan (LP24-0002) Record can be found on the March 13, 2024 Planning Commission meeting page, in the “Agenda Packet” (https://www.ci.wilsonville.or.us/bc-pc/page/planning-commission-76)

Stormwater Master Plan Update

Planning Commission Hearing

March 13, 2024

Kerry Rappold
Natural Resource Manager

Angela Wieland
Brown & Caldwell

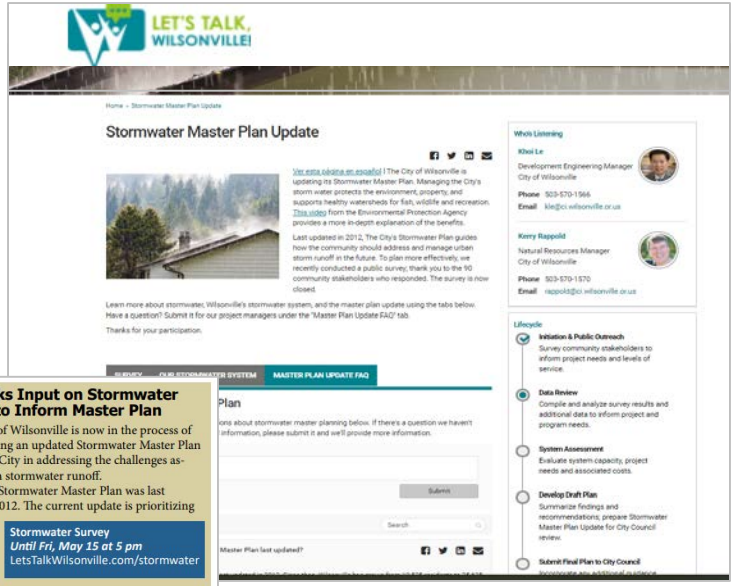
WILSONVILLE
OREGON

Discussion Topics

- Stormwater Management in Wilsonville
- Master Plan Development Process
- Regulatory Drivers and Overlap
- Capital Project and Program Overview
- Next Steps

Stormwater Management in Wilsonville

- Outreach moved online to educate community and gather feedback
  - Web page with traditional open house materials – hosted on *letstalkwilsonville*
  - Boones Ferry Messenger article
  - Social media
- External Stormwater Survey
  - April 1 – May 15, 2021
  - 90+ participants
  - 97% favorable impression of Wilsonville's stormwater services
  - Provided areas of concern
- Follow up Survey
  - March – April 2024



City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

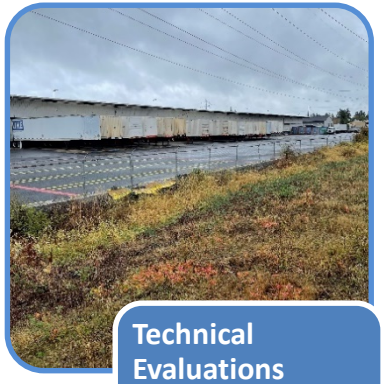
The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-1566 or kle@ci.wilsonville.or.us.

Master Plan Development Process

Project Needs Assessment

- Data Collection
- Public Survey
- Staff Interviews
- Site Visits
- Problem Area Identification



Technical Evaluations

H/H Modeling

Stream Assessment

Water Quality Retrofits

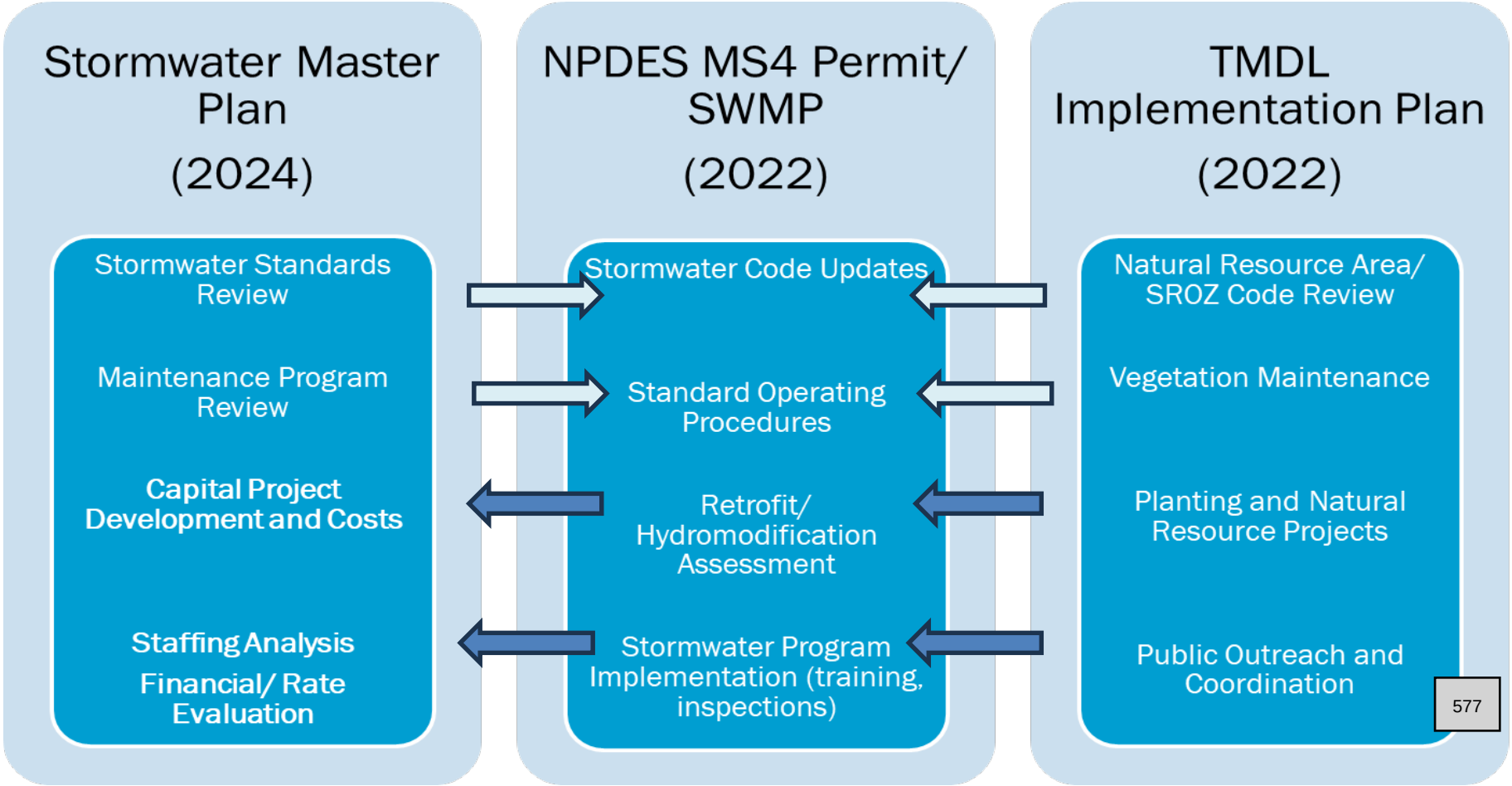
Capital Program Development

- Projects (Capital and Planning)
- City-wide Programs
- Policies
- Cost Estimation

Capital Program Implementation

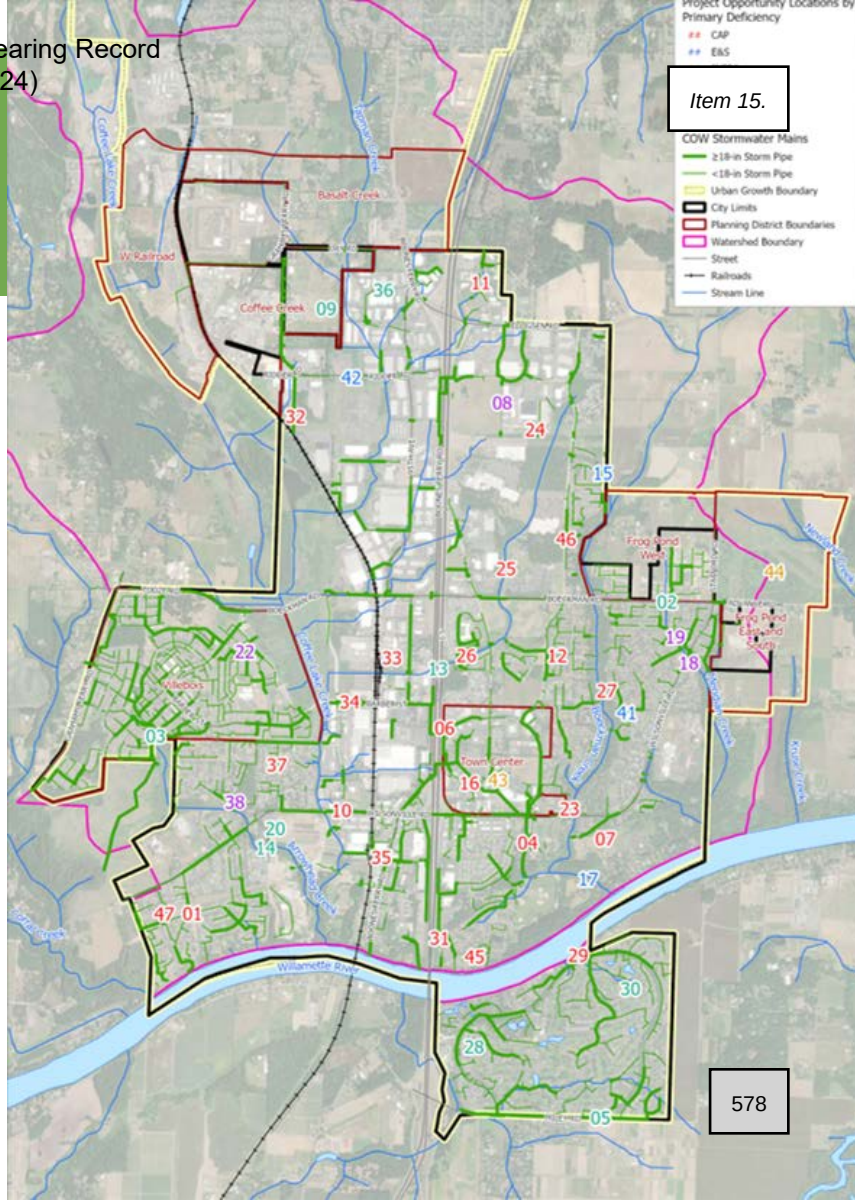
- Staffing
- Project Prioritization
- Documentation
- Stakeholder Outreach

Regulatory Drivers and Overlap



Capital Program Development

- Project Objectives
  - Capacity
  - Maintenance
  - Repair/ Replacement (System Condition)
  - Infrastructure Need (growth areas)
  - Water Quality
  - Erosion and Sediment Control/ Instream
- Project Categorization
  - Funded Project
  - Program Need
  - Policy Need
  - Future/ Unfunded Project



Capital Projects (Funded)

- One-time cost
- 15 Capital Projects
  - Fact sheets
  - Detailed Cost Estimates
- Four Planning Projects
- Project Scheduling
  - Near Term (2024-2028)
  - Mid Term (2029-2033)
  - Long Term (2034-2043)

	Near Term	Mid Term	Long Term
Capital Project Cost	18.86M	20.82M	29.47M
Planning Project Cost	$280,000	$30,000	$60,000
TOTAL	19.14M	20.85M	29.53M

Program Needs (Annual)

	Name	Annual Cost
P-1	Localized Drainage Improvements Program	$100,000
P-2	Water Quality Retrofit Program	$200,000
P-3	Repair and Replacement (R/R), citywide	$275,000
P-4	Charbonneau R/R	1.92M
P-5	Riparian Vegetation Management Program	$25,000
P-6	Stormwater Facility Enhanced Maintenance Program	$25,000
TOTAL		2.54M

Implementation

	Annual	Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-2043)
Capital Project Cost	---	18.86M	20.82M	29.47M
Planning Project Cost	---	$280,000	$30,000	$60,000
Program Cost	2.54M			
Staffing (Public Works)		2.5 FTE		0.2 FTE
Staffing (Engineering)		0.2 FTE	1.2FTE	
TOTAL	2.54M	19.14M + 2.7 FTE	20.85M + 1.2 FTE	29.53M + 0.2 F

Next Steps

Virtual Open House and Follow-up Survey

Council Public Hearing and Plan Adoption

Rate Study

AFFIDAVIT OF MAILING AND POSTING NOTICE OF PUBLIC HEARING IN THE CITY OF WILSONVILLE

STATE OF OREGON)

COUNTIES OF CLACKAMAS AND WASHINGTON)

CITY OF WILSONVILLE)

I, Mandi Simmons, do hereby certify that I am Administrative Assistant for the City of Wilsonville, Counties of Clackamas and Washington, State of Oregon, that the attached copy of Notice of Public Hearing is a true copy of the originals of the following that I did cause to be mailed/displayed copies of said public hearing in the exact form hereto attached:

- Single-paged notice was emailed on February 21, 2024 to the attached list of affected agencies
- Single-paged notice was sent to the Wilsonville Spokesman for publication in the February 29, 2024 newspaper issue
- The content of the notice was posted on February 21, 2024 on the City's website
- Single-paged notice was posted at physical locations listed below on February 21, 2024
  - City Hall, 29799 SW Town Center Loop, East, Wilsonville OR 97070
  - Wilsonville Community Center, 7965 SW Wilsonville Road, Wilsonville, OR 97070
  - Library, 8200 SW Wilsonville Road, Wilsonville OR 97070

Witness my hand this 4th **day of March 2024**

Mandi Simmons, Administrative Assistant

Acknowledged before me this 4th **day of March 2024, in Clackamas County, Oregon**

Noelle Colleen Edwards

Signature of Oregon Notary

Noelle Colleen Edwards

Printed Notary Name

OFFICIAL STAMP
NOELLE COLLEEN EDWARDS
NOTARY PUBLIC - OREGON
COMMISSION NO. 1036468
MY COMMISSION EXPIRES MAY 01, 2027

NOTARY PUBLIC

My Commission Expires 5-1-27

NOTICE OF LEGISLATIVE PUBLIC HEARING BEFORE THE PLANNING COMMISSION AND CITY COUNCIL: STORMWATER MASTER PLAN, CASE FILE LP24-0002

PLANNING COMMISSION

On **Wednesday, March 13, 2024, beginning at 6 pm,** the Planning Commission will hold a public hearing regarding the **Stormwater Master Plan,** and will consider whether to recommend to City Council adoption of the Plan.

You will not receive another notice unless you: submit a request in writing or by phone, or submit testimony or sign-in at the hearing.

CITY COUNCIL

On **Monday, April 1, 2024, beginning at 7 pm,** the City Council will hold a public hearing regarding the **Stormwater Master Plan,** after which it may make the final decision.

The hearings will take place at **Wilsonville City Hall**, 29799 SW Town Center Loop East. A complete copy of the project record, including staff report, findings, and recommendations, will be available online and at City Hall for viewing seven (7) days prior to each public hearing.

SUMMARY OF PROPOSAL

In 2012, the City adopted the Stormwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use and new stormwater management requirements that need to be addressed as part of this update to the Stormwater Master Plan. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

The Stormwater Master Plan identifies capital projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, alleviate natural system deficiencies, and proactively plan for future growth. For more detail visit **https://www.letstalkwilsonville.com/stormwater**

HOW TO COMMENT: Oral or written testimony may be presented at the public hearings. Written comment on the proposal is also welcome prior to the public hearings. To have your written comments or testimony distributed to the Planning Commission before the meeting, it must be received by 2 pm on March 5, 2024. **Direct written comments to** Mandi Simmons, Administrative Assistant, 29799 SW Town Center Loop East, Wilsonville, Oregon, 97070 or msimmons@ci.wilsonville.or.us

Note: Assistive Listening Devices (ALD) are available for persons with impaired hearing and can be scheduled for this meeting. ***The City will endeavor to provide qualified sign language interpreters and/or bilingual interpreters, without cost, if requested at least 48 hours prior to the meeting.*** *To obtain such services, please call Mandi Simmons, Administrative Assistant at (503) 682-4960.*

Pat McGough
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Lake Oswego, OR 97035

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Sherwood, OR 97140

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Oregon City, OR 97045

Oregon Dept of Environ Quality
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Portland, OR 97232

Tualatin Valley Water District
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Beaverton, OR 97005

Planning Director
City of Sherwood
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Sherwood, OR 97140

James Clark
BPA, Realty Department
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Keizer, OR 97013

Tualatin Valley Fire and Rescue
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Wilsonville, OR 97070

Tualatin Valley Fire and Rescue
South Division
8445 SW Elligsen Road
Wilsonville, OR 97070

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Contact:	***Ad Size:*** 9.403
Address: 29799 SW TOWN CENTER LOOP E WILSONVILLE	***Column Width:*** 1
	Column Height: 9.403
Telephone: (503) 570-1510	***Ad Class:*** 1202
Fax: (503) 682-1015	***Phone #***
	Email: lhutchison@fgnewstimes.com

Run Dates:

Wilsonville Spokesman 02/29/24

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SUMMARY OF PROPOSAL:

In 2012, the City adopted the Stormwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use and new stormwater management requirements that need to be addressed as part of this update to the Stormwater Master Plan. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

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Publish February 29, 2024 WS317726

CITY COUNCIL

THURSDAY, FEBRUARY 22, 2024

WORK SESSION

Stormwater Master Plan (Rappold)

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: February 22, 2024	**Subject: Draft Stormwater Master Plan** **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☐ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☒ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Review and provide comment on the Draft Stormwater Master Plan.	
Recommended Language for Motion: N/A	
Project / Issue Relates To:	
☒Council Goals/Priorities: Protect and Preserve Wilsonville's Environment	☐Adopted Master Plan(s):
☐Not Applicable	

ISSUE BEFORE COUNCIL:
Staff and the consultant will present the Draft Stormwater Master Plan (SMP).

EXECUTIVE SUMMARY:

In 2012, the City adopted the current Stormwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., Urban Growth Boundary (UGB) expansion areas) and new stormwater management requirements (i.e., National Pollutant Discharge Elimination System Municipal Separate Sewer System (NPDES MS4) Permit) that need to be addressed as part of the update. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore, and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a virtual open house and survey were conducted to gather feedback from the community about the proposed SMP. Ninety respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

Since 2021, the consultant team has been working on extensive data collection, problem area identification, modeling of the stormwater system, retrofit analysis, Capital Improvement Program (CIP) projects, and developing the policies that will guide the implementation of the SMP. In developing the SMP, a number of new elements were included:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality (DEQ)) and Total Maximum Daily Load (TMDL) Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon DEQ) to determine the appropriate management and project objectives in the SMP.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The Capital Improvement Program addresses the variety of issues and problems associated with the City's public stormwater system and represents a critical piece in the overall management of the system. Projects were prioritized to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as water quality retrofit and local drainage improvements were developed to address regulatory drivers and support proactive system maintenance.

A total of 15 capital projects were identified to address current and future storm drainage infrastructure needs over the 20-year planning period. Due to phasing some of the projects, these 15 capital projects represent 20 separately costed and phased projects for purposes of prioritization and scheduling efforts. The CIP projects, which are divided into annual, high priority (2024-28), medium priority (2029-33), and low priority, have an estimated total cost of $72,065,000.

On February 14, 2024, the SMP will be presented at a Planning Commission work session. Any feedback received from the Commissioners will be presented to the City Council.

EXPECTED RESULTS:
The SMP includes goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Program, fee in lieu of construction program, and draft and final versions of the SMP. The recommended capital improvements will provide the basis for an analysis of stormwater rates and system development charges (SDCs) that are necessary to fund the projects needed to meet permit requirements and the City's stormwater management needs.

TIMELINE:
The project team will incorporate feedback received from both the Planning Commission (February 14, 2024 work session) and the City Council (February 22, 2024 work session) into the final SMP. Public hearing review of the SMP by the Planning Commission is scheduled for March 13, 2024. The City Council public hearing is scheduled for April 1, 2024.

CURRENT YEAR BUDGET IMPACTS:
The amended fiscal year 2023-2024 Budget for CIP#7064 includes $77,425 in storm operations and system development charge funds to develop the SMP.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the SMP. The Public Engagement Plan incorporated the City's existing public engagement tools, including Let's Talk Wilsonville and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities. The forthcoming Storm System Rate Study and SDC Update will also include a public engagement process with outreach to utility customers and the development community.

POTENTIAL IMPACTS or BENEFIT TO THE COMMUNITY:
The SMP will benefit the community by providing goals and policies and an updated Capital Improvement Program to serve a growing population and meet environmental regulations.

ALTERNATIVES:
The project team considered and evaluated numerous alternatives to provide the needed storm drainage improvements necessary to meet the City's system management needs and permit requirements. The recommended Capital Improvement Program implements the needed improvements in a way that is efficient and cost effective.

CITY MANAGER COMMENT:
N/A

ATTACHMENT:
1. Draft Stormwater Master Plan

Stormwater Master Plan

February 2024 // **DRAFT**

WILSONVILLE
OREGON

DRAFT

Stormwater Master Plan

Prepared for
City of Wilsonville, Oregon
February 2024

This is a draft and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

Brown AND Caldwell

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552
T: 503.244.7005

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List of Abbreviations

AACE	Association for the Advancement of Cost Engineering
ac	acre
BC	Brown and Caldwell
BMP	best management practice
CB	catch basin
CCTV	closed-circuit television
cfs	cubic feet per second
COM/GOV	Commercial/Government
CIP	capital improvement program
City	City of Wilsonville
CPs	capital projects
CPP	corrugated polyethylene pipe
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DIP	ductile iron pipe
DS	downstream
EPA	U.S. Environmental Protection Agency
E&S	Erosion and Sediment
fps	feet per second
ft	feet/foot
GIS	geographic information system
H	horizontal
H/H	hydrologic and hydraulic
HSG	Hydrologic Soil Group
IGA	Intergovernmental Agreements
in.	inch/inches
IND	Industrial
INST	Institutional
I-5	Interstate 5
LA	Load Allocation
LF	linear foot/feet
LID	low impact development
MEP	maximum extent practicable
MH(s)	manhole(s)
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
Plan	Stormwater Master Plan
PVC	polyvinyl chloride
PWS	Wilsonville Public Works Standards
RA	Rural Agricultural
RCP	reinforced concrete pipe
ROW	right-of-way
R/R	repair/replacement
SDC	System Development Charge
SF	square feet
SMP	Stormwater Master Plan
SOPs	standard operating procedures
SROZ	Significant Resource Overlay Zone
SSURGO	Soil Survey Geographic Database
TM	technical memorandum
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UGB	Urban Growth Boundary
US	upstream
USCS	Unified Classification System
V	vertical
VAC	Vacant
WDC	Wilsonville Development Code
WLA	Waste Load Allocation
WQ	water quality

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.
tmp3508

Acknowledgements

The Brown and Caldwell Team, including Waterways Consulting, Inc. and Consor (formerly Barney and Worth) would like to extend thanks to the following staff and stakeholders for assistance in completing this Stormwater Master Plan:

- Kerry Rappold, Natural Resources Manager and City Project Manager
- Andy Sheehan, Asset Management Coordinator
- Sean Shortes, Engineering Tech II

Wilsonville Internal Stakeholders

- Zach Weigel, City Engineer
- Andrew Barrett, Capital Projects Manager
- Amy Pepper, Development Engineering Manager
- Dan Pauly, Planning Manager
- Jim Cartan, Environmental Specialist
- Delora Kerber, Public Works Director
- Martin Montalvo, Operations Manager
- Brad Painter, Roads and Stormwater Supervisor
- Bill Evans, Communications and Marketing Manager

City Council

- Mayor Julie Fitzgerald
- Kristin Akervall, Council President
- Dr. Joann Linville, Councilor
- Caroline Berry, Councilor
- Katie Dunwell, Councilor

City Planning Commission

- Ronald Heberlein, Chair
- Jennifer Willard, Vice-Chair
- Nicole Hendrix
- Andrew Karr
- Kamran Mesbah
- Kathryn Neil

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include the need to: 1) address changing regulatory requirements; 2) reassess the storm system based on completion of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), 3) accommodate new and redevelopment activities, and 4) address observed system deficiencies warranting additional study.

This 2024 SMP identifies and prioritizes projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth. The SMP development process includes the:

- Evaluation of project needs and system improvements as identified by City staff.
- Development of validated hydrologic and hydraulic (H/H) model to confirm capacity issues and to assess anticipated flooding frequency and severity.
- Assessment of stormwater system retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risks to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality issues at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. Project needs were initially identified through the distribution of surveys to City staff and the public, a literature-based and Geographic Information System (GIS) data review, and site visits and staff interviews. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of this effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvements, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, the continued applicability of water quality projects not implemented from the 2012 SMP, and the ability to integrate water quality into other project needs, CP and program needs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby referred to as Kruse Creek for this SMP) to inform locations where stream morphology may

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be or is currently impacted by changes to upstream land use, and in response to changes in flow, infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) model developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities constructed since 2012. CPs installed since 2012 were also incorporated into the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and projected future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing level needs and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into staffing recommendations for both Public Works and Community Development/Engineering.

Project/Program Development and Prioritization. Project opportunities from the various technical evaluations were consolidated and developed into CPs and programs. CP development included conceptual design, facility sizing, and cost estimation. CPs were prioritized based on multiple criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing drainage area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater funding evaluations.

General Recommendations

The following project, program, and policy actions are recommended to improve and enhance the performance of the storm drainage infrastructure throughout the city:

1. Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
2. Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
3. Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
4. Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
5. Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.
6. Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
7. Clearly document CP and program costs and schedule to inform future funding and rate analyses.

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Capital Project Summary

Individual and city-wide CPs, as well as stormwater programs, were developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified 15 CPs (representing 20 individually costed project phases) and 4 city-wide planning projects, including conceptual cost estimates and respective priorities. Figure ES-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
Capital Projects							
BC-1	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	$1,880,000	11%	X		
BC-2	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	$2,940,000	27%	X		
BC-3-Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	$4,860,000	19%			X
BC-3-Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	$7,210,000	19%			X
BC-4	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	$410,000	19%	X		
BC-5	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	$910,000	2%			X
BC-6	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	$400,000	1%	X		
CLC-1-Phase 1	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	$8,020,000	38%	X		
CLC-1-Phase 2	Day Road Stormwater Improvements, Phase 2	• **Capacity**	$3,930,000	38%		X	

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Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	$290,000	6%		X	
CLC-3	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	$3,780,000	35%		X	
NC-1	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	$4,090,000	79%	X		
WR-1-Phase 1	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **Capacity** • Water Quality	$2,310,000	2%		X	
WR-1-Phase 2	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **Capacity**	$1,080,000	2%			X
WR-2-Phase 1	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	$820,000	--		X	
WR-2-Phase 2	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$10,510,000	--			X
WR-3	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	$200,000	10%	X		
WR-4-Phase 1	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	$600,000	--			X
WR-4-Phase 2	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$4,440,000	--			X
WR-5	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	$10,370,000	--			X
City-wide Planning Projects							
City-1	Flow Monitoring and Rain Gauge Installation	• **Capacity**	$100,000	N/A	X		
City-2	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	$30,000/ event	N/A	X	X	X
City-3	Porous Pavement Pilot Study	• **Water Quality**	$100,000	N/A	X		
City-4	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	$150,000	N/A	X		
				TOTAL:	**$19.14M**	**$20.85M**	**$29.53M**

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. City-wide planning projects are designated as "City".

*b. Primary objectives addressed are identified in **BOLD**.*

c. % Related to Growth refers to SDC-eligible projects and the proportional cost attributable to growth.

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Program Summary

In addition to the identified CPs, the following programs were identified to address regulatory drivers and support proactive stormwater system maintenance. These programs, objectives, and estimated annual cost are listed in Table ES-2 and described below:

- **Local Drainage Improvements Program (P-1).** Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).
- **Water Quality Retrofit Program (P-2).** Establish an annual funding mechanism to integrate low impact development (LID) and/or green infrastructure (GI) in conjunction with street improvements, public improvements, and other utility projects. This program supports the City's retrofit strategy and regulatory objectives by adding water quality treatment in areas that do not currently have treatment.
- **City-wide Repair/Replacement Program (P-3).** Allocate funds to conduct replacement of public pipe and outfalls (outside of the Charbonneau development area) in conjunction with inspection results and asset management efforts.
- **Charbonneau Repair/Replacement Program (P-4).** Allocate funds to conduct replacement of public pipe and structures within the Charbonneau development area in accordance with the Charbonneau Consolidated Improvement Plan (2014). Excludes portions of the system identified by CPs WR-4 and WR-5.
- **Riparian Vegetation Management Program (P-5).** Allocate funds to conduct riparian and/or in-channel vegetation restoration and maintenance including removal of invasive plant species.
- **Vegetative Facility Maintenance Program (P-6).** Allocate funds to conduct restorative maintenance for select stormwater facilities (public and private) in the City where larger-scale maintenance is needed and/or maintenance agreements are not in place or executed.

Table ES-2. Program Costs

Project Number	Project Name	Objective(s) Addressed	Estimated Annual Cost
City-Wide Programs			
P-1	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	$100,000/yr
P-2	Water Quality Retrofit Program	• **Water Quality** • Capacity	$200,000/yr
P-3	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$275,000/yr
P-4	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$1,920,000/yr
P-5	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	$25,000/yr
P-6	Vegetative Facility Maintenance Program	• **Water Quality** • Maintenance	$25,000/yr
		Annual Total	$2,545,000/yr

*Note: Primary objectives addressed are identified in **BOLD**.*

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Implementation

CPs, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP) as described in this SMP.

To ensure effective implementation of the CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP. The purpose of this analysis was to inform recommendations as needed for additional Public Works Operations and Community Development engineering staff.

An additional 2.7 FTE in Public Works Operations and 1.4 FTE in Community Development/Engineering are recommended to accommodate new projects and programs defined in this SMP as well as to address deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the implementation schedule and respective funding needs of capital investments. The City will need to develop a financial plan to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, should reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

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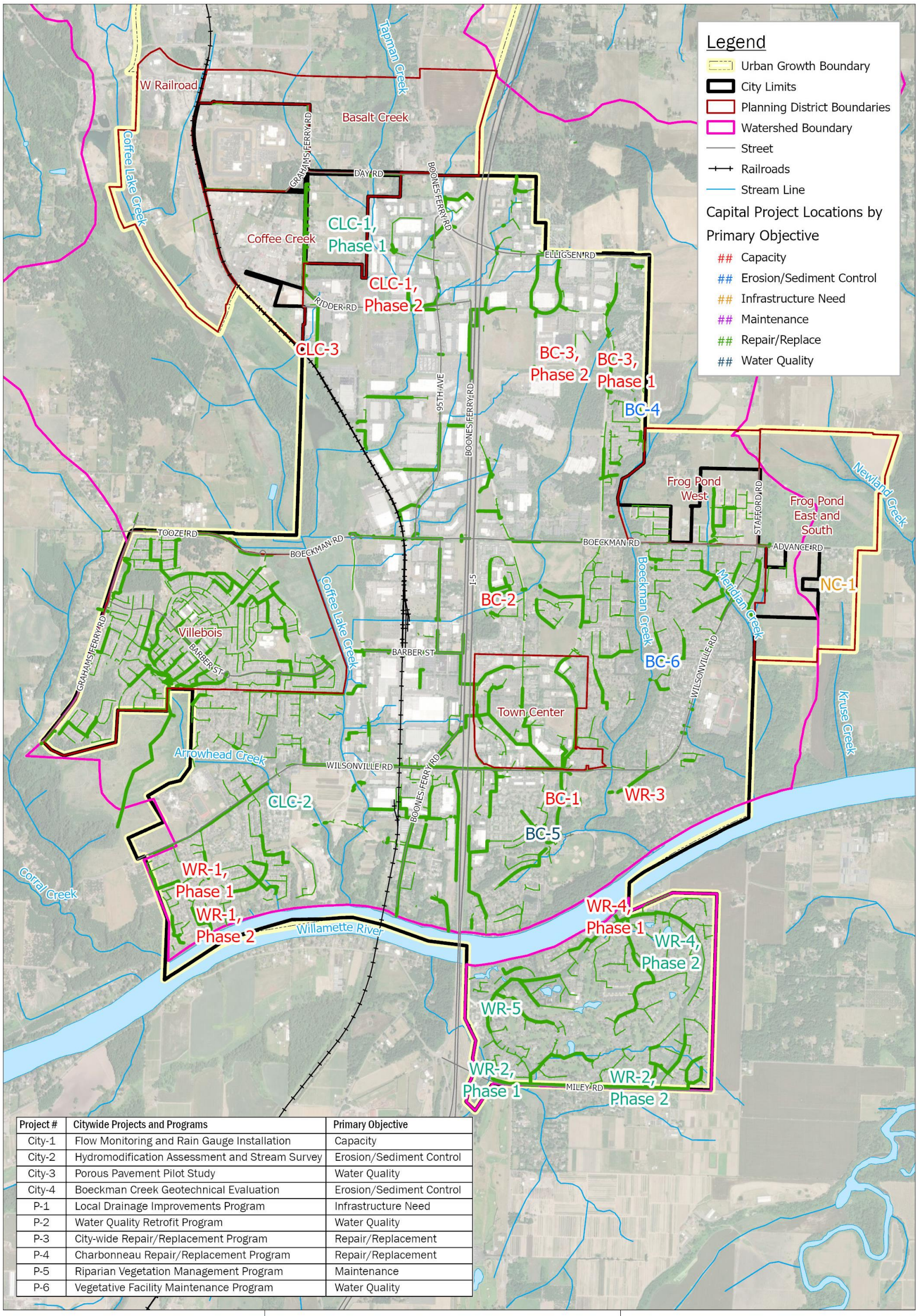

Project #	Citywide Projects and Programs	Primary Objective
City-1	Flow Monitoring and Rain Gauge Installation	Capacity
City-2	Hydromodification Assessment and Stream Survey	Erosion/Sediment Control
City-3	Porous Pavement Pilot Study	Water Quality
City-4	Boeckman Creek Geotechnical Evaluation	Erosion/Sediment Control
P-1	Local Drainage Improvements Program	Infrastructure Need
P-2	Water Quality Retrofit Program	Water Quality
P-3	City-wide Repair/Replacement Program	Repair/Replacement
P-4	Charbonneau Repair/Replacement Program	Repair/Replacement
P-5	Riparian Vegetation Management Program	Maintenance
P-6	Vegetative Facility Maintenance Program	Water Quality

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Capital Projects City-1 to City-4 and Programs P-1 to P-6 are citywide and not specific to a single location.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure ES-1: City of Wilsonville Capital Improvement Program Overview

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Section 1

Introduction

The City of Wilsonville (City) developed this Stormwater Master Plan (SMP or Plan) to guide stormwater and drainage-related capital project (CP), program, and policy decisions over a 20-year planning period.

The City's overall storm drainage system includes approximately 87 miles of piped and open channel (e.g., ditch, stream) conveyance, in addition to stormwater treatment and detention facilities for stormwater management. Most of the City's stormwater is collected and conveyed from north to south, discharging to the Willamette River via major stream corridors including Boeckman Creek (eastern portion of the City) and Coffee Lake Creek (western portion of the City). This SMP collectively considers both piped and open channel conveyances as part of the overall storm drainage system.

This Plan documents the processes and methods used to evaluate the City's storm drainage infrastructure, City stormwater programs, and maintenance activities. Results of the evaluation provide the City with projects, programs, and policies for implementation over the next 20 years and support future funding evaluations and stormwater utility rate and system development charge (SDC) calculations.

1.1 Need for a Master Plan

The City's previous SMP was completed in 2012, setting the course for stormwater management policies and CPs for the last decade. CPs and programs were proposed, prioritized, and scheduled (short term, midterm, long term, and unfunded) in the 2012 SMP, and some of the higher priority projects have been initiated or constructed. However, for some unconstructed and unfunded projects, the project needs have changed, and warrant reconsideration based on development drivers and regulatory needs.

In 2012, project prioritization focused more on project complexity and cost versus other objectives that are of increased importance (e.g., safety, recurring maintenance, water quality, erosion, and stream protection). New regulatory drivers, including the City's reissued 2021 Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit and the Oregon Department of Environmental Quality's (DEQ's) 2021 finalization of the 2019 Revised Willamette Basin total maximum daily load (TMDL) for mercury prompted increased consideration of water quality objectives as part of the capital project and program development effort.

Since 2012, new and re-development activities are rapidly occurring within the City's urban growth boundary (UGB). New infrastructure is continually being added, and ongoing maintenance of new infrastructure can strain City resources. The City also needs a proactive plan to address existing capacity deficiencies and aging and failing infrastructure, while considering resource limitations and development trends.

This SMP addresses water quantity, quality, and natural resource management for constructed drainage systems and stream corridors under the City's management.

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1.2 Master Plan Objectives

The City's overarching goal for this SMP is to guide storm drainage infrastructure improvements over a 20-year implementation period. Improvements must address maintenance/system condition issues, capacity issues, and water quality needs into the future. Specific objectives of the City's SMP include the following:

- Establish a process for evaluating and prioritizing stormwater needs in Wilsonville.
- Solicit information from staff to inform the identification of project needs and improvements.
- Identify known areas of flooding and other storm drainage problems, and provide project solutions related to collection, conveyance, treatment, and natural resource protection.
  - Update the City's existing hydrologic and hydraulic (H/H) model to evaluate system capacity based on current system information and updated land use and development conditions as obtained from the City's Planning Division.
  - Integrate findings and project needs stemming from stormwater planning documents completed since 2012 (i.e., 2015 Retrofit Plan, 2015 Hydromodification Assessment, development-specific master plans, etc.).
- Identify programmatic and planning opportunities to address areas of frequent maintenance needs, system condition deficiencies, and water quality concerns on a City-wide scale.
- Support long-term staffing and funding of the City's stormwater utility.
- Support current, pending, and future regulatory requirements and drivers through CPs, programs and policy recommendations.

This Plan is intended to support regulatory directives under the City's NPDES MS4 Permit and total maximum daily load (TMDL) obligations.

1.3 Approach

The City developed this SMP using an initial, collaborative planning approach with Community Development (Engineering and Planning divisions) and Public Works to assess known storm drainage problem areas and identify areas where the addition, replacement, or retrofit of infrastructure is needed to address an issue.

Targeted system evaluations were conducted to investigate water quality or natural resource opportunities and confirm capacity limitations. Following system evaluation efforts, Project Opportunity Areas were defined and vetted with the project team to inform the development of capital project and program concepts and costs.

This overall process allowed the City to develop multi-benefit projects that target areas of the City likely to be prioritized and funded in a capital improvement program.

Figure 1-1 outlines the approach used to develop this Plan. Detail related to specific evaluation efforts can be found in the following technical memorandums:

- Technical Memorandum #1 (TM1)- Stormwater Basis of Planning (February 2022), not included directly in this SMP document, but much of the content and figures have been integrated into this SMP document.
- Technical Memorandum #2 (TM2)-Geomorphic Reconnaissance of Boeckman, Meridian, and Arrowhead Creeks (May 2022), included in this SMP as Appendix C.
- Technical Memorandum #3 (TM3)-Hydrologic and Hydraulic Modeling Methods and Results, included in this SMP as Appendix B.

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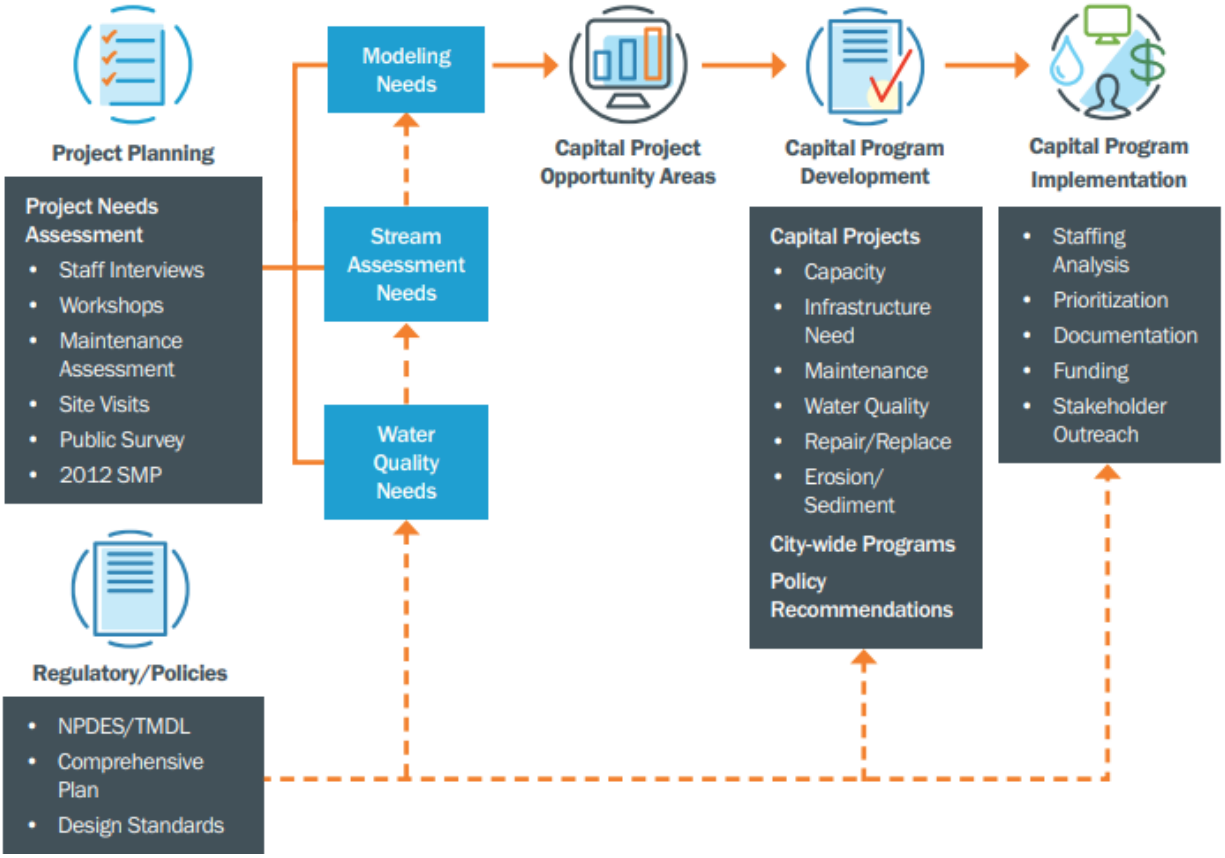

Figure 1-1: Stormwater Master Plan Approach

1.4 Supporting Documents

In addition to the 2012 SMP, several development-specific drainage reports and technical studies prepared since 2012 helped inform project development efforts. Many of these documents contain proposed infrastructure and capital improvements that have been integrated into capital projects proposed in this SMP. However, individual development master plans should still be referenced for detailed design concepts in these development areas. A summary of the reports and studies reviewed and considered for this SMP are listed in Table 1-1.

Additional detail related to regulatory drivers including the 2015 Retrofit Assessment and 2015 Hydromodification Assessment is provided in Section 2.6.

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Table 1-1. Existing Stormwater Planning Documentation and Reports		
Report	Date	Summary and application to the SMP
City of Wilsonville Stormwater Master Plan	2012	Recommends capital improvement projects to achieve city wide stormwater goals and objectives. Projects completed or in progress include SD4208 & SD4209, BC-4, BC-7, ST-6, ST-7, SD9030-9037, SD9013-9021, SD9060, ST-5, LID1, SD9022-9029, ST-9, and WD-3.
Villebois Village Master Plan	2013	Establishes projected land use categories/density requirements for the 2,300 residential unit development. Onsite and regional stormwater management concepts for treatment and detention are outlined.
Charbonneau Consolidated Improvement Plan	2014	Documents pipe replacement projects to address capacity deficiencies and poor condition of the existing stormwater collection system. Includes prioritization of stormwater pipe replacement in conjunction with other utilities (sanitary, water, etc.).
Stormwater Retrofit Plan	2015	Provides an updated prioritization of capital project needs stemming from the 2012 SMP, focusing on water quality criteria.
Hydromodification Assessment	2015	Provides an evaluation of hydromodification risk in stream corridors within the City, as well as recommended actions (including projects) for the City to implement.
Frog Pond Area Plan/West Master Plan	2015/2017	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage. The Frog Pond West Master Plan does not include information about proposed storm drain infrastructure, as that is detailed in the Area Plan.
Basalt Creek Concept Plan	2018	Provides preferred land use and recommends high-level concepts for transportation and infrastructure planning for the Basalt Creek Planning Area.
Town Center Plan	2019	Documents the proposed reconfiguration of existing stormwater infrastructure in conjunction with redevelopment of the Town Center area. Preliminary concepts send additional flow to the Library Detention Pond and remove an existing high flow bypass structure directing runoff west across I-5.
TMDL Implementation Plan	2019/2022	Outlines programmatic activities and best management practices (BMPs) implemented by the City to address instream temperature.
Frog Pond East/South Master Plan	2022	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage.

1.5 Master Plan Organization

Following this introductory Section 1, this SMP is organized as follows:

- Section 2 includes a description of the study area characteristics.
- Section 3 outlines the basis of planning, including the project needs assessment (identification of stormwater problem areas), water quality retrofit evaluation, and additional background to support the project identification and development effort.
- Section 4 summarizes the geomorphic stream assessment.
- Section 5 describes H/H modeling methods and results of the stormwater drainage system capacity evaluation and the identification of capacity-related capital project needs.
- Section 6 summarizes the stormwater capital project development effort, including development of project opportunity areas and determination of final capital project and program needs.
- Section 7 provides an overview of the implementation elements of the capital improvement program, including results of the stormwater staffing analysis specific to Public Works and Community Development, as well as project prioritization and policy recommendations.

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Section 2

Study Area Characteristics

This section provides an overview of study area characteristics, including location, topography, soils, land use, climate and rainfall, drainage system configuration, community perspectives, and regulatory objectives.

Referenced figures depicting study area characteristics are located at the end of this section.

2.1 Location and Study Area

The City of Wilsonville (City) is located primarily in Clackamas County with the northern portion of the City located in Washington County. The City is approximately 17 miles south of Portland, Oregon in the Willamette River Valley. The Willamette River runs west-east in the vicinity of the City, generally forming the southern City boundary with the majority of the City situated to the north of the river. The Charbonneau District is located south of the Willamette River (Figure 2-1). Interstate 5 (I-5) runs north to south through the center of the City and influences topography and drainage patterns.

The City covers six major basins within the city limits with topography that causes each basin to ultimately drain to the Willamette River (see Figure 2-2 at the end of this section). The waterways that define the major basins include Mill Creek (including the Corral Creek tributary), Coffee Lake Creek (including the Tapman Creek tributary), Boeckman Creek, and Meridian Creek which all flow from north to south and drain to the Willamette River. Developed areas adjacent to the Willamette River directly discharges to the Willamette River via pipe or open channel, and these areas are indicated on Figure 2-2, at the end of this section, as the Charbonneau basin and Willamette River direct basin. Together, Coffee Lake Creek/Tapman Creek and Boeckman Creek drain about 71 percent of the total city area, and their watershed boundaries extend outside the city limits and the urban growth boundary (UGB). The Coffee Lake Creek watershed is the largest, covering approximately 50 percent of the city area within the UGB.

The future Frog Pond East and South Planning District (within the UGB but partially within and outside of current City limits) will drain to Newland Creek, a tributary to the Willamette River, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby known as Kruse Creek in this SMP).

Some drainage systems in the city have also been re-routed to accommodate new development. For example, a historical flow diversion was constructed to re-route flows from Arrowhead Creek (in the Coffee Lake Creek watershed) to Legacy Creek (outside of the city limits), and a current flow diversion is used to re-route flow from the middle tributary of Coffee Lake Creek toward upstream Boeckman Creek. While efforts have been made to redirect flows back to their historical points of discharge, impacts can still be observed.

Table 2-1 summarizes the major basins and contributing drainage areas, both within the city limits/UGB and outside of the UGB. The defined study area for this SMP reflects areas of the City where hydrologic modeling was conducted, and the study area includes all areas within the city limits and UGB, with the exception of the Frog Pond East and South Planning District, located in the Newland and Kruse Creek basins. This area is predominately outside of the current UGB and subject to basin-specific master planning for utility placement (see Section 3.5).

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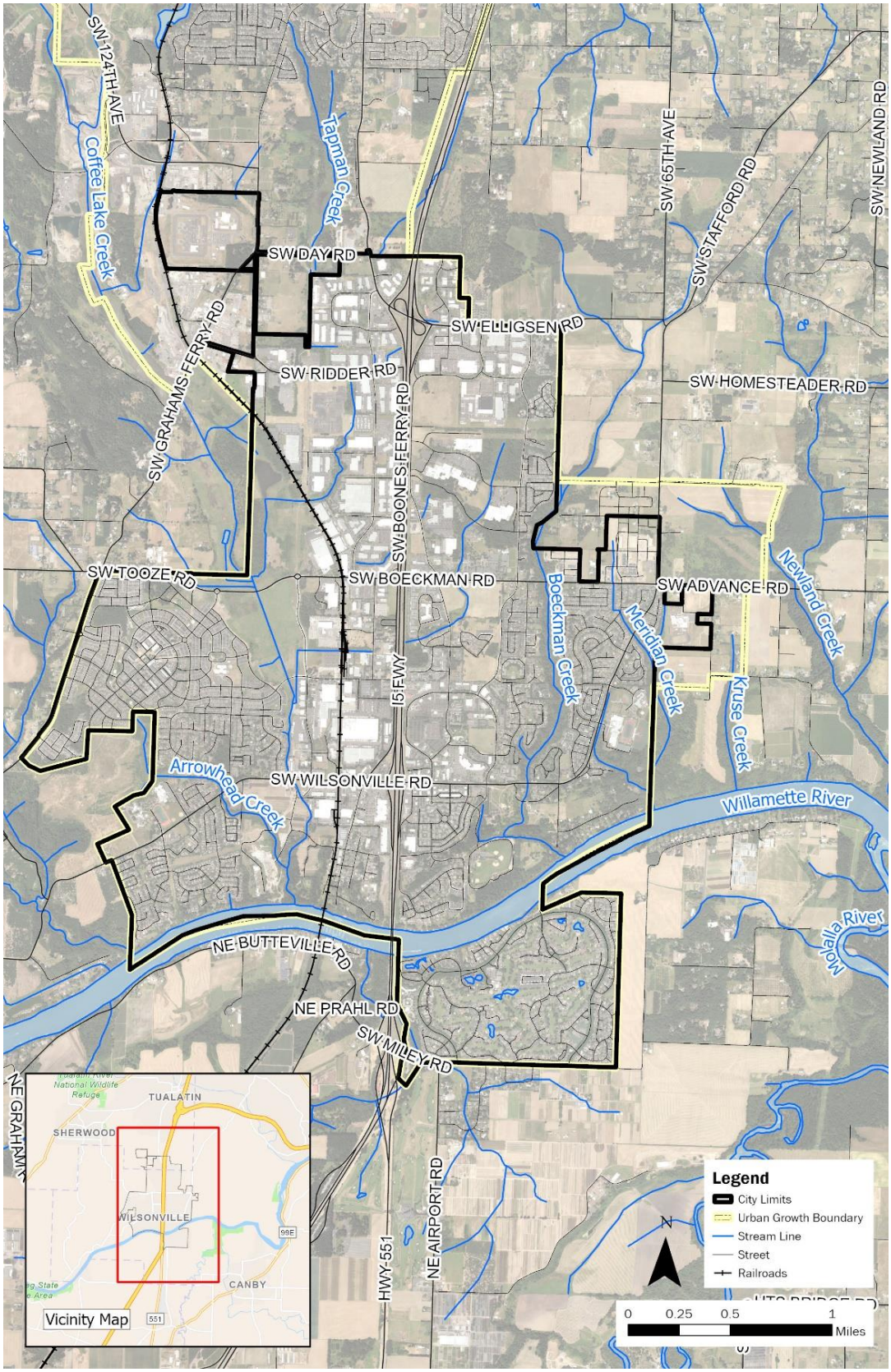

Figure 2-1: Location Overview

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Table 2-1. Study Area Overview				
Basin	Study Area (ac)			Total Study Area (ac)
	Within City Limits	Outside of City Limits (within the UGB)	Outside UGB	
Major Basins				
Boeckman Creek	1,096	70	806	1,972
Charbonneau	478	0	4	482
Coffee Lake Creek	2,332	1,418	1,412	5,162
Mill Creek[a]	101	0	10,424	10,525
Meridian Creek	283	100	87	470
Willamette River	505	0	0	505
Total	**4,795**	**1,588**	**12,733**	**19,116**
Related Basins				
Kruse Creek	13	55	231	299
Newland Creek	0	138	3,098	3,236

a. Area outside UGB is provided for informational purposes and does not contribute to City infrastructure.

2.2 Topography/Soils

Wilsonville's natural topography is characterized by steep hillsides on the eastern edge of the city, along the Boeckman Creek corridor, and relatively flat topography and floodplain area around Coffee Lake Creek basin and the associated Coffee Lake wetlands along the western portion of the city. Elevation within the city ranges from approximately 380 feet in the headwaters of Coffee Lake Creek to approximately 60 feet at the Willamette River.

Soil characteristics within the city vary by watershed. Soils within the city are generally limited in infiltration capability (Hydrologic Soil Group (HSG) C/D), although large areas of HSG B soils along the Willamette River and in the headwaters of Tapman Creek have higher infiltration rates. Soils are generally silty or silty loam, except along the canyon portion of Boeckman Creek, which are combination silt and sand. The downstream reach of Coffee Lake Creek also has a higher portion of gravel and cobble substrate materials than other city areas (ODFW, 2006).

Soils are an important watershed characteristic for evaluating potential runoff rates and volumes. Soils information for the study area was sourced from the National Resources Conservation Service (NRCS) Soil Survey online tool. Soil information is based upon data obtained from a 2016 publication from the U.S. Department of Agriculture, NRCS titled "Soil Survey (SSURGO) Database for Columbia County, Oregon."

For this SMP, soil texture classifications were considered for hydrologic modeling purposes. These texture classifications include various parameters that approximate soil runoff and infiltration potential. Generally, soils with sandy or silt textures have higher rates of infiltration and lower runoff potential, whereas soils with clay textures have lower rates of infiltration and high runoff potential.

Table 2-2 lists the NRCS Soil Texture Classes by percent coverage and by basin. Most of the study area (80 percent) is in the Silt Loam soil texture class. This soil class is characterized as, more than 70 percent silt, 50 percent or less sand, and less than 30 percent clay by weight.

Figure 2-3, at the end of this section, shows the soil texture classifications throughout the study area.

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Table 2-2. Soil Textures within the Study Area (by % of major basin)						
Basin	Clay	Loam	Sandy Loam	Silt Loam	Silty Clay Loam	Total
Boeckman Creek	0%	1%	0%	95%	4%	100%
Charbonneau	0%	67%	2%	30%	1%	100%
Coffee Lake Creek	7%	12%	0%	76%	5%	100%
Mill Creek	0%	0%	0%	97%	3%	100%
Meridian Creek	0%	0%	0%	100%	0%	100%
Willamette River	0%	16%	6%	74%	4%	100%
Total by Combined Area	**4%**	**11%**	**1%**	**80%**	**4%**	**100%**

2.3 Land Use and Population

The City resides within the Metro UGB, and as such development in and around Wilsonville is coordinated with Metro and the surrounding jurisdictions. The City has grown from a rural farming community to a thriving city encompassing approximately 7.8 square miles (approximately 5,000 acres) and is home to over 26,500 residents. The City's population has increased by approximately 3.6 percent annually over the last decade; increasing from approximately 19,509 in 2010 to 26,597 in 2022.[1]

Land use within the City of Wilsonville includes residential, commercial, and industrial, with most of the commercial and industrial development located along the I-5 corridor. Open space areas are scattered throughout the City and include a number of parks, wetlands, and riparian areas.

2.3.1 Development Conditions

Wilsonville is primarily developed within the current city limits; however, there are areas of undeveloped and underdeveloped land that are anticipated to redevelop and densify over this SMP planning period. These areas include the Town Center Planning District and existing low-density residential in the southern portion of the City.[2]

New development is projected to occur in designated future planning areas within the UGB. These future planning areas include the Coffee Creek Planning Area (industrial development), Basalt Creek Planning Area (industrial development), Frog Pond West Planning Area (residential development), and Frog Pond East and South Planning Area (residential and institutional development). The City uses a similar master planning process for the planning areas to guide infrastructure planning and provide opportunities to mitigate natural resource impacts, including the protection and restoration of adjacent stream channels.

1 United States Census Bureau (2022), https://www.census.gov/quickfacts/fact/table/wilsonvillecityoregon#

2 House Bill (HB) 2001 was adopted by the Oregon Legislative Assembly in June 2019, and it promotes middle housing to increase housing options for Oregon citizens. As such, areas zoned as "single family residential" had to be reclassified to allow for duplexes, triplexes, and other middle housing options.

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2.3.2 Land Use Coverage and Imperviousness

For this SMP, land use categories, coverages, and impervious percentages by land use category were initially prepared by the City's Planning Division and reviewed by BC to accurately reflect existing conditions and future development/densification anticipated because of House Bill (HB) 2001.[3]

Existing and future land use coverages for the study area are provided in Figure 2-4 and Figure 2-5 at the end of this section. Land use/zoning consolidation and reclassification, as well as associated impervious percentages by land use are reflected in Table 2-3. Additional description of the process for developing updated land use GIS coverages and impervious percentage estimates are reflected in Section 5.4.

Future land use coverage within the city limits or a defined concept planning area assumes that all developable (vacant) lands will develop into their underlining zoning category. In addition, specific residential areas in the City may adjust to a denser land use category (i.e., PDR2 to PDR5) per HB 2001. Aside from these situations, the existing land use coverage is generally assumed to be retained for the future development condition.

Table 2-3. Land Use Categories

Land Use Categories (2012)	Land Use Categories (Updated)	Calculated Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15 [b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential-Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used.

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City (October 2021).

b. Based on the adjusted impervious percentage value per the Boeckman Road Hydraulic Evaluation and model calibration (December 2021).

[3] Key revisions to City zoning coverage made for this SMP include the adoption of the "Planned Development Residential" (PDR) nomenclature to define residential lands, the subsequent removal of the "Villebois" designation for a subset of residential, multi-family residential, and commercial areas, and the addition of several previously uncategorized land use types.

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2.4 Climate and Rainfall

Wilsonville's climate is characterized by cool wet winters and warm summers. Most rainfall occurs between October and March. On average, December is the wettest month with an average of 7.1 inches of precipitation. July and August are the warmest and driest months with average high temperatures above 80 degrees Fahrenheit and less than 1 inch of rain per month.

The average annual precipitation for the Portland metropolitan area ranges from 37 to 43 inches, with an average of 1.8 inches of snowfall annually. There is currently no rain gage within the City of Wilsonville's jurisdiction, so the Aurora State Airport (UAO) rain gage (approximately 5 miles to the south) is used as a proxy. Based on the UAO data, Wilsonville averages 43 inches of rainfall a year and 2 inches of snowfall annually. Rainfall data from Clean Water Services (CWS) was also used to supplement H/H modeling and model validation efforts.

The lack of, and need for, local rainfall data has led the City to prioritize the installation of a rain gage and at least three flow meters as funded through the city-wide CP "City-1" (see Section 7 for more information). Acquisition of localized and real-time precipitation data allows the City to prepare for and support mitigation of precipitation-related impacts of climate change including increased rainfall intensities, storm surges and flooding, which are likely to affect many urban systems and services.

Current climate and rainfall projections show wide ranging uncertainty regionally and are not time scales typically used for designing storm systems. Therefore, modifications to the City's Public Works Design Standards (PWDS) and design storm events were not proposed for this SMP and associated CP sizing. However, urban planning is key to developing and implementing responses to changing precipitation patterns in urban systems. Incorporation of tools such as updated design storms reflecting local precipitation patterns are one way to adapt the SMP as necessary to address climate change. As data becomes available, the City will continue to work to identify how climate change is likely to impact the City's ability to operate its facilities and meet policy, program, and project objectives.

2.5 Drainage System

The City maintains an asset inventory of their stormwater collection system in GIS that contains various attribute fields depending on the asset class. This information is continually updated by City staff as new information becomes available, either from field investigations or as-built records.

The City manages approximately 83 miles (approximately 439,100 linear feet [LF]) of stormwater drainage pipe and culverts. Table 2-4 summarizes City-owned pipe and culvert system assets mapped (in GIS) throughout the City, as well as approximately 4 miles of mapped streams.[4]

4 Data for Tables 2-4 through 2-6 was sourced from City-provided GIS databases in 2021.

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Table 2-4. System Asset Inventory-Public (City) Pipe/Culvert/Stream (mapped in GIS), City-wide							
Diameter (in)	Length (ft) by basin						Total (ft)
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
<12	11,941	11,168	21,115	532	1,104	6,514	52,375
12-18	53,046	35,189	126,356	11,591	17,799	29,216	273,196
20-27	9,469	6,104	28,636	1,205	2,772	6,125	54,311
30-36	7,326	8,358	18,855	0	1,045	4,047	39,632
42-48	1,807	823	6,054	0	0	4,381	13,064
54-60	60	0	169	0	0	0	229
72-84	424	0	250	0	0	0	674
Total Pipe [a]	84,072	61,641	201,437	13,328	22,720	50,284	433,481
Total Culvert [b]	1,412	212	3,035	322	331	284	5,596
Total Pipe & Culvert	85,484	61,853	204,472	13,650	23,051	50,568	439,077
Total Mapped Stream [c]	5,791	2,718	11,003	0	2,760	197	22,469

a. Pipe refers to active, public mainlines only, excludes laterals.

b. Ownership, maintenance responsibility, and life cycle status of culverts not identified in GIS data-all available data is included in total length.

c. Mapped stream/creek total length clipped to area within city limits and excludes Willamette River shoreline.

Tables 2-5 and 2-6 summarize major City-owned storm structures, such as clean outs, inlets, manholes, stormwater treatment facilities, and outfalls.

Table 2-5. System Asset Inventory–Storm Structures (City ownership)							
Facility	Number by basin						Total
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
Clean out	566	95	656	3	104	109	1,533
Inlets [a]	618	423	1,363	101	203	292	3,000
Manholes [b]	619	304	1,574	119	158	307	3,081
Outfalls	77	5	117	18	21	24	262

Note: Excludes identified county, ODOT and private infrastructure.

a. Inlets include all inlet types: area drains, beehive inlets, catch basins, curb inlets, and other.

b. Includes all manhole types. Ownership not identified in GIS attribute data.

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Table 2-6. System Asset Inventory-Water Quality Facilities (City ownership/maintenance responsibility)

Facility	Number /Footprint Area (SF) by basin												Total	
	Boeckman Creek		Charbonneau		Coffee Lake Creek		Mill Creek		Meridian Creek		Willamette River (direct)			
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Infiltration Vault [a]	1	N/A	0		2	N/A	0		0		3	N/A	6	N/A
Vegetated Facility [b]	113	37,248	0		44	213,420	2	1,432	50	46,234	3	3,443	212	301,777
Pond	6	35,758	0		4	58,518	0		0		1	992	11	95,268

a. GIS data do not include the configuration of an infiltration vault. Based on communications with City staff, an infiltration vault is likely a proprietary filtration vault (e.g., Contech StormFilter). Infiltration vaults have N/A listed in the area column as these are point locations and not dependent on facility surface size.

b. Includes swales, lined planters, and filtration rain gardens.

Figure 2-6, at the end of this section, provides an overview of the stormwater collection system throughout the City including stormwater mains, manholes, outfalls and public stormwater treatment and detention facilities as of 2021. The City's GIS data reflecting both public and private stormwater treatment and detention/retention facilities is continuously updated by City staff, the most up to date record can be found at https://www.wilsonvillemaps.com/.

2.6 Regulatory Drivers

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing provisions of the federal Clean Water Act pertaining to stormwater discharges and surface water quality. DEQ issues permits related to surface water discharges, establishes water quality criteria for waterbodies based on designated beneficial use, and conducts studies and evaluations to determine whether a waterbody adheres to water quality standards.

Regulatory drivers considered in the context of this SMP include Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit requirements and the Total Maximum Daily Load (TMDL) program and associated 303(d) listings for receiving waters.

2.6.1 NPDES Permit Requirements

The City is a co-permittee on the Clackamas County Phase 1 NPDES MS4 permit, along with 13 other jurisdictions in Clackamas County, for management of stormwater runoff. Other neighboring co-permittees include the cities of West Linn, Lake Oswego, and Oregon City.

The NPDES MS4 permit program regulates the discharges of stormwater to receiving waters from urbanized areas and requires permitted municipalities to develop and implement stormwater control measures to address water quality. As a co-permittee, the City is independently responsible for the implementation of their permit, although coordination through intergovernmental agreements (IGAs) with co-permittees is commonplace to help efficiently address programmatic needs such as public education and monitoring. The City's NPDES MS4 permit was reissued in October 2021 after being administratively extended when the previous permit expired in 2017. Most recently, the effective NPDES MS4 permit was modified in May 2023 to address a change in monitoring requirements.

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Implementation of the City's NPDES MS4 permit is outlined in their 2022 Stormwater Management Program document (SWMP). Stormwater activities or best management practices (BMPs) are outlined to address the elements of the permit including:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Stormwater Management for New Development and Redevelopment
- Pollution Prevention and Good Housekeeping for Municipal Operations
- Industrial and Commercial Facilities
- Monitoring and Reporting
- Stormwater Management Facilities Operation and Maintenance Activities

In addition to the elements above, the reissued NPDES permit requires an assessment of outcomes from the 2015 Hydromodification Assessment and 2015 Retrofit strategy, which was due to DEQ by December 1, 2023. This review required an evaluation of progress made under both plans and, as necessary, establishing new goals, priorities, and projects. This SMP incorporates goals and project identification efforts conducted for both documents (see Section 3.2 Water Quality Retrofit Analysis and Section 4 Stream Assessment), as well as identifies new projects and programs to support efforts in the future.

The continued consideration of water quality in conjunction with planning and development efforts is addressed within the City's NPDES MS4 permit, further necessitating the need for this SMP to address stormwater treatment, particularly in locations where treatment is not provided.

2.6.2 TMDL and 303(d) Listings

Wilsonville is in the Middle Willamette River watershed. All areas within the city limits and associated concept planning areas discharge either directly or indirectly to the Willamette River between river mile (RM) 37 and 40.

On September 21, 2006, DEQ finalized a TMDL for the Willamette Basin. The TMDL addressed water quality impairment of the Middle Willamette River and its tributaries and included previously approved TMDLs by reference. The Willamette Basin TMDL addressed bacteria, mercury, and temperature, and included wasteload allocations (WLAs) and load allocations (LAs) specific to Designated Management Agencies (DMAs), except for mercury, as it required additional monitoring and analysis prior to the development of allocations.

On November 22, 2019, DEQ issued the Final Revised Willamette Basin Mercury TMDL, which was in turn submitted and disapproved by the United States Environmental Protection Agency (USEPA) due to questions related to the identification of sources and associated concentrations used to define WLAs and LAs. On February 4, 2021, the Willamette Basin mercury TMDL was reissued by the USEPA, including WLAs specific to the stormwater.

Table 2-7 summarizes the TMDL pollutants and associated LAs and WLAs applicable to Wilsonville. The City's 2022 TMDL Implementation Plan specifies temperature management activities targeting effective shade as well as natural resource and stream channel restoration and riparian cover. Additionally, in conjunction with NPDES MS4 obligations, the City is required to develop pollutant load reduction benchmarks at the end of each permit cycle to quantify TMDL pollutant load reduction estimates due to stormwater management activities and facilities. This requires the continual

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installation of water quality treatment facilities to ensure progress is made towards TMDL pollutant load reduction goals.

Additional water quality impairments relevant to the City are reflected in the effective (2018/2020) 303(d) list for receiving waters within the City. Parameters of concern for the Middle Willamette River include aldrin, biological criteria, DDT/DDE, dieldrin, and polychlorinated biphenyls (PCBs). Such parameters represent additional targeted parameters for pollutant reduction with the City's stormwater program, as TMDLs are slated for development for these parameters in the future.

Table 2-7. TMDL Summary for Wilsonville

TMDL	Year	Subbasin(s)	TMDL Parameters	TMDL Surrogate Parameters	WLA	LA
Willamette River	2006	Middle Willamette	• Mercury • Bacteria (*E. coli*) • Temperature	Effective shade (surrogate for temperature)	• Mercury = 97% [a] • Bacteria = 75-88% reduction [b]	Temperature = 85-95% effective shade

a. Air deposition is the primary source of mercury for MS4 permittees. Through the City's reissued (2021) MS4 NPDES permit, the City was required to prepare a mercury minimization assessment and BMP effectiveness analysis to assess pollutant removal potential.

b. The WLA for bacteria varies according to season and discharge location. A 75% reduction in bacteria load is applicable for areas directly discharging to the Willamette River and a 75% reduction is applicable during the fall, winter, and spring seasons for areas discharging to tributaries. An 88% reduction during the summer season is applicable for areas that discharge to tributaries.

2.6.3 Regulatory Program Integration

Development of this SMP provides a unique opportunity to address regulatory requirements in the context of capital improvement program development, as outlined below:

- The City's 2021 NPDES MS4 permit includes expanded stormwater program and maintenance activities that will require additional stormwater resources and staffing, and such needs have been considered when developing capital project and program costs in this SMP (see Section 3.2 and Section 7.3).
- Updates to the 2015 Retrofit Plan and the 2015 Hydromodification Assessment (as required by the 2021 NPDES MS4 permit) are reflected with updated project needs identified and prioritization reflected in this SMP.
- Ongoing preservation and maintenance of stream channel vegetation and planting activities, as reflected in the 2022 TMDL Implementation Plan, are supported by capital project and program efforts (see Section 4).

Regulatory requirements have the potential to influence the City's overall stormwater capital program throughout the 20-year SMP implementation period. Figure 2-7 shows the correlation between the regulatory programs and SMP components. It reflects how requirements and activities conducted independently under individual regulatory programs help inform each other, as well as how the SMP is the primary mechanism to support capital and program funding and staffing resources that collectively benefits all programs.

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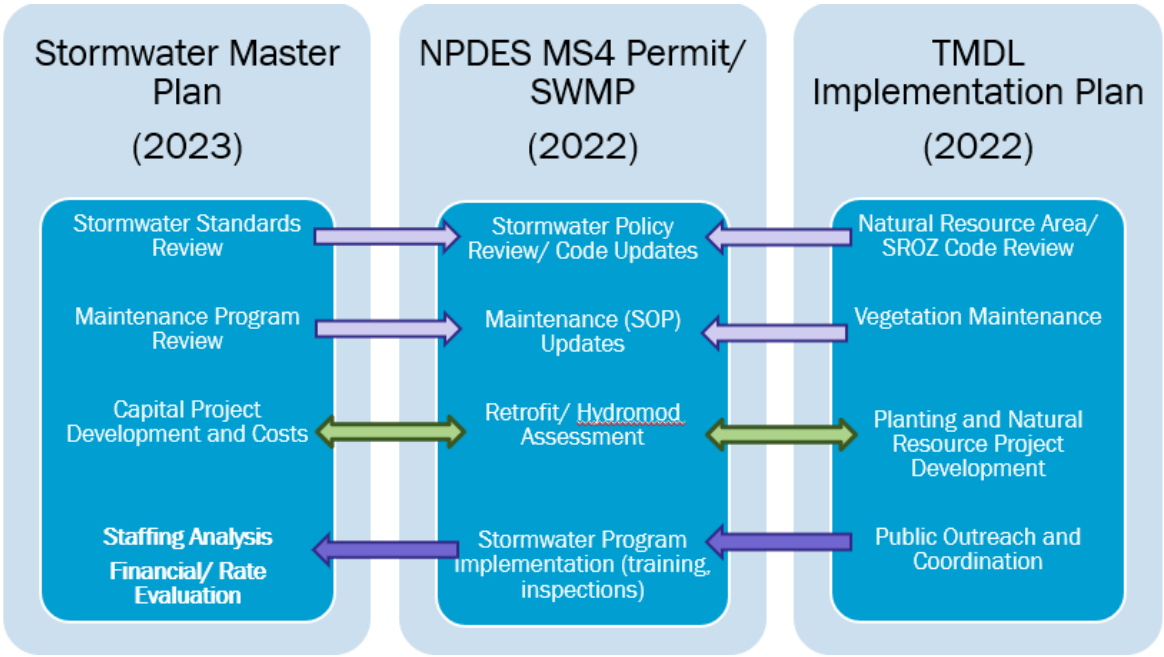

Figure 2-7: SMP and Regulatory Connectivity

2.7 Comprehensive Plan Review

All cities and counties in Oregon are required to adopt Comprehensive Plans and implement ordinances in conformance with the Statewide Planning Goals. Comprehensive Plans direct land use and development within local jurisdictions and must be legislatively adopted by the City and reviewed by the Land Conservation and Development Commission for compliance with Statewide Planning Goals. Local land use decisions must be made in conformance with the provisions and policies of the City's Comprehensive Plan.

The City of Wilsonville Comprehensive Plan (October 2018, updated June 2020) is periodically reviewed to ensure it is current and reflective of continued compliance. BC reviewed the City's Comprehensive Plan with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit. Review comments are associated with the Public Facilities and Services, under the subcategory heading "Storm Drainage Plan". Comments and suggested changes are summarized below:

- Under Policy 3.1.8, page C-8 related to the Storm Drainage Plan, to be more consistent with the MS4 NPDES permit, the reference to pollutants "temperature and turbidity" should be updated to include additional pollutants of concern.
- Under Policy 3.1.8, page C-8 and throughout the plan, there are references to "detention facilities". These references imply that detention is the main or sole type of facility used for stormwater management. Given the focus of the MS4 NPDES permit on green infrastructure, low impact development, and infiltration/retention, the term "detention facilities" should be replaced with a broader term such as "stormwater management facilities" or itemized to include more recently prioritized types of facilities.
- Under Policy 3.1.7 (based on numbering, it should be Policy 3.1.9), there is reference to constructing facilities to improve stormwater quality and control the volume of runoff. To be comprehensive this should be expanded to include reference to controlling peak rates of runoff.

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While not related to the MS4 permit, implementation measures related to natural resource areas and overlay zones in the Environmental Resources and Community Design Section (e.g., Implementation Management Measures 4.1.5.e, 4.1.5.m, and 4.1.5.n) were reviewed but no proposed adjustments are recommended in the context of the SMP.

2.8 Stormwater Operations

Stormwater-related maintenance activities are managed by the City of Wilsonville's Public Works Department, Roads and Stormwater Section. Stormwater-related planning, NPDES MS4 and TMDL compliance, and engineering activities are managed under the Community Development Department in the Engineering Division.

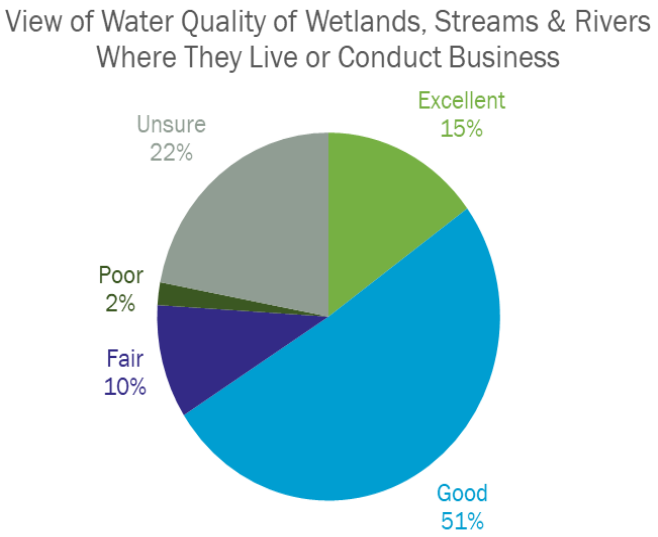
The City of Wilsonville's Public Works Roads and Stormwater Section currently has 2.74 full-time equivalent (FTE) to support ongoing stormwater maintenance efforts (0.4 FTE Stormwater Supervisor and 2.34 FTE Utility Maintenance Specialists). Of the 2.34 FTE Utility Maintenance Specialists, 2.0 FTE are dedicated to stormwater and the other 0.34 FTE reflect staff that assist with underground utility locating, but not dedicated to stormwater. Occasionally, additional coordination with Parks and Recreation is required to supplement staff to conduct routine and response-driven maintenance activities (time not reflected in the FTE summary).

The City of Wilsonville Community Development Department in the Engineering Division includes 1.5 FTE that are responsible for NPDES MS4 and TMDL compliance and directly support the Public Works Roads and Stormwater Section with facility inspections and other activities. Additional Engineering staff oversee and manage capital projects, as well as perform stormwater development review activities.

2.9 Community Perspectives

Outreach efforts were conducted at the beginning of the SMP process, in part, to obtain a better understanding of City perceptions of stormwater, as well as the perception of stormwater services provided by the City.

A public survey was advertised from April 1 to May 15, 2021, on the City's *Let's Talk Wilsonville* web platform. Interested citizens and community members were invited to participate. The survey was provided in both English and Spanish, and 90 participants completed the survey, encompassing both residential and business customers. The survey also provided a forum for participants to describe observed issues and concerns with the stormwater system operation and functionality.



Public surveys help confirm the types of capital projects most beneficial to the community

Findings from the survey indicated that more than 65 percent of the participants believe water quality in wetlands, streams, and rivers in Wilsonville are of excellent or good condition and 97 percent of participants the City had a positive impression of Wilsonville's stormwater services. For both residential and business customers, removal of pollutants before runoff enters streams; the improvement of water quality and habitat; and management of flood/flooding problems (in pipes and facilities) were identified as the most important stormwater services.

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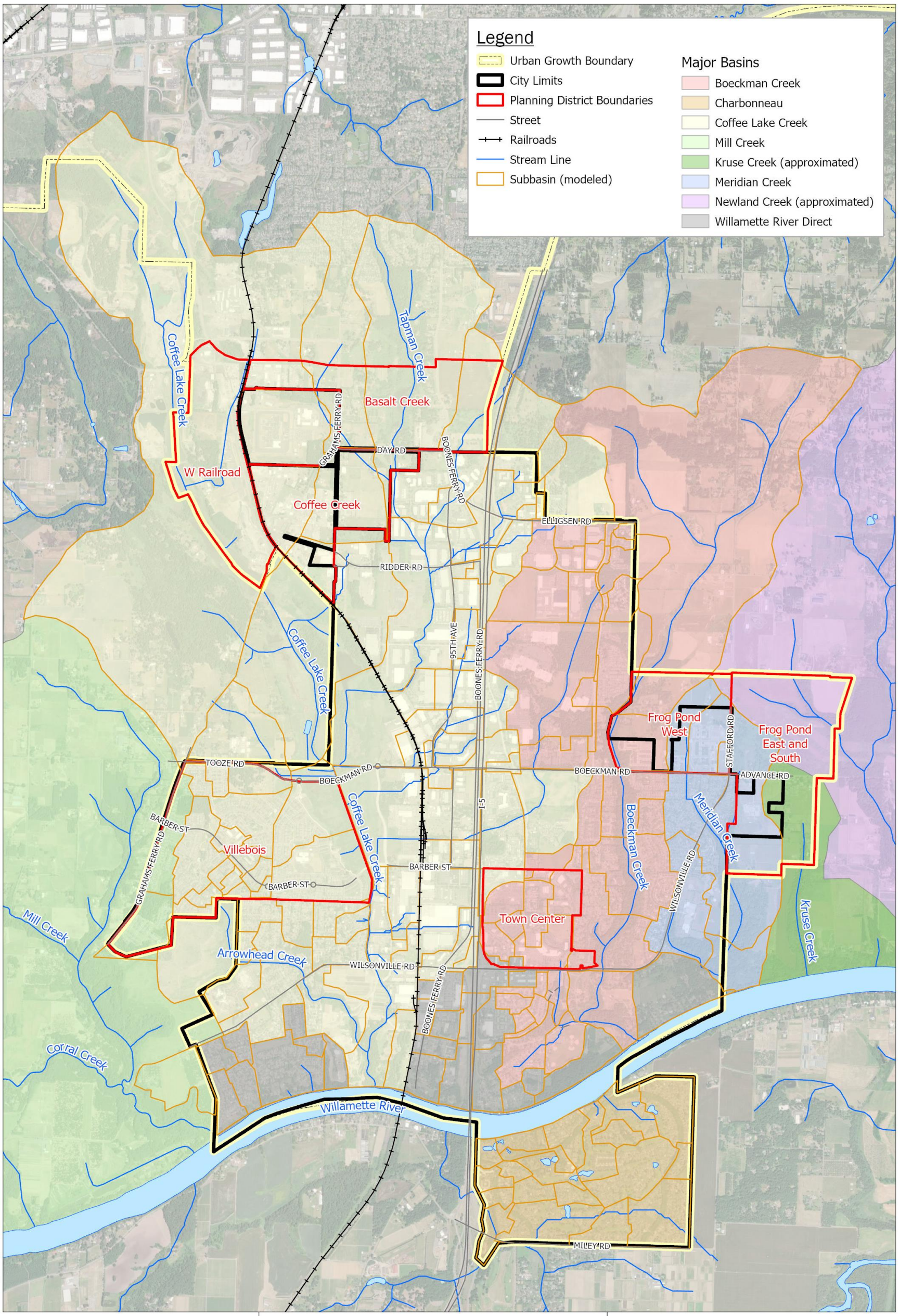

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-2: Major Basins and Planning Areas

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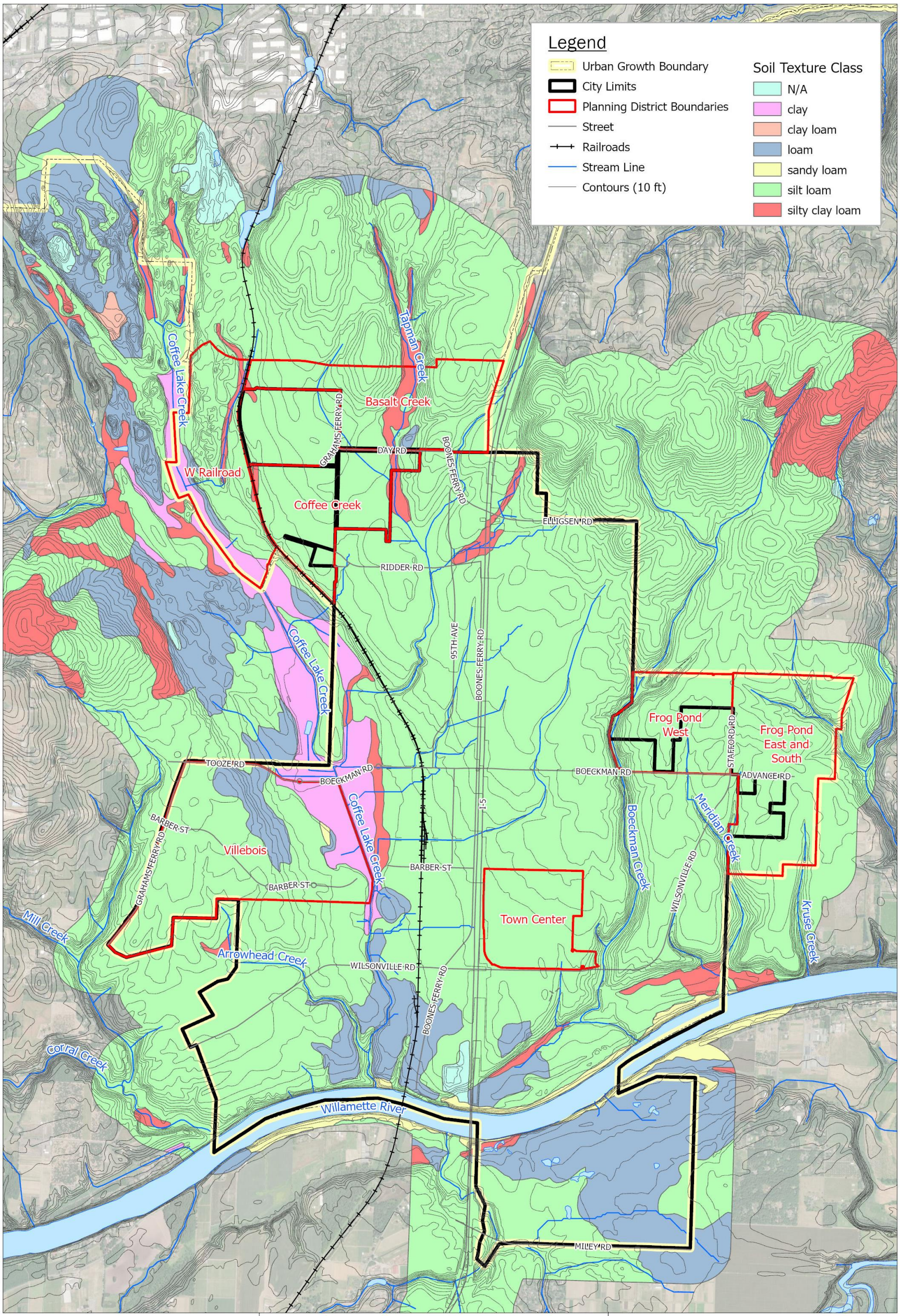

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Stormwater Master Plan

Figure 2-3: Soils and Topography

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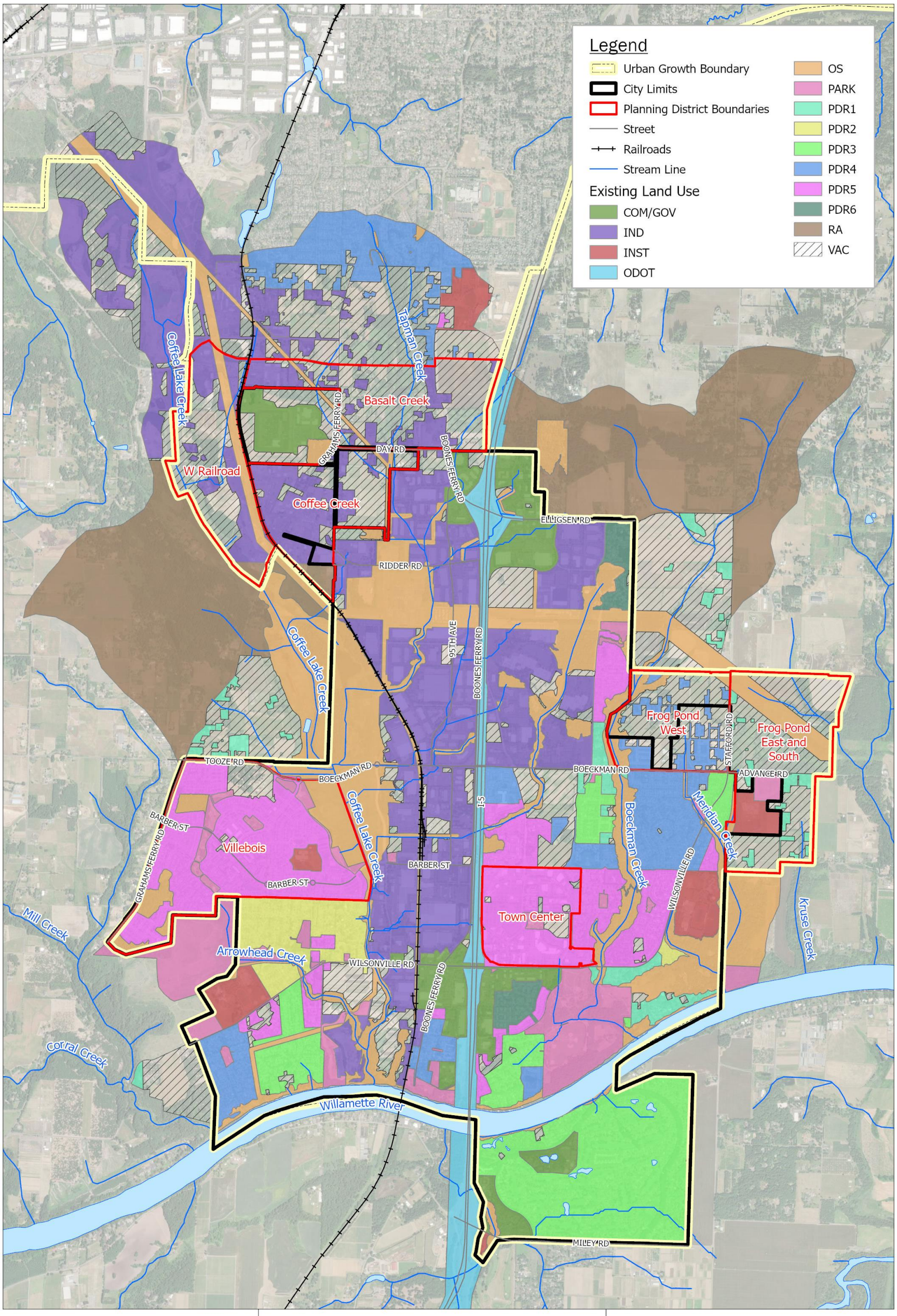

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Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Figure 2-4: Existing Land Use Condition

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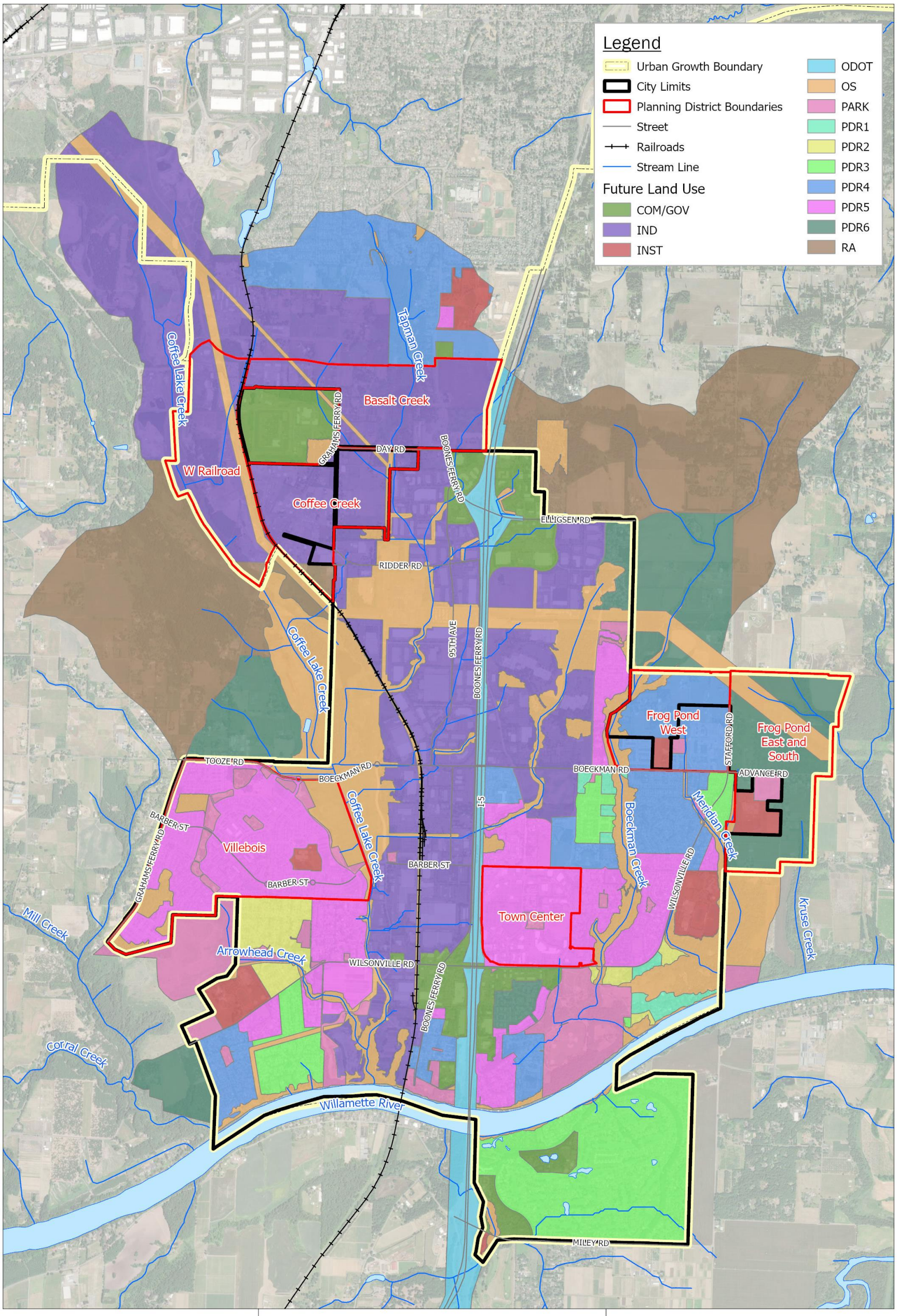

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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0 0.25 0.5 1 Miles

Figure 2-5: Future Land Use Condition

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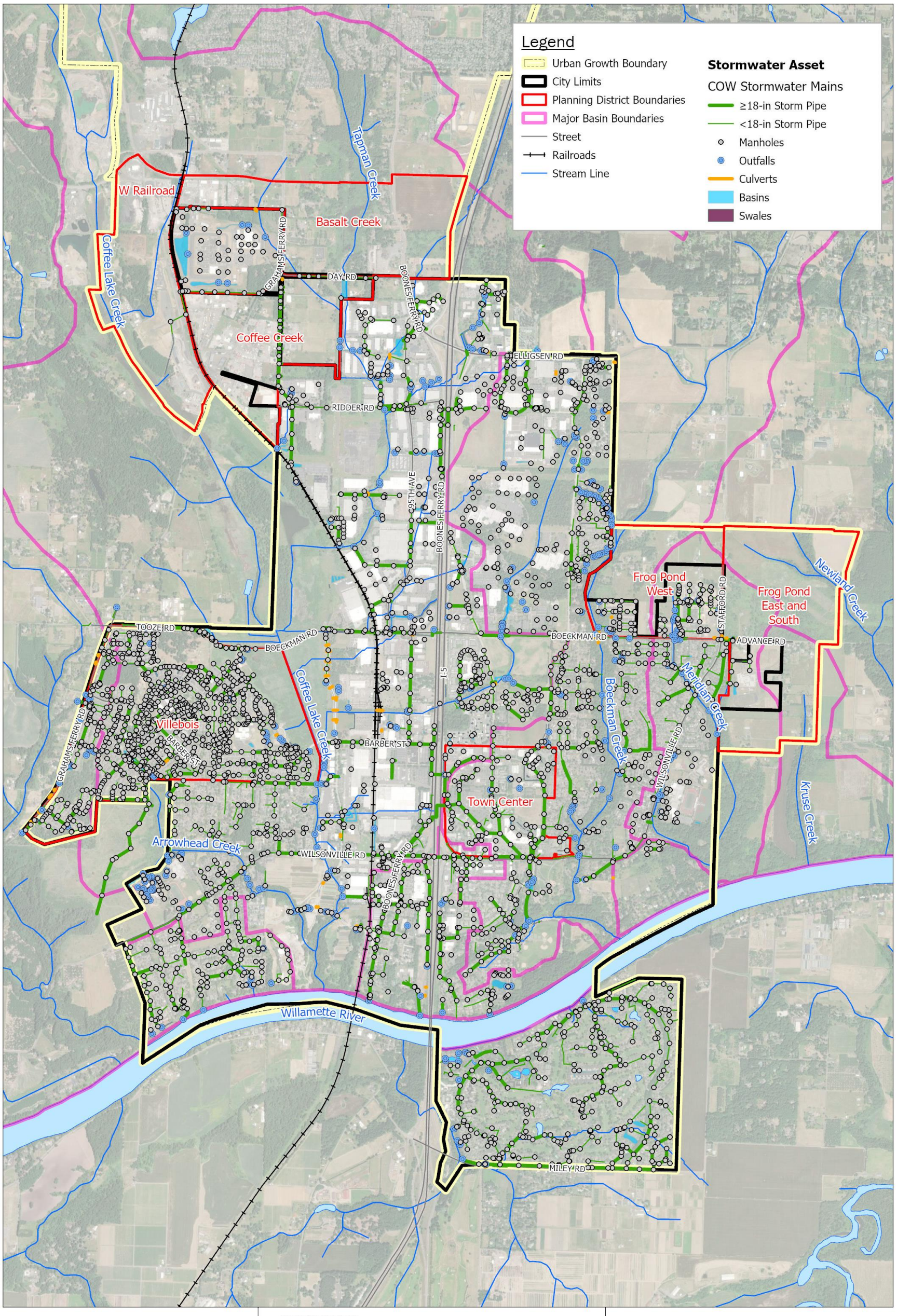

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-6: Stormwater System Overview

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Section 3

Basis of Planning

This section summarizes the overall project planning process and the process to identify stormwater problem areas and water quality retrofit needs, which collectively inform capital project needs identification and development efforts.

This project planning process allowed the City to develop information for areas and activities most likely to be prioritized and funded in a capital improvement program. This process qualified project and program needs in consideration of the SMP objectives, including rectifying known areas of stormwater drainage problems and flooding; enhancing and/or expanding water quality treatment and flow control; and identifying programmatic opportunities to address stormwater needs on a city-wide scale.

Appendix A includes background documentation related to the project planning activities, including a Stormwater Problem Area matrix (Appendix A, Table A-1) and a Project Opportunity Matrix (Appendix A, Table A-2). Identified project opportunities stem from the individual assessment of problem areas (Section 3.1), water quality retrofit opportunities (Section 3.2), stream assessment efforts (Section 4), and H/H modeling results (Section 5).

Referenced figures are included at the end of this section.

3.1 Problem Area Identification

A collaborative approach with Community Development and Public Works staff, as well as the public, was used to identify known stormwater problem areas where infrastructure improvement, replacement, or retrofit may be needed. Problem areas were initially identified through a combination of City staff surveys and follow-up discussions, an external survey (distributed via a virtual open house platform), review of the 2012 SMP, field investigations, and a Project Planning Workshop.

Problem areas were documented in a Stormwater Problem Area Matrix (Appendix A, Table A-1) by primary and secondary deficiency category (i.e., capacity issue, instream erosion/sediment issue, maintenance, and repair and replacement). In addition, portions of the stormwater system requiring refinement/update or expansion of the existing H/H model, as well as locations to be investigated as part of the stream assessment were identified. Problem areas are mapped by primary deficiency (see Figure 3-1 at the end of this section).

3.1.1 City Staff Surveys

In February 2021, surveys were distributed to City staff requesting input on specific locations of reported capacity deficiencies, system condition issues (i.e., pipe and open channel), frequent maintenance needs, and water quality opportunities.

On March 16, 2021, Public Works and Community Development staff collaborated and provided a summary table and accompanying map reflecting 39 problem area locations. Some locations and descriptions provided from Community Development staff overlapped with locations identified by Public Works. Specific issues included culvert misalignments, use of bubblers, standing water in roads and easements due to a lack of system capacity, flooding at open channels, crushed or

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improperly abandoned pipe, the buildup of sediment at catch basins, and damaged outfall structures.

3.1.2 External Stakeholder Surveys

To help facilitate external communications to the public (i.e., citizens and business community), a survey was prepared for external stakeholders to solicit information regarding drainage issues and project needs. External stakeholders included community members, businesses and community groups, developers and contractors, and neighboring jurisdictions.

The Let's Talk Wilsonville web platform was used to publish the external survey as well as provide general background information related to stormwater, the City's current stormwater system, and the purpose of the SMP. The external survey was publicized using local publications (i.e., Boones Ferry Messenger) as well as social media.[5] Website content was also translated into Spanish.

The external survey was open from April 1 to May 15, 2021, and included general demographic questions and questions intended to assess the level of understanding of the participant with respect to stormwater utilities. Additional questions related to values and level of service were also included. The survey included an opportunity for the participant to directly identify problem areas/locations and issues of concern.

The external surveys resulted in the identification of four additional problem areas that are documented in the Problem Area Matrix (Appendix A, Table A-1).

3.1.3 2012 Stormwater Master Plan

The City's 2012 SMP identified 50 stormwater CPs. Project categories included pipe replacement, planning/studies, restoration projects, and low impact development (LID) projects. Sixteen of the projects identified in the 2012 SMP were either completed or are in progress. Some of the proposed pipe replacement projects were subsequently reflected in the Charbonneau Infrastructure Plan (2014).

Outstanding (non-constructed) projects from the 2012 SMP were reviewed against identified problem areas and seven locations directly overlapped. The remainder of projects from the 2012 SMP were discussed with the City during a project coordination call to confirm the need to include the associated project area directly in the Problem Area Matrix. Because hydrologic modeling methods for this plan deviate from the 2012 SMP, and additional assessment efforts (water quality retrofit assessment, stream assessment) were conducted for this SMP, the City opted to independently evaluate project needs for this SMP update instead of relying on previous outdated work.

3.1.4 Project Planning Workshop

A Project Planning Workshop was conducted with City staff on August 24, 2021, to review data compilation efforts and the identification of the stormwater problem areas. The objective of the workshop was to solicit additional detail on the nature of each problem area, add any additional problem areas suggested by the City, and to categorize the problem areas by potential solution (whether project-based or programmatic).

A total of 46 problem areas were identified for discussion. Discussion included the size and scale of the anticipated project and whether a capital project solution or programmatic approach may be taken to address the issue. Problem area locations were also reviewed to establish 1) the need to conduct a site visit; 2) a need to expand model extents to evaluate the problem area; and 3) whether

[5] The current website is: Stormwater Master Plan Update | Let's Talk, Wilsonville! (letstalkwilsonville.com).

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there is benefit in including the location as part of the stream assessment effort. From the workshop, 22 locations requiring site visits were flagged and scheduled. Seven locations were flagged for consideration as part of the stream assessment effort.

3.1.5 Field Investigation

An initial field investigation was conducted September 27, 2021, to verify stormwater problem areas and assess potential project concepts in conjunction with the Project Planning Workshop. A total of 14 problem areas were visited, clustered into seven discrete site visit locations. The site visits provided BC staff with an opportunity to discuss each of the problem areas and better understand the overall drainage patterns and system to advance discussion of modeling needs and capital project concepts.

Subsequent site visits were conducted to inform H/H model validation, water quality retrofits, and capital project development efforts, and those field investigation efforts are discussed under the respective sections.

3.1.6 Results

The Problem Area Matrix (Appendix A, Table A-1) includes the findings from the Project Planning Workshop and field investigation efforts, and documents whether the problem area and potential project solution required additional evaluation as part of the stream assessment and/or hydraulic modeling (via expansion of the existing modeling extents). Problem area locations, including those where a site visit was conducted are reflected in Figure 3-1 at the end of this section.

Of the comprehensive list of 46 identified problem area locations, 11 locations were not anticipated to warrant a project or program solution but were maintained in Table A-1 for reference. Seven locations were identified for further evaluation as part of the stream assessment effort, and eight locations were identified for evaluation as part of the capacity analysis.

Following field investigations and additional evaluation efforts, vetted problem areas were carried forward as Project Opportunity Areas (see additional discussion in Section 6.1) and CP needs. Project Opportunity Areas are documented in Appendix A, Table A-2.

3.2 Maintenance Evaluation

Per Section 3.1, some problem areas were identified as the result of deferred maintenance or due to a relatively minor drainage issue that may not warrant capital project funding. These issues can be more efficiently addressed by expansion of the City's maintenance program (with increased staffing) and/or by defining a programmatic need that can be annually funded.

Maintenance activities and staffing allocations were discussed during a series of two interviews with Public Works staff in late 2021. Staff labor estimates by department and maintenance activity were compiled for use during interviews. The interviews were used to verify the current (as of 2021) maintenance activities, maintenance frequencies and internal processes to issue work orders. The City's Public Works Department uses Cartegraph for asset management, and Cartegraph refers to features (assets) in the City's GIS system to specify where maintenance is required.

Table 3-1 summarizes the primary stormwater maintenance activities conducted by the City of Wilsonville's Public Works Roads and Stormwater Section, along with a summary of the frequency and ability of the stormwater staff to meet maintenance targets (whether they are NPDES MS4 Permit-related or individual Public Works goals). Table 3-1 does not reflect an extensive list of activities but rather reflects the primary activities with a regulatory driver.

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Table 3-1. City Maintenance Activities and Potential Implementation Gaps								
Activity	NPDES MS4 SWMP Requirement	Frequency Required [a]	Annual Target [a]	Regularly Meeting Target? (Y/N) [b]	Required Crew Size	Stormwater Staff Time (per person)	Department	Increased Staffing Need (Y/N)
TV inspection	Not explicitly stated	Annual	15% (60,000 LF) of public conveyance system >6"	N	2	200 ft/hr	Public Works (see Cartegraph Work Flow Process 8.0)	Y
Pipeline cleaning	Y	Annual	As required based on inspections	Y	2	250 ft/hr	Public Works	N
Priority CB inspection and cleaning	Y	Annual	All	Y	2	0.5 hr/facility	Public Works	N
Other CB inspection and cleaning (public)	Y	Every 4 years	25% of total	N	2	0.5 hr/facility	Public Works	Y
Culvert inspections and cleaning	Y	Annual	20%	Uncertain	2	2 hr/facility	Public Works	Potential
WQ MH inspection/cleaning	Y	Annual	150	N	2	1 hr/facility	Public Works	Y
Street sweeping [c]	Y	Monthly	All curbed	Y	NA	165 hours total annually	Contractor	N
System repair and maintenance	Y	As needed	–	Y	2	Varies	Public Works	N (Programmatic approach recommended)
Public water quality facility inspections	Y	Annual	All	N	2	1 hr/facility	Community Development/ Public Works	N
Public water quality facility maintenance [c]	Y	Annual	Public works performs maintenance independent of inspection results	Y (magnitude varies)	2	1-16+ hrs/facility	Public Works	Potential
Public water quality facility maintenance (landscaping)	Y	Annual	All	Y (magnitude varies	NA	291 hours	Public Works	Potential
Private WQ facility inspections [d]	Y	Annual	Varies	Y	1	4 hr/facility	Community Development	N

a. Based on the documentation in the 2022 SWMP Document and/or as documented in the City's Stormwater Maintenance Schedule.

b. Based on the available documentation in the NPDES MS4 annual reports or as provided by Public Works. This column reflects the ability of the Roads and Stormwater Section to conduct this work independently (not requiring staff supplementation from other Sections or Divisions).

c. Activity requirements vary based on inspection results.

d. Current GIS data does not differentiate types of facilities in the "basins" GIS layer. Basins includes ponds, swales, planters, and raingardens.

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3.2.1 Staffing Estimates to Support Maintenance Activities

In accordance with Table 3-1, additional staffing is required to conduct routine maintenance activities in conjunction with NPDES MS4 permit requirements. Estimated staffing needs were initially calculated based on required staff time and length/number of assets (see Section 2.5) and discussed with the Public Works Operations Manager to better incorporate the following staffing considerations:

- Approximately 35 percent of time reserved for stormwater maintenance ultimately supports other departments and emergency response needs. Because many maintenance activities require a crew of two people, the Public Works Roads and Stormwater Section (with 2.74 FTE) is unable to consistently conduct routine maintenance activities and be available to respond to emergencies.
- Based on detailed staff labor estimates compiled by the City, approximately 15 percent of work orders issued by the Stormwater Division are cancelled, which means staffing limitations are preventing the work orders from being completed.

Additional staffing estimates assume that one FTE equals approximately 1,650 hours of work after deducting estimated annual leaves, training, and other non-task related hours (Personal communication with Martin Montalvo, Public Works Department Operations Manager, November 17, 2021). The following maintenance activities were evaluated and additional staff support needs estimated.

- **CCTV Inspections:** Closed-circuit television (CCTV) inspections for stormwater and sanitary were historically contracted out by the City, but in 2021, the City took over delivery of the work. Stormwater CCTV efforts do not routinely occur. The City maintains a Public Works goal of inspecting 15 percent of their public collection system (>6 inches in diameter) annually, which is approximately 60,000 LF of pipe. Stormwater Division staff are needed to operate the CCTV equipment and review of the CCTV reports.

  Recommendation = 0.5 FTE

- **Non-priority Catch Basin/Pollution Control Manhole Cleaning:** The City regularly maintains identified priority catch basins, but routine cleaning of all catch basins is more challenging with current Roads and Stormwater section staffing levels (i.e., clean all catch basins on a 4-year cycle).

  Recommendation = 0.25 FTE

- **Vegetated System Maintenance:** LID facilities (swales/planters) and stormwater basins (ponds) require more extensive maintenance than traditional gray infrastructure (e.g., filter vaults, underground detention facilities, etc.). Maintenance activities include debris removal, vegetation removal and replacement, regrading, replacement of amended soil media, inlet and outlet cleaning, and repair of structural components. Some activities may occur during each maintenance effort (e.g., annually), whereas some may be conducted once every few years.

  Current staffing levels and maintenance efforts do not account for/include vegetation/soil replacement or the large-scale reconstruction/replanting of facilities that are not operating property. Additional staffing needs will help ensure a more proactive program for inspection and maintenance, as well as development of a standard operating procedure (SOP) to guide vegetated system maintenance (both shorter term and larger scale).

  Recommendation = 1.25 FTE (assuming annual maintenance of 4 hours for vegetated facilities; 16 hours for ponds).

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A total of two additional FTE are estimated to address recurring and deferred maintenance activities exclusive to the Public Works Roads and Stormwater Section. Final maintenance-related staffing recommendations in conjunction with the 2022 SWMP Document and identified CPs per this SMP are referenced in Section 7.3.

3.2.2 Programmatic Needs

The Project Planning Workshop and subsequent interviews with Public Works staff also identified the following ongoing programmatic activities that, if routinely conducted, could offset individual CP needs. These programmatic concepts were refined and are detailed in conjunction with CP development activities in Section 6.

- **Repair and Replacement (R/R) Program**. Dedicated funding is needed to repair/replace all public pipe 12-inches and greater within the City limits over a defined timeframe to address lifecycle costs.
- **Localized Drainage Improvements**. Dedicated funding is needed to assist with minor system configuration or installation needs or to respond to recurring maintenance needs.
- **Inlet Replacement Program**. Dedicated funding is needed to relocate and/or install curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues.
- **Green Street Retrofit Program.** A dedicated program is needed to retrofit local streets, which may include, depending on the feasibility, porous pavement overlays and/or green street facilities to promote additional infiltration and water quality treatment.

3.3 Water Quality Retrofit Analysis

Opportunities to incorporate water quality treatment are necessitated by the regulatory drivers in place for the City and supported by the community and public goals to protect water quality. These water quality retrofits can be accommodated through the addition of new water quality and/or detention facilities or the reconfiguration of existing facilities.

The problem area identification effort was focused on capacity and maintenance issues (Section 3.1) and did not focus on water quality objectives. Therefore, a separate analysis was conducted to identify locations where water quality could be integrated into the developed landscape or where pending development and future transportation projects could be leveraged to initiate construction of new facilities. To support the analysis, a GIS desktop evaluation was conducted to map public property (classified as vacant, parks, open space, or City-owned), ponds (public and private), water quality projects from the 2012 SMP, existing stormwater facility contributing drainage areas, and future transportation corridors.

Based on a review of the mapping and City staff preferences, the following objectives (strategies) were developed to guide the water quality retrofit analysis for this SMP:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects reflect water quality-related projects per the 2012 SMP. Review and integration of findings from the 2015 Retrofit Assessment was conducted to support compliance with requirements of the 2021 NPDES MS4 permit.
2. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation to address erosion/hydromodification issues.
3. Integrate water quality and/or flow control into existing project opportunity areas (where possible).

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Identification of new facilities to support future development and growth is not a preferred retrofit strategy, given the fact that private development will already be required to adhere to the City's prescriptive stormwater design standards.

Figure 3-2, at the end of this section, reflects source information used for the water quality retrofit analysis, as well as the resulting project needs.

3.3.1 2015 Retrofit Assessment Update

The City's 2015 Stormwater Retrofit Plan documents the City's stormwater policies, projects, and programs intended to improve water quality in areas of the City that are currently underserved or lacking stormwater quality controls. The 2015 Retrofit Plan included a review of twenty, non-constructed capital projects (CPs) per the City's 2012 SMP and 2014 Capital Improvement Program that had a water-quality element. Updated scoring criteria that focused on water quality objectives were applied to each project. Criteria included:

- Progress toward meeting TMDL Wasteload Allocations (i.e., bacteria and mercury)
- Priority areas for treatment (focusing on areas with no structural stormwater treatment facility and high pollutant generating areas [commercial/industrial land uses])
- Temperature control (meet the shade targets identified in the TMDL)
- Erosion prevention and control (i.e., retrofit of outfalls or stream channel restoration where active erosion results in the transport of excess sediment, increased turbidity and reduced instream water quality).
- Additional objectives (including project integration, maintenance, livability/sustainability, safety, and land acquisition).

For this SMP, the prioritized projects per the City's 2015 Retrofit Plan were reviewed to confirm: 1) projects completed and/or where a project need may have changed, and 2) projects that should be carried forward as part of this SMP.

Results of this review are detailed in Table 3-2. Identified project needs are carried forward as a Project Opportunity Area.

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	16	Viable project, but could be reflected in program (Section 6.5)		X	
LID7	SW Wilsonville Road Stormwater Planters	No	No	16	Viable project, but could be reflected in program (Section 6.5)		X	
CLC-10B	Coffee Creek Storm Projects	No	Yes	16	Not Applicable-reflects 2012 SMP CLC-1. Project number is unique to the Retrofit Assessment source document.			X
BC-5	Boeckman Creek Outfall Realignment	No	No	13	• Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. • Erosion issues not identified/confirmed in 2022 stream assessment effort. • Project location overlaps potential Boeckman Road mitigation site (Creekside Apartments). See Project Opportunity Area #23.	X		
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	13	• Referenced as a long-term project need from source document of retrofit assessment. • Project location overlaps with a portion of the Boeckman Road mitigation area (Siemens/Ash Meadows). Current METRO project may also negate the project need.			X
BC-4	Gesellschaft Water Well Channel Restoration	No	No	13	Project still viable and construction may occur in conjunction with other infrastructure projects (Interceptor Trail).	X		
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	13	Viable project, but could be reflected in program (Section 6.5)		X	
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	12	• Short term/High priority CIP need per source document from retrofit assessment. • Project locations may overlap potential Boeckman Road mitigation site (Canyon Creek Park). See Project Opportunity Area #24.	X		
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	12	• Mid-term project need from source document of retrofit assessment. • See Project Opportunity Area #9.	X		
WD-4A	Willamette Way West Outfall Replacement	No	No	11	Project location is being monitored. No immediate project needs.			X
WD-4B	Belknap Ct Outfall Protection	Yes	No	11	Complete. Remove from list.			X

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
WD-4C	Morey Ct West Outfall Protection	Yes	No	11	Complete. Remove from list.			X
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	9	• Project involves rehab of five existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. • Erosion issues not identified/confirmed in the 2022 stream assessment. • Targeted retrofit of culverts has already occurred.			X
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	9	• Project was intended to enhance the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream. Mid-term project need from source document of retrofit assessment. • Project location overlaps with potential Boeckman Road flow mitigation site. See Project Opportunity Area #23.	X		
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	8	• Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. • See Project Opportunity Area #9.	X		
CLC-2	SW Parkway Avenue Stream Restoration	No	No	8	• Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.			X
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	8	• Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.			X
CLC-8	Coffee Lake Creek Restoration	No	No	8	• Project is no longer needed. This location is associated with 5th and Kinsman Project-Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.			X
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Limited access onto private property.			X
CLC-4	Ridder Road Wetland Restoration	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Not a high priority need for future restoration, but maintain as a future Project Opportunity Area.	X		

a. The overall score is per the 2015 Retrofit Assessment and considered for this 2024 SMP as an indication of the preferred water quality projects per the 2012 SMP.

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3.3.2 New Retrofit Opportunities

In addition to project needs maintained from the 2015 Retrofit Assessment, several opportunities to integrate water quality and/or flow control into existing, underutilized facilities or another Project Opportunity Area were identified. These opportunities and their preliminary retrofit concepts are summarized in Table 3-3.

Table 3-3. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Underutilized Facility	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-in-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. Piped stormwater system may be reconfigured to provide a flow control benefit. Opportunity to help mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Underutilized Facility and Existing Project Opportunity	Existing swale is not draining properly. Swale needs retrofit and potential relocation.
Canyon Creek Park	Existing Project Opportunity	Existing Park property has potential for construction of a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

3.4 Boeckman Road Hydraulic Evaluation and Mitigation Opportunities

Concurrent with development of this SMP, Wilsonville is constructing improvements to Boeckman Road from SW Canyon Creek Road to SW Stafford Road, as part of a Progressive Design-Build project. The Boeckman Road Corridor Project (BRCP), initiated in 2021, involves widening and reconstruction of the road, including removal of an existing culvert and instream flow control structure (FCS) on Boeckman Creek immediately north of Boeckman Road. The removal of the culvert and FCS prompted earlier planning efforts and a technical evaluation of Boeckman Creek. Opportunities for water quality and flow control mitigation within the Boeckman Creek watershed were identified and considered with project planning efforts for this SMP.

In 2021, a hydraulic evaluation of Boeckman Creek was conducted to evaluate potential changes to flows and water surface elevations (WSE) in Boeckman Creek due to removal of the FCS and the existing culvert crossing (Boeckman Road Hydraulic Evaluation, January 2022). The City's existing H/H InfoSWMM model (also used for this SMP) was refined and calibrated to reflect existing hydraulic performance. Efforts to identify potential off-site flow mitigation were initiated in 2022 with significant participation from City staff and the Progressive Design-Build consultant team. Both upland and instream mitigation locations were evaluated based on specific criteria including contributing drainage area and available storage capacity.

Four potential mitigation locations were ultimately identified as preferred locations. Preferred mitigation locations are referenced in the Project Opportunity Matrix for this SMP (see Appendix A, Table A-2).

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3.5 Growth-Related Considerations

A particular focus for this SMP is future development/growth areas, as these areas are expected to develop in the near term and require new stormwater infrastructure including pipe and stormwater management facilities. Such future development may result in increased impervious area and additional stormwater runoff.

Specific growth areas of interest for this SMP include those areas documented in the Basalt Creek Concept Plan (2018), the Town Center Plan (2019), and the Frog Pond East/South Concept Plan (2022). These growth areas represent Project Opportunity locations because new public infrastructure is required and may be funded (in part) by the City. Therefore, cost estimates for new infrastructure are required for inclusion in the overall stormwater CIP.

3.5.1 Basalt Creek Concept Planning Area

With the adoption of the Basalt Creek Concept Plan by the cities of Tualatin and Wilsonville in August 2018, efforts are underway to amend the City's Comprehensive Plan and Transportation System Plan to promote industrial development in the area. Downstream capacity deficiencies on Tapman Creek require further study and planning to address increases in impervious surface due to anticipated development. Development in the Tapman Creek basin will be subject to differing onsite stormwater management standards for new and redevelopment activities. The City of Tualatin, in the upstream portion of the basin, implements Clean Water Services (CWS) standards, whereas the City of Wilsonville regulates stormwater locally. Despite differing standards and requirements, all drainage from the Basalt Creek concept planning area will ultimately drain through City infrastructure before entering Coffee Lake Creek.

The Day Road area, including Commerce Circle, is identified as a problem area (Appendix A, Table A-1) and Project Opportunity Area (Appendix A, Table A-2) and receives flow directly from new development in the Basalt Creek Concept Planning area. Policies related to onsite stormwater management in the upstream portions of the basin may be considered to help mitigate existing, downstream capacity constraints.

3.5.2 Town Center Planning Area

The Town Center Plan (2019) addresses a key redevelopment area in the city, located north of Wilsonville Road in the Boeckman Creek basin. Redevelopment of the Town Center area is anticipated to require major reconfiguration of the existing stormwater collection system. The Town Center Plan proposes the demolition of several segments of existing stormwater trunkline and the installation of new piping alignments in conjunction with City ROW. As a result of these improvements, additional flow is anticipated to be conveyed to the downstream Library Detention Pond, south of Wilsonville Road in Memorial Park.

Inclusion of new infrastructure associated with the Town Center redevelopment area is reflected as a Project Opportunity in Appendix A, Table A-2 (Figure 3-3). In addition, the Library Pond is identified as a current problem area, as well as a Project Opportunity. Policies related to the use of the Library Pond as a fee-in-lieu strategy/facility for treatment and/or flow control for upstream redevelopment are described in Section 6.3.4.

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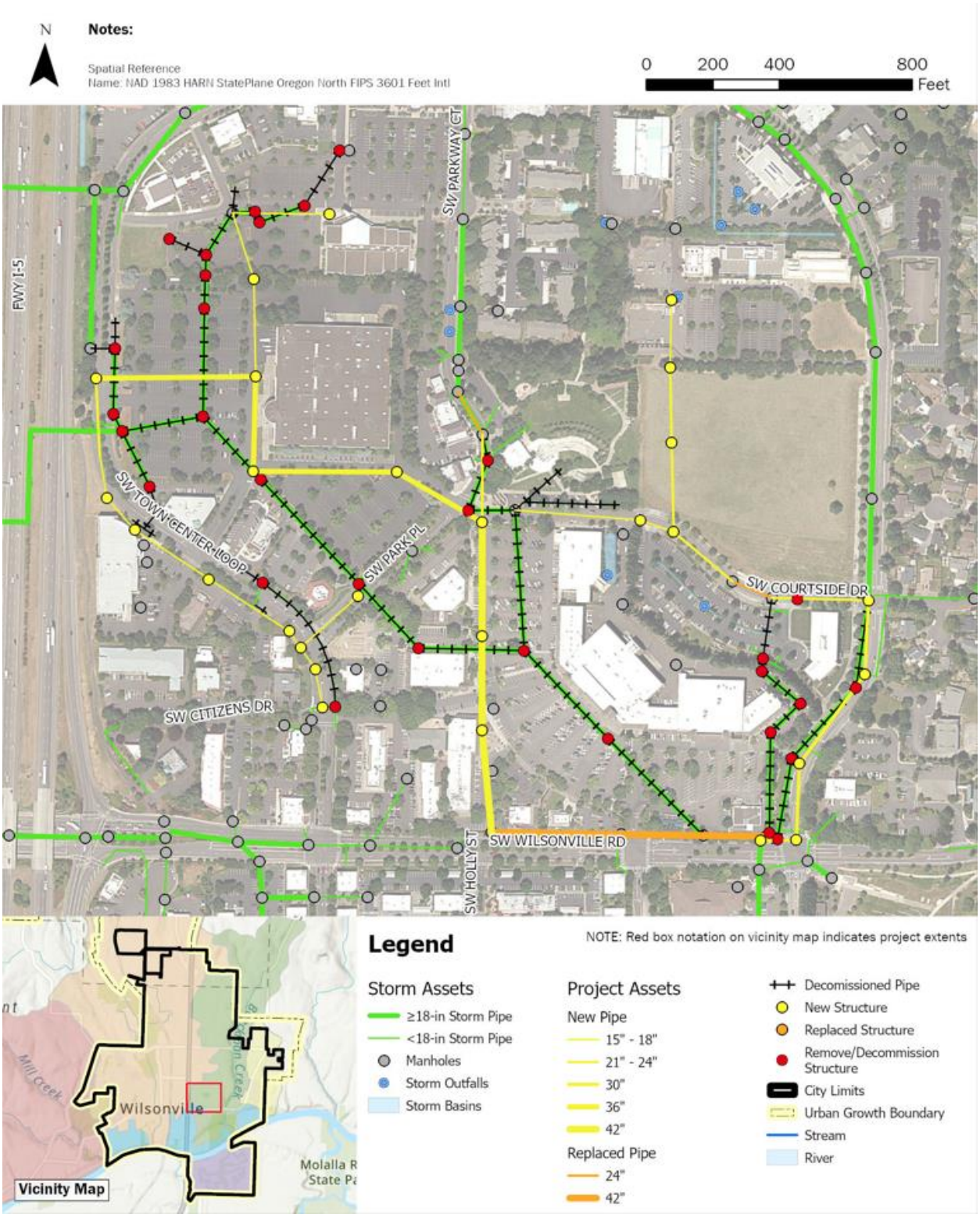

Figure 3-3: Town Center Stormwater Infrastructure Proposal

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3.5.3 Frog Pond East and South Planning Area

The Frog Pond East and South Planning Area is located east of the existing Frog Pond development, adjacent to Advance Road in the Newland Creek basin. New development warrants the installation of new stormwater trunklines and outfalls in dedicated City ROW. Inclusion of new infrastructure associated with the Frog Pond East and South Planning Area is reflected as a Project Opportunity Area (Appendix C, Table C-2).

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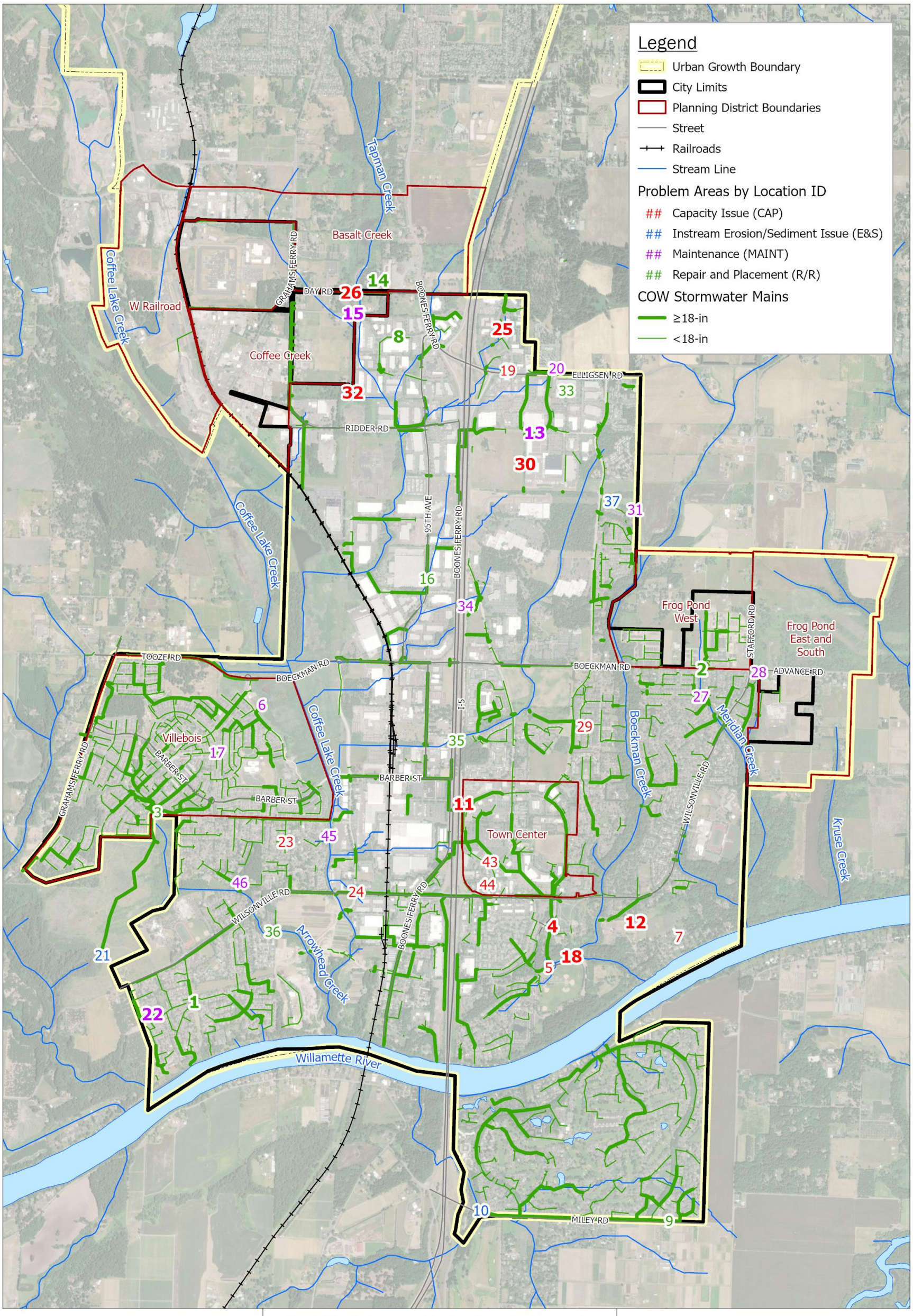

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Bold location IDs represent locations where a site visit occurred.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 3-1: Problem Area Location

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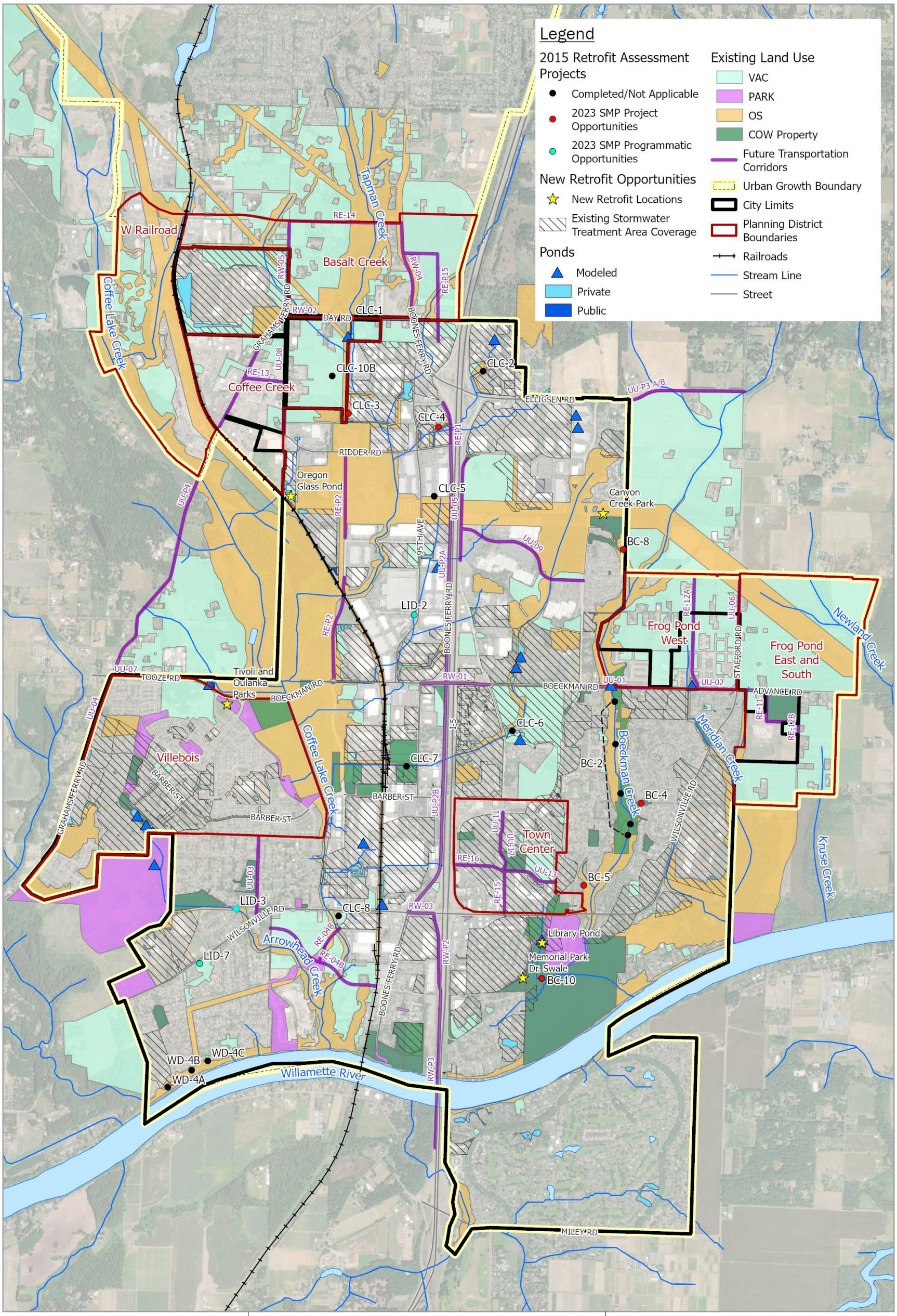

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 3-2: Water Quality Retrofit Analysis

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Section 4

Stream Assessment

Tributary stream channels to the Willamette River are an important element of the overall stormwater collection and conveyance system in the city. Stream channels provide conveyance and storage of water and sediment and provide habitat for aquatic and terrestrial species.

This section outlines results of the stream assessment conducted for this SMP to inform project, program, and policy recommendations. The stream assessment effort helps improve the understanding of hydraulic processes in the selected reaches, as well as identify infrastructure risks associated with changes in stream hydraulics. The stream assessment is described in additional detail in Appendix C. Project Opportunities stemming from the results of the Stream Assessment are detailed below and referenced in the Project Opportunity Matrix (Appendix A, Table A-2).

4.1 Regulatory Background

The City of Wilsonville prepared a 2015 Hydromodification Assessment in accordance with requirements of the City's 2012 NPDES MS4 permit. The 2015 Hydromodification Assessment focused on aspects of hydromodification[6] that are addressed in NPDES MS4 permits, specifically erosion, sedimentation, and alteration of stormwater flow, volume, and duration that may cause or contribute to water quality degradation. Efforts included a GIS desktop assessment, targeted field assessment, and review of existing planning documents and policies to inform the development of strategies and approaches to address hydromodification. Findings from the 2015 Hydromodification Assessment reflect the following:

- Observed stream channels indicate historical hydromodification impacts; minor impacts are observed in locations of concentrated flow or development encroachment.
- Current City programs and policies appear to be effective at addressing hydromodification indicators.
- Current land use and future development patterns show there is a potential for future flow increases; however, the City's current land use policies and updated stormwater design standards are in line with best practices to address hydromodification; and
- The City has identified, and is implementing projects to address hydromodification (per their 2012 SMP).

Recommendations from the 2015 Hydromodification Assessment included the following:

- Implement key capital projects to address instream hydromodification problems including erosion at stormwater outfalls and sites with historic channel modifications.
- Continue to monitor known problem areas.
- Continue to develop and implement master plans for new development areas that address natural resource and channel restoration needs.

[6] The U.S. Environmental Protection Agency (EPA) broadly defines hydromodification as the alternation of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources."

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This SMP update includes a focus on instream channel conditions and erosion prevention in conjunction with capital project development. To inform capital project and program needs, as well as directly address the recommendations per the 2015 Hydromodification Assessment, a geomorphic stream assessment was conducted for select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse creeks to better understand the stream processes and identify infrastructure at risk due to changes in stream hydraulics.

Channel incision and aggradation can inform locations of active erosion and hydromodification risk

4.2 Objectives and Methods

The stream assessment included stream walks along priority reaches as well as desktop mapping and analysis. The objectives of the stream assessment were to:

- Provide a baseline assessment of existing physical stream conditions.
- Identify existing problem areas, such as locations of channel instability or excessive erosion that may impact private or public infrastructure.
- Assess the potential for changes and impacts to the stream channel.
- Recommend capital, operational, maintenance or other solutions or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The stream assessment was conducted by Waterways Consulting, Inc. (Waterways) to reflect the continued evaluation of stream channel conditions as recommended by the 2015 Hydromodification Assessment. Information collected as part of this assessment should be referenced and used during future inspection efforts to help assess improvements and degradation.

In accordance with the Problem Area Identification effort (Section 3.1), City staff identified priority and secondary assessment locations in the city based on the observed hydromodification impacts, land accessibility, future development potential (and the ability to establish a baseline condition of the stream), and history of staff or citizen complaints/concerns.

Figure 4-1 identifies specific stream reaches investigated for the Stream Assessment, as well as the secondary assessment locations not investigated as part of this effort that may be considered in the future.

4.2.1 Stream Walks

Stream walks were conducted over four days, in November 2021 and January 2022 in the Meridian, Boeckman, and Arrowhead Creek basins. Additional stream walks were conducted in October 2023 in the Newland Creek and Kruse Creek basins. Stream walk locations are identified generally in Figure 4-1 at the end of this section. Specific reach numbering associated with stream walk locations can be referenced in Appendix C.

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Stream walk activities included a review of key geomorphic features, stream and bank conditions, and infrastructure. During the stream walks, photographs were taken to document stream characteristics and conditions. Physical and biological stream conditions were noted and mapped and included:

- General vegetation condition.
- In-stream and hillslope erosion processes (incision, aggradation, and hillslope failures).
- Location of stormwater outfalls, exposed pipes, bridges, culverts, affected roads and trails.
- Wildlife activity (presence of beaver dams).
- Heavily eroded banks, headcuts, and bedrock outcrops.

Photo logs and stream reach summary sheets were developed to identify cross section and physical condition characteristics for each reach at the time of the stream walk (see Appendix A).

4.2.2 Desktop Analysis

The desktop assessment included compilation and analysis of geospatial data, including infrastructure, topographic, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for Boeckman, Meridian, Arrowhead, Newland, Kruse and Tapman[7] creeks. A REM shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream.

Waterways also created and analyzed topographic and geologic cross sections and stream longitudinal profiles to develop a set of field maps identifying streams and stormwater infrastructure identified during the field component.

4.3 Findings and Results

Observations made during the stream walks were used to qualitatively identify current stream channel deficiencies and potential strategies for improvement.

Table 4-1 summarizes the general findings by stream reach. Locations where ongoing vegetation management/invasive removal is needed are identified, as well as locations where future monitoring for impacts is recommended. Locations considered a Project Opportunity (see Appendix A, Table A-2) are also identified, and these locations were discussed with the City for consideration as a capital project (see Section 6). Additional detail on these locations is provided in Appendix C.

Of note, the downstream portion of Kruse Creek (Reach 4) was unable to be accessed due to bank stability issues. Future annexation and development activity along Kruse Creek should incorporate a geotechnical evaluation and consider setbacks from the top of canyon, given ongoing landslide risk.

[7] Tapman Creek is referred to as Basalt Creek in TM2.

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Table 4-1. Summary of Stream Assessment Findings

Stream	Assessment Date(s)	Reach No.[a]	Beaver Dam Presence (Y/N)	Infrastructure at Risk? (Y/N)	Invasive Vegetation Present? (Y/N)	Field Observations	Vegetation Management Need? (Y/N)	Ongoing Monitoring Need? (Y/N)	Project Opportunity? (Y/N)
Boeckman Creek	Nov. 19 and 24, 2021	2-9	Y	N	Y	Stream reaches appear laterally confined and vertically stable.	Y	Y	N
Boeckman Creek	Jan. 25, 2022	1	N	Y	N	Risk of channel incision and lateral erosion due to lack of stable beaver dams and seasonal variability in the backwater conditions on the Willamette River.	N	Y	Y
Meridian Creek	Nov. 26, 2021	1	N	Y	Y	Stable stream reaches due to bedrock base level control and lateral confinement. Obstructed culvert at Wilsonville Road (30") results in backwater conditions.	Y	Y	Y
Meridian Creek	Nov. 26, 2021	2	N	Y	Y	Historic channel incision and head cuts, but active head cuts not readily observed. Obstructed culvert at Willow Creek Drive and downstream stabilization measures in place.	Y	Y	Y
Arrowhead Creek	Jan. 25, 2022	2-3	Y	N	Y	General stream stability due to shallow hardpan and abundant beaver dams. Riparian vegetation management needed to ensure beaver activity.	Y	Y	N
Arrowhead Creek	Jan. 25, 2022	4	Y	Y	Y	Culvert at pedestrian crossing is failing. Upstream portion of culvert not evaluated due to access issues.	Y	Y	Y
Kruse Creek	Oct. 26, 2023	1-2	N	N	Y	Moderately incised channel but appears relatively stable. Riparian corridor in relatively good condition, but non-native (ivy and English holly) was noted in Reach 1.	Y	Y	N
Kruse Creek	Oct. 26, 2023	3-4	Unknown	Unknown	Unknown	Reach 4 was inaccessible due to deep channel incision and unstable banks. High groundwater table and seeps and springs contributing to natural stability issues.	Unknown	Y	N
Newland Creek	Oct. 26, 2023	1-3	N	N	N	Reaches are highly incised and likely to incise further. Culvert at SW Kahle Road is acting as grade control and likely preventing additional headcut. Riparian corridor is in good condition, but narrower in reaches 2 and 3.	N	Y	N
Newland Creek	Oct. 26, 2023	4	Y	N	N	Gradient is flatter with in-channel wood and debris dams. Reach 4 is at risk of bank stability, but only one head cut observed. Riparian corridor is in good condition.	N	Y	N

a. Reach numbering can be referenced in Appendix C.

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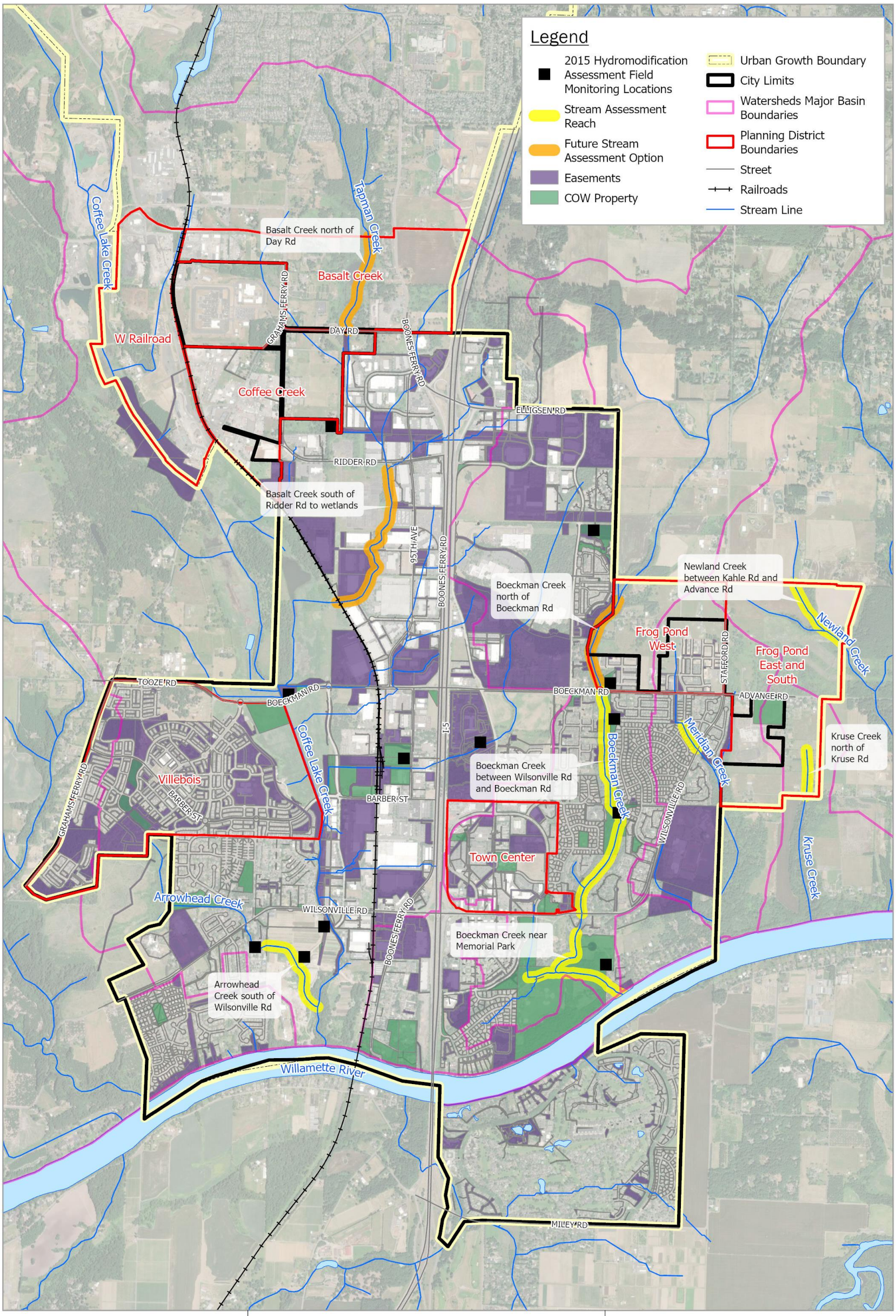

Brown AND Caldwell

City of Wilsonville
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 4-1: Stream Assessment

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Section 5

Capacity Evaluation

Stormwater conveyance is the primary function of the City's storm drainage infrastructure. This section summarizes the H/H system modeling methods and results to verify and identify conveyance capacity limitations.

H/H modeling conducted for this SMP used the City's existing InfoSWMM model, which was originally developed as part of the 2012 SMP effort. The model includes major hydraulic components of the City's stormwater drainage system including public stormwater pipe (15-inch-diameter and greater) and open channel conveyances defined by a simplified trapezoidal geometry. Capacity deficiencies within the study area were identified and/or problem areas validated using the H/H model.

This section summarizes the updates to the City's 2012 InfoSWMM model for this SMP effort, as well as the H/H modeling approach and results.

H/H modeling assumptions, methods and results are described in additional detail in Technical Memorandum #3 (TM3), included in this SMP as Appendix B. Referenced figures are included at the end of this section.

5.1 Objectives and Approach

The City's existing InfoSWMM model was used to simulate the hydraulic performance of select pipe and open-channel systems and evaluate the capacity limitations of City-owned stormwater infrastructure.

Targeted updates to the City's existing model were conducted where updated development activities, CP installations or identified problem areas were identified and there was a need to quantify system capacity to help develop project solutions.

For this SMP, the following modeling approach was generally used to update the H/H model and evaluate conveyance capacity:

1. Review available data (via GIS, as-builts, etc.) to compare mapped infrastructure (i.e., pipe size, slope, etc.) and existing model profiles. Update the existing hydraulic model accordingly.
2. Compile a list of known and suspected problem areas and identify areas where modeling is needed to inform corrective measures. Expand the hydraulic model extents accordingly.
3. Refine the existing subbasin delineation based on the updated hydraulic model coverage.
4. Develop an updated city-wide hydrologic model to estimate stormwater runoff generated for existing and future development conditions.
5. Validate modeled flooding using historical rainfall records, and anecdotal flooding information (photographs, City records),
6. Verify capacity constraints and identify potential sources or causes of flooding with City staff (preliminary flooding results); and
7. Use the validated hydraulic model to document existing capacity deficiencies for inclusion as Problem Opportunity Areas.
8. Use the validated hydraulic model to develop potential solutions to capacity problems (see Section 6).

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5.2 Stormwater Design Standards and Performance Criteria

Design standards and criteria related to the sizing and evaluation of stormwater infrastructure are described in the City of Wilsonville's Public Works Standards (PWS), Section 3 Stormwater & Surface Water Design and Construction Standards, as revised in December 2015.

Additional planning guidelines are described in the City of Wilsonville Code (WC), Chapter 4 Wilsonville Development Code (WDC). The WDC defines assumptions related to the concept planning district designations, overlays and open space designations, and general development regulations that inform land use coverage and hydrologic modeling assumptions for this project.

5.2.1 Planning and Sizing Criteria

Stormwater sizing/design criteria will ultimately be used to both assess the existing stormwater system for deficiencies and guide the design of capital projects in the context of the SMP. Planning and sizing design criteria for select infrastructure components are outlined in Table 5-1. Design storms referenced in the design criteria are outlined in Table 5-2.

Table 5-1. Wilsonville Drainage Standards and Design Criteria

Criteria	Source	Value
Water Quality Facility Design	• PWS 301.4.04.c	• Provide water quality treatment for a design storm of 1 inch in 24 hours. • Design water quality facilities to capture and treat 80% of the average annual runoff volume to the MEP with the goal of 70% TSS removal. • See BMP Sizing Tool.
Water Quantity Facility Design	• PWS 301.4.09.d • PWS 301.4.09.e • PWS 301.4.09.f	• Properties or development draining directly to and within 300 ft of the Willamette River or the Coffee Lake wetlands are exempt from the flow control standards. • Maximum water storage depth for the 100-year storm should not exceed 4 ft deep. • Side slopes should not exceed 4H:1V up to the maximum design water surface elevation; maximum exterior side slopes = 2H:1V. • At least 25% of the pond perimeter should be vegetated with maximum slide slopes of 3H:1V. • See BMP Sizing Tool.
Conveyance Piping Design	• PWS 301.1.10.e • PWS 301.1.13 • PWS 301.8.02 • PWS 301.8.02.c • PWS 301.9.03.b	• Mainline pipes shall be 12 inches in diameter. • Design pipes for conveyance of the 25-year undetained storm (emergency overflow structures should be designed for the 100-year storm). • A minimum of 1 ft of freeboard should be provided between the hydraulic grade line and the top of the structure or finished grade. • Mainline pipes should be reinforced concrete pipe (RCP), ductile iron pipe (CIP), polyvinyl chloride pipe (PVC), or corrugated polyethylene pipe (CPP). Pipe and fittings shall consist of one type of material throughout.
Culvert Design	• PWS 301.1.14 • PWS 301.7.02	• Culverts shall be designed for the 100-year storm. • All culverts shall be designed for fish passage in accordance with ODFW's "Fish Passage Criteria," or latest edition, unless exempt by ODFW or the City. • The headwater elevation must be at least 1 foot lower than road or parking lot subgrade. • New culverts ≤18 inches in diameter: the maximum headwater elevation (measured from the inlet invert) should not exceed 2x the pipe diameter. • New culverts >1 8 inches in diameter: the maximum headwater elevation should not exceed 1.5x the pipe diameter.

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Table 5-1. Wilsonville Drainage Standards and Design Criteria

Criteria	Source	Value
Open Channel Design	• PWS 301.1.13.f • PWS 301.6.02	• Open channels shall be designed for the 25-year undetained storm with a minimum of 1 ft of freeboard. • Channel lining material is site specific. • The minimum slope for the flow line is 1% where practicable, but flow shall not be less than 2 fps (unless approved by City).
Pipe Cover	• PWS 301.8.02m Table 3.8 Minimum Pipe Cover	• 36" of cover: Nonreinforced, RCP Class III, Other Pipe Materials • 24" of cover: RCP Class IV • 12" of cover: RCP Class V, AWWA C-900, AWWA C-905, DIP
Structure Spacing	• PWS 301.8.06	• The maximum distance between structures (manholes, area drains, and catch basins-excluding clean outs) is 400 ft.
Outfalls to Open Channel Waterways	• PWS 301.6.04	• Design bank stabilization for the 25-year storm. • Flows from outfall structures should be directed downstream, typically no less than 30 degrees from perpendicular to waterway flow. • Outfalls must be located at higher elevations than the downstream mean low water. • Plantings (willows or other approved plantings) every 2 ft.
Manhole Design	• PWS 301.8.01 • PWS 301.9.01 • PWS 301.4.11	• Manholes are required at least every 400 ft (unless approved by the City). Required placement includes at every grade change, change in pipe size, change in alignment, pipe connection greater than 6 inches, and at the end of the main lines. • Manhole sizing: • 48-inch-diameter manhole for pipe ≤24 inches in diameter • 60-inch-diameter manhole for pipe 27 to 36 inches in diameter and pretreatment manholes • 72-inch-diameter manhole for pipe ≥42 inches in diameter • Maximum of four pipes entering/exiting a manhole. • Minimum free drop of 0.20 ft, maximum free drop of 1.5 ft.
Catch Basins/Curb Inlets	• PWS 301.8.04 • PWS 301.8.05 • PWS 301.8.05.b	• Must be designed for the 10-year storm. • All catch basins must have a sump (unless approved by the City). • Maximum of three catch basins may be connected in a series before connecting to the mainline. • Curb inlets should be constructed with an 18"minimum sump and 6 ft deep from the top of grate to the lowest pipe invert. • Between the inlet and the mainline or mainline structure, the maximum length of pipeline shall be 60 ft for 12" pipe, unless additional length is required to cross the street ROW.

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service. Design storms evaluated in this SMP include the 2-, 10-, 25-, and 100-year recurrence interval 24-hour events as well as water quality events. Design storms are listed in the City's PWS and listed in Table 5-2. The rainfall distribution for these design storms is based on a Unified Soil Classification System (USCS) Type IA distribution.

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Table 5-2. Design Storm Depths	
Design storm event	Rainfall depth, inches
2-yr, 24-hr	2.50
10-yr, 24-hr	3.45
25-yr, 24-hr	3.90
100-yr, 24-hr	4.50
Water Quality Event , 24-hr	1.00

5.2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater treatment and flow control facilities in consideration of instream hydromodification impacts. The BMP Sizing Tool (updated 2017) is intended to be used in conjunction with the City's PWS to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate facility sizes for the following BMP types:

- Rain Garden-Filtration and Infiltration
- Stormwater Planter-Filtration and Infiltration
- Vegetated Swale-Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The BMP Sizing Tool was developed and calibrated based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration-based facilities is based on the facility soil subgroup. Infiltration rates greater than 0.5 in/hr are considered acceptable for use with infiltration facilities and can be used to meet treatment and flow control standards directly. Infiltration rates less than 0.5 in/hr require use of filtration facilities that include piped underdrain systems and orifice controls to meet flow control requirements.

Use of the BMP Sizing Tool represents a shift away from traditional stormwater detention design practices to match pre- and post- development peak flows for standard (i.e., 24-hour) synthetic design storms. Instead, the tool sizes facilities to match the duration of post development peak flows to pre-development levels for the range of flows anticipated to be the most erosive. The BMP Sizing tool was used to size several CPs in this SMP as well as to evaluate policy recommendations associated with use of the Library Pond to support treatment and flow control requirements associated with the Town Center redevelopment. Additional information related to the Library Pond evaluation is discussed in Section 6.3.4 and Appendix F.

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5.3 Model Evaluation Criteria

Stormwater infrastructure was evaluated using the H/H model for capacity per the design criteria defined in Table 5-1. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding where the hydraulic grade line (HGL) exceeds the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level.

For capacity deficient locations where a CP was recommended and developed (see Section 6), the goal was to adhere to the PWS and accommodate the minimum of 1 foot of freeboard between the HGL and the ground surface.

5.4 Model Refinement

Wilsonville developed a city-wide H/H model using the Innovyze InfoSWMM model platform for the 2012 SMP. Localized model updates were incorporated in 2019.

For this SMP, updates to the model datum, hydrologic input parameters, hydraulic model extents and select hydraulic infrastructure were completed. Additional detail related to datum corrections and hydrologic model refinements are included in TM1, which are independent from this SMP. Specific locations of hydraulic model refinement, as well as more detailed explanation of the model validation effort are outlined in Appendix B.

5.4.1 Datum Conversion

As part of the GIS data review process, initiated in 2021, BC reviewed rim and invert elevation data stored in the City's GIS with LiDAR data to identify consistency regarding the vertical datum. Results of this GIS-based spatial analysis indicated inconsistency between recorded datums within the City's GIS dataset, which prompted a similar comparison effort on the City's 2012 InfoSWMM model.

Based on the model comparison results, the original (2012) hydraulic model appeared to rely on inconsistent vertical datums for select model elements. Through discussions with the City, this inconsistency was due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted hydraulic model elevations to be consistent with the City's current standard of NAVD88. Successful conversion of the existing model to NAVD88 was completed in June 2021.

5.4.2 Hydrologic Model Refinement

Hydrologic model refinements included updated subbasin delineations, existing and future land use coverage, and land-use based impervious percentages. With the adjusted subbasin delineation, updated area-weighted average values for infiltration parameters and impervious areas were assigned for each subbasin. In addition, updated subbasin areas, slopes and widths were calculated.

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The City's 2012 SMP reflected an initial subbasin delineation within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and made updates based on:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

A summary of the updated subbasin delineation by major basin is presented in Table 5-3. Please note Newland Creek (and its associated drainage area) is outside the designated study area for the H/H model and not included in Table 5-3.

Table 5-3. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

As introduced in Section 2.3, City staff developed an updated existing and future (full build-out) land use coverage using City zoning and comprehensive plan designations plus specific overlays where development is restricted (e.g., Significant Resource Overlay Zone (SROZ), METRO vacant/developable lands, City maintained vacant lands, Bonneville Power Administration (BPA) easements, significant wetlands, public parks/natural areas etc.). Impervious coverage by land use designation was based on digitization of impervious area (from aerial imagery) for representative tax lots within each existing land use category and calculated by the City as an area-weighted impervious percentage.

Land use categories reflecting reclassification due to HB 2001, as well as calculated impervious percentages are provided in Table 2-3.

5.4.3 Hydraulic Model Refinement and Model Validation

Updates to the City's 2012 InfoSWMM hydraulic model were completed from May 2021 to May 2022. Hydraulic model updates included areas of model expansion, primarily in new growth areas since the 2012 SMP was completed or identified problem areas, and updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects.

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The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments recommended as part of the Boeckman Road Hydraulic Evaluation (January 2022).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

Discussion of preliminary model flooding results with City staff focused on newly identified 25-year flooding locations where the 2012 SMP did not define a CP to address flooding under existing land use conditions. In general, City staff agreed with the preliminary flooding results presented by the model. However, based on results of the validation exercise, additional hydraulic model updates were warranted in select locations based on updated information provided by the City.

These locations included:

- **Charbonneau SW French Prairie Rd. Outfall**. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- **Library Pond**. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- **Penske Truck Rental Property**. Model revised to reflect updated culvert information underneath the parking lot based on as-built drawings.
- **Wilsonville Distribution Center Pond**. Model revised to reflect the pond outlet structure based on as-built drawings.

Figure 5-1, at the end of this section, summarizes the hydraulic modeling extents as well as locations where the hydraulic model was expanded or updated, including updates based on model validation efforts.

5.5 Model Results and Project Opportunity Area Identification

Upon completion of the model validation effort, detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm.

H/H model inputs and results are summarized for the hydrologic and hydraulic models in Appendix B, Attachment B, Tables B-2 and B-3, respectively.

5.5.1 Hydrologic Model Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events.

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are

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primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow).

Although flow attenuation with new development is anticipated through implementation of the City's stormwater design standards, for purposes of this SMP, CP sizing is based on unmitigated flows. In addition, policy recommendations may be considered to ensure that for capacity limited infrastructure, additional efforts are made to retain and mitigate stormwater flows onsite.

5.5.2 Hydraulic Model Results and Project Opportunity Areas

Hydraulic model results identify locations with the potential for flooding and the need to develop CPs to increase conveyance capacity. As described in Section 5.2, flooding within the model is defined as locations where the hydraulic grade line exceeded the structure's rim elevation. Flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storms were also simulated to identify the minimum flooding frequency. Table 5-4 and Figure 5-2, at the end of this Section, summarize the 18 locations that are anticipated to experience flooding under the existing conditions. Generally, all modeled flooding locations are designated as Project Opportunity Areas unless indicated otherwise, and the "priority need" column in Table 5-4 indicates whether a flooding location is confirmed by City staff as necessitating a CP or program to address.

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Table 5-4. Modeled Capacity Deficiencies

Flooding Location ID (Figure 5-2)	Basin	Location Description	Minimum Flooding Frequency	Flooding Predicted in 2012 SMP? (Y/N)	Project Opportunity Area (Y/N)	Priority Need
1	Charbonneau	Miley Road	10-yr	Y	Y	Y
2	Charbonneau	French Prairie Rd and Old Farm Rd	2-yr	Y	Y	Y
3	Willamette	Parkway Ave/Metolius Ln	10-yr	Y	Y	N
4	Willamette	SW Miami	25-yr	N	Y	N
5	Boeckman	Memorial Dr	2-yr	Y	Y	Y
6	Boeckman	Canyon Creek Rd	10-yr	Y	Y	N
7	Boeckman	Sysco Ditch	10-yr	N	Y	N
8[a]	Boeckman	Elligsen Rd	10-yr	Y	N	N
9	Coffee	Shrine Center Pond	2-yr	Y	Y	Y
10	Coffee	Commerce Circle Ditch	2-yr	Y	Y	Y
11	Coffee	Garden Acres	2-yr	N (not modeled)	Y	Y
12[b]	Coffee	Coffee Creek Wetlands	2-yr	Y	N	N
13	Coffee	Boberg Rd and RR crossing	10-yr	N	Y	N
14	Coffee	I-5 Culverts	25-yr	N	Y	N
15	Coffee	Barber Street	25-yr	Y	Y	N
16	Willamette	River Fox Park	2-yr	N	Y	Y
17	Willamette	Lower Boones Ferry	2-yr	Y	Y	N
18[c]	Coffee Lake	Boeckman Corp. Center Pond	10-yr	Y	N	N

a. *Flooding likely due to modeled routing (large subbasin at the upstream end of model). City indicated no Project Opportunity Area designation needed.*

b. *Generalized modeled cross sections are underrepresenting the actual storage. City indicated no Project Opportunity Area designation needed.*

c. *Model configuration questions exist in regard to an existing flow control structure in this area. City staff report no flooding and so this area was not included as a Project Opportunity at this time.*

Three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and required alternatives analysis to ensure that City objectives and preferences will be achieved. These locations are discussed further in Section 6.3 and include:

- Flooding Location ID 2: Charbonneau (French Prairie and Old Farm Road)
- Flooding Location ID 10: Commerce Circle Ditch (Day Road)
- Flooding Location ID 11: Garden Acres

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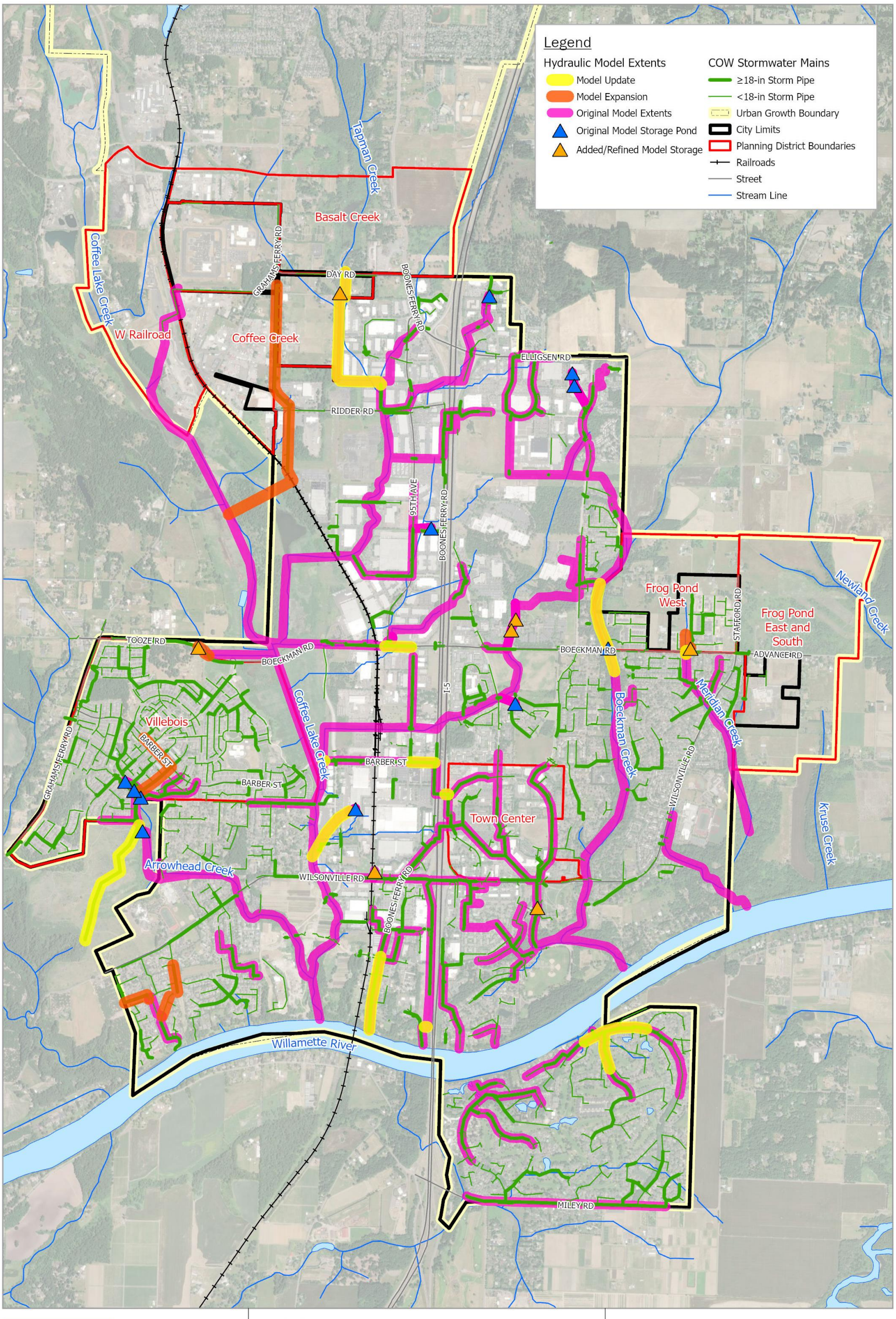

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 5-1: Hydraulic Model Overview

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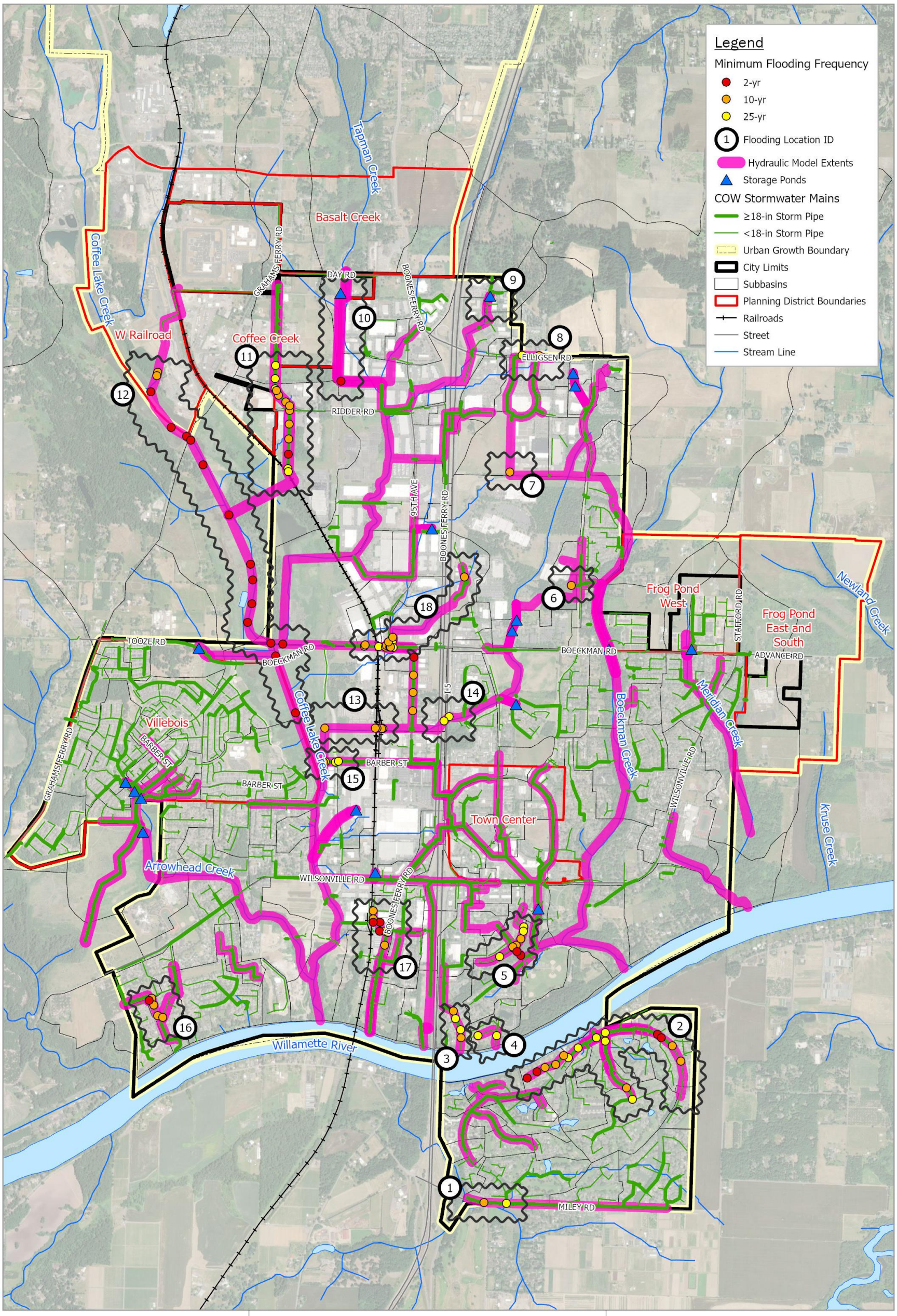

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 5-2: Capacity Deficiencies (Existing Land Use)

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Section 6

Capital Program Development

Project planning and technical analyses as outlined in Sections 3, 4, and 5 of this SMP resulted in the identification of 47 Project Opportunities, which represent locations with a potential need for a Capital Project (CP) or program as part of the overall stormwater Capital Improvement Program (CIP).

Input from City staff helped focus the projects and programs selected for inclusion in the CIP on addressing the most immediate needs. Project Opportunities not developed into recommended CPs are documented in this SMP as future project needs, although full project descriptions and costs are not developed as part of this SMP.

This section describes the process to develop CPs from Project Opportunities. A detailed list of Project Opportunities is provided in Appendix A, Table A-2. Resulting fact sheets for identified CPs are provided in Appendix D and detailed cost estimates for identified CPs are provided in Appendix E.

6.1 Capital Project Needs Identification

Project Opportunities stemming from the Problem Area identification effort (Section 3.1); Water Quality Retrofit Assessment (Section 3.3); Stream Assessment (Section 4) and Model Evaluation (Section 5) were compiled into a matrix to facilitate discussion amongst Public Works and Community Development/Engineering staff. Areas with overlapping project needs were consolidated into a single Project Opportunity area to facilitate development of multi-objective project concepts.

6.1.1 Project Opportunity Matrix

The Project Opportunity matrix (Appendix A, Table A-2) details the source of the Project Opportunity; the relative deficiency or objective the project would address; and how the system evaluation activities support the project need. If applicable, the Problem Area Location (Appendix A, Table A-1) is also identified. Figure 6-1, at the end of this section, identifies all Project Opportunity Locations by primary deficiency category.

6.1.2 Capital Project Workshops

Two capital project planning workshops were held in the spring of 2023 with members of Public Works and Community Development/Engineering to discuss which Project Opportunities should be prioritized for project development. Staff considered the feasibility of construction during a 20-year Capital Improvement Plan (CIP) implementation period in the selection of locations warranting a capital project, as well as recurring maintenance activities, known/reported capacity deficiencies, and pending development drivers. These identified priority locations (i.e., Project Opportunities identified as “costed capital project needs” per Table A-2) include a conceptual project design and cost estimate that will ultimately factor into future financial evaluations and rate studies.

In some cases, an immediate project need was not identified, and instead a program to address activities at a city-wide scale was the preferred approach. These programmatic needs are identified with an annual funding mechanism (see Section 6.5). In other cases, the Opportunity Area does not warrant a more immediate project, but a project may become more necessary in the future. Those areas are identified as “unfunded capital project need” per Table A-2. These Project Opportunities

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are typically associated with a modeled capacity deficiency that was not confirmed or substantiated by city staff.

Of the Project Opportunity Areas, 22 locations resulted in a capital project conceptually designed and costed in this SMP. Notes from the respective workshops are detailed in Table A-2.

6.2 Capital Project Sizing and Design Assumptions

CP sizing generally follow the City's PWS and design criteria summarized in Table 5-1 as detailed below.

- **Capacity Projects**. Projects to replace stormwater infrastructure, including pipes and culverts, are sized in accordance with the City's PWS unless noted. Pipelines are sized for the 25-year, 24-hour design event under future land use conditions and culverts for the 100-year, 24-hour design event under future land use conditions. Where possible, replaced infrastructure was sized to adhere to the minimum one-foot freeboard between the HGL and top of structure.
- **Water Quality Facility**. For purposes of conceptual sizing and cost estimation, the BMP Sizing Tool was used to size treatment or treatment and flow control facilities in accordance with the specified facility type.
- **New Infrastructure**. Several capital projects require new infrastructure in locations where no storm system currently exists. In the case of the Frog Pond East and South Planning Area, infrastructure sizing per the concept plan was maintained for CP development and costing. For other areas, new infrastructure was sized in accordance with the City's PWS. New infrastructure alignments are in the public right-of-way (ROW). However, it should be noted that final design may require additional structures, alternate alignments, or deeper/shallower infrastructure than assumed for this conceptual project design to address utility conflicts and other constraints not identified as part of this SMP. Survey will be required to verify elevations and locations.

For certain CPs, the project description and costs are developed with a phased approach, splitting the overall project into multiple phases that may be funded and constructed on different timelines. This approach was applied to specific, higher-cost projects for this SMP. These selected projects are generally associated with the same Project Opportunity area but have separate, independent components. In some cases, additional flow monitoring and model calibration may influence the scope or size of the proposed improvements and as such, portions of the project may be delayed, warranting scheduling as a different phase.

For phased projects, Phase 1 project elements should be constructed first, and Phase 2 project elements may be conducted later or following additional evaluation efforts.

6.3 Project Alternative Analysis

In developing CP concepts, a more in-depth evaluation of alternatives was warranted for select locations. These locations include Day Road, Charbonneau, and Garden Acres Road. These areas have complicated drainage patterns and reflect Project Opportunities where a single project solution may not resolve all deficiencies.

A description of the alternatives analysis and H/H model development is provided below for these locations, identified by their Project Opportunity ID. Additional background and description of the preferred design concept is provided in the respective fact sheets (Appendix D).

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6.3.1 Day Road/Commerce Circle (Project Opportunity ID#9)

Tapman Creek, between Day Road and Ridder Road, is conveyed through a series of culverts and open channels before it enters a piped section just north of Ridder Road. The open channels include reaches of negative slope and limited capacity and storage potential. Flooding has been observed at adjacent industrial properties, and the catchment area upstream includes the Basalt Creek Planning Area (see Section 3.5.1). Pending, and future, development from the Coffee Creek Industrial Area and Basalt Creek Planning Area may increase the frequency and severity of flooding.

In 2019, AKS prepared a facility siting alternatives report, which included design concepts expected to alleviate flooding during the existing land use condition. The report did not include analysis of alternatives' performance under future land use conditions.

For this SMP, the preferred AKS concept as well as other system configurations were analyzed for both existing and future development conditions using the updated H/H model. Model results validated the AKS report's conclusion that the preferred concept would alleviate flooding under existing land use conditions, but flooding under future land use conditions is still predicted.

Therefore, to augment the preferred AKS alternative, additional system configuration alternatives were evaluated, including use of a surface detention facility, pipe/culvert upsizing at Day Road, and piped conveyance system upsizing north of Ridder Road. The 25-year storm was used to evaluate flooding, and water surface elevations (WSE) predicted during the 100-year storm were also compared to the elevation of adjacent structures. Results of the additional alternatives evaluation are shown in Table 6-1.

Table 6-1. Day Road Evaluation Summary

Alternative	25-Year Flooding Result		100-Year Flooding Result	
	Existing Land Use	Future Land Use (unmitigated)	Existing Land Use	Future Land Use (unmitigated)
Existing Conveyance	Flooding at multiple points in system	Extensive system flooding	WSE at or above structures at multiple locations	WSE at or above structures at multiple locations
AKS Preferred Concept (AKS)	None	Extensive system flooding	Approx. 2 ft freeboard to structures	WSE at or above structures
AKS + Detention Pond	None	Flooding at multiple points in system	Not analyzed[a]	WSE at or above structures
AKS + Upsizing pipes upstream of Ridder Rd	None	Flooding at multiple points in system	Not analyzed[a]	Approx. 1 ft freeboard to structures
AKS + Detention Pond + Upsizing pipes upstream of Ridder Rd	None	Minimal flooding	Not analyzed[a]	Approx. 1 ft freeboard to structures

a. Alternative not analyzed because it was assumed to have good or better performance than the AKS Preferred Concept.

Evaluation of alternatives considered the relative costs and benefits associated with the alternatives. For example, the addition of a detention pond involves significant costs and logistical challenges, while model results still predict flooding, albeit reduced, for this alternative. Ultimately, the City selected the alternative that included both the preferred AKS concept and upsizing of pipes upstream of Ridder Road. See Appendix F, CP CLC-1, Phases 1 and 2.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. Application of the City's design standards are anticipated to mitigate some of the increased flow associated with future land use.

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However, the larger drainage area to this conveyance system includes area outside of city limits, creating further uncertainty about flow mitigation. In conjunction with this CP, a policy defining and directing the implementation of design standards in the Coffee Creek Industrial Area (as well as other new development areas currently outside of the UGB but draining towards capacity-limited infrastructure and stream corridors) is recommended. In addition, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.2 Charbonneau East (Project Opportunity ID#30)

The Charbonneau East Project Opportunity reflects the continuation of identified pipe replacement and system upsizing along SW French Prairie Rd and SW Old Farm Road. The 2012 SMP identified both capacity and condition limitations throughout the Charbonneau basin. The 2014 Charbonneau Consolidated Improvement Plan categorizes the stormwater infrastructure in this neighborhood as Storm Priority 1 and 2, and efforts to replace deficient infrastructure are ongoing (Figure 6-2). Specific to the SW French Prairie Rd and SW Old Farm Road systems, some pipe upsizing and replacement has already occurred in the downstream portions of the system.

Figure 6-2: Charbonneau Consolidated Improvement Plan (2014), Charbonneau East

In accordance with this SMP, H/H modeling confirmed continued flooding along the extents of SW French Prairie Rd and SW Old Farm Road due, in part, to an undersized outfall pipe discharging to the Willamette River. Reported condition deficiencies also exist.

Various alternatives were evaluated to reduce the extent and coverage of flooding predicted under existing (25-year) and future development scenarios, while considering the portions of the piped collection system that have already been replaced. Due to space limitations, above ground detention was ruled out as a method of flow control to minimize the need for widespread pipe upsizing. Alternatives evaluated included inline detention along SW French Prairie Rd and/or SW Old Farm Rd,

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both at the upstream end and downstream end, as well as the upsizing and replacement of the outfall.

Alternatives were presented to the City in a workshop, and ultimately inline detention alternatives were not selected due to existing sanitary utility conflicts, space (limited ROW) constraints, maintenance concerns, as well as cost implications of replacing recently constructed infrastructure. The selected alternative includes a phased approach reflecting upsizing of the outfall to the Willamette River under Phase 1, and selective upsizing/replacing the remaining condition-limited pipes along SW French Prairie Rd and SW Old Farm Rd under Phase 2. See Appendix F, CP WR-4, Phases 1 and 2.

Like with the Day Road CP, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.3 Garden Acres (Project Opportunity ID#32)

The stormwater collection system along Peters Road is undersized with several pipe constrictions and a downstream pipe constriction at the P&W railroad crossing on the south end of Peters Road. The larger catchment area upstream includes portions of the Coffee Creek Industrial Area and West Railroad Planning Area. Pending development may increase the frequency and severity of flooding.

Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO. Stormwater is currently diverted towards a public stormwater pond on the 10450 SW Riddler Road parcel west of Peters Road to reduce flow through undersized storm piping (Figure 6-3). The existing pond does not have an outlet control structure and based on aerial imagery and site visits, appears to overflow to an existing stormwater ditch west of the pond along the railroad ROW.

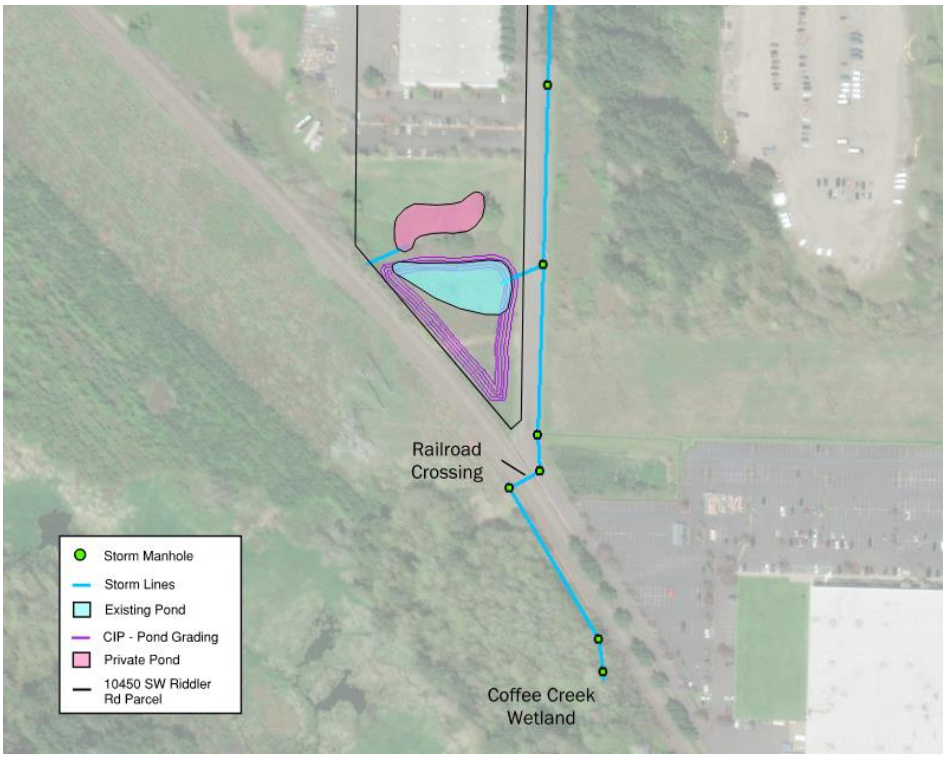

Figure 6-3: Garden Acres Pond (within Coffee Lake Wetlands)

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Several alternatives were evaluated to retrofit the existing public pond to provide additional treatment and storage (detention) of stormwater during high flow events. In addition, reconfiguration of the pond to establish a discharge route from the pond to the stormwater collection system in Peters Road would also reduce the amount of overflow to the railroad ROW. Design alternatives include expansion of the public pond footprint and available storage capacity, including one scenario to utilize additional storage capacity in a private detention pond (currently serving private development).

H/H model scenarios to optimize the storage capacity needed and relieve reported flooding in Peters Road during the 25-year storm event were developed and presented to City staff in a workshop setting. The City opted to increase the existing pond storage capacity to 39,000 cubic feet, fully utilizing the existing parcel while maintaining separation from the private pond located to the north. See Appendix F, CP CLC-3.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. As with the Day Road CP, application of the City's design standards is anticipated to mitigate and offset some of the increased flow associated with future land use. The Garden Acres system reflects another area of the City where adherence to current stormwater design standards requiring retention/mitigation of flows to pre-development conditions is needed, as the CP does not completely alleviate all modeled flooding in the system.

6.3.4 Library Pond Analysis (Project Opportunity ID#4)

The Library Detention Pond (Library Pond), located in Memorial Park, was originally constructed in the 1980s and receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, predominately associated with the Town Center Planning Area. Although operating as a regional detention facility, the current pond configuration has structural and sizing limitations preventing it from adhering to the City's current PWS as a water quality and flow control facility.

Dense, overgrown vegetation and accumulated sediment, combined with a lack of an outlet control structure, limits Library Pond's capacity and water quality function.

The city anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with redevelopment of the Town Center Planning Area. Therefore, as part of this SMP, a sizing evaluation was conducted to confirm capital project needs (specific to retrofit of the pond to meet current operations), as well as policy recommendations applicable to the Town Center Planning Area to allow the Library Pond to offset onsite stormwater treatment and flow control needs associated with redevelopment.

The BMP Sizing Tool was used to evaluate sizing of the Library Pond in conjunction with 1) varying pre-development conditions (to facilitate adherence to the City's flow control standard), 2) varying coverage of onsite stormwater management facilities applied to

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redevelopment areas, and 3) varying site and depth constraints associated with retrofit of the Library Pond (while maintaining the same pond footprint). Detailed findings and results of the sizing evaluation are contained in Appendix F.

Results of the evaluation conclude that there are limited redevelopment options to retrofit the Library Pond to current design standards under future development conditions. Scenarios are described in Appendix F, Table 5, with Scenario 2B and Scenario 3 being the sole options that meet pond design criteria under future development conditions.

Scenario 2B requires onsite mitigation (treatment and flow control) of approximately 50 percent of all redeveloped impervious surface, which requires redevelopment to adhere to the stormwater standards as outlined in the PWS including definition of pre-developed land cover condition and pond design criteria. Scenario 3 requires the City to approve of a policy change, allowing the definition of pre-development for the Town Center Planning Area to conform with existing development conditions (as opposed to pre-developed land cover).

For purposes of capital project development, Scenario 2B was assumed for costing and reflected in the CP fact sheet. See Appendix F, CP BC-1. In conjunction with this CP, a policy defining and directing redevelopment in the Town Center Planning Area is required. The policy needs to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment.

6.4 Cost Estimate Assumptions

CP costs are based on the total capital investment necessary to complete a project (i.e., engineering through construction). Unit costs for project (construction) elements are generally based on recent bid tabs and stormwater master planning efforts and (as necessary) adjusted for 2023 based on a historical cost index. City staff validated unit costs used in this SMP. Cost estimates presented in this SMP are Association for the Advancement of Cost Engineering (AACE) Class 5 Conceptual Level or Project Viability Estimates. Actual costs may vary from these estimates between -50 percent to +100 percent, although changes to design may result in cost differences outside of this anticipated range.

Project cost estimates use unit cost information for construction elements and generally apply a 40 percent construction contingency and multipliers to account for traffic control/utility relocation (5-10 percent), erosion control (3 percent), surveying (5 percent) and mobilization (10 percent). The range in traffic control/utility relocation is based on location (arterial vs. local street). Additional multipliers to account for engineering and permitting (20-30 percent) and construction administration (13.5 percent) are applied to the total construction cost with contingencies. The range in engineering and permitting costs is based on the anticipated permitting level of effort, such as whether in-water work is anticipated. Variations from these assumptions are noted on the project fact sheets in Appendix D.

Due to the resulting construction cost of select projects, the cost applicable to engineering and permitting and construction administration was capped in certain cases. For planning purposes, costs were rounded to the nearest $1,000 for engineering and permitting and construction administration; total project cost was rounded to the nearest $10,000 for budgeted purposes.

Appendix E includes unit costs developed for this SMP and presents the planning-level cost estimates for capital projects. Cost assumptions related to program recommendations are described in Section 6.5.

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Land acquisition and easements are not included in the cost estimates, as most projects are located on City property or within the City right-of-way (ROW).

6.5 Programmatic Recommendations

During the problem area identification (Section 3.1) and project planning efforts (Section 6.1), select maintenance-related, regulatory-driven, and condition-related project needs were consolidated into program recommendations, to address issues at a city-wide scale instead of as multiple, stand-alone individual projects.

The following programs defined below support the successful management of a municipal stormwater system. Implementation will result in cost savings by providing for proactive maintenance, replacement, and repair, as well as contracting efficiencies for smaller, localized project needs.

Costs proposed for the programs are estimated based on current City spending and vetted with City staff. Funding may accumulate over multiple years to be used on a larger cost effort.

6.5.1 Localized Drainage Improvements (P-1)

This program would dedicate funding to assist with minor system configuration/reconfiguration or installation needs or in response to a recurring maintenance need. Improvements funded under this program are not anticipated to require extensive engineering services and would help address localized issues that do not warrant a standalone capital project. These improvements may include relocation and/or installation of curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues, as well as the installation of additional inlets and laterals (to address localized flooding or lack of infrastructure) and the minor regrading and replanting of conveyance ditches and swales.

An annual cost of $100,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- Wilsonville Road and Kinsman Road (Project Opportunity ID #10),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Commerce Circle (Project Opportunity ID #36),
- Serenity Way (Project Opportunity ID #37),
- SW Camelot Street (Project Opportunity ID #38), and
- SW Del Monte Ct (regular maintenance need reported during staff interviews).

6.5.2 Water Quality Retrofit Program (P-2)

This program stems from the project planning efforts and the stormwater retrofit analysis. This program involves the opportunistic incorporation of LID features (planters, curb bump outs, bioretention basins, porous pavement overlays, etc.) to address water quality in conjunction with other transportation, public improvement, or utility planning projects. These types of retrofit activities promote additional infiltration and water quality treatment, which are core values reflected in results from the public survey and external stakeholder outreach efforts. Efforts will help address NPDES MS4 retrofit requirements and TMDL compliance. Targeted locations may include collector roadways, park properties, and residential neighborhoods with limited or no existing water quality treatment.

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An annual cost of $200,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Green Streets/LID Facilities (Project Opportunity ID #39),

6.5.3 Repair and Replacement (R/R) Program (P-3)

CCTV is one of the least expensive and most robust methods to document, assess, and identify condition-related issues in the piped stormwater network. The City's Public Works Road and Storm Section is implementing their CCTV program in accordance with staffing recommendations.

An R/R Program is used to budget the design and construction of improvements stemming from a CCTV and Asset Management Program. The gathered information and subsequent ranking of pipe and infrastructure condition will inform the locations where pipes need to be repaired or replaced in accordance with available funding and schedule. An R/R Program is key to the long-term sustainability of the stormwater collection system. An R/R program ensures that replacement is scheduled for older infrastructure nearing the end of its useful life before failure, as well as prioritizing damaged or failing pipes identified through the CCTV Program.

This program includes dedicated funding to repair/replace all public pipe 12-inches to 48-inches in diameter in-kind within the city limits over a 100-year timeframe. This fund would utilize results of the CCTV inspections to proactively schedule necessary replacement projects and exclude Charbonneau infrastructure, as replacement of a significant portion of the system is underway via a separate program effort in accordance with the Charbonneau Consolidated Improvement Plan (2014) (see Section 6.5.4).

Based on the City's asset inventory, this requires the replacement of approximately 3,700 LF of public stormwater pipe and associated manholes annually, reflecting a present-day construction cost (excluding contingencies and multipliers) of approximately $2.66M/year. However, this estimate does not consider ongoing pipe replacement efforts in CIP implementation and other drainage improvements. The estimate also excludes unknowns related to pipe age and associated lifespan of plastic pipe. As such, the City opted to allocate an additional $275,000 per year (approximately 10 percent of the annually calculated amount for this program.

6.5.4 Charbonneau R/R Program (P-4)

Since 2014, the City has implemented stormwater R/R efforts in the Charbonneau basin as part of the Charbonneau Consolidated Improvement Plan. The Charbonneau Consolidated Improvement Plan identified improvements across four utilities and consolidated utility improvements based on priority and location over a 20+ year period. To date, approximately 12,900 linear feet of pipe has been replaced. Project identification and H/H modeling efforts as part of this SMP identified two CP needs (WR-4, Phases 1 and 2 and WR-5) that incorporate pipe upsizing and direct pipe replacement in the Charbonneau basin.

This R/R program reflects direct replacement of remaining public pipe identified in the Charbonneau Consolidated Improvement Plan that has not been replaced or costed as a CP in this SMP (see Figure 6-4). This program includes in-kind replacement of approximately 30,000 linear feet of public pipe and 150 manhole structures. Pipe replacement will use PVC; pipe diameters less than 12 inches are assumed to be replaced with 12-inch pipe in accordance with the PWDS. A program duration of 20 years is maintained in conjunction with the Charbonneau Consolidated Improvement Plan.

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Program costs were calculated directly and incorporate contingency, and multipliers as outlined in Section 6.4 (see Appendix E for a detailed cost estimate). The present-day construction cost (including contingencies and multipliers) is approximately $38.36M, resulting in an annualized program cost of approximately $1.92M per year.

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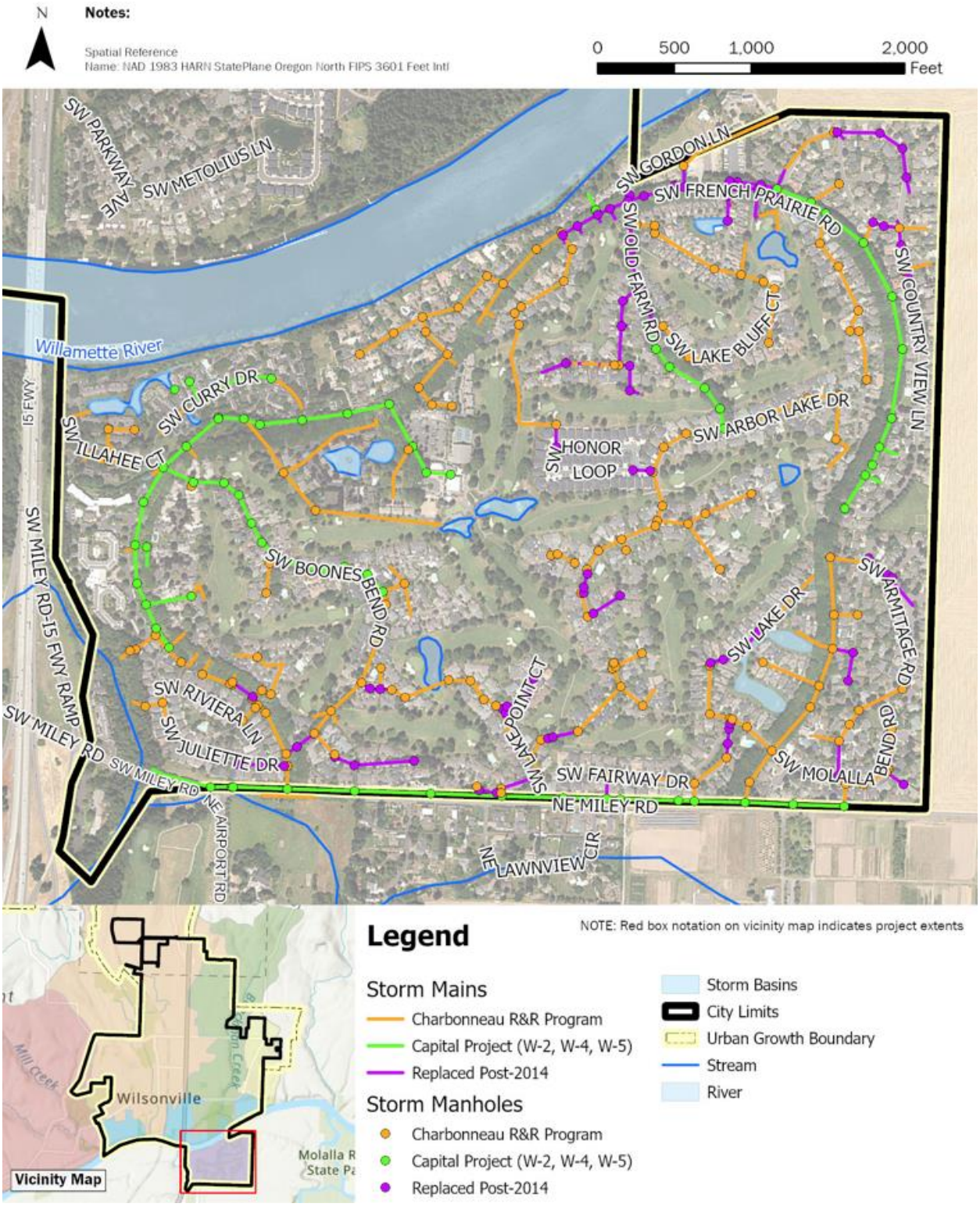

Figure 6-4: Charbonneau R/R Program Coverage

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6.5.5 Riparian Vegetation Management Program (P-5)

This program includes dedicated funding to conduct riparian vegetation management and maintenance activities along stream corridors including removal of invasive species. This need was identified in the Stream Assessment (Section 4 and Appendix C), as there was dense coverage of invasive species including Himalayan blackberry, reed canary grass, and English ivy. In some cases, extensive vegetation prevented data collection efforts. These efforts support NPDES MS4 and TMDL (temperature management) initiatives.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas and specific locations noted in the Stream Assessment (Appendix C) that would potentially benefit from this program include:

- Boeckman Creek Reaches 2-9 (Stream Assessment identified vegetation management need)
- Kruse Creek Reaches 1-2 (Stream Assessment identified vegetation management need)
- Meridian Creek in Landover Park (Reaches 1 and 2) (Project Opportunity ID #18 and #19)
- Arrowhead Creek Reach 4 (Project Opportunity ID #20)
- Boeckman Creek Instream Flow Mitigation and Restoration (Project Opportunity ID #27)

6.5.6 Stormwater Facility Enhanced Maintenance Program (P-6)

This program establishes a dedicated funding mechanism supporting Public Works staff efforts to conduct more reactive and extensive maintenance of public and private vegetated stormwater facilities. Although routine maintenance of public facilities is addressed in conjunction with existing maintenance activities and staffing levels, occasionally additional support is needed to conduct a more robust, restorative maintenance effort on a larger, regional facility or address widespread replacement of amended soils and vegetation on LID/GI facilities.

Private facilities subject to this program would include those where private facility maintenance agreements are not in place and/or not being implemented after enforcement efforts are conducted. Maintenance on private facilities where a maintenance agreement is on file may be subject to reimbursement.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- Pond F and other ponds in Villebois (Project Opportunity ID #5),
- SW Daybreak Street and SW Morningside Avenue (Project Opportunity ID #12),
- Oulanka and Tivoli Parks (Project Opportunity ID #22)

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6.6 Project and Program Numbering and Naming

CP numbering is applied to all location-specific capital projects, based on major basin. The project numbering convention maintains consistency with the 2012 SMP and includes a major basin abbreviation and number to indicate the individual project location. Phasing is defined within the project numbering. Project naming incorporates the location and primary objective of the project in the title.

Major basin abbreviations used for project numbering are listed below:

- Boeckman Creek (BC)
- Coffee Lake Creek (CC), includes projects associated with Tapman Creek drainage area
- Willamette River (WR), includes projects associated with the Charbonneau planning area
- Newland Creek (NC)

Four planning-related capital projects are identified and numbered with a “City” prefix.

Programmatic activities are numbered P-1 through P-6 and reflect city-wide implementation and an annual funding need.

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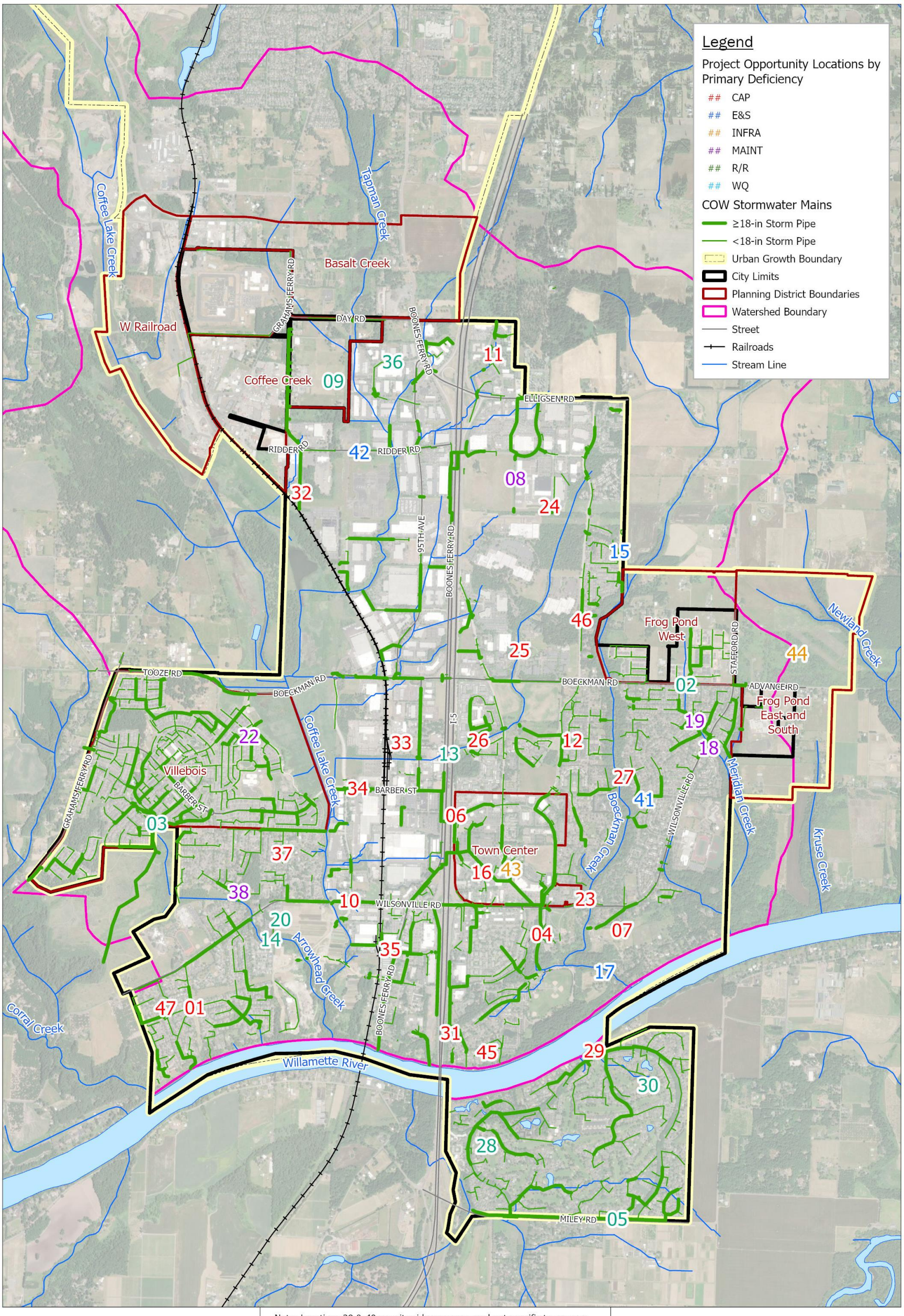

Note: Locations 39 & 40 are citywide programs and not specific to an area.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 6-1: Project Opportunity Locations

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Section 7

Capital Improvement Plan

This section summarizes the capital projects, programs, and policy recommendations identified through the master planning process, collectively comprising the City's Stormwater Capital Improvement Plan (CIP).

A total of 15 capital projects (CPs) are identified to address current and future storm drainage infrastructure needs related to system capacity, repair and replacement (R/R), a lack of infrastructure, recurring maintenance, instream erosion and sediment accumulation, and water quality. Considering multiples phases for some projects, these 15 CPs represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts.

CP recommendations are considered a one-time cost and are shown in Figure 7-1, located at the end of this section.

In addition to the 15 CPs, there are four, city-wide planning projects that are also considered a one-time cost. These planning projects are described in Section 7.2.

Six programmatic recommendations are identified, including addressing ongoing support for localized drainage improvements, city-wide system repair and replacement (R/R) needs, water quality retrofits and expanded stormwater facility maintenance needs, and riparian vegetation management. Program recommendations are considered an annual cost, as described in Section 6.5, and intended to support ongoing asset management efforts.

Section 7.1 summarizes the recommended actions costed for this SMP. Section 7.2 summarizes the overall CIP, and Section 7.3 outlines the staffing analysis to assess Public Works and Engineering staffing needs in support of this SMP and regulatory obligations.

7.1 Summary of Recommended Actions

Project, program, and policy recommendations in this SMP are proposed to improve and enhance drainage infrastructure and water resources throughout the City, as summarized by the following recommended actions.

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
- Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
- Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
- Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.

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- Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
- Clearly document capital project and program costs and schedule to inform future funding and rate analyses.

7.2 Capital Improvement Program Recommendations

CP locations are mapped in Figure 7-1, at the end of this section, based on the following objectives (identified in **BOLD**):

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table 7-1 lists all CP and program recommendations and references the associated Project Opportunity Area as defined in Section 6. A brief description of the project and summary of project objectives are also included. Most projects address multiple objectives. Table 7-1 also reflects the anticipated implementation schedule for the CP, based on prioritization efforts. Corresponding CP fact sheets with more detailed project information are provided in Appendix D.

The portion of total project cost considered eligible for funding via system development charges (SDCs) is also provided in Table 7-1. Projects solely related to planning, repair & replacement, and maintenance were determined not eligible for SDCs, as they do not address required improvements associated with new or redevelopment. The portion of the total project cost considered SDC eligible is calculated based on the increase in flow associated with anticipated development, using percent increase in impervious coverage as a surrogate.

Description of the four planning-related projects (City-1, City-2, City-3, and City-4) are provided below. Planning projects require specific, scheduled budget allocations and so were added to the overall stormwater CIP.

7.2.1 Flow Monitoring and Rain Gauge Installation (City-1)

This planning project includes the installation of three flow monitors, installed in the piped stormwater collection system, as well as the installation of one rain gauge to assess stormwater flow and aid in the more refined calibration of the City's InfoSWMM model. Additional flow monitoring and model calibration will help confirm the need for and sizing of select CPs, particularly where City staff have not yet observed flooding issues, but the model is predicting flooding.

Recommended locations for installation of flow monitoring include locations with a phased, capacity-related CP and pending new development. They include locations in each of the three major basins: Coffee Lake Creek, Boeckman Creek, and the Willamette basin (e.g., Charbonneau). CPs potentially informed by this effort include Day Road Stormwater Improvements (Project ID CLC-1), Garden Acres Pond Retrofit (Project ID CLC-3), Morey's Landing (Project ID WR-1), Charbonneau East (WR-4), and Charbonneau West (WR-5).

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The project duration (for costing purposes) is estimated at 12 months, and the cost estimate of $100,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

7.2.2 Hydromodification Assessment and Stream Survey (City-2)

This planning project includes follow up monitoring efforts related to the 2022 geomorphic assessment of select high priority reaches as conducted for this SMP (see Appendix C). Although the focus of the assessment was to identify existing and potential future risks associated with hydromodification, the assessment also provided a baseline within the study areas to assess changes in channel, floodplain, and riparian condition over time. This was done by documenting locations of noticeable bank erosion, headcuts, neglected or compromised riparian corridor, grade control locations, and other points of interest.

Data collection efforts will use similar protocols and data sheets developed during the 2022 assessment along these high priority reaches to provide continuous monitoring of stream impacts associated with upstream development activities or hydromodification mitigation strategies. The assessment will be both field-based, consisting of stream walks along the select reaches, and qualitative, including descriptions of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure. Reaches recommended for ongoing evaluation per the 2022 assessment include Boeckman Creek (reaches 2, and 9), Meridian Creek (reaches 1 and 2), Arrowhead Creek (reaches 2 and 3), Newland Creek (reaches 1-4), and Kruse Creek (reaches 1-3).

Additionally, the City may want to establish baseline conditions associated with identified “secondary” locations that were not included in the 2022 geomorphic assessment effort. This new evaluation may be conducted in addition to or in lieu of ongoing monitoring at select reaches.

The complete assessment will be documented in a technical memorandum summarizing the results for inclusion in TMDL and/or NPDES MS4 reporting.

This project is estimated to be completed every three years and/or following a high flow event that exceeds the 10-yr discharge. A project cost of $30,000 per monitoring event is reflected in Table 7-1 and is assumed to occur once during initial 5-year CIP implementation period; once during the second 5-year CIP implementation period; and twice during the third, 10-year CIP implementation period.

7.2.3 Porous Pavement Pilot Study (City-3)

This planning project stems from the City’s NPDES MS4 Retrofit Strategy, water quality project objectives, TMDL drivers, and the need to expand water quality treatment to areas lacking in treatment. To date, use of pervious pavement, porous asphalt or other permeable road and drive surfaces has not been used in the public right-of-way (ROW). This pilot study would include the installation of a porous pavement overlay in conjunction with pavement resurfacing efforts in the City. Water quality monitoring may be conducted to confirm/inform stormwater pollutant reduction, as local research efforts have indicated water quality benefits (i.e., reduction of sediment, bacteria, heavy metals, and organic compounds) can be observed, even with an overlay versus full pavement replacement with pervious pavement.

Recommended locations for implementation of the pilot project have not yet been identified but are anticipated to coordinate with scheduled pavement maintenance. A project duration (for costing purposes) is estimated at 24 months and scheduled during the first 5-year CIP implementation period, and the cost estimate of $100,000 for this effort is based on recent efforts in the City of Milwaukie. This estimate has not been validated or based on a detailed scope.

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7.2.4 Boeckman Creek Geomorphic and Geotechnical Evaluation (City-4)

This planning project is to conduct a geomorphic and geotechnical evaluation on Reach 1 of Boeckman Creek, where continued risk of channel incision and bank erosion exists. This project stems from a recommendation in the 2022 geomorphic assessment, which was unable to confirm source, rate, or extent of bank failure in the reach (see Appendix C). A holistic evaluation of backwater conditions, geomorphic conditions and a geotechnical assessment of slope stability and potential bank stabilization techniques is recommended.

The project duration (for costing purposes) is estimated at 12 months, and a cost estimate of $150,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-1	4	Boeckman Creek	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	Existing Library Pond facility, east of SW Memorial Drive in Memorial Park	132.0	• Clear, regrade, and replant 0.7 acre detention pond, including adding 3 ft required rocks and media to pond bottom. • Install a new outlet structure. • Replace 70 LF of 18-inch CSP pipe. • Install 70 LF of 6-inch perforated HDPE underdrain. • Install 15-foot-wide, 25-foot-long road for maintenance access.	$1,880,000	$213,000		X		
BC-2	25, 26	Boeckman Creek	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	East of SW Ash Meadows Rd, West of SW Parkway Ave, and north of SW Greenway Dr	295.0	• Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Update 80 LF of 36-inch culvert at SW Parkway Ave to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at Ash Meadows Cir. • Clear, regrade, and replant 1.3 acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.	$2,940,000	$798,000		X		
BC-3-Phase 1	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	Canyon Creek Park, north of SW Carriage Oaks Ln	295.0	• Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe.	$4,860,000	$920,000				X
BC-3-Phase 2	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	Existing Wiedemann Ditch alignment, south of Sysco property	295.0	• Clear, regrade, and replant approximately 2.1 acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot-wide, 1,500-foot-long access road west of Canyon Creek Road.	$7,210,000	$1,365,000				X
BC-4	15	Boeckman Creek	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	Boeckman Creek corridor adjacent to Canyon Creek Estates and bounded on the west by SW Roanoke Dr	358.0	• Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch-diameter PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of 150 LF of vegetated swale in accordance with the City's PWS.	$410,000	$78,000		X		
BC-5	21	Boeckman Creek	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	Within Memorial Park, north of the parking lot by the baseball fields and south of SW Memorial Dr	33.0	• Remove 90 LF of 10-inch CSP (SD5041 and SD5042). • Remove 120 LF of 12-inch CSP (SD5044). • Remove: manhole (ST5098), swale inlet structure (CARTE ID 568), and outlet structure (CARTE ID 19). • Fill existing 1,500 SF swale and revegetate area. • Replace two 48-inch manholes (ST5200 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Replace manhole ST5208 with a 72-inch flow splitting/WQ manhole. • Install 2,400 SF vegetated water quality swale with 1 foot of drain rock and 1.5 feet of amended soil. • Install 140 LF of 6-inch perforated HDPE underdrain pipe. • Install 50 LF of 12-inch PVC pipe. • Install structures for the new swale: swale inflow spreader with rip-rad pad, beehive overflow structure, and outfall to the creek.	$910,000	$22,000				X

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-6	41	Boeckman Creek	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	Boeckman Creek riparian area near Wilsonville High School, at the Gesellschaft well site (29001 SW Meadows Pkwy)	25.0	• Install approx. 480 LF of 12" PVC pipe to convey discharge flows from the well maintenance. • Install two new 48-inch manholes. • Install outfall with 8 CY of Class 200 rip-rap to the creek. • Restore approx. 310 LF of the existing channel with coir log check dams and matting, and re-vegetating with native trees and shrubs.	$400,000	$2,000		X		
CLC-1 - Phase 1	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	Open channel alignment south of Day Rd	944.0	• Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 180 LF of two barrel, 36-inch diameter PVC culverts at Day Road.	$8,020,000	$3,054,000		X		
CLC-1 - Phase 2	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 2	• **Capacity**	North of Ridder Rd through Tax Lot 500	944.0	• Remove 1.200 LF of existing pipe. • Upsize 1,800 LF of existing 36-inch parallel storm pipes to 48-inch. • Replace seven 72-inch manholes. • Install 3 trash racks.	$3,930,000	$1,497,000			X	
CLC-2	20	Coffee Lake Creek	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	Arrowhead Creek culvert crossings under pedestrian path at the south end of SW Morey Ln	421.0	• Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.	$290,000	$16,000			X	
CLC-3	32	Coffee Lake Creek	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	Existing public pond in an industrial area along Peters Rd between SW Graham's Ferry Rd to the west, SW Day Rd to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.	231.0	• Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.	$3,780,000	$1,339,000			X	
NC-1	44	Newland Creek	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	East of SW Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. Only K1 Basin of Frog Pond East and South.	61.0	• Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.	$4,090,000	$3,222,000		X		

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-1 - Phase 1	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **System Capacity** • Water Quality	Along Willamette Wy East from SW Pkwy Dr to the Belknap Ct Outfall, including greenfield along BPA easement	46.0	• Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).	$2,310,000	$45,000			X	
WR-1 - Phase 2	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **System Capacity**	SW Champoeg Dr	46.0	• Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 - SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).	$1,080,000	$21,000				X
WR-2 - Phase 1	5	Willamette River	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	Miley Rd outfall	138.0	• Replace and upsize 80 LF outfall pipe (from area drain with ENG ID 9341 to outfall) from 36-inch CMP to 42-inch PVC. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe between area drain (9341) and MH (ST9002) with same diameter 42-inch PVC. • Replace and lower invert of MH (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 25 feet along the channel upstream and downstream of the outfall.	$820,000	$0		X		
WR-2 - Phase 2	5	Willamette River	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	Miley Rd from NE Airport Rd to eastern intersection with SW French Prairie Rd	138.0	• Install approx. 530 LF of new 42-inch pipe from replaced MH ST9002 to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch diameter manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install 10 new 60-inch diameter manholes and approx. 3015 LF of new 36-inch storm pipe along NE Miley Road from SW French Prairie Road to new manhole adjacent to MH ST9011. • Install 2 new 48-inch diameter manholes and approx. 650 LF of new 24-inch storm pipe from the new manhole adjacent to MH ST9011 to new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets along new NE Miley Road alignment - approximately 13.	$10,510,000	$0			X	
WR-3	7	Willamette River	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	SW Rose Ln between SW Wilsonville Rd and SW Montgomery Wy	14.0	• Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370). • Install approx. 40 LF of parallel 12-inch RCP culverts. Realign the culverts at a diagonal across the road with the same outlet location. • Reinforce stormwater conveyance around property near culvert to move water into ditch.	$200,000	$19,000		X		
WR-4 - Phase 1	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	SW French Prairie outfall	159.0	• Remove and replace existing Charbonneau East Outfall (ENG ID: STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch PVC discharging to Willamette River (ENG ID: STD9005 to ST9014). • Replace one 72-inch manhole (ST9014).	$600,000	$0				X

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-4 - Phase 2	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	SW French Prairie Rd and SW Old Farm Rd	159.0	• Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes. • Replace nine 60-inch manholes.	$4,440,000	$0				X
WR-5	28	Willamette River	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	SW Curry Dr, SW French Prairie Rd, and SW Boones Bend Rd	54.0	• Pipe replacement along SW Curry Drive: • Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). • Replace 520 LF of 18-in pipe with PVC (new manhole to PRIVATE manhole CARTE ID: 1892). • Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). • Replace private outfall (CARTE ID: 15). • Replace two private 48-in manholes (CARTE ID 1892 and 1383). • Install three 48-in manholes. • Pipe replacement along SW French Prairie Road: • Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) • Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). • Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 - ENG ID unknown) • Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). • Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). • Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). • Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall - ID unknown). • Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. • Pipe replacement along SW Boones Bend Road: • Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). • Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). • Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). • Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). • Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). • Replace eight 48-in manholes; and replace three 60-in manholes.	$10,370,000	$0				X
City-1	N/A	City-wide	Flow Monitoring and Rain Gauge Installation	• **Capacity**	City-wide	N/A	• Location of one rain gauge and installation of a minimum of three flow meters over a 12-month duration to aid in Info-SWMM model calibration and validation of project needs/phasing.	$100,000	N/A		X		

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Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
City-2	18, 19, 27	Boeckman, Meridian, and Newland	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	Stream corridors associated with developing portions of the Boeckman Creek, Meridian Creek and Newland Creek basins	N/A	• Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	$30,000/event	N/A		X	X	X
City-3	40	City-wide	Porous Pavement Pilot Study	• **Water Quality**	City-wide	N/A	• Implementation of a porous pavement overlay and associated water quality monitoring to inform more widespread applications.	$100,000	N/A		X		
City-4	17	Boeckman Creek	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	Downstream 750' of the Boeckman Creek stream corridor	N/A	• Geomorphic and geotechnical evaluation of the downstream 750' of Boeckman Creek at the confluence with the Willamette River.	$150,000	N/A		X		
P-1	5, 7, 10, 17	City-wide	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	City-wide	N/A	• Installation of small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow). • Relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues	$100,000/yr	N/A	X			
P-2	8, 11, 39, 40	City-wide	Water Quality Retrofit Program	• **Water Quality** • Capacity	City-wide	N/A	• Design and install opportunistic LID or green infrastructure (porous pavement overlays, regional facilities, stormwater planters/curb bump outs) along streets, within public property, and/or within available ROW to provide water quality treatment.	$200,000/yr	N/A	X			
P-3	N/A	City-wide	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	City-wide	N/A	• Conduct prescriptive replacement of public pipe and structures s over a 100-year period. Use results of CCTV analysis to inform locations.	$275,000/yr	N/A	X			
P-4	29	Willamette River	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	Charbonneau Basin	478.0	• In-kind repair and replacement of public pipe and manholes within the Charbonneau basin, in accordance with the Charbonneau Consolidated Improvement Plan. Excludes pipes replaced within the last 10-years (since 2014) and CP WR-4, Phases 1 and 2 and WR-5.	$1,920,000/yr	N/A	X			
P-5	18, 19, 20, 27	City-wide	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	City-wide	N/A	• Conduct riparian and/or in-channel vegetation maintenance including removal of invasives.	$25,000/yr	N/A	X			
P-6	5, 12, 22	City-wide	Stormwater Facility Enhanced Maintenance Program	• **Water Quality** • Maintenance	City-wide	N/A	• Conduct restorative maintenance on select public and private stormwater facilities.	$25,000/yr	N/A	X			
									TOTAL	$2.545M	$19,140,000	$20,850,000	$29,530,000

N/A: Not Applicable

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. Citywide planning projects are designated as "City". Programs (to be funded annually) are prefaced with a P designation.

*b. Primary objective (for mapping purposes) is identified in **BOLD**.*

c. Estimated costs and SDC eligible costs are described in Section 7 of the SMP and detailed cost summaries provided in Appendix E. City-wide planning projects and solely related to Repair/Replacement or Maintenance are not eligible for SDCs and the SDC eligible cost is indicated as N/A. For projects with no developable lands in the upstream contributing drainage area, the portion of project cost associated with SDCs is $0.

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7.3 Future/Unfunded Capital Project Opportunities

Table 7-2 summarizes potential, additional CP needs as identified during project planning efforts and documented in the Project Opportunity Matrix (Appendix A, Table A-2). However, these are considered unfunded capital projects for purposes of this SMP, as needs are more undefined and/or staff have not observed specific deficiencies in these areas. In some cases, a standalone CP may not be necessary if the project opportunity can be addressed as part of a program activity (i.e., Localized Drainage Improvement [P-1]).

Specific cost estimates have not been developed and schedule for implementation not established for these projects.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
8	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch. Downstream N-S drainage swale has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	N	Y	• Install WQ manhole(s) or other facilities to remove sediments from public runoff.
11	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	A city-owned pond receives a small amount of drainage and requires frequent maintenance (due to undersized catch basins). Model predicts flooding within the pond and outlet.	CAP		Y	N	N	• Improve maintenance access from the Shrine Center parking lot. • Expand/retrofit pond to improve water quality function and outlet configuration.
17	Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River.	E&S		N	Y	N	• Planning project (City-4) proposed to evaluate source and potential, structural repairs first. • Channel stabilization and grade control (retaining/crib wall or soldier pile) pending planning study feedback.
22	Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	Four private swales—have not been maintained consistently	MAINT	WQ	N/A	N	Y	• Acquire private swales and conduct restorative maintenance.
23	Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	Underutilized irrigation pond adjacent to Boeckman Creek. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	N/A	N	Y	• Expand water quality treatment through retrofit of existing facility. • Will require private property partnership.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
31	Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Pipe upsizing and realignment as necessary.
34	Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		Y	N	N	• Pipe upsizing and realignment as necessary. No immediate need.
35	Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		Y	N	Y	• Pipe upsizing and realignment as necessary. No immediate need.
42	Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	--	N	Y	• Future restoration/retrofit opportunity.
43	Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		--	N	Y	• Additional assets/re-piping is development driven. • New/decommissioned infrastructure pending development activities.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
45	SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
46	Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
47	River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.

N/A = not applicable.

a. Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.

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7.4 Staffing Evaluation

A supplemental staffing analysis was conducted to support the earlier, maintenance-related staffing evaluation described in Section 3.2. This analysis included both Public Works and Engineering staffing needs in conjunction with 1) new regulatory obligations associated with the City's 2021 NPDES MS4 permit and 2022 Stormwater Management Program (SWMP) Document, and 2) implementation of this SMP.

Specific to implementation of this SMP, additional Engineering staff are required to execute and manage the CPs over the 20-year CIP (see the construction administration cost by CP included in Appendix E). Additional Public Works staff support will be needed to maintain additional assets resulting from CP implementation. Figure 7-2 summarizes the departments and associated activities resulting in the need for additional staff. Summary tables and documentation related to this evaluation are included in Appendix G.

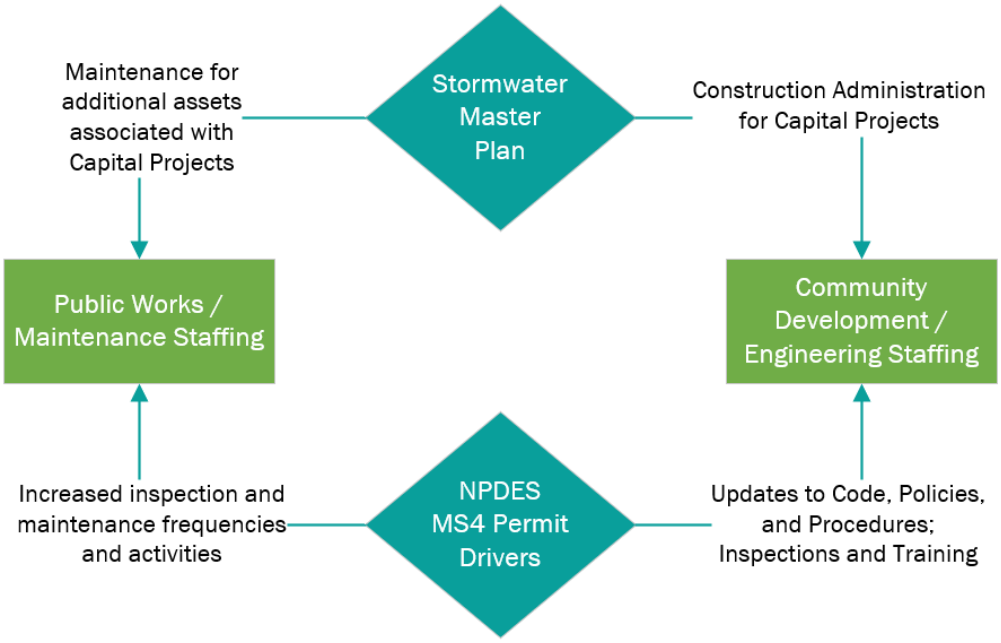

Figure 7-2: Staffing Evaluation Considerations

7.4.1 Assumptions

The following general assumptions were used to develop the staffing evaluation for both Public Works Stormwater staff and Engineering staff. Detailed assumptions specific to staffing estimates by activity are outlined in Appendix G.

- Except for the additional Public Works staffing needs identified in Section 3.2 for deferred maintenance, it is assumed that existing Public Works and Engineering staffing levels were adequate to implement the City's stormwater program and CP implementation prior to reissuance of the City's NPDES MS4 permit or implementation of this SMP. Thus, only additional activities are used to inform additional staff resource needs.
- One FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year (as confirmed by City staff).

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- The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021-Sept. 30, 2026) - reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.
- CPs are assumed implemented on an annual basis, and the CIP is assumed to be implemented over a 20-year implementation schedule, ranging from 2024-2043. Given uncertainty with schedule, CP costs are averaged across the 20-year implementation schedule equally. In practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.
- For the CPs listed in this SMP, 100 percent of engineering and permitting costs will be used for consultant support, and 100 percent of design/construction administration costs will be required for City Engineering staff.

7.4.2 Results

Table 7-3 provides a summary of the combined Public Works/Stormwater and Community Development/Engineering staffing needs for both the NPDES MS4 Permit driven activities and CP implementation activities. Detailed staffing projections, as reported in Appendix G, reflect FY 2023-2027 in alignment with the NPDES MS4 Permit timeline. However, staffing projections are relatively consistent when annualized and reflect the ongoing implementation of regulatory requirements over the 5-year permit period, as well as an annual average over a 20-year CIP implementation period. Thus, the annual average staffing is reflected below, and rounded to the nearest 0.1 FTE.

Table 7-3. Combined Staffing Assessment Summary

		Increased Staffing (FTE)
		Annual Average
Public Works/Stormwater Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.1
	Staffing contingency for NPDES MS4 Driven Activities [a]	0.4
	CP Implementation	0.2
	Public Works Staffing Total	2.7
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.2
	CP Implementation	1.2
	Community Development Staffing Total	1.4

a. Staffing contingency estimated at 20% to account unscheduled maintenance and response.

For Public Works (Roads and Stormwater Section), an increase of approximately 2.5 FTE is recommended to address both deferred and additional maintenance activities as defined with the reissued NPDES MS4 permit. This increase reflects a 20 percent contingency to account for additional, unscheduled activities as well as prescriptive maintenance efforts. An additional 0.2 FTE increase is anticipated for maintenance of new infrastructure (assets) associated with CIP implementation. However, timing of this 0.2 FTE may vary in accordance with construction of CPs and could be delayed over the 20-year implementation period.

For Community Development (Engineering Division), an increase of approximately 0.2 FTE is recommended to address additional tracking and inspection needs as defined with the reissued NPDES MS4 permit. This may be accommodated through reallocation of existing staffing or contracted support. An additional 1.2 FTE is anticipated to manage and execute contracts for CP design and construction services. This increase accounts for the 1.0 FTE of engineering staff

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currently dedicated to overseeing stormwater CP implementation, and reflects the additional staffing need. As with Public Works staffing, timing of this 1.2 FTE may vary in accordance with design and construction schedules and could be delayed over the 20-year implementation period. It should be noted that cost estimates for programmatic activities (i.e., Projects P-1 through P-5) have not been included in the staffing projections.

7.5 Project Prioritization

Project prioritization is an important component of the stormwater master planning process and can provide direction in sequencing projects in accordance with City objectives. This section summarizes the prioritization of CPs for implementation.

For this SMP, a CP prioritization tool was developed to assist with project prioritization. This Multi-Criteria Decision Analysis (MCDA) tool was developed using Microsoft Excel and includes prioritization criteria, scoring mechanism, and weighting factor schemes to present graphical and numeric rankings of CPs. The MCDA tool normalizes City-assigned scores for each criterion and project, which allows better differentiation of relative project performance (difference between best and worst options) and balances variability in scoring. Normalized scores were multiplied by their associated weights and summed to represent the overall project priority. The MCDA tool is intended to be updated on a continual basis; as projects are constructed, they can be removed from the ranking tool and new projects can be included as master plans are updated.

It should be noted that the overall stormwater CIP includes several new programs established to facilitate improvements without dedicated, individual CP consideration. Programs are not prioritized as part of this effort.

7.5.1 Prioritization Criteria

Proposed CPs are developed to address a variety of objectives including increased capacity, new infrastructure needs, maintenance, repair & replacement, water quality, and instream erosion/sediment control.

In consideration of the varied scope of proposed CPs and overlapping project objectives, the following scoring categories were used as the basis for developing project prioritization criteria.

- System Operations: System operations is a collective category representing capacity deficiencies, regular or recurring maintenance needs, and safety and accessibility as related to the location of a proposed issue or deficiency.
- System Condition: System condition reflects known problem areas where repair or replacement of an asset addresses a known or immediate issue.
- Compliance: Compliance reflects a CPs ability to address regulatory drivers including NPDES MS4 permit needs (water quality retrofits needs), TMDL and shade management drivers, and hydromodification risk.
- Other: Other criteria including contributing drainage area, project sequencing and phasing, construction constraints and funding source.

Table 7-4 summarizes the evaluation criteria and scoring guide. The scoring guide helps score projects consistently and advises others that may need to apply the tool in the future. A range of scores, from 0 to 3, is applied to each criterion for every project to yield an unweighted total score. As the City implements projects over time, and as priorities change and evolve, these criteria and the scoring guide can be revised in the CP prioritization tool.

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Table 7-4. Project Prioritization Criteria

Criteria	Scoring Definition (3 = High; 2 = Medium; 1 = Lower; 0=Does not address)			
	High (H)	Medium (M)	Lower (L)	Does not address
System Operation-Capacity	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses an existing capacity deficiency per hydraulic modeling efforts.	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses a lack of infrastructure (infrastructure need)	• Addresses a future capacity/infrastructure need.	• May provide some capacity benefit, but the location has not been identified as an existing or future capacity deficiency.
System Operation-Maintenance	• Addresses a location that has frequent citizen complaints and onsite response requirements.	• Addresses a location that has frequent citizen complaints and will reduce existing maintenance needs.	• Addresses a location that has less frequent citizen complaints and will reduce existing maintenance needs.	• Project does not address existing maintenance deficiency or lack of infrastructure
System Operation-Safety and Accessibility	• Reduces risk near a transit line, school, or backbone utility	• Mitigates risk, including system relocation into the public ROW to avoid collateral damage, safety concerns on private property.	• Reduces risk to non-essential property/minor roadways/structures.	• The identified problem is not anticipated to address safety concerns.
System Condition	• Addresses an immediate system condition need (problem area) where delay may result in immediate property damage or safety concerns.	• Addresses a system condition need (problem area) where delay may result in additional infrastructure deterioration or property damage.	• Replaces an existing City asset.	• The project does not include replacement of an existing asset.
Compliance-Water Quality	• Provides new or enhanced water quality treatment to address pollutants of concern, qualifying as a retrofit project with potential for fee-in-lieu	• Restores or enhances water quality function or coverage, qualifying as a retrofit project only.	• Provides some water quality benefit through sedimentation.	• The project does not include water quality treatment.
Compliance-Vegetation Management	• Restores shade protection (within 100' of stream bank) to address temperature TMDL	• Enhances riparian corridor vegetation coverage; removes invasive species	• Enhances upland vegetation conditions/characteristics.	• No plantings or vegetation enhancement associated with project construction
Compliance-Hydromodification	• Addresses area of known or observed instream erosion that could result in property damage or infrastructure failure.	• Addresses area of known or observed instream erosion that could result in bank stability issues.	N/A	• Project does not address area of known hydromodification impacts
Other-Contributing Area	• Project has regional impacts (drainage area is > 100 acres)	• Project has subbasin impacts (drainage area is > 10 acres)	• Project has local impacts (drainage area is < 10 acres)	
Other-Sequencing	• Project is required as a pre-requisite or preliminary project before another prioritized project need.	N/A	N/A	• Project construction scheduling would not be impacted by other project scheduling needs.
Other-Traffic and Accessibility	• Project construction is not expected to impact traffic or private property	• Construction may impact residential streets.	• Construction may impact collector streets.	• Construction will impact arterial streets or structures on private property are expected
Other-Development Drivers	• Project is a prerequisite to a current construction project.	• Project is required to support future growth and development or a planning area.	N/A	N/A
Other-Funding Source	• Project is eligible for funding via SDCs (50% or greater)	• Project is eligible for funding via SDCs (25%-50%)	• Project is eligible for funding via SDCs (up to 25%)	• Project is not eligible for SDC funding.

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7.5.2 Scoring and Weighting Factors

Every CP was reviewed by the City Engineer, Natural Resource Manager, and Public Works Operations Supervisor and scored by assigning a "0" through "3" score to each criterion in accordance with the scoring definitions (Table 7-4).

The MCDA tool includes the ability to incorporate weighting factors schemes that vary based on the importance of various scoring categories and individual criteria. Weighting factor schemes were established in collaboration with City staff including 1) an initial weighting with emphasis on system condition and balanced weights within the system operation and compliance categories, 2) adjusted weighting to emphasize on project sequencing (part of the other category), and 3) emphasis on criteria prioritized by Public Works.

Results of the various weighting schemes were compared, and outcomes discussed internally by the City. These schemes resulted in relatively consistent prioritization of projects, with some projects moving slightly up or down in ranking depending on the scheme. Ultimately, the city selected the initial weighting scheme and opted to make some related project scheduling adjustments in accordance with Public Works feedback. Resulting weighting factors are provided in Table 7-5.

The final, average score for each criterion were multiplied by the weighting factors associated with the select weighting factor scheme and summed for a final project score creating a project ranking.

Table 7-5. Selected Weighting Schema

Scoring Category	Category Weight (%)	Criteria	Criteria Weight (%)
System Operation	30	System Operation - Capacity	10
		System Operation - Maintenance	10
		System Operation - Safety and Accessibility	10
System Condition	25	System Condition	25
Compliance	25	Compliance - Water Quality	8.33
		Compliance - Vegetation Management	8.33
		Compliance - Hydromodification	8.33
Other	20	Other - Contributing Area	5
		Other - Sequencing	5
		Other - Traffic and Accessibility	5
		Other - Development Drivers	2.5
		Other - Funding Source	2.5

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7.5.3 Prioritization Results

The CP prioritization tool provides a bar graph that illustrates scoring results (see Figure 7-3). Each bar represents the total score, and each colored segment of the bar represents a specific evaluation criterion so the user can see which criterion played the most prominent role in the scoring results for each project.

The prioritization and ranking of the CPs were reviewed and used to inform the ultimate project scheduling (see Figure 7-1). In general, the highest scoring priority projects are scheduled in the next 5 years (2024-2028); the next level of priority projects are scheduled in the following 5 years (2029-2033); and the remaining priority projects are scheduled 10 years from now (2034-2043). Based on the total number and cost of projects within any one timeframe, some project schedules were adjusted per City feedback (see Table 7-1).

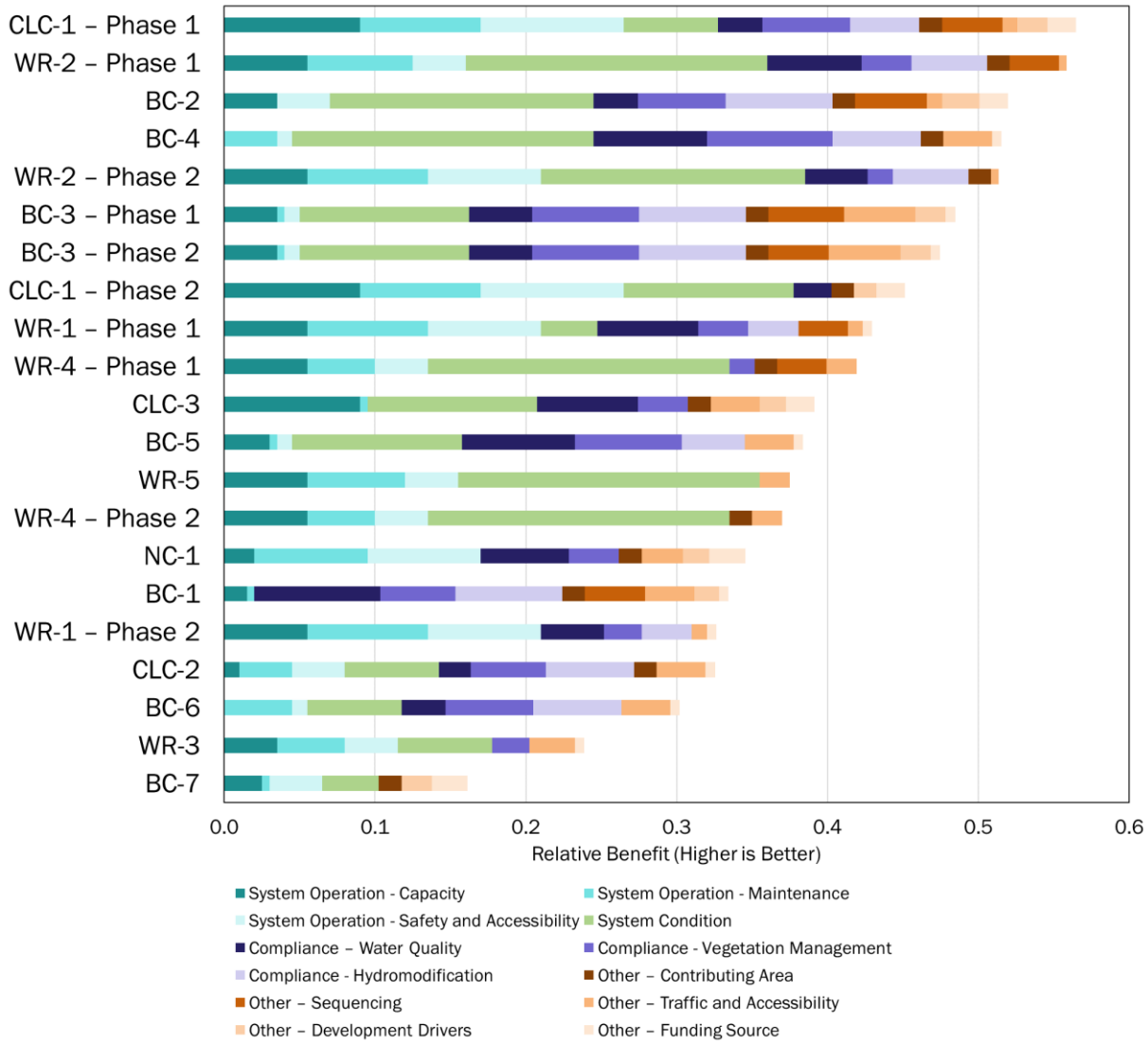

Figure 7-3: Prioritization Results

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7.6 Policy Recommendations

The following policy recommendations pertaining to the implementation of this SMP and associated CIP have been referenced in this SMP and are summarized for City consideration:

7.6.1 Stormwater Design Standards Applicable to Town Center

As described in Section 6.3.4, utilization of the Library Pond to mitigate stormwater treatment and flow control for Town Center redevelopment requires a site-specific stormwater design standard applicable to the Town Center property.

The City will need to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment. Onsite treatment and flow control will need to be provided for 50% of the redeveloped property (both private and public ROW).

7.6.2 Comprehensive Plan Updates

As summarized in Section 2.7, the City of Wilsonville Comprehensive Plan was reviewed with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit to ensure it is current and reflective of continued compliance.

A detailed summary of proposed modifications to the Comprehensive Plan are provided in Appendix H.

7.6.3 Design Standards for New Development and Growth Areas

Capacity-related CPs are sized in accordance with future growth and development, both within the city limits and outside city limits to the extent future zoning is established. Most area subject to new development will be within the City's jurisdiction and subject to the city's stormwater design standards that mimic pre-development flow conditions and require the use of infiltration-based facilities to the maximum extent feasible.

Site constraints occasionally prevented CP design to adhere to the City's design criteria, and in a few cases, flooding or system surcharge is still anticipated with implementation of CPs. Implementation of the City's stormwater design standards help ensure maximum capacity in the downstream stormwater collection system.

There are a few key locations in the City where future development outside of the city limits will be subject to another jurisdictions stormwater design standards (i.e., CP CLC-1: Day Road Stormwater Improvements). Establishing consistent stormwater design standards and design metrics for key Planning Areas (Coffee Creek Industrial Planning Area, Basalt Creek Planning Area) that encompass neighboring jurisdictions including Clean Water Services and the City of Tualatin is recommended to ensure that onsite retention and flow mitigation are applied to these new development areas. This mitigation should mimic pre-development site conditions to reduce the risk of downstream capacity and hydromodification impacts, as well as preserve water quality.

7.6.4 Stormwater Facility Tracking and Maintenance for Private Facilities

The City's GIS inventory of stormwater treatment and detention facilities is currently being updated to include consistent facility naming conventions (i.e., swales, raingardens, detention ponds) and inclusion of ownership information (specific to private facilities). Such updates will allow better integration between mapping and asset management, as well as allow geographic tracking of maintenance activities and responsibilities.

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The City's Stormwater Operations and Maintenance Plan is required for newly installed private facilities to ensure that the owners recognize responsibility for inspections and maintenance of their private stormwater facilities. The Stormwater Operations and Maintenance Plan requirements went into effect in 2012 and require submittal of an Annual Inspection and Maintenance Report by May 1 each year. The City conducts private facility inspections annually, targeting facilities that did not return an Annual Inspection and Maintenance Report.

In conjunction with the identification of problem areas and Project Opportunity Areas, private facilities are routinely observed to have deficient system maintenance, due to inconsistent and infrequent maintenance. In cases where the private facility is not being maintained and functionality is compromised, the City may consider a policy to reassign maintenance responsibility for existing private stormwater facilities and conduct maintenance in accordance with public facility maintenance protocols and schedules, subject to reimbursement by the private facility owner. Implementation of this proposed policy is supported through P-5: Stormwater Facility Enhanced Maintenance Program.

7.7 Next Steps

Following adoption of this Plan, a financial analysis will be required to evaluate the City's current stormwater utility rate and SDCs to ensure adequate funding is available for implementation of CPs and programs outlined in this SMP. The resulting financial plan will provide a funding structure in accordance with the defined LOS that allows the City to implement the CPs and programs as costed and scheduled in this SMP while meeting other financial obligations and policy objectives.

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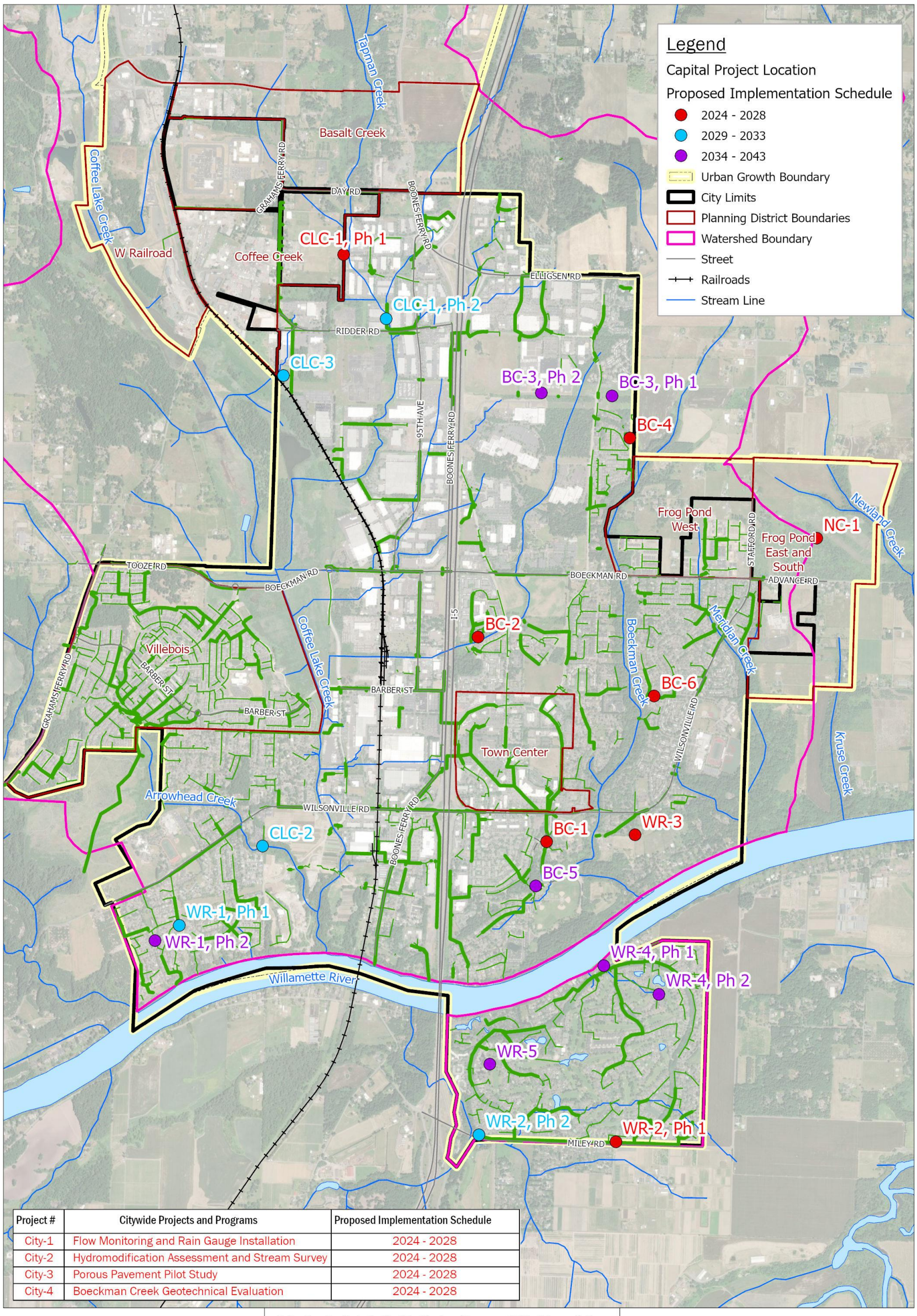

Project #	Citywide Projects and Programs	Proposed Implementation Schedule
City-1	Flow Monitoring and Rain Gauge Installation	2024 - 2028
City-2	Hydromodification Assessment and Stream Survey	2024 - 2028
City-3	Porous Pavement Pilot Study	2024 - 2028
City-4	Boeckman Creek Geotechnical Evaluation	2024 - 2028

Note: Planning Projects City-1 to City-4 and Programs P-1 to P-6 are all city-wide and not specific to a location. Programs P-1 to P-6 assume annualized funding.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 7-1: Capital Improvement Projects Prioritization

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Section 8

Limitations

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

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Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix

Table A-2: Project Opportunity Matrix

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Public Works Community Development	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass easement area under the power line and to the river. The design (location) is flawed and the water flows into the yard of the homes that back up against the easement, requiring sandbags to redirect flow.	R/R		Y	Recent outfall projects on Belknap and Morey Lane. AKS study (2017) indicated current pipe size is not sufficient to redirect flow into pipe to SW Belnap Ct outfall. AKS study identified alternatives. Meetings have occurred with BPA related to locating a pond.	Any pond option on the BPA easement would require coordination and adequate BPA utility access. There is a high-pressured fuel line running N-S on the E edge of the easement that would need to be avoided. Infiltration rates anticipated to be high. Project development considerations: Need to understand infiltration rates for pond/gsi feasibility. Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. Both pond/GSI and pipe upsizing in one project unlikely System modeling would be needed to assess flows and size detention.	Y	N	Y*	N
2	Frog Pond ditch and culvert under Boeckman Rd.	Public Works	Ongoing flooding issue at 6920 SW Boeckman Rd. House - foundation is only 2-3 in. higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R		Y	Area has presented an ongoing issue. Model extension is needed.	Existing culvert along Boeckman Road is directed toward the homeowner's garage, where peak flows come very close to the foundation. Project development considerations: Project needed to right size the culvert underneath Boeckman Rd (currently not in the model). A box culvert may be easier to maintain. Pipe the drainage along Boeckman Road beyond the property owner's house where the channel has additional vertical drop. Projects may be implemented as part of the Boeckman Road improvements	Y	Secondary	Y*	N
3	Pond F	Public Works	Possible design flaw and blockages impeding flow; potential maintenance issue.	R/R	MAINT	N		Not visited but discussed with PW staff. Pond is already included in model but scheduled for reconfiguration.	N	N	TBD	TBD
4	Library Pond	Public Works Community Development	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP		Y	City wants to include Library Pond expansion in fee in lieu program for Town Center redevelopment. Current configuration/ contributing drainage area in model overestimates flow contribution. Model updates needed to more accurately reflect existing drainage area to pond.	Flow from the pond is a ditch inlet that requires maintenance to keep clear from vegetation and debris (currently there is a temporary fence installed for this purpose). Project development considerations: Phase 1: retrofit the pond outlet structure to include an emergency overflow for consistency with current standard pond details. Clear vegetation and debris. Phase 2: construct flow control structure per standard details and pond outlet structure to accommodate per future growth. Include a dedicated maintenance access path. No as-builts/drainage report available to confirm existing stage-storage. Model updates required to refine the current contributing drainage area (hydrology) and evaluate capacity.	N	Primary	Y*	N

[1] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[2] Stream assessment locations identified as priority or secondary.
[3] Priority project location identified with a *

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
5	Memorial Lift Station - current location	Public Works	Ditch behind lift station occasionally overflows during heavy precipitation.	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
6	Regional Parks 7 & 8; SW Coffee Lake Dr. Level Spreader	Public Works	Level spreader does not drain properly causing erosion issues	MAINT	E&S	N	Appears to be an operational issue only.	Not visited.	N	N	N	N
7	SW Montgomery Way	Public Works Community Development 2012 SMP	Channel and culvert issues are causing flooding. Future development (PDR1) is anticipated upstream of problem area.	CAP		N	City staff have not reported recent flooding issues here and don't consider it a project need any longer. 2012 MP identified a CIP (WD-1) for this location. Limited GIS information available to conduct modeling. City staff have not reported recent flooding issues here and don't consider it a project need any longer.	Not visited.	N	N	N	N
8	Commerce Circle near Delta Logics parking lot	Public Works Community Development	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	Contributing drainage area to pipeline is unclear.	Improperly abandoned storm line is not shown in the GIS. Pipe is on private property north of the street. Project/ program development considerations: Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. Current sink hole is causing a safety concern. Additional as-built research is needed to identify lateral connections to the abandoned pipe.	N	N	N	Y
9	Miley Rd sinkhole	Public Works 2012 SMP	Collapsed mainline due to age and pipe corrosion has caused a sinkhole. Remaining pipe is failing and needs replacement.	R/R		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents.	Not visited.	N	N	Y	TBD
10	Miley Rd outfall	Public Works 2012 SMP	Significant scouring into jurisdictional wetland.	E&S		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents. Erosion issues are entering a jurisdictional wetland and thus replacement is beyond scope for maintenance.	Not visited.	N	N	Y*	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
11	Town Center Loop near Les Schwab Tire Shop	Public Works Community Development	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Town Center redevelopment will impact high flow bypass for flows towards Library Pond.	CAP		Y	In 2015, ODOT installed a reducer on the 18" pipe that outfalls west before entering ODOT culvert under I-5.	ODOT reducer (12" as verified by PW 10-11-21) limits the existing 18" pipe that outfalls west to the ODOT culvert underneath I-5. Town Center redevelopment will remove the high flow bypass that currently sends flow south towards Library Pond. PW has observed flooding along Town Center Loop W via the CBs that tie into this current high flow bypass line. Project development considerations: **Model development needed to determine when it floods, and project need for existing conditions.** **Future conditions will be driven by adherence to Town Center plan.**	Y	N	Y	N
12	Rose Ln culvert	Public Works Community Development 2012 SMP	Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	City has implemented programmatic activities to resolve the issues but is still a problem. **2012 MP identified a CIP (WD-2) for this location.** **Limited GIS information available to conduct modeling.** Boeckman Road project may inform need.	Culvert underneath Rose Lane floods as vegetation on the upstream side blocks flow and drainage overtops the road and floods the neighbor's yard/garage on the downstream side. Drainage patterns here take several hard turns and is very flat. Project development considerations: **Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field.**	N	N	Y	N
13	SW Parkway Ave south of Costco	Public Works	N-S drainage swale south of Parkway has filled with sediment, surcharging the roadway drainage system, and resulting in ongoing maintenance. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	MAINT	CAP	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. **Location is already included in hydraulic model extents.**	Sysco ditch experiences high sedimentation rates due to minimal grade for the first section of the ditch. Sysco has plans to develop the lot to the west of the ditch, but timeline for this is unknown. Project development considerations: **Since this is a complicated issue (Sysco owns ditch but receives drainage from others both public/private), City may install WQ manhole (s) to remove sediments from public runoff. This would isolate any additional sediment accumulated in Sysco ditch to private sources.** **Hydraulic model review is needed to confirm long stream profile for potential improvement opportunities.** **Public works confirmed 36" pipe from Costco to 40" pipe to Sysco ditch (may attribute to Costco backwater).**	N	N	TBD	TBD
14	Culvert south of Day Rd.	Public Works	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #15/26.	R/R		Y	Location is already included in hydraulic model extents. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	Y	Secondary	Y*	N

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15	South of Day Road ponds near power lines behind businesses	Public Works 2012 SMP	Without brush clearing, the ponds south of Day Road back up and flow onto the road. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #14/26.	MAINT		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-1) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	Area studied as part of AKS Coffee Creek Facility Study. Effort worked to identify infrastructure needs and alternatives). The 2012 MP also included several capital projects to address these issues. Project development considerations: AKS study did not directly incorporate survey into existing condition model (extra effort required to incorporate survey independently into the hydraulic model). AKS study does not alleviate flooding.	Y	Secondary	TBD	TBD
16	95th Ave north of Hillman Rd.	Public Works	Crushed storm pipe found during CCTV inspection.	R/R		N	Location is already included in hydraulic model extents. Per City (10-1-21), replacement being completed as CIP #7062 95th Avenue Storm Line Repair. North repair is replacement of 120 LF of existing 24" CMP with 24" PVC (Carte ID 2335). South Repair is replacement of 44 LF of 15" CMP with 15" PVC (Carte ID 2337).	Not visited.	N	N	N	N
17	Mont Blanc in Villebois	Public Works	Tree planted in front of inlet blocking drainage into swale	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
18	Memorial Park drainage area behind the barn	Public Works	Same drainage ditch that causes issues with Memorial lift station (see Location ID5).	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
19	NW intersection of Elligsen Road and SW Parkway Ave near 76 gas station	Public Works External Survey	During heavy precipitation the CB backs up and floods the road at the corner	CAP		N	Additional CBs were installed with roadway improvements at low points and has alleviated flooding issue.	Visited surrounding property area and confirmed no issue.	N	N	N	N
20	NE corner of Elligsen Road and SW Parkway Center	Public Works	Sediment from the agriculture area north of Elligsen Road impacts Pheasant Ridge RV Park detention pond.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
21	NW corner of Graham Oaks parking lot	Public Works	Erosion around outfall sends debris into creek.	E&S		N	Outfall included in model for capacity only, does not evaluate erosion. Public Works filled with CDF and is continuing to monitor for erosion.	Not visited.	N	N	N	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
22	Converted bubbler River Fox Park & SW Preakness	Parks Department (via) Public Works	Piped collection system is outside of the ROW and pipe diameter is reduced. Leaf debris affects the manhole in front of 11591 SW Preakness limits flow to mainline to Willamette Way East causing flooding. "Bubbler" manhole at fenceline acts like a sump.	MAINT	CAP	Y	Manhole (Cartograph # 57) surcharges and water exits the system, overflowing to inlet Cart #1240. Issue is capacity and whether the manhole should be redesigned to actually be a bubbler and not a surcharged manhole.	Complicated SW configuration. Pipe size changes from 24" to 18" to 12". Based on conversations with the property owner at 11242 SW Champoeg Dr (adjacent to inlet grate in SW corner of park) no flooding occurs here. Project development considerations: May consider installation of a pipe to directly tie runoff that is coming from Preakness Dr. into the MH at the end of Champoeg Dr. Following site visit, PW confirmed with Parks that this is nonissue. Clearing grates of any leaf debris addresses the issue. Future CCTV at this location may be warranted to confirm configuration.	N	N	N	N
23	Cul-de-sacs west of Serenity Way	Public Works	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul-de-sac.	Not visited but confirmed that additional inlets can be included in a programmatic effort.	N	N	N	Y
24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Public Works	Recurring flooding at catchbasins occurs after cleaning.	CAP	MAINT	Still Needed	Location is already included in hydraulic model extents.	Not visited.	N	N	TBD	TBD
25	SW Salish Ln at intersection with Parkway Ave	Public Works	Undersized catch basins cause flooding (ponding in SE corner by pond).	CAP		Y	Location is already included in hydraulic model extents, but with limited detail. As-builts provided from City reflect drainage ditches but no cross sections for ditches.	City pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Project development considerations: Need improved access (for a vactor truck) to the WQ MH and pond maintenance (like Library Pond). Access should be from the Shrine Center parking lot. Refinement of the model extents not needed.	N	N	Y	TBD
26	Day Rd culvert at Tapman Creek near PGE substation	Public Works	Undersized culvert over capacity causing flooding. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Areas #14/15.	CAP		Y	Location is already included in hydraulic model extents. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	N	Secondary	Y*	N
27	Storm basin SW Iron Horse St & SW Willow Creek Dr	Public Works	Reoccurring maintenance issues causing flooding; mix of private and City maintained structures	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
28	SW Advance Rd btwn Stafford Rd & SW 63rd Ave	Public Works	Outfall blockage issues caused by vegetation. City cannot access to fix	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N

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29	SW Daybreak St & SW Morningside Ave	Public Works	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond	CAP		N	Renaissance Pond is included in existing hydraulic model. City confirmed configuration and pond outlet to west.	Not visited.	N	N	TBD	N
30	Sysco drainage ditch south of Parkway Ave	Public Works Community Development	Historical flooding issues; can no longer be accessed due to newly constructed fence. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	CAP	MAINT	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. Location is already included in hydraulic model extents.	See Problem #13. Same issue.	N	N	Y	TBD
31	Off Canyon Creek Road; catch basin in a residential backyard	Public Works	When farmer plows the field east of area debris enters catch basin and causes backups.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
32	Drainage ditch west & south of Delta Logistics	Public Works 2012 SMP	Overflow floods parking lot/channel conveyance issues. Related to Problem Area#15.	CAP		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-3) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15. Same issue.	Y	Secondary	Y*	N
33	Elligsen Rd and Parkway Center Dr near Jeep Dealership	Public Works	Bubbler does not operate as designed; runoff goes over road.	R/R		N	Bubbler location is mapped incorrectly (located on SW Canyon Creek Rd near Burns Way). Issue deemed to be not significant by COW staff.	Not visited.	N	N	N	N
34	95th Ave at Grace Chapel	Public Works Community Development	Outfall blockage in ODOT right of way.	MAINT		N	Appears to be an operational issue requiring coordination with ODOT.	Not visited.	N	N	N	N
35	Culverts under I-5	Public Works	End of design life and need to be replaced (already modeled). Various locations along Parkway Ave & Boones Ferry Rd.	R/R		Still Needed	Locations already included in hydraulic model extents. Requires coordination with ODOT.	Not visited.	N	N	TBD	TBD

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
36	Culverts under Jobsey Ln. and Arrowhead Creek	Public Works 2012 SMP	Damaged and old culverts (already modeled), need to be replaced	R/R		Y	Locations already included in hydraulic model extents. 2012 MP identified a CIP (CLC-9) for this location.	Not visited.	N	N	Y	TBD
37	Boeckman Creek N of Colvin Ln.	Public Works	Erosion of streambank and migrating channel.	E&S		N	Potential stream survey evaluation area	Not visited.	N	Primary	Y	N
38	Villebois neighborhoods	Public Works	Ponding issues in front of mailboxes.	R/R		N	Staff is unaware of any ponding in this area. Existing modeling extents are adequate.	Not visited.	N	N	N	N
39	Villebois neighborhood	Public Works	Concerns about the various detention ponds and whether they are being maintained appropriately. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issues.	MAINT		Still Needed	HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the City maintains the inlets and outlets. Grahams Ferry Pond has some design issues associated with the WQ manhole and adjacent inlets. Tooze Pond needs to be added to the hydraulic model (need stage-storage curve).	Not visited but discussed with PW. Pond maintenance is an ongoing issue. Recommend dedicated program to address and review of SOPs.	Y	N	TBD	Y
40	Citywide	Public Works	1996 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
41	Citywide	Public Works	2006 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
42	Citywide	Public Works	2015 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
43	Town Center Loop W - Shari's	External Survey	Drainage issues -Shari's parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
44	Town Center Loop W - Starbucks	External Survey	Drainage issues -Starbucks parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
45	Coffee Creek	External Survey	Lots of trash within creek at various locations (especially at choke points).	MAINT		N	Locations already included in hydraulic model extents, but need to verify configuration.	Not visited but location discussed with PW. Modeling refinements to incorporate the 30" and 36" lines from the Coca Cola Pond, starting at Seely Road to Coffee Creek.	Y	N	N	N
46	29851/29840 SW Camelot St	External Survey	Flooding from storm drain street grate. Grate clogs with debris .	MAINT		N	Appears to be an operational issue.		N	N	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
1	1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Willamette River	Staff Surveys	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass area within the BPA power line easement and to the river. 2012 AKS study identified deficient pipe capacity, preventing flow from reaching SWM Belknap Court outfall. Water flows into yards adjacent to the easement, requiring sandbags to redirect flow.	R/R	WQ	Y	Y	Y	N	Y	• Project area is adjacent to high pressure fuel line. • Project will require continued coordination with BPA to locate water quality facility and maintain utility access. • Need to understand infiltration rates for retention/GSI feasibility. • Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. • GSI and pipe upsizing in one project unlikely	Y- WR-1, Phase 1 and 2	--	--	--
2	2	Frog Pond ditch and culvert under Boeckman Rd.	Meridian Creek	Staff Surveys H&H Model	Ongoing flooding issue at 6920 SW Boeckman Rd. Culvert along Boeckman Road directs flows toward an existing garage. The foundation is only 2-3 inches higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R	CAP	Y	Y	Y	Y	N	• Project Fact Sheet and Cost Estimate prepared March 2022. • Project currently in design as part of the Boeckman Road improvements • Piped drainage system extended along Boeckman Road beyond the existing house, where the channel has additional vertical drop.	N	N	N	N
3	3, 39	Pond F and other ponds in Villebois	Coffee Lake Creek	Staff Surveys	Concerns whether various private detention ponds are being maintained appropriately. HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the city maintains the inlets and outlets. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issue.	R/R	MAINT	Y	Y, except for Grahams Ferry Pond	N	N	Y	• H/H model updated to include relevant facilities. • Active maintenance implemented by HOA. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement. • Per City (6/9/23) – Pond F swales above the level spreader have been cleaned out and are no longer causing issues.	N	N	Y- P-6	Y
4*	4	Library Pond	Boeckman Creek	Staff Surveys Retrofit Analysis H&H Model	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP	WQ	Y	Y	Y	N	Y	• Primary objective is to accommodate redevelopment of the Town Center; secondary is to accommodate Boeckman mitigation needs. • As-builts (stage-storage) incorporated into H&H evaluation.	Y – BC-1	--	--	Y

N/A = Not Applicable
Project Opportunities in gray have been removed from consideration for further project development.
[1] Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.
[2] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[3] Stream assessment locations identified as priority or secondary.
[4] Costed Project needs = Y were confirmed with City during on 3-15-23 and require a conceptual design, fact sheet and cost estimate. Unfunded Project needs will be documented in the SMP but will not have a conceptual design or cost associated. The resulting Project ID is listed for reference.
[5] Project Opportunity Locations affiliated with the Boeckman Road mitigation efforts are indicated with a *.

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					Ongoing challenges with debris removal at existing ditch inlet (which serves as outlet from pond). City has considered expanding the pond as part of the fee in lieu program for Town Center redevelopment.								• BC to document findings specific to future policy requirements and cost improvements to the pond to adhere to current design criteria. • Policy recommendation –Require portions of redevelopment to install onsite treatment and flow control to ensure capacity in Library Pond as a fee-in-lieu opportunity.				
5	9, 10	Miley Rd sinkhole and outfall	Charbonneau	Staff Surveys 2012 SMP H&H Model	2012 MP CIP SD9000 to SD9069. Collapsed mainline due to age and pipe corrosion has caused a sinkhole at eastern edge of pipe alignment. Challenge is exacerbated by steep slopes. Remaining pipe along Miley Rd. is failing and needs replacement. Significant scouring into jurisdictional wetland. Upstream capacity deficiencies indicated by H/H modeling (preliminary flooding location #1).	R/R	CAP	Y	Y	Y	N	N	• Steep slopes will require geotechnical evaluation. • Erosion issues are entering the jurisdictional wetland, and beyond the scope of maintenance actions, such as adding riprap to dissipate energy at the outfall. • Upstream end is collapsed (replacement in kind) and upsizing with outfall. Alignment is under private retaining wall. • Modeled capacity deficiencies at the upstream portion of the alignment (due to hydrologic inputs)	Y – WR-2, Phase 1 and 2	--	--	--
6	11	Town Center Loop near Les Schwab Tire Shop	Boeckman Creek	Staff Surveys	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Existing reducer (12” control on 18” pipe) was installed in 2015 to limit flow toward ODOT culvert under I-5. Restriction contributes to upstream problems through Town Center Loop. Town Center redevelopment will remove the high flow bypass for flows towards Library Pond.	CAP		Y	Y	N	N	N	• Model does not reflect flooding in this location. • Future conditions will be driven by adherence to Town Center Plan. • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
7	12	Rose Ln culvert	Willamette River	Staff Surveys 2012 SMP	2012 MP identified a CIP WD-2 for this location. Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage pattern is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	N	N/A	N	N	• Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field. • Consider opportunity to construct project in conjunction with future upstream development (PDR1). • Discussion during 3-15 Wksp confirmed historic project need requiring cost estimate.	Y – WR-3	--	--	--
8	13, 30	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	N-S drainage swale south of Parkway has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	Y	Y	N	Y	• Public works confirmed 36” pipe from Costco to 40” pipe to Sysco ditch (may attribute to Costco backwater). • Sysco intends to expand its footprint at this location, so private development may alleviate immediate open channel issue.	N	Y	Y-P-1	--

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					Ditch is owned and maintained by private owner (Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch.								• Future Project/ Program Recommendation - City may install WQ manhole(s) or other facilities to remove sediments from public runoff (Localized Drainage Improvements Program or Green Street/LID Retrofit). This would isolate any additional sediment accumulated in the ditch to private sources (could be done as part of a program activity).				
9	14, 15, 26, 32	Open channel system from Day Rd. to Ridder Rd	Coffee Lake Creek	Staff Surveys 2012 SMP H&H Model	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Existing AKS design does not fully alleviate modeled flooding.	R/R		Y	Y	Y	N	Y	• AKS Coffee Creek system evaluation included additional survey that was incorporated into model as part of validation efforts. AKS evaluation did not include impoundment (incorporated into BC model) or updated hydrology. • Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement. • Discussion during 3-15 Wksp indicated purchasing the adjacent (to the west) parcel for installation of the detention pond (AKS concept) is complicated by access road issues. • BC to confirm feasibility of improvements and 100-year WSE with respect to adjacent structures. City to confirm what level of future flooding is acceptable. • Policy recommendation – May be required to limit/ confirm adherence to City stormwater standards upstream (north) of Day Rd and establish similar standards for Tualatin discharge. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs.	Y – CLC-1, Phase 1 and 2 and City-1	--	Y-P-5	Y
10	24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Coffee Lake Creek	Staff Surveys	Recurring flooding at catch basins occurs even after cleaning.	CAP	MAINT	N	Y	N	N	Y	• Reconstruction is occurring so this may not be a pressing issue; future deficiencies to be addressed as part of a program (Localized Drainage Improvements Program)	N	N	Y-P-1	N
11	25	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	Undersized catch basins cause flooding (ponding in SE corner by pond). A city-owned pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Model predicts flooding within the pond and outlet. Pond configuration is based on original model build from 2012 SMP (preliminary flooding location #10).	CAP		Y	Y	Y	N	N	• Need improved access for a vactor truck to access the WQ MH and pond for maintenance. Access should be from the Shrine Center parking lot. • Refinement of the model extents or pond configuration determined to not be needed. • Program Recommendation - Localized Drainage Improvements Program or Green Street/LID Retrofit.	N	Y	Y-P-1	N

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													• Other option would be documentation of an unfunded project for maintenance enhancement.				
12*	29	SW Daybreak St & SW Morningside Ave	Coffee Lake Creek	Staff Surveys	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond. Opportunity to improve water quality treatment through retrofit and reconfiguration of existing pond property.	CAP		Y	N	N	N	Y	• Possible pond retrofit to increase storage capacity and improve water quality treatment. • Location is also affiliated with Boeckman Road mitigation alternative locations and Ash Meadows (Project Opportunity Location #26), but not a prioritized location. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	N	Y- P-6	Y
13	35	Culverts under I-5	Coffee Lake Creek	Staff Surveys H/H Model	End of design life and need to be replaced. Various locations along Parkway Ave & Boones Ferry Rd (crossings from E-W).	R/R		N	Y	Y	N	N	• Project may be referred to ODOT; not one that the City would initiate. • Locations already included in hyd. model.	N	N	N	N
14	36	Culverts under Jobsey Ln. and Arrowhead Creek	Coffee Lake Creek	2012 SMP Stream Assessment	2012 MP identified CIP CLC-9 for this location. Damaged and old culverts (already modeled), need to be replaced	R/R	E&S	Y	Y	N	Y	N	• Locations already included in hydraulic model. • Combine with Project Opportunity #20.	Y – CLC-2	--	N	N
15	37	Boeckman Creek N of Colvin Ln.	Boeckman Creek	Staff Surveys 2012 SMP	2012 MP identified BC-8 (Canyon Creeks Estate Pipe Removal) for this location. Erosion of streambank and migrating channel reported in downstream portion of the project site.	E&S	WQ	Y	Y	N	N	N	• Consider more detailed stream survey evaluation to understand channel constraints and extents of potential planting. • Per meeting on 3-8, City confirmed ongoing issue. Refer to 2012 SMP.	Y – BC-4	--	N	N
16	43, 44	Town Center Loop W - Shari's and Starbucks	Boeckman Creek	External Survey	Drainage issues - Shari's and Starbucks parking lot (down the road from each other).	CAP		N	Y	N	N	TBD	• May be localized ponding addressed with addition of inlets (programmatic). • This issue was identified to be addressed through the Town Center Plan (2019). • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
17		Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Significant risk of continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River. Several properties have experienced bank failures and loss of land, and an active	E&S		Y	Y	N	Y	Y	• Consider upstream opportunities to reconnect floodplain, allow high flows to expand laterally, and dissipate channel energy. • Boeckman Road mitigation efforts (in progress) include evaluation of the tributary channel to the	Y- City-4	Possible	N	N

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					landslide is impacting the backyard and deck of one of the properties.								main reach of Boeckman and potential modification to increase upstream retention. • Per 3-15 Wksp, efforts may include stabilizing the channel and apply grade control; geotechnical investigation; retaining/ crib wall or soldier pile. • June 2023 – Per City - location to part of ongoing monitoring project (planning project need)				
18		Meridian Creek in Landover Park - Reach 1 (US of Wilsonville Rd.)	Meridian Creek	Stream Assessment	Sediment-clogged culvert (30-inch) at the Meridian Creek Crossing at Wilsonville Road. Culvert is mostly obstructed and appears to cause ponding during storm runoff.	MAINT	E&S	Y	Y	N	Y	N	• Consider location of ponding and whether infrastructure is being impacted. • If ponding is isolated to park and not overtopping any roadways or impacting private property, then maybe this isn't a problem that needs to be fixed. It's effectively a detention pond. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
19		Meridian Creek in Landover Park - Reach 2 (DS of Willow Creek Dr.)	Meridian Creek	Stream Assessment	Culvert outlet at upstream end of reach is clogged and backs up water underneath Willow Creek Dr. PVC SW outfall along reach is undermined (STA 1,100) and 6-foot section has washed out and moved downstream.	MAINT	E&S	Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • Traffic impacts to Willow Creek Drive during culvert replacement. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
20		Arrowhead Creek at Pedestrian Bridge (Reach 4)	Coffee Lake Creek	Stream Assessment	Culvert at upstream end of reach (at pedestrian crossing) is failing and should be considered for replacement.	R/R		Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • See Project Opportunity #14.	Y – CLC-2	N	N	N
21*		Memorial Park (Swale Retrofit, Pipe Upsizing, and Mitigation)	Boeckman Creek	Retrofit Analysis H/H Model	Swale at Memorial Dr. is not draining properly. Potential concept is to extend swale all the way along the road or relocate to the base of hill. Modeling evaluation indicates that the pipe system after convergence point at Memorial Drive has a constriction resulting in backwater and upstream system flooding (preliminary flooding location #5).	MAINT	CAP	Y	Y	Y	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Location is also affiliated with Boeckman Road mitigation alternative location (raising of pedestrian trail to detain flow from entering Boeckman Creek). • Relocation of swale allows for offline facility construction. •	Y – BC-5	--	N	N
22		Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	6 swales haven't been maintained properly - 2 are City owned and 4 need to be retrofitted and taken over by City	MAINT	WQ	Y	N	N/A	N	Y	• Level spreaders aren't working well. • Opportunity to expand water quality treatment through retrofit of existing facility. • June 2023 – Per City – PW already fixed the swales. Instead, recommend unfunded project or program for restorative maintenance of facilities (especially private). Current PW staffing doesn't support private facility maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	Y-P-6	Y

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23*		Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	City staff have identified a former irrigation pond near this apartment complex adjacent to Boeckman Creek. This location may have potential to provide additional storage or provide mitigation measures. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	Y	N	N/A	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Boeckman Road mitigation efforts originally identified as a potential flow mitigation site but was not prioritized for alternative evaluation. • Will require private property partnership. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	N	Y
24*		Wiedeman Ditch/ Canyon Creek Park/BPA Easement	Boeckman Creek	Boeckman Road Mitigation Study 2012 SMP Retrofit Analysis	City staff identified potential project opportunity to construct a regional wetland or drainage facility at this location (would require BPA coordination). Facility would be able to manage runoff from Argyle Square, Sysco, and other future developments to help offset Boeckman Creek flows. This location is adjacent to previously identified erosion issues within Canyon Creek Estates (BC-8).	CAP	WQ	Y	N	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention through retrofit of existing facility. • Boeckman Road mitigation efforts evaluated storage capabilities in Wiedeman Ditch and Canyon Creek. This location is one of the preferred alternatives. • Will require coordination with BPA. • Potential mitigation opportunity for Sysco redevelopment (discussions in progress).	Y – BC-3, Phase 1 and 2	--	N	N
25*		Mentor Graphics/Siemens Ponds	Coffee Lake Creek	Boeckman Road Mitigation Study	Existing series of ponds located on Siemens property (8005 Boeckman Rd) currently only provide flow through storage. Ponds have potential to be modified to provide detention or reconfigured to divert less flow to Boeckman Creek during large storm events.	CAP		Y	Y	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention capacity through retrofit of existing facility. • Boeckman Road mitigation efforts included evaluation of potential bypass for low flow conditions and reroute from Boeckman to Coffee Creek watershed (in line with historic drainage patterns). See Project Opportunity #26. This location is one of the preferred alternatives.	Y – BC-2	--	N	N
26*		Mentor Graphics/Siemens Flow diversion structure and Ash Meadows Detention	Coffee Lake Creek	Boeckman Hydraulic Eval TM	Eliminate flow diversion structure on private property that diverts flows to Boeckman Creek during high flows (Project Opportunity Area 25). To account for additional flow returning to the Coffee Lake Creek drainage basin, utilize the Ash Meadows area to detain flows prior to entering the ODOT culvert underneath I-5. Utilize the volume of the natural depression near Ash Meadows to detain flows during large storm events.	CAP	WQ	Y	Y	N	N	N	• Boeckman Road mitigation efforts evaluated flow control potential at this location. This location is one of the preferred alternatives. • May require additional capital improvement projects downstream of Ash Meadows to ensure adequate conveyance capacity is available. • Will require coordination with ODOT.	Y – BC-2	--	N	N
27*		Boeckman Creek Instream flow mitigation and restoration	Boeckman Creek	Boeckman Hydraulic Eval TM	Within Boeckman Creek, several concepts have been identified to provide flow mitigation for projected increases in flow.	CAP	E&S	Y	Y	N	Y	Y	• Boeckman Road mitigation efforts indicated that instream improvements wouldn't provide the level of flow protection required.	Y- City-2	N	Y- P-5	N

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				Retrofit Analysis	Specific locations within Boeckman Creek have not been identified at this stage: • Beaver Analogs: Increase the depth and size of natural ponding within the creek. This would supplement the existing population of beavers and dams currently within Boeckman Creek. • Channel Improvements: Protect, harden, or slow flow in areas potentially impacted by the change in creek flows. May include the addition of large woody debris, large root wads, grade control structures or other appropriate measures to protect threatened stream banks."								• Program need - Instream restoration or vegetation enhancement. Project needs may stem from monitoring efforts.				
28		Charbonneau West - SW French Prairie Rd and SW Boones Bend Rd.	Charbonneau	2012 SMP	Stormwater system within the western portion of Charbonneau was identified in the 2012 SMP as a location that requires replacement	R/R	CAP	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • The 2012 SMP and subsequent Charbonneau Plan identified the piped infrastructure at this location in need of repair and replacement. • Per 3-15 Wksp, City confirmed need to cost out capital project for this area per the R/R Chabonneau Infrastructure Master Plan.	Y – WR-5	--	N	N
29		Charbonneau East- SW French Prairie Rd Outfall and SW Edgewater	Charbonneau	H/H Model 2012 SMP	Model predicts flooding at this outfall and along the SW Edgewater piped system. Predicted flooding along this system generally starts at the 10-yr design storm, while the most upstream pipe segments along SW Edgewater are predicted to start at the 2-yr design storm. Restriction is caused by undersized outfall (30") in comparison to upstream pipe segments (36"). This outfall pipe was replaced in 2018 during an emergency repair but was not upsized to 36" per the recommendation from the 2012 SMP.	CAP	R/R	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Wallis Engineering is currently designing the portion of the system on Edgewater that contributes to this outfall. Per City (11-2-22), no capital project needed for Edgewater component.	N	N	Y- P-4	N
30		Charbonneau East- SW French Prairie Rd and SW Old Farm Rd piped system	Charbonneau	2012 SMP	Model predicts flooding throughout these piped systems starting at the 2-yr design storm due to insufficient capacity at the outfall pipe (Project Opportunity #29). Flooding at this location could impact the residential properties within Charbonneau.	R/R	CAP	Y	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Alternatives evaluated include inline detention upstream along SW French Prairie Rd and/or SW Old Farm Rd and replacement of outfall. Due to space limitations a detention pipe within the roadway cannot provide adequate flow control. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs. • City to confirm how much modeled flooding is acceptable.	Y – WR-4, Phase 1 and 2 and City-1	--	N	N

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31		Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding at several nodes along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		N	Y	Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Per 3-15 Wksp, PW Ops confirmed no immediate project need.	N	Y	N	N
32		Garden Acres Rd./Peters Rd.	Coffee Lake Creek	H/H Model Retrofit Analysis	Model predicts flooding along N-S piped system along Garden Acres that crosses the RR tracks and outfalls to Coffee Creek wetlands. Model flooding starts at the 2-yr design storm. City concern with obtaining easement/ coordinating with railroad to upsize pipe. Flooding at this location during the 2-yr design storm is concerning as in the future the contributing drainage area will further develop which will exacerbate this issue.	CAP		Y	Y	Y	N	TBD	• Prior to outfall, there are several smaller size pipe constraints constricting flow and causing surcharge. • As-builts were received for the existing ponds (two private, one public) located near the outfall (at the location of several small diameter pipes) of the Garden Acres Rd./Peters Rd. piped system. • Potential pipe rerouting and new outfall was evaluated to divert flow away from the undersized storm piping along Peters Rd. and towards a separate outfall to Coffee Creek. Per meeting 3-29, not a preferred option because would require new outfall. • Expanded pond to help mitigate flow downstream.	Y – CLC-3	--	N	N
33		Boberg Rd. and RR crossing	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding along N-S pipe prior to discharging into open channel starting at the 2-yr design storm. Predicted flooding also at two large diameter culverts flowing E-W underneath RR tracks. Flooding at this location could impact the industrial properties along Boberg Rd.	CAP		N	Y	Y	N	N	• May be addressed in conjunction with Opp Area #32.	---	N	N	N
34		Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		N	Y	Y	N	N	• Per H/H results, immediate project need is unlikely.	N	Y	N	N
35		Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along piping that conveys private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		N	Y	Y	N	Y	• Modeled flooding may be due in part to hydrology node placement. • Large parking lots in adjacent areas could be potential for retrofit with pervious pavements or stormwater planters for stormwater collection. • Will require coordination with private property owners. • Per Wksp 3-15, City is unaware of existing issue here.	N	Y	N	N

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
36	8	Commerce Circle near Delta Logics parking lot	Coffee Lake Creek	Staff Survey	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	N	--	N	N	• Discussion during Public Works during site visit concludes no project need. • Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. • Additional as-built research is needed to identify lateral connections and drainage area to the abandoned pipe. • Program Recommendation - Localized Drainage Improvements Program or Repair and Replacement.	N	N	Y-P-1	N
37	23	Cul-de-sacs west of Serenity Way	Coffee Lake Creek	Staff Survey	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	N	--	N	N	• Program Recommendation - Localized Drainage Improvements Program. Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul de sac.	N	N	Y-P-1	N
38	46	29851/29840 SW Camelot St	Coffee Lake Creek	External Survey	Flooding from storm drain street grate. Grate clogs with debris.	MAINT	WQ	N	N	--	N	N	• Appears to be an operational issue. • Program Recommendation - Localized Drainage Improvements Program.	N	N	Y-P-1	N
39		Green Streets/LID Facilities	N/A	Retrofit Analysis	Develop a program to install LID facilities in conjunction with planned roadway improvements. Potential locations as listed in the Retrofit Assessment include SW Camelot, SW Wilsonville Road, and SW Hillman.	R/R			N	--	N	Y	• Program Recommendation – Water Quality Retrofit Program.	N	N	Y-P-2	N
40		Porous Pavement Pilot Study	N/A	Retrofit Analysis	Evaluate feasibility of porous pavement for future paving projects.	R/R			N	--	N	Y	• Consider applicability as a planning project to do porous pavement overlays for water quality in conjunction with pavement restoration/ improvement needs.	Y-City-3	N	N	N
41		Gesellschaft Water Well Channel Restoration	Boeckman Creek	2012 SMP Retrofit Analysis	Erosion is occurring within the drainage channel that enters Boeckman Creek.	E&S		N	N	--	N	Y	• Determined to be a higher priority retrofit location per 2015 Retrofit Assessment. • Per Wksp 3-15, project per 2012 SMP needed for funding.	Y – BC-6	N	N	N
42		Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	N	N	--	N	Y	• Determined to be a low priority retrofit location per 2015 Retrofit Assessment. • Discussion needed during planning workshop to confirm that funded project is not warranted.	N	Y	N	N
43		Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		Y	N	--	N	Y	• Conveyance sizing is based on no onsite controls. • Library Pond analysis will be used to support onsite (private) collection system requirements. • Additional assets/ re-piping is development driven. No defined project need, pending redevelopment.	N	Y	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
44		Frog Pond E and S Conveyance Piping	Newland Creek	Community Development Frog Pond East and South Master Plan	Public stormwater collection pipe and outfall along SW 60th Ave. (>15" diameter) per Frog Pond Master Plan.	INFRA		N	N	--	Y	Y	• Frog Pond E and S Master Plan complete in December 2022. • Additional stream assessment conducted in October 2023 baselined receiving water characteristics. • SMP incorporates trunk line and outfall associated with proposed system along SW 60th.	Y – NC-1	--	N	N
45		SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
46		Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
47		River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N

Appendix B: TM#3: Stormwater Modeling Methods, Assumptions, and Results

Technical Memorandum: Hydrologic and Hydraulic Modeling Methodology and Results

Brown AND Caldwell

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Technical Memorandum

FINAL

Prepared for: City of Wilsonville

Project Title: Stormwater Master Plan

Project No.: 156157

Technical Memorandum #3

Subject: Hydrologic and Hydraulic Modeling Methodology and Results

Date: March 7, 2023 (Final)

To: Kerry Rappold, City of Wilsonville

From: Michael Glass, P.E.
Angela Wieland, P.E.

Prepared by: _____
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Limitations:

This document was prepared solely for Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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List of Abbreviations

BC	Brown and Caldwell
BRCP	Boeckman Road Corridor Project
CIP	capital improvement program
City	City of Wilsonville
CMP	corrugated metal pipe
COM	Commercial
CPs	capital projects
CWS	Clean Water Services
GIS	geographic information system
GOV	Government
HB	House Bill
H/H	hydrological and hydraulic
HGL	hydraulic grade line
IND	Industrial
INST	Institution
LID	low impact development
LIDAR	Light Detection and Ranging
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NRCS	National Resource Conservation Service
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
PVC	polyvinyl chloride
PWS	Public Works Stadards
RA	Rural Agriculture
RCP	reinforced concrete pipe
SMP	Stormwater Master Plan
TM	Technical Memorandum
TMDL	total maximum daily load
TSS	total suspended solids
UGB	urban growth boundary
VAC	Vacant

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Section 1: Introduction

The City of Wilsonville (City) is developing an updated Stormwater Master Plan (SMP) to improve the understanding of stormwater system characteristics and infrastructure in the city. The SMP will include a capital improvement program (CIP) reflecting prioritized capital projects (CPs) and programmatic activities to address conveyance, capacity, water quality, and natural resource enhancement for existing and future development.

To document efforts completed as part of the SMP update, a series of Technical Memorandums (TM) have been developed. Technical Memorandum #1 (TM#1): Stormwater Basis of Planning (2/18/22) documented data collection and compilation efforts, presents applicable regulatory and design criteria, identifies stormwater problem areas (informing hydrologic and hydraulic [H/H] model updates), as well as preliminary project and programmatic concepts. Technical Memorandum #2 (TM#2): Geomorphic Analysis (5/25/22) documented field stream assessments for select stream channels within the City and identifies areas for additional consideration as a capital project.

This Technical Memorandum #3 (TM#3) builds upon the previously completed TMs to document the methodology and results of the H/H model activities. Topics covered in TM#3 include:

- H/H model evaluation criteria.
- Hydrologic model updates, including development of revised input parameters.
- Hydraulic model updates and expansion efforts, including refinement of existing modeled elements and the inclusion of additional stormwater infrastructure.
- Model validation approach, objectives, and adjustments.
- H/H model results under applicable design storm events, including identification of capacity limitations to inform development of capital projects.
- Next steps, including the comprehensive summary of project opportunities to inform CP development.

Section 2: Design Storm and Model Evaluation Criteria

The City's 2012 SMP developed a city-wide H/H model using the Innovyze InfoSWMM model platform. BC reviewed the City's existing H/H model and initiated updates as described in Sections 2.2 and 5.4 of TM#1. In addition, Brown and Caldwell (BC) reviewed Section 3 of the City's Public Works Standards (PWS) to outline planning criteria and sizing/design criteria to assess the existing stormwater system for deficiencies. This review is detailed in Section 4 of TM#1.

Section 2.1 identifies design storms that will be simulated for the H/H model and how model results will be used to assess compliance with the Surface Water Design and Construction Standards outlined in Section 3 of the City's PWS, revised December 2015.

2.1 Design Storms

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service.

Design storms used for this study include the 2-, 10-, 25-, and 100-year, 24-hour recurrence interval events. The rainfall distribution for these design storms is based on the standard National Resource Conservation Service (NRCS) Type IA storm, which is applicable to western Oregon, Washington, and northwestern California. Table 1 lists the design storm rainfall depths used in the hydrology model, as listed in the City's PWS.

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Table 1. Design Storm Depths	
Design Storm Event	Rainfall Depth (inches)
2-year, 24-hour	2.5
10-year, 24-hour	3.45
25-year, 24-hour	3.9
100-year, 24-hour	4.5

2.2 Model Evaluation Criteria

Stormwater infrastructure within the H/H model will be evaluated for capacity per the design criteria established in the PWS. The PWS reflects design criteria for new infrastructure and will also be the basis for design of future CPs developed as part of this SMP. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.
  - For new culverts 18 inches in diameter or less, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed two times the pipe diameter or three times the pipe diameter with a seepage collar, unless an exception is approved by the City.
  - For new culverts larger than 18 inches in diameter, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed 1.5 times the pipe diameter, unless an exception is approved by the City Engineer.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation conducted in Section 7 identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding which consisted of locations where the HGL exceeded the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level. For capacity deficient locations where a CP is developed, recommended projects will follow the PWS to allow for the minimum of 1 foot of freeboard between the HGL and ground surface. For additional information on PWS design standards and criteria as it relates to this SMP, refer to TM#1 Section 4.

Section 3: Hydrologic Model Development

The hydrologic model developed for this SMP update utilizes InfoSWMM version 15.0 and the RUNOFF method, which is consistent with the original modeling approach for the 2012 SMP. The RUNOFF method is a simple yet well-established method for simulating subbasin hydrology that utilizes the Green-Ampt method for calculating infiltration.

The necessary parameters for the RUNOFF method when utilizing the Green-Ampt method for infiltration includes subbasin area, slope, width, impervious percentage, hydraulic conductivity, initial moisture deficit, and suction head. The hydrologic module in InfoSWMM converts rainfall into stormwater runoff based on design storm parameters (i.e., volume and intensity of rainfall) and the hydrologic input parameters listed above.

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This section includes detailed descriptions of the methodology used in determining each of the hydrology model input parameters to update the original model.

3.1 Subbasin Delineation

The total contributing drainage area to City owned stormwater infrastructure is approximately 8,728 acres and extends beyond both the City limits and the urban growth boundary (UGB) in some locations. This total contributing drainage area represents the study area for the SMP and is organized by watershed or major basin. The study area is further subdivided into subbasins as shown on Figure A-1 of Attachment A. The receiving water body for all watersheds is the Willamette River.

The City's 2012 SMP developed subbasin delineations within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and updated based on the following City provided information:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

From this revised subbasin delineation, ArcGIS Pro was used to calculate individual subbasin areas for use as a hydrologic input into the model. A summary of the subbasins by major basin is presented in Table 2. Please note Newland Creek (and its associated drainage area) is outside the designated study area and not included in Table 2.

Table 2. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau [a]	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

a. The Charbonneau basin discharges to the Willamette River (direct) but was classified as a separate major based due to its location south of the Willamette River versus north.

The largest basins within the study area are the Boeckman Creek and Coffee Creek/Tapman Creek watersheds. These watersheds represent over 80 percent of the contributing drainage area from which the City manages stormwater runoff.

Subbasin names throughout the watershed are consistent with those developed for the 2012 SMP. This naming convention includes a unique four-digit ID (e.g., 1100, etc.) to classify each individual subbasin. Per the 2012 SMP, deviations from this convention include several subbasins that are instead named in accordance with the detention facility they drain to (e.g., CANYON_N etc.).

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Modification to subbasin naming for this SMP update only occurred when the original subbasin delineations were subdivided to provide a greater level of hydrologic detail. Split basins use “A” or “B” in the suffix to the original subbasin ID for identification purposes.

3.2 Subbasin Slope and Width

The RUNOFF method requires both subbasins slope and width parameters which are a function of the revised subbasin delineation discussed in Section 3.1. To approximate these two physical parameters for modeling purposes, the subbasin slope was first calculated based on the longest flow path line within each individual subbasin. Flow path lines were generated for each subbasin in ArcGIS Pro using automated spatial processing tools. These tools approximate the flow path line as the straight-line distance between the highest and lowest elevation points (based on LIDAR) in the subbasin. The auto generated flow path lines for each subbasin were then reviewed, and manually adjusted as necessary to correct instances where the flow path lines did not appear to represent reality. Examples of this includes flow path lines that did not follow the existing topography or followed a path outside of the subbasin due to an oddly shaped catchment or other nonstandard configuration. Subbasin slope was then calculated based on the flow path line length and upstream and downstream elevations. Subbasin width was then calculated for each subbasin by dividing the subbasin area by the flow path line length.

3.3 Infiltration Conditions and Soils

Soil classification and infiltration are important characteristics to consider when developing and evaluating runoff flow rates and volumes for subbasins. Soil classifications within the study area were identified using the NRCS Soil Survey. Soil information is based upon 2020 soil survey data in Clackamas and Washington County, Oregon. Soil texture class information for the study area is presented on Figure A-2 of Attachment A.

There are multiple methods that can be used to simulate infiltration associated with each soil type. For this project, the Green Ampt method was selected which is consistent with the 2012 SMP approach. The Green Ampt method was used due to its ability to be applied City-wide and for its use of parameters that can be sourced from available soil data without the need for field work.

The Green Ampt method requires the following input parameters for each soil texture classification:

- Average Capillary Suction. A measure of the water transport through soils due to surface tension acting in soil pores.
- Initial Moisture Deficit. The fractional difference between soil porosity and actual moisture content.
- Saturated Hydraulic Conductivity. A physical parameter reflective of the rate at which water moves through saturated soil.

All input parameters for soil texture classifications were based on the reference values in Table 6-1 of the City’s 2012 SMP and confirmed against published literature values. These values have been reproduced as Table 3.

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Table 3. Soil Infiltration Parameters (Green Ampt Method)				
Soil Texture Class	Saturated Hydraulic Conductivity (inches/hour)	Initial Moisture Deficit (fraction)	Suction Head (inches)	Percent of Contributing Drainage Area (%)
Sand	4.74	0.41	1.93	0
Loamy Sand	1.18	0.39	2.40	0
Sandy Loam	0.43	0.37	4.33	1
Loam	0.13	0.35	3.50	12
Silt Loam	0.26	0.37	6.69	79
Sandy Clay Loam	0.06	0.26	8.66	0
Clay Loam	0.04	0.28	8.27	0
Silty Clay Loam	0.04	0.26	10.63	4
Sandy Clay Loam	0.02	0.21	9.45	0
Silty Clay Loam	0.02	0.23	11.42	0
Clay	0.01	0.21	12.60	4

An area-weighted average value was assigned to each subbasin for each input parameter based on the distribution of soil texture class within the subbasin. The average input parameters for each subbasin are listed in Attachment B, Table B-2.

3.4 Land-Use and Impervious Percentage

Area-weighted impervious percentages were assigned to each subbasin based on an associated percent imperviousness for each land-use coverage in the City. Land use coverage and percent imperviousness by land use were adjusted from values used in the 2012 SMP due to refined zoning categories (i.e., impacts of House bill [HB] 2001) and improved methodology for calculating impervious coverage.

Land-use categories and coverages (reflecting existing development conditions and future, full-build out development conductions) were developed with the City in October 2021 using City zoning, comprehensive plan designations, developable lands/open space coverage, floodplain and wetland area designations, and impervious area coverages. The methodology of developing representative, current percent impervious percentages for each land-use coverage for this study is summarized in Section 2.3.2 of TM#1. A summary of the updated land use categories and associated impervious percentages are shown in Table 4 below.

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Table 4. Land-Use Categories		
SMP 2012 Categories	SMP Category	Representative Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15[b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential–Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City.

b. Adjusted as part of the calibration process for the Boeckman Creek Hydraulic Evaluation TM (1/31/22). See Section 5.1 of the TM.

An area-weighted average impervious percentage by subbasin was calculated for both existing and future development conditions based on the contributing land use and associated land-use based impervious percentages. The future land use coverage assumes conversion of vacant lands that are developable to their underlying zoning or comprehensive plan designation. The existing and future impervious percentage for each subbasin is listed in Attachment B, Table B-2 and shown in Attachment A, Figures A-3, and A-4.

The revised hydrologic input parameters discussed in this section inform the amount of runoff generated and ultimately routed through the hydraulic model as discussed in Section 4.

Section 4: Hydraulic Model Development

The City's existing InfoSWMM H/H model was initially developed as part of the 2012 SMP effort with minor, localized revisions for the Elligsen Pump-to-Waste evaluation completed in 2019. This most recent version of the H/H model was provided to BC in March 2021 and additional hydraulic updates were made as necessary for this SMP effort. The following subsections provide a description of the key hydraulic inputs required for the model and a summary of the hydraulic updates completed for this SMP.

4.1 Hydraulic Input Parameters

The InfoSWMM hydraulic model includes a network of nodes connected by conduits to represent the City's stormwater system in the model environment. Hydraulic information required by the model is stored within each node or conduit dataset. Within each node or conduit element, various hydraulic information is stored to govern the calculations and flow routing performed by the model.

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4.1.1 Node Data

Model nodes include structures such as manholes, outfalls, storage facilities and junctions. These elements are informed by the City's GIS. Model nodes also include other relevant connection points in the system not defined in the GIS such as connection points between continuous open channel segments. Key model node attributes are listed in Table 5.

Table 5. Model Node Attributes

Attribute	Value
ID	The ID is maintained from the original 2012 SMP model. New nodes were assigned an ID based on the City's GIS attribute information.
Invert elevation	Invert elevation of the junction in feet (vertical datum NAVD88)[a]
Rim elevation	Elevation at the ground level in feet (vertical datum NAVD88)[a]
Storage Volume (if applicable)	Stage storage relationship (Depth vs. surface area)

a. Vertical datum of GIS data discussed in Section 4.2.1.

Storage nodes within the model allow for the simulation of ponds, underground detention, and other flow control facilities within the City's stormwater network. Each storage node is assigned a stage storage relationship (depth. vs. surface area) to represent the available volume of storage at a given water elevation. Table 6 lists the storage facilities included within the H/H model, including both those reflected in the 2012 SMP and those newly added or modified as part of this SMP update.

Table 6. Model Storage Nodes

Storage Node ID	Description	SMP update status
POND_LIBRARY	Library Pond (Memorial Dr.)	Updated
POND_E1	Villebois–Palermo Park dry pond	No adjustment
POND_E2	Villebois–Palermo Park dry pond	No adjustment
POND_F	Villebois–Palermo Park dry pond	No adjustment
COCA-COLA_POND	Coca Cola Facility Pond (SW Kinsman Rd.)	No adjustment
RENAISSANCE_POND	Renaissance Development Pond (SW Canyon Creek Rd.)	No adjustment
STAFFORD_POND	Al Kader Shrine Center pond (SW Parkway Ave.)	No adjustment
WILSONVILLE_DIST_CTR_POND	Wilsonville Distribution Center pond (Boones Ferry Rd.)	No adjustment
TONKIN_NISSAN_POND	Tonkin Wilsonville Nissan Pond (SW 95th Ave.)	No adjustment
CANYON_CR_PH2_DET	Canyon Creek Business Park underground detention facility	No adjustment
CANYON_CR_ARCH_PIPE	Canyon Creek Business Park underground detention facility	No adjustment
POND_BOECKMAN	Area upstream of Boeckman Rd. flow control structure	Updated
SIEMENS_POND_B	Private pond on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
SIEMENS_POND_C&D	Private ponds on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
STAFFORD_MEADOWS_1_BASIN	Frog Pond West–Stafford Meadows pond (Boeckman Rd.)	Added
DAY_RD_IMPOUNDMENT	Impoundment south of Day Rd.	Added
TOOZE_POND	Villebois–Calais East (Tooze Rd.)	Added

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4.1.2 Conduit Data

Key attributes for conduits (i.e., pipes, culverts, and open channels) include ID, length, invert elevations, slope, shape (i.e., circular, or open channel cross-section), inlet and outlet losses, and Manning's roughness coefficient. The existing model conduit ID and naming convention was maintained for this SMP update. In locations where new conduits were integrated into the model, an ID was assigned based on the City's GIS attribute information.

Manning's roughness coefficient "n" is dependent on the material of the conduit. Table 7 provides a list of the roughness values applied, which are consistent with the documentation for the 2012 H/H model.

Table 7. Model Conduit Roughness

	Manning's *"n"* Roughness Coefficient
Pipe Material and Open Channel	Polyvinyl chloride (PVC) Pipe: 0.011
	Reinforced Concrete Pipe (RCP): 0.013
	Concrete Pipe: 0.013
	Corrugated Metal Pipe (CMP): 0.024
	Open channels: 0.035

4.2 Hydraulic Updates

Hydraulic model updates completed for this SMP update include model expansion, primarily in new growth areas since the previous 2012 SMP was completed or in identified problem areas (see TM#1), and model updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects. These areas were discussed in a System Status and Modeling Extents workshop with City Staff in August 2021 to identify/confirm the specific locations for hydraulic model updates and documented in TM#1. Hydraulic updates used the City's GIS data (provided June 2021) as the primary source information and supplemented by City provided as-built drawings and field verification where necessary. Additional hydraulic model refinement described outside of this section was completed as part of the model validation adjustments discussed in Section 5.3.

4.2.1 Vertical Datum Resolution

The original hydraulic model used inconsistent vertical datums to reflect elevations of hydraulic model elements. Based on discussions with the City, this inconsistency was determined to be due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted all existing hydraulic model elevations to be consistent with the City's current standard of NAVD88. Details and assumptions related to the identification and correction of datums is included in TM#1, Section 2.1.2. With this effort complete, future hydraulic updates (Section 4.2.2) were able to be integrated into the model under a consistent datum.

4.2.2 Model Update and Area Expansion Locations

Hydraulic model updates were completed from May 2021 through May 2022 as additional data were received and concurrently with the problem area identification process (see TM#1 Section 5.1). This process supported the initial identification of stormwater problem areas for the City, as locations requiring modeling to validate an observed problem. Additionally, expanded modeling helps to identify new problem areas or predict future problem capacity deficiencies.

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Table 8 summarizes the specific locations of hydraulic model updates that were integrated into the City's InfoSWMM model for this SMP update. Comprehensive locations of hydraulic model updates are shown in Attachment A, Figure A-5.

Table 8. Hydraulic Model Update Summary

Date Completed	Type of Revision	Rationale for Update	Location	Description
May 2021	Update	Topographic survey	Boeckman Creek	Integrated open channel cross-sections surveyed in the vicinity of Boeckman Rd. crossing. Revised stage storage relationship of Boeckman Pond based on survey information.
June 2021	Update	Constructed capital project	Charbonneau	Revised model to incorporate Charbonneau pipe upsizing associated with CP SD9022-9025 (Old Farm Rd. Phase I) and CP SD9014-9016, & SD9030 (French Prairie Drive Phase II).
June 2021	Update	Constructed capital project	Barber Street	Revised model to incorporate pipe upsizing along Barber St. associated with CP SD4208 and SD4209.
August 2021	Update	GIS discrepancy	ODOT yard west of I-5	Updated diameter of modeled culvert from 40-in to 42-in to match GIS data.
August 2021	Update	GIS discrepancy	Boones Ferry Rd.	No model adjustment needed north of 5th St. for existing 24-in pipe segment. City rectified GIS data to match the 24-in pipe shown in model. Model adjusted south of 5th St. to reflect pipe upsizing to 30-in shown in GIS.
August 2021	Update	GIS discrepancy	Wilsonville Rd.	No model adjustment needed. City rectified GIS data to match 30-in pipe shown in model.
August 2021	Update	GIS discrepancy	Graham Oaks Nature Park	Adjusted model to follow correct piping alignment shown in GIS.
August 2021	Update	GIS discrepancy	Boeckman Rd. (west of I-5)	Adjusted pipe diameter to 24-in to reflect latest GIS data.
August 2021	Update	GIS discrepancy	Hillman Ct.	No model adjustment needed. City rectified GIS data to match 24-in pipe shown in model.
October 2021	Update	Problem area and site visit	Kinsman Rd.	Model adjusted to incorporate field measurements (rim and measure-down elevations) collected by Public Works.
October 2021	Update	Problem area and site visit	Town Center Loop	Model adjusted to incorporate field measurement of ODOT reducer (12-in) collected by Public Works.
November 2021	Expansion	Problem area and site visit	Tooze Pond	Model expanded to include Tooze Pond detention facility. Stage-storage relationship estimated form City provided as-built drawings.
November 2021	Update	Problem area and site visit	Day Rd. to Ridder Rd.	Model updated with culvert information (diameter, length, inverts) surveyed in 2019 as part of the Coffee Creek Stormwater Facility Study. Surveyed open channel information not incorporated.
November 2021	Update	Boeckman Creek Hydraulic TM	Boeckman Road flow control structure	Integrated as-built information to update flow control structure elevations and the storage capacity of the pond upstream of the flow control structure.
November 2021	Update	Boeckman Creek Hydraulic TM	Mentor Graphics/Siemens	Model updated based on survey information collected as part of the Boeckman Road Improvement Hydraulic Evaluation. Survey information included geometry and elevations of the Boeckman Creek diversion structure and weirs. Onsite Siemens ponds added to the model based on as-built drawings.

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Table 8. Hydraulic Model Update Summary				
Date Completed	Type of Revision	Rationale for Update	Location	Description
December 2021	Expansion	New growth	Garden Acres Rd.	Expand model to include piped stormwater infrastructure along Garden Acres Rd. to Coffee Creek outfall.
December 2021	Expansion	New growth	Villebois	Expand model to include additional large diameter (>18-in) pipe within the Villebois planning district.
December 2021	Expansion	Problem area and site visit	Willamette Way E	Expand model to include additional infrastructure associated with Belnap Court outfall and Bonneville Power Administration (BPA) easement outfall.
February 2022	Update/Expansion	Problem area and site visit	Meridian Creek at Boeckman Rd. (Frog Pond)	Revised Meridian Creek culvert information based on City provided as-built drawings. Expanded model to include the open channel and "Stafford Meadows 1 Basin" detention pond upstream of the culverts.
May 2022	Expansion	Problem area and site visit	Day Rd. impoundment	Impoundment south of Day Rd. added to model based on as-built information provided by the City.

Section 5: Model Validation

The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. Flow monitoring and model calibration was not specifically conducted as part of this SMP update. The validation process involved several successive steps, as described below, leading to refinement of model input data to ultimately support the use of the H/H model to identify and develop CPs under this SMP update. The validation process included discussion of intermediate modeling results with the City during regular project check in meetings, which informed additional hydraulic modeling updates where the incorporation of as-built information was necessary.

The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments determined as part of the Boeckman Road Hydraulic Evaluation (1/31/22).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

5.1 Boeckman Road System Calibration

The Boeckman Road Hydraulic Evaluation (1/31/22) is a separate but concurrent study conducted as a precursor to the Boeckman Road Corridor Project (BRCP). This study utilizes the same, updated, citywide InfoSWMM H/H model as being updated for this SMP. The study calibrated the H/H model for the Boeckman Creek basin based on flow monitoring data collected at the Boeckman Road flow control structure from March to June 2021. This flow data represents drainage from approximately 1,400 acres of the study area, specifically the upper Boeckman Creek watershed that drains to the Boeckman Road flow control structure.

Calibration adjustments integrated into the H/H model are summarized in Table 9 below.

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Table 9. Boeckman Rd. Hydraulic Evaluation Calibration Adjustment Summary	
Adjustment	**Description**
1. Baseflow addition	Added constant 0.4 cubic feet per second of inflow to the Boeckman Creek system and simulated the three preceding months of rainfall to replicate antecedent conditions.
2. Residential Agriculture (RA) Land Use Impervious Percentage	Revised the initial RA impervious percentage from 6 to 15 percent. This adjustment affected hydrology citywide.
3. Mentor Graphics/Siemens survey results (2022)	Updated model to better represent existing conditions of private stormwater infrastructure, which included the Boeckman Creek diversion structure and weirs.

These calibration adjustments result in model results that match (within 3 percent) the peak instream flow for the selected calibration storm (June 11-15, 2021). Since conveyance infrastructure is sized based on peak flows, matching peak flow was the primary objective for this calibration effort. Detailed results of this calibration process including assumptions and rationale are described in the Boeckman Creek Hydraulic Evaluation TM, dated 1/31/22.

The calibration adjustments were applied to the citywide H/H model as the initial validation step for this SMP update. The anticipated impact from these calibration adjustments is not expected to be substantial; however only adjustment #2 from Table 9 directly impacts basins outside of Boeckman Creek watershed. Residential agriculture (RA) land use only comprises a small portion of the study area (approximately 14 percent), and most of this area is outside of the city limits. As such, additional validation efforts beyond the Boeckman Road Hydraulic Evaluation calibration adjustments alone were needed to sufficiently validate the citywide model.

5.2 Model Validation

To further validate the City-wide model, a validation storm event from January 4 to 7, 2022, was selected by City staff for simulation in the H/H model. This event was identified based on reported flooding observed by Public Works staff near Day Road and Commerce Circle (NW portion of City limits). Available information for this storm event included anecdotal accounts of flooding, photographs, and water surface measurements. The 15-minute rainfall data was collected from a nearby rain gauge.

Public Works staff provided several photographs from January 6 (time unknown) to document the reported ponded water south of Day Road as shown in Figure 1.

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Figure 1. Validation observations (south of Day Road)

To correlate observed standing water conditions with measured data, BC staff collected a water depth measurement downstream of the observed flooding per Figure 2 (left) on January 7, 2022 at 11 a.m.. This measurement was collected at one of the 48-inch culverts underneath Ridder Road. While this measurement was collected after the peak of the storm event, water levels within the culvert remained high, as the culvert was approximately 67 percent full as shown in Figure 2 (right) below.

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Figure 2. Validation measurement location (48-in. culvert underneath Ridder Road)

Left: Location of culvert. Right: Depth of water in culvert.

Rainfall data for this validation storm event was obtained from a rain gauge owned and operated by Clean Water Services (CWS) located along 99W Pacific Hwy between King City and Sherwood near the Tualatin National Wildlife Refuge. The gauge is identified by CWS as "LTR" and is approximately 5.75 miles from the Boeckman Road and Boeckman Creek crossing. This rain gauge was also used for the model calibration effort conducted for the 2012 SMP. The validation storm event rainfall is plotted (15-minute increments) on Figure 3, and storm characteristics are summarized in Table 10.

Table 10. Validation Storm Event

Statistic	Storm 1
Start Date/Time	1/4/22, 12:00
End Date/Time	1/7/22, 12:00
Duration, hours	72
Total Rainfall, inches	1.76
Peak Intensity, inches/hour	0.28

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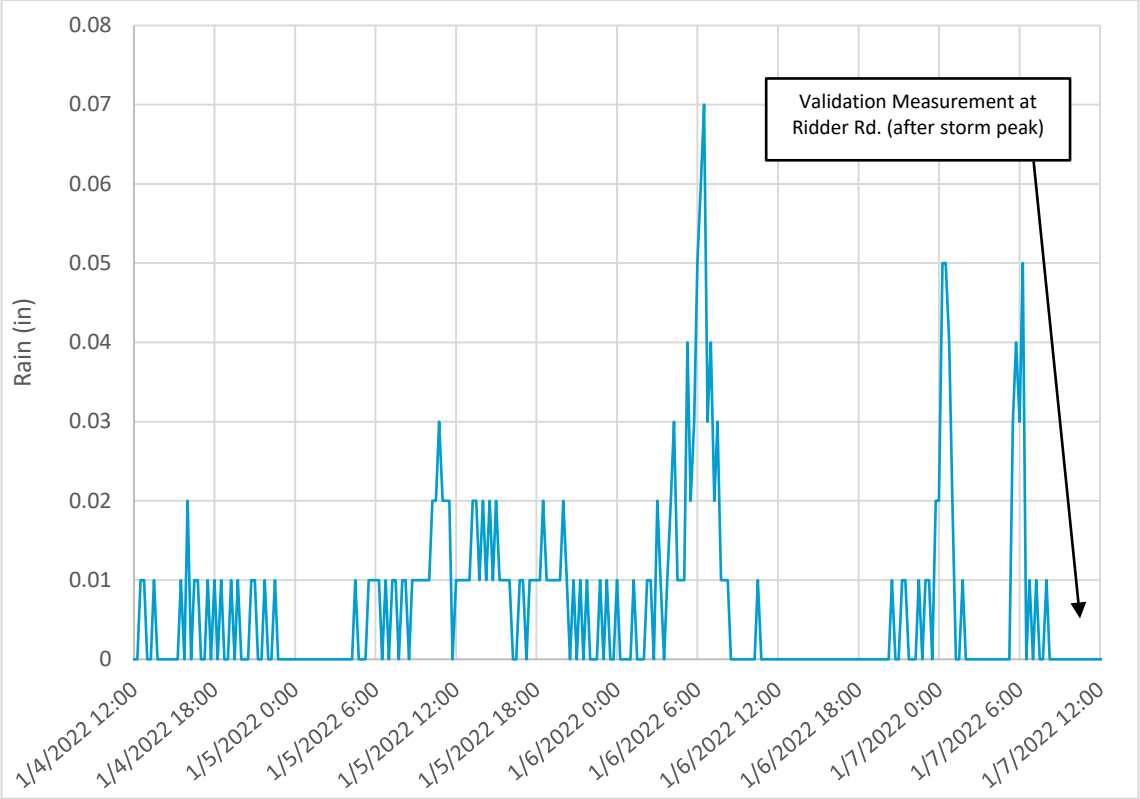

Figure 3. January 2022 validation storm event

5.2.1 Model Simulation

The validation storm was simulated in the H/H model to attempt to replicate the observed water surface elevations within the culverts at Ridder Road. The validation model simulation was unable to replicate observed conditions (i.e., standing water), indicating a discrepancy between the model results, City staff observations and BC measurements. The validation model results underpredicted the water depth measurements collected at the culverts underneath Ridder Road (Figure 2). While field measurements indicate that the culverts were approximately 67 percent full, the validation model predicted that the culverts would only be 11 percent full during that same period of the storm.

The discrepancy between the measured and simulated water surface elevation was attributed to the model not fully representing actual upstream hydraulic conditions from the culverts at Ridder Road. The modeled hydraulic reach between Day Road and Ridder Road includes simplified geometry to represent the open channel conveyance (trapezoidal cross-sections) and does not include the large wetland area north of Day Road nor the impoundment directly south of Day Road. In addition, it is suspected that during the storm event, the buildup of vegetation and sediment along this reach significantly contributed to backwater conditions and elevated water surface levels throughout the system.

5.2.2 Hydraulic Model Updates (Commerce Circle)

Adjustments to the system hydrology and hydrologic input parameters were briefly discussed with City staff but ultimately not made to resolve the large discrepancy in water surface elevations at the Ridder Road culverts. Rainfall patterns and storm volumes can vary significantly, and the rainfall gauge used to obtain the rainfall data is a relatively far distance from the validation location. Also, any adjustment to the hydrologic input parameters to increase flows at this location may have unintended consequences (i.e., impact CP sizing in other locations). The drainage area to the Ridder Road culverts is relatively small compared to the

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overall City's contributing drainage area. Therefore, it was decided that hydrologic adjustments associated with the model validation effort are not preferred and hydraulic model refinements should be made.

The hydraulic model between Day Road and Ridder Road was reviewed and updated based on available survey data within the general system area. Representative channel cross-sections were developed using the preliminary design information for AKS' 2019 Coffee Creek Stormwater Facility Study including the topographic data for the area collected by the survey team. This provided a more accurate representation of channel geometry in comparison to the conceptual trapezoidal channels included in the 2012 SMP model, although the change in the model results for the validation storm was marginal.

5.3 Preliminary Flooding Results and Additional Model Adjustments

With the large disparity in validation model results in the Day Road and Commerce Circle system (Section 5.2), it was decided jointly with the City to use a more comprehensive approach to qualify other flooding locations throughout the City.

Preliminary model results (reflecting validation adjustments described above) were discussed with the City in May 2022. This review focused on newly identified flooding locations (i.e., the 2012 SMP did not define a CP to address flooding in a specific location) throughout the City based on the 25-yr design storm (City's conveyance standard) under existing conditions. The preliminary flooding results were reviewed to identify and confirm deficiencies within the City's drainage network.

Locations with predicted flooding were cataloged in a summary table (Attachment B, Table B-2) and mapped (Attachment A, Figure A-6). City staff provided input on the preliminary modeled flooding locations as well as provided additional information (as-builts) to help refine the model prior to producing finalized results. City staff confirmed known flooding locations and locations where model flooding may not be indicative of a real-world issue.

In general, City staff agreed with the preliminary flooding results presented by the model. Preliminary flooding locations where City staff were not aware of issues were reviewed in detail to confirm their hydraulic configuration and whether the contributing drainage area and subbasin delineation was representative. For several locations where flooding had not been previously known by City staff, modeled flooding was resolved by further subdividing subbasins to simulate runoff entering the piped hydraulic system more accurately. It was decided jointly with the City that these adjustments were reasonable to resolve the issues and further effort should focus on the higher priority locations.

Additional locations (per Attachment A, Figure A-6) warranted hydraulic updates based on updated information provided by the City. These locations include:

- Location #2 Charbonneau SW French Prairie Rd. Outfall. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- Location #6 Library Pond. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- Location #11: Penske Truck Rental Property. Model revised to reflect updated culvert information underneath parking lot based on as-built drawings.
- Location #15: Wilsonville Distribution Center Pond: Model revised to reflect pond outlet structure based on as-built drawings.

Following hydraulic model adjustments, several locations are still predicted to flood despite City staff not being aware of any issues. These locations are outlined in Attachment B, Table B-1 as location IDs without narrative in the "City Validation Notes" column. Completion of the City-driven validation adjustments to the hydraulic model concluded the validation effort for the model. As previously discussed, traditional validation

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efforts for this H/H model were not feasible due to limited data. BC relied on feedback from City staff as part of this validation effort as it provided the most realistic path forward to continue with the capacity evaluation (Section 7) and advance CP development without requiring additional extensive data collection or flow monitoring.

Section 6: Future Flow Condition Modeling Analysis

During the model development process (Sections 3 and 4), BC evaluated different future flow assumption methodologies to determine impacts on runoff rates and ultimately CP sizing.

This analysis was initiated based on efforts to expedite design of a culvert replacement project at Meridian Creek at Boeckman Road (Problem Area #2) in February 2022. In this location, upstream development complies with current City stormwater design standards and incorporates various low impact development (LID) and flow control facilities and practices. As the sizing of CPs is typically independent of the presence of onsite facilities, the impact of onsite treatment and flow control on CP sizing was considered. While the immediate applicability of this effort was intended to inform this specific design effort (implemented and funded as part of the Boeckman Road Corridor Project), it was acknowledged that the future flow assumptions established here should apply to CPs developed as part of this SMP. This section documents the analysis for application to the SMP.

6.1 Background

The 2012 SMP developed CPs with a future flow condition that assumed each contributing subbasin would be fully built out to its zoning coverage. Future condition hydrology was developed from this future land use condition to size applicable stormwater infrastructure (i.e., pipes, culverts, ponds, etc.).

Since adoption of the 2012 SMP, the City revised their Stormwater and Surface Water Design and Construction Standards (2015). As part of this revision, developers are required to maintain pre-development runoff characteristics to minimize the effects of sediment transport and erosion, as described in Section 301.1.05 below:

> Stormwater management facilities shall be designed to maximize groundwater recharge through the process of infiltration of runoff into vegetated facilities and the use of what is referred to as Low Impact Development (LID) facilities and/or flow controls to address hydromodification.
>
> *Section 301.1.05, Wilsonville Stormwater and Surface Water Design and Construction Standards, 2015*

Compliance with this requirement provides a level of flow control for new development that was not accounted for in the 2012 SMP methodology for estimating future flows. If the same methodology is used, there is a potential to oversize CPs, as any upstream flow mitigation provided by LID facilities may reduce the peak flow to be managed by the constructed CP. The objective of this analysis was to evaluate whether implementation of onsite LID facilities should adjust the future flow methodology for CP development.

6.2 LID Facilities Modeling Approach

Evaluating the direct impact of future LID facilities associated with future development using the InfoSWMM H/H model is inherently difficult as the configuration and location of these facilities is unknown. InfoSWMM is capable of modeling specific LID facilities through its hydraulic module, but requires several known inputs such as invert elevations, depth/storage curves, outlet structure geometry, and specific locations within the drainage system to accurately retain and route flow.

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Due to the absence of this information, the impact of future LID facilities was estimated through InfoSWMM's hydrologic module, specifically by adjusting the Sub-Area routing feature. The Sub-Area routing default within InfoSWMM routes all impervious and pervious area associated with a subbasin directly to the outlet (outlet routing). An optional configuration called percent routing, allows for a percentage of the impervious area within a subbasin to be routed over the pervious area within a subbasin prior to reaching the outlet. This is illustrated in Figure 4, originally published in the EPA Storm Water Management Model Reference Manual Volume I, Hydrology.

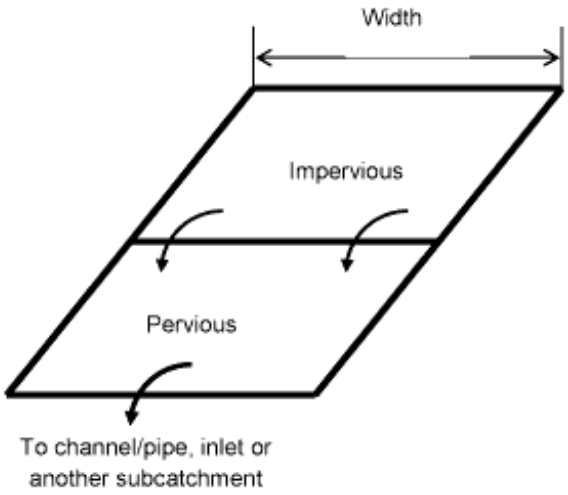

Figure 4. Percent routing diagram

Use of this percent routing feature within InfoSWMM is a simple routing mechanism. Available literature on this routing feature reflects its usage to approximate impacts of LID facilities within a subbasin, as it slows the timing of peak flow and allows for flow attenuation and additional infiltration.

The percent routed can range from 0 percent (direct outlet routing) to 100 percent (all runoff from impervious area routed to pervious area). To assess the sensitivity of the percent routing option on peak flows within the model, three different future alternative scenarios were simulated in addition to the traditional outlet routing model:

- PERV=75 percent
  - Routes 75 percent of impervious area over pervious area (less conservative)
- PERV=50 percent
  - Routes 50 percent of impervious area over pervious area
- PERV=25 percent
  - Routes 25 percent of impervious area over pervious area (more conservative)
- Outlet Routing
  - Impervious area and pervious area are routed directly to outlet (most conservative)

6.3 Results

The different future alternative scenarios were simulated for several design storms to assess relative impact on peak flows specific to the location of the Meridian Creek culvert replacement project. Results for the 10-yr design storm and the 100-yr design storm (culvert design standard) are shown below on Figures 5 and 6, respectively.

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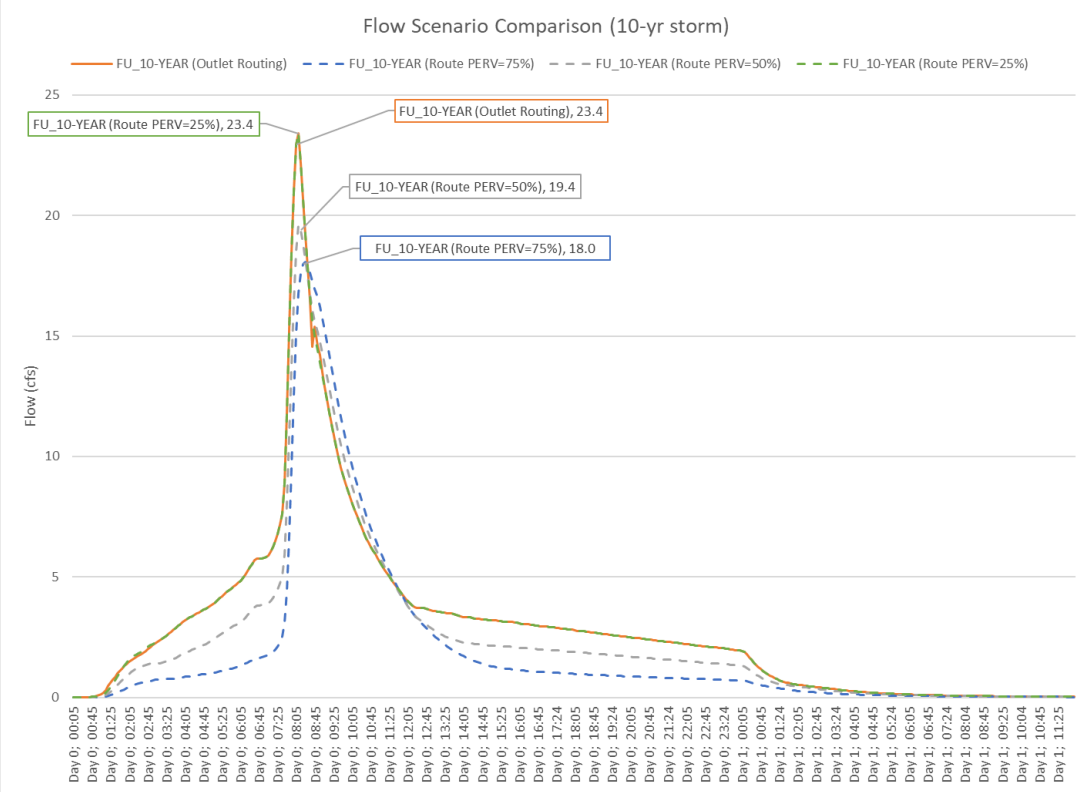

Figure 5. Meridian creek culvert–10-yr design storm

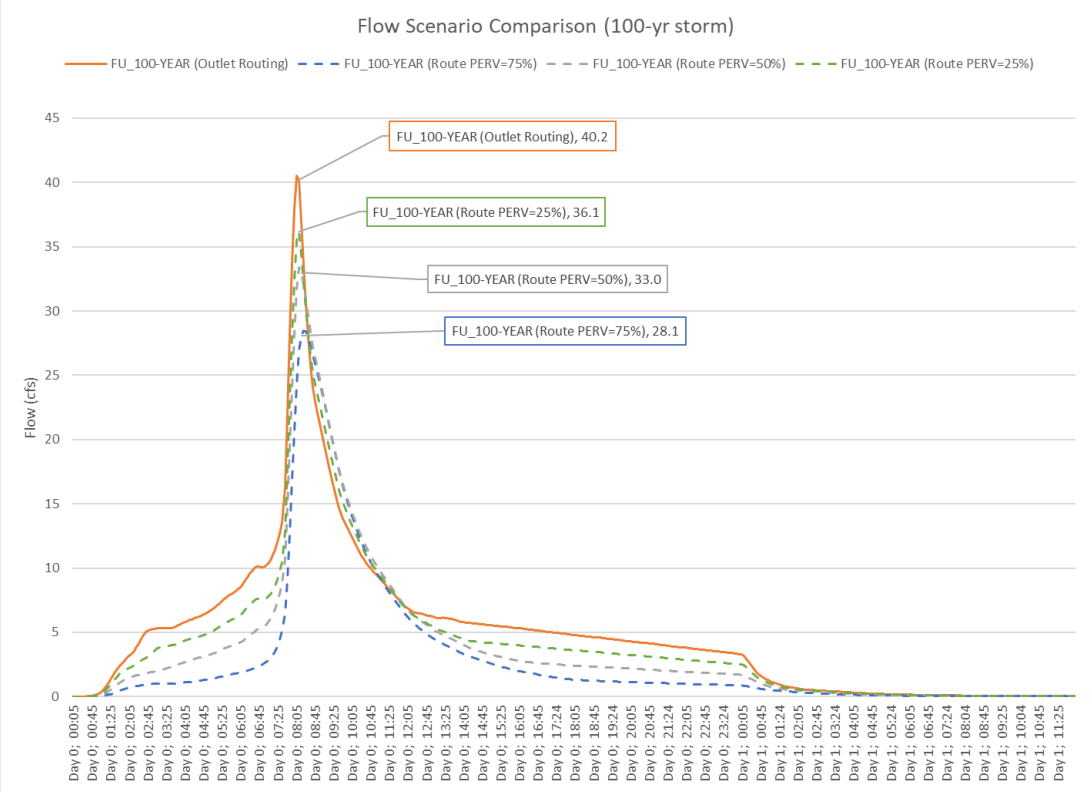

Figure 6. Meridian creek culvert–100-yr design storm

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Based on these sensitivity model runs, the following conclusions regarding peak flow percent routing were reached:

- Increasing percent routing for a subbasin reduces anticipated peak flows.
- Percent routing has a greater impact on anticipated peak flows for larger design storms (i.e., 100-yr design storm)
- Percent routing has a greater impact on subbasins with lower impervious percentages (undeveloped/vacant lands).
- For smaller design storms (i.e., 10-yr design storm) the anticipated peak flow difference between outlet routing and PERV=25 percent is insignificant.

Based on these conclusions, and the desire to build some conservatism into the sizing for future CPs, it was decided jointly with the City to proceed with future condition modeling without subbasin percent routing. It was acknowledged that this approach may lead to the oversizing of some stormwater infrastructure; however, this would only be where the contributing drainage area is primarily undeveloped.

Section 7: H/H Model Evaluation and Results

Upon completion of the model validation effort (Section 5), detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm. H/H model inputs and results are summarized for the hydrologic and hydraulic models in Tables B-2 and B-3, of Attachment B, respectively. The following sections present the findings resulting from the model and how the model will inform CP development efforts.

7.1 Hydrologic Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events. Future land use conditions represent the development of developable (vacant) lands per their associated zoning category or adjusted zoning coverage for select, developed lands based on anticipated zoning in accordance with House Bill (HB) 2001.[1]

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. Attachment A, Figure A-7 presents subbasins within the study area and their anticipated increase in peak flows (based on percentage) from existing to future land use conditions.

The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow). As noted in Section 6, flow attenuation during new development is anticipated through implementation of the City's stormwater design standards, but for purposes of this SMP, CP sizing will be based on unmitigated flows.

Detailed hydrologic inputs and peak flow results for all subbasins and design storms are included in Attachment B, Table B-2.

[1] HB 2001 was passed by the 2019 Oregon State Legislature and requires Cities to allow for middle housing (e.g., duplexes) for properties zoned as single family residential.

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7.2 Hydraulic Results

Hydraulic model results identify flooding locations with the intent to develop CPs to increase conveyance capacity and resolve flooding. For purposes of this evaluation, and as referenced in Section 2.2, flooding within the model was defined as locations where the hydraulic grade line exceeded the node rim elevation. Node flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storm flooding locations were also identified as shown in Attachment A, Figures A-8 and A-9. Using results from the three design storms, flooding locations were discussed with the City and cross-referenced with the Problem Area Matrix (Table A-1 of TM#1) to confirm the need to develop a CP for inclusion in the SMP.

As described in Attachment B, Table B-1, there are a total of 17 locations that continue to experience flooding in the existing condition. Of these, three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and may require alternatives analysis to ensure that City objectives and preferences will be achieved. Description of these key flooding locations is provided below.

7.2.1 Charbonneau

Flooding is predicted within the SW French Prairie Rd. area of the Charbonneau District during rainfall events starting at the 2-yr design storm. Deficiencies (capacity and condition) in stormwater infrastructure within Charbonneau were previously identified in the 2012 SMP and subsequent Charbonneau Consolidated Improvement Plan (2014). Since the completion of those studies, some of the recommended pipe improvements have been completed and as-builts or revised GIS is integrated into the updated hydraulic model (see Table 8).

As part of the model validation exercise (Section 6), this area was reviewed in detail to investigate predicted flooding in the model since model results should incorporate completed pipe upsizing projects. Discussions with City staff led to an in-depth review of the as-builts for an emergency outfall repair project adjacent to 31233 SW Edgewater Pl. completed in 2019. Review of the as-builts indicated that the damaged section of the 30-inch corrugated metal pipe (CMP) was removed and replaced with a lined 30-inch CMP. The outfall pipe was not upsized to 36-inches as recommended by the 2012 SMP due to limitations associated with the emergency repair. While the lining of the pipe increases flow (reduces pipe roughness), the H/H model still indicates this section of pipe is a bottleneck in the system resulting in an elevated hydraulic grade line upstream of the outfall as shown on Figure 7 below.

To address predicted flooding, CP development at this location will evaluate options to incorporate detention into the upstream (non-replaced) portions of the collection system, to reduce peak flows downstream. Since available space is limited within the area, concepts that utilize a limited footprint such as detention pipes will be explored.

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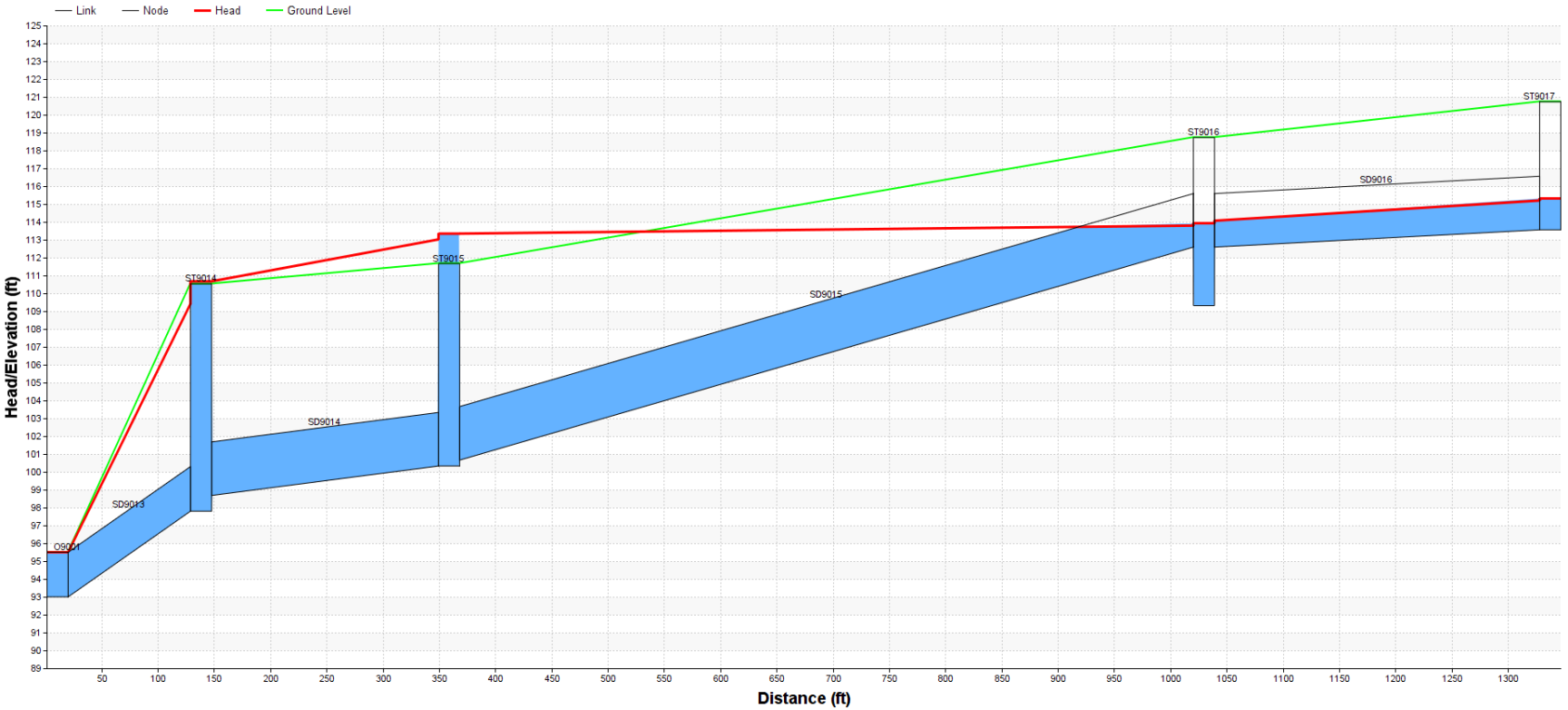

Figure 7. Charbonneau outfall–hydraulic grade line 25-yr design storm

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7.2.2 SW Garden Acres Rd./Peters Rd.

Starting at the 2-yr design storm, flooding is anticipated along the stormwater collection system running north to south along SW Garden Acres Rd. and Peters Rd. The modeled capacity issue at this location is caused by a constriction due to undersized pipes (24-inch/27-inch) prior to the system discharging to the Coffee Lake Creek wetlands as shown on Figure 8 below. The upstream drainage area to this piped system is expected to develop into a high impervious land use type (industrial) and as such currently contains large diameter conveyance pipes (42-inch/48-inch). Future development will further exacerbate the predicted flooding at this location. This location is a known issue for the City, and a CP will be developed at this location to address the capacity issues.

Early discussions with the City have identified potential issues to upsize the undersized pipe, due to the fact the alignment transects the railroad right-of-way and discharges to a greenspace property owned by Metro. To avoid railway and Metro conflicts, the City has suggested retrofit of existing (private and public) ponds along the pipe alignment near the terminus of Peters Road to provide additional flow mitigation (discussed further in Section 8.1). In addition, alternative alignments may also be considered to divert runoff from the identified pipe constriction near the existing outfall. One possibility that could avoid the railroad right-of-way and Metro property would be to install new piping along SW Clutter Rd. to the west and along Grahams Ferry Rd. to the south to outfall into Coffee Lake Creek wetlands. This concept is preliminary and will need to be investigated and tested further with the City once CPs start to be developed.

7.2.3 Commerce Circle and Day Road

Starting at the 2-year design storm, model results indicate that the open channel to the west of Commerce Circle continues to be a flooding problem area. Banks of the open channel and the existing impoundment adjacent to Day Road are expected to overtop during larger storm events. These model results are consistent with the modeling/CP development for the 2012 SMP, and the follow up study “Coffee Creek Stormwater Facility Study” completed by AKS in 2019.

This location has several deficiencies within the waterway such as undersized culverts, heavy buildup of vegetation/debris, and segments with negative grade. Historically, this location has been particularly difficult to address due to space constraints, limited available grade, and the original drainage design allowing for the adjacent parking lots to flood to provide detention. This SMP update will build upon previous preliminary design concepts to develop a refined option for implementation.

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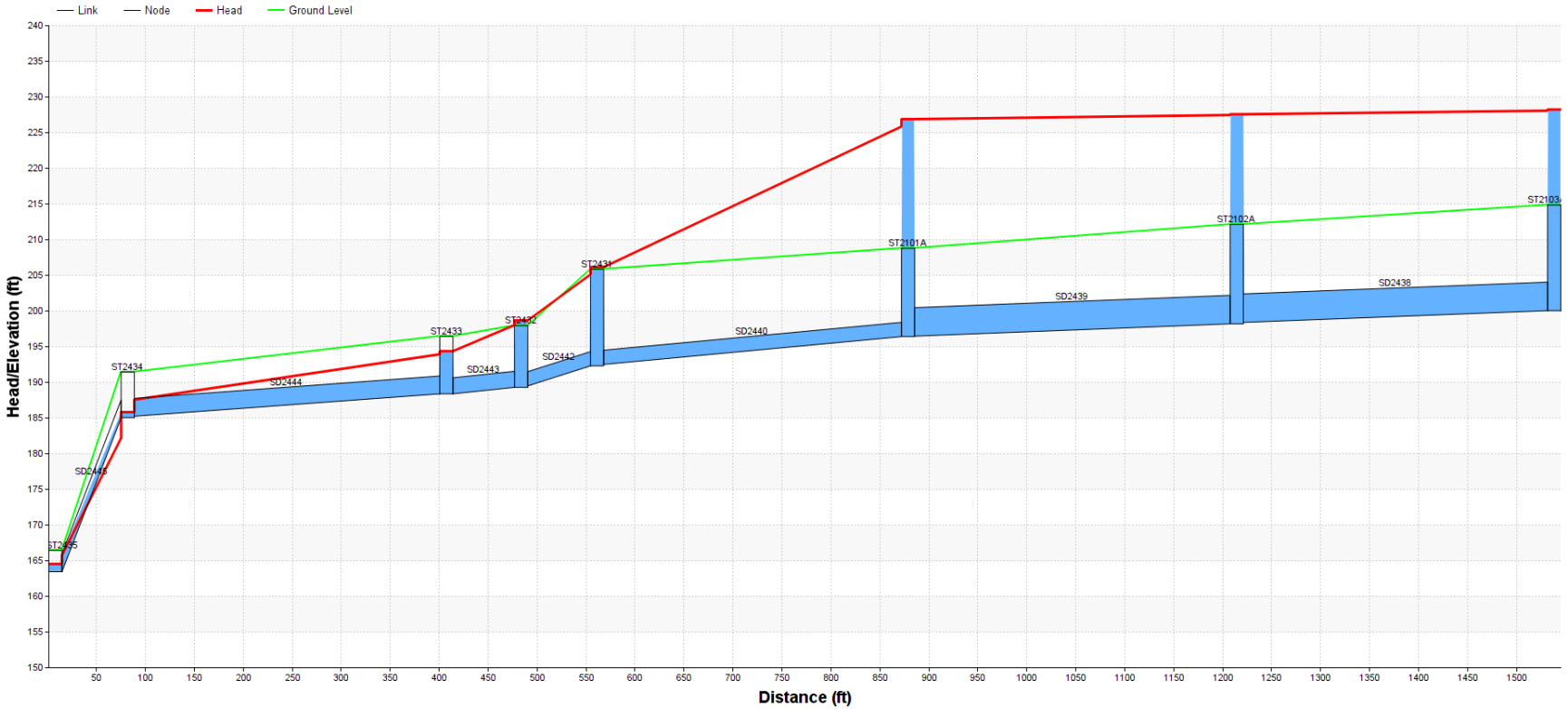

Figure 8. Peters Road–hydraulic grade line 25-yr design storm

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Section 8: Retrofit Analysis

In conjunction with the H/H modeling evaluation of the City's stormwater system, BC initiated efforts to investigate additional project opportunity locations where the addition of new water quality and/or detention facilities or the reconfiguration of such facilities can provide regulatory or development benefit within the City.

To assist in this analysis, a working map was developed to facilitate the identification of potential retrofit locations. Key elements displayed on this figure included potential property (classified as vacant, parks, open space, or City owned), ponds (public and private), water quality projects from the 2012 SMP, best management practice drainage areas, and future transportation corridors. This retrofit figure is included in Attachment A, Figure A-10.

Based on review of the retrofit analysis figure and City staff preferences, the following objectives (strategies) were developed to guide the retrofit analysis:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects generally align with water quality-related projects per the 2012 SMP. This effort supports requirements of the 2021 National Pollutant Discharge Elimination System municipal separate storm sewer permit, which requires permittees to revisit the 2015 Retrofit Assessment and provide a status update.
2. Integrate water quality and/or flow control into existing project opportunity areas (where possible).
3. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation.

Identification of new facilities to support anticipated development and growth was not considered a preferred retrofit strategy, given the fact that private development already has to adhere to the City's prescriptive stormwater design standards. These strategies helped to inform the retrofit projects and program discussed below.

8.1 Potential Retrofit Project Locations

Retrofit project locations were organized into two primary categories: previously identified locations and new opportunity locations. Applicable and relevant project opportunities are discussed in the following subsections to document potential locations for future CP development.

8.1.1 Previously Identified Opportunities

The 2012 SMP originally identified 14 restoration and 7 LID projects. These projects were reassessed and prioritized as part of the 2015 Retrofit Assessment.

For this SMP update, these projects were revisited to confirm implementation status and continued applicability in conjunction with current retrofit objectives. To track these projects and document discussions with City staff, Table 11 below was produced.

In this table, eight projects were removed (see gray shading) from consideration either due to them already being completed or no longer being feasible. Most projects were deemed still applicable and thus have been retained for inclusion in the overall project opportunity list.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	**16**	4	2	2	2	3	1	0	2	Reflect in Program
LID7	SW Wilsonville Road Stormwater Planters	No	No	**16**	4	2	2	2	3	1	0	2	Reflect in Program
CLC-10B	Coffee Creek Storm Projects	No	Yes	**16**	4	2	2	2	2	1	1	2	Not Applicable–reflects CLC-1. Project number is unique to the Retrofit Assessment source document.
BC-5	Boeckman Creek Outfall Realignment	No	No	**13**	2	0	0	3	3	2	1	2	Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with a Boeckman Road mitigation need (Creekside Woods Pond). Not considered a retrofit but keep as a Project Opportunity Area.
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	**13**	2	2	3	2	0	3	0	1	Referenced as a long-term project need from source document of retrofit assessment. Project location overlaps with Siemens/Ash Meadows. Current METRO project may also negate the project need. Remove from Project Opportunity List.
BC-4	Gesellschaft Water Well Channel Restoration	No	No	**13**	2	0	1	3	2	1	1	3	Project may be constructed in conjunction with other infrastructure projects (Interceptor Trail). Not considered a retrofit but keep as a Project Opportunity Area.
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	**13**	4	3	2	2	0	1	0	1	Reflect in Program
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	**12**	2	0	1	3	0	2	1	3	Short term/High priority CIP need per source document from retrofit assessment. Maintain as a retrofit project and keep as a Project Opportunity Area (combined with problem area).
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	**12**	0	0	3	1	3	2	1	2	Mid-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
WD-4A	Willamette Way West Outfall Replacement	No	No	**11**	2	0	0	3	0	2	1	3	Project location is being monitored. No immediate project need. Remove as a Retrofit project and Project Opportunity Area.
WD-4B	Belknap Ct Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
WD-4C	Morey Ct West Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	**9**	0	0	0	1	3	2	1	2	Project involves rehab of 5 existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with other infrastructure projects. Not considered a retrofit but keep as a Project Opportunity Area.
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	**9**	0	0	3	0	2	2	0	2	BC-10 enhances the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream (Problem Area #52 & BC-9). Mid-term project need from source document of retrofit assessment. Project location overlaps with potential Boeckman Road flow mitigation site. Keep as a retrofit project and Project Opportunity Area.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	**8**	2	1	0	2	0	1	1	1	Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-2	SW Parkway Avenue Stream Restoration	No	No	**8**	0	0	3	1	0	2	0	2	Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.
CLC-8	Coffee Lake Creek Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed. This location is associated with 5th and Kinsman Project–Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-4	Ridder Road Wetland Restoration	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).

a. *Overall score is based on a maximum 23 points possible.*

TMDL = total maximum daily load

WLA = waste load allocation

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8.1.2 New Opportunities

In addition to the projects previously identified in the 2015 Retrofit Assessment, this SMP update identified several opportunities to integrate water quality and/or flow control into an existing project opportunity or retrofit an existing, underutilized facility. These opportunities and their preliminary retrofit concept are summarized in Table 12.

Table 12. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Existing Project Opportunity	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-and-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. piped stormwater system may be able to be reconfigured to provide a flow control benefit. Opportunity to help to mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Existing Project Opportunity and Underutilized Facility	Existing swale is not draining properly. Swale needs retrofit.
Canyon Creek Park	Existing Project Opportunity	Existing park property has potential to construct a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

While these are the opportunities identified to date, additional opportunities may be identified in the future especially with the current design efforts associated with the BRCP. As part of the BRCP, mitigation opportunities associated with Boeckman Creek are currently being identified and evaluated for future project development. Any projects that result from the BRCP will be coordinated with projects developed as part of the SMP update. At this time, preferred mitigation opportunity locations have also been integrated into the larger project opportunity list for this SMP.

8.2 Potential Programs

To allow for the opportunistic integration of water quality in conjunction with transportation or other utility replacement projects, this retrofit assessment identified two potential programs that would provide a general funding mechanism to support retrofit strategies. These programs include the following:

- Green Street/LID Facilities–Allocate approximately $250,000/year to support green street and LID facility installations of facilities in conjunction with already planned utility work for select roadway improvements. This would allow for continued expansion of water quality treatment areas in areas without any existing treatment.
- Porous Pavement Pilot Study–Allocate approximately $25,000/year to install porous pavement overlays in conjunction with scheduled pavement replacement or restoration efforts. This would allow the City to begin to evaluate feasibility of adopting porous pavement for future paving projects in the City.

These programs will be considered in conjunction with other CP planning. Additional program opportunities have previously been identified as outlined in TM#1.

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Section 9: Conclusions and Next Steps

Project identification and preliminary project concepts stemming from the H/H modeling (Section 7) and retrofit assessment (Section 8), as documented in this TM, have been integrated into a Project Opportunity Matrix (Attachment B, Table B-4). The Project Opportunity Matrix expands the Problem Area Matrix that was originally included as Table A-1 in TM#1. The Project Opportunity Matrix provides a comprehensive summary of project needs in the City and will be used to facilitate City discussions and identify preferred locations to develop CPs for the SMP update.

Following City review of this TM, BC will start evaluating priority flooding locations (see Attachment B, Table B-4) to assess alternatives and feasibility of preferred project concepts. Subsequent evaluation efforts will focus on other priority locations, as confirmed through the Capital Project Workshop (scheduled for February/March 2023). Refined project concepts and cost estimates will be developed for select (approximately 15) project opportunity locations, and results documented in the SMP in graphical and tabular format.

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Attachment A: Figures

Figure A-1: Subbasin Delineation
Figure A-2: Soils and Topography
Figure A-3: Existing Land Use Condition
Figure A-4: Future Land Use Condition
Figure A-5: Hydraulic Model Overview
Figure A-6: Preliminary Flooding Results (25-yr design storm)
Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %
Figure A-8: Hydraulic Results: Existing Condition Flooding Locations
Figure A-9: Hydraulic Results: Future Condition Flooding Locations
Figure A-10: Retrofit Analysis

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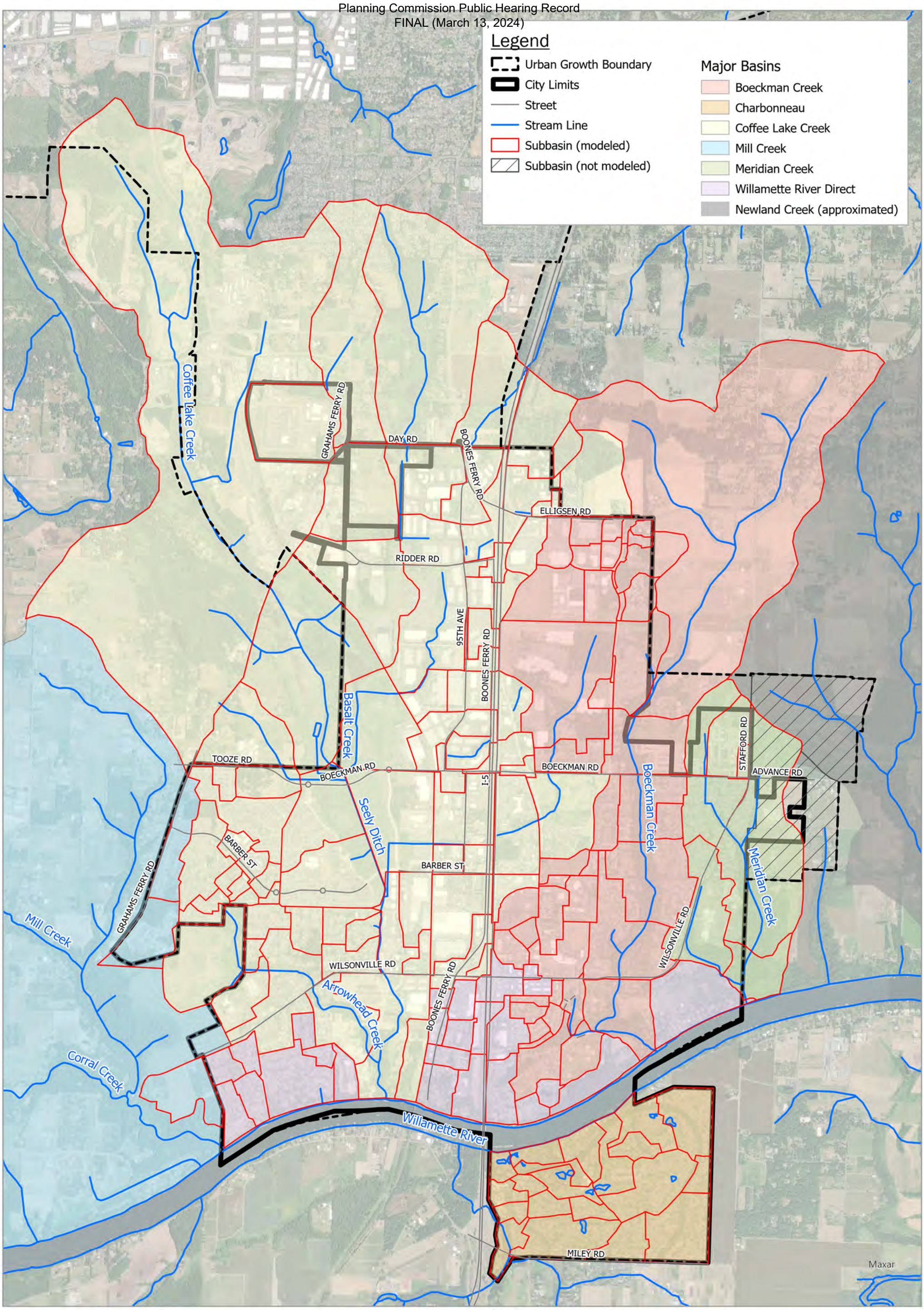

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Project # 156157

Stormwater Master Plan

Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,250 2,500 5,000
Feet

Date: 3/3/2023

Figure A-1: Subbasin Delineation

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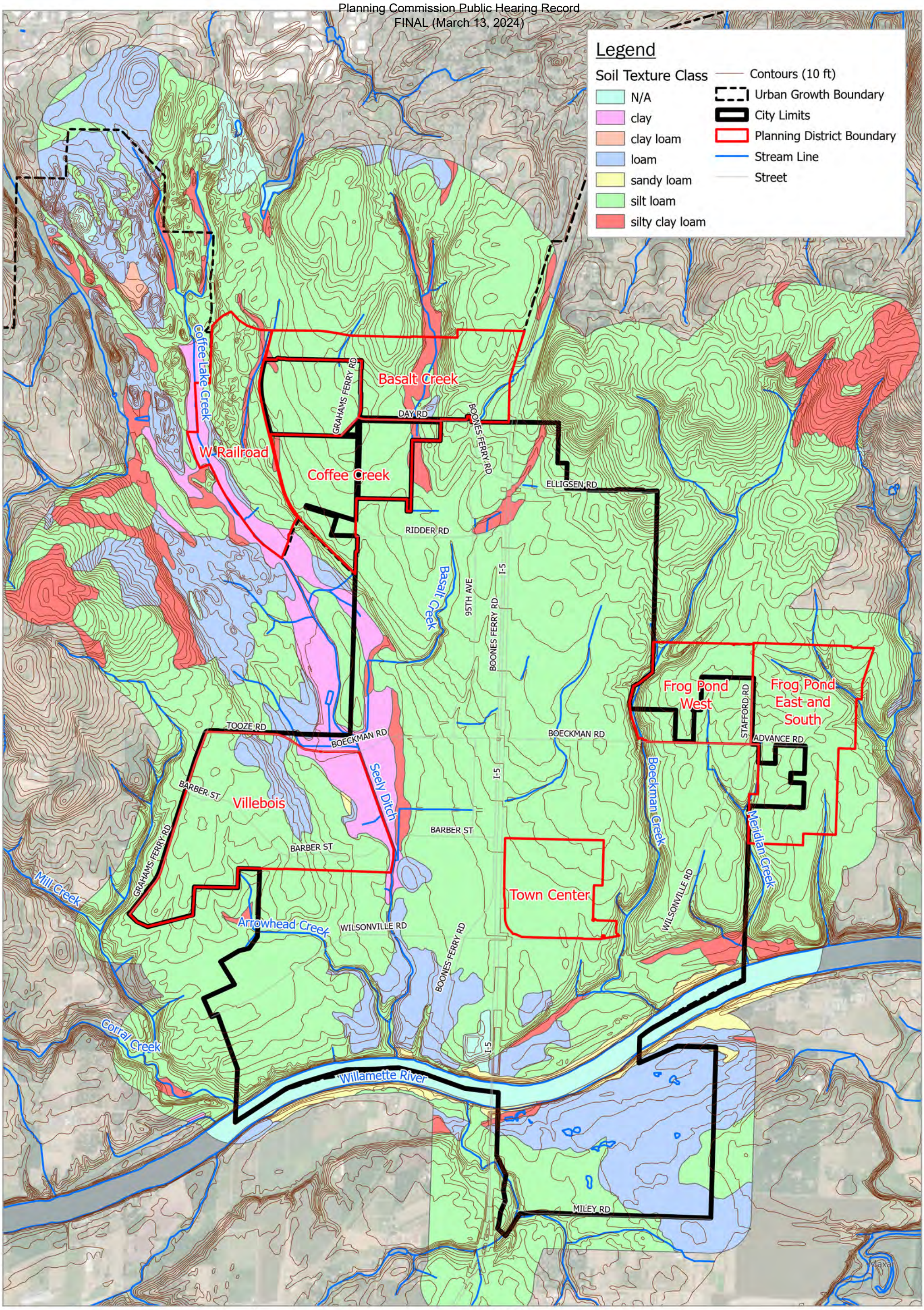

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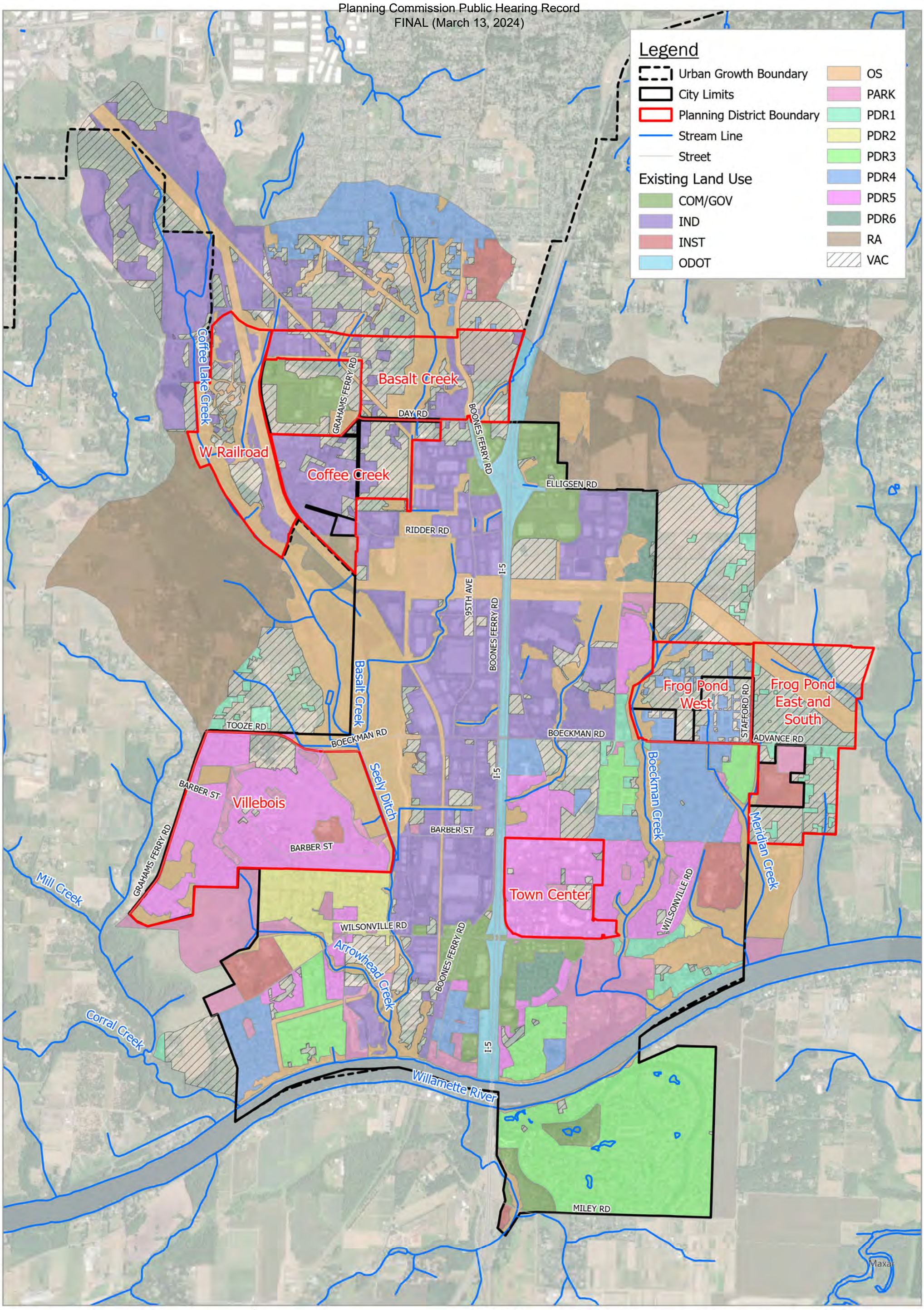
Date: 3/7/2023

Figure A-2: Soils and Topography



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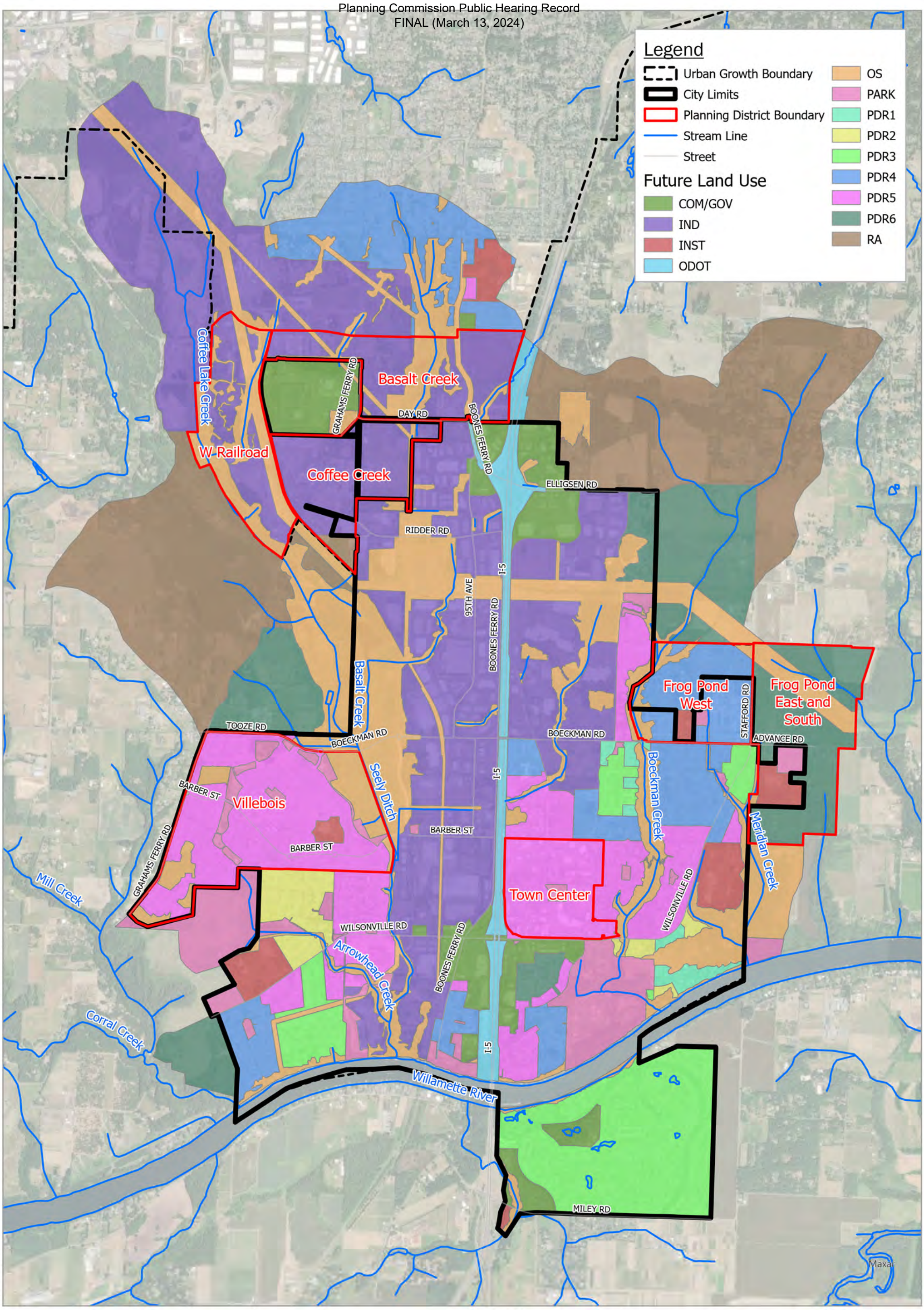
Feet

Date: 3/7/2023

Figure A-3: Existing Land Use Condition



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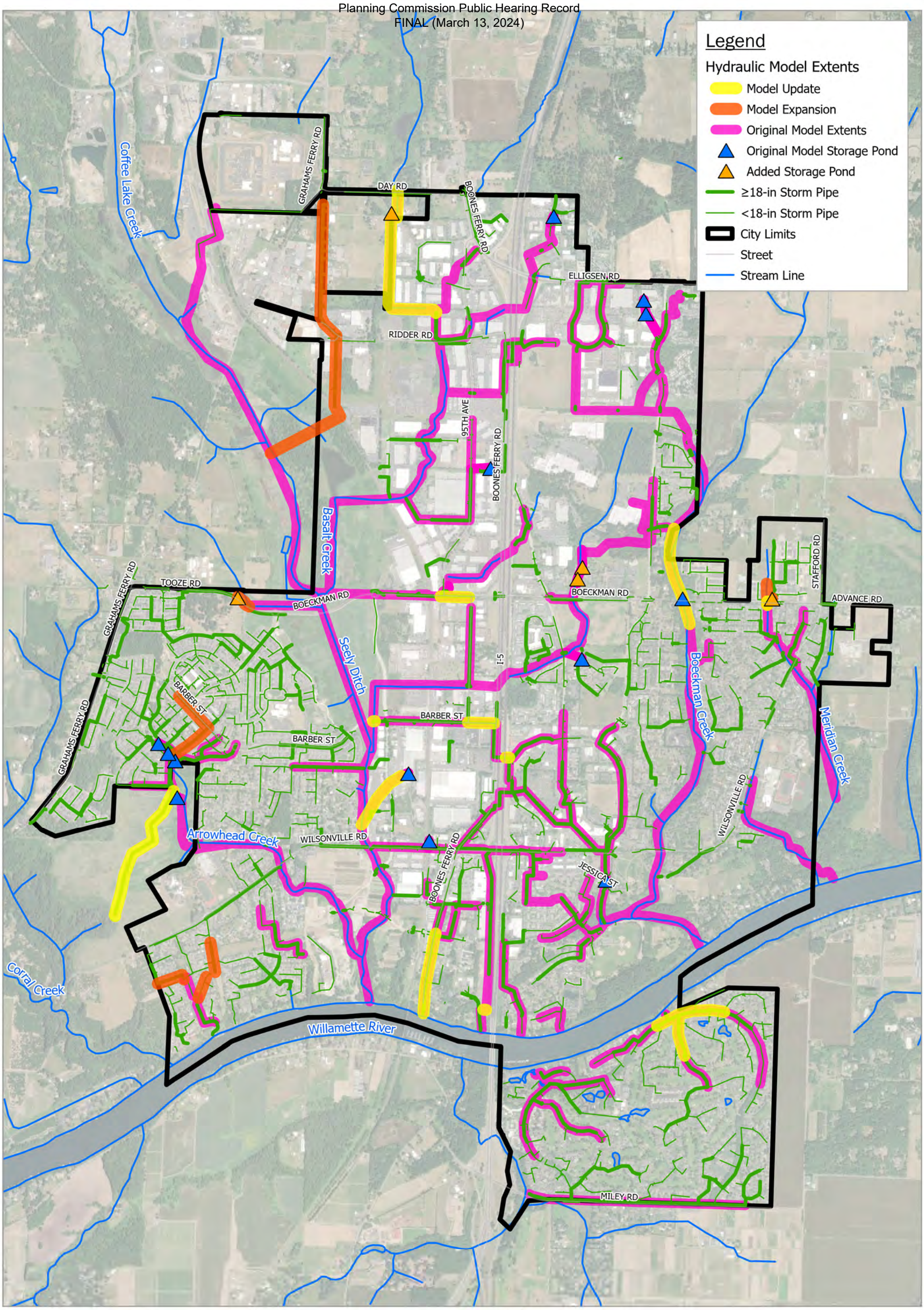
Feet

Date: 3/7/2023

Figure A-4: Future Land Use Condition



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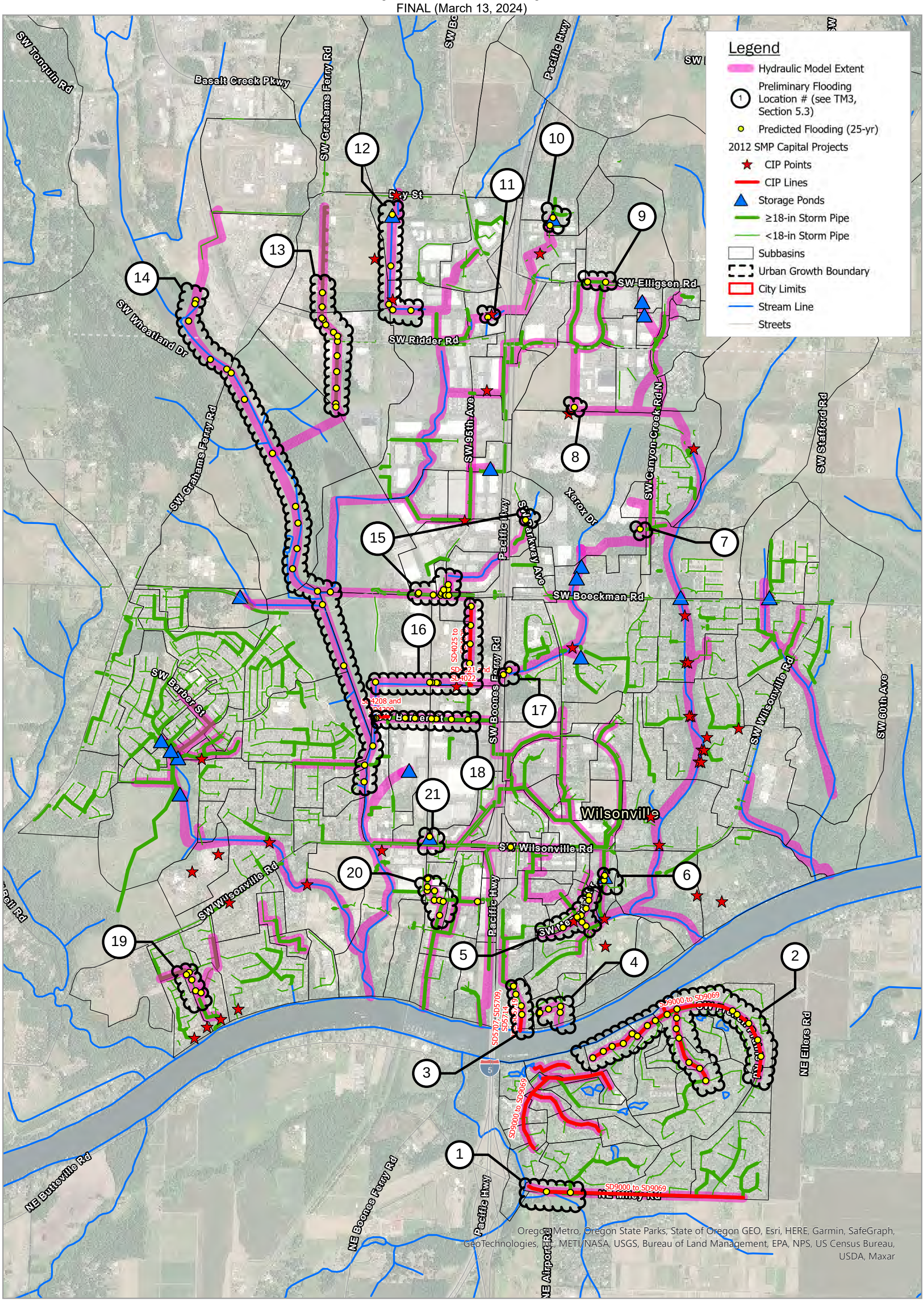
Date: 3/7/2023

Figure A-5. Hydraulic Model Overview



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Date: 3/7/2023

Figure A-6: Preliminary Flooding Results (25-yr design storm)

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Legend

Subbasins

Existing vs. Future Land Use:
Anticipated Peak Flow Increase

- No Change
- ≤10%
- ≤25%
- ≤50%
- ≤100%
- Urban Growth Boundary
- City Limits
- Stream Line
- Street

Coffee Lake Creek
Basalt Creek
Seely Ditch
Boeckman Creek
Meridian Creek
Arrowhead Creek
Corral Creek
Willamette River
Mill Creek
GRAHAMS FERRY RD
BOONES FERRY RD
95TH AVE
DAY RD
RIDDER RD
TOOZE RD
BOECKMAN RD
BARBER ST
ELLIGSEN RD
CANYON_N
CANYON_S
TONKIN_NISSAN_BASIN
I-5
STAFFORD RD
ADVANCE RD
WILSONVILLE RD
MILEY RD

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Spatial Reference:
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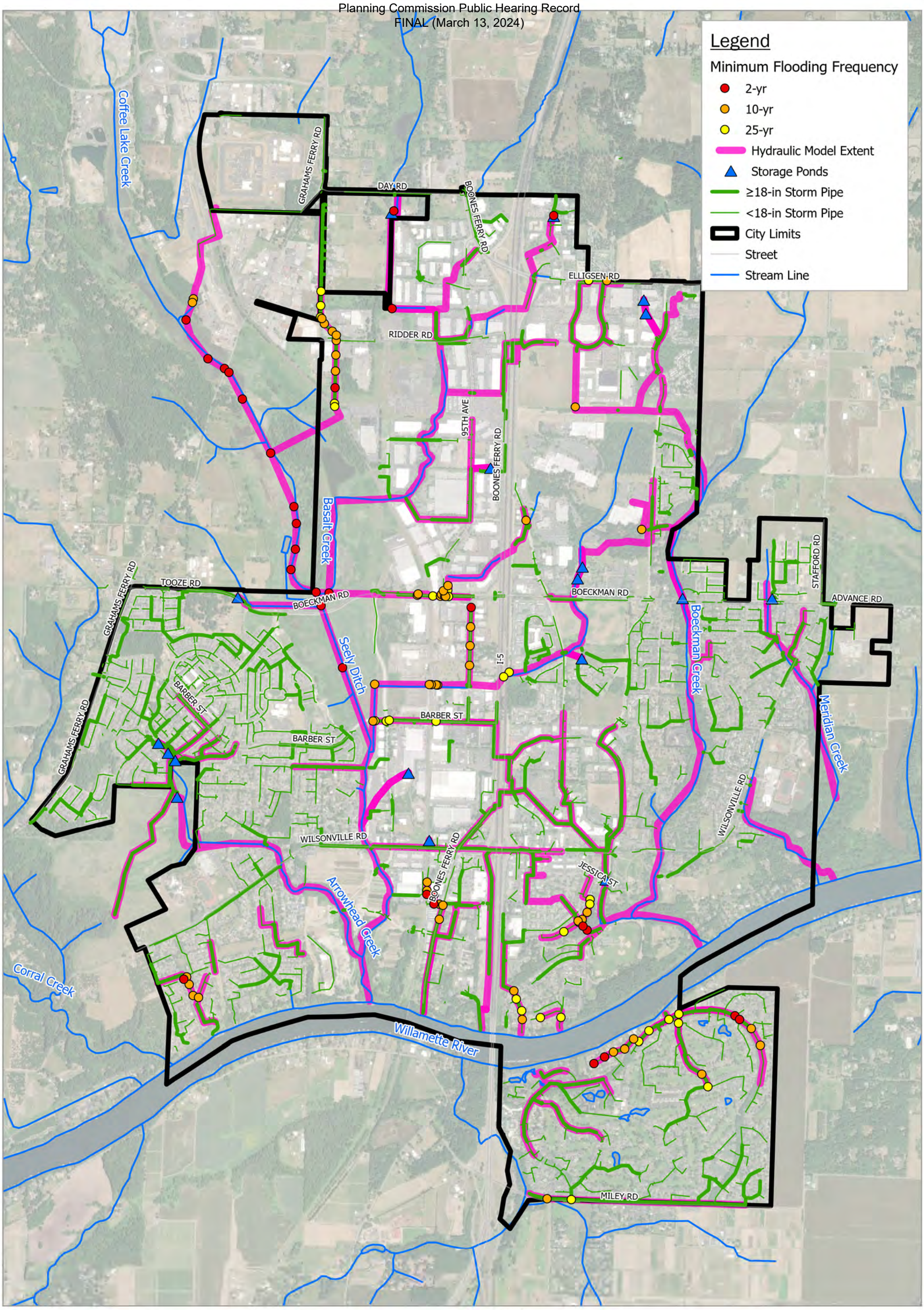
Feet

Date: 3/7/2023

Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %



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Feet

Date: 3/7/2023

Figure A-8. Hydraulic Results: Existing Condition Flooding Locations

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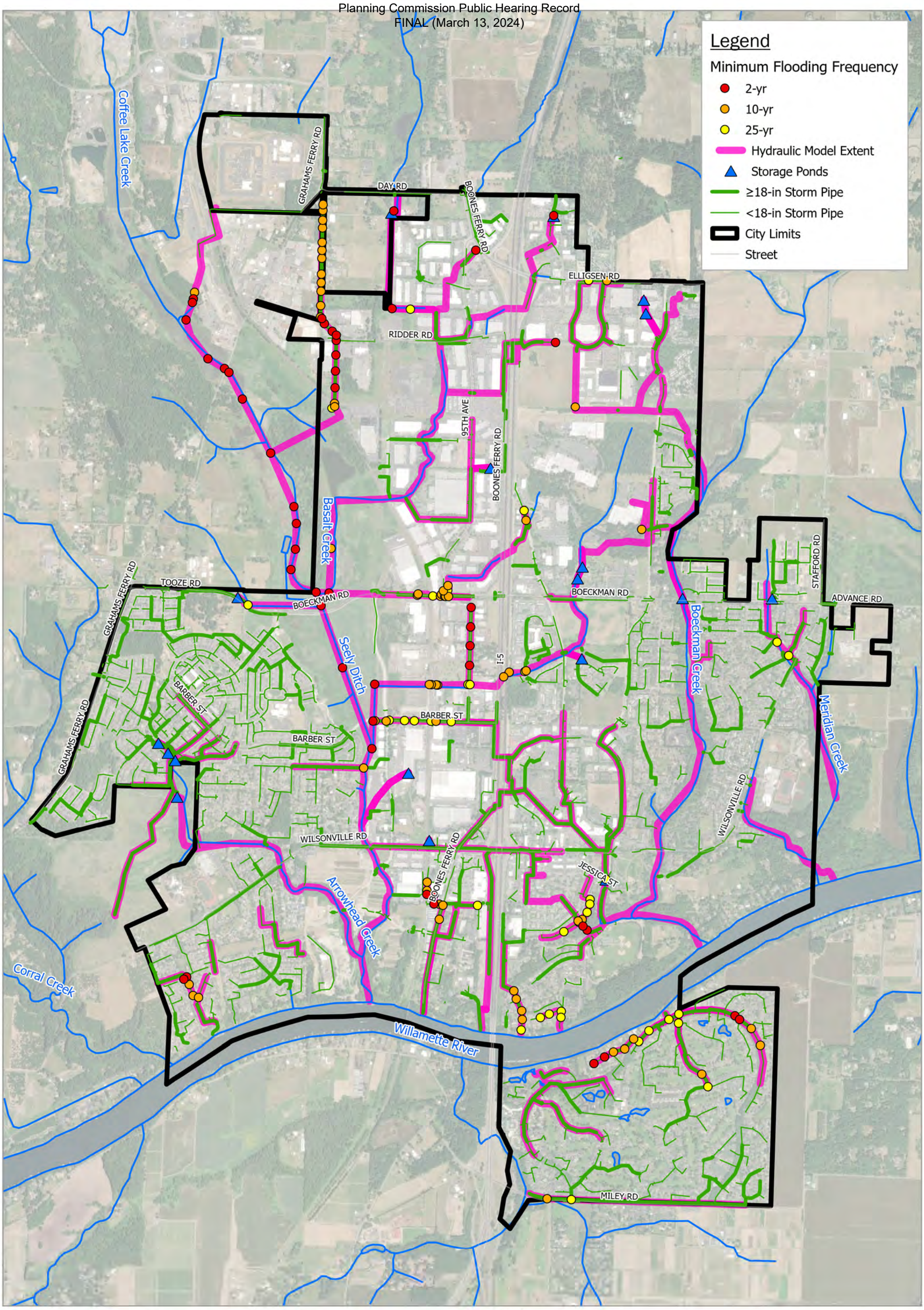

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Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Feet

Date: 3/7/2023

Figure A-9. Hydraulic Results: Future Condition Flooding Locations

Accessed By: SGILMARTIN at 03/07/2023

Legend

2015 Retrofit Assessment

WQ Projects (higher priority in red text)
- Erosion Control
- Planting/Restoration
- Treatment
- BMP Drainage Area

Ponds
- Modeled
- Private
- Public

Existing Land Use
- VAC
- PARK
- OS
- COW Property
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Future Transp Corridors
- Street
- Stream Line

Basalt Creek
W Railroad
Coffee Creek
Frog Pond West
Frog Pond East and South
Town Center
Villebois
Coffee Lake Creek
Basalt Creek
Seely Ditch
Boeckman Creek
Meridian Creek
Arrowhead Creek
Corral Creek
Willamette River
I-5
GRAHAMS FERRY RD
BOONES FERRY RD
95TH AVE
DAY RD
BOECKMAN RD
TOOZE RD
BARBER ST
RIDDER RD
ELLIGSEN RD
WILSONVILLE RD
JESSICA ST
STAFFORD RD
MILEY RD
RE-14
RW-05
RW-04
RE-P15
RW-02
CLC-1
RE-13
UU-08
CLC-10B
CLC-3
CLC-4
RE-P1
CLC-5
UU-P3 A/B
UU-P4
RE-P2
UU-05
UU-P2A
UU-09
BC-8
LID-2
RE-P2
RW-01
UU-01
UU-02
RE-12A
UU-06
UU-10
RE-11
RE-12B
BC-2
UU-07
UU-04
CLC-6
CLC-7
UU-P2B
UU-11
UU-12
UU-13
RE-16
RE-15
BC-5
UU-03
LID-3
CLC-8
RW-03
RE-04B
RW-P2
BC-10
LID-7
RW-P3
WD-4C
WD-4B
WD-4A

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Date: 3/7/2023

Figure A-10. Retrofit Analysis

Attachment B: Tables

Table B-1: Preliminary Flooding Results
Table B-2: Hydrologic Model Inputs and Results
Table B-3: Hydraulic Model Inputs and Results
Table B-4: Working Project Opportunity Matrix *(removed for the 2024 SMP deliverable, instead refer to Appendix A, Table A-2 of the SMP for the final Project Opportunity Matrix)*

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Table B-1. Modeled Capacity Deficiencies

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
1	Charbonneau	Miley Rd.	Predicted flooding at 42" pipe segment upstream of Miley Rd. outfall.	10-yr	Rim elevations and inverts along pipe profile appears reasonable and match GIS data. No apparent issues.	None	10 (E&S)	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	N	Y	Y	City confirmed project need at this location for inclusion in the SMP.
2	Charbonneau	French Prairie Rd. & Old Farm Rd.	Flooding indicated throughout these piped systems. Model contains some pipe replacement projects completed as CIPs from the Charbonneau Consolidated Improvement Plan (2014). Small portion of all improvements recommended per the plan.	2-yr	Issues previously identified/documented in 2012 SMP and Charbonneau Consolidated Improvement Plan. Capacity issue appears to be the outfall piping (30") acting as a constriction to the upstream piping that was upsized (36") as part of the CIP.	Model previously was updated to reflect the completed CIPs. Asbuilts of the emergency outfall repair were provided and reviewed by BC. Confirmed model assumption of 30" diameter of outfall. Updated model to include revised pipe slope and Manning's roughness for installation of CMP liner based on provided asbuilt information.	None	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	Y (select phases completed)	Y	Y	Wallis Engineering is currently working on the design of pipe upsizing along SW French Prairie and SW Edgewater. City coordinated meeting between BC and Wallis with the goal to have the capacity deficiency identified by the SMP modeling effort (outfall pipe constriction) inform current design project. based on the capacity deficiency identified by the SMP modeling effort. This work is in progress and strategies are being discussed to provide flow detention to mitigate the model predicted flooding.
3	Willamette River	Parkway Ave./Metolius Ln.	Flooding at several nodes along N-S run of pipe. Constriction appears to be the small diameter pipe at the outfall and one conduit US.	10-yr	Invert elevations in MH prior to outfall are misaligned. Pipe sequence is 48">42">21">15" causing constriction. No GIS data available to verify the existing model data. Issue previously identified in previous MP.	None. Inverts and diameters appear odd but better information is not available in GIS to resolve. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	SD5707, SD5709, SD5714, and SD5719 (SW Parkway Pipes Replacement)	N	Y	?	
4	Willamette River	SW Miami	15" conveyance pipe with US node preliminary flooding results.	25-yr	Subbasin hydrology is inserted at most US node of each pipe segment to generate flow w/in all pipes. May not be fully representative of runoff received by US nodes in reality. There also is a pond that is not currently being modeled which may alleviate flooding to the system.	Original subbasin subdivided to try and address the suspected hydrology input issue. However flooding still predicted at this location.	None	N. However the drainage area to this location was revised from the original model.	None	N	Y	N	City does not recall issues at this location. Maintain this location as a flooding location however development of a project is not warranted.
5	Boeckman	Memorial Dr.	Piped system near Memorial Dr. swale predicts flooding.	2-yr	After convergence point at Memorial Dr. (ST5002) pipe sizes are 24">15">12">18">24" prior to outfall to Boeckman Creek causing the constriction and US flooding.	Asbuilts of the swale and piped system were provided and reviewed by BC. Asbuilts confirmed the model configuration, no adjustments required.	52 (swale issues)	Y	BC-9 (Memorial Drive Pathway and Storm Drain Repair)	Y	Y	Y	Based on confirmed pipe configuration and known issues at this location, project at this location is needed.
6	Boeckman	Library Pond	Preliminary Library Pond flooding, Depth >9' (pond max depth). and node DS of Library Pond outlet shows flooding	N/A	Unknown how previous model build accounted for amount of library pond storage or developed the outlet curve for flow leaving the pond. From site visit, outlet should just be a pipe w grate. Seems unlikely that pond would flood based on configuration.	Model updated per asbuilts to reflect pond outlet configuration	4 (CAP)	Y	None	N	N	Y	Project to be developed at this location to provide a flow control benefit for pond storage. Project need is primarily based on providing flow control for Town Center redevelopment and not for capacity (no issues observed by City).
7	Boeckman	Canyon Creek Rd (near Xerox)	Flooding at node that convey private SW (Xerox) to the S and then E across Canyon Creek Rd.	10-yr	Pipe sequence is 15">18">15">12">12" causing constriction at Canyon Creek Rd. Final 12" pipe is at 5%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	None		Y	N	City confirmed pipe configuration per as-built drawings. City does not recall this location as an issue and unlikely to be a project need.
8	Boeckman	Sysco Ditch	Flooding at US node of 30" culvert at end of N-S section of Sysco Ditch	10-yr	Issue (constriction) is at 30" culvert. Very steep slope @ 8.6%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	30 (CAP and MAINT)	N	BC-1 (Wiedeman Road Regional SW Detention/Stream Enhancement)		Y	N	Very limited grade. Flooding shown at upstream end of culvert and impacts downstream Costco property. Sysco owns property to west of ditch. Ditch can be removed (manmade) and they are proposing. Does not warrant a City project need - up to Sysco to resolve.
9	Boeckman	Elligsen Rd	Flooding along US nodes of 18" SW piping	10-yr	Model set up seems reasonable. Large subbasins is inserted at US end which may be causing the flooding. Trailer Park pond on N side of Elligsen is not currently in the model	None. Flooding likely can be disregarded here, otherwise additional routing likely needed for model (pond and open channel for routing purposes)	20 (MAINT)	Y	None		Y	N	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
10	Coffee Creek	Shrine Center Pond	Pond flooding (HGL>4.7' max pond depth) and DS node from pond outlet	2-yr	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	25 (MAINT Access)	Y	None		Y	Y (specfic to maintenance access only)	
11	Coffee Creek	NW of 95th Ave. and Ridder Rd. intersection	Preliminary flooding at US end of culvert that conveys flow E to W under a private parking lot (Penske Truck)	N/A	Rim elevation at US end of culvert appears low. GIS does not show culvert, so unable to verify inherited model data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	None	N	CLC-4 (Ridder Rd Wetland Restoration). Proj is immediately US of culvert that floods		N	N	Culvert under parking lot - private (Penske property) and not in GIS. City not aware of issues at this location but provided as-built information. -BC incorporated revised culvert information into model from provided asbuilts. US end of culvert flooding resolved.
12	Coffee Creek	Commerce Circle Ditch	Flooding throughout N-S run of ditch and culverts to the W of Commerce Circle	2-yr	See old MP and AKS study for issues that have been well documented. Current model has updated culvert inverts from survey	None	14/15/26 (R/R, MAINT, CAP)	Y	CLC-1 (Detention/Wetl and Facility near Tributary to Basalt Creek) and CLC-3 (Commerce Circle Channel Restoration)		Y	Y	Known important project area. Beaver dam, other unknowns may not be reflected in model and factor into current discrepancy in peak flow and WSE. Redevelopment application looking to build parking area west of channel and would have to span existing channel to other development area - no access from Day Road. -BC developed 4 representative cross-sections along the Commerce Circle Ditch based on AKS survey points. Model link geometry within this reach then revised accordingly. Note that survey data was unavailable for 1 model link and thus a revised cross-section was not developed for this section.
13	Coffee Creek	Garden Acres	N-S piped system along Garden Acres Rd. and Peters Rd. Outfalls to Coffee Creek wetlands.	2-yr	Prior to outfall there is several small diameter pipes (24") that cause constriction and elevated HGL that backs up system. Most other pipes in profile are large diameter (42"/36")	None. Model matches GIS info. City (Sean S.) provided as-builts of this outfall (1994) which showed this small diameter pipe near the outlet of piping run.	None	Not modeled	None		Y	Y	City not surprised by flooding here. This is a priority need in conjunction with build out of Coffee Creek area. Private development is currently having to overdetain. Higher priority need. Railroad and METRO coordination needed (outfalls to METRO property).
14	Coffee Creek	Coffee Creek Wetlands	Flooding throughout wetlands predicted	2-yr	Main issue is the generalization of cross-sections in the model(under represents the actual amount of storage in locations)	None	None	Y	None		Y	N	
15	Coffee Creek	Boeckman Corp. Center Pond	Flooding DS of flow control structure in model and at node near the US end. Flow control structure configuration rationale is unknown but appears to be the restriction	N/A	At very US end of this pipe segment there is a 30">12">24" which seems incorrect. GIS has same info	None. Would need to thouroughly look through asbuilts to modify how this flow control structure is modeled from scratch	None	Y	None		Y	N	US portion - on Parkway. No known issue DS portion - Car dealership - existing pond is mitigation for wetland. Flooding reported downstream of pond. City not aware of any flooding in area (may be an after effect of how pond was integrated into the model. - Based on asbuilt review, control structure configuration adjusted. Pond no longer floods during 25-yr storm event.
16	Coffee Creek	Boberg Rd. and RR crossing	Flooding along N-S pipe prior to discharging into ope channel. This was an area identified in original MP. Flooding also at two large diameter culverts (59" and 51"?!) flowing E-W underneath RR tracks	10-yr	Pipe profile looks reasonable. Previous CIP location. Culverts in model (in series) do not match configuration in GIS (parallel). GIS does not have diameters or inverts	None. Need more info about culverts to make updates	None	Y	SD4025-SD4029 (Boberg Rd Pipe Replacement)		Y	?	
17	Coffee Creek	I-5 Culverts	Flooding at culverts crossing I-5 from E to W	25-yr	Profile looks reasonable. Culvert size (36") can not be verified as that info is not in the GIS data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	35 (R&R)	N	None		Y	N	City thinks that flooding at this location is accurate. Maintain as a flooding location, however a project that upsizes ODOT culverts is unlikely.
18	Coffee Creek	Barber St	Flooding indicated at several DS nodes prior to outfall and at node near RR tracks	25-yr	DS flooding along this segment appears to be from backwatering of Coffee Creek (see location #14). Profile appears reasonable and matches the GIS data.	None	None	Y	SD4208 and SD4209 (Barber Street Pipe Replacement). -	N	Y	Unlikely	
19	Willamette River	River Fox Park (site visit	Flooding predicted within 12" pipes	2-yr	Profile looks reasonable and matches the GIS data.	None	22 (MAINT and CAP)	N	None	N/A	Y	Y	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
20	Willamette River	Lower Boones Ferry	Flooding along 18" Piped segment on private property.	2-yr	Hydrology is input at most US node to generate flow through all pipes, not reflective of reality for US node flooding.	Split subbasin at this location with assumption that they have the same hydrology characteristics. Model still indicates flooding during the 25-yr event.	None	Y	None	N/A	Y	?	
21	Coffee Creek	Wilsonville Distr Center Pond	Model predicts pond flooding	N/A	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	None	N. However the original model is configured incorrectly such that flow is not actually routed through the pond.	None	N/A	N	?	

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
1000	STAFFORD_POND	69.13	33.7	33.7	11.2	1616	6.85	0.36	0.25	14.3	14.3	23.9	23.9	29.8	29.8	38.7	38.7
1000B	ST1000	28.49	59.7	62.4	3.8	673	7.26	0.35	0.23	9.9	10.3	15.0	15.6	17.8	18.4	21.7	22.3
1100	ST1100	55.81	29.9	52.1	1.5	1516	6.69	0.37	0.26	9.8	16.6	15.2	24.7	18.2	29.1	22.8	35.2
1104	ST1104	21.55	82.2	82.2	1.7	625	6.69	0.37	0.26	9.8	9.8	14.3	14.3	16.6	16.6	19.6	19.6
1114	ST1114	74.81	15.3	15.3	7.8	1303	6.69	0.37	0.26	7.1	7.1	12.8	12.8	16.5	16.5	22.5	22.5
1116	ST1116	3.25	82.2	82.2	4.6	209	6.69	0.37	0.26	1.6	1.6	2.4	2.4	2.8	2.8	3.3	3.3
1124	ST1124	14.02	70.8	70.8	4.9	601	6.69	0.37	0.26	5.9	5.9	8.9	8.9	10.5	10.5	12.6	12.6
1125	ST1125	10.91	71.6	71.6	4.5	649	6.69	0.37	0.26	4.7	4.7	7.1	7.1	8.4	8.4	10.1	10.1
1133A	ST1002	14.12	10.0	10.0	11.9	412	6.69	0.37	0.26	1.0	1.0	2.5	2.5	3.5	3.5	5.1	5.1
1133B	ST1000	4.26	74.4	79.8	3.6	370	6.69	0.37	0.26	1.9	2.1	2.9	3.1	3.4	3.6	4.1	4.3
1133C	ST1132	25.05	74.2	80.6	2.1	766	6.69	0.37	0.26	10.5	11.3	15.5	16.7	18.1	19.4	21.6	22.9
1201	ST1201	2.75	66.1	66.1	5.6	151	6.69	0.37	0.26	1.1	1.1	1.7	1.7	2.0	2.0	2.4	2.4
1202	PST1202	4.78	64.1	64.1	11.9	588	6.69	0.37	0.26	2.0	2.0	3.2	3.2	3.8	3.8	4.6	4.6
1207	PST1207	4.10	64.1	64.1	14.5	392	6.69	0.37	0.26	1.7	1.7	2.7	2.7	3.2	3.2	3.9	3.9
1302	ST1302	0.70	39.5	39.5	1.8	68	6.69	0.37	0.26	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
1303	ST1303	35.38	19.2	51.4	5.6	841	6.69	0.37	0.26	4.2	10.7	7.4	16.3	9.4	19.5	12.6	23.9
1307A	ST1307	2.27	36.0	47.3	5.4	733	6.69	0.37	0.26	0.7	0.8	1.3	1.4	1.6	1.7	2.0	2.1
1307B	ST1402	20.17	36.0	47.3	5.4	733	6.69	0.37	0.26	4.4	5.8	7.3	9.1	9.1	11.0	11.7	13.8
1504	ST1504	1.09	37.0	43.6	2.8	82	6.69	0.37	0.26	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.8
1603A	ST1404A	63.03	30.0	37.1	3.8	1121	6.69	0.37	0.26	11.2	13.7	17.2	20.8	20.8	24.8	26.0	30.6
1603B	ST1603	809.84	12.6	26.7	3.5	3376	7.01	0.36	0.24	58.3	112.1	87.9	166.3	104.4	194.8	129.7	235.6
1604	POND_BOECKMAN	69.37	19.4	40.0	5.6	1559	6.69	0.37	0.26	8.3	16.5	14.3	25.7	18.2	31.0	24.4	38.7
1608	ST1608	3.82	49.3	62.5	4.1	209	6.69	0.37	0.26	1.1	1.4	1.9	2.2	2.3	2.7	2.8	3.2
1701	ST1701	25.65	40.7	40.7	2.2	907	6.69	0.37	0.26	6.2	6.2	9.6	9.6	11.6	11.6	14.4	14.4
1703	ST1703	171.87	41.3	46.8	1.5	2258	6.69	0.37	0.26	38.3	42.6	56.6	62.9	66.3	73.5	79.7	88.2
1711	ST1711	9.40	69.5	69.5	3.6	531	6.69	0.37	0.26	3.9	3.9	5.9	5.9	7.0	7.0	8.4	8.4
1726	ST1726	29.64	54.6	60.0	1.1	721	6.69	0.37	0.26	8.9	9.7	13.2	14.4	15.5	16.8	18.6	20.1
2000	ST2000	250.97	9.7	21.1	1.3	2548	8.82	0.30	0.14	16.6	32.0	30.9	52.7	30.4	55.3	30.9	59.8
2008	ST2008	1550.87	31.4	42.1	0.9	4917	6.57	0.34	0.19	194.4	238.8	292.4	358.6	343.9	421.2	415.2	507.8
2019	ST2019	102.09	48.4	76.9	3.6	2343	6.75	0.36	0.26	28.8	44.3	43.6	65.1	51.8	75.9	63.4	90.1
2101A	ST2120	69.86	43.0	62.5	2.9	1499	7.45	0.35	0.22	17.8	25.0	27.4	37.5	33.2	44.5	41.3	54.0
2101B	ST2101	44.71	50.7	50.7	1.4	1656	6.74	0.36	0.26	13.2	13.2	19.9	19.9	23.6	23.6	28.8	28.8
2107A	ST2123	359.21	24.0	41.2	1.2	2353	7.15	0.35	0.23	44.8	68.9	66.6	102.5	78.3	120.0	95.0	144.3
2107B	ST2123	178.65	22.1	55.4	1.9	1285	6.69	0.37	0.26	21.8	46.4	32.3	68.6	37.9	80.0	45.9	95.5
2112A	ST2112	88.70	15.9	56.5	2.9	1214	6.69	0.37	0.26	8.4	27.3	13.4	40.3	16.4	47.1	21.1	56.5
2112B	ST2112	43.89	62.6	71.3	2.9	854	6.69	0.37	0.26	15.4	17.3	22.7	25.4	26.6	29.7	31.9	35.4
2118	ST2118	42.69	52.3	52.3	2.0	571	7.85	0.34	0.19	12.1	12.1	18.4	18.4	21.8	21.8	26.6	26.6
2402	ST2402	112.36	39.2	41.2	1.6	1188	6.69	0.37	0.26	23.3	24.3	34.4	35.9	40.3	42.0	48.4	50.4

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
2405	ST2405	13.00	63.9	63.9	1.4	785	6.69	0.37	0.26	4.9	4.9	7.4	7.4	8.8	8.8	10.6	10.6
2406	ST2406	15.27	22.0	56.6	2.0	463	6.69	0.37	0.26	2.0	5.0	3.3	7.5	4.2	8.8	5.4	10.7
2409	ST2409	11.04	57.3	57.4	1.2	422	7.23	0.35	0.23	3.7	3.7	5.6	5.6	6.6	6.6	8.1	8.1
2413A	ST2413	2.04	46.8	50.2	1.1	73	6.69	0.37	0.26	0.6	0.6	0.8	0.9	1.0	1.0	1.2	1.3
2413B	ST2410	10.32	66.1	66.4	1.6	444	6.69	0.37	0.26	4.0	4.0	5.9	5.9	6.9	7.0	8.3	8.4
2701A	ST2119A	102.46	28.7	67.3	1.6	2586	6.69	0.37	0.26	17.4	38.2	26.8	56.4	32.3	65.9	40.4	78.7
2701B	ST2105A	128.40	39.2	41.1	1.8	2063	6.69	0.37	0.26	28.3	29.6	42.1	43.9	49.5	51.6	60.1	62.5
2707	ST2707	23.67	64.1	64.1	2.3	650	6.69	0.37	0.26	8.7	8.7	12.9	12.9	15.1	15.1	18.1	18.1
2711	ST2711	26.66	70.9	70.9	2.2	755	6.69	0.37	0.26	10.7	10.7	15.8	15.8	18.5	18.5	22.1	22.1
2720	ST2720	24.22	57.1	57.1	2.2	484	6.69	0.37	0.26	7.7	7.7	11.4	11.4	13.4	13.4	16.1	16.1
3005	ST3005	14.54	50.8	51.3	2.8	598	6.69	0.37	0.26	4.4	4.4	6.8	6.9	8.2	8.2	10.1	10.1
3008	ST3008	213.73	16.8	38.0	2.4	1453	6.69	0.37	0.26	20.4	41.6	30.5	61.4	36.1	71.7	44.2	85.9
3011	ST3011	51.74	45.7	46.3	2.8	2046	6.69	0.37	0.26	14.1	14.3	22.0	22.3	26.6	26.8	33.0	33.3
3017A	9067	36.66	10.9	46.6	1.5	600	6.69	0.37	0.26	2.4	9.3	4.0	13.8	4.9	16.2	6.5	19.4
3017B	STAFFORD_MEADOWS_1_BASIN	38.68	27.2	51.3	1.4	774	6.69	0.37	0.26	6.1	10.9	9.3	16.2	11.1	19.0	13.7	22.8
3025	ST3024	5.99	31.7	51.0	2.5	378	6.69	0.37	0.26	1.2	1.9	2.0	2.9	2.6	3.6	3.4	4.4
3201	ST3201	51.42	29.7	30.3	4.5	918	6.69	0.37	0.26	9.1	9.2	14.1	14.4	17.1	17.4	21.5	21.8
3204	ST3204	64.53	46.3	46.3	2.0	1078	6.69	0.37	0.26	16.7	16.7	24.7	24.7	29.1	29.1	35.1	35.1
3207	ST3207	78.25	17.7	56.7	2.1	1728	6.69	0.37	0.26	8.4	25.0	13.6	37.1	16.9	43.6	22.0	52.5
3208	RENAISSANCE_POND	25.07	41.1	41.2	0.9	587	6.69	0.37	0.26	5.8	5.8	8.6	8.6	10.1	10.1	12.2	12.2
3212	ST3212	7.21	62.2	66.8	2.1	366	6.69	0.37	0.26	2.7	2.8	4.0	4.3	4.8	5.0	5.8	6.1
3216	ST3208	30.40	62.0	62.0	2.0	881	6.69	0.37	0.26	10.8	10.8	16.0	16.0	18.8	18.8	22.6	22.6
3218	ST3218	14.44	19.6	51.8	1.8	415	6.69	0.37	0.26	1.7	4.3	2.8	6.5	3.5	7.6	4.6	9.3
3402	ST3402	34.92	41.4	52.6	1.4	1087	6.69	0.37	0.26	8.4	10.5	12.8	15.7	15.2	18.6	18.7	22.5
3414	ST3414	25.72	43.5	46.7	1.6	652	6.69	0.37	0.26	6.4	6.9	9.7	10.3	11.4	12.1	13.9	14.8
3417	ST3417	3.75	52.0	52.2	2.4	230	6.69	0.37	0.26	1.2	1.2	1.9	1.9	2.2	2.3	2.8	2.8
3418A	ST3421	14.99	51.6	52.0	0.6	631	6.69	0.37	0.26	5.6	5.7	8.9	8.9	10.4	10.4	12.2	12.3
3418B	ST3418	8.22	52.2	52.2	0.5	456	6.69	0.37	0.26	2.5	2.5	3.7	3.7	4.4	4.4	5.3	5.3
3420	ST3420	20.12	51.0	52.2	3.2	1215	6.69	0.37	0.26	6.2	6.4	10.0	10.2	12.1	12.3	15.0	15.2
3425	ST3425	15.60	51.2	51.3	1.2	378	6.69	0.37	0.26	4.5	4.5	6.6	6.6	7.8	7.8	9.4	9.4
3436	ST3436	22.08	48.4	52.2	1.8	734	6.69	0.37	0.26	6.2	6.7	9.4	10.1	11.2	11.9	13.7	14.5
3443	ST3443	4.70	49.2	51.3	2.3	314	6.69	0.37	0.26	1.4	1.5	2.2	2.3	2.7	2.8	3.4	3.5
3445	ST3445	23.46	63.5	63.5	2.6	930	6.69	0.37	0.26	8.7	8.7	13.2	13.2	15.5	15.5	18.8	18.8
3451	ST3451	3.55	56.1	56.1	0.9	289	6.69	0.37	0.26	1.2	1.2	1.8	1.8	2.2	2.2	2.7	2.7
3600	ST3600	91.20	41.5	43.1	3.7	1193	6.69	0.37	0.26	21.5	22.2	32.0	33.1	37.7	38.9	45.8	47.2
3602	ST3602	90.57	39.7	39.9	5.8	1918	6.69	0.37	0.26	21.4	21.5	33.1	33.3	40.0	40.1	49.9	50.0
3607	ST3606	82.77	36.5	36.5	2.9	916	6.70	0.37	0.26	16.9	16.9	25.0	25.1	29.4	29.5	35.6	35.7
4003	ST4003	95.74	18.9	22.1	1.7	1565	8.66	0.31	0.17	11.5	13.2	19.6	21.9	24.8	27.5	32.5	35.6

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4008	ST4008	12.06	67.5	70.9	3.3	714	6.69	0.37	0.26	4.9	5.1	7.4	7.7	8.8	9.1	10.6	10.9
4012	ST4012	22.39	59.4	66.3	2.0	626	6.69	0.37	0.26	7.6	8.4	11.3	12.4	13.3	14.6	16.0	17.5
4014	ST4014	41.33	66.2	66.2	2.7	710	6.69	0.37	0.26	14.9	14.9	22.0	22.0	25.7	25.7	30.8	30.8
4029	ST4029	59.74	51.7	64.5	2.7	1218	6.69	0.37	0.26	17.6	21.5	26.2	31.8	30.9	37.2	37.4	44.6
4202	ST4202	34.53	63.0	64.3	1.0	936	6.59	0.33	0.16	12.3	12.5	19.0	19.3	22.6	22.9	25.2	25.6
4203	ST4203	13.49	31.3	48.5	1.5	630	7.57	0.34	0.22	2.6	4.0	4.4	6.2	5.5	7.5	7.2	9.4
4204	COCA-COLA_POND	32.66	68.5	68.5	0.5	726	5.91	0.36	0.23	11.1	11.1	16.5	16.5	19.3	19.3	23.1	23.1
4205A	ST4205	89.30	40.5	40.5	3.2	1666	7.97	0.33	0.20	21.6	21.6	33.6	33.6	40.9	40.9	51.3	51.3
4205B	ST4205	113.36	28.3	34.3	1.3	2147	9.25	0.30	0.14	20.3	23.9	34.4	39.4	35.4	41.2	37.5	44.3
4205C	ST4000	79.50	29.0	29.0	3.2	1548	9.46	0.28	0.11	17.5	17.5	20.2	20.2	24.4	24.4	30.6	30.6
4214	ST4214	13.80	61.0	68.2	1.9	778	6.69	0.37	0.26	5.0	5.6	7.6	8.4	9.1	9.9	11.0	11.8
4216	ST4216	13.42	61.5	66.8	2.5	563	6.69	0.37	0.26	4.9	5.3	7.4	7.9	8.7	9.3	10.6	11.2
4225	ST4225	11.73	54.8	66.6	0.8	449	6.69	0.37	0.26	3.7	4.4	5.4	6.4	6.4	7.5	7.7	9.0
4226	WILSONVILLE_DIST_CTR_POND	65.84	68.0	68.0	1.0	1069	6.69	0.37	0.26	22.3	22.3	32.9	32.9	38.3	38.3	45.7	45.7
4228A	ST4228	28.98	72.6	74.3	1.4	623	6.69	0.37	0.26	11.2	11.4	16.4	16.8	19.2	19.5	22.8	23.2
4228B	ST6007	14.64	82.2	82.2	1.1	522	6.27	0.36	0.24	6.6	6.6	9.8	9.8	11.3	11.3	13.4	13.4
4231	ST4231	6.30	56.3	57.4	3.9	511	6.69	0.37	0.26	2.2	2.2	3.5	3.6	4.3	4.3	5.2	5.3
4400	ST4400	84.63	33.9	37.5	2.9	1896	6.69	0.37	0.26	16.9	18.6	26.1	28.5	31.4	34.1	39.2	42.2
4403A	ST4403	93.84	23.5	23.5	2.0	1987	6.88	0.36	0.25	13.2	13.2	20.7	20.7	25.2	25.2	32.1	32.1
4403B	ST4402	34.38	31.5	31.5	0.7	841	6.69	0.37	0.26	6.2	6.2	9.3	9.3	11.0	11.0	13.4	13.4
4404A	ST4639	19.90	32.9	32.9	2.6	672	6.69	0.37	0.26	3.9	3.9	6.3	6.3	7.7	7.7	9.8	9.8
4404B	ST4404	8.40	32.9	32.9	2.6	672	6.69	0.37	0.26	1.7	1.7	3.1	3.1	4.0	4.0	5.2	5.2
4501	ST4501	18.45	34.0	52.1	1.8	420	6.78	0.36	0.26	3.7	5.4	5.6	8.1	6.6	9.5	8.2	11.5
4502	ST4502	22.56	31.8	32.3	4.2	1035	6.69	0.37	0.26	4.4	4.5	7.6	7.7	9.6	9.7	12.5	12.6
4503A	ST4503	58.83	46.4	49.1	2.6	745	5.59	0.36	0.21	15.2	15.9	22.8	23.9	27.1	28.4	33.1	34.6
4503B	ST4503	81.06	6.2	64.1	3.9	1499	5.80	0.36	0.22	3.7	29.6	8.2	44.3	11.7	52.4	17.7	63.4
4503C	ST4503	30.20	13.8	39.1	5.7	899	5.86	0.33	0.14	4.2	8.5	9.9	15.3	8.3	15.0	8.8	16.5
4503D	TOOZE_POND	12.16	49.2	51.8	3.2	450	4.99	0.36	0.19	3.7	3.9	6.1	6.3	7.5	7.7	9.3	9.5
4608	ST4608	10.25	51.9	51.9	1.6	280	6.69	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4611	POND_E2	7.97	47.5	47.5	2.7	475	6.69	0.37	0.26	2.3	2.3	3.7	3.7	4.5	4.5	5.6	5.6
4614A	POND_E1	53.36	42.8	42.9	1.6	1058	6.69	0.37	0.26	12.9	12.9	19.2	19.2	22.6	22.6	27.4	27.4
4614B	ST4829	11.09	45.2	52.2	2.2	662	6.69	0.37	0.26	3.0	3.5	4.9	5.5	5.9	6.6	7.4	8.1
4617A	ST4610	6.68	52.1	52.1	1.6	378	6.69	0.37	0.26	2.1	2.1	3.2	3.2	3.8	3.8	4.7	4.7
4617B	ST4803	5.35	52.2	52.2	2.1	268	6.69	0.37	0.26	1.7	1.7	2.6	2.6	3.1	3.1	3.8	3.8
4617C	ST4617	4.89	52.2	52.2	2.2	310	6.69	0.37	0.26	1.5	1.5	2.4	2.4	2.9	2.9	3.6	3.6
4623	ST4623	4.26	52.2	52.2	1.2	453	6.69	0.37	0.26	1.4	1.4	2.2	2.2	2.6	2.6	3.3	3.3
4631A	ST4631	9.68	52.2	52.2	0.8	535	6.66	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4631B	ST4806	10.14	52.2	52.2	2.4	615	6.66	0.37	0.26	3.2	3.2	5.0	5.0	6.1	6.1	7.5	7.5

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4632A	04632A	49.06	31.8	31.8	1.7	814	6.69	0.37	0.26	8.9	8.9	13.4	13.4	15.8	15.8	19.4	19.4
4632B	04632B	41.58	43.7	43.7	1.2	674	6.69	0.37	0.26	9.9	9.9	14.6	14.6	17.1	17.1	20.5	20.5
5004A	ST5004	5.30	59.7	59.7	3.1	360	5.50	0.36	0.21	2.0	2.0	3.2	3.2	3.9	3.9	4.7	4.7
5004B	ST5028	6.65	54.3	54.3	4.2	380	6.69	0.37	0.26	2.2	2.2	3.5	3.5	4.2	4.2	5.2	5.2
5006	ST5006	9.00	64.1	64.1	1.1	589	6.69	0.37	0.26	3.4	3.4	5.1	5.1	6.0	6.0	7.3	7.3
5022	ST5022	4.80	70.7	70.7	0.9	304	6.69	0.37	0.26	2.0	2.0	2.9	2.9	3.4	3.4	4.1	4.1
5024	ST5024	7.31	78.8	78.8	1.2	645	6.69	0.37	0.26	3.4	3.4	5.1	5.1	5.9	5.9	7.0	7.0
5033	ST5033	4.32	71.8	71.8	3.3	476	6.69	0.37	0.26	1.9	1.9	2.9	2.9	3.4	3.4	4.2	4.2
5037	ST5037	2.66	49.2	50.3	3.5	135	4.36	0.35	0.16	0.9	0.9	1.5	1.5	1.8	1.9	2.0	2.0
5038	ST5038	15.24	43.6	43.6	7.1	553	6.69	0.37	0.26	4.0	4.0	6.6	6.6	8.1	8.1	10.2	10.2
5200	ST5200	64.84	21.6	23.9	4.8	1222	6.75	0.36	0.26	8.5	9.3	13.9	15.1	17.2	18.6	22.4	23.9
5207	ST5207	26.98	23.7	23.7	2.5	1176	6.91	0.36	0.24	4.0	4.0	7.2	7.2	9.1	9.1	12.4	12.4
5210	05210	37.10	23.5	23.5	10.3	3038	6.21	0.37	0.29	5.3	5.3	12.9	12.9	17.2	17.2	23.0	23.0
5501	ST5501	40.80	14.3	14.3	8.6	1077	7.94	0.33	0.19	4.6	4.6	10.2	10.2	14.2	14.2	19.9	19.9
5502	05502	75.65	12.7	13.9	7.8	1936	7.24	0.34	0.24	6.5	7.0	13.7	14.4	18.5	19.3	27.1	27.9
5706A	ST5703	8.78	43.6	47.1	3.6	607	5.51	0.36	0.24	2.4	2.6	4.1	4.3	5.1	5.3	6.5	6.7
5706B	ST5706	11.41	43.6	47.1	3.6	607	5.51	0.36	0.24	3.1	3.3	5.1	5.4	6.3	6.6	8.0	8.3
5709	ST5709	29.34	43.9	53.0	6.1	642	5.20	0.36	0.22	7.8	9.3	12.3	14.4	15.1	17.3	18.9	21.4
5713	ST5713	25.39	71.0	71.0	2.9	985	6.30	0.36	0.24	10.6	10.6	15.9	15.9	18.7	18.7	22.4	22.4
5718	ST5718	34.38	39.0	46.2	7.6	1251	6.12	0.34	0.16	9.6	11.0	17.7	19.3	21.9	23.6	23.1	25.2
6001	ST6001	24.29	39.6	39.6	10.7	1121	5.08	0.36	0.19	6.8	6.8	12.5	12.5	15.8	15.8	19.6	19.6
6004	ST6003	13.42	53.7	53.7	1.6	528	5.03	0.36	0.19	4.4	4.4	6.9	6.9	8.3	8.3	10.2	10.2
6013A	ST6013	6.55	73.9	73.9	1.3	1183	4.91	0.36	0.19	3.1	3.1	4.9	4.9	5.7	5.7	6.7	6.7
6013B	ST6007	9.69	73.9	73.9	1.3	1183	4.91	0.36	0.19	4.5	4.5	7.0	7.0	8.2	8.2	9.7	9.7
6021	ST6021	12.43	68.8	68.8	1.0	513	3.99	0.35	0.15	4.9	4.9	7.8	7.8	8.9	8.9	10.4	10.4
6022	ST6022	27.99	51.1	51.1	6.8	687	5.56	0.37	0.30	8.4	8.4	12.6	12.6	15.1	15.1	18.3	18.3
6031	ST6031	14.40	65.2	65.2	1.9	429	6.61	0.37	0.26	5.3	5.3	7.9	7.9	9.3	9.3	11.1	11.1
6201A	ST6412	56.66	34.1	42.4	1.9	885	5.81	0.36	0.22	11.1	13.5	16.9	20.3	20.2	24.2	25.1	29.6
6201B	ST6201	97.87	25.0	49.0	3.0	1101	4.90	0.36	0.19	14.6	26.4	23.2	40.1	28.4	47.8	36.2	58.4
6205	ST6205	25.21	37.1	49.6	2.3	757	6.71	0.36	0.25	5.6	7.3	8.7	11.1	10.5	13.3	13.2	16.3
6210	06210	26.56	23.8	51.5	4.4	551	4.29	0.35	0.17	4.2	8.4	7.8	13.4	10.1	16.2	12.0	19.0
6211	06211	16.53	37.7	37.7	10.1	587	4.46	0.35	0.17	4.5	4.5	8.3	8.3	10.4	10.4	12.2	12.2
6411A	ST6411	10.69	40.1	40.1	2.4	565	6.37	0.36	0.25	2.6	2.6	4.3	4.3	5.3	5.3	6.7	6.7
6411B	ST6405	7.47	40.1	40.1	2.4	565	6.37	0.36	0.25	1.9	1.9	3.2	3.2	4.0	4.0	5.1	5.1
6416A	ST6653	11.82	48.7	49.7	1.7	435	6.68	0.37	0.26	3.4	3.4	5.1	5.2	6.1	6.2	7.5	7.6
6416B	06416	59.26	34.8	36.5	5.6	1204	6.68	0.37	0.26	12.3	12.9	19.3	20.0	23.3	24.2	29.4	30.4
6610A	ST6610	15.48	44.9	46.9	2.6	789	6.69	0.37	0.26	4.2	4.4	6.7	6.9	8.1	8.4	10.2	10.5
6610B	ST6605	18.06	43.6	43.6	7.3	525	6.69	0.37	0.26	4.8	4.8	7.6	7.6	9.2	9.2	11.6	11.6

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Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
6611	06611	20.49	44.0	44.1	6.3	530	6.69	0.37	0.26	5.4	5.4	8.4	8.5	10.2	10.2	12.7	12.7
9003	ST9003	52.84	50.4	50.4	1.6	900	6.35	0.36	0.25	14.6	14.6	21.6	21.6	25.3	25.3	30.5	30.5
9006	ST9006	26.30	43.4	43.4	1.8	752	4.66	0.35	0.18	7.0	7.0	11.2	11.2	13.7	13.7	17.0	17.0
9013	ST9013	58.92	43.4	43.4	0.7	1462	4.40	0.35	0.17	14.7	14.7	22.9	22.9	27.6	27.6	32.4	32.4
9019	ST9019	46.34	43.4	43.4	2.0	995	3.51	0.35	0.13	12.2	12.2	18.9	18.9	20.6	20.6	25.2	25.2
9023	ST9023	11.00	42.7	43.4	1.5	481	4.61	0.35	0.18	3.0	3.0	4.9	5.0	6.1	6.1	7.6	7.7
9024	ST9024	30.75	41.9	41.9	4.5	727	3.57	0.35	0.16	8.3	8.3	13.8	13.8	17.3	17.3	19.0	19.0
9027	ST9027	14.17	43.4	43.4	3.2	799	3.50	0.35	0.13	4.3	4.3	7.3	7.3	7.7	7.7	9.7	9.7
9031	ST9031	56.63	43.4	43.4	1.3	1438	3.51	0.35	0.13	14.8	14.8	22.9	22.9	25.0	25.0	30.5	30.5
9032	ST9032	29.13	42.7	42.7	3.9	608	3.72	0.35	0.16	7.8	7.8	12.7	12.7	15.9	15.9	17.4	17.4
9039	ST9039	24.37	51.0	51.0	5.4	777	3.58	0.35	0.16	8.1	8.1	13.4	13.4	16.6	16.6	18.3	18.3
9041	ST9066	19.00	64.7	64.7	1.2	395	4.18	0.35	0.16	6.7	6.7	10.2	10.2	12.2	12.2	13.8	13.8
9048A	ST9044	11.52	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.8	3.8	6.3	6.3	7.6	7.6	9.4	9.4
9048B	ST9048	8.86	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.0	3.0	5.0	5.0	6.1	6.1	7.4	7.4
9051	ST9051	7.62	43.3	43.4	1.8	365	3.82	0.35	0.14	2.2	2.2	3.6	3.6	4.0	4.0	4.6	4.6
9059A	ST9053	13.59	43.4	43.4	1.4	582	6.15	0.36	0.24	3.5	3.5	5.5	5.5	6.6	6.6	8.3	8.3
9059B	ST9059	11.82	43.4	43.4	1.4	582	6.15	0.36	0.24	3.1	3.1	4.9	4.9	5.9	5.9	7.4	7.4
9060	ST9060	11.18	63.9	64.7	1.8	230	3.50	0.35	0.13	4.0	4.1	6.1	6.2	6.8	6.9	8.1	8.2
9065	ST9065	14.62	35.3	39.3	10.5	997	4.96	0.33	0.12	4.2	4.5	7.6	7.9	8.2	8.6	10.6	11.0
9071	09071	10.19	39.8	40.4	8.5	743	5.61	0.33	0.14	3.6	3.7	6.5	6.6	6.6	6.6	7.2	7.2
9072	09072	19.38	43.9	43.9	4.1	1126	6.69	0.37	0.26	5.2	5.2	8.7	8.7	10.7	10.7	13.5	13.5
CANYON_N	CANYON_CR_PH2_DET	7.24	70.4	70.4	9.3	367	6.69	0.37	0.26	3.1	3.1	4.8	4.8	5.6	5.6	6.8	6.8
CANYON_S	CANYON_CR_ARCH_PIPE	7.74	70.9	70.9	3.9	469	6.69	0.37	0.26	3.3	3.3	5.0	5.0	5.9	5.9	7.1	7.1
FUT6612	06612	50.30	3.7	64.1	5.1	1383	6.69	0.37	0.26	1.5	18.9	4.7	28.4	7.1	33.5	11.4	40.4
S_1203	1203	3.59	64.8	64.8	5.5	126	6.69	0.37	0.26	1.4	1.4	2.1	2.1	2.5	2.5	3.0	3.0
TONKIN_NISSAN_BASIN	TONKIN_NISSAN_POND	17.83	37.3	43.5	0.9	638	6.69	0.37	0.26	3.9	4.5	5.9	6.7	7.0	8.0	8.7	9.8

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
ST1202	1203	ST1202	CIRCULAR	1.5	-	262	276.62	265.7	3.87	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
17559	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
17558	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
SD6629	6652	ST6618	CIRCULAR	0.83	-	106.2	161.33	160.0	1.04	0.013	0.0	0.0	0.0	0.3	NF	0.0	0.0	0.0	1.8	NF
STAFFORD_MEADOWS_CHANNEL	9067	3316	STAFFORD_CHANNEL	88	3	410	214.8	212.8	0.50	0.035	2.4	3.8	4.8	6.3	NF	9.2	13.6	15.8	19.1	NF
SD2151	DAY_RD_IMPOUNDMENT	ST2107	CIRCULAR	2	-	192.4	227.55	227.5	0.07	0.01	17.4	16.7	16.4	16.4	2-yr, 24-hr	16.8	16.7	16.7	16.9	2-yr, 24-hr
SD5218	POND_LIBRARY	ST5215	CIRCULAR	1.5	-	69	140.76	136.0	4.08	0.013	19.3	22.2	22.2	22.2	100-yr, 24-hr	21.9	22.2	22.2	22.1	25-yr, 24-hr
PST1204	PST1202	PST1204	CIRCULAR	1	-	84.3	331.58	329.2	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1205	PST1204	PST1205	CIRCULAR	1	-	129.3	329.2	314.6	11.16	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1206	PST1205	PST1206	CIRCULAR	1	-	189.2	314.58	309.5	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1207	PST1206	PST1207	CIRCULAR	1	-	121.8	309.49	307.0	1.91	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1208	PST1207	PST1208	CIRCULAR	1	-	61.1	306.97	292.8	8.21	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.7	NF
PST1209	PST1208	PST1209	CIRCULAR	1	-	116.5	292.77	278.1	14.30	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
1203	PST1209	1203	CIRCULAR	1	-	23.3	278.08	276.6	1.50	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
SD1740	SIEMENS_POND_C&D	ST3208	CIRCULAR	2.5	-	77	208.45	207.0	1.95	0.013	2.8	6.1	8.3	11.8	NF	3.5	7.5	10.1	14.3	NF
SD1000	ST1000	ST1129	CIRCULAR	2.5	-	142.7	257.9	253.5	3.12	0.013	18.9	25.5	28.9	33.7	NF	19.5	26.2	29.7	34.6	NF
SD1001	ST1001	ST1000	CIRCULAR	1.5	-	900	270.05	257.9	1.24	0.013	7.2	8.3	7.9	8.1	NF	7.2	7.8	7.8	8.1	NF
SD1002	ST1002	ST1001	CIRCULAR	1.25	-	540	277.75	270.1	1.38	0.013	7.2	8.4	8.7	8.3	25-yr, 24-hr	7.2	8.1	8.1	8.2	25-yr, 24-hr
SD1100	ST1100	ST1700	CIRCULAR	2.5	-	72	241.73	239.2	3.59	0.013	36.2	49.6	57.9	72.9	10-yr, 24-hr	39.6	57.3	68.1	80.4	10-yr, 24-hr
SD1101	ST1101	ST1100	SYSCO	21	3.8	1170	244.65	241.7	0.25	0.035	28.5	43.6	48.3	52.6	NF	28.5	40.9	43.8	51.9	100-yr, 24-hr
SD1102	ST1102	ST1101	CIRCULAR	3.5	-	58	244.82	244.7	0.29	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1103	ST1103	ST1102	CIRCULAR	3.5	-	77	245.25	244.8	0.30	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1104	ST1104	ST1103	CIRCULAR	3	-	31	245.61	245.3	0.52	0.011	18.4	28.5	34.0	41.4	NF	18.4	28.5	34.0	41.5	NF
SD1105	ST1105	ST1104	CIRCULAR	2.5	-	150	250.61	245.6	3.20	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1106	ST1106	ST1105	CIRCULAR	2.5	-	332.6	253.77	250.6	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1107	ST1107	ST1106	CIRCULAR	2.5	-	170.5	255.79	253.8	1.07	0.011	8.7	14.6	18.2	22.8	NF	8.7	14.6	18.2	22.8	NF
SD1108	ST1108	ST1107	CIRCULAR	2.5	-	180	257.5	255.8	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1109	ST1109	ST1108	CIRCULAR	2.5	-	273.1	261.49	257.5	1.39	0.011	8.7	14.6	18.2	22.9	NF	8.7	14.6	18.2	22.9	NF
SD1110	ST1110	ST1109	CIRCULAR	2.5	-	218.1	266.69	261.5	2.29	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1111	ST1111	ST1110	CIRCULAR	2	-	112.9	267.03	266.7	0.30	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1112	ST1112	ST1111	CIRCULAR	1.5	-	100	271.56	267.0	4.53	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1113	ST1113	ST1112	CIRCULAR	1.5	-	67.4	272.22	271.6	0.68	0.013	7.1	12.4	15.7	20.4	25-yr, 24-hr	7.1	12.4	15.7	20.4	25-yr, 24-hr
SD1114	ST1114	ST1113	CIRCULAR	1.5	-	379.5	276.02	272.2	0.92	0.013	7.1	12.4	15.7	20.8	10-yr, 24-hr	7.1	12.4	15.7	20.8	10-yr, 24-hr
SD1115	ST1115	ST1110	CIRCULAR	2.5	-	47	268.44	266.7	2.32	0.012	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1116	ST1116	ST1115	CIRCULAR	2.25	-	79	270.48	268.4	2.58	0.013	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1117	ST1117	ST1103	CIRCULAR	2.75	-	238.4	246.52	245.3	0.31	0.013	10.6	15.9	18.4	22.0	NF	10.6	15.8	18.2	21.9	NF
SD1118	ST1118	ST1117	CIRCULAR	2.75	-	350.9	247.64	246.5	0.32	0.013	10.6	15.9	18.5	22.0	NF	10.6	15.9	18.3	21.9	NF
SD1119	ST1119	ST1118	CIRCULAR	2.75	-	293.1	262.81	247.6	5.18	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1120	ST1120	ST1119	CIRCULAR	1.5	-	309	267.58	262.8	1.48	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1121	ST1121	ST1120	CIRCULAR	1.5	-	277.3	271.88	267.6	1.44	0.013	5.9	8.9	10.5	12.4	NF	5.9	8.9	10.5	12.4	NF
SD1122	ST1122	ST1121	CIRCULAR	1.5	-	277.7	273.75	271.9	0.67	0.013	5.9	8.9	10.5	12.2	NF	5.9	8.9	10.5	12.2	NF
SD1123	ST1123	ST1122	CIRCULAR	1.25	-	105.6	276.24	273.8	2.12	0.013	5.9	8.9	10.5	12.2	100-yr, 24-hr	5.9	8.9	10.5	12.2	100-yr, 24-hr
SD1124	ST1124	ST1123	CIRCULAR	1.25	-	257.5	284.48	276.2	3.20	0.013	5.9	8.9	10.5	12.3	100-yr, 24-hr	5.9	8.9	10.5	12.3	100-yr, 24-hr
SD1125	ST1125	ST1118	CIRCULAR	1.75	-	193.8	251.13	247.6	1.28	0.013	4.7	7.1	8.4	10.1	NF	4.7	7.1	8.5	10.2	NF
SD1127	ST1126	ST1701	CANYON_CR	22	4	1500	246.95	237.5	0.63	0.035	12.5	19.9	24.0	31.1	NF	19.0	28.9	34.1	42.3	NF
SD1128	ST1128	ST2118	CIRCULAR	2.5	-	307.2	244.51	241.5	0.86	0.013	18.8	28.7	28.9	33.3	NF	19.3	28.8	29.4	34.1	NF
SD1129	ST1129	ST1128	BASALT_CR9	11	2	530	253.45	244.5	0.75	0.035	18.8	33.6	33.6	33.7	NF	19.3	38.5	38.5	34.3	NF
SD2411	ST1130	ST2407	CIRCULAR	2	-	727	240.02	236.7	0.43	0.024	8.7	9.4	9.8	10.4	NF	8.8	9.5	9.8	10.5	NF
SD2410	ST1130	ST2409	CIRCULAR	2	-	263.6	240.02	240.3	0.59	0.024	1.6	5.8	8.0	10.6	NF	2.1	6.2	8.2	10.8	NF
SD1130	ST1131	ST1130	CIRCULAR	2.75	-	105.9	242.76	240.0	0.32	0.024	10.5	15.4	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF
SD1131	ST1132	ST1131	CIRCULAR	2.75	-	399.7	244.2	242.8	0.31	0.024	10.5	15.5	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1132	ST1133	ST1132	CIRCULAR	1.25	-	282.4	247.5	244.2	0.64	0.013	0.0	0.0	0.0	0.1	NF	11.0	15.9	18.3	22.0	2-yr, 24-hr
SD1302	ST1200	ST1302	CIRCULAR	2.25	-	75	257.59	256.1	1.64	0.013	8.4	12.8	14.9	19.1	NF	8.4	12.8	14.9	19.1	NF
SD1200	ST1201	ST1200	CIRCULAR	2.25	-	180	260.31	257.6	1.46	0.013	8.5	12.8	14.9	19.1	NF	8.5	12.8	14.9	19.1	NF
SD1201	ST1202	ST1201	CIRCULAR	2	-	251.1	265.7	260.3	2.05	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
SD1126	ST1300	ST1126	CIRCULAR	3	-	68	247.22	247.0	0.40	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1300	ST1301	ST1300	CIRCULAR	3	-	121	248.45	247.2	0.55	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1301	ST1302	ST1301	CIRCULAR	2.5	-	323	256.11	248.5	2.18	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1303	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.33	0.011	1.4	2.8	3.6	4.3	NF	3.9	5.6	6.6	8.0	100-yr, 24-hr
SD1304	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.44	0.011	0.1	1.3	2.2	4.0	NF	3.1	5.4	6.4	7.9	100-yr, 24-hr
SD1305	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	0.44	0.011	2.7	3.2	3.5	4.3	NF	3.8	5.4	6.4	7.9	100-yr, 24-hr
SD1401	ST1304	ST1400	CIRCULAR	1.5	-	93.8	240.49	238.7	1.03	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1306	ST1305	ST1304	CIRCULAR	1	-	310.8	242.46	240.5	0.60	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1307	ST1306	ST1305	CIRCULAR	1.25	-	159	244.66	242.5	0.82	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1308	ST1307	ST1306	CIRCULAR	1.25	-	147.8	246.73	244.7	1.33	0.013	0.7	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1400	ST1400	ST1401	CIRCULAR	1.5	-	10	238.7	235.4	0.80	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1402	ST1401	ST1402	CIRCULAR	4	-	68	235.43	235.4	0.49	0.013	43.7	58.1	65.6	73.7	NF	50.9	65.0	71.1	79.1	NF
SD1403	ST1402	ST1403	BOECKMAN_CR	37	9	970	235.43	197.5	3.92	0.035	45.9	61.7	69.6	78.5	NF	53.5	68.8	75.5	83.9	NF
SD1404	ST1403	ST1404A	CIRCULAR	4	-	45	197.45	195.5	4.45	0.013	45.4	61.6	69.3	78.1	NF	53.1	68.6	75.2	83.6	NF
SD1405A	ST1404A	ST1404B	BOECKMAN_CR	37	9	1285	195.45	160.9	2.69	0.035	50.8	70.3	79.8	91.8	NF	59.7	78.6	88.7	102.5	NF
SD1405B	ST1404B	ST1603	BOECKMAN_CR	37	9	500	160.9	147.5	2.69	0.035	50.8	70.3	79.7	91.8	NF	59.7	78.6	88.4	102.2	NF
SD1602	ST1500	ST1600	CIRCULAR	2.5	-	221.5	203.36	194.6	2.06	0.011	0.3	0.4	1.5	3.1	NF	0.3	0.5	1.6	3.2	NF
SD1500	ST1501	ST1500	CIRCULAR	1.5	-	153	212.81	203.4	5.47	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1502	ST1502	ST1501	CIRCULAR	1.5	-	300.9	220.39	212.8	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1503	ST1503	ST1502	CIRCULAR	1.25	-	276	227.5	220.4	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1504	ST1504	ST1503	CIRCULAR	1.25	-	54	228.96	227.5	2.52	0.013	0.3	0.4	0.6	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1603	ST1600	ST1601	CIRCULAR	4	-	157.6	194.55	180.0	9.11	0.013	29.8	37.4	42.0	50.0	NF	31.3	39.9	44.8	56.1	NF
SD1604	ST1601	ST1602	CIRCULAR	4	-	169	180.04	156.6	14.03	0.013	29.8	37.4	42.0	50.2	NF	31.3	39.9	44.8	56.5	NF
SD1605	ST1602	ST1603	MENTOR_GRAPHICS	13	1	350	156.56	147.5	2.60	0.035	29.8	37.4	41.9	49.2	NF	31.3	39.9	44.8	54.5	NF
SD1607	ST1603	POND_BOECKMAN	BOECKMAN_CR_B	141.6	15.3	100	147.45	131.5	16.21	0.035	130.5	186.1	216.4	529.5	NF	196.0	278.7	707.7	651.9	NF
SD3200	ST1605	ST3200	CIRCULAR	5	-	300	131.45	127.6	1.29	0.024	124.0	161.8	210.5	289.9	25-yr, 24-hr	166.9	247.4	304.8	303.6	10-yr, 24-hr
SD1600	ST1608	ST1600	CIRCULAR	1.25	-	251	212.8	194.6	5.11	0.013	1.1	1.9	2.3	2.8	NF	1.4	2.2	2.7	3.2	NF
16687	ST1640	3316	CIRCULAR	1.5	-	125	214.82	212.8	1.54	0.011	3.7	4.9	5.3	5.9	NF	5.3	6.4	6.9	7.5	NF
SD1700	ST1700	ST1701	SYSCO-2	70	3	900	239.15	237.5	0.19	0.035	35.7	49.0	52.8	62.3	NF	39.3	52.2	59.7	70.3	NF
SD1701	ST1701	ST1702	SYSCO-3	24	5	350	237.45	236.2	0.35	0.035	43.5	57.9	65.4	73.8	NF	50.7	64.7	70.7	79.3	NF
SD1702	ST1702	ST1401	CIRCULAR	4	-	95	236.23	235.4	0.49	0.013	43.4	57.7	65.2	73.4	100-yr, 24-hr	50.6	64.6	70.7	78.7	100-yr, 24-hr
SD1703	ST1703	ST1704	CIRCULAR	4	-	56	208.45	210.4	0.18	0.013	24.9	30.8	34.7	40.2	NF	26.1	34.0	37.8	44.4	NF
SD1704	ST1704	ST1705	CIRCULAR	4	-	312	210.35	209.4	0.32	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1705	ST1705	ST1706	CIRCULAR	4	-	276.9	209.35	208.3	0.40	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1706	ST1706	ST1707	CIRCULAR	4	-	263.6	208.25	207.7	0.20	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1707	ST1707	ST1708	CIRCULAR	4	-	142.8	207.72	207.4	0.23	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1708	ST1708	ST1709	CIRCULAR	4	-	434.9	207.39	206.0	0.32	0.013	24.7	30.8	34.5	40.4	NF	26.0	33.4	37.6	44.4	NF
SD1709	ST1709	ST1710	CIRCULAR	4	-	277	205.99	200.6	1.93	0.013	24.8	30.8	34.6	42.4	NF	26.0	33.4	37.7	48.2	NF
SD1716	ST1710	ST1600	CIRCULAR	4	-	75	200.64	194.6	8.15	0.013	28.6	35.7	39.8	48.2	NF	29.8	38.1	42.9	54.5	NF
SD1710	ST1711	ST1712	CIRCULAR	1.25	-	310	217.25	215.0	0.71	0.013	3.9	5.9	7.1	8.4	100-yr, 24-hr	3.9	5.9	7.2	8.5	100-yr, 24-hr
SD1711	ST1712	ST1713	CIRCULAR	1.5	-	270	215.04	208.6	2.14	0.013	3.9	5.8	7.1	8.4	NF	3.9	5.8	7.2	8.4	NF
SD1715	ST1713	ST1500	CIRCULAR	1.5	-	128	208.58	203.4	9.93	0.013	0.0	0.0	1.0	2.5	NF	0.0	0.0	1.0	2.5	NF
SD1712	ST1713	ST1714	CIRCULAR	1.25	-	250.1	208.58	208.6	-0.28	0.013	3.9	5.3	6.2	6.5	NF	3.9	5.3	6.2	6.5	NF
SD1713	ST1714	ST1715	CIRCULAR	1	-	135	208.58	205.7	2.17	0.013	3.8	5.2	5.9	5.9	10-yr, 24-hr	3.8	5.3	5.9	5.9	10-yr, 24-hr
SD1714	ST1715	ST1710	CIRCULAR	1	-	20	205.65	200.6	25.88	0.013	3.8	5.2	5.9	5.9	NF	3.8	5.3	5.9	5.9	NF
SD2722	ST1717	ST2720	CIRCULAR	2	-	500	209.05	205.5	0.72	0.013	8.6	12.6	13.8	16.9	100-yr, 24-hr	9.3	13.0	14.5	17.2	100-yr, 24-hr
SD1717	ST1718	ST1717	TRAPEZOIDAL	30	2	50	209.45	209.1	0.80	0.035	8.7	12.9	13.8	17.4	100-yr, 24-hr	9.4	13.4	14.5	18.3	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1718	ST1719	ST1718	CIRCULAR	3.5	-	107	210.45	209.5	0.93	0.024	8.8	13.1	15.0	17.7	NF	9.5	14.2	15.9	18.9	NF
SD1719	ST1720	ST1719	ARCH	2.92	2	100	211.35	210.5	0.90	0.024	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.1	18.9	NF
SD1720	ST1721	ST1720	CIRCULAR	2	-	282.2	216.15	211.4	1.70	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	18.9	NF
SD1721	ST1722	ST1721	CIRCULAR	1.5	-	38.9	216.83	216.2	0.98	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	19.3	NF
SD1722	ST1723	ST1722	CIRCULAR	2	-	90	217.26	216.8	0.32	0.013	8.8	13.1	15.4	18.1	NF	9.5	14.2	16.5	19.3	100-yr, 24-hr
SD1723	ST1724	ST1723	CIRCULAR	1	-	40.9	217.39	217.3	0.05	0.011	8.8	13.1	15.3	18.1	25-yr, 24-hr	9.6	14.2	16.5	19.4	10-yr, 24-hr
SD1724	ST1725	ST1724	CIRCULAR	2.5	-	208	218.26	217.4	0.36	0.013	8.8	13.2	15.5	18.3	100-yr, 24-hr	9.6	14.4	16.6	19.7	100-yr, 24-hr
SD1725	ST1726	ST1725	CIRCULAR	2.5	-	34	218.56	218.3	0.56	0.013	8.9	13.2	15.5	18.6	NF	9.7	14.4	16.8	20.0	100-yr, 24-hr
SD2000	ST2000	ST4002	PRISON_OFFSITE6	33	3.5	820	139.95	139.5	0.06	0.035	127.8	162.0	174.8	191.0	2-yr, 24-hr	160.7	199.6	206.0	225.9	2-yr, 24-hr
SD2001	ST2001	ST2000	PRISON_OFFSITE6	33	3.5	331.9	140.15	140.0	0.06	0.035	157.8	187.7	190.6	190.8	2-yr, 24-hr	150.7	191.5	196.6	216.5	2-yr, 24-hr
SD2002	ST2002	ST2001	PRISON_OFFSITE5	40	3.5	630.6	140.45	140.2	0.05	0.035	143.6	179.7	178.7	184.3	2-yr, 24-hr	172.0	182.4	191.0	215.3	2-yr, 24-hr
SD2003	ST2003	ST2002	PRISON_OFFSITE4	19	3.5	359.2	140.95	140.5	0.14	0.035	166.1	167.6	177.3	181.0	2-yr, 24-hr	174.5	177.2	189.9	214.5	2-yr, 24-hr
SD2004	ST2004	ST2003	PRISON_OFFSITE4	19	3.5	1208.4	142.45	141.0	0.12	0.035	135.7	141.5	156.5	179.6	2-yr, 24-hr	145.3	175.5	189.3	214.1	2-yr, 24-hr
SD2005	ST2005	ST2004	PRISON_OFFSITE3	48	3	1322.9	142.95	142.5	0.04	0.035	121.1	143.8	156.6	177.1	2-yr, 24-hr	138.2	171.1	186.8	207.0	2-yr, 24-hr
SD2006	ST2006	ST2005	PRISON_OFFSITE2	23.4	2.3	705.4	143.85	143.0	0.13	0.035	132.5	173.0	192.3	219.2	2-yr, 24-hr	159.1	208.4	231.2	260.1	2-yr, 24-hr
SD2007	ST2007	ST2006	PRISON_OFFSITE2	23.4	2.3	46.3	143.95	143.9	0.22	0.035	137.8	182.4	203.7	232.9	2-yr, 24-hr	166.8	220.2	245.4	280.0	2-yr, 24-hr
SD2008	ST2008	ST2007	PRISON_OFFSITE2	23.4	2.3	195.6	144.15	144.0	0.10	0.035	140.3	187.1	209.8	241.4	2-yr, 24-hr	170.1	226.5	253.7	290.8	2-yr, 24-hr
SD2009	ST2009	ST2008	PRISON_OFFSITE2	23.4	2.3	1744.5	145.45	144.2	0.10	0.035	17.3	34.6	42.9	55.8	2-yr, 24-hr	19.8	39.8	54.8	73.7	2-yr, 24-hr
SD2010	ST2010	ST2009	PRISON_OFFSITE	20	4	108	150.46	145.5	4.18	0.035	29.5	78.9	115.0	90.8	10-yr, 24-hr	101.0	72.6	64.2	81.2	2-yr, 24-hr
SD2011	ST2011	ST2010	RECT_CLOSED	6	3	32	153.13	150.5	8.37	0.013	45.5	112.8	114.3	109.3	10-yr, 24-hr	110.2	115.1	81.6	86.6	2-yr, 24-hr
SD2012	ST2012	ST2011	PRISON_OFFSITE	20	4	89	160.54	153.1	8.35	0.035	28.7	54.1	57.9	62.4	100-yr, 24-hr	51.8	64.2	75.1	93.3	10-yr, 24-hr
SD2013	ST2013	ST2012	PRISON_OFFSITE	20	4	361	170.14	160.5	2.66	0.035	28.8	43.2	51.0	62.4	NF	43.8	64.2	77.1	89.5	100-yr, 24-hr
SD2014	ST2014	ST2013	RECT_CLOSED	6	3	32	170.46	170.1	1.00	0.013	28.8	43.1	51.0	62.5	NF	43.8	64.2	75.2	89.5	100-yr, 24-hr
SD2015	ST2015	ST2014	PRISON_OFFSITE	20	4	587	178.35	170.5	1.34	0.035	28.8	43.2	51.2	62.7	NF	43.9	64.5	75.6	89.8	NF
SD2016	ST2016	ST2015	CIRCULAR	3.5	-	279	187.75	178.4	3.37	0.013	28.8	43.3	51.4	62.9	NF	44.0	64.6	75.8	90.0	NF
SD2017	ST2017	ST2016	CIRCULAR	3.5	-	401	199.05	187.8	2.79	0.013	28.8	43.3	51.4	62.8	NF	44.0	64.6	75.8	90.0	NF
SD2018	ST2018	ST2017	CIRCULAR	3.5	-	551	201.95	199.1	0.50	0.013	28.8	43.4	51.4	62.9	NF	44.0	64.7	75.9	90.1	NF
SD2019	ST2019	ST2018	CIRCULAR	3.5	-	69	202.45	202.0	0.49	0.013	28.8	43.6	51.8	63.4	NF	44.2	65.1	75.9	90.1	NF
SD2403B	ST2100	ST2403	CIRCULAR	4	-	79.9	222.7	222.1	1.29	0.013	50.8	63.0	67.7	73.4	NF	58.7	69.1	72.9	77.5	NF
SD2403	ST2100	ST2403	CIRCULAR	4	-	80.8	222.7	222.1	0.84	0.013	46.1	59.5	64.6	70.1	NF	55.0	66.1	69.7	75.5	NF
SD2100	ST2101	ST2100	CIRCULAR	3	-	602.1	224.96	222.7	0.31	0.013	34.0	41.9	44.3	46.6	NF	42.8	48.0	49.3	51.2	NF
SD2101	ST2101	ST2100	CIRCULAR	3	-	603.7	224.96	222.7	0.28	0.013	33.9	41.8	44.2	46.5	NF	43.2	47.9	49.2	51.2	NF
SD2440	ST2101A	ST2431	CIRCULAR	2	-	327.1	196.41	192.3	1.19	0.013	37.9	47.3	51.3	56.2	2-yr, 24-hr	47.3	55.7	59.5	65.2	2-yr, 24-hr
SD2102	ST2102	ST2101	COMMERCE_CIR_DITCH	140.2	7.4	493.4	226.88	225.0	0.37	0.035	37.9	44.8	46.6	48.6	NF	45.0	48.8	49.9	50.3	NF
SD2439	ST2102A	ST2101A	CIRCULAR	4	-	346.6	198.2	196.4	0.50	0.013	38.8	54.5	55.8	70.9	10-yr, 24-hr	54.2	65.0	60.2	65.8	2-yr, 24-hr
SD2103	ST2103	ST2102	CIRCULAR	4	-	30	226.56	226.9	-1.07	0.024	37.9	42.6	44.4	46.1	NF	42.8	46.0	46.9	47.2	25-yr, 24-hr
SD2438	ST2103A	ST2102A	CIRCULAR	4	-	334.3	200.05	198.2	0.49	0.013	39.4	57.1	61.3	71.7	10-yr, 24-hr	57.6	62.7	63.5	69.7	2-yr, 24-hr
SD2104	ST2104	ST2103	BASALT_CR5_UPDATE	91.5	4	367.5	225.75	226.6	-0.22	0.035	38.1	43.3	44.2	45.0	2-yr, 24-hr	43.1	44.5	44.9	45.1	2-yr, 24-hr
SD2437	ST2104A	ST2103A	CIRCULAR	4	-	302.8	203.63	200.1	1.12	0.013	43.4	57.9	66.1	73.3	10-yr, 24-hr	59.9	69.9	71.2	75.6	2-yr, 24-hr
SD2105	ST2105	ST2104	CIRCULAR	4	-	96.7	226.41	225.8	0.68	0.024	39.7	44.1	45.9	47.4	NF	43.4	46.6	47.6	48.5	NF
SD2167	ST2105A	ST2104A	CIRCULAR	4	-	109.2	204.37	203.6	0.49	0.013	45.1	60.2	70.5	79.7	10-yr, 24-hr	63.2	76.4	77.6	80.1	2-yr, 24-hr
SD2106	ST2106	ST2105	COMMERCE_CIR_DITCH	42.1	9.8	754	226.75	226.4	0.05	0.035	41.0	44.6	46.7	48.8	NF	43.7	48.0	49.4	50.9	NF
SD2164	ST2106A	ST2105A	CIRCULAR	3.5	-	117.7	205.46	204.4	0.50	0.013	18.3	22.6	23.5	26.7	10-yr, 24-hr	35.8	43.4	44.2	43.4	2-yr, 24-hr
SD2107	ST2107	ST2120	COMMERCE_CIR_DITCH	26.4	7.4	965	227.47	226.7	0.08	0.035	28.8	28.8	29.1	29.5	NF	29.7	29.7	29.7	29.9	NF
SD2163	ST2107A	ST2106A	CIRCULAR	3.5	-	227.5	206.8	205.5	0.50	0.013	18.0	24.5	27.2	32.0	10-yr, 24-hr	42.2	48.6	48.5	50.6	2-yr, 24-hr
SD2108	ST2108	ST2101	BASALT_CR	24	5	300	228.84	225.0	1.27	0.035	22.8	34.0	40.2	50.4	NF	41.8	63.5	73.7	81.8	NF
17184	ST2108A	ST2107A	CIRCULAR	3.5	-	119.8	207.59	206.8	0.49	0.013	18.1	24.9	31.6	40.8	25-yr, 24-hr	41.9	48.0	48.4	48.5	2-yr, 24-hr
SD2109	ST2109	ST2108	BASALT_CR7	48	4	500	229.63	228.8	0.16	0.035	23.0	34.2	40.4	51.2	NF	42.1	63.9	74.2	85.8	NF
17195	ST2109A	ST2186	CIRCULAR	3.5	-	236.9	209.13	208.0	0.48	0.013	18.2	24.5	34.7	40.4	25-yr, 24-hr	40.5	47.4	47.7	47.6	10-yr, 24-hr
SD2110	ST2110	ST2109	CIRCULAR	3	-	70	230.56	229.6	1.33	0.013	23.0	34.4	40.6	52.0	NF	42.2	64.1	74.4	86.0	NF
17194	ST2110A	ST2109A	CIRCULAR	3.5	-	299.2	212.26	209.1	0.98	0.013	18.4	25.8	34.7	40.4	25-yr, 24-hr	40.3	47.4	47.6	47.9	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2111	ST2111	ST2110	BASALT_CR6	48	2	330	236.05	230.6	1.66	0.035	23.7	35.9	42.8	51.9	NF	44.3	64.1	74.4	86.0	NF
17203	ST2111A	ST2110A	CIRCULAR	3	-	177.8	214.19	212.3	0.80	0.013	17.4	26.8	34.5	40.4	100-yr, 24-hr	40.1	47.3	47.6	47.9	10-yr, 24-hr
SD2112	ST2112	ST2111	CIRCULAR	2	-	279.3	240.69	236.1	1.45	0.013	23.7	36.1	43.0	52.0	100-yr, 24-hr	44.4	64.2	74.5	88.8	10-yr, 24-hr
17201	ST2112A	ST2111A	CIRCULAR	3	-	178.4	215.82	214.2	0.80	0.013	17.4	28.7	34.3	40.5	100-yr, 24-hr	39.9	47.3	47.5	49.2	10-yr, 24-hr
SD2113	ST2113	ST2100	CIRCULAR	4	-	235.4	224.98	222.7	0.65	0.013	29.8	40.8	44.7	51.1	NF	30.2	41.0	45.2	51.6	NF
17269	ST2113A	ST2112A	CIRCULAR	3	-	329.5	218.27	215.8	0.68	0.013	17.4	27.5	34.2	40.5	100-yr, 24-hr	39.7	47.3	47.5	52.9	10-yr, 24-hr
SD2114	ST2114	ST2113	CIRCULAR	4	-	282.9	227.4	225.0	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17271	ST2114A	ST2113A	CIRCULAR	3	-	166	219.51	218.3	0.63	0.013	17.4	27.0	34.0	40.4	100-yr, 24-hr	39.5	47.2	50.3	57.1	10-yr, 24-hr
SD2115	ST2115	ST2114	CIRCULAR	4	-	242	229.45	227.4	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.0	45.2	51.7	NF
17280	ST2115A	ST2114A	CIRCULAR	3	-	166.1	220.95	219.5	0.75	0.013	17.4	27.6	33.7	40.4	100-yr, 24-hr	39.2	48.0	52.8	60.2	10-yr, 24-hr
SD2116	ST2116	ST2115	BASALT_CR11	16	4	150	233.95	229.5	3.00	0.035	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17282	ST2116A	ST2115A	CIRCULAR	2.5	-	300.4	224.4	221.0	0.98	0.013	17.4	28.8	33.5	40.2	100-yr, 24-hr	39.0	50.1	55.9	64.5	10-yr, 24-hr
SD2117	ST2117	ST2116	CIRCULAR	3	-	288	235.45	234.0	0.69	0.013	29.8	40.8	44.7	51.2	100-yr, 24-hr	30.3	41.1	45.2	51.8	100-yr, 24-hr
17285	ST2117A	ST2116A	CIRCULAR	2.5	-	159.9	226.55	224.4	1.22	0.013	17.4	26.7	33.2	40.2	NF	38.8	52.1	59.0	68.8	10-yr, 24-hr
SD2118	ST2118	ST2117	BASALT_CR10	44	4	380	241.45	235.5	1.45	0.035	30.8	45.2	50.3	59.7	NF	31.3	44.7	51.0	60.3	NF
17290	ST2118A	ST2117A	CIRCULAR	2.5	-	202.4	229.21	226.6	1.22	0.013	17.4	26.7	34.1	40.2	NF	38.5	53.8	61.8	72.8	10-yr, 24-hr
17291	ST2119A	ST2118A	CIRCULAR	2.5	-	120	230.56	229.2	0.96	0.013	17.4	26.7	32.4	40.2	100-yr, 24-hr	38.2	55.5	64.5	76.8	10-yr, 24-hr
SD2120	ST2120	ST2106	CIRCULAR	4	-	62	226.67	226.8	-0.13	0.024	41.8	45.3	47.2	49.5	NF	44.2	48.7	50.5	52.2	NF
SD2121	ST2121	ST2107	ARCH	3	1.67	53.8	228.59	227.5	2.10	0.024	14.1	13.5	13.2	13.3	NF	13.6	13.5	13.5	13.6	NF
DAY_RD_BYPASS_CHANNEL	ST2122	DAY_RD_IMPOUNDMENT	TRAPEZOIDAL	17	3	20	226.18	227.6	0.01	0.035	54.6	89.7	108.5	135.0	NF	105.6	163.5	193.1	233.5	NF
SD2122	ST2122	ST2121	COMMERCE_CIR_DITCH	20.9	3.7	583	226.18	228.6	-0.41	0.035	19.2	15.8	14.1	14.1	NF	14.4	14.1	14.1	14.4	NF
SD2123	ST2123	ST2122	CIRCULAR	3	-	43	226.37	226.2	0.44	0.024	66.6	98.9	116.2	140.8	NF	115.3	171.1	200.0	239.7	100-yr, 24-hr
17196	ST2186	ST2108A	CIRCULAR	3.5	-	42.6	207.99	207.6	0.47	0.013	17.6	24.7	34.8	40.4	25-yr, 24-hr	41.0	47.5	48.0	47.8	10-yr, 24-hr
SD2706	ST2400	ST2706	BASALT_CR3	42	5	1130	214.45	175.5	3.45	0.035	133.9	178.5	197.6	223.3	NF	155.1	196.9	214.7	238.8	NF
SD2400	ST2401	ST2400	BASALT_CR3	42	5	90	214.9	214.5	0.50	0.035	134.0	178.5	197.7	223.4	NF	155.1	197.0	214.8	238.9	NF
SD2401	ST2402	ST2401	BASALT_CR3	42	5	1110	220.95	214.9	0.55	0.035	134.3	178.7	197.9	223.6	NF	155.3	197.2	215.0	239.1	NF
SD2402	ST2403	ST2402	BASALT_CR8	38	5	1000	222.09	221.0	0.10	0.035	96.3	121.7	131.5	142.6	NF	113.1	134.4	141.9	152.3	NF
SD2404	ST2404	ST2402	BASALT_CR2	30	5	400	228.12	221.0	1.67	0.035	19.9	29.9	35.2	42.8	NF	23.1	33.6	39.0	47.1	NF
SD2405	ST2405	ST2404	CIRCULAR	4.5	-	250	228.12	228.1	0.00	0.013	19.9	29.9	35.2	42.9	NF	23.1	33.6	39.1	47.1	NF
SD2406	ST2406	ST2405	BASALT_CR	24	5	450	229.5	228.1	0.31	0.035	15.5	23.4	27.6	33.5	NF	18.7	27.2	31.5	38.0	NF
SD2407	ST2407	ST2406	CIRCULAR	3.5	-	677	236.7	229.5	1.06	0.011	13.8	20.6	24.1	28.9	NF	14.1	20.6	23.8	28.6	NF
SD2408	ST2408	ST2407	CIRCULAR	3	-	131	238.66	236.7	1.18	0.011	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2409	ST2409	ST2408	CIRCULAR	3	-	242.8	240.25	238.7	0.54	0.013	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2716	ST2410	ST2715	CIRCULAR	1.5	-	253	214.7	210.3	1.42	0.013	5.0	7.6	9.1	11.4	NF	5.1	8.1	9.7	11.9	NF
SD2412	ST2411	ST2410	CIRCULAR	1.25	-	284	217.44	214.7	0.84	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2413	ST2412	ST2411	CIRCULAR	1.25	-	415.1	221.01	217.4	0.85	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2414	ST2413	ST2412	CIRCULAR	1.25	-	318.4	223.72	221.0	0.82	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2442	ST2431	ST2432	CIRCULAR	2	-	69	192.31	189.3	4.08	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2443	ST2432	ST2433	CIRCULAR	2.25	-	67.6	189.3	188.4	1.35	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2444	ST2433	ST2434	CIRCULAR	2.5	-	335.6	188.39	185.1	0.94	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	25-yr, 24-hr
SD2445	ST2434	ST2435	CIRCULAR	2.5	-	65	185.05	163.5	35.23	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	NF
SD2446	ST2435	ST2004	PRISON_OFFSITE3	48	3	2000	163.45	142.5	1.05	0.035	37.4	47.1	51.2	56.2	NF	47.1	55.7	59.5	65.2	NF
SD2700	ST2700	ST4003	COFFEE_CR2	80	3.5	900	143.45	140.0	0.39	0.035	147.8	203.5	204.0	224.2	NF	170.4	192.2	226.7	298.4	10-yr, 24-hr
SD2701	ST2701	ST2700	COFFEE_CR2	80	3.5	1000	147.95	143.5	0.45	0.035	149.7	205.8	230.9	261.4	NF	172.0	223.8	248.1	278.0	NF
SD2702	ST2702	ST2701	COFFEE_CR2	80	3.5	1100	169.45	148.0	1.95	0.035	151.0	207.1	232.5	263.4	NF	173.3	225.7	250.1	280.6	NF
SD2703	ST2703	ST2702	COFFEE_CR	40	5	50	173.45	169.5	8.03	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2704	ST2705	ST2703	BASALT_CR4	44	4	350	173.95	173.5	0.14	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2705	ST2706	ST2705	BASALT_CR3	42	5	170	175.45	174.0	0.88	0.035	133.6	178.3	197.4	223.1	NF	154.9	196.7	214.5	238.6	NF
SD2707	ST2707	ST2705	CIRCULAR	2.5	-	48	178.69	174.0	6.79	0.013	24.2	35.8	40.7	47.6	NF	24.4	36.2	41.3	48.2	NF
SD2708	ST2708	ST2707	CIRCULAR	2.5	-	452	182.05	178.7	0.70	0.013	15.6	22.9	26.0	29.3	NF	15.7	23.3	26.6	30.1	NF
SD2709	ST2709	ST2708	CIRCULAR	2	-	274	188.85	182.1	2.30	0.013	15.6	23.1	26.3	29.5	NF	15.7	23.5	27.0	33.6	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2710	ST2710	ST2709	CIRCULAR	2	-	400	195.05	188.9	1.50	0.013	15.6	23.1	27.4	32.1	100-yr, 24-hr	15.7	23.5	30.2	32.2	100-yr, 24-hr
SD2711	ST2711	ST2710	CIRCULAR	2	-	400	200.45	195.1	1.30	0.013	15.6	23.1	27.3	32.7	100-yr, 24-hr	15.7	23.5	28.4	32.9	100-yr, 24-hr
SD2712	ST2712	ST2711	CIRCULAR	3	-	106.1	203.05	200.5	2.45	0.013	5.0	7.6	11.8	30.3	100-yr, 24-hr	5.1	8.0	13.4	29.9	100-yr, 24-hr
SD2713	ST2713	ST2712	CIRCULAR	2	-	247.2	205.72	203.1	0.76	0.013	5.0	7.6	9.1	14.3	NF	5.1	8.0	9.8	15.7	100-yr, 24-hr
SD2714	ST2714	ST2713	CIRCULAR	2	-	174.8	206.95	205.7	0.70	0.013	5.0	7.6	9.1	13.8	NF	5.1	8.0	9.7	16.9	100-yr, 24-hr
SD2715	ST2715	ST2714	CIRCULAR	1.75	-	293	210.3	207.0	1.04	0.013	5.0	7.6	9.1	11.7	NF	5.1	8.0	9.7	13.8	NF
SD2717	ST2716	ST4015	CIRCULAR	2.5	-	84.3	171.46	169.9	1.74	0.024	12.5	23.4	25.0	26.7	25-yr, 24-hr	13.7	24.1	25.5	26.9	25-yr, 24-hr
SD2718	ST2717B	ST2716	CIRCULAR	2.5	-	75	172.13	171.5	0.89	0.024	12.5	23.4	25.0	26.6	25-yr, 24-hr	13.8	24.1	25.5	26.8	25-yr, 24-hr
SD2719	ST2718	ST2717	COFFEE_CR	40	5	680	186.45	172.1	2.11	0.035	15.3	22.5	25.5	30.3	NF	15.9	23.0	26.1	31.0	NF
SD2720	ST2719	ST2718	ARCH	4.5	2.25	76	188.2	186.5	2.30	0.024	15.3	22.6	25.6	30.3	NF	16.0	23.1	26.2	31.0	NF
SD2721	ST2720	ST2719	COFFEE_CR	40	5	640	205.45	188.2	2.70	0.035	15.9	23.7	26.6	31.5	NF	16.6	24.0	27.3	32.8	NF
SD3000	ST3001	ST3201	CIRCULAR	1.25	-	111.7	171.92	113.5	25.67	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3001	ST3002	ST3001	CIRCULAR	1.25	-	71.5	180.31	171.9	11.82	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3002	ST3003	ST3002	CIRCULAR	1.25	-	116.4	188.52	180.3	7.07	0.011	4.4	6.8	8.1	10.2	NF	4.4	6.9	8.2	10.2	NF
SD3003	ST3004	ST3003	CIRCULAR	1.25	-	35	190.86	188.5	4.58	0.011	4.4	6.8	8.1	11.4	NF	4.4	6.9	8.2	10.6	NF
SD3004	ST3005	ST3004	CIRCULAR	1.25	-	293	195.52	190.9	1.53	0.011	4.4	6.8	8.1	10.7	NF	4.5	6.9	8.2	10.6	NF
SD3006	ST3007	03000	N_FORK_MERIDIAN_CR	22	4	5350	153.45	58.5	1.78	0.035	36.1	52.3	59.8	71.2	NF	61.6	85.8	98.4	120.8	NF
SD3007	ST3008	ST3007	N_FORK_MERIDIAN_CR	22	4	500	169.45	153.5	2.20	0.035	38.0	54.6	62.6	73.6	NF	63.6	88.7	101.6	123.8	NF
SD3008	ST3009	ST3008	N_FORK_MERIDIAN_CR	22	4	750	185.82	169.5	2.18	0.035	18.4	26.6	29.2	35.4	NF	24.5	30.8	34.9	46.1	NF
SD3009	ST3010	ST3009	CIRCULAR	2	-	63.8	190	185.8	6.57	0.011	18.4	26.6	29.2	40.5	NF	24.5	30.9	34.9	54.0	100-yr, 24-hr
SD3010	ST3011	ST3010	CIRCULAR	2	-	198	191.45	190.0	0.73	0.011	18.4	26.6	29.2	36.8	NF	24.5	30.9	34.9	49.3	100-yr, 24-hr
SD3011	ST3012	ST3011	N_FORK_MERIDIAN_CR	22	4	260	192.03	191.5	0.22	0.035	6.9	11.2	13.6	25.3	NF	14.6	18.0	19.5	37.2	100-yr, 24-hr
SD3012	ST3013	ST3012	CIRCULAR	3	-	101.9	198.56	192.0	6.42	0.013	6.4	9.9	11.9	25.2	NF	13.7	16.1	17.2	36.7	NF
SD3013	ST3014	ST3013	CIRCULAR	3	-	27.7	200.02	198.6	4.55	0.011	6.4	9.9	11.9	29.3	NF	13.7	16.1	17.2	36.7	NF
SD3014	ST3015	ST3014	CIRCULAR	3	-	116.1	204.42	200.0	3.79	0.013	6.4	9.9	11.9	17.3	NF	13.7	16.1	17.2	36.7	NF
SD3015	ST3016	ST3015	CIRCULAR	3	-	31.7	206.09	204.4	4.32	0.013	6.4	9.9	11.9	13.6	NF	13.7	16.1	17.2	53.3	NF
SD3016	ST3017	ST3016	N_FORK_MERIDIAN_CR	22	4	600	211.15	206.1	0.84	0.035	6.5	10.1	12.0	13.7	NF	13.7	16.1	17.2	18.9	NF
SD3017	ST3018	ST3011	CIRCULAR	2	-	158.4	203.41	191.5	3.18	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	15.6	NF
SD3018	ST3019	ST3018	CIRCULAR	2	-	61.4	204.08	203.4	1.01	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	7.0	NF
SD3019	ST3020	ST3019	CIRCULAR	2	-	266.8	205.51	204.1	0.50	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	5.0	NF
SD3020	ST3021	ST3020	CIRCULAR	1.5	-	56.5	209.33	205.5	4.48	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3021	ST3022	ST3021	CIRCULAR	1.5	-	203.2	210.35	209.3	0.40	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3022	ST3023	ST3022	CIRCULAR	1.25	-	38.7	211.86	210.4	0.41	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3023	ST3024	ST3023	CIRCULAR	1.25	-	220.6	212.84	211.9	0.40	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3201	ST3200	ST3201	BOECKMAN_CR_D	123.6	15.8	1100	127.59	113.5	1.29	0.035	124.0	161.8	188.4	281.1	NF	166.9	227.1	280.9	280.9	NF
SD3202	ST3201	ST3202	BOECKMAN_CR2	40	10	1100	113.45	111.5	0.18	0.035	132.6	172.7	195.5	285.6	NF	173.4	232.9	284.6	284.8	NF
SD3603	ST3202	ST3603	BOECKMAN_CR2	40	10	900	111.45	105.5	0.67	0.035	132.4	172.6	195.3	285.4	NF	173.3	232.1	284.5	284.8	NF
SD3203	ST3203	ST4025	CIRCULAR	3	-	100	177.45	177.0	0.50	0.013	39.1	51.4	56.3	70.1	25-yr, 24-hr	50.1	61.4	76.5	95.2	10-yr, 24-hr
SD3204	ST3204	ST3203	S_COFFEE_CR3	29	2	250	181.45	177.5	1.60	0.035	39.1	51.4	57.6	102.9	NF	50.1	94.4	109.5	118.2	25-yr, 24-hr
SD3220	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	15.6	23.8	27.0	24.4	100-yr, 24-hr	26.4	25.2	53.8	28.2	10-yr, 24-hr
SD3225	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	7.8	11.9	13.5	48.8	100-yr, 24-hr	13.2	50.4	26.9	56.4	10-yr, 24-hr
SD3221	ST3206	ST3205	S_COFFEE_CR2	30	2	750	190.73	183.5	0.97	0.035	23.6	36.1	43.2	54.5	NF	39.7	58.5	68.6	77.4	NF
SD3205	ST3207	ST3206	CIRCULAR	3	-	90.5	192.45	190.7	1.90	0.013	15.1	13.0	15.4	18.5	NF	25.6	19.7	22.4	58.5	NF
SD3206	ST3207	ST3206	CIRCULAR	2	-	90.6	192.45	190.7	0.79	0.013	8.6	23.2	28.0	36.1	NF	14.2	39.0	46.4	29.8	NF
SD3207	ST3208	ST3207	S_COFFEE_CR	16	2	1400	206.95	192.5	1.04	0.035	14.5	21.7	25.9	32.4	NF	14.8	22.4	27.0	34.7	NF
SD3208	ST3209	ST3208	CIRCULAR	1.5	-	204.1	210.24	207.0	1.20	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3209	ST3210	ST3209	CIRCULAR	1.5	-	218.1	212.35	210.2	0.88	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3210	ST3211	ST3210	CIRCULAR	1.5	-	50	213.1	212.4	1.30	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3211	ST3212	ST3211	CIRCULAR	1.5	-	38	213.53	213.1	0.66	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3418	ST3217	ST3417	CIRCULAR	1.25	-	279.3	188.65	186.5	0.70	0.013	1.7	2.8	3.5	4.5	NF	4.3	6.5	7.6	9.3	NF
SD3216	ST3218	ST3217	CIRCULAR	1.25	-	242.9	192.02	188.7	1.37	0.013	1.7	2.8	3.5	4.6	NF	4.3	6.5	7.6	9.3	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3400	ST3400	ST5039	CIRCULAR	4	-	88	158.96	155.2	0.48	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.5	87.7	NF
SD3401	ST3401	ST3400	CIRCULAR	3.5	-	17.3	159.33	159.0	2.14	0.013	27.6	42.8	50.7	62.4	NF	31.6	48.5	56.9	73.2	NF
SD3402	ST3402	ST3401	CIRCULAR	3.5	-	187.4	160.35	159.3	0.54	0.013	27.6	42.9	50.7	62.4	NF	31.6	48.5	56.9	70.5	NF
SD3403	ST3403	ST3402	CIRCULAR	3.5	-	400	162.32	160.4	0.44	0.013	19.3	30.7	36.5	45.3	NF	21.4	33.6	40.0	49.5	NF
SD3404	ST3404	ST3403	CIRCULAR	3	-	365	165.43	162.3	0.81	0.011	19.4	30.8	36.5	45.2	NF	21.5	33.6	39.8	50.7	NF
SD3405	ST3405	ST3404	CIRCULAR	2	-	410	170.29	165.4	0.89	0.011	7.6	11.4	13.5	16.4	NF	8.9	13.2	15.5	19.1	NF
SD3406	ST3406	ST3405	CIRCULAR	2	-	11.7	171.08	170.3	6.34	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3407	ST3407	ST3406	CIRCULAR	2	-	143	171.45	171.1	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3408	ST3408	ST3407	CIRCULAR	2	-	163	171.85	171.5	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3409	ST3409	ST3408	CIRCULAR	2	-	77	172.15	171.9	0.13	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3410	ST3410	ST3409	CIRCULAR	2	-	145	174.88	172.2	1.75	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.5	18.7	NF
SD3411	ST3411	ST3410	CIRCULAR	2	-	60	175.55	174.9	0.78	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3412	ST3412	ST3411	CIRCULAR	2	-	27.1	175.43	175.6	-0.81	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3413	ST3413	ST3412	CIRCULAR	2.5	-	145	176.1	175.4	0.46	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.8	NF
SD3414	ST3414	ST3413	CIRCULAR	2.5	-	20	176.25	176.1	0.75	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.3	15.6	18.8	NF
SD3415	ST3415	ST3414	CIRCULAR	1.5	-	268	178.63	176.3	0.73	0.013	1.2	1.8	2.2	2.8	NF	2.1	3.0	3.5	4.4	NF
SD3416	ST3416	ST3415	CIRCULAR	1.25	-	254	182.49	178.6	1.41	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3417	ST3417	ST3416	CIRCULAR	1	-	230.5	186.51	182.5	1.61	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3433	ST3417	ST3430	CIRCULAR	1.25	-	216.6	186.51	180.4	2.76	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3419	ST3418	ST3404	CIRCULAR	3	-	591	168.26	165.4	0.47	0.013	11.8	19.5	22.9	29.8	NF	12.6	20.3	24.3	31.5	NF
SD3420	ST3419	ST3418	CIRCULAR	3	-	429.1	169.25	168.3	0.23	0.013	9.4	15.9	18.8	24.1	NF	10.2	16.8	20.2	26.0	NF
SD3421	ST3420	ST3419	CIRCULAR	3	-	258	169.73	169.3	0.15	0.013	9.4	15.9	18.8	24.2	NF	10.2	16.8	20.3	26.0	NF
SD3422	ST3421	ST3420	CIRCULAR	1.75	-	247.8	170.98	169.7	0.50	0.013	3.2	6.2	7.0	9.3	NF	3.9	6.9	8.4	10.8	NF
SD3423	ST3421	ST4236	CIRCULAR	1.5	-	638	170.98	166.9	0.65	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD3424	ST3422	ST3421	CIRCULAR	1.75	-	59	170.81	171.0	-0.29	0.013	0.4	2.9	4.4	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3425	ST3423	ST3422	CIRCULAR	1.75	-	195	171.05	170.8	0.19	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3426	ST3424	ST3423	CIRCULAR	1.75	-	74.2	171.12	171.1	0.09	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.8	7.6	NF
SD3427	ST3425	ST3424	CIRCULAR	1.75	-	479.2	169.61	171.1	0.18	0.013	0.4	2.9	4.4	5.5	NF	1.7	4.9	5.8	9.3	100-yr, 24-hr
SD3428	ST3426	ST3425	CIRCULAR	1.75	-	85.1	169.79	169.6	0.21	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.3	8.0	100-yr, 24-hr
SD3429	ST3427	ST3426	CIRCULAR	1.5	-	297.3	173.44	169.8	1.20	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.8	8.0	100-yr, 24-hr
SD3430	ST3428	ST3427	CIRCULAR	1.5	-	434.9	178.86	173.4	1.21	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.3	NF
SD3431	ST3429	ST3428	CIRCULAR	1.5	-	171.5	179.89	178.9	0.59	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.0	NF
SD3432	ST3430	ST3429	CIRCULAR	1.5	-	65.7	180.41	179.9	0.65	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3434	ST3431	ST3400	CIRCULAR	3.5	-	51.4	160.46	159.0	0.90	0.013	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	18.6	NF
SD3435	ST3432	ST3431	CIRCULAR	2.5	-	257.6	163.39	160.5	1.04	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	17.8	NF
SD3436	ST3433	ST3432	CIRCULAR	2.5	-	287.9	166.73	163.4	1.09	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.6	17.8	NF
SD3437	ST3434	ST3433	CIRCULAR	2.5	-	262.1	169.86	166.7	1.12	0.011	7.6	11.6	13.8	16.9	NF	8.1	12.3	14.6	17.9	NF
SD3438	ST3435	ST3434	CIRCULAR	2.25	-	318.2	174.35	169.9	1.34	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3439	ST3436	ST3435	CIRCULAR	2.25	-	442.3	180.59	174.4	1.40	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3440	ST3437	ST3436	CIRCULAR	1.75	-	240	186.74	180.6	2.50	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3441	ST3438	ST3437	CIRCULAR	1.75	-	240	189.99	186.7	1.26	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3442	ST3439	ST3438	CIRCULAR	1.75	-	240	191.55	190.0	0.56	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3443	ST3440	ST3439	CIRCULAR	1.75	-	240	193.2	191.6	0.58	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3444	ST3441	ST3440	CIRCULAR	1.75	-	194.9	195.11	193.2	0.88	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3445	ST3442	ST3441	CIRCULAR	1.75	-	120	197.05	195.1	1.62	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3446	ST3443	ST3442	CIRCULAR	1.75	-	177	198.16	197.1	0.54	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3447	ST3444	ST6036	CIRCULAR	2	-	230	150.86	142.2	3.65	0.013	14.1	21.2	24.5	29.1	NF	14.1	21.2	24.1	29.0	NF
SD3448	ST3445	ST3444	CIRCULAR	1.5	-	66	156.67	150.9	7.70	0.013	14.1	21.2	27.1	32.0	25-yr, 24-hr	14.1	21.2	27.3	31.9	25-yr, 24-hr
SD3449	ST3446	ST3445	CIRCULAR	1.5	-	173.9	166.18	156.7	4.71	0.013	5.4	8.1	9.4	10.9	NF	5.4	8.1	9.4	10.9	NF
SD3450	ST3447	ST3446	CIRCULAR	1.5	-	29.7	166.66	166.2	1.62	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF
SD3451	ST3448	ST3447	CIRCULAR	1.5	-	198.7	168.66	166.7	1.06	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3452	ST3449	ST3448	CIRCULAR	1.5	-	214.2	171.41	168.7	1.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3453	ST3450	ST3449	CIRCULAR	1.25	-	178.4	175.05	171.4	2.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3454	ST3451	ST3450	CIRCULAR	1.25	-	268.6	175.8	175.1	0.28	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD5204	ST3600	ST5203	BOECKMAN_CR_WILSO	42.5	5.5	49	95.2	94.5	1.53	0.035	158.4	210.4	236.5	299.5	NF	194.7	256.7	297.1	299.4	NF
SD3601	ST3602	ST3600	BOECKMAN_CR2	40	10	1250	103.45	95.2	0.66	0.035	144.2	190.0	212.1	292.0	NF	182.6	244.0	290.5	290.8	NF
SD3602	ST3603	ST3602	BOECKMAN_CR2	40	10	600	105.45	103.5	0.33	0.035	132.1	172.5	195.1	285.4	NF	173.2	231.5	284.5	284.8	NF
SD5503	ST3605	ST5501	S_FORK_MERIDIAN_CR	22	4	1250	167.45	111.5	4.48	0.035	16.7	24.7	29.1	35.3	NF	16.7	24.8	29.1	35.3	NF
SD3605	ST3606	ST3605	S_FORK_MERIDIAN_CR	22	4	530	184.96	167.5	3.31	0.035	16.8	25.0	29.3	35.5	NF	16.8	25.0	29.4	35.6	NF
SD4206	ST4000	ST4205	SEALY_DITCH	80	3.5	1450	138.45	138.0	0.03	0.035	238.1	298.7	322.9	432.6	2-yr, 24-hr	347.9	459.9	437.7	382.8	2-yr, 24-hr
SD4000	ST4001	ST4000	SEALY_DITCH	80	3.5	1600	138.95	138.5	0.03	0.035	231.5	286.9	307.7	330.4	2-yr, 24-hr	291.9	318.2	340.1	370.9	2-yr, 24-hr
SD4001	ST4002	ST4001	SEALY_DITCH	80	3.5	400	139.45	139.0	0.13	0.035	240.2	269.7	286.4	320.0	2-yr, 24-hr	272.0	306.5	325.4	345.5	2-yr, 24-hr
SD4002	ST4003	ST4002	COFFEE_CR2	80	3.5	150	139.95	139.5	0.33	0.035	158.6	212.3	215.6	236.8	2-yr, 24-hr	173.2	204.2	227.8	264.8	2-yr, 24-hr
SD4003	ST4004	ST4003	COFFEE_CR2	80	3.5	1400	149.66	140.0	0.69	0.035	29.5	50.8	54.5	58.5	NF	31.1	51.5	54.8	58.8	NF
SD4004	ST4005	ST4004	CIRCULAR	3	-	75	150.66	149.7	1.33	0.024	30.5	51.7	55.3	59.1	100-yr, 24-hr	32.0	52.4	55.6	59.3	100-yr, 24-hr
SD4005	ST4006	ST4005	CIRCULAR	3	-	300	154.66	150.7	1.33	0.024	30.5	51.7	55.3	59.1	10-yr, 24-hr	32.0	52.4	55.6	59.3	10-yr, 24-hr
SD4006	ST4007	ST4006	CIRCULAR	2.5	-	390	167.15	154.7	3.08	0.024	19.0	33.6	34.2	35.1	25-yr, 24-hr	21.3	34.0	34.6	35.3	25-yr, 24-hr
SD4007	ST4008	ST4007	CIRCULAR	2.5	-	146	168.68	167.2	1.05	0.024	19.0	33.0	33.8	34.8	10-yr, 24-hr	21.3	33.5	34.1	35.3	10-yr, 24-hr
SD4008	ST4009	ST4008	CIRCULAR	2	-	88.5	172.51	168.7	3.27	0.024	7.6	11.6	12.4	14.7	10-yr, 24-hr	8.4	12.4	13.7	15.9	10-yr, 24-hr
SD4009	ST4010	ST4009	CIRCULAR	2	-	21.1	172.71	172.5	0.95	0.024	7.6	11.3	12.4	14.7	25-yr, 24-hr	8.4	12.2	13.7	16.0	10-yr, 24-hr
SD4010	ST4011	ST4010	CIRCULAR	2	-	58.9	176.05	172.7	5.59	0.024	7.6	11.2	12.5	14.8	25-yr, 24-hr	8.4	12.0	13.7	16.0	10-yr, 24-hr
SD4011	ST4012	ST4011	CIRCULAR	2	-	429.3	185.15	176.1	2.12	0.024	7.6	11.6	13.3	15.2	100-yr, 24-hr	8.4	12.7	14.4	16.5	100-yr, 24-hr
SD4012	ST4013	ST4006	CIRCULAR	3	-	29.7	156.9	154.7	5.87	0.013	14.9	21.5	25.4	30.2	10-yr, 24-hr	14.9	21.6	25.4	30.2	10-yr, 24-hr
SD4013	ST4014	ST4013	CIRCULAR	3	-	195	159.2	156.9	0.92	0.013	14.9	22.7	25.7	30.5	100-yr, 24-hr	14.9	22.0	25.7	30.5	100-yr, 24-hr
SD4014	ST4015	ST4008	CIRCULAR	2.5	-	44.1	169.86	168.7	1.00	0.024	12.5	23.5	25.0	26.8	10-yr, 24-hr	13.8	24.2	25.6	27.0	10-yr, 24-hr
SD4015	ST4016	ST4206	S_COFFEE_CR5	16	2	700	143.95	141.7	0.29	0.035	47.7	59.0	62.8	69.7	10-yr, 24-hr	58.3	65.8	70.8	75.5	2-yr, 24-hr
SD4016	ST4017	ST4016	S_COFFEE_CR6	10	2	1150	150.25	144.0	0.55	0.035	48.5	65.6	65.8	73.3	10-yr, 24-hr	62.9	68.1	74.8	78.7	10-yr, 24-hr
SD4017	ST4018	ST4017	CIRCULAR	4.92	-	40	151.01	150.3	1.90	0.013	55.0	69.3	70.4	80.9	10-yr, 24-hr	63.7	73.8	81.3	84.7	10-yr, 24-hr
SD4018	ST4019	ST4018	S_COFFEE_CR4	9	2	90	152.72	151.0	1.90	0.035	54.9	69.6	70.8	82.0	10-yr, 24-hr	64.2	74.3	82.5	85.5	10-yr, 24-hr
SD4019	ST4020	ST4019	CIRCULAR	4.25	-	35	153.4	152.7	1.94	0.013	55.3	69.9	73.8	83.2	10-yr, 24-hr	64.7	75.2	83.7	86.3	10-yr, 24-hr
SD4020	ST4021	ST4020	S_COFFEE_CR4	9	2	580	164.48	153.4	1.91	0.035	54.5	73.8	75.3	91.8	100-yr, 24-hr	67.8	78.9	92.7	94.6	25-yr, 24-hr
SD4021	ST4022	ST4021	CIRCULAR	3.5	-	30	165.05	164.5	1.90	0.013	38.7	64.1	68.6	70.9	100-yr, 24-hr	50.1	70.4	73.0	74.8	25-yr, 24-hr
SD4022	ST4023	ST4022	CIRCULAR	3.5	-	30	165.63	165.1	1.90	0.013	38.7	67.4	72.0	73.5	100-yr, 24-hr	50.1	73.6	76.9	77.5	25-yr, 24-hr
SD4023	ST4024	ST4023	S_COFFEE_CR	16	2	540	175.95	165.6	1.91	0.035	39.1	51.4	56.3	69.2	NF	50.1	60.6	74.6	93.9	100-yr, 24-hr
SD4024	ST4025	ST4024	CIRCULAR	3	-	200	176.95	176.0	0.50	0.013	39.1	51.4	56.3	70.3	25-yr, 24-hr	50.1	60.7	76.9	95.5	10-yr, 24-hr
SD4025	ST4026	ST4021	CIRCULAR	1.75	-	400	168.35	164.5	0.83	0.013	15.9	20.7	22.4	24.8	10-yr, 24-hr	19.1	22.8	24.1	27.7	2-yr, 24-hr
SD4026	ST4027	ST4026	CIRCULAR	1.75	-	410	173.35	168.4	1.20	0.013	15.9	22.1	22.8	25.9	10-yr, 24-hr	19.4	23.2	25.5	28.7	2-yr, 24-hr
SD4027	ST4028	ST4027	CIRCULAR	1.75	-	390	175.76	173.4	0.59	0.013	16.1	21.0	23.7	27.4	10-yr, 24-hr	19.7	24.3	27.2	30.8	2-yr, 24-hr
SD4028	ST4029	ST4028	CIRCULAR	1.5	-	401.5	178.5	175.8	0.66	0.024	16.1	22.3	25.4	29.9	2-yr, 24-hr	18.9	26.2	29.7	34.5	2-yr, 24-hr
SD4200	ST4200	ST6205	RECT_CLOSED	24	7	75	135.3	135.0	0.47	0.013	298.6	357.8	386.5	416.9	NF	311.2	383.8	417.8	456.5	NF
SD4201	ST4201	ST4200	COFFEE_CR3	27	4	520	135.95	135.3	0.13	0.035	298.5	357.8	386.4	430.5	100-yr, 24-hr	311.2	423.0	417.8	456.5	10-yr, 24-hr
SD4202	ST4202	ST4201	COFFEE_CR3	27	4	500	136.95	136.0	0.20	0.035	298.5	357.8	386.4	441.2	100-yr, 24-hr	311.4	448.2	451.5	456.5	10-yr, 24-hr
SD4203	ST4203	ST4202	COFFEE_CR3	27	4	300	137.15	137.0	0.07	0.035	292.6	351.6	380.3	471.9	100-yr, 24-hr	319.3	494.6	471.4	451.4	10-yr, 24-hr
SD4204	ST4204	ST4203	COFFEE_CR3	27	4	250	137.45	137.2	0.12	0.035	291.6	350.4	379.2	507.8	100-yr, 24-hr	377.4	504.2	488.8	450.1	2-yr, 24-hr
SD4205	ST4205	ST4204	COFFEE_CR3	27	4	540	137.95	137.5	0.09	0.035	288.8	347.5	376.1	466.2	100-yr, 24-hr	414.9	469.4	461.7	446.9	2-yr, 24-hr
SD4207	ST4206	ST4205	S_COFFEE_CR7	12	2	400	141.67	138.0	0.99	0.035	55.0	66.5	69.7	97.9	10-yr, 24-hr	73.2	94.5	98.2	82.1	2-yr, 24-hr
SD4208	ST4207	ST4206	CIRCULAR	3.5	-	41.4	142.21	141.7	1.30	0.024	15.1	20.0	23.6	26.7	25-yr, 24-hr	16.0	23.9	24.6	24.9	10-yr, 24-hr
SD4209	ST4208	ST4207	CIRCULAR	3.5	-	233.4	142.32	142.2	0.05	0.024	15.4	20.4	23.3	26.5	25-yr, 24-hr	16.4	23.2	24.3	24.8	10-yr, 24-hr
SD4210	ST4209	ST4208	CIRCULAR	2.25	-	65.9	142.77	142.3	0.64	0.013	15.4	20.6	23.1	25.8	100-yr, 24-hr	16.6	22.4	24.1	25.1	25-yr, 24-hr
SD4211	ST4210	ST4209	CIRCULAR	2.25	-	319.3	144.47	142.8	0.50	0.013	15.5	20.6	23.1	25.5	100-yr, 24-hr	16.6	22.5	24.1	25.3	25-yr, 24-hr
SD4212	ST4211	ST4210	CIRCULAR	2.25	-	204	145.39	144.5	0.40	0.013	15.5	20.6	23.1	27.7	100-yr, 24-hr	16.8	22.5	23.6	26.7	25-yr, 24-hr
SD4213	ST4212	ST4211	CIRCULAR	2	-	290	147.56	145.4	0.65	0.013	15.5	20.6	23.1	26.1	NF	16.9	22.5	23.7	26.1	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4214	ST4213	ST4212	CIRCULAR	2	-	57	148.95	147.6	1.91	0.013	15.5	20.6	23.1	26.3	100-yr, 24-hr	16.9	22.5	26.7	26.5	25-yr, 24-hr
SD4215	ST4214	ST4213	CIRCULAR	2	-	103.6	149.03	149.0	0.08	0.013	15.5	20.6	23.1	25.9	25-yr, 24-hr	16.9	22.5	25.5	26.9	10-yr, 24-hr
SD4216	ST4215	ST4214	CIRCULAR	2	-	317	151.3	149.0	0.72	0.013	10.5	13.6	14.9	17.9	100-yr, 24-hr	11.4	14.6	17.1	17.1	25-yr, 24-hr
SD4217	ST4216	ST4215	CIRCULAR	2	-	349.1	155.45	151.3	1.16	0.013	10.5	13.6	15.0	20.0	100-yr, 24-hr	11.3	14.6	20.1	20.0	25-yr, 24-hr
SD4218	ST4217	ST4216	CIRCULAR	2	-	265.9	159.75	155.5	1.47	0.011	5.7	6.4	8.0	16.1	100-yr, 24-hr	6.1	7.4	14.0	14.0	100-yr, 24-hr
SD4219	ST4218	ST4217	CIRCULAR	2	-	288.1	163.05	159.8	1.11	0.011	5.7	6.4	6.8	11.5	NF	6.1	6.8	8.4	10.6	NF
SD4220	ST4219	ST4218	CIRCULAR	1.5	-	39.1	164.14	163.1	1.38	0.011	5.7	6.4	6.7	8.3	NF	6.1	6.8	7.6	11.1	NF
SD4221	ST4220	ST4219	CIRCULAR	2	-	355	164.8	164.1	0.14	0.013	5.7	6.4	6.7	8.0	NF	6.1	6.8	7.6	9.3	100-yr, 24-hr
SD4222	ST4221	ST4220	CIRCULAR	2	-	355.8	165.89	164.8	0.29	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	11.4	100-yr, 24-hr
SD6207	ST4223	ST6205	CIRCULAR	4	-	82.2	138.64	135.0	0.18	0.013	33.7	54.1	60.3	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4224	ST4224	ST4223	CIRCULAR	4	-	371.1	139.59	138.6	0.20	0.013	33.7	54.1	60.4	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4225	ST4225	ST4224	CIRCULAR	4	-	365	140.31	139.6	0.20	0.013	33.7	54.2	60.4	65.3	NF	35.1	56.4	62.2	66.9	NF
SD4226	ST4226	ST4225	CIRCULAR	4	-	398.1	141.53	140.3	0.30	0.013	30.5	49.3	54.6	58.4	NF	31.3	50.5	55.2	58.8	NF
SD4227	ST4227	ST4226	CIRCULAR	3	-	361	143.64	141.5	0.58	0.013	15.8	24.8	29.9	34.6	NF	16.5	26.3	30.8	35.1	NF
SD4228	ST4228	ST4227	CIRCULAR	3	-	268.4	145.19	143.6	0.57	0.013	15.8	24.8	30.5	34.8	NF	16.5	26.3	31.4	35.1	NF
SD4229	ST4229	ST4228	CIRCULAR	3	-	68.6	145.77	145.2	0.85	0.024	2.2	3.5	4.4	5.1	NF	2.2	3.6	4.5	5.3	NF
SD4230	ST4230	ST4229	CIRCULAR	2.5	-	244	147	145.8	0.45	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.3	NF
SD4231	ST4231	ST4230	CIRCULAR	2.5	-	246.4	147.7	147.0	0.28	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.5	NF
SD4232	ST4232	ST4228	CIRCULAR	2.5	-	173.8	146.98	145.2	0.60	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4233	ST4233	ST4232	CIRCULAR	1.75	-	471.6	151.25	147.0	0.76	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4234	ST4234	ST4233	CIRCULAR	1.5	-	426	159.45	151.3	1.88	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4235	ST4235	ST4234	CIRCULAR	1.5	-	27.5	164.24	159.5	1.49	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4236	ST4236	ST4235	CIRCULAR	1.5	-	110.9	166.85	164.2	2.21	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD4241	ST4241	ST4242	CIRCULAR	2.5	-	80.5	143.45	142.1	1.74	0.013	0.6	0.7	0.9	1.3	NF	0.6	0.7	0.9	1.3	NF
SD4242	ST4242	ST4202	CIRCULAR	2.5	-	564	142.05	137.0	0.90	0.013	0.6	0.7	0.9	4.0	NF	0.6	3.1	2.7	1.3	NF
SD6413	ST4400	ST6413	CIRCULAR	4	-	100	161.45	159.5	2.00	0.013	52.4	71.8	80.9	92.7	NF	53.9	74.2	82.4	94.3	NF
SD4400	ST4401	ST4400	ARROWHEAD_CR2	28	6	400	163.45	161.5	0.50	0.035	32.7	47.0	55.5	65.6	NF	32.8	47.1	55.7	65.9	NF
SD4401	ST4402	ST4401	ARROWHEAD_CR	32	4	800	169.67	163.5	0.78	0.035	33.2	47.8	56.3	75.3	NF	33.2	47.8	56.5	76.0	NF
SD4402	ST4403	ST4402	ARROWHEAD_CR	32	4	100	170.45	169.7	0.78	0.035	25.4	35.8	42.1	58.0	NF	25.5	35.9	42.5	58.5	NF
SD4403	ST4404	ST4402	CIRCULAR	1.25	-	355	178.69	169.7	2.23	0.013	1.7	3.1	3.9	5.2	NF	1.7	3.1	3.9	5.2	NF
SD4500	ST4500	ST4204	CIRCULAR	2	-	421	143.57	137.5	1.44	0.013	8.1	13.0	15.9	21.2	NF	9.9	16.6	20.4	24.1	100-yr, 24-hr
SD4501	ST4501	ST4500	CIRCULAR	2	-	561	149.45	143.6	0.99	0.013	8.1	13.0	16.0	20.7	NF	9.9	15.6	18.9	24.4	NF
SD4502	ST4502	ST4501	CIRCULAR	1.5	-	473.6	167.3	149.5	2.81	0.013	4.4	7.6	9.5	12.5	NF	4.5	7.7	9.6	12.9	NF
SD4503	ST4503	ST4001	SEALY_CR	58	2	400	146.55	139.0	1.90	0.035	33.9	53.4	65.1	82.2	100-yr, 24-hr	63.2	94.0	110.8	133.4	25-yr, 24-hr
SD4600	ST4601	ST4600	CIRCULAR	2	-	57.2	195.67	190.2	0.49	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.3	4.7	5.8	NF
SD4601	ST4602	ST4601	CIRCULAR	2	-	101.1	195.67	195.7	0.01	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.1	4.7	5.8	NF
SD4602	ST4603	ST4602	CIRCULAR	2	-	135	195.87	195.7	0.15	0.013	3.0	4.3	4.6	5.8	NF	3.0	4.2	4.7	5.8	NF
SD4603	ST4604	ST4603	CIRCULAR	2	-	265.6	197.91	195.9	0.29	0.011	3.0	4.6	5.0	5.8	NF	3.0	4.5	5.0	5.8	NF
SD4604	ST4605	ST4604	CIRCULAR	2	-	165.8	198.78	197.9	0.40	0.011	3.0	4.5	5.3	6.1	NF	3.0	4.5	5.3	6.0	NF
SD4605	ST4606	ST4605	CIRCULAR	2	-	352.4	200.59	198.8	0.43	0.011	3.0	4.5	5.3	6.6	NF	3.0	4.5	5.3	6.6	NF
SD4606	ST4607	ST4606	CIRCULAR	1.5	-	58.5	201.4	200.6	1.04	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4607	ST4608	ST4607	CIRCULAR	1.5	-	186.5	202.57	201.4	0.41	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4612	ST4609	ST4614	CIRCULAR	2.5	-	36	196.32	196.0	0.28	0.01	7.1	8.3	8.5	11.2	NF	7.1	8.2	8.5	11.2	NF
SD4609	ST4610	ST4609	CIRCULAR	2.5	-	86	196.84	196.3	0.08	0.011	6.6	7.8	8.1	10.5	NF	6.6	7.8	8.0	10.5	NF
SD4610	ST4611	ST4610	CIRCULAR	2.5	-	125	197.42	196.8	0.16	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4611	ST4612	ST4611	CIRCULAR	2.5	-	102	198.17	197.4	0.34	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4613	ST4613	ST4609	CIRCULAR	1.5	-	42	197.53	196.3	0.50	0.01	0.5	0.6	0.6	0.8	NF	0.5	0.6	0.6	0.8	NF
SD4608	ST4614	ST4600	CIRCULAR	3	-	36	195.97	190.2	0.92	0.011	15.0	20.3	23.1	28.9	NF	15.5	20.8	24.0	29.7	NF
SD4614	ST4615	ST4600	CIRCULAR	2.5	-	103.5	195.7	190.2	0.38	0.013	5.8	8.1	9.5	12.6	NF	5.8	8.0	9.5	12.7	NF
SD4615	ST4616	ST4615	CIRCULAR	2.5	-	58.3	196.06	195.7	0.27	0.013	5.8	8.2	9.5	12.6	NF	5.8	8.1	9.5	12.8	NF
SD4616	ST4617	ST4616	CIRCULAR	2.5	-	151.3	196.68	196.1	0.28	0.013	5.8	8.5	9.5	12.6	NF	5.8	8.4	9.5	12.7	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4617	ST4618	ST4617	CIRCULAR	2.5	-	191.5	197.23	196.7	0.18	0.013	4.3	6.4	7.1	9.2	NF	4.3	6.4	7.0	9.2	NF
SD4618	ST4619	ST4618	CIRCULAR	2	-	134.6	198.35	197.2	0.68	0.011	1.4	2.2	2.5	3.2	NF	1.4	2.2	2.5	3.3	NF
SD4619	ST4620	ST4619	CIRCULAR	1.5	-	355.3	199.97	198.4	0.40	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.7	3.3	NF
SD4620	ST4621	ST4620	CIRCULAR	1.5	-	142	200.83	200.0	0.46	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4621	ST4622	ST4621	CIRCULAR	1.5	-	94.8	201.43	200.8	0.42	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4622	ST4623	ST4622	CIRCULAR	1.5	-	106.3	202.53	201.4	0.85	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4623	ST4624	ST4618	CIRCULAR	2	-	52.2	197.64	197.2	0.40	0.011	3.0	4.4	5.1	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4624	ST4625	ST4624	CIRCULAR	2	-	47.6	198.06	197.6	0.46	0.011	3.0	4.4	5.2	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4625	ST4626	ST4625	CIRCULAR	2	-	69.4	198.46	198.1	0.29	0.011	3.0	4.4	5.3	6.1	NF	3.0	4.4	5.2	6.2	NF
SD4626	ST4627	ST4626	CIRCULAR	2	-	58.4	198.89	198.5	0.39	0.011	3.0	4.4	5.3	6.2	NF	3.0	4.4	5.3	6.2	NF
SD4627	ST4628	ST4627	CIRCULAR	2	-	118.1	199.56	198.9	0.40	0.011	3.0	4.4	5.3	6.3	NF	3.0	4.4	5.3	6.3	NF
SD4628	ST4629	ST4628	CIRCULAR	1.5	-	44.5	200.15	199.6	0.88	0.011	3.0	4.4	5.3	6.5	NF	3.0	4.4	5.3	6.5	NF
SD4629	ST4630	ST4629	CIRCULAR	1.5	-	104.2	200.85	200.2	0.48	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4630	ST4631	ST4630	CIRCULAR	1.5	-	95.2	201.33	200.9	0.29	0.011	3.0	4.5	5.3	6.5	NF	3.0	4.5	5.3	6.5	NF
SD4641	ST4633	ST4634	CIRCULAR	2.5	-	18.1	190.22	190.2	0.39	0.013	10.4	18.4	24.7	35.2	NF	10.5	18.9	25.5	36.5	NF
SD4633	ST4634	ST4635	CIRCULAR	2.5	-	100.3	190.15	189.3	0.54	0.013	10.4	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4634	ST4635	ST4636	CIRCULAR	2.5	-	259.5	189.31	187.4	0.62	0.013	10.7	18.4	24.7	35.2	NF	11.6	18.9	25.5	36.5	NF
SD4635	ST4636	ST4637	CIRCULAR	3	-	262.3	187.4	189.4	-0.76	0.013	10.5	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4637	ST4638	ST4639	CIRCULAR	2.5	-	85.7	189.38	188.4	1.10	0.013	9.6	17.1	18.4	19.8	NF	9.7	17.3	18.5	19.9	NF
SD4638	ST4639	ST4403	ARROWHEAD_CR	32	4	1200	188.44	170.5	1.50	0.035	12.5	20.1	23.3	27.8	NF	12.5	20.4	23.6	28.0	NF
SD4640	ST4640	O-SDDI	CIRCULAR	3	-	3151.9	189.38	168.1	0.68	0.013	0.9	1.3	6.1	15.2	NF	0.9	1.6	6.8	16.3	NF
3594	ST4656	ST4767	CIRCULAR	2.5	-	67.9	200.74	197.9	3.89	0.013	7.9	12.3	15.1	18.5	NF	8.3	12.9	16.0	19.3	NF
SD4654	ST4767	ST4614	CIRCULAR	2.5	-	59	197.9	196.0	3.27	0.013	7.9	12.3	14.9	18.4	NF	8.3	12.9	15.8	19.1	NF
949	ST4768	ST4656	CIRCULAR	2.5	-	55.2	201.23	200.7	0.62	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
950	ST4802	ST4768	CIRCULAR	2.5	-	109.6	202.54	201.2	1.01	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4741	ST4803	ST4802	CIRCULAR	2.5	-	129.9	203.75	202.5	0.39	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4830	ST4804	ST4803	CIRCULAR	2.5	-	268.2	205.38	203.8	0.53	0.013	6.2	9.8	11.8	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4742	ST4805	ST4804	CIRCULAR	2.5	-	149.4	206.36	205.4	0.52	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4789	ST4806	ST4805	CIRCULAR	2.5	-	116.6	207.03	206.4	0.40	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.6	NF
SD4790	ST4828	ST4806	CIRCULAR	2	-	335.2	208.63	207.0	0.42	0.013	3.0	4.8	5.9	7.4	NF	3.5	5.4	6.5	8.1	NF
SD4752	ST4829	ST4828	CIRCULAR	2	-	335.2	211.99	208.6	1.00	0.013	3.0	4.9	5.9	7.4	NF	3.5	5.5	6.6	8.1	NF
SD5000	ST5000	ST5209	CIRCULAR	1	-	56	108.6	90.9	32.36	0.024	11.4	14.0	14.6	15.3	2-yr, 24-hr	11.4	14.0	14.6	15.3	2-yr, 24-hr
SD5001	ST5001	ST5000	CIRCULAR	1.25	-	120	124.12	108.6	12.89	0.024	11.4	14.3	14.7	15.3	10-yr, 24-hr	11.5	14.4	14.7	15.3	10-yr, 24-hr
SD5002	ST5002	ST5001	CIRCULAR	2	-	113	138.96	124.1	14.63	0.024	11.4	17.8	19.5	20.2	10-yr, 24-hr	11.5	17.8	19.5	20.2	10-yr, 24-hr
SD5003	ST5003	ST5002	CIRCULAR	1.5	-	34	145.4	139.0	2.44	0.024	6.5	10.0	11.3	13.3	10-yr, 24-hr	6.5	10.0	11.3	13.3	10-yr, 24-hr
SD5004	ST5004	ST5003	CIRCULAR	1.5	-	154.8	158.38	145.4	8.41	0.011	6.5	9.9	11.7	14.9	NF	6.5	9.9	11.7	14.9	NF
SD5005	ST5005	ST5004	CIRCULAR	1.5	-	129	161.19	158.4	2.02	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5006	ST5006	ST5005	CIRCULAR	1.5	-	319.1	163.74	161.2	0.74	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5007	ST5007	ST5006	CIRCULAR	1.25	-	84.1	164.9	163.7	0.43	0.011	1.2	1.7	2.0	3.1	NF	1.2	1.7	2.0	3.0	NF
SD5008	ST5008	ST5007	CIRCULAR	1.25	-	82.4	165.39	164.9	0.59	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5009	ST5009	ST5008	CIRCULAR	1.25	-	100	165.88	165.4	0.49	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5010	ST5010	ST5009	CIRCULAR	1.25	-	100	166.39	165.9	0.51	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5011	ST5011	ST5010	CIRCULAR	1	-	100	166.89	166.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5012	ST5012	ST5011	CIRCULAR	1	-	100	167.39	166.9	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5013	ST5013	ST5012	CIRCULAR	1	-	100	167.89	167.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5014	ST5014	ST5013	CIRCULAR	1	-	70.5	168.05	167.9	0.23	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5015	ST5015	ST5014	CIRCULAR	1.5	-	292.7	169.56	168.1	0.43	0.011	1.2	1.7	2.0	3.5	NF	1.2	1.7	2.0	3.5	NF
SD5016	ST5016	ST5015	CIRCULAR	1.5	-	248.9	170.98	169.6	0.49	0.011	1.2	1.7	2.0	3.7	NF	1.2	1.7	2.0	3.7	NF
SD5017	ST5017	ST5016	CIRCULAR	1.5	-	132.4	171.76	171.0	0.44	0.011	1.2	1.7	2.0	3.6	NF	1.2	1.7	2.0	3.6	NF
SD5018	ST5017	ST5018	CIRCULAR	1.5	-	169.7	171.76	171.1	0.23	0.011	0.8	1.2	1.5	1.8	NF	0.8	1.2	1.5	1.8	NF
SD5019	ST5018	ST5019	CIRCULAR	1.5	-	167.1	171.09	170.0	0.45	0.011	0.8	1.2	1.5	2.0	NF	0.8	1.2	1.5	2.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5020	ST5019	ST5020	CIRCULAR	1.5	-	109.3	170	169.4	0.38	0.011	4.2	6.3	7.2	7.6	NF	4.2	6.3	7.2	7.6	NF
SD5021	ST5020	ST3448	CIRCULAR	1.5	-	87.6	169.38	168.7	0.59	0.011	4.2	6.3	7.1	7.6	NF	4.2	6.3	7.1	7.6	NF
SD5022	ST5021	ST5017	CIRCULAR	1.25	-	100	172.92	171.8	0.96	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5023	ST5022	ST5021	CIRCULAR	1.25	-	100	173.42	172.9	0.50	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5024	ST5023	ST5019	CIRCULAR	1.5	-	154.3	171.31	170.0	0.63	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5025	ST5024	ST5023	CIRCULAR	1.25	-	159.8	172.11	171.3	0.38	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5026	ST5025	ST5002	CIRCULAR	2	-	88	145.03	139.0	0.92	0.024	4.1	6.5	6.9	7.6	10-yr, 24-hr	4.1	6.5	6.9	7.6	10-yr, 24-hr
SD5027	ST5026	ST5025	CIRCULAR	2	-	181	146.43	145.0	0.66	0.024	4.1	6.8	8.7	9.0	25-yr, 24-hr	4.1	6.8	7.7	9.0	25-yr, 24-hr
SD5028	ST5027	ST5026	CIRCULAR	1.25	-	180	152.77	146.4	3.36	0.024	4.1	6.6	7.3	7.9	25-yr, 24-hr	4.1	6.6	7.1	7.9	25-yr, 24-hr
SD5029	ST5028	ST5027	CIRCULAR	1.25	-	97	157.4	152.8	4.53	0.024	4.1	6.7	7.3	8.3	25-yr, 24-hr	4.1	6.6	7.2	8.3	25-yr, 24-hr
SD5030	ST5029	ST5028	CIRCULAR	1.25	-	27	157.89	157.4	1.37	0.024	1.9	3.0	4.1	4.9	100-yr, 24-hr	1.9	3.0	4.0	4.8	100-yr, 24-hr
SD5031	ST5030	ST5029	CIRCULAR	1.25	-	38.1	159.14	157.9	1.60	0.011	1.9	3.9	4.0	4.8	100-yr, 24-hr	1.9	3.8	4.0	4.8	100-yr, 24-hr
SD5032	ST5031	ST5030	CIRCULAR	1.25	-	88.3	160.04	159.1	0.79	0.011	1.9	3.3	3.9	4.8	NF	1.9	3.3	3.9	4.7	NF
SD5033	ST5032	ST5031	CIRCULAR	1.25	-	47.8	160.69	160.0	0.94	0.011	1.9	2.9	4.1	4.7	NF	1.9	2.9	4.1	4.7	NF
SD5034	ST5033	ST5032	CIRCULAR	1.25	-	372.1	164.77	160.7	1.04	0.011	1.9	2.9	3.8	4.7	100-yr, 24-hr	1.9	2.9	3.7	4.7	100-yr, 24-hr
SD5035	ST5034	ST5002	CIRCULAR	1.25	-	372	152.22	139.0	2.00	0.024	0.9	1.5	2.6	3.0	25-yr, 24-hr	0.9	1.5	2.6	3.0	25-yr, 24-hr
SD5036	ST5035	ST5034	CIRCULAR	1.25	-	179	161.98	152.2	5.21	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5037	ST5036	ST5035	CIRCULAR	1.25	-	119	167.87	162.0	4.74	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5038	ST5037	ST5036	CIRCULAR	1.25	-	188	169.38	167.9	0.69	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5219	ST5038	POND_LIBRARY	CIRCULAR	4	-	190	143.45	140.8	1.11	0.013	38.9	59.9	71.1	88.2	NF	43.5	66.0	78.4	96.6	NF
SD5039	ST5039	ST5038	CIRCULAR	4	-	308.1	155.16	143.5	0.92	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.4	87.5	NF
SD5200	ST5200	ST5204	BOECKMAN_CR2	40	10	1200	78.85	71.7	0.60	0.035	199.1	271.7	306.4	352.8	NF	234.8	306.3	337.9	380.4	NF
SD5201	ST5201	ST5200	BOECKMAN_CR2	40	10	930	94.45	78.9	1.68	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.1	NF
SD5202	ST5202	ST5201	KOLBE_BRIDGE	55	11	70	92.45	94.5	-2.86	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.2	NF
SD5203	ST5203	ST5202	BOECKMAN_CR2	40	10	430	94.45	92.5	0.47	0.035	158.3	210.3	236.4	299.5	NF	194.6	256.6	297.1	299.3	NF
SD5205	ST5204	ST5205	MEMORIAL_PARK_BRI	88	20	55	71.7	71.7	0.02	0.035	198.5	271.3	305.9	351.5	NF	234.6	304.8	336.3	379.1	NF
SD5206	ST5205	05200	BOECKMAN_CR2	40	10	1500	71.69	63.5	0.55	0.035	198.3	271.1	305.7	350.9	NF	234.5	304.2	335.7	378.7	NF
SD5207	ST5206	ST5200	BOECKMAN_CR	37	9	500	83.65	78.9	0.96	0.035	40.9	57.6	64.5	69.5	NF	43.2	59.3	66.3	71.8	NF
SD5208	ST5207	ST5206	BOECKMAN_CR	37	9	150	85.1	83.7	0.97	0.035	24.7	38.1	45.0	49.8	NF	26.2	39.8	46.7	52.0	NF
SD5210	ST5208	ST5207	CIRCULAR	2	-	201	87.14	85.1	1.02	0.024	11.4	14.0	14.6	15.3	NF	11.4	14.0	14.6	15.3	NF
SD5211	ST5209	ST5208	CIRCULAR	1.5	-	50	90.89	87.1	6.65	0.024	11.4	14.0	14.6	15.3	NF	11.5	14.0	14.6	15.3	NF
SD5212	ST5210	ST5206	CIRCULAR	1.75	-	164.3	102.15	83.7	5.61	0.024	19.3	20.0	21.9	21.9	NF	19.8	20.2	21.7	21.8	NF
SD5213	ST5211	ST5210	CIRCULAR	1.75	-	125	109.15	102.2	5.61	0.024	19.3	20.1	20.8	21.0	NF	20.0	20.2	21.0	20.8	NF
SD5214	ST5212	ST5211	CIRCULAR	1.75	-	105.4	115.05	109.2	5.61	0.024	19.3	20.1	20.8	21.1	NF	20.0	20.2	20.8	20.8	NF
SD5215	ST5213	ST5212	CIRCULAR	1.75	-	123.2	121.95	115.1	5.61	0.024	19.3	20.2	20.7	21.4	NF	20.0	20.2	20.7	20.7	NF
SD5216	ST5214	ST5213	CIRCULAR	1.75	-	108.9	128.05	122.0	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.9	20.9	20.9	20.8	NF
SD5217	ST5215	ST5214	CIRCULAR	1.75	-	141.1	135.95	128.1	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.8	20.9	20.9	20.8	NF
SD5501	ST5500	05500	S_FORK_MERIDIAN_CR	22	4	282.7	71.45	63.5	2.83	0.035	20.7	34.1	42.2	54.1	NF	20.7	34.1	42.3	54.2	NF
SD5502	ST5501	ST5500	S_FORK_MERIDIAN_CR	22	4	1130	111.45	71.5	3.54	0.035	20.8	34.3	42.5	54.4	NF	20.8	34.3	42.5	54.4	NF
SD5701	ST5701	05701	CIRCULAR	1.25	-	79.1	84.07	72.0	15.48	0.024	5.5	9.2	10.9	12.8	NF	5.9	9.7	11.2	13.4	NF
SD5702	ST5702	ST5701	CIRCULAR	1.25	-	158	86.6	84.1	1.60	0.013	5.5	9.2	10.9	13.1	25-yr, 24-hr	5.9	9.8	11.2	13.3	25-yr, 24-hr
SD5703	ST5703	ST5702	CIRCULAR	1.25	-	126	89.82	86.6	2.40	0.013	5.5	9.2	10.9	12.9	100-yr, 24-hr	5.9	9.8	11.3	13.0	100-yr, 24-hr
SD5704	ST5704	ST5703	CIRCULAR	1	-	103	95.76	89.8	4.68	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.3	100-yr, 24-hr
SD5705	ST5705	ST5704	CIRCULAR	1.25	-	160	96.61	95.8	0.40	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.2	25-yr, 24-hr
SD5706	ST5706	ST5705	CIRCULAR	1.25	-	199.8	97.61	96.6	0.40	0.013	3.1	5.1	6.1	7.6	25-yr, 24-hr	3.3	5.4	7.0	7.9	25-yr, 24-hr
SD5719	ST5707	ST5719	CIRCULAR	3.5	-	260	100.45	99.0	0.56	0.013	18.4	24.0	25.9	28.7	25-yr, 24-hr	19.8	24.6	27.1	29.6	10-yr, 24-hr
SD5708	ST5708	ST5707	CIRCULAR	4	-	270	101.32	100.5	0.32	0.013	18.4	24.6	28.6	33.5	25-yr, 24-hr	19.9	25.1	31.0	35.0	10-yr, 24-hr
SD5709	ST5709	ST5708	CIRCULAR	3.5	-	165	102.47	101.3	0.70	0.013	18.4	26.5	29.9	37.5	10-yr, 24-hr	19.9	27.5	33.7	39.5	10-yr, 24-hr
SD5710	ST5710	ST5709	CIRCULAR	4	-	246	107.43	102.5	1.79	0.011	10.6	18.1	19.9	24.2	NF	10.6	15.7	20.0	23.7	NF
SD5711	ST5711	ST5710	CIRCULAR	4	-	224.6	121.09	107.4	6.00	0.011	10.6	17.4	19.9	22.4	NF	10.6	17.4	19.4	22.4	NF
SD5712	ST5712	ST5711	CIRCULAR	4	-	314	137.34	121.1	5.15	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5713	ST5713	ST5712	CIRCULAR	4	-	358.4	150.79	137.3	3.73	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF
SD5714	ST5714	O5702	CIRCULAR	1.25	-	67	88.49	62.5	44.03	0.024	18.4	22.5	24.4	26.5	100-yr, 24-hr	19.7	22.9	25.0	26.9	100-yr, 24-hr
SD5209	ST5715	ST5207	BOECKMAN_CR	37	9	267	90	85.1	0.92	0.035	9.4	17.4	21.8	22.9	NF	10.9	19.1	23.5	25.0	NF
SD5715	ST5716	ST5715	CIRCULAR	2.5	-	198	90.69	90.0	0.35	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.2	23.6	25.2	NF
SD5716	ST5717	ST5716	CIRCULAR	2.5	-	131	91.23	90.7	0.26	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.3	23.6	25.2	NF
SD5717	ST5718	ST5717	CIRCULAR	2.5	-	123	91.7	91.2	0.22	0.013	9.6	17.6	21.9	23.1	NF	11.0	19.3	23.6	25.2	NF
SD5707	ST5719	ST5714	CIRCULAR	1.75	-	108	99	88.5	10.99	0.024	18.4	22.5	24.4	26.6	10-yr, 24-hr	19.7	22.9	25.1	27.0	10-yr, 24-hr
SD6000	ST6000	O6000	CIRCULAR	2.5	-	466.3	117.95	60.5	11.84	0.013	29.7	43.8	51.2	60.3	NF	29.7	43.8	51.2	60.3	NF
SD6001	ST6001	ST6000	CIRCULAR	2.5	-	182.4	122.86	118.0	4.23	0.013	29.8	43.9	51.3	60.3	NF	29.8	43.9	51.3	60.3	NF
SD6002	ST6002	ST6001	CIRCULAR	2.5	-	632.1	135.95	122.9	1.54	0.013	23.1	31.7	36.0	41.9	NF	23.1	31.7	36.1	41.9	NF
SD6003	ST6003	ST6002	CIRCULAR	2.5	-	167.5	137.28	136.0	0.79	0.013	23.1	31.8	36.1	41.5	NF	23.1	31.8	36.2	41.5	NF
SD6004	ST6004	ST6003	CIRCULAR	2.5	-	196.6	138.85	137.3	0.80	0.013	18.8	25.8	28.3	32.2	NF	18.8	25.8	28.3	32.2	NF
SD6005	ST6005	ST6004	CIRCULAR	2.5	-	68	139.17	138.9	0.47	0.013	14.0	18.2	20.0	22.6	NF	14.0	18.2	20.0	22.6	NF
SD6006	ST6006	ST6005	CIRCULAR	1.5	-	297.9	141.48	139.2	0.87	0.013	14.0	18.1	20.0	22.6	10-yr, 24-hr	14.0	18.1	20.0	22.6	10-yr, 24-hr
SD6007	ST6007	ST6006	CIRCULAR	2	-	302	142.11	141.5	0.21	0.013	14.0	18.5	20.4	23.3	10-yr, 24-hr	14.0	18.5	20.4	23.3	10-yr, 24-hr
SD6008	ST6008	ST6007	CIRCULAR	2	-	79	142.55	142.1	0.30	0.013	3.7	6.7	6.8	6.9	10-yr, 24-hr	3.7	6.5	6.8	6.9	10-yr, 24-hr
SD6009	ST6009	ST6008	CIRCULAR	2	-	112	142.9	142.6	0.31	0.013	3.7	6.2	6.1	6.2	10-yr, 24-hr	3.7	6.2	6.2	6.2	10-yr, 24-hr
SD6010	ST6010	ST6009	CIRCULAR	1.5	-	197	143.59	142.9	0.30	0.013	3.7	5.6	5.3	5.3	10-yr, 24-hr	3.7	5.6	5.4	5.3	10-yr, 24-hr
SD6011	ST6011	ST6010	CIRCULAR	1.5	-	154	144.25	143.6	0.30	0.013	3.5	4.8	4.8	5.4	10-yr, 24-hr	3.8	4.8	4.8	5.2	10-yr, 24-hr
SD6012	ST6012	ST6011	CIRCULAR	1.5	-	79	144.69	144.3	0.30	0.013	3.6	5.5	6.3	6.0	10-yr, 24-hr	4.0	5.4	5.8	6.3	10-yr, 24-hr
SD6013	ST6013	ST6012	CIRCULAR	1.5	-	177	145.43	144.7	0.31	0.013	3.5	6.2	5.5	7.5	10-yr, 24-hr	3.7	5.3	6.9	6.9	10-yr, 24-hr
SD6014	ST6014	ST6004	CIRCULAR	1.75	-	303.3	141.45	138.9	0.82	0.013	4.9	7.7	8.7	9.7	NF	4.9	7.7	8.7	9.7	NF
SD6015	ST6015	ST6014	CIRCULAR	1.5	-	290	143.21	141.5	0.52	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6016	ST6016	ST6015	CIRCULAR	1.5	-	251	144.97	143.2	0.70	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6017	ST6017	ST6016	CIRCULAR	1.5	-	89	145.42	145.0	0.51	0.013	4.9	7.8	8.8	9.7	NF	4.9	7.8	8.8	9.7	NF
SD6018	ST6018	ST6017	CIRCULAR	1.5	-	60	145.99	145.4	0.95	0.013	4.9	7.8	8.8	9.7	100-yr, 24-hr	4.9	7.8	8.8	9.7	100-yr, 24-hr
SD6019	ST6019	ST6018	CIRCULAR	1.5	-	160	147.08	146.0	0.68	0.013	4.9	7.8	8.8	9.8	100-yr, 24-hr	4.9	7.8	8.8	9.8	100-yr, 24-hr
SD6020	ST6020	ST6019	CIRCULAR	1.5	-	177	147.97	147.1	0.50	0.013	4.9	7.8	8.8	10.0	100-yr, 24-hr	4.9	7.8	8.8	10.0	100-yr, 24-hr
SD6021	ST6021	ST6020	CIRCULAR	1.25	-	114	148.43	148.0	0.18	0.013	4.9	7.8	8.8	10.3	25-yr, 24-hr	4.9	7.8	8.8	10.3	25-yr, 24-hr
SD6022	ST6022	O6001	I5	16	2	300	108.45	73.5	11.75	0.035	26.3	39.3	45.8	54.5	NF	26.3	39.3	45.9	54.4	NF
SD6023	ST6023	ST6022	I5	16	2	80	111.36	108.5	3.64	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6024	ST6024	ST6023	CIRCULAR	3.5	-	50	120.41	111.4	18.40	0.013	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6025	ST6025	ST6024	I5	16	2	20	123.14	120.4	13.78	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6026	ST6026	ST6025	I5	16	2	700	132.99	123.1	1.41	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6027	ST6027	ST6026	CIRCULAR	3.5	-	33	133.08	133.0	0.27	0.013	19.3	28.5	32.0	38.0	NF	19.3	28.5	32.0	38.0	NF
SD6028	ST6028	ST6027	CIRCULAR	3.5	-	394	134.09	133.1	0.26	0.013	19.3	28.5	32.0	38.1	NF	19.3	28.5	32.0	38.0	NF
SD6029	ST6029	ST6028	CIRCULAR	3.5	-	394	135.08	134.1	0.25	0.013	19.3	28.6	32.1	38.1	NF	19.3	28.6	32.1	38.1	NF
SD6030	ST6030	ST6029	CIRCULAR	3.5	-	394	136.06	135.1	0.25	0.013	19.3	28.7	32.1	38.3	NF	19.3	28.7	32.2	38.2	NF
SD6031	ST6031	ST6030	CIRCULAR	3.5	-	394	137.05	136.1	0.25	0.013	19.4	28.7	32.1	38.4	NF	19.4	28.7	32.2	38.4	NF
SD6032	ST6032	ST6031	CIRCULAR	3.5	-	394	138.03	137.1	0.25	0.013	14.1	21.1	23.4	27.6	NF	14.1	21.1	23.1	27.5	NF
SD6033	ST6033	ST6032	CIRCULAR	3.5	-	246	138.62	138.0	0.24	0.013	14.1	21.1	23.5	27.7	NF	14.1	21.1	23.3	27.6	NF
SD6034	ST6034	ST6033	CIRCULAR	3.5	-	254.4	139.24	138.6	0.24	0.013	14.1	21.2	23.8	27.8	NF	14.1	21.2	23.4	27.6	NF
SD6035	ST6035	ST6034	CIRCULAR	3	-	131	139.88	139.2	0.49	0.013	14.1	21.2	24.1	27.9	NF	14.1	21.2	23.5	27.7	NF
SD6036	ST6036	ST6035	CIRCULAR	2.25	-	131	142.21	139.9	1.40	0.013	14.1	21.2	24.3	28.0	NF	14.1	21.2	23.6	27.8	NF
SD6200	ST6200	O6200	COFFEE_CR4	27	4	650	79.45	62.2	2.66	0.035	370.6	484.3	525.3	529.3	NF	427.5	479.5	515.4	633.0	NF
SD6201	ST6201	ST6200	COFFEE_CR4	27	4	420	88.45	79.5	2.14	0.035	370.7	484.3	525.4	529.3	NF	427.6	479.7	515.6	633.1	NF
SD6202	ST6202	ST6201	ARROWHEAD_CR2	28	6	850	125.45	88.5	4.36	0.035	60.8	86.5	97.5	111.9	NF	64.3	92.2	102.9	117.2	NF
SD6203	ST6203	ST6202	ARROWHEAD_CR2	28	6	900	143.45	125.5	2.00	0.035	61.2	86.7	97.5	111.9	NF	64.5	92.4	103.0	117.3	NF
SD6205	ST6204	ST6201	COFFEE_CR4	27	4	900	123.95	88.5	3.95	0.035	323.6	384.7	413.8	443.0	NF	347.4	399.3	437.7	479.8	NF
SD6206	ST6205	ST6204	COFFEE_CR4	27	4	1300	134.95	124.0	0.85	0.035	323.6	384.7	413.8	443.1	NF	347.5	399.3	437.7	479.8	NF
SD6400	ST6400	O6400	CIRCULAR	2.5	-	10	146.95	145.0	20.41	0.011	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD6401	ST6401	ST6400	CIRCULAR	2.5	-	109	148.55	147.0	0.59	0.013	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF
SD6402	ST6402	ST6401	CIRCULAR	2.5	-	229.6	149.5	148.6	0.25	0.013	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6403	ST6403	ST6402	CIRCULAR	2.5	-	217.4	150.99	149.5	0.46	0.011	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6404	ST6404	ST6403	CIRCULAR	2.5	-	207	151.76	151.0	0.33	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6405	ST6405	ST6404	CIRCULAR	2	-	75.4	152.6	151.8	0.85	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6406	ST6406	ST6405	CIRCULAR	2	-	89	153.47	152.6	0.98	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6407	ST6407	ST6406	CIRCULAR	2	-	172.2	155.78	153.5	1.34	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6408	ST6408	ST6407	CIRCULAR	1.5	-	109.3	158.01	155.8	1.47	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6409	ST6409	ST6408	CIRCULAR	1.5	-	45.3	158.66	158.0	1.35	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6410	ST6410	ST6409	CIRCULAR	1.25	-	219.7	161.47	158.7	1.17	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6411	ST6411	ST6410	CIRCULAR	1.25	-	346	164.48	161.5	0.81	0.011	2.6	4.3	5.2	6.6	NF	2.6	4.3	5.2	6.6	NF
SD6204	ST6412	ST6203	CIRCULAR	4	-	70	149.45	143.5	8.60	0.013	61.4	86.8	97.5	111.9	NF	64.6	92.5	103.0	117.3	NF
SD6414	ST6413	ST6414	ARROWHEAD_CR2	28	6	50	159.45	158.7	1.56	0.035	51.8	71.4	80.6	92.6	NF	53.1	73.8	82.6	94.2	NF
SD6415	ST6414	ST6415	CIRCULAR	3.5	-	100	158.67	157.1	1.56	0.024	51.2	71.3	80.0	92.6	NF	52.2	73.6	82.2	94.2	NF
SD6412	ST6415	ST6412	ARROWHEAD_CR2	28	6	490	157.1	149.5	1.56	0.035	50.9	71.2	80.0	92.6	NF	51.8	73.6	82.2	94.2	NF
SD6601	ST6601	O6600	CIRCULAR	1.5	-	37.1	100.63	97.1	9.58	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6602	ST6602	ST6601	CIRCULAR	1.5	-	53.4	114.29	100.6	26.04	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6603	ST6603	ST6602	CIRCULAR	1.5	-	149.2	129.78	114.3	10.30	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6604	ST6604	ST6603	CIRCULAR	1.75	-	233.4	139.31	129.8	4.00	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6605	ST6605	ST6604	CIRCULAR	1.75	-	178.1	147.4	139.3	4.43	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6606	ST6606	ST6605	CIRCULAR	0.83	-	144.2	150.98	147.4	2.35	0.013	4.2	5.3	5.9	6.8	10-yr, 24-hr	4.3	5.4	6.0	6.9	10-yr, 24-hr
SD6607	ST6607	ST6606	CIRCULAR	1	-	120.7	153.15	151.0	1.62	0.013	4.2	5.4	6.1	7.1	10-yr, 24-hr	4.3	5.5	6.3	7.3	10-yr, 24-hr
SD6608	ST6608	ST6607	CIRCULAR	1	-	245	156.07	153.2	1.10	0.013	4.2	5.7	6.4	7.6	10-yr, 24-hr	4.3	5.8	6.6	7.8	10-yr, 24-hr
SD6609	ST6609	ST6608	CIRCULAR	1	-	165.6	158.29	156.1	1.08	0.013	4.2	6.0	7.1	8.6	10-yr, 24-hr	4.3	6.2	7.3	8.8	10-yr, 24-hr
SD6610	ST6610	ST6609	CIRCULAR	1	-	77	159.64	158.3	1.40	0.013	4.2	6.4	7.7	9.6	10-yr, 24-hr	4.4	6.7	8.0	9.8	10-yr, 24-hr
SD6630	ST6618	ST6619	CIRCULAR	0.83	-	117.9	160.03	155.8	3.32	0.013	0.0	0.0	0.1	0.4	NF	0.0	0.0	0.2	1.9	NF
SD6632	ST6619	ST6606	CIRCULAR	0.83	-	348.8	155.79	151.0	1.35	0.013	0.0	1.1	1.2	1.5	NF	0.0	1.2	1.2	1.5	100-yr, 24-hr
SD6616	ST6653	ST6654	CIRCULAR	1.5	-	210.7	171.05	167.7	1.57	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6617	ST6654	ST6655	CIRCULAR	1.5	-	197	167.65	161.9	2.89	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6619	ST6655	STD6604	CIRCULAR	2	-	213.9	161.85	161.0	0.42	0.013	3.4	5.1	6.1	7.4	NF	3.4	5.2	6.2	7.6	NF
SD9000	ST9001	09000	CIRCULAR	3	-	74	100.78	100.6	0.24	0.024	34.8	51.9	62.5	71.6	NF	34.8	51.9	62.5	70.7	NF
SD9001	ST9002	ST9001	CIRCULAR	3.5	-	317	101.89	100.8	0.32	0.024	34.8	51.9	62.5	71.6	10-yr, 24-hr	34.8	51.9	62.5	70.7	10-yr, 24-hr
SD9002	ST9003	ST9002	CIRCULAR	3.5	-	504.5	109.78	101.9	1.54	0.024	35.2	55.0	65.2	72.1	25-yr, 24-hr	35.2	55.0	65.2	71.1	25-yr, 24-hr
SD9003	ST9004	ST9003	CIRCULAR	3	-	436.8	119.75	109.8	2.17	0.013	21.1	33.2	40.0	45.9	NF	21.1	33.2	40.0	46.4	NF
SD9004	ST9005	ST9004	CIRCULAR	3	-	498	126.25	119.8	1.29	0.013	21.1	33.2	40.4	45.9	NF	21.1	33.2	40.4	46.6	NF
SD9005	ST9006	ST9005	CIRCULAR	3	-	460	127.45	126.3	0.24	0.013	21.1	33.2	40.5	53.2	NF	21.1	33.2	40.5	53.4	100-yr, 24-hr
SD9006	ST9007	ST9006	CIRCULAR	3	-	402.2	139.5	127.5	2.97	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.9	NF
SD9007	ST9008	ST9007	CIRCULAR	3	-	283.7	141.13	139.5	0.57	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.7	NF
SD9008	ST9009	ST9008	CIRCULAR	3	-	86.3	141.35	141.1	0.26	0.013	14.6	22.7	27.3	31.7	NF	14.6	22.7	27.3	31.7	NF
SD9009	ST9010	ST9009	CIRCULAR	3	-	379.9	143.25	141.4	0.50	0.013	14.6	22.7	27.4	31.7	NF	14.6	22.7	27.4	31.7	NF
SD9010	ST9011	ST9010	CIRCULAR	3	-	432.6	144.96	143.3	0.40	0.013	14.6	22.8	27.5	31.9	NF	14.6	22.8	27.5	31.9	NF
SD9011	ST9012	ST9011	CIRCULAR	2	-	315	147.48	145.0	0.27	0.013	14.7	22.9	27.6	31.9	NF	14.7	22.9	27.6	31.9	NF
SD9012	ST9013	ST9012	CIRCULAR	2	-	332	148.38	147.5	0.27	0.013	14.7	22.9	27.6	31.9	100-yr, 24-hr	14.7	22.9	27.6	31.9	100-yr, 24-hr
SD9013	ST9014	09001	CIRCULAR	2.5	-	117	97.82	93.0	4.11	0.018	54.8	83.2	88.4	94.1	100-yr, 24-hr	54.8	83.2	88.1	94.2	100-yr, 24-hr
SD9014	ST9015	ST9014	CIRCULAR	3	-	217	100.35	97.8	0.76	0.011	40.2	62.1	64.8	70.3	25-yr, 24-hr	40.3	62.2	64.5	70.4	25-yr, 24-hr
SD9015	ST9016	ST9015	CIRCULAR	3	-	701.7	109.33	100.4	1.70	0.011	14.4	19.6	22.5	27.6	NF	14.5	19.7	22.3	27.6	NF
SD9016	ST9017	ST9016	CIRCULAR	3	-	311	113.58	109.3	0.31	0.011	14.5	19.6	21.2	24.0	NF	14.5	19.7	21.2	24.0	NF
SD9017	ST9018	ST9017	CIRCULAR	1.75	-	240	115.7	113.6	0.84	0.024	14.5	19.7	21.2	23.7	2-yr, 24-hr	14.5	19.7	21.2	23.7	2-yr, 24-hr
SD9060	ST9019	ST9018	CIRCULAR	1.75	-	121.7	116.62	115.7	0.67	0.024	14.8	20.0	21.5	24.5	2-yr, 24-hr	14.8	20.0	21.5	24.6	2-yr, 24-hr
SD9018	ST9020	ST9019	CIRCULAR	1.5	-	309	118.6	116.6	0.56	0.013	3.9	6.1	6.3	7.4	10-yr, 24-hr	3.8	6.2	6.4	7.5	10-yr, 24-hr
SD9019	ST9021	ST9020	CIRCULAR	1.25	-	395	130.67	118.6	2.99	0.013	2.9	5.3	5.6	6.5	10-yr, 24-hr	3.0	5.4	5.7	6.5	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD9020	ST9022	ST9021	CIRCULAR	1.25	-	351	140.33	130.7	2.72	0.013	2.9	4.9	6.2	8.0	25-yr, 24-hr	3.0	4.9	6.3	8.0	25-yr, 24-hr
SD9021	ST9023	ST9022	CIRCULAR	1.25	-	453.5	145.89	140.3	1.20	0.013	3.0	4.9	6.2	7.9	100-yr, 24-hr	3.0	4.9	6.3	7.9	100-yr, 24-hr
SD9022	ST9024	ST9015	CIRCULAR	3	-	159.4	103.27	100.4	1.51	0.011	27.0	43.2	46.6	50.3	25-yr, 24-hr	27.0	43.5	46.4	62.5	25-yr, 24-hr
SD9023	ST9025	ST9024	CIRCULAR	3	-	238.4	106.07	103.3	1.17	0.011	18.8	29.5	30.4	34.5	100-yr, 24-hr	18.8	29.7	32.9	45.9	100-yr, 24-hr
SD9024	ST9026	ST9025	CIRCULAR	2.5	-	175.8	110.34	106.1	2.39	0.011	18.9	29.2	30.2	34.5	100-yr, 24-hr	18.9	29.4	32.9	38.3	25-yr, 24-hr
SD9025	ST9027	ST9026	CIRCULAR	2.5	-	271.6	117.35	110.3	2.58	0.011	18.9	29.1	30.2	35.0	NF	18.9	29.1	32.8	34.8	NF
SD9026	ST9028	ST9027	CIRCULAR	2	-	142	121.35	117.4	2.75	0.024	14.7	21.9	23.1	25.7	100-yr, 24-hr	14.7	21.9	23.0	25.7	100-yr, 24-hr
SD9027	ST9029	ST9028	CIRCULAR	2	-	160	125.35	121.4	2.44	0.024	14.7	21.9	23.1	25.9	100-yr, 24-hr	14.7	21.9	23.0	25.8	100-yr, 24-hr
SD9028	ST9030	ST9029	CIRCULAR	2	-	258	131.45	125.4	2.33	0.024	14.7	21.9	23.1	26.5	10-yr, 24-hr	14.7	21.9	23.0	26.4	10-yr, 24-hr
SD9029	ST9031	ST9030	CIRCULAR	2.5	-	296	135.35	131.5	1.28	0.024	14.7	22.9	27.0	28.8	25-yr, 24-hr	14.7	22.9	26.9	28.8	25-yr, 24-hr
SD9030	ST9032	ST9014	CIRCULAR	3	-	263.3	102.61	97.8	1.49	0.011	15.4	22.3	25.1	27.5	100-yr, 24-hr	15.4	22.3	25.1	30.4	100-yr, 24-hr
SD9031	ST9033	ST9032	CIRCULAR	1.75	-	202.4	103.63	102.6	0.45	0.024	7.7	10.9	13.1	16.7	100-yr, 24-hr	7.7	10.9	13.1	17.2	100-yr, 24-hr
SD9032	ST9034	ST9033	CIRCULAR	1.75	-	306.4	105.2	103.6	0.48	0.024	7.7	10.9	13.1	13.6	25-yr, 24-hr	7.7	10.9	13.1	14.9	25-yr, 24-hr
SD9033	ST9035	ST9034	CIRCULAR	1.5	-	118.7	107.06	105.2	0.40	0.013	7.7	10.9	12.8	12.6	25-yr, 24-hr	7.7	10.9	12.8	12.7	10-yr, 24-hr
SD9034	ST9036	ST9035	CIRCULAR	1.5	-	276	108.14	107.1	0.39	0.013	7.7	10.9	12.1	12.5	10-yr, 24-hr	7.7	10.9	12.1	12.5	10-yr, 24-hr
SD9035	ST9037	ST9036	CIRCULAR	1.5	-	242	108.87	108.1	0.39	0.013	7.7	10.6	12.5	13.5	10-yr, 24-hr	7.7	10.6	12.5	13.5	10-yr, 24-hr
SD9036	ST9038	ST9037	CIRCULAR	1.25	-	212.2	109.62	108.9	0.22	0.013	7.7	11.2	13.5	14.7	2-yr, 24-hr	7.7	11.2	13.5	14.7	2-yr, 24-hr
SD9037	ST9039	ST9038	CIRCULAR	1.25	-	260.1	110.29	109.6	0.22	0.013	7.9	12.4	15.1	16.6	2-yr, 24-hr	7.9	12.4	15.1	16.6	2-yr, 24-hr
SD9058	ST9040	ST9041	CIRCULAR	2.5	-	203	111.71	108.3	1.51	0.013	15.5	24.9	29.8	37.0	NF	15.5	24.9	29.8	37.0	NF
SD9057	ST9041	ST9068	CIRCULAR	2.5	-	275	108.31	104.0	1.21	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9038	ST9042	ST9040	CIRCULAR	2	-	294.3	114.63	111.7	0.98	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9053	ST9043	ST9066	CIRCULAR	1.5	-	961	122.65	108.0	1.51	0.013	4.0	6.0	6.7	8.0	NF	4.0	6.1	6.8	8.1	NF
SD9045	ST9044	ST9042	CIRCULAR	2	-	250	116.13	114.6	0.60	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9054	ST9045	ST9044	CIRCULAR	1.5	-	249.8	117.91	116.1	0.51	0.013	3.0	4.9	6.1	7.5	NF	3.0	4.9	6.1	7.5	NF
SD9056	ST9046	ST9045	CIRCULAR	1.5	-	150	118.6	117.9	0.33	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9055	ST9047	ST9046	CIRCULAR	1.25	-	168.6	120.31	118.6	0.87	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9046	ST9048	ST9047	CIRCULAR	1.25	-	148.2	121.19	120.3	0.59	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9047	ST9049	ST9040	CIRCULAR	2.25	-	217.2	114.26	111.7	1.06	0.013	8.8	13.8	16.2	20.2	NF	8.8	13.8	16.2	20.2	NF
SD9048	ST9050	ST9049	CIRCULAR	2	-	200.7	115.86	114.3	0.80	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9049	ST9051	ST9050	CIRCULAR	2	-	118	116.69	115.9	0.70	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9050	ST9052	ST9051	CIRCULAR	1.75	-	208	118.6	116.7	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9044	ST9053	ST9052	CIRCULAR	1.75	-	143	119.74	118.6	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9051	ST9054	ST9053	CIRCULAR	1.75	-	157	120.84	119.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9040	ST9055	ST9054	CIRCULAR	1.75	-	180	121.74	120.8	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9043	ST9056	ST9055	CIRCULAR	1.5	-	125	122.87	121.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9041	ST9057	ST9056	CIRCULAR	1.5	-	150	123.62	122.9	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9042	ST9058	ST9057	CIRCULAR	1.5	-	150	124.37	123.6	0.50	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9039	ST9059	ST9058	CIRCULAR	1.25	-	135	125.5	124.4	0.65	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9059	ST9060	ST9061	CIRCULAR	1.25	-	248.8	129.87	124.3	2.25	0.013	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.2	NF
SD9052	ST9061	ST9043	CIRCULAR	1.25	-	65.9	124.27	122.7	2.26	0.024	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.1	NF
SD9061	ST9062	ST9063	CIRCULAR	1.5	-	265.8	97.57	95.7	0.70	0.011	4.2	7.5	8.1	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9067	ST9063	ST9069	CIRCULAR	1.5	-	128	95.65	94.8	0.75	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.1	NF
SD9062	ST9064	ST9062	CIRCULAR	1.5	-	138.1	99.06	97.6	1.08	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.5	11.0	NF
SD9063	ST9065	ST9064	CIRCULAR	1.25	-	98.2	99.89	99.1	0.54	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.6	11.0	NF
SD9064	ST9066	ST9067	CIRCULAR	2.5	-	205	107.95	103.8	2.00	0.013	10.7	16.2	18.8	21.7	NF	10.7	16.3	18.9	21.8	NF
SD9065	ST9067	09003	CIRCULAR	3	-	145	103.75	100.0	2.60	0.013	26.2	40.9	48.4	58.6	NF	26.2	40.9	48.5	58.7	NF
SD9066	ST9068	ST9067	CIRCULAR	3	-	10	103.95	103.8	2.00	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9068	ST9069	ST9070	CIRCULAR	1.5	-	110	94.81	92.8	1.44	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9069	ST9070	09002	CIRCULAR	1.5	-	30	92.83	92.9	-0.27	0.011	4.1	7.5	8.0	10.6	NF	4.4	7.8	8.5	11.0	NF
1207	STD3400	ST4221	CIRCULAR	1.5	-	290.7	169.61	165.9	1.11	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	9.7	NF
SD4592	TOOZE_POND	ST4503	CIRCULAR	2	-	264	147.24	146.6	0.26	0.013	3.6	5.8	7.0	8.7	NF	3.8	6.0	7.3	9.0	NF

Table B-3. Hydaulic Model Inputs and Results																				
Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions					
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
1323	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1	-	38	146.45	141.5	1.32	0.013	1.8	2.7	3.5	22.9	100-yr, 24-hr	1.8	2.7	3.5	22.9	100-yr, 24-hr
4826	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1.5	-	30	146.45	141.5	22.88	0.024	14.9	22.9	22.3	4.4	100-yr, 24-hr	14.9	22.9	22.3	4.4	100-yr, 24-hr

NF = No Flooding

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

WATERWAYS CONSULTING, INC.

Ecological Restoration Design ~ Civil Engineering ~ Natural Resource Management

TECHNICAL MEMORANDUM - FINAL UPDATED

To: Angela Wieland, Brown and Caldwell

From: Waterways Consulting, Inc.

Date: January 30, 2024

Re: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead Creeks, Newland, and Kruse Creeks

Introduction

Brown and Caldwell (BC) was hired by the City of Wilsonville (COW) to prepare an updated Stormwater Master Plan that will develop an integrated and long-term approach for managing stormwater in the city. Wilsonville is one of Oregon's fastest growing cities, and its rapid growth has necessitated updates to previous Stormwater Master Plans (URS, 2012) to reflect changes in land use and improvements to stormwater management practices.

As part of this process BC requested that Waterways Consulting, Inc. (Waterways) conduct geomorphic stream assessments of a subset of stream segments within and adjacent to the City of Wilsonville to inform the updated Stormwater Master Plan. The assessments are meant to improve the understanding of stream processes in the selected reaches and to identify infrastructure risks associated with changes in creek hydrology as the city develops. The assessment was conducted in two phases with an initial phase that included evaluations of portions of Boeckman, Meridian and Arrowhead Creeks. The second phase, conducted in Fall 2023, included evaluations of portions of Newland Creek and an unnamed tributary to the Willamette River, referred to as Kruse Creek in this report.

Boeckman, Meridian, Arrowhead creeks (tributary to Coffee Lake Creek), Newland, and Kruse Creeks are small tributaries of the Willamette River flowing in narrow canyons bordered by thick deposits of fine-grained sediment deposited by the Missoula Floods. These creeks flow in confined valleys with steep, landslide-prone valley walls. In some areas, residential development encroaches to the edge of the adjacent terraces[1], while in other areas, including the assessed portions of Arrowhead Creek, Newland Creek, and Kruse Creek, the adjacent land use is agricultural, rural residential, or industrial. Large portions of the watersheds upstream of the assessment reaches have, are in the process of, or will be converted from open space to suburban residential neighborhoods. These land use changes have, and will continue to have, the potential to impact the morphology of these streams as the channels respond to changes in flow, direct modifications, and changes in sediment supply. This assessment focuses on evaluating the current condition of the channels within the study reach, identifies any ongoing infrastructure concerns associated with past hydromodification impacts, and evaluates the susceptibility of the streams to future hydromodification impacts.

[1] This assessment focuses only on stream-based hazards and concerns and does not address landslide risks on the valley walls.

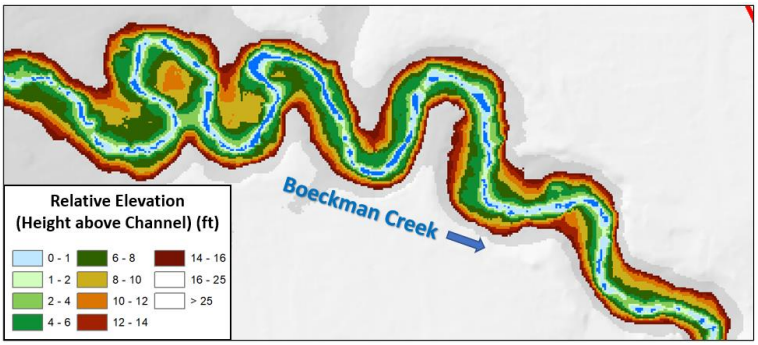
Approach

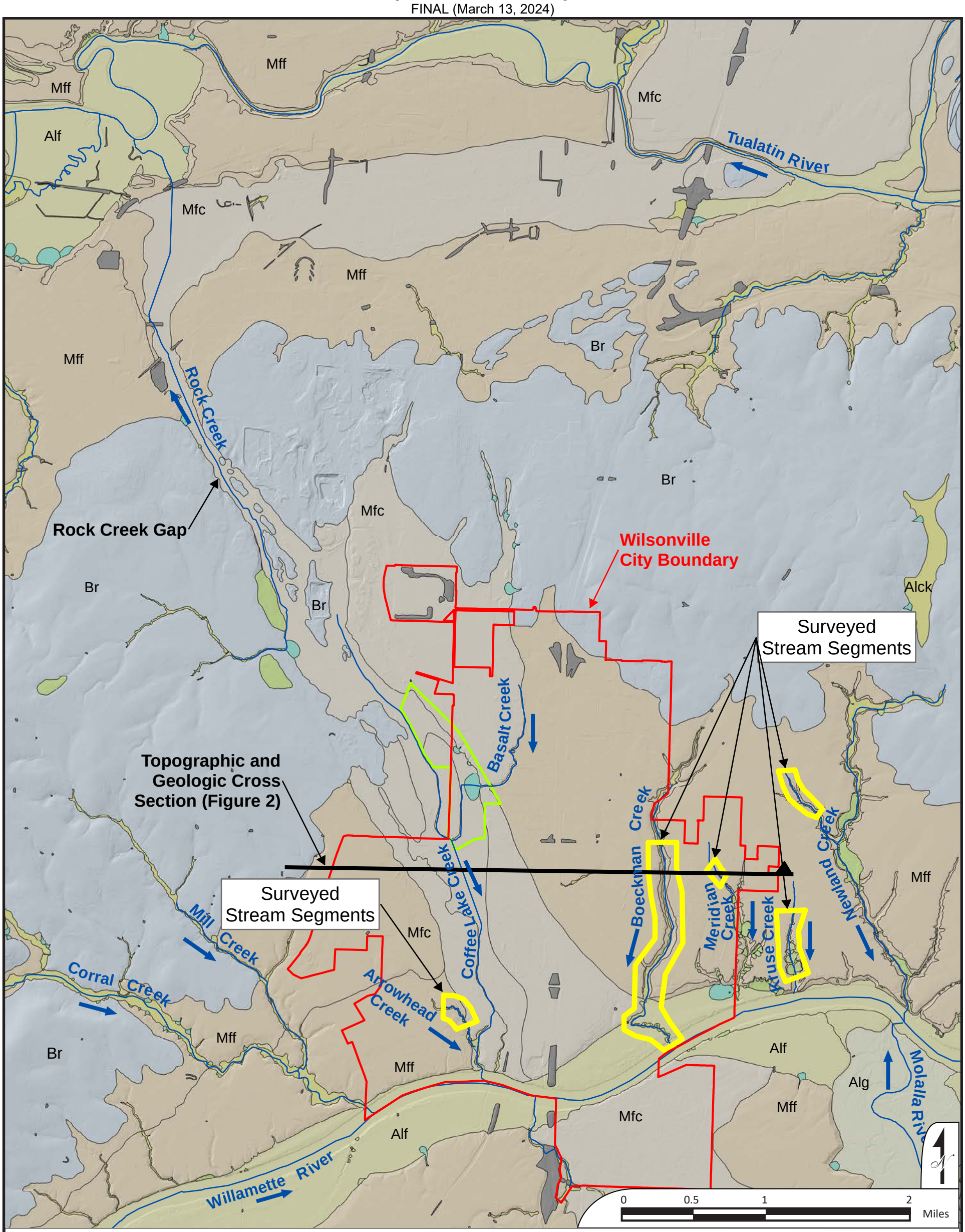
The purpose of the assessment is to understand and map the dominant geomorphic processes in the assessment reaches and identify any infrastructure-related issues that should be considered within the context of the updated Stormwater Master Plan. A key component of the assessment is the understanding that the reaches may be impacted by further hydromodification in the near future as a result of new upstream residential development or changes in other land use, such as agriculture or road development. Future efforts will include using the assessment information to identify potential Capital Improvement Projects (CIPs) or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The assessments consisted of reconnaissance-level field observations supported by desktop mapping and analysis. The field protocols involved an experienced geomorphologist walking a designated stream reach twice in one day, starting and ending at the same location. In the first pass, the geomorphologist traversed the channel by wading, mapping and collecting georeferenced photographs of individual point features of interest, such as beaver dams, bridges, culverts, exposed pipes, affected roads and trails, headcuts, bedrock outcrops, heavily eroding banks, etc. The locations of these point-scale features were recorded in a tabular format and later digitized (these point-scale observations are presented in the tables in **Appendix A** of this report). During the first pass, the geomorphologist subdivided the stream into mappable "subreaches," typically several hundreds to thousands of feet long, within which geomorphic conditions are relatively consistent and could be characterized. The second pass consisted of walking back through the reach and evaluating the subreaches' key geomorphic features, conditions, infrastructure risks, restoration opportunities, etc. The reach-scale observations were recorded in a matrix-based field form specifically developed for this project. Subreach summary tables for the surveyed reaches are provided later in this report.

The desktop component of this assessment included compilation and analysis of geospatial data, including infrastructure data, topographic data, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for each of the creeks within the assessment area. An REM is a topographic model created from a LiDAR elevation surface that shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream (e.g., **Figure 1**). The REMs for the creeks are provided as .tif files in a digital appendix to this report (**Appendix B**). In addition, as part of the desktop portion of the assessment Waterways created and analyzed topographic and geologic cross sections and stream longitudinal profiles and produced a set of field maps identifying streams and stormwater infrastructure identified during the field component. The field maps are provided as **Appendix C**.

Figure 1. *Example of Relative Elevation Model of Part of Lower Boeckman Creek*





Legend

City Limits

Stream Centerline

Coffee Lake Wetlands (City of Wilsonville)

Surficial Geology (from compilation by Ma et al., 2012)

- Af - Artificial Fill
- Alck - Creek Alluvium
- Alf - Fine Alluvium
- Alg - Coarse Alluvium
- Br - Columbia River Basalts
- Df - Debris Flow Fans
- Ls - Large Landslides
- Mfc - Missoula Flood Coarse Bedload Deposits
- Mff - Missoula Fine Flood Deposits

Ma, L., Madin, I.P., Duplantis, S., and K.J. Williams. 2012. LiDAR- Based Surficial Geologic Map and Database of the Greater Portland Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington. State of Oregon Department of Geology and Mineral Industries, Open File Report O-12-02.

Geologic and Geomorphic Setting Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 2

Geologic and Geomorphic Setting

Geomorphic processes in the creeks that dissect the Wilsonville area are influenced by their recent geologic history (**Figure 2**). Wilsonville sits on sedimentary deposits laid down by the Missoula Floods (Bretz, 1969), a series of dozens of gigantic floods that inundated the Willamette Valley between approximately 20,000 and 14,000 years ago (O'Connor et al., 2020). These cataclysmic floods originated from Glacial Lake Missoula in Montana and traveled down the Columbia River valley. A constriction downstream from Portland hydraulically impounded these flows, causing backwater flooding up the Willamette Valley. One of the main flow pathways for the Missoula Floods into the Willamette Valley was through a path that includes Lake Oswego and the "Rock Creek Gap" north of Wilsonville (O'Connor et al., 2001) (**Figure 3**). At these locations, huge flows moving south into the Willamette Valley were concentrated through narrow gaps in bedrock, forming underwater vortices powerful enough to carve deep channels ("scablands") and lakes ("kolks") in the resistant basalt bedrock in these locations.

The City of Wilsonville lies on an alluvial fan that formed in these floods where concentrated floodwater moving into the Willamette Valley spread out after moving through the Rock Creek Gap. The sudden widening downstream of the gap caused giant lobes of poorly sorted gravel and boulders to deposit along a pathway that bisects the City of Wilsonville (**Figure 2**). Drill logs from Canby and Wilsonville indicate that these coarse-grained, poorly sorted Missoula Flood deposits (labeled ***Mfc*** on **Figure 2**) range from 50 to 120 feet thick and are typically covered with 5-15 feet of sand and silt (Allison, 1978). In Wilsonville, the north-south oriented swath of ***Mfc*** is bounded on both sides by finer grained Missoula Flood deposits (***Mff*** in **Figure 2**). These sediments are thick, stratified silt and clay deposits that cover much of the lowland Willamette Valley floor. The finer-grained sediments (***Mff***) were laid down at a later phase in the Missoula Floods when the Willamette Valley was ponded as the main floods moved through the Columbia River.

Figure 4 is an east-west topographic and geologic profile through the main creeks of Wilsonville, passing through several of the reaches included in this assessment. The profile illustrates the differences between the parallel north-south creeks flowing through Wilsonville. Coffee Lake Creek, the largest creek in the city, flows in an "underfit" valley created by the Missoula Floods, and is underlain by coarse Missoula Flood sediments (***Mfc***). This geological setting explains why the Coffee Lake Creek valley is a wide, flat valley containing ecologically important wetlands, along with other unique geologic features of Wilsonville area, such as scablands and kolks, including the ecologically important Coffee Lake Wetlands as well as the 3.5-acre kolk pond at the Tonquin geologic area managed by Metro.

In contrast with Coffee Lake Creek, Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks carved deeper canyons in thick deposits of fine-grained Missoula Flood deposits (***Mff***) (**Figure 4**). Boeckman Creek is in a narrow canyon as much as 100 feet deep, with steep, unstable hillslopes prone to landslides. Boeckman, Meridian, Arrowhead, and Newland Creeks appear to have incised through the softer deposits to the point where their beds have encountered more consolidated clay deposits, or in the case of Arrowhead, where it reached the base level established by Coffee Lake Creek. Th presence of marginally resistant, consolidated clay in the streambed in some locations on all of these creeks provides a degree of base level stability. In some cases, including Boeckman and Arrowhead, the creeks appear to be no longer incising, especially in the lower reaches of these watersheds. Conversely, the headwater reaches assessed on Meridian and Newland Creek, appear to be experiencing incision despite exposures of more consolidated substrates. The morphology of the channel and valley on Kruse Creek is more dominated by the presence of valley-wide landslides and a high groundwater table.

Figure 3. *Pathway of Missoula Floods into the Willamette Valley through Wilsonville (modified from Minervini et al., 2003)*

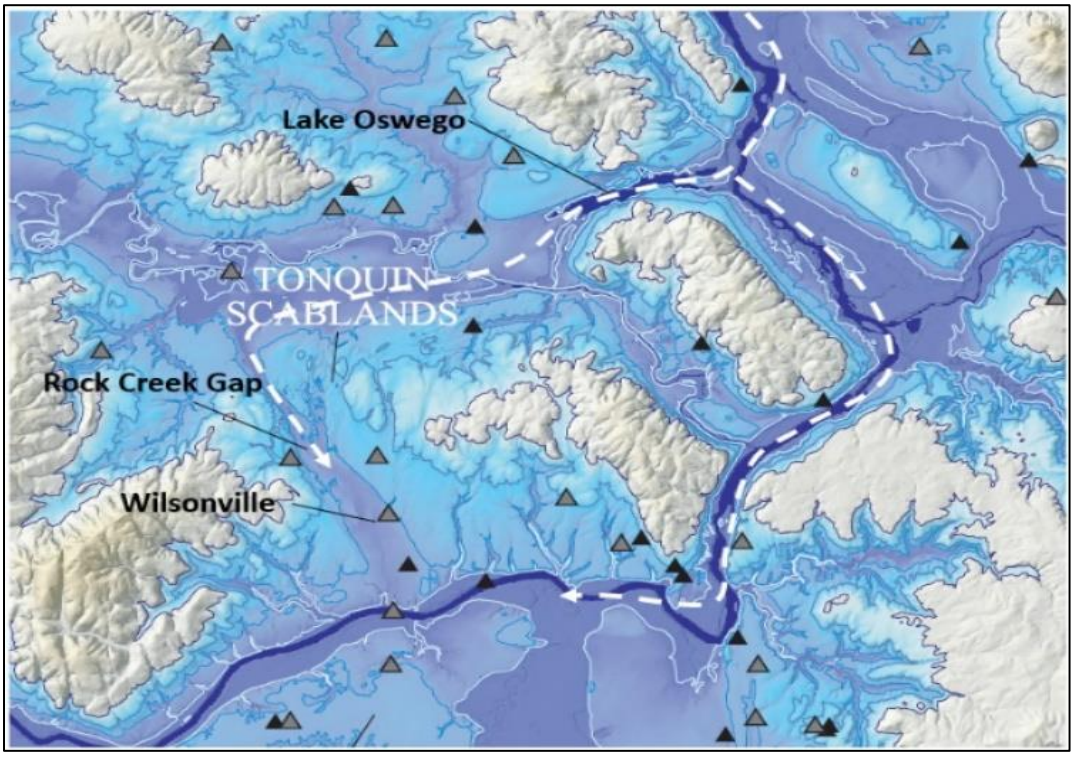
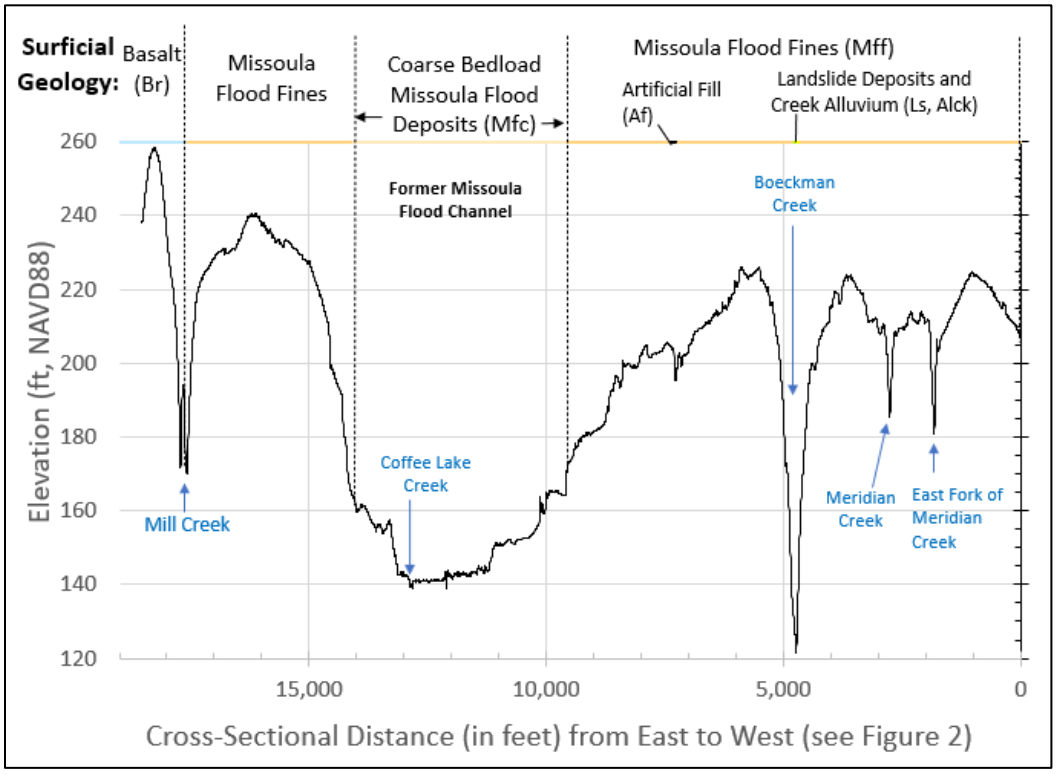


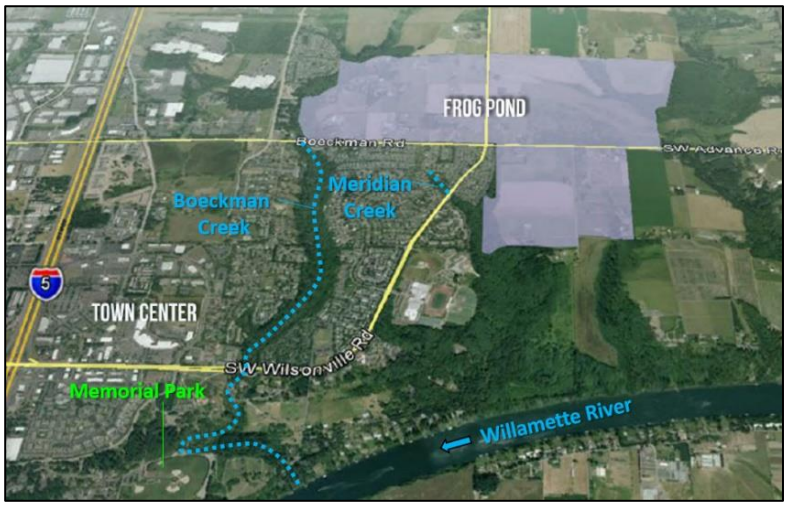
Figure 4. *Topographic and Geologic Cross Section Across the Wilsonville Area (See Fig. 2 for Profile Location)*



Human Impacts and Infrastructure

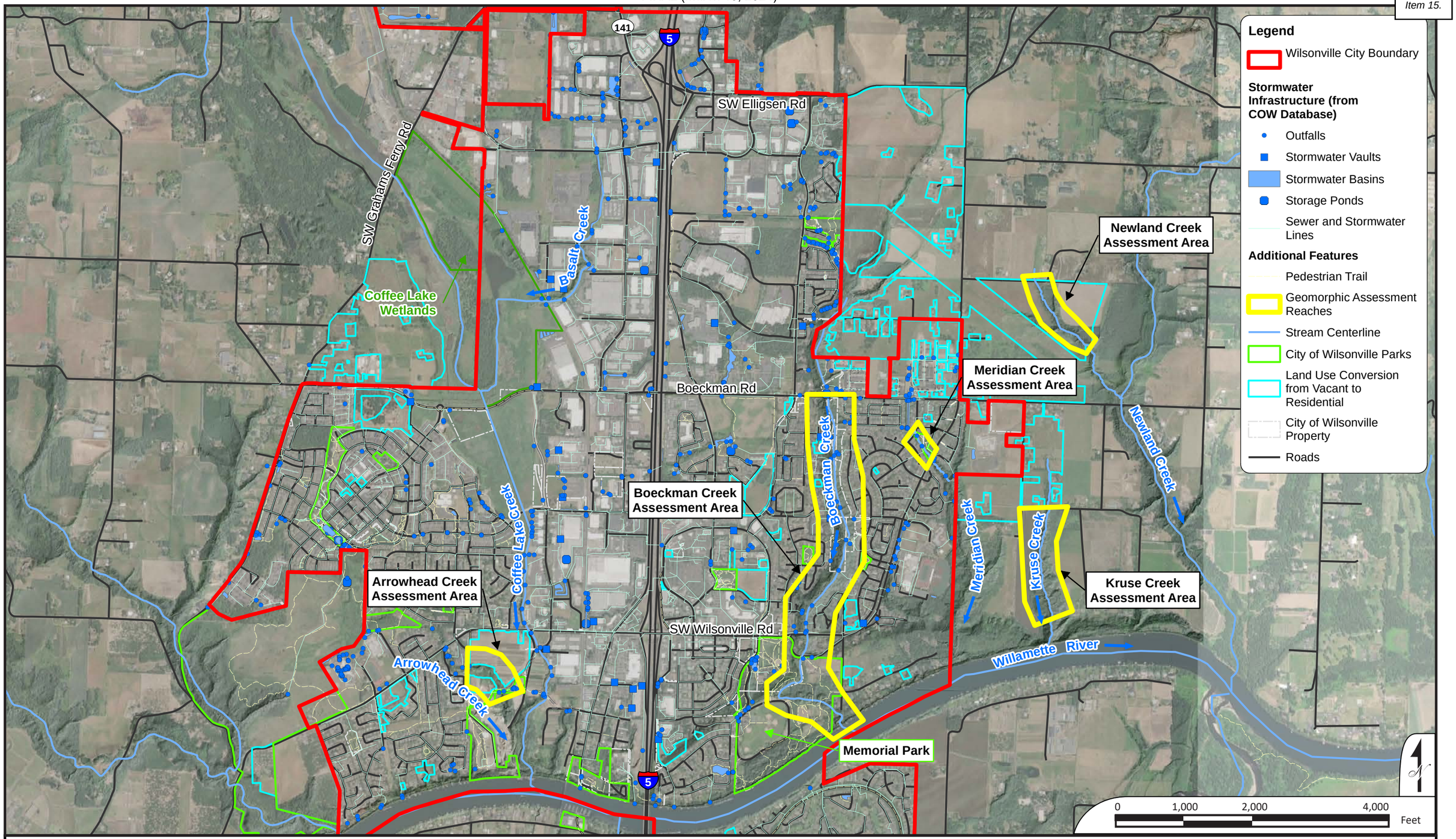
Most of the assessment reaches are adjacent to existing developed areas or are downstream of zones in the process of, or anticipated to be, converted from agricultural uses to residential developments (***Figure 5***). Hydromodification impacts in the assessment reaches are not limited to impacts associated with urban and residential development. Hydromodification impacts on these stream channels have been ongoing for over a century when the forested landscape was converted to agriculture, roads were built, culverts were installed, and fields were tile drained. These land use changes specifically intended to reduce water storage on the landscape while increasing the efficiency of runoff to adjacent waterbodies.

Figure 5. *Location of Phase 1 Assessment Reaches (dashed blue lines) relative to Existing and Planned Developed Areas (modified from APG. 2015)*



In the assessment reaches, Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks flow in incised canyons. Along Boeckman and Meridians Creeks, residences are built to the edges of the canyons and the streams flow in confined valleys 20 to 100 feet deep. Water enters the streams from paved areas through a complex network of stormwater pipes that discharge along the steep valley walls (***Figure 6***).

The assessment reaches in Boeckman and Meridian are downstream of recently developed areas within the Frog Pond Development Area, a 500-acre residential neighborhood under construction within the urban growth boundary (**Figure 5**). The Newland and Kruse Creek assessment reaches are located downstream of an undeveloped portion of the Frog Pond Development area located to the east of Wilsonville and Stafford Roads. The long-planned development will include residences, schools, parks, transit, and trails, including a new regional trail following Boeckman Creek along the assessment reach (APG, 2015). To mitigate for potential hydromodification impacts from the existing and proposed portions of the Frog Pond Development area on the assessment reaches and other receiving streams, the developments are implementing Best Management Practices (BMP's) that are specifically designed to maintain the natural hydrology and limit the discharge of stormflow off of newly created impervious surfaces. Both "upland" and "in-stream" strategies for mitigating hydromodification risks have been adopted by the City and are being implemented within newly developed portions of Wilsonville, including the Frog Pond area (Brown and Caldwell, 2015). Those BMP's include infiltration and detention facilities, neighborhood-based Low Impact Development strategies, retrofitting existing stormwater detention basins, rehabilitating stormwater outfalls along the creek, culvert upgrades, and riparian vegetation improvements. The assessment reaches, especially along Newland and Kruse Creeks, provides an opportunity to establish a baseline of channel conditions prior to development occurring in the contributing watershed.



Human Impacts and Infrastrucure Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 6

Field Observations

The assessment included 5 days of field time to document conditions in priority reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks. These reaches were prioritized by the City of Wilsonville based on the importance of the streams, likelihood of hydromodification impacts, land access, and available budget. Additional reaches may be added to the assessment in the future.

The highest priority reach was the section of Boeckman Creek from Boeckman Road to the Willamette River, an along-stream distance of 12,200 feet (2.3 miles) (**Figure 7**). The second priority for the assessment was the 600-foot-long (0.1-mile) reach of Meridian Creek adjacent to Willow Creek/Landover Park (also shown in the top right corner of **Figure 7**). Sections of Basalt Creek and Arrowhead Creek were also identified as potential assessment reaches. Arrowhead was prioritized for the assessment over Basalt Creek due to the lack of landowner agreements along Basalt Creek.

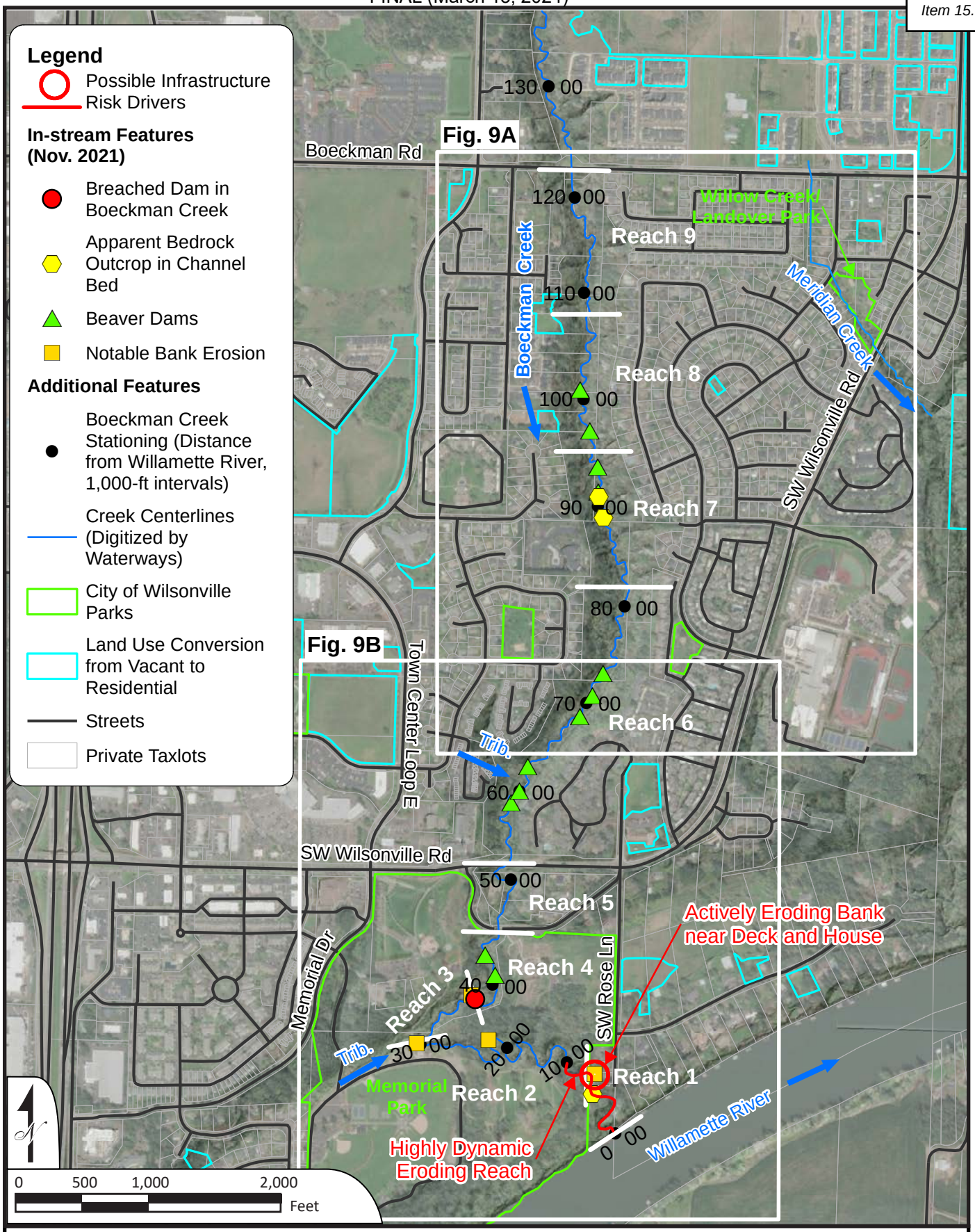
Approximately 1,000 feet (0.2 miles) was assessed on Arrowhead Creek. In Fall 2023, portions of Newland and Kruse Creeks that have the potential to be impacted by the Frog Pond Development or any additional eastward expansion of Wilsonville were also included in the assessment. Approximately 1,700 feet (0.3 miles) of Newland Creek and 2,200 feet (0.4 miles) of Kruse Creek was evaluated.

Boeckman Creek

The field assessment for Boeckman Creek occurred on November 19 and 24, 2021. The first day covered the lower reach within Memorial Park, from the private property boundary at Station 750 to Kolbe Lane (Sta. 4,500). The second day covered the reach from Wilsonville Road (Sta. 5,300) to Boeckman Road (Sta. 12,200). Two sections between the Willamette River and the private property boundary (Sta. 0 to 750) and between Kolbe Lane and Wilsonville Road (Sta. 4,500 to 5,300) were not accessed because those sections were on private property and Waterways did not have access permission. Permissions for the portion of private property located near the Willamette River were received in January 2022 and this section of channel (from Sta. 0 to 750) was assessed on January 25, 2022.

General Observations and Interpretations

- Specific point-scale observations of this section of Boeckman Creek are listed in **Appendix A1**.
- Boeckman Creek is confined within a narrow canyon bounded by steep valley walls prone to erosion and landsliding. At the bottom of the canyon, there is a meandering channel and a narrow, discontinuous floodplain covered by dense invasive species, especially Himalayan blackberry, reed canary grass, and English ivy. Very dense blackberry made for a difficult and slow traverse of the channel.
- Within the assessment reaches, Boeckman Creek has incised to a stable base level with a straight profile and relatively low gradient (about 0.6%), as illustrated in the longitudinal profile (**Figure 8**). The valley is graded to the Willamette River, and Boeckman Creek appears to no longer be actively incising, except in the most downstream reach at the confluence with the Willamette.
- The assessment area was subdivided into nine geomorphic sub-reaches ranging in length from 750 feet to 2,850 feet, within which geomorphic conditions and processes are relatively consistent. The subreaches are shown on the overview map (**Figures 7**), longitudinal profile (**Figure 8**), and detailed maps (**Figures 9a and 9b**). **Table 1** provides information and observations that characterize the geomorphic conditions and infrastructure features within each reach.



Boeckman Creek Geomorphic Survey Overview

Geomorphic Assessment of Wilsonville Creeks

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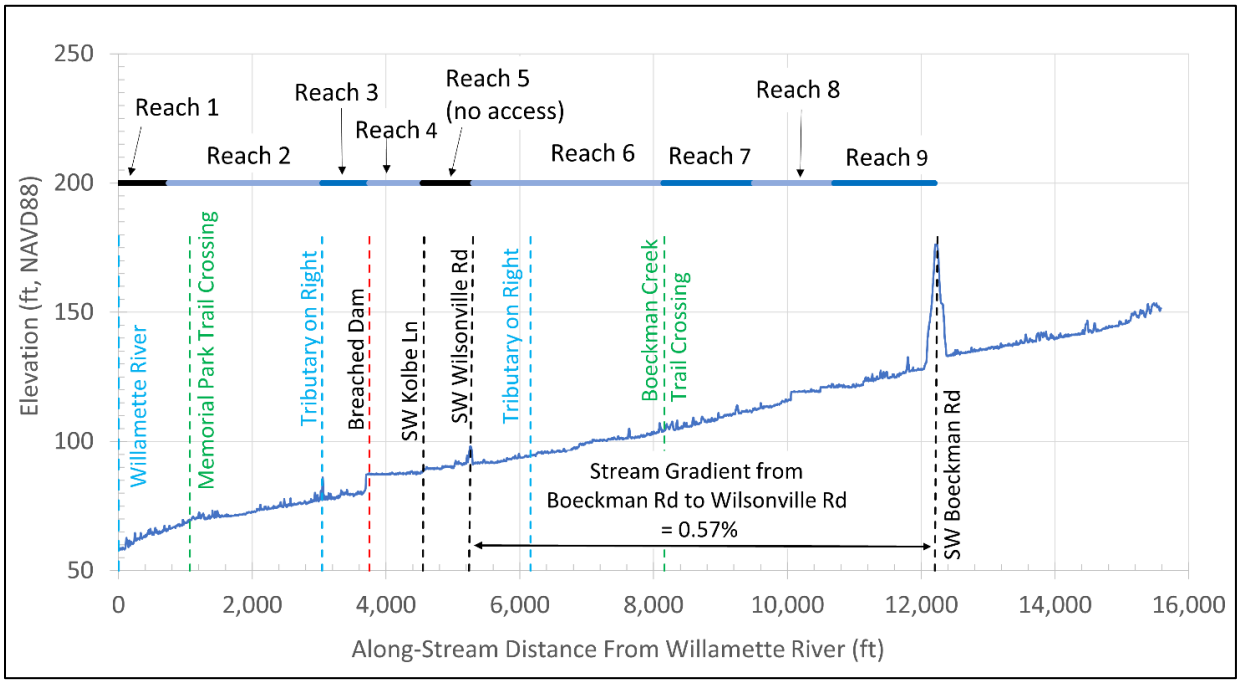
FIGURE 7

Figure 8. *Longitudinal Profile of Boeckman Creek (from 2014 LiDAR data)*



- Beaver are abundant throughout most of the assessment reaches and have a dominant impact on processes along Boeckman Creek. The most obvious impacts are from the channel-spanning dams that create a stairstep of flat water environments. Most of the grade control features shown on the field result map (**Figures 9a and 9b**) are beaver dams. The beaver dams range in height from about 1 foot to about 5 feet and pond long, continuous sections of the assessment area. The dams are actively maintained by beaver and most of them appear to be stable through typical floods in Boeckman Creek. Beaver are less prevalent or absent in the lower reaches of Boeckman Creek (Reaches 1 and 2), and are most abundant in the upper section (Reaches 6 through 9).
- The lack of stable beaver dams and seasonal variability in the backwater extent of the Willamette River along lower Boeckman Creek creates a highly dynamic condition with increased risk of erosion of the bed and banks. Dams throughout the Willamette River watershed, and the associated flow storage that those dams provide, results in a low stage in the Willamette River, relative to historic condition. Hydromodification impacts can potentially exacerbate channel instability by producing high flow events in early fall when the Willamette River is still low and the backwater influence is absent. This reach of Boeckman Creek is the most at-risk from hydrologic changes in the watershed.
- The breached former dam at Sta. 3,750 has an important reach-scale influence on the geomorphology in Boeckman Creek. Although the dam is breached, the remaining concrete and boulders are still present and provide a significant grade control feature, holding about 7 feet of grade (**Figure 8**). A wedge of fine sediment deposited upstream of the dam is covered with reed canary grass and extends as much as 800 feet upstream to the SW Kolbe Lane bridge.

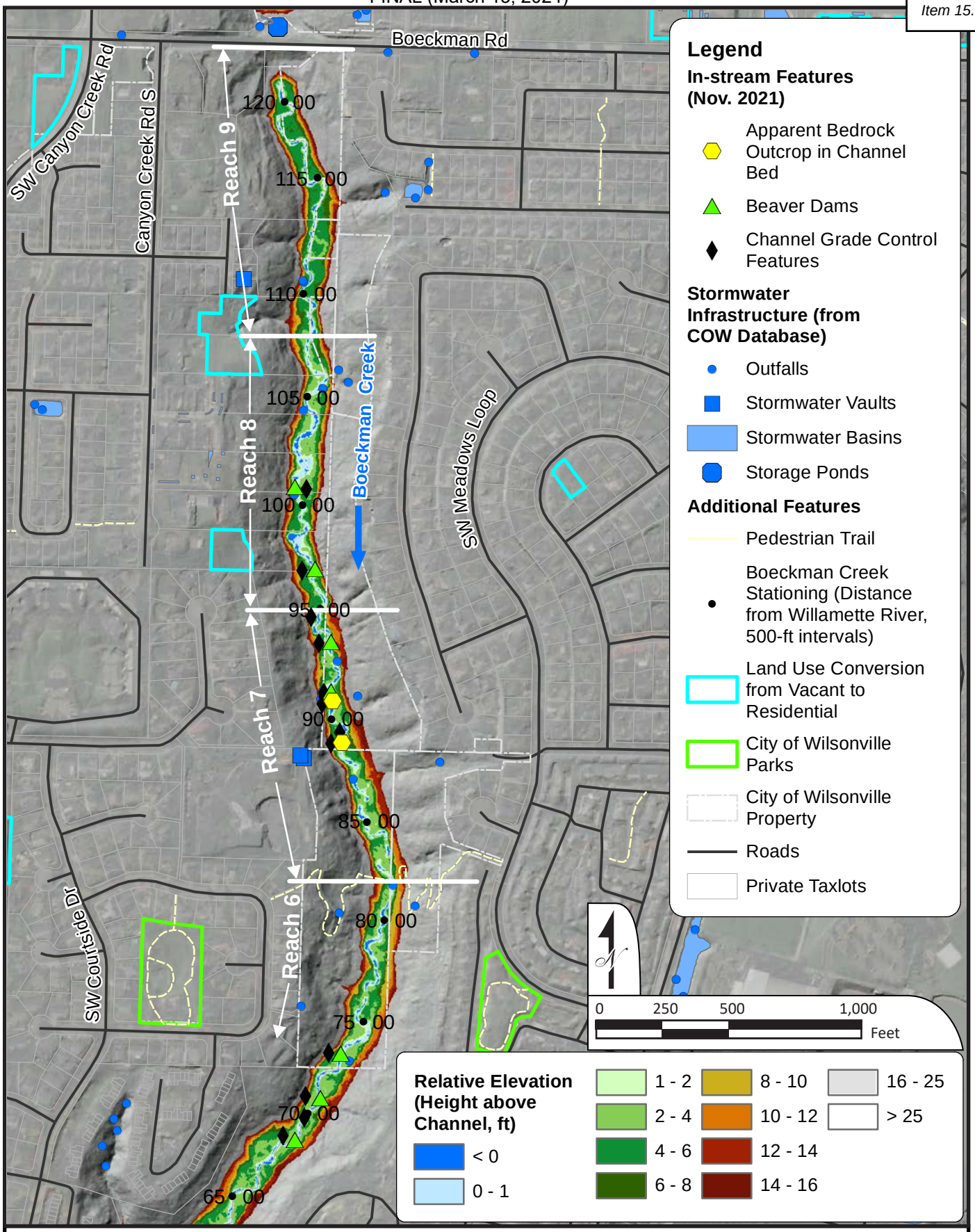
- There are at least three places where consolidated bedrock or other resistant material was observed within the channel bed in Boeckman Creek. These were noted by feel underfoot while wading. It was not possible to observe these resistant bed features due to the presence of turbid water about two to three feet deep at the time of the site visit.
- The presence of stable grade control – including resistant bed material, abundant stable beaver dams, fallen logs, boulders, and the 7-foot-high concrete and boulder grade control at the former dam – distributed throughout the project reach implies that much of Boeckman Creek cannot continue to incise. Collectively these features stabilize most of the channel bed, which is not susceptible to further incision due to hydromodification (**Figures 9a and 9b; Appendix A**).
- Waterways' geomorphologist also inspected the lower portions of two tributaries that enter Boeckman Creek from the west: one at Station 3,050 in Memorial Park, and one at Station 6,020 draining a residential area upstream of Wilsonville Road. Both tributaries appeared to be stable with no obvious infrastructure-related concerns:
    - The downstream tributary enters Boeckman Creek on river-right through a culvert under a road crossing in Memorial Park. The lower section of this tributary is deeply incised, low-gradient, gravel- and sand-bed stream in a dense blackberry thicket. Some bank erosion was observed along the steep banks but was not identified as an infrastructure concern. There is a partially clogged culvert on this tributary at a road crossing several hundred feet upstream of the confluence with Boeckman Creek. The clogged culvert backs water up to a footbridge in a grassy field in the park but does not appear to have any detrimental impacts. More descriptions are provided in **Appendix A1,** and photographs of this tributary can be found in the photo log (**Figure 10a**).
    - The upstream tributary drains the residential area along the west side of the creek north of Wilsonville Road. The tributary was only accessible at one location due to dense blackberry. At that location the channel bed was alluvial fine gravel and appeared stable.

Summary Conclusions from Boeckman Creek

- With the exception of Reach 1, the field reconnaissance did not identify any obvious concerns or infrastructure risk drivers related to geomorphology and hydromodification in the assessed portion of Boeckman Creek. No infrastructure appears at risk in the valley bottom. The stream in the assessment reach is laterally confined and vertically stable, and relatively little infrastructure is in the stream. Any increases to stormwater related to land use changes at the Frog Pond Development area are not expected to pose significant specific infrastructure risks. (*Note that the assessment area did not include the Boeckman Road crossing above the upstream extent of the assessment reach*).
- Within Reach 1, there is a risk of continued channel incision and bank erosion. Several properties have experienced bank failures and loss of land over the past several decades, and an active bank failure is impacting the backyard and deck of one of the properties. This study does not make any findings regarding the cause(s) and extent of bank failure in Reach 1. Further investigation of the bank failure should be conducted by a geotechnical engineer to determine if the source is associated with fill placed behind a now failed retaining wall, or if there is a larger slope stability issue at the site. If a further investigation to determine cause(s), extent, and possible remediation is conducted, then the investigation should consist of a slope stability analysis along with recommendations to address the instability within the context of existing site conditions. There is currently insufficient data to understand erosion rates and associated

risks. Longer-term geomorphic monitoring of this reach might be warranted, which would include establishing cross-sections that would be resurveyed every three to five years to document erosional or depositional trends over time.

- The most significant risks in the canyons may relate to instability of the valley walls, which is outside the scope of this study. In a large rainstorm or possibly during an earthquake, mass wasting (landslides) from the valley wall could potentially occur, possibly blocking the channel, potentially endangering infrastructure near the top of the canyon walls.
- It is possible that a large flood could breach one or more of the apparently stable beaver dams. If that were to happen, one or more waves of incision could move upstream through parts of the assessment reach. However, the consequences of such an event appear to be relatively low given the stable base level, lack of infrastructure in the valley bottom, and the likelihood that the beaver would reestablish impacted dam sites.
- Collapses of individual beaver dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the beaver dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy riparian corridor consisting of a mix of native riparian species in Boeckman Creek would be a beneficial long term management strategy to maintain the beaver population.
- **Figures 10a and 10b** provides some summary photographs showing conditions within the assessed portion of Boeckman Creek in November 2021 and January 2022.



Boeckman Creek Geomorphic Survey (Upstream)

Geomorphic Assessment of Wilsonville Creeks

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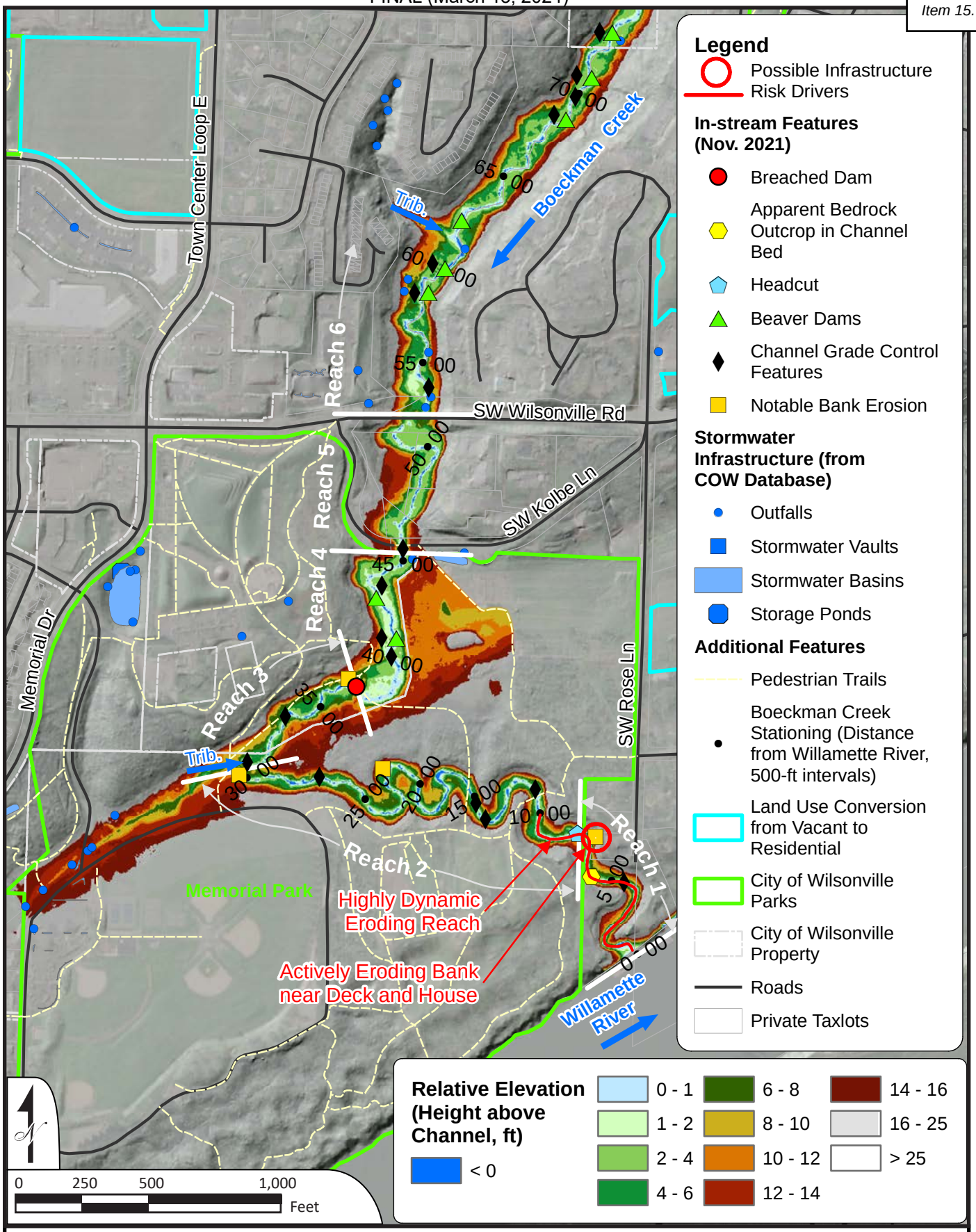
FIGURE **9A**



Boeckman Creek Geomorphic Survey (Downstream)

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 9B

Table 1. *Field Observations for Geomorphic Subreaches Within Boeckman Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	0	750	Dynamic reach with seasonal backwater from Willamette River	1.07%	Pool-Riffle	gravel / fines	Incised	Willamette River	Valley walls susceptible to mass wasting	Yes, but no dams	Incising and wideneing	4	3	5	5	Grade control and bank stabilization	Actively incising and eroding, especially upper extent of reach where active small headcuts still migrating. Lower Willamette water level combined with high intensity rainfall in fall cause incision and widening. Recommend detailed geotechnical slope stability analysis in locatoin of active bank erosion and landsliding.
2	750	3,050	Incised Meandering Reach in Willamette Floodplain	0.44%	Pool riffle	Mud, wood, boulder, cobble	Incised, Stable	Some boulder steps, downed logs, Willamette base level	High mud terraces; tree roots	Yes upstream of 2,400' ; Maybe downstream of 2,400'	Stable	2	3	2	1	Remove invasive blackberry and ivy	From property boundary at downstream end to the tributary on right in Memorial Park. Reach is within the historic Willamette River floodplain and river terrace. Single-thread, incised meanders with banks between 6 feet and 40 feet high. Generally the amount of incision increases in the downstream direction. Banks are massive mud deposits from Missoula Flood fines and/or Willamette River floodplain deposits. Bed contains mud, wood, and some gravel reaches. From about Station 1,400' downstream, Willamette River bedload deposits are visible in the banks. Little to no beaver presence below Sta 2,400'; beaver present between 2,400 and 3,040'.
3	3,050	3,700	Meander Reach below Breached Dam	0.37%	Pool riffle	Mud, wood	Incised, Stable	Beaver dams, downed logs	Valley walls, reed canary grass root mass	Yes, abundant	Stable	2	2	2	1	Remove invasives, add wood	From right bank tributary in Memorial Park to site of breached dam. Meandering channel with stable banks, beaver dams, relatively low floodplains covered in reed canary grass. Inundated areas are mostly reed canary grass, less blackberry than in other parts of the creek.
4	3,700	4,500	Low Gradient Depositional Reach above Former Dam	0.01%	Pool riffle	Mud, wood	Stable	Breached dam; beaver dam	reed canary grass in floodplain	Yes	Stable	1	2	1	1	Good reach for potential floodplain restoration	Reach from breached dam to SW Kolbe Lane in Memorial Park. Low gradient, meandering reach with relatively low, frequently inundated floodplain. Abundant beaver presence consisting of dams, canals, burrows, slides, and lot of chewed wood. Banks heavily covered with reed canary grass. Water is about 2 to 3 feet dep at this flow (moderately high flow), with mud dominated bed. A floodplain vegetation restoration project to replace reed canary grass with willow and alder could work well here.
5	4,500	5,300	Not Surveyed														Skipped this reach due to property access constraints

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
6	5,300	8,150	Stepped Beaver Pond Reach above Wilsonville Road	0.47%	Ponded by beaver dams	Mud, gravel, some bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1 (some trail erosion)	Remove invasives, add wood	Reach from Wilsonville Road to Boeckman Trail footbridge. Reach is mostly ponded by a series of beaver dams, most are small but with at least 2 large dams at Sta 6,250 and 7,300. The dams are built so that ponds are mostly continuous throughout the entire reach, with the toe of each dam close to the head of each pool of the downstream beaver pond. Reach is moderately incised but not as much as in other reaches of Boeckman Creek.
7	8,150	9,500	Mostly Free-Flowing Reach between Beaver Dammed Reaches	0.59%	Pool riffle	Gravel, mud	Stable, little to moderate incision	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	1	1 (some trail erosion)	Remove invasives, add wood	From Boeckman Trail footbridge to big beaver dam at Sta 9,500. Free flowing reach without much beaver activity. Riffle pool, gravel bed with some resistant bedrock in channel bed within the upper part of the reach. Some small beaver dams present but are not dominant.
8	9,500	10,700	Floodplain Inundated by Ponding at Several Large Beaver Dams	0.86%	Ponded by beaver dams	Mud	Stable, low banks	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1	Remove invasives, add wood	From beaver dam at Sta 9,500 to transition to more free-flowing reach. Deep ponded reach, with inundated floodplain over large areas. It is like this because either (1) dams are larger than those inreaches 6 and 9; and/or (2) the reach is less incised with lower banks. Viewed from trail on river left with some stops; unlike downstream reaches, I did not traverse the channel through this entire reach due to difficult access and need to speed up assessment. Did not visit outfall at Sta. 10,500
9	10,700	12,200	Incised Beaver Pond Reach	0.61%	Ponded, pool riffle	Mud, gravel, possible bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	3	1	Remove invasives, add wood	Similar to Reach 6, but deeper incision. Reach dominated by a series of beaver dams, not all were mapped due to difficult access. Did not visit crossing under Boeckman Road due to apparent private property

Table 1

Selected Photos From Boeckman Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE
10A

Selected Photos From Boeckman Creek, January 2022

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 10B

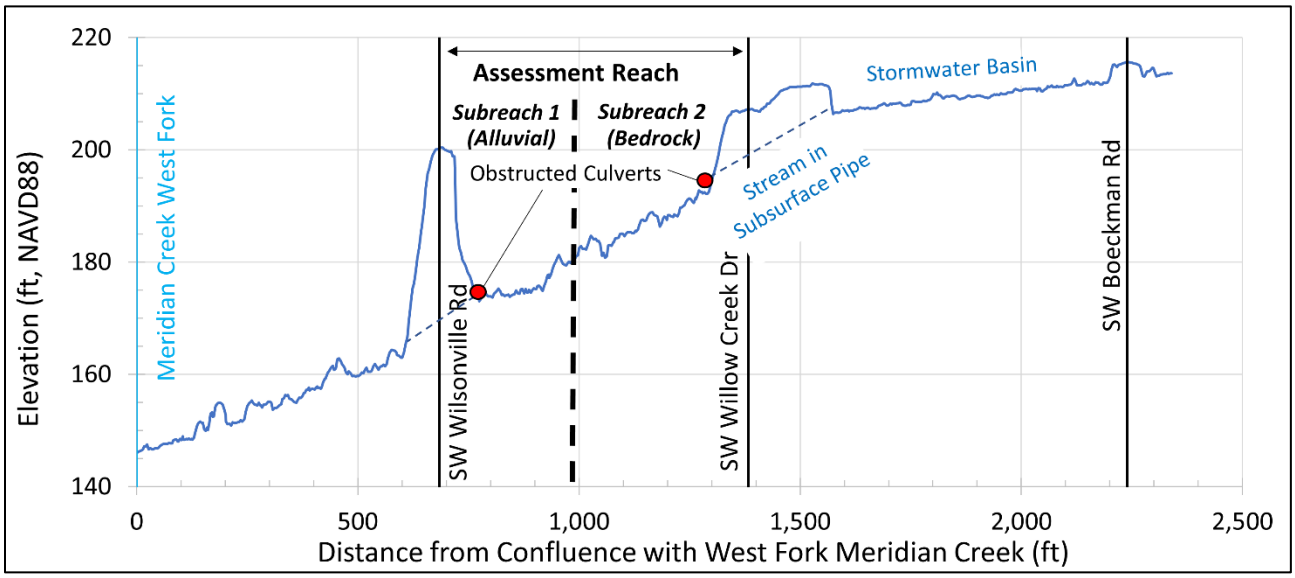
Meridian Creek in Landover Park

The field assessment for Meridian Creek occurred on November 26, 2021. The assessment included a 600-foot-long section of Meridian Creek between Wilsonville Road and SW Willow Creek Drive (**Figure 11**). This reach is immediately downstream of part of the Frog Pond Development Area. **Figure 12** is a longitudinal profile of the creek. **Table 2** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A2**. **Figure 13** contain photographs from this section of Meridian Creek.

GENERAL OBSERVATIONS AND INTERPRETATIONS

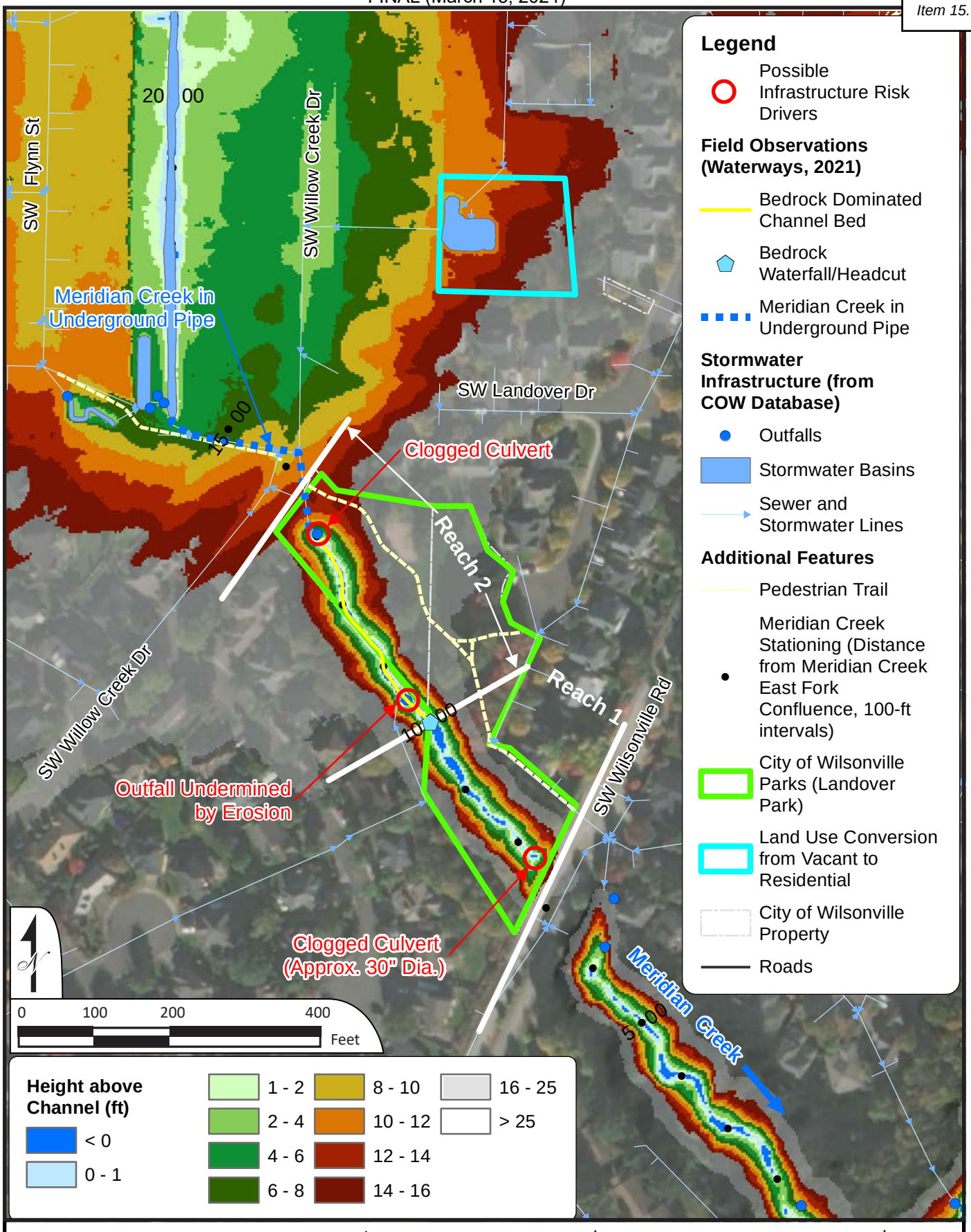
- This portion of Meridian Creek is incised in a very narrow canyon without any floodplains, whose steep slopes bound one side of the channel with a developed park on the other. The canyon is not as deep as the Boeckman Creek canyon, as can be seen in **Figure 4,** but the valley walls are steep with potentially unstable slopes underlain by fine-grained sediments and covered with dense blackberry thickets. The western valley wall is more at risk of landslides because Meridian Creek flows along the western margin of the canyon (right bank looking downstream).
- There are two distinct subreaches within the assessed area, delineated at a 4-foot-high bedrock/hardpan waterfall at Station 1,000 (**Figure 12**). The waterfall does not appear to be an active headcut advancing upstream and appears relatively stable. Downstream of the waterfall, the channel has an alluvial bed and is influenced by an obstructed culvert at Wilsonville Road. Upstream of the waterfall, a resistant layer of consolidated fine-grained sediment is exposed over most of the channel bed.
- The culvert at SW Willow Creek Drive appears to be undersized which may limit more significant hydromodification impacts from occurring downstream. Rock placed downstream of the culvert suggests that streambed erosion has been a concern in the past. This reach likely experienced significant channel incision and headcutting in the past but the active headcutting has been mostly arrested by the presence of hardpan material in the streambed. The discontinuity in the longitudinal profile across SW Willow Creek Drive (**Figure 12**) provides evidence for this field-based interpretation.

Figure 12. *Longitudinal Profile of portion of Meridian Creek (from 2014 LiDAR data)*



SUMMARY CONCLUSIONS FROM MERIDIAN CREEK

- The stream is stable in this reach due to the bedrock base level control and being confined laterally by valley walls and culverts at the upstream and downstream end.
- The main risk drivers are the culverts at the downstream and upstream ends of the reach:
  - There is a sediment-clogged culvert at the Meridian Creek crossing at Wilsonville Road (Station 775). The culvert under the high road prism is mostly obstructed and appears to cause ponding during storm runoff (**Figure 12**). It is unlikely that ponded water would overtop Wilsonville Road, but backwatering behind the road could result in significant ponding and potential for piping through the road prism, which was not likely designed to act as a dam. The risks at the crossing should be further evaluated as part of the Stormwater Master Plan. Hydraulic modeling may provide an opportunity to understand maximum inundation depths if the culvert were to plug.
  - The grate at the outlet of the culvert at the Willow Creek Drive appears to have been modified to address past channel incision and headcut migration. This location should be monitored to determine if the stabilization measures installed downstream of the culvert provide adequate, long-term grade stabilization.
- The PVC stormwater outfall on the creek at Station 1,100 is undermined and a 6-foot section has washed out and moved downstream.



Meridian Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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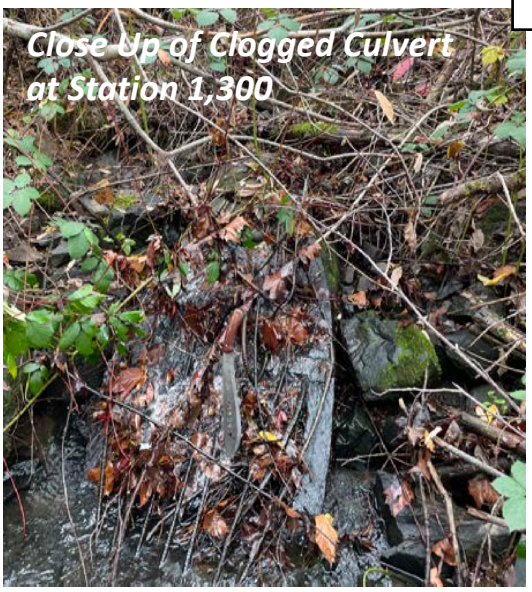
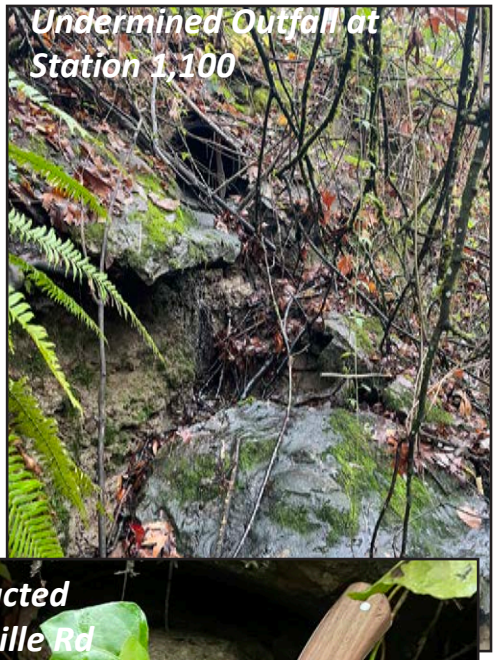
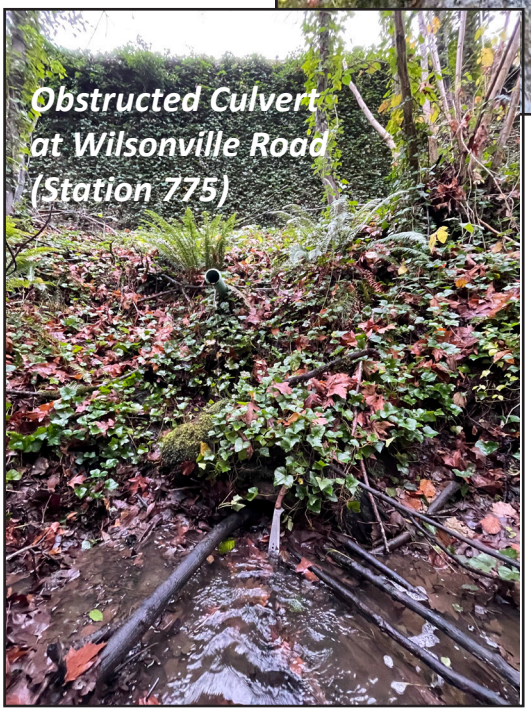
FIGURE 11

Table 2. *Field Observations for Geomorphic Subreaches Within Meridian Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	775	1,000	Gravel depositional reach behind clogged culvert	1.05%	Step Pool	Gravel, fines, wood	Incised, Stable	Culvert at Wilsonville Road	Narrow valley wall	No	Stable or aggrading	1	3	4	4	Address downstream drainage, invasives removal	Short alluvial reach behind the obstructed culvert at Wilsonville Road. Gravel bed, one or more small steps formed by fallen logs. Channel is incised to base level at the culvert, but could incise more if culvert is cleared. Small incised channel in narrow valley with unstable mud valley walls subject to landsliding. Obstructed culvert at Wilsonville road could become a problem, and should be evaluated further as to whether it is a risk that should be addressed.
2	1,000	1,300	Reach incised to bedrock above waterfall	3.74%	Plane Bed	Bedrock (consolidated mud)	Incised, Stable	Bedrock channel bed	Narrow valley wall	No	Stable	1	3	3	3	Address upstream culvert drainage, invasives removal	Bedrock reach upstream of a 4'-high waterfall. Reach incised to consolidated mud bedrock. There are at least 2 waterfalls in reach, and at least one boulder step h from probable artificially placed boulders. Dense blackberry throughout reach. The culvert at the upstream end of reach is clogged and backs up water underneath Willow Creek drive.







Selected Photos From Meridian Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 13

Arrowhead Creek

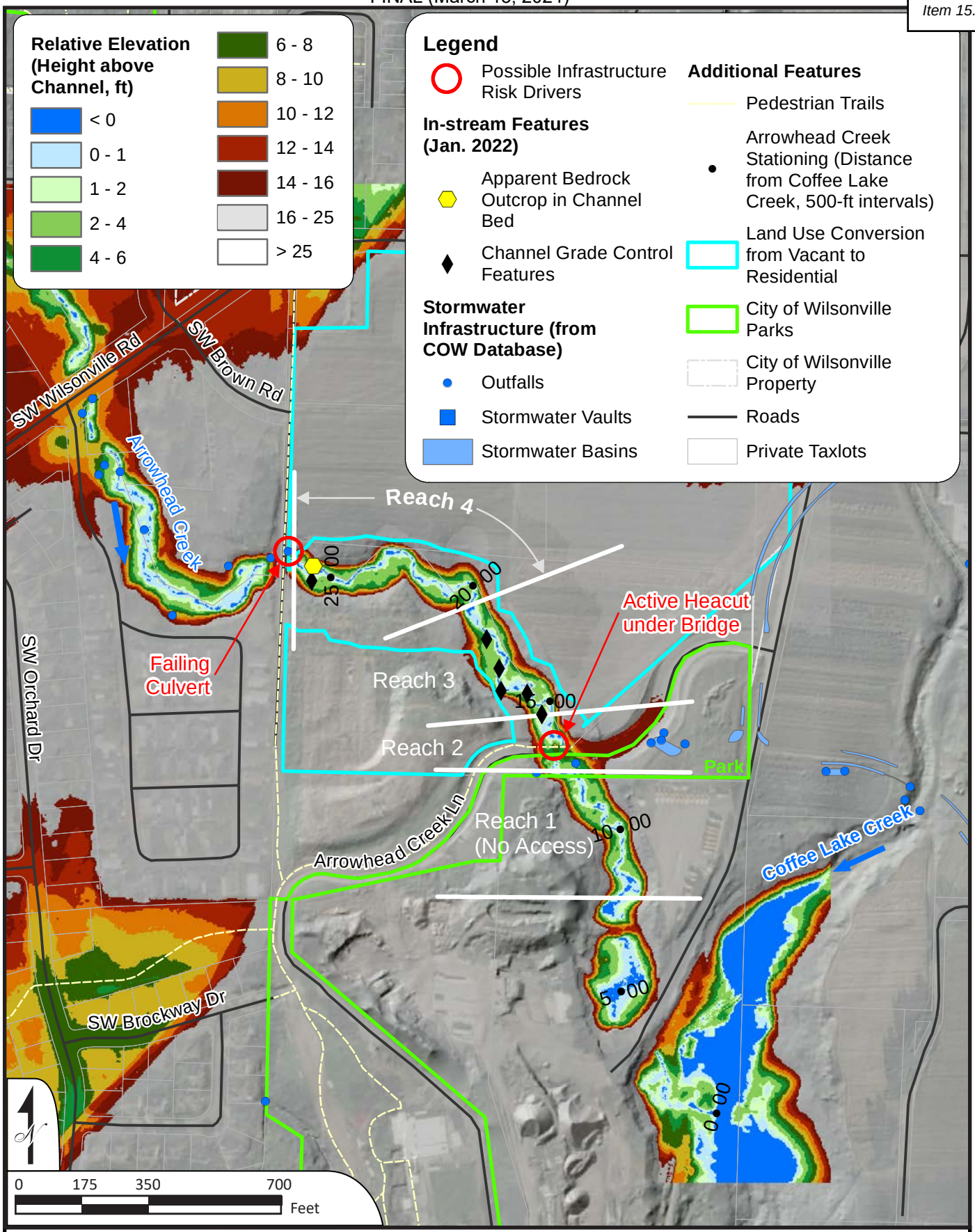
The field assessment for Arrowhead Creek occurred on January 25, 2021. The assessment included a 1,400-foot-long section of Arrowhead Creek between an asphalt pedestrian crossing and Arrowhead Creek Road (**Figure 14**). **Figure 15** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A3**. **Figure 16** contain photographs from this section of Arrowhead Creek.

General Observations and Interpretations

- The assessment area on Arrowhead Creek was divided into three subreaches based primarily on where beaver are active and have established stable dams that act as both local and regional grade control for the channel at the time of the assessment.
- Throughout the assessment area Arrowhead Creek consists of a meandering channel that is moderately incised within a broad floodplain that ranges between 40 and 80 feet. The channel and floodplain are inset 30 to 40 feet into the fine Missoula Flood deposits.
- Moderate incision of the channel limits high flow access to much of the broad floodplain except where beaver have built dams across the channel, and in some cases across the entire floodplain. In Reach 3, where the beaver dams create continuous backwater conditions along the entire reach, water engages the floodplain creating a complex mosaic of backwater and secondary channels.
- The culvert located at the pedestrian crossing at the upstream extent of the assessment area is in the process of failing and should be considered for replacement. It appeared from the downstream end that water may be piping through the fill and creating void spaces that are causing the culvert to fail. We did not evaluate the upstream end of the culvert due to lack of landowner permissions.
- English ivy dominates much of the project area and has the potential to limit the food and dam building resources for the beaver which could be detrimental to the beaver population and associated channel stability over the longer term. The ivy has already killed, or is at risk of killing, many of the alder and maple throughout the project area.

Summary Conclusions from Arrowhead Creek

- The stream is stable in this reach due to the presence of shallow hardpan and abundant beaver dams that act as local base level control and the fact that the channel is small and meanders across a broad floodplain with stable valley wall confinement.
- The main risk drivers consist of the following:
  - Failing condition of the upstream culvert. The fill prism appears to consist of relatively coarse material and therefore may be somewhat porous, limiting the potential for catastrophic failure of the prism. Further investigation by a geotechnical engineer is recommended.
  - Some instability was observed where Arrowhead Creek flows under the Arrowhead Creek Road bridge that appears to be related to construction of the channel under the crossing. Given the degree of channel stability observed upstream and downstream of the crossing the poor conditions at the crossing was determined to be relatively low risk unless there are significant changes to the active maintenance of the beaver dams.
  - Long-term, the loss of riparian trees and understory associated with dominance of English ivy does present some risk if there is a significant loss of food resources and dam building material for beaver.



Arrowhead Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 14

Figure 15. *Longitudinal Profile of portion of Arrowhead Creek (from 2014 LiDAR data)*

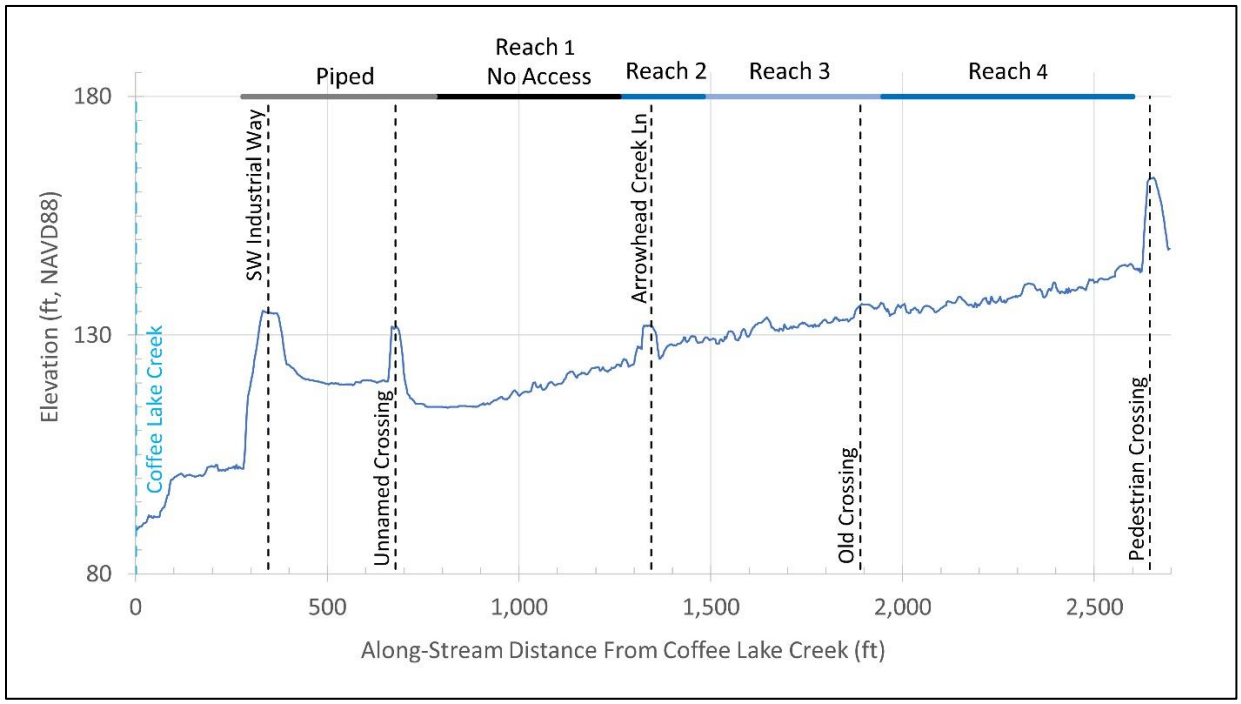

Table 3. *Field Observations for Geomorphic Subreaches Within Arrowhead Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	7+80	12+60	Not Surveyed														Did not visit this reach due to property access constraints.
2	12+60 (GPS 11)	14+80	Unstable reach associated with bridge replacement at Arrowhead Creek Road but low risk due to good stability in upstream and downstream reaches	1.95%	plane bed meandering	gravel	incised	limited. Could impact upstream reach	bridge and valley walls	Y, but limited by vegetation	incising but limited activity	3	1	3	3 - irrigation pipe at risk	remove blackberry and revegetate	Bridge reach at Arrowhead Road. Construction of crossing appears to have impacted channel with limited mitigation measures. Riparian not restored so blackberry dominates. Irrigation line crosses channel unburied.
3	14+80	19+50	Meandering channel in highly stable reach associated with actively maintained beaver dams	1.44%	plane bed meandering	hardpan bedrock gravel	incised but stable	bedrock hardpan and beaver dams	valley wall ~25'-30' with low energy	Y	stable	1	2	2	1	Ivy removal and riparian	Beaver dominated. Very similar to Reach 1, but beaver present which have built successive dams backwatering channel. Increased floodplain engagement. Poor ripariain condition long-term. Cottonwood/maple dominated.
4	19+50	26+00	Stable reach with hardpan grade control. Culvert at upstream extent of reach is in the process of failing	1.31%	plane bed meandering	hardpan bedrock gravel	incised but stable	shallow alluvium intermittent on hardpan bedrock	valley walls ~25-ft high with low energy	N	stable	1	2	2	2	Ivy removal and riparian restoration	Subreach consists of 50'-75' valley bottom confined by 25'-30' of 1:1 valley walls. Channel incised 2'-5' into valley bottom with some active inset foodplains. Creek flows on hardpan bedrock. Cottonwood/alder/fir canopy threatened by ivy which dominates groundcover.

Selected Photos From Arrowhead Creek, January 2022

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 16

Newland Creek

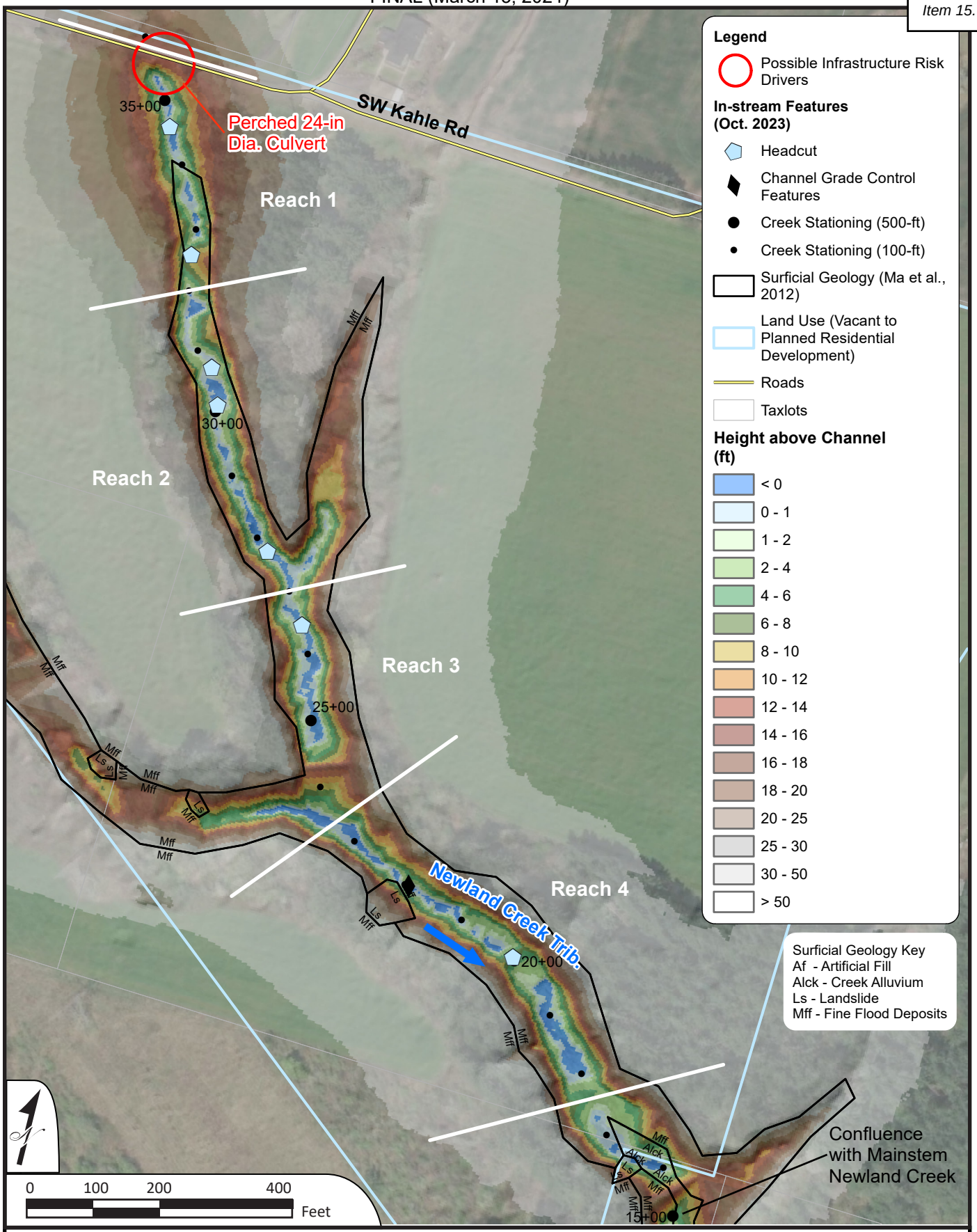
The field assessment for Newland Creek occurred on October 26, 2023. The assessment included a 1,700-foot-long section of a tributary to the mainstem of Newland Creek with the Urban Growth Boundary (UGB) with the upstream extent located at SW Kahle Road (**Figure 17**). **Figure 18** is a longitudinal profile of the creek. **Table 4** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A4**. **Figure 19** contain photographs from this section of Newland Creek.

General Observations and Interpretations

- The assessment area on Newland Creek was divided into four subreaches based primarily on the assessment boundaries and two tributaries that entered that had an influence on channel size.
- The culvert located at SW Kahle Road looked relatively new, consisting of a 24" corrugated plastic pipe. The culvert is significantly perched with about a 6-ft drop to the channel bed. Moderately sized angular rock was placed to dissipate energy. SW Kahle Road likely has prevented continued upstream movement of a large headcut by acting as a grade control.
- Upstream of SW Kahle Road the channel is small and the adjacent fields have been tiled and the tile drains closest to the road are exposed and eroding. The road probably also contributes a significant amount of stormwater.
- Reach 1 and 2 are highly incised with a least a half dozen headcuts that are eroding into erodible hardpan material. The channel is a notch in many places, characterized by a channel that is 3 to 4 feet wide and equally as deep cut into a narrow, confined valley that is 20 to 30 feet deep.
- The tributary entering from river left is also very incised.
- The gradient of Reach 4 is much flatter, after a larger tributary enters from river right. The channel is larger but still very incised and a deeper valley.
- Only one large headcut was observed in Reach 4. This reach may be in a widening phase in response to past incision as more bank instability was observed.
- More in-channel wood was observed in Reach 4 along with several debris jams that were holding grade.
- The riparian corridor is in good condition with a mix of mature coniferous and deciduous trees.
- Blackberry is the dominant understory in some areas though there are also significant stands of dogwood and vine maple.

Summary Conclusions from Newland Creek

- Reaches 1, 2, and 3 are highly unstable and likely to incise further and widen over time independent of additional upstream development.
- Reach 4 is at risk of bank instability.
- All reaches were considered to be at risk from hydromodification.
- The main risk drivers consist of the following:
  - Condition of the culvert at SW Kahle Road. Although the risk of failure of this culvert does not appear to be imminent, future development will likely increase downstream risks. As mentioned above, the culvert is likely acting as a grade control, preventing the downstream channel incision from moving upstream. Any future replacement of the crossing will need to incorporate grade control to prevent future upstream channel incision.
  - Instability in the tributaries entering Reach 2 and 3 should be considered if adjacent agricultural lands are developed. The riparian buffers on these tributaries are narrower.



Newland Creek Geomorphic Survey

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FIGURE 17

Figure 18. *Longitudinal Profile of portion of Newland Creek (from 2014 LiDAR data)*

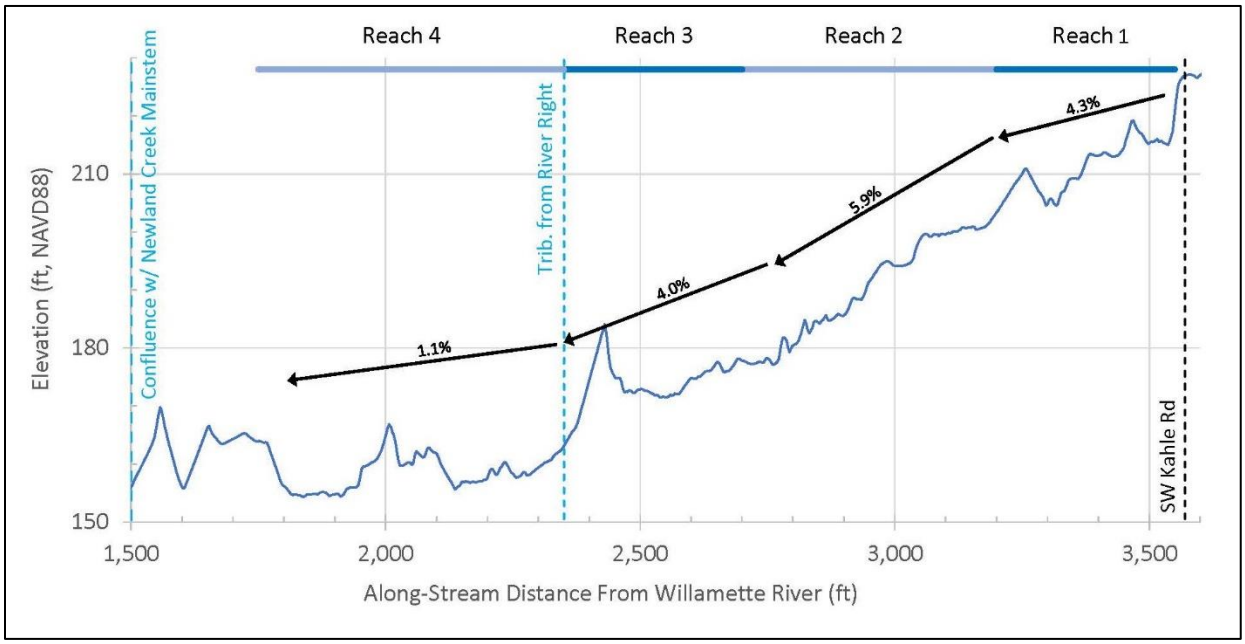

Table 4. *Field Observations for Geomorphic Subreaches Within Newland Creek Tributary*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LIDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	32+00	35+50	4.31%	bedrock/hardpan; confined	hardpan	incised	none	steep hillslopes	No	incising	5	3, but maybe not in widening phase	5	4, upstream culvert and road	Address profile instability if culvert is replaced	Steep, actively incising reach with several large to moderate headcuts. Early stage of channel evolution.
2	27+00	32+50	5.92%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	Headcuts should be monitored and addressed if results suggest rapid incision	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	23+50	27+00	4.03%	bedrock/hardpan; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Headcuts should be monitored and addressed if results suggest rapid incision	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.
4	17+50	23+50	1.12%	plane bed; confined	hardpan w/ angular cobble	incised	hardpan but only limited effectiveness	steep valley walls	No	incising	4	4, some softer bank material, maybe landslides	5	same as previous reaches	Consider adding large wood to channel to improve profile stability channel; though access is poor	Hardpan is more solid in this reach. Hillslopes not as steep though bank material is less consolidated. Maybe old landslides. Most of bed is hardpan though some coarse substrate consisting of basalt from tributary. More wood in channel.

Selected Photos From Newland Creek, October 2023

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FIGURE 19

Kruse Creek

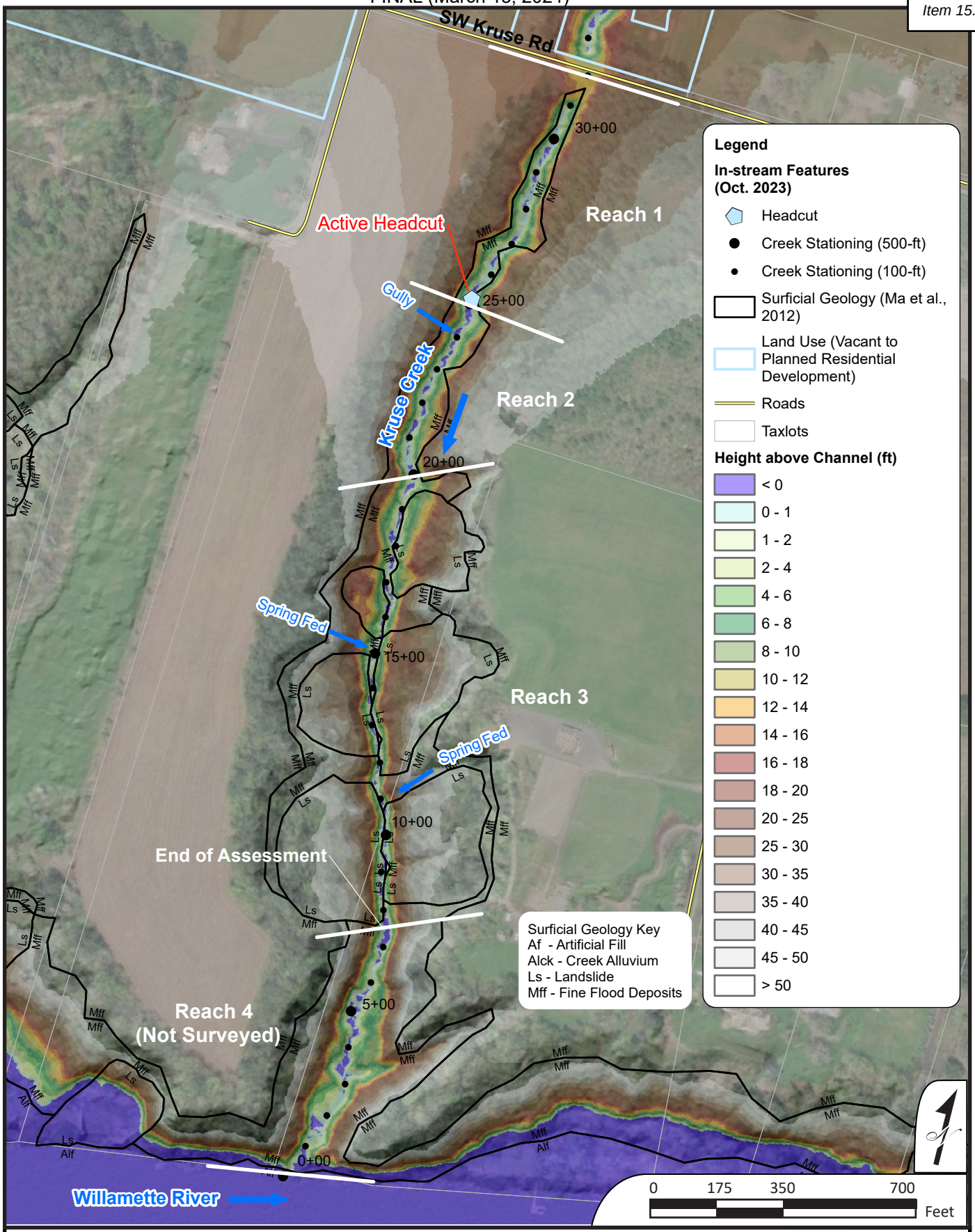
The field assessment for Kruse Creek occurred on October 26, 2023. The assessment included a 2,500-foot-long section of Kruse Creek between SW Kruse Road and the confluence with the Willamette River (**Figure 20**). **Figure 21** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A5**. **Figure 22** contains photographs from this section of Kruse Creek.

General Observations and Interpretations

- Reaches 1 and 2 are geomorphically distinct from Reach 3 and 4 due to the presence of large landslides from both the western and eastern hillslopes that extend continuously along approximately 1,400 feet of Kruse Creek.
- Although the channel is moderately incised in both Reaches 1 and 2, only one headcut was observed with the rest of the channel being relatively stable. This is likely due to the downstream landslides, which begin at the Reach 2 to 3 transition, and act as a downstream base level for these upstream reaches.
- The culvert at SW Kruse Road was difficult to access due to heavy growth of vegetation but it was perched which suggests some past channel incision that was likely arrested at the crossing.
- Reach 3 and 4 were very inaccessible due to deep channel incision and unstable banks associated with the adjacent large landslides.
- Active landslides and bank failures followed by subsequent channel incision through unconsolidated landslide debris is indicative of channel conditions through all of Reach 3 and potentially Reach 4. High ground water tables and seeps and springs through much of Reach 3 adds to the instability.
- The riparian corridor is in relatively good condition and consists of a mix of mature coniferous and deciduous trees with a good understory. Ivy is prevalent throughout the assessment reach and is climbing up many of the trees.
- On the eastern terrace in Reach 1 there is an extensive area of non-native English holly that was likely part of a former commercial holly farm.

Summary Conclusions from Kruse Creek

- Due to the presence of active landslides through Reach 3, Kruse Creek could be considered naturally unstable. This fact should be considered if the area were to develop in the future with riparian buffers adjusted to account for existing landslide activity and the potential for landward movement of the landslide scarps.
- It is unclear what the risk of hydromodification would be on this section of Kruse Creek. In Reaches 1 and 2 there would likely be additional channel incision and widening. A geotechnical engineer should be consulted to better understand the risk of increased sediment transport in Reach 3 that could cause rapid channel incision and destabilization of the toes of the existing landslides.
- Protection of the existing mature forest should be a priority in this area including management of ivy and removal of holly.
- Profile stabilization will need to be considered if the crossing at SW Kruse Road is upgraded.



Kruse Creek Geomorphic Survey

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FIGURE **20**

Figure 21. *Longitudinal Profile of portion of Kruse Creek (from 2014 LiDAR data)*

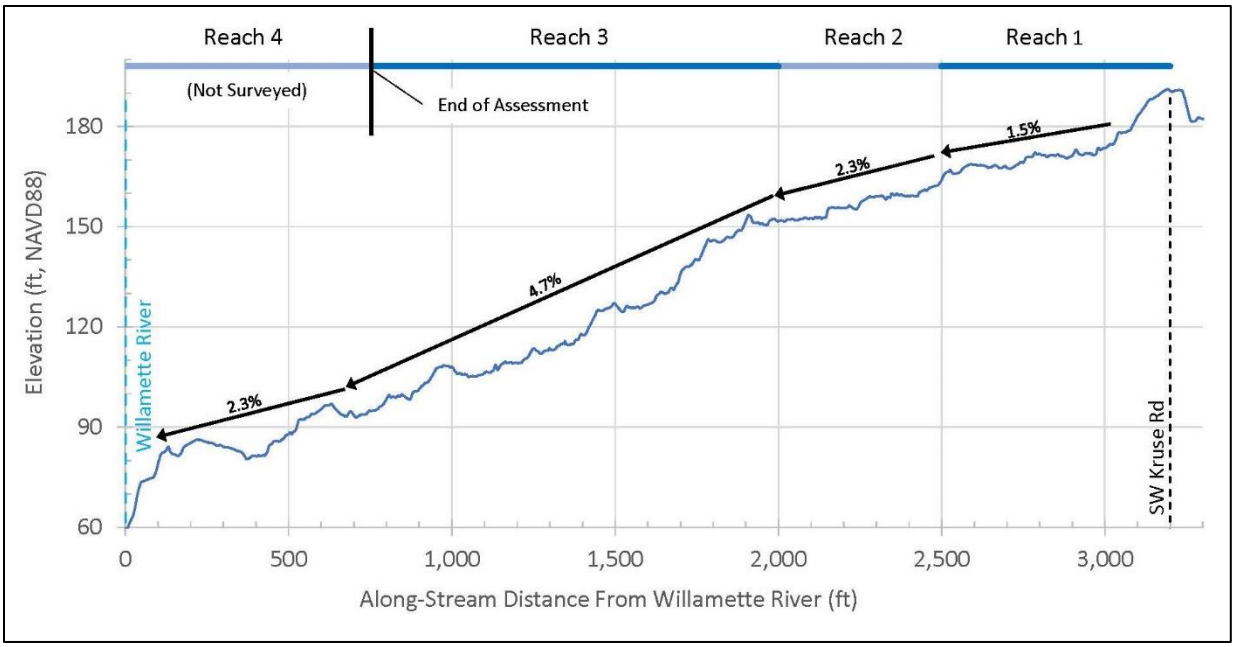

Table 5. *Field Observations for Geomorphic Subreaches Within Kruse Creek*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LiDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	25+00 (PM 3)	32+00 (at culvert)	1.51%	plane bed; confined	fines with some gravel	stable	none, some wood debris	valley slopes adjacent to small floodplain	No	stable, headcut downstream reach boundary	1, high incision potential	2, stable but rate of movement of downstream headcut could increase risk	4	No	ivy removal to save large trees	Low to moderate gradient channel. Small with adjacent low floodplain. Channel 6-ft top, 0.5-ft depth. Overall valley bottom width 20-ft. Lots of blackberry and ivy. Good canopy of douglas fir, cedar, but ivy is growing up a lot of trees. Reach break at headcut.
2	20+00 (PM 5)	25+00	2.29%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	ivy removal to save large trees	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	7+50	20+00	4.66%	colluvial; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Access is poor; Establish valley wide buffer to limit future infrastructure impacts	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.

Selected Photos From Kruse Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 22

Summary of Findings

Boeckman Creek

Boeckman Creek flows in a deep valley that appears to have formed quickly following the Missoula Floods, which ended about 15,000 years ago. The creek appears to have achieved a stable base level thousands of years ago, with a flat slope graded to the Willamette River. The assessment identified several smooth, hard surfaces in the channel bed that may be resistant bedrock or hardpan, which would prevent further downcutting and indicate that the stream has reached its limit of incision.

A major base level control in the reach is at the site of a breached concrete dam within Memorial Park (**Figure 9b**). The remnants of the dam are large concrete and boulders, creating a cascade, which should remain stable under future flood scenarios.

Upstream of the dam, and especially above Wilsonville Road, beaver are the primary controller of the morphology of the Boeckman Creek channel. Although the channel itself is moderately incised, beaver dams create a stair-stepped backwater condition that allow high flows to access the floodplain and reduce stream power and associated erosional forces. Numerous large and small dams were identified during the field investigation. The beaver dams create ponded areas and form complex environments and habitats in addition to providing base level stability in Boeckman Creek. Most of the dams appear stable, although they may be more likely to collapse as a result of larger or more frequent floods. The collapse of individual dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy beaver population in Boeckman Creek would be a beneficial long term management strategy. Riparian restoration, which would include removal of blackberry and ivy, would benefit beaver and improve the long-term resiliency of the reaches dominated by beaver.

The most at-risk area to past and future changes in the hydrology associated with hydromodification within the watershed is near the confluence with the Willamette River (**Figure 9b**). In this reach the combination of high flow conditions, an incised channel, and seasonal backwatering from the Willamette River appear to limit the long-term stability of beaver dams that provide local grade control elsewhere along Boeckman Creek. Although seasonally the Willamette River does provide base level control, hydromodification impacts, especially in fall when the Willamette River is typically low, has led to channel incision and widening in the reach downstream of Memorial Park.

Meridian Creek

Meridian Creek is incised in a small canyon between houses on the west and Landover Park on the east. Meridian Creek is incised to “bedrock,” which is a resistant layer of consolidated fine-grained sediment. The valley walls confine the channel on both sides. The valley slopes are covered with dense blackberry and are prone to landsliding, which could affect some backyards. A stormwater outfall pipe on the west side of the stream, near the Reach 1 and Reach 2 boundary, is undermined and a section has washed away (**Figure 11; Photo on Figure 13**).

The primary infrastructure issue in this reach is the crossing of Meridian Creek under Wilsonville Road (**Figure 11; Photos on Figure 13**). The culvert appears to be undersized and is nearly clogged with fine sediment. This obstruction caused a wedge of sediment to accumulate in the channel upstream. The lack of drainage appears to cause some ponding under current conditions, and complete plugging of the culvert seems like a reasonable possibility. It is unlikely that ponded water would overtop Wilsonville Road, but repeated ponding behind the road could cause geotechnical instability through other

mechanisms. The risks at this crossing should be further evaluated as part of the Stormwater Master Plan.

Secondary infrastructure issues in this reach are:

- The debris rack at the outlet of the culvert under Willow Creek Drive is clogged with leaves, debris and sediment, backing up water under Willow Creek Drive (**Figure 11; Photo on Figure 13)**. The undersized culvert at Willow Creek Drive may limit future hydromodification impacts downstream.

Arrowhead Creek

The Arrowhead Creek channel meanders across a broad floodplain that is inset approximately 30-40 feet from the upper Missoula Flood terraces. Grade control is provided through a combination of localized exposures of hardpan "bedrock" and beaver dams that are continuous and redundant along more than 60% of the project reach.

The primary infrastructure risk observed through the project reach is the condition of the culvert at the pedestrian pathway at the upstream extent of the assessment area, which is piping and failing and should be evaluated further by a structural engineer (**Figure 14; Photo on Figure 16**). An additional risk factor that was considered low to moderate and should be monitored in the future was the potential for instability and headcut migration within the vicinity of the Arrowhead Creek Lane crossing. The constructed streambed under the relatively new bridge crossing lacks adequate grade control and has the potential to incise further and threaten the series of beaver dams in the upstream, stable reach (**Figure 14).** The lack of grade control may be due to downstream mobilization of the streambed substrate that was installed during construction of the crossing. A pile of angular cobble was noted approximately 200 feet downstream of the crossing that may have been eroded from the channel at the bridge. An indirect risk factor in the assessment area relates to the condition of the riparian corridor. Much of the riparian vegetation is being impacted by the growth of English ivy, which has the potential to impact long-term beaver use of this section of creek, which could impact the primary source for grade control in this section of Arrowhead.

Newland Creek

The assessment reach included a portion of a tributary to the mainstem of Newland Creek within the existing Urban Growth Boundary. The channel is highly incised, and relatively steep, and flows within a canyon that increases in width in the downstream direction as it incises into a broader terrace surface. Past and active channel incision has resulted in a highly perched condition at the culvert at SW Kahle Road which is the upstream boundary of the assessment area. A half dozen headcuts were mapped through the project reach that ranges from 2 feet to 4 feet high with likely low to moderate rates of upstream movement as the bed of the channel flows over hardpan material.

The primary infrastructure risk identified in the project reach is the perched culvert at SW Kahle Road (**Figure 17; Photo on Figure 19**). Although this culvert isn't immediately at risk due to placement of energy dissipation rock at the outlet, upgrades to the road will need to address the profile discontinuity and also consider the likelihood of additional channel incision associated with future headcut migration. This reach lacks grade control other than exposure of hardpan material in the bed, which will slow channel incision, but not eliminate it, especially if there are significant flow increases that occur in the future associated with development. Channel incision and active headcuts along the two tributary channels entering the assessment reach should also be considered in any future development planning.

Kruse Creek

Geomorphic conditions in the assessed portion of Kruse Creek are dominated by the presence of the presence of large landslides through the lower quarter mile of the canyon. These landslides are associated with a high water table, active springs and seeps along the entire lower canyon, and sets the base level control for the upper sub reaches of the assessment area. Active slumping into and across the Kruse Creek channel, followed by reincision into landslide debris characterizes channel conditions which were difficult to directly access during the assessment.

The primary infrastructure risk observed through the project reach is the condition of the culvert at W Kruse Road (**Figure 20**). The corrugated metal pipe is perched and, although not immediately at risk of failure, would need to be addressed, along with the apparent profile discontinuity, if the crossing was replaced during upgrades to the road, which is currently a narrow, relatively undeveloped asphalt road. Although there is no direct infrastructure risk associated with the mapped landslides, any planned development might have an impact on their rate of movement. Creating large buffers along Kruse Creek that considers existing geologic and geotechnical conditions as well as how those might be exacerbated by changes to watershed hydrology will be important to limit future impacts to infrastructure. Addressing non-native species, especially the potential for English ivy to impact mature trees, would also benefit the Kruse Creek corridor.

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APPENDIX A

Field Observations in Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks

Appendix A1 *: Record of Field Observations in Boeckman Creek*

Dates: 11/19/2021, 11/24/2021 and 01/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
450	1										Steel beam, full span			3	Rock grade control in channel		Private bridge at upstream extent of Willamette backwater. Accesses 1 property. Landowner there since 1976. Creek has incised and widened when Memorial Park bridge replaced culvert. Rock grade control provides limited protection. Rocks are small and could get flanked.
580	2						X										Bedrock exposed in bed along right bank. Shale. May not be continuous across bed. Overlain by fine sediments.
700	3	L	Active, 50'x25'	5	None								Deck and House	5			Actively eroding bank. Local incision and widening of channel undermined bank. May be exacerbated by fill/retaining wall at house. Retaining wall has since failed.
780	4							18"					Old crossing				Old crossing. Some road fill still present. Upstream extent of ??? headcut migration. Possibly associated with debris log jam.
1000-800	2115-2121																Reach below bridge to private property boundary consist of a 100' section with boulders and gravel, followed downstream by a 100' section of mud and wood bed before reaching property boundary. Appears to be significant bank erosion in the downstream section underneath the private homes (see photo 2121)
1050	2109, 2111, 2127-2129										Trail footbridge						High foot bridge over creek. Low chord is about 20 feet above creek, well engineered. A few boulders and rounded gravel lag deposits in the channel under the bridge
1100	2107, 2112-2113							12" boulder drop							X		Small step with boulder rip rap just upstream of bridge
1400	2096-2100						Willamete River bed material								X		Outcrop of a contact between overlying fine-grained sediments and underlying partially cemeted gravel close to the current water level. Gravel is well rounded basalt pebbles and cobbles, looks like probably old Willamette River bed material. This suggests stream from here down is probably not susceptible to much further incision due to exposing the coarser bed material and also as approaching the base level of the Willamette River
1500	2093-2094														X		Large, recently fallen cedar tree in channel. Log jam beginning to form, accumulating wood, and will probably persist for many years
2000 - 1500	2080-2093																Deeply incised meanders in low gradient channel. Not actively moving meanders. Bank walls as high as 40' and as low as 12 feet above channel Steps are formed at several fallen logs, mostly featureless runs. Abandoned floodplain is covered with mostly ivy (not as much blackberry here)
2050	2079-2080							30" high step, log							X		step from fallen log and debris. Doesn't appear to be a beaver dam

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
2200	2069-2071	L	50' Long by 30' high	2													Bank erosion on outside of a sharp bend in incised meandering reach. 30' high near-vertical brank held up by several large fir trees composed of Missoula Flood fines. There's foot traffic at top of bank, trail may be endangered from erosion (didn't climb up to top to be sure)
2700-2200	2069-2078																Mud and wood channel bottom, 2' to 4' deep at current high flows. Channel bed about 12 feet wide, mostly runs. Ivy/blackberry floodplain, incised. Floodplain is about 6 to 12 feet above floodplain
2700	2066-2068								18"						X		Small step within mud reach, likely beaver dam but not clearly so. Could be a downed log covered with debris. Low gradient, mud reach. Lots of ivy on floodplain
3000	2026-2031	R				Tributary enters from River Right											Tributary enters from river right through a large (>36") corrugated metal culvert under a road fill. Culvert is open but backwatered by Boeckman Creek about 24" deep. Scour pool at mouth of tributary
3050 to 2700	2059-2065; 2132-2134														X		Relatively featureless reach below tributary junction; incised, heavy blackberry and ivy on terraces; mud bed; lots of wood in channel bed
3050	2058	R	75' long by 6' high	3													Bank erosion and incision on river right below fence and facility on the top of bank downstream of tributary.
3050	**TRIBUTARY DESCRIPTION**																Inspected the lower end of tributary at request from B&C. Visited lower portion of tributary up to the road crossing in Memorial Park. Low gradient, deeply incised. For the first 200 to 300 feet upstream of confluence, upstream of access road, the channel is incised in blackberry thicket with no floodplain. Channel is about 5-10' bottom width, about 20' top width. Occasional lower benches, mud in channel
3350	2016, 2024														X		100-foot-long boulder riffle with boulder bank protection on river right @ 3350. Some of the boulders transported a short distance downstream forming a stable base level control over about 50-100' distance
3450	2019-2023; 2135-2138	R															Relatively broad floodplain surface covered with blackberry
3675	2003-2004	R	50' long by 16' high	5													Big eroding bank on right bank just downstream of dam. Banks composed of Missoula Flood fine facies

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
3700	1990-1999, 2145-2147														X		Breached dam in creek. Dam made from stone and mortar, about 15' wide. Even though it is breached it is still a 4 to 5 foot drop over a distance of about 30 feet, and provides a stable base level control. Boulders on the downstream side of dam. Possible fish passage barrier at low flows (not at the current high flow). Currently an aluminum pipe ~8" crosses above channel at former dam, looks like it is no longer used.
3700 to 4000	2148-2156	R											depositional floodplain				Relatively broad, flat surface covered in reed canary grass. Appears to be a deposit in an impoundment behind former dam at 3700
4000	1983	R			2 to 3' boulders								boulder riffle		X		Boulder bank protection and boulders in streambed. It looks like the boulders were installed to protect the right bank and provide grade control. There is about a 2 foot drop over the riffle
4100	1975-1979								2 to 3'						X		2 to 3' high beaver dam. Exact height not clear due to high flows. Appears to be stable
4300	2157, 1968, 1970								18"						X		Beaver dam (?) with reed canary grass root mat. Unclear height due to high flow. Chewed sticks. RCG is providing added strength to apparent damn
4450	1965, 1966	L								30" PVC							Stormwater outfall from parking lot in park. Discharges onto slope about 4 feet above channel. Rocked around outfall, no notable erosion
4500	1960 - 1964										SW Kolbe Lane Single lane vehicle bridge				X		Single lane auto bridge at Kolbe lane. Wood single span lower chord about 12 to 15 feet above channel. Headcuts or small beaver dams under the bridge
11/24/2021 - Wilsonville Road to SW Boeckman Road																	
5250	2168, 2183	R								18"	SW Wilsonville Road Bridge						High bridge with 4 sets of 3 large concrete piers about 40-50' above the streambed. No apparent hazards related to the stream. There is a record of a past stream realignment project here but no obvious evidence of what was done here. Old concrete stormwater outfall into the channel on river right under the bridge
5350	no photo	R															Drainage off senior living community parking lot creates a ponded area on the floodplain on river right, at least during wet season.
5400	2186								2'						X		Small beaver dam a short distance upstream of bridge backs up water around 400 feet. The pond is confined within banks about 15' wide, only about 2' above water level.
5800	2199																Upstream end of beaver pond from dam at 5400' . Flow into pond comes from a beaver dam just 50' upstream of top of pool. Beaver clearly know how to build dams so that the pond ends just below the toe of next upstream dam.

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
5850	2201-2202								2'						X		2 foot high beaver dam just above ponded area from downstream dam
5900	2205	R								Surface water from outfall							Trickle of water entering from gully which begins at a stormwater outfall high up on hillslope/valley wall. The gully is protected with sandbags, minor erosion
6000	2206-2208								1.5'						X		Beaver dam around 18" high at upstream end of pond from the dam at 5850
6200	2220-2226	R				Small tributary											Small tributary from river right, incised in dense blackberry, enters just downstream of the small tributary. I was only able to reach the stream in one spot about 100' from Boeckman Creek confluence due to blackberry. Creek has pebble gravel bed and appears reasonably stable. No clear hazards noted
6250	2213-2216								**4 to 5' high**						X		Big (4 to 5' high) beaver dam inundating lot of area upstream from here. High dam spreads water onto floodplain for as much as 500' upstream
6200-6600	2217-2234																Ponded, meandering reach upstream of large beaver dam at 6250. Water spreads out onto floodplain. Lots of blackberry, slow walking through here.
6550	2233-2235																Large fallen cedar tree across channel. 3'-4' DBH within the ponded area upstream of dam at 6250. Seems certain to trap any wood traveling through this reach for many years to come.
6650	2240-2242								1'						X		Small beaver dam just upstream of the pond behind the dam at 6250
7000	2245-2246							2' high step							X		Small (2') step or beaver dam. Could be behind a collapsed block of root mats, or a fallen tree. Unclear due to accumulated debris, but it's backing up water similar to beaver dam
7100	2248								2'						X		Apparently stable 2' high step in channel as a rsult of a beaver dam reinforced by reed canary grass sod. Looks very stable and long lived
7300	2259-2267								**3-4'**						X		Big beaver dam with lots of reed canary grass covered floodplain that is flooded by this dam
7300-8000	2270-2282																Reach mostly impounded by the big dam at 7300. Impounded area continues almost up to the footbridge. Impenetrable blackberry throughout this reach
8150	2284-2286										Boeckman Creek Trail Bridge						Boeckman Creek trail footbridge crosses over creek. At this location, stream is flowing, not ponded; gravel, with riffle-pool morphology and small wood. Lots of blackberry

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
8150-8650																	Mostly gravel riffle-pool reach from bridge to 8650; low floodplain with blackberries, not ponded reach
8650	2299-2303	L															Gully and drainage from river left. It appears that a PVC culvert pipe under the trail had washed out and was moved out of the way. Former homeless encampment here.
8890															X		Resistant bedrock in channel underwater near the dam.
8900	2308								2' high dam						X		Beaver dam, around 2 feet high. Lots of blackberry
9070															X		Apparent bedrock under water
9075	2315								2' high dam						X		Another beaver dam short distance upstream of the one at 8900, also resistant bed here underwater based on feel (not visible due to turbid water). Clearly a stable base level here
9100	2317-2324									18" pipe and box							Stormwater outfall and energy dissipator on the right bank, just above the beaver dam. It appears to be sitting on basalt bedrock. It remains clear of debris. Appears to be working well, no concerns or hazards noted
9300	2329-2331								2' high dam						X		Small beaver dam ~2' high; pond backs up to toe of the next upstream dam
9500	2335-2337								**5' high**						X		Tall but narrow beaver dam. Dam is built off of one large fallen log. 5 feet high by 15 feet wide
9700	2343-2344								**3-4' high beaver dam**						X		Large beaver dam, difficult to access. Ponds water a far distance upstream.
10000	2345-2346								2' high dam						X		Beaver dam near mapped outfall. Only viewed from the trail, did not get close to it. Difficult access
10000-10500	2350-2351																Reach with mostly ponded water. Beaver pond is effectively inundating much of the valley floor throughout this reach
10500		R								plastic pipe							Large pipe down long hillside on river right valley wall. Did not visit except from trail across the valley

***Appendix A2** : Record of Field Observations in Meridian Creek*

Date: 11/26/2021

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
11/26/2021 - SW Wilsonville Road to SW Willow Creek Dr																	
775	2372-2383										Wilsonville Road				X	Fix drainage at culvert	Meridian Creek crossing at Wilsonville Road. Clogged, apparently undersized (approx 30") culvert under high road prism under Wilsonville Road. Culvert is clogged on the upstream end with about 2 feet of sediment which is backing up a wedge of sediment for about 50 feet. There is a outfall (or possibly overflow pipe inlet) above main culvert, 6" plastic pipe. This is a hydromodification risk factor that should be evaluated. Unlikely there's enough water that it could overtop the road. But could plugging the culvert and an extended period of standing water following a storm destabilize the road embankment?
850	2388-2392									18" PVC							Section of corrugated plastic culvert pipe, about 6' long, along side of the channel. It appears to have been washed down from upstream
875	2393							18" step							X		Small log jam forming a 1.5' foot high step in the channel. Gravel sediment stored in a wedge behind it. If this were to fail or collapse, sediment could easily clog the rest of the culvert at Wilsonville road
1000	2415-2417							4' high waterfall in bedrock`							X		Waterfall in consolidated fine-grained bedrock. Marks transition from alluvial bed below and a bedrock stream above the waterfall.
1050	2421-2425									18" PVC							Stormwater outfall, 18" PVC on river right, about 6' above where the channel is in bedrock.There is a concrete support under the outfall which is undermined and failing. This is where the 6' long piece of pipe at Sta. 850 came from
1200	2448-2452							2' step							X		Boulder step in consolidated mud bedrock. Boulders may have been placed here for some reason,. Perhaps they were installed as bank protection and fell into the creek.
1300	2456-2466														X		Culvert outlet at top of reach under SW Willow Creek Drive. Culvert has a metal grate at the outlet that is clogged mostly by leaves. Some water is leaking through but this is a low flow. It is probably backwatered during storm flow. Currently, there is standing water about 2' deep under Willow Creek Drive behind the clogged grate. The channel upstream of Willow Creek drive is a stormwater basin which may reduce the amount of runoff from the developed area, but this culvert should be evaluated in the context of hydromodification upstream.

Appendix A3 *: Record of Field Observations in Arrowhead Creek*

Date: 1/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
13+50	10							3 (2')			Arrowhead Road; freespan truss			3			Arrowhead Road. Freespan concrete truss. Active headcutting at creek under bridge. Mitigated somewhat by beaver activity upstream. Unknown irrigation line (6" PVC) in channcel crosses creek several times.
18+50	5-9								Series of 5 beaver dams. See notes for locations and height								Series of beaver dams. Ramps and chew suggest active site. Dams (Stationing and Height): 18+50 and 17+30 = 18" high; 16+80 = 24" high; 15+90 = 12" high; 14+80=30" high
18+80	4												old crossing	1			Old road bed/crossing. Approach fill still present and evident in LiDAR. Crossing not evident.
23+00	3												rock groin on left bank				Boulder groin on left bank at toe at apex of meander bend. Upper bank ~55' high but no evidence of active erosion. Remnant training structure.
25+50	2						hardpan										Channel flowing on hardpan. Channel 6' wide incised 2'-3' feet into floodplain. No evidence of floodplain activation. Stable channel profile.
26+00	1									Culvert at trail				3			Double concrete box cultert 5'x5' (x2). Only looked at outlet. Drop of 2'-3' to channel. Concrete base of culvert failing. Water subbing under structure. High risk to infrastructure.

Reach Name: Newland Creek Trib. - Reach 1 Date: 10/26/2023 **Appendix A4**

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
35+50	PM 1									24" Dia CPP							Culvert at Kahle Rd 24-in CPP perched 6-ft above channel bed. Stormwater from road enters uncontrolled. Concrete rubble placed at culvert outlet. Outfall relatively stable though channel downstream is highly incised compared to upstream.
34+50	PM 2							3-ft over 10-ft (4)									Channel highly incised into erodible hardpan. Steep on both banks with a narrow channel notch 4-ft wide by 4-ft deep. Headcut 3-ft distributed over 10-ft channel not even deeper and narrower downstream of headcut.
32+50	PM 3							4-ft over 6-ft (5)									Larger headcut 4-ft over 6-ft incised into erodible hardpan. Steep banks.
30+75	PM 5							3-ft (3)									Headcut 3-ft held up by maple roots.
30+00	PM 6							4-ft over 15-ft (3)									Two closely spaced headcuts. 4-ft over 115-ft. Harder bedrock exposure along right bank. Unsure if its continuous across channel.
28+00	PM 7							4-ft (5)									Headcut 4-ft tall. Risk level 5.
26+50	PM 9							3-ft (5)									Headcut 3-ft tall. Risk is 5.
22+00	PM 12								debris jam of small wood								Debris jam holds 18-in of grade. Fine sediment accumulated upstream.
20+00	PM 14							2-ft (3)									Downstream extent of assessment

Reach Name: Kruse Creek Date: 10/26/2023 **Appendix A5**

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
32+00	PM 1									24" Dia CMP							Culvert 24-in CMP perched 4-ft above channel. Large scour hole and circular erosion. Undercut.
25+00	PM 3							4-ft (5)									Headcut 4-ft. Risk 5
24+00	PM 4					right gully											Small gully entering from right bank 2-ft wide, 3-ft wide. Appears to be stormwater runoff. Extends to conifers 40-ft upslope.
15+00	PM 6					right spring fed											Drainage from landslide area enters from right bank. Flow equal to or exceeds main channel flow. Flow is piping through landslide along bank.
11+00	PM 7					left spring fed											Tributary or drainage input from left bank. Might be from landslide. Steep drainage. Could be highly erosive if additional water is delivered to the drainage.

APPENDIX B

Field Maps for

Boeckman, Meridian, Arrowhead,

Newland, and Kruse Creeks

Secondary Location
Basalt Creek north of Day Rd

Priority Location
Basalt Creek South of Ridder Rd to wetlands

Secondary Location
Boeckman Creek north of Boeckman Rd

Priority Location
Boeckman Creek between Wilsonville Rd and Boeckman Rd

Secondary Location
Meridian Creek at Landover Park

Priority Location
Boeckman Creek near Memorial Park

Secondary Location
Arrowhead Creek south of Wilsonville Rd

Sheet 7
Sheet 6
Sheet 5
Sheet 4
Sheet 3
Sheet 2

Basalt Creek
W RailRoad
Coffee Creek
Villebois
Town Center
Advance Rd

006
005
004
007
003
001
002
021
37
010
011
012
10

Legend

Hydromodification-Related Capital Projects

- Erosion Prevention/Flow Bypass
- Instream Channel Improvement
- Upland Flow Control (Detention or Infiltration)
- Completed
- Field Observation Locations
- 43 E&S Problem Area ID
- COW Property
- Easements
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Stream Line
- Streets

Accessed By: MGLASS at 08/23/2021
Path: Q:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\Modeling Workshop\Stream Assessment.aprx
Maxar

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

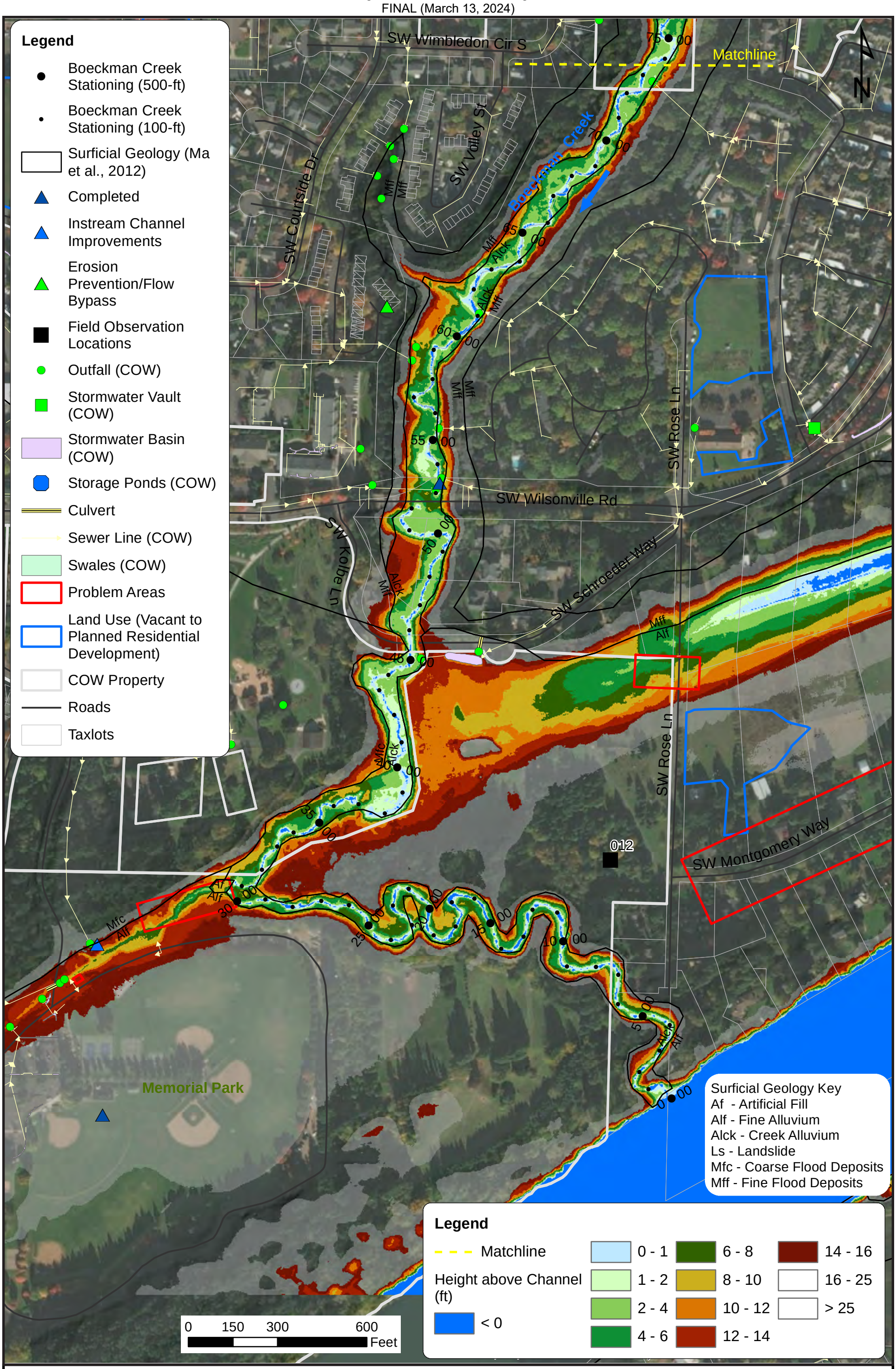
Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Date: 8/23/2021

Stream Assessment



Boeckman Creek Downstream (1 of 3) - Priority Location

Wilsonville Stormwater Master Plan

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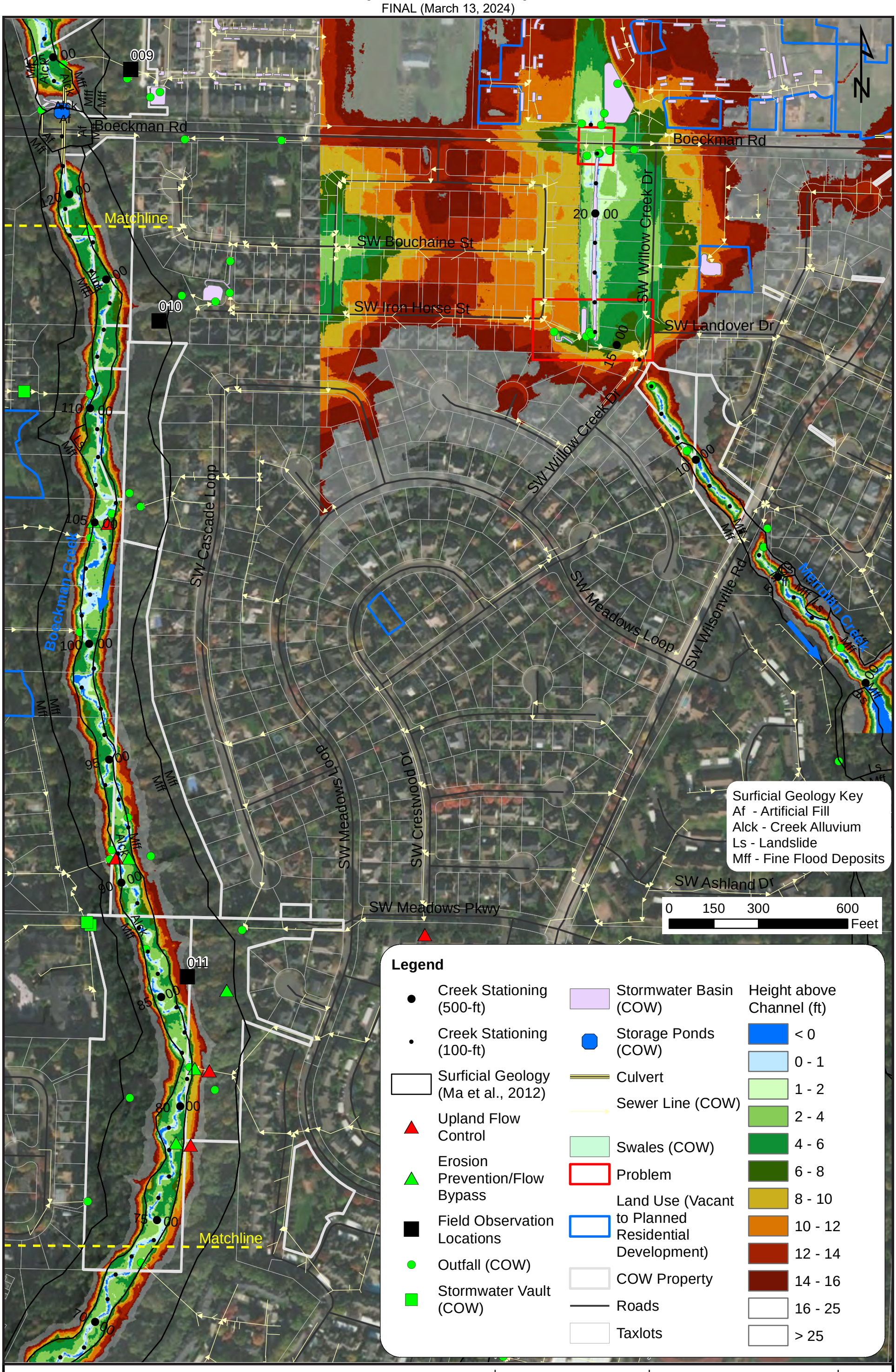
FIGURE 2



Boeckman Creek Mid (2 of 3) - Priority Location

Wilsonville Stormwater Master Plan

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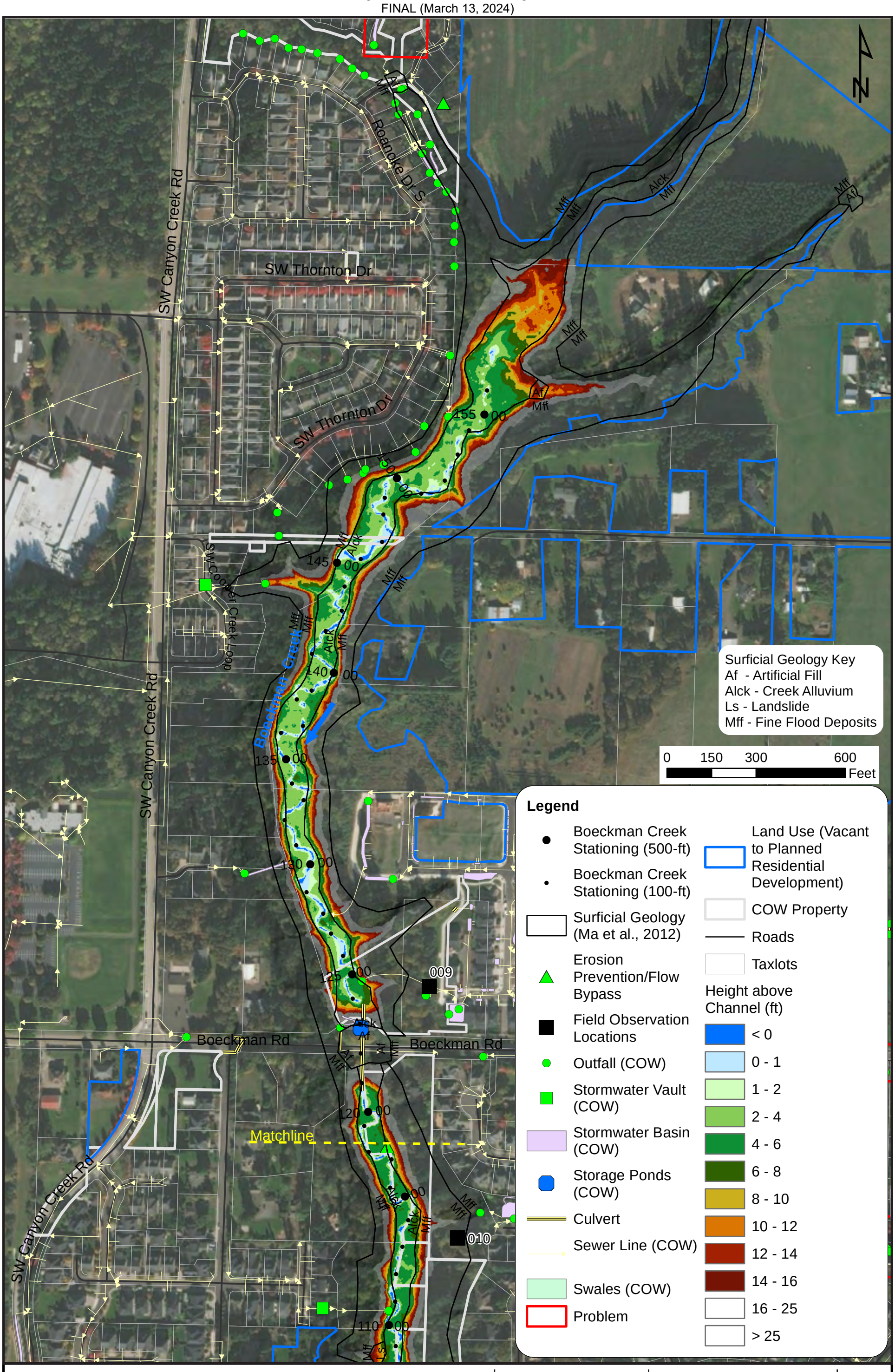
FIGURE 3



Boeckman Creek Upstream (3 of 3) - Secondary Location

Wilsonville Stormwater Master Plan

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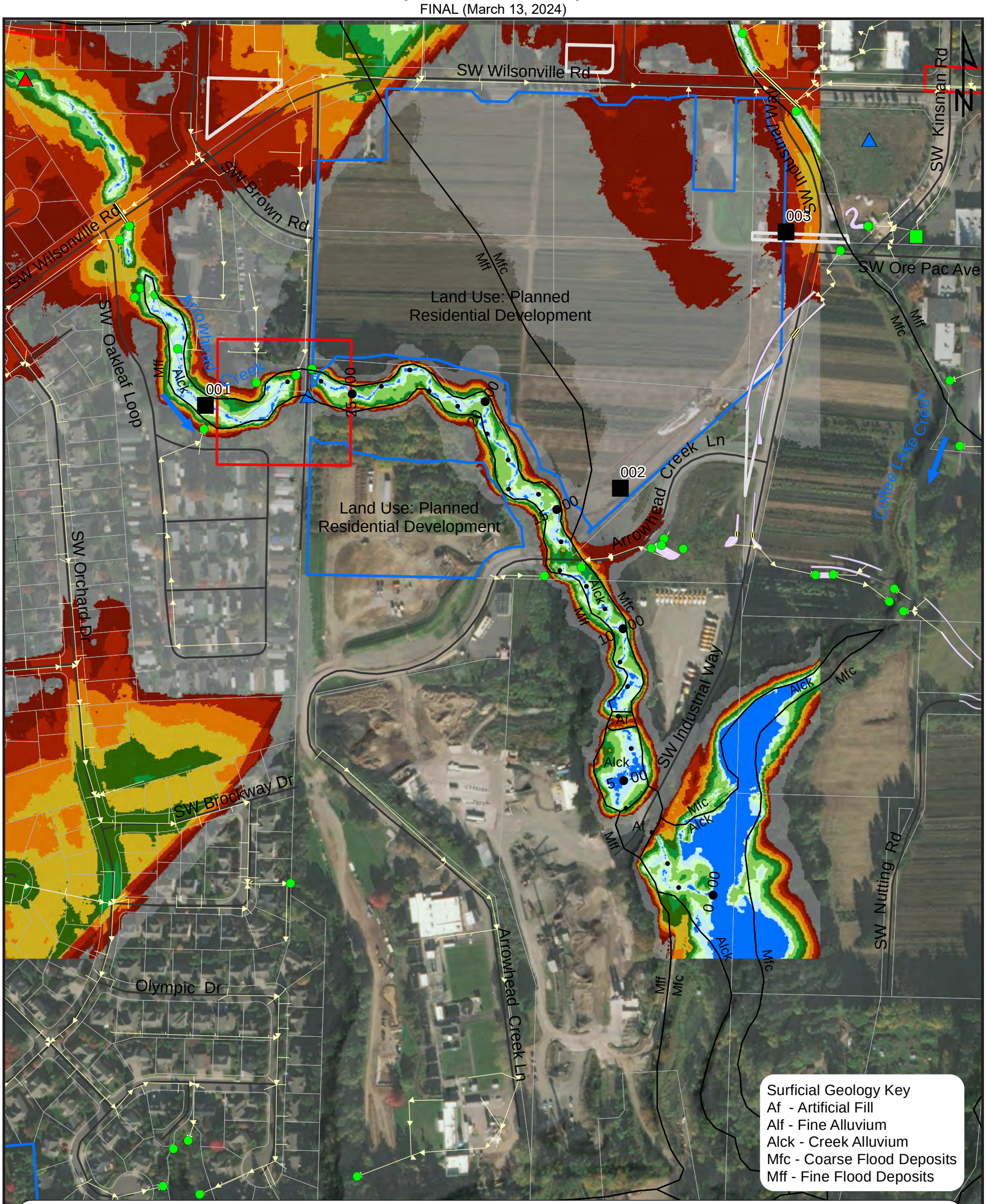
FIGURE 4



Arrowhead Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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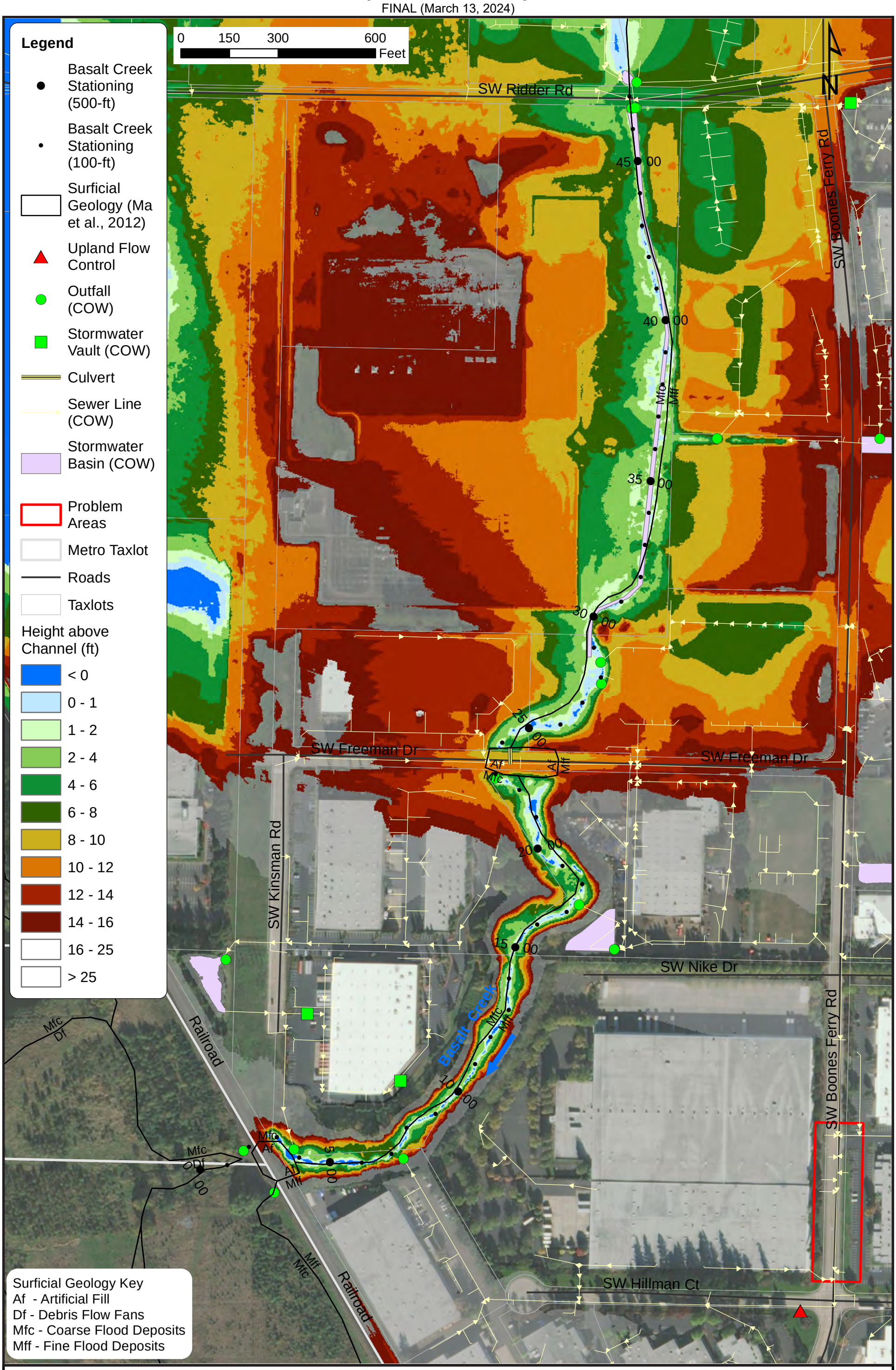
FIGURE 5



Basalt Creek Overview - Priority Location

Wilsonville Stormwater Master Plan

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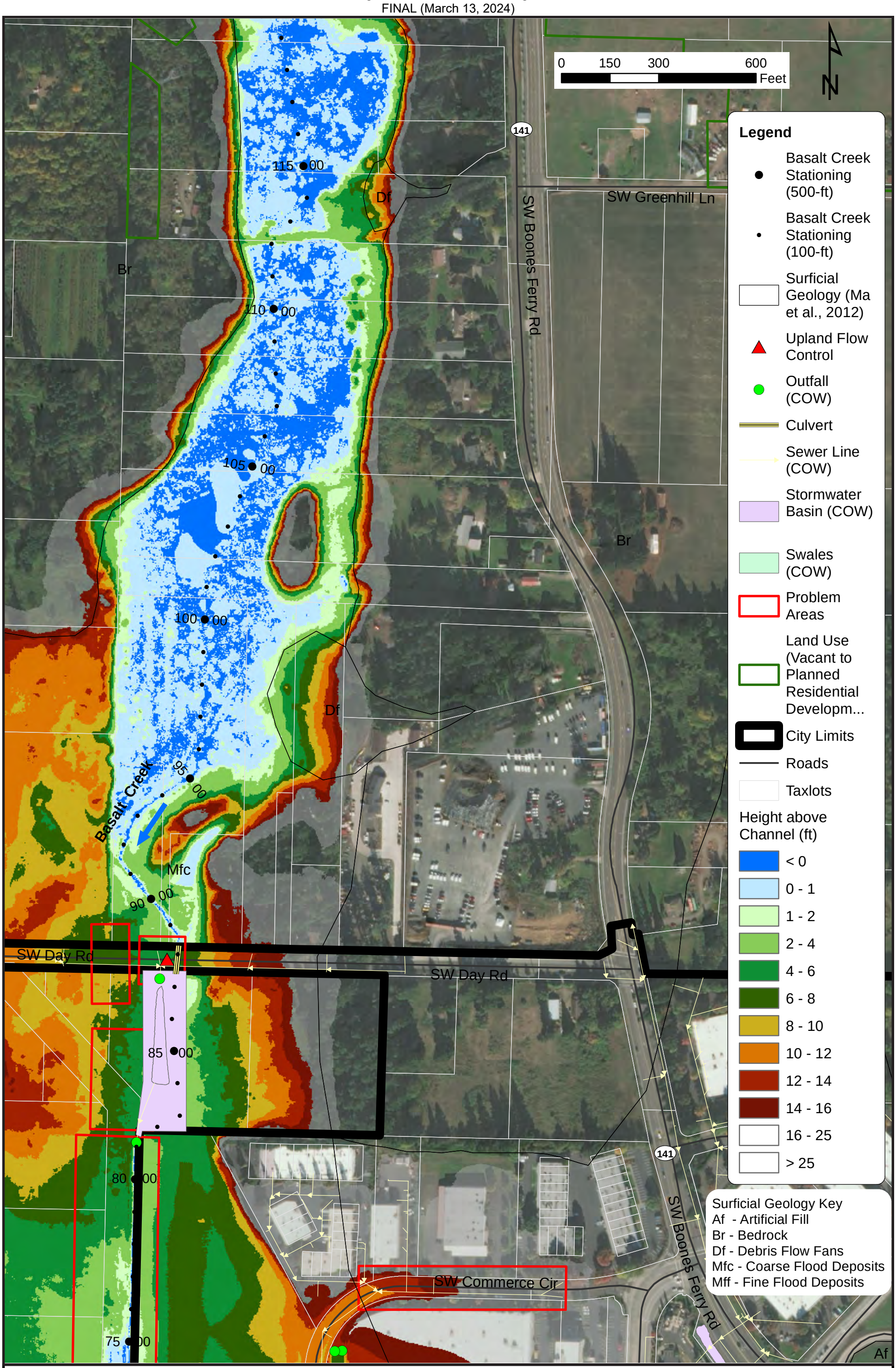
FIGURE 6



Basalt Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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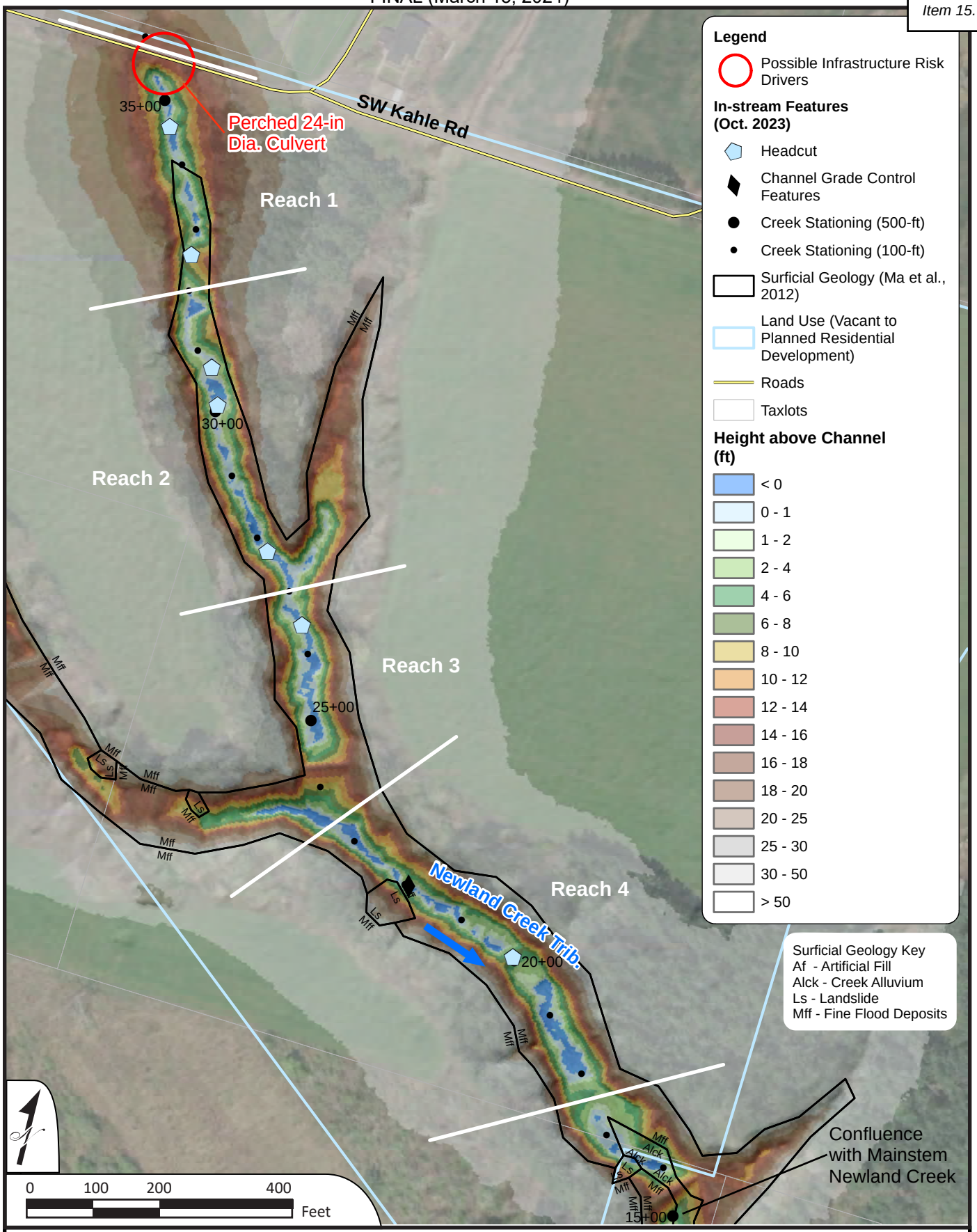
FIGURE 7



Newland Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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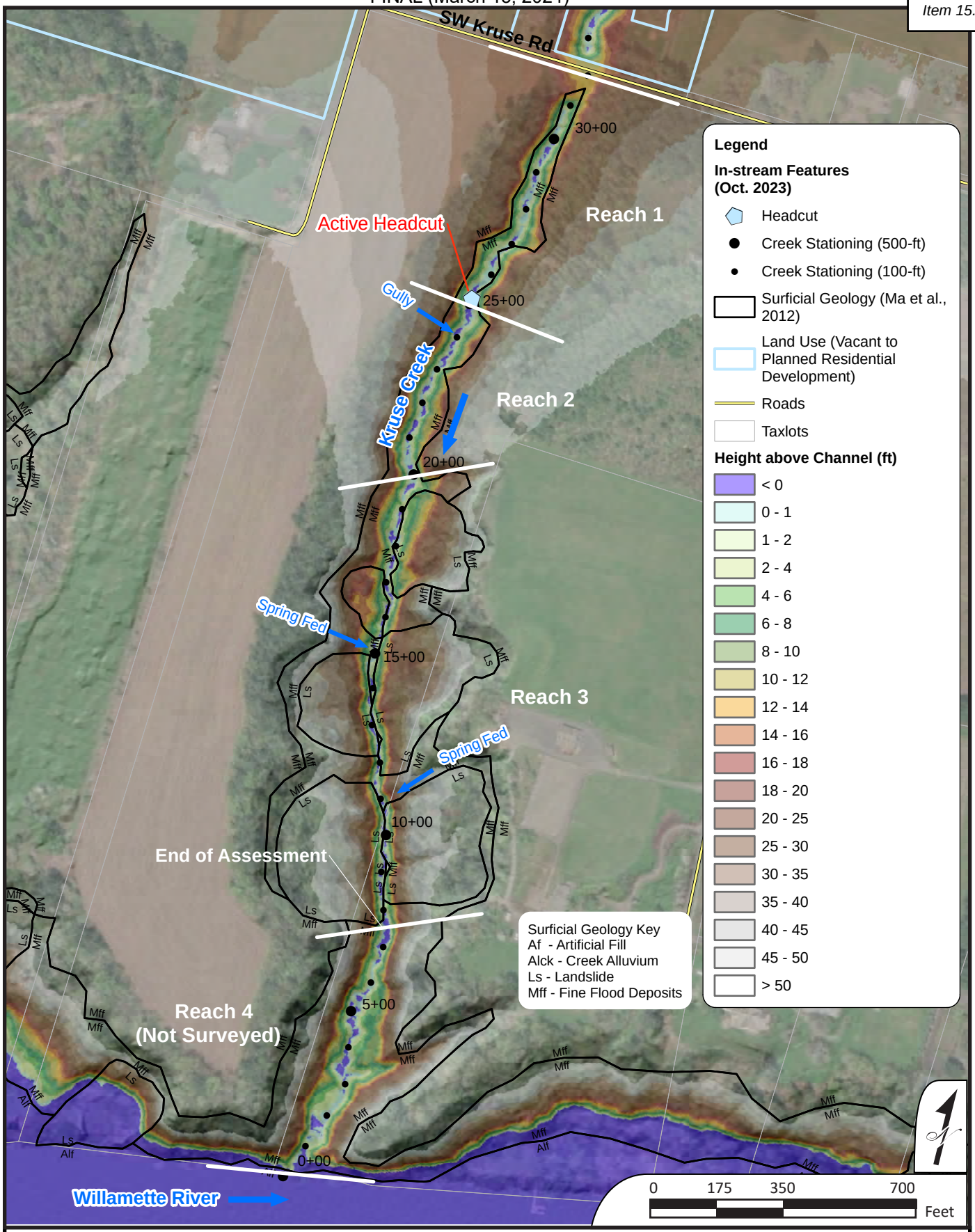
FIGURE 8



Kruse Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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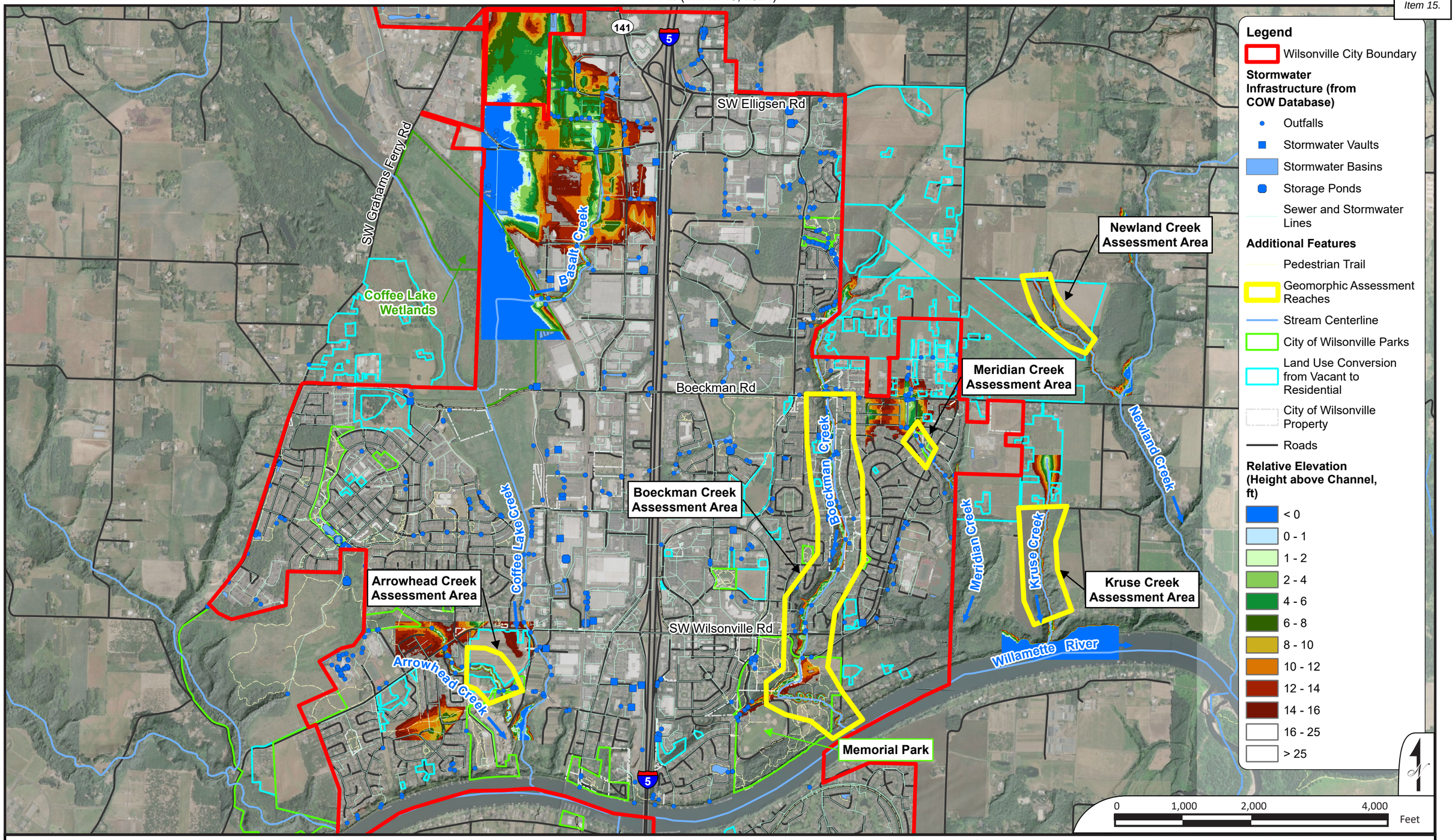
FIGURE 9

APPENDIX C

Relative Elevation Maps for Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks in Wilsonville Oregon

(Overview PDF; full data sets are provided as .tif digital files)



Relative Elevation (Height above Channel) Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE C1

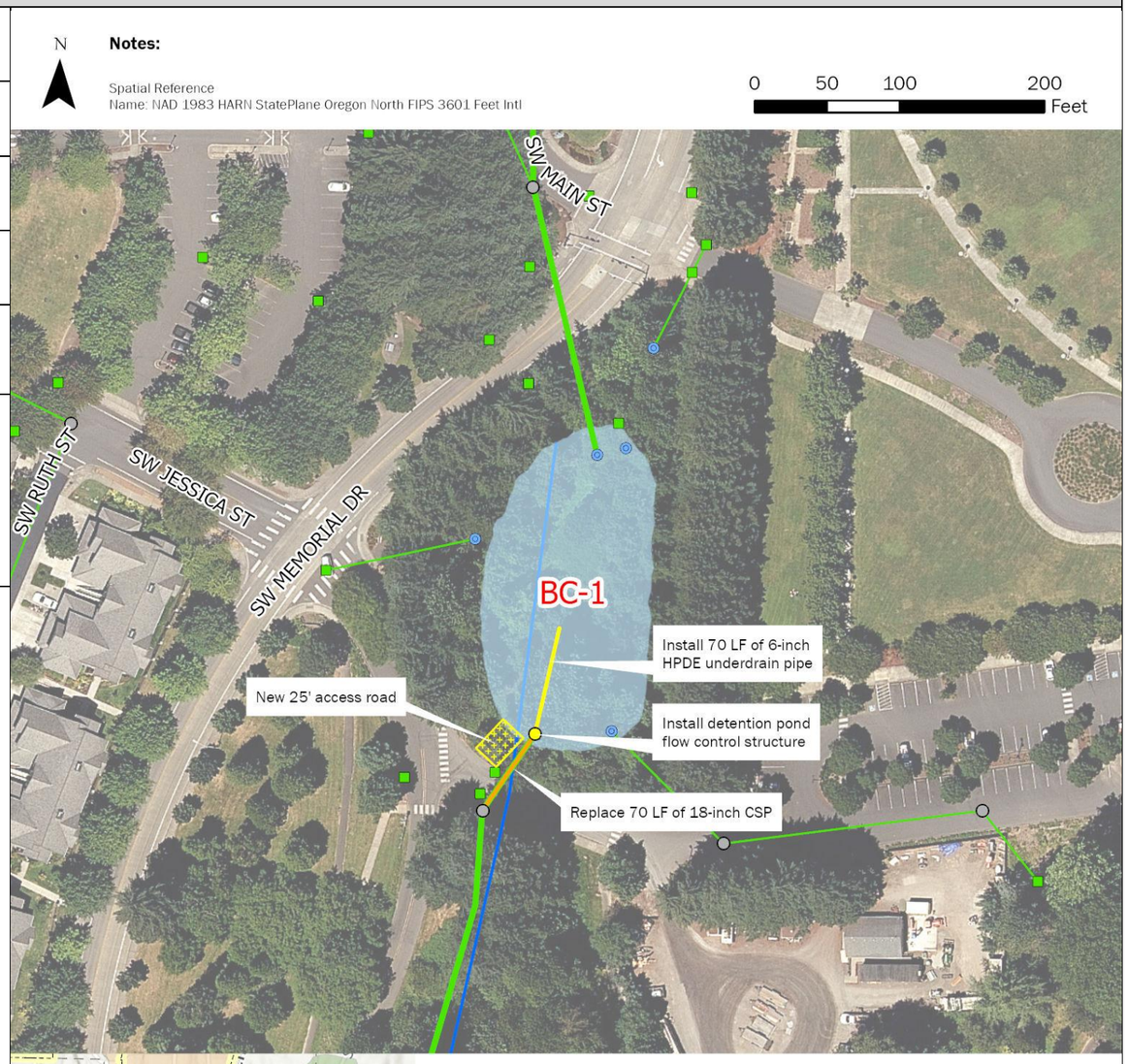
APPENDIX D (provided separately)

Digital Folders Containing Georeferenced Photographs from Boeckman and Meridian Creeks (including .kmz files with geolocated thumbnails)

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



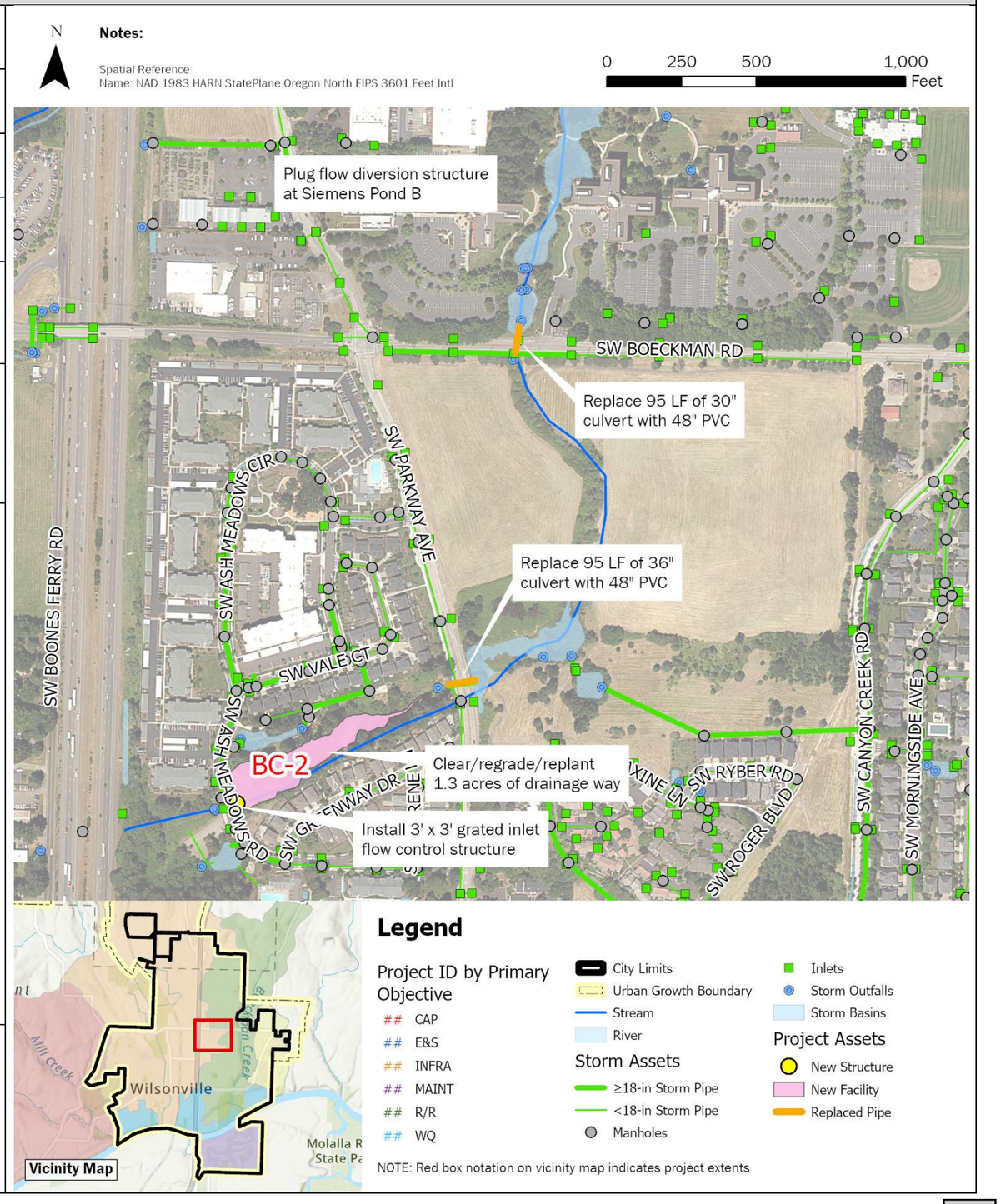
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$1,407,000
	Design / Construction Admin. (13.5%)	$190,000
	Engineering & Permitting (20%)	$281,000
	Total Cost	**$1,880,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Upsize 80 LF of 36-inch culvert at Parkway Ave (main barrel) to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		



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City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Fact Sheet

BC-2 – Ash Meadows Flow Mitigation

BC-2 Ash Meadows Flow Mitigation

Design Considerations / Assumptions

- This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road.
- Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet.
- This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions.
- The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.

Estimated Project Cost

Capital Expense Total	$1,737,000
Design / Construction Admin. (13.5%)	$234,000
Engineering & Permitting (50%)	$869,000
Geotechnical	$100,000
Total Cost	**$2,940,000**

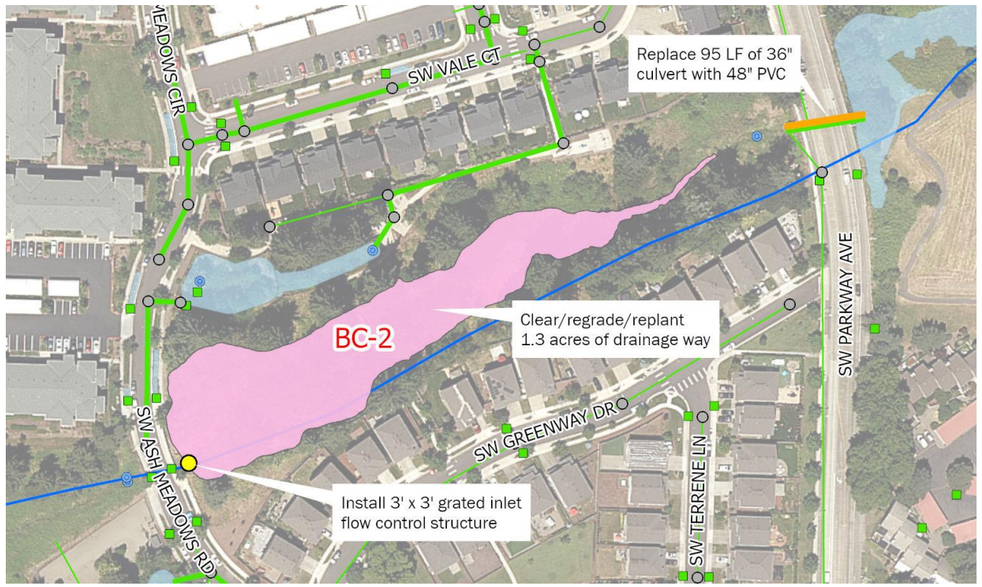
Project Cost Notes

- The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area.
- Clearing and plant restoration is necessary for entire area to 190 ft elevation.
- Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project.
- A 50% Engineering and Permitting multiplier was applied based on design cost estimate.
- A 15% Traffic Control/Utility Relocation multiplier was applied based on design cost estimate.
- A 20% Surveying multiplier was applied based on design cost estimate.
- A $100,000 lump sum cost was included for Geotechnical work based on design cost estimate.

Additional Figures

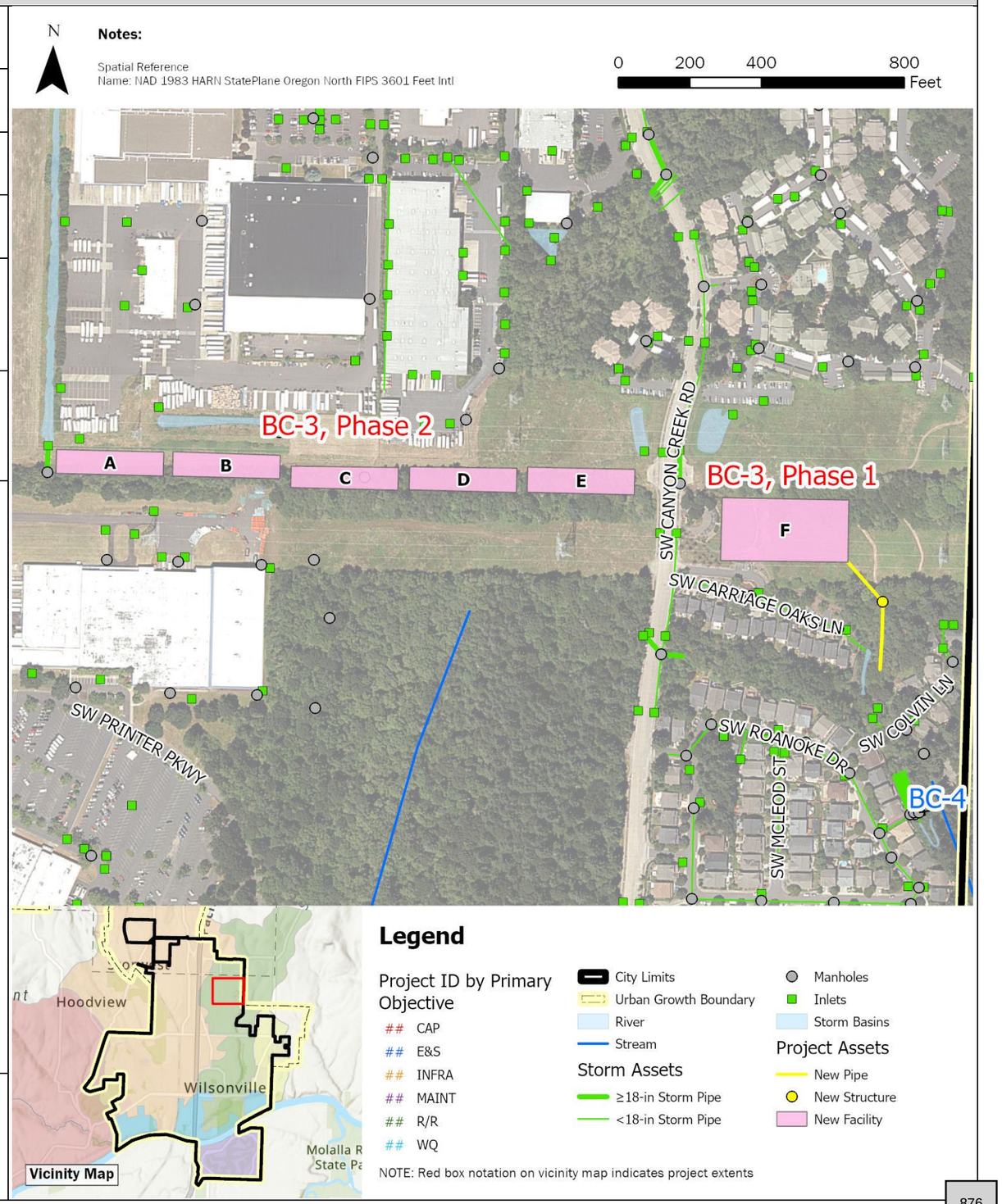
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$3,491,000	$5,253,000
Design / Construction Admin. (3.5% + $200K)	$322,000	$384,000
Engineering & Permitting (30%)	$1,047,000	$1,576,000
Total Cost	**$4,860,000**	**$7,210,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

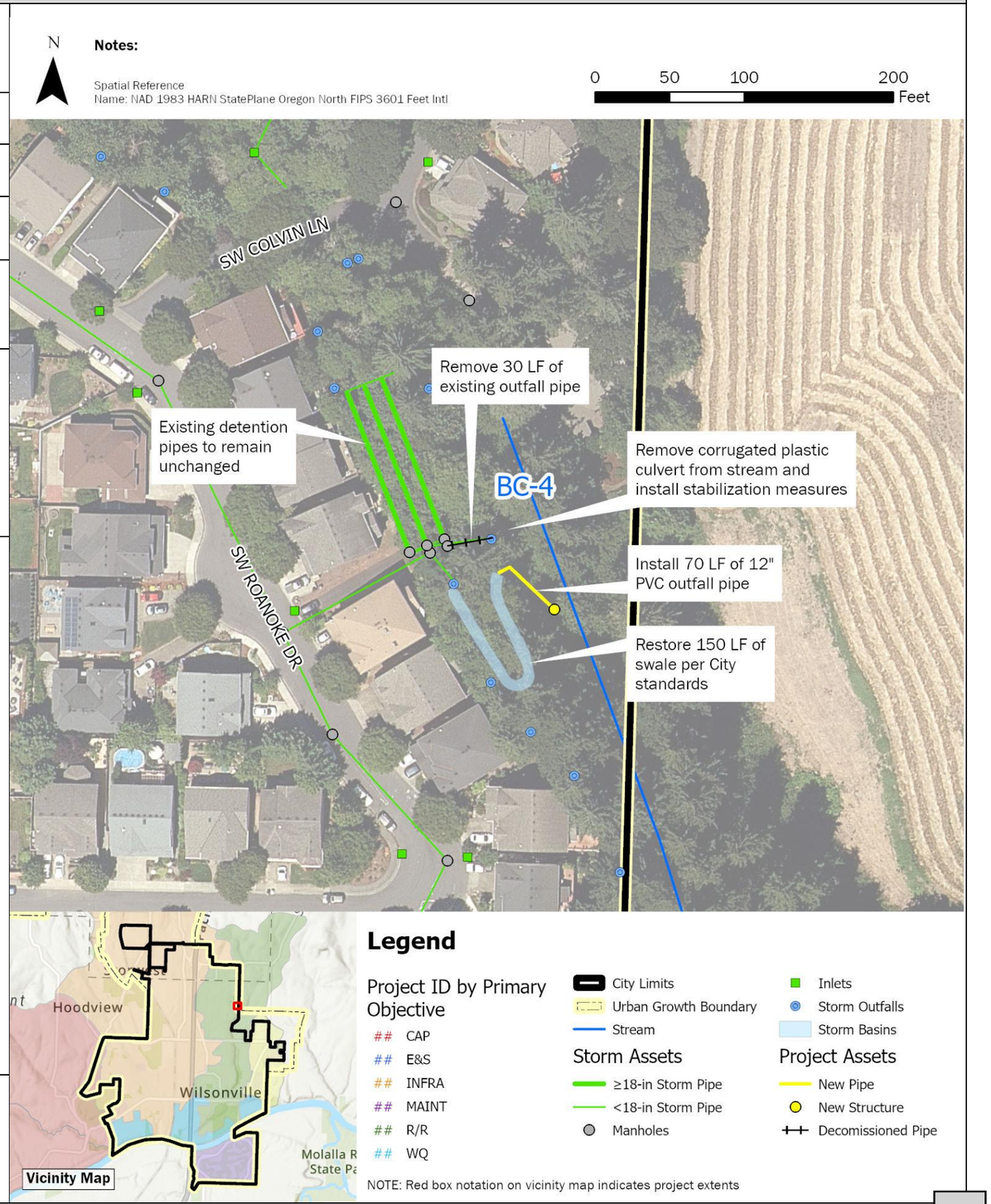
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

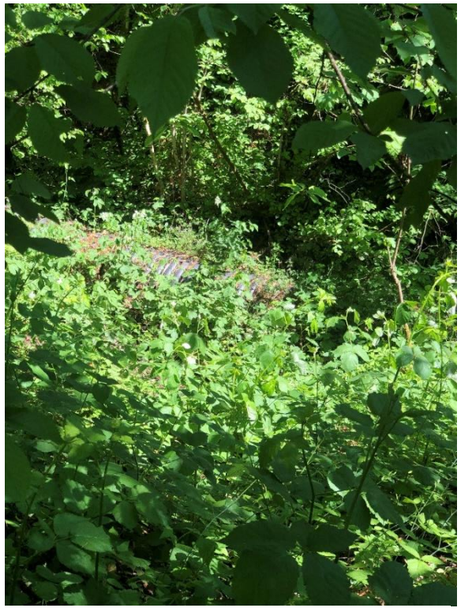
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$282,000
	Design / Construction Admin. (13.5%)	$38,000
	Engineering & Permitting (30%)	$85,000
	Total Cost	**$410,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

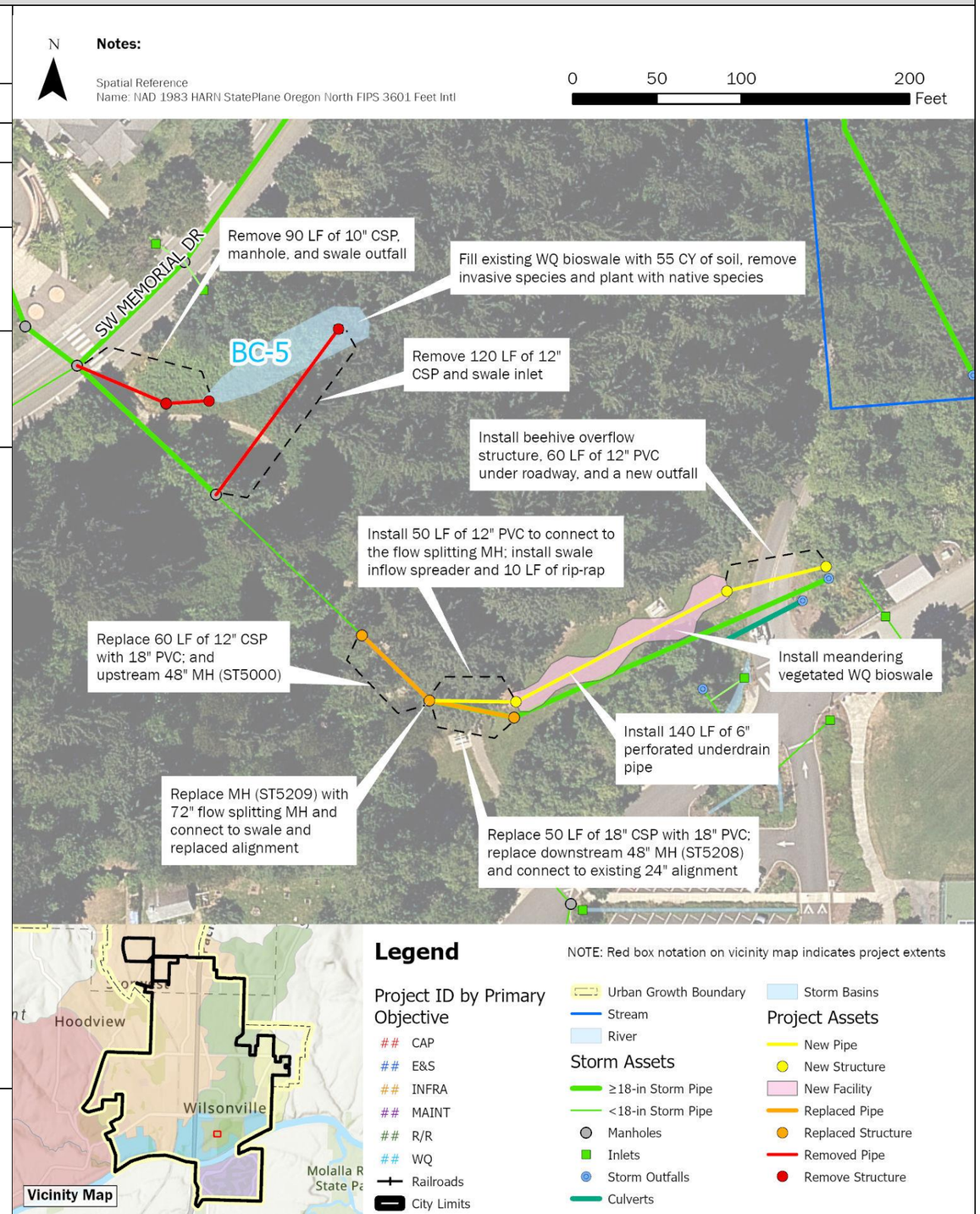


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



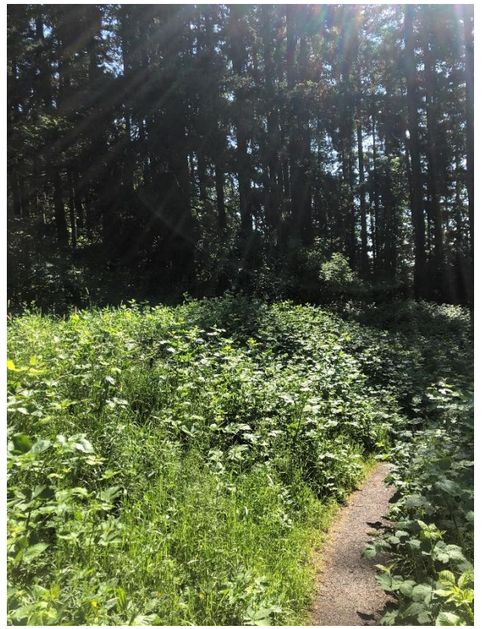
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$631,000
	Design / Construction Admin. (13.5%)	$85,000
	Engineering & Permitting (30%)	$189,000
	Total Cost	**$910,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

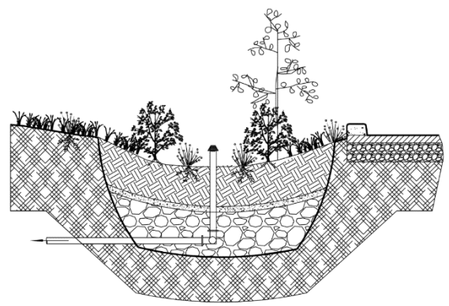
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



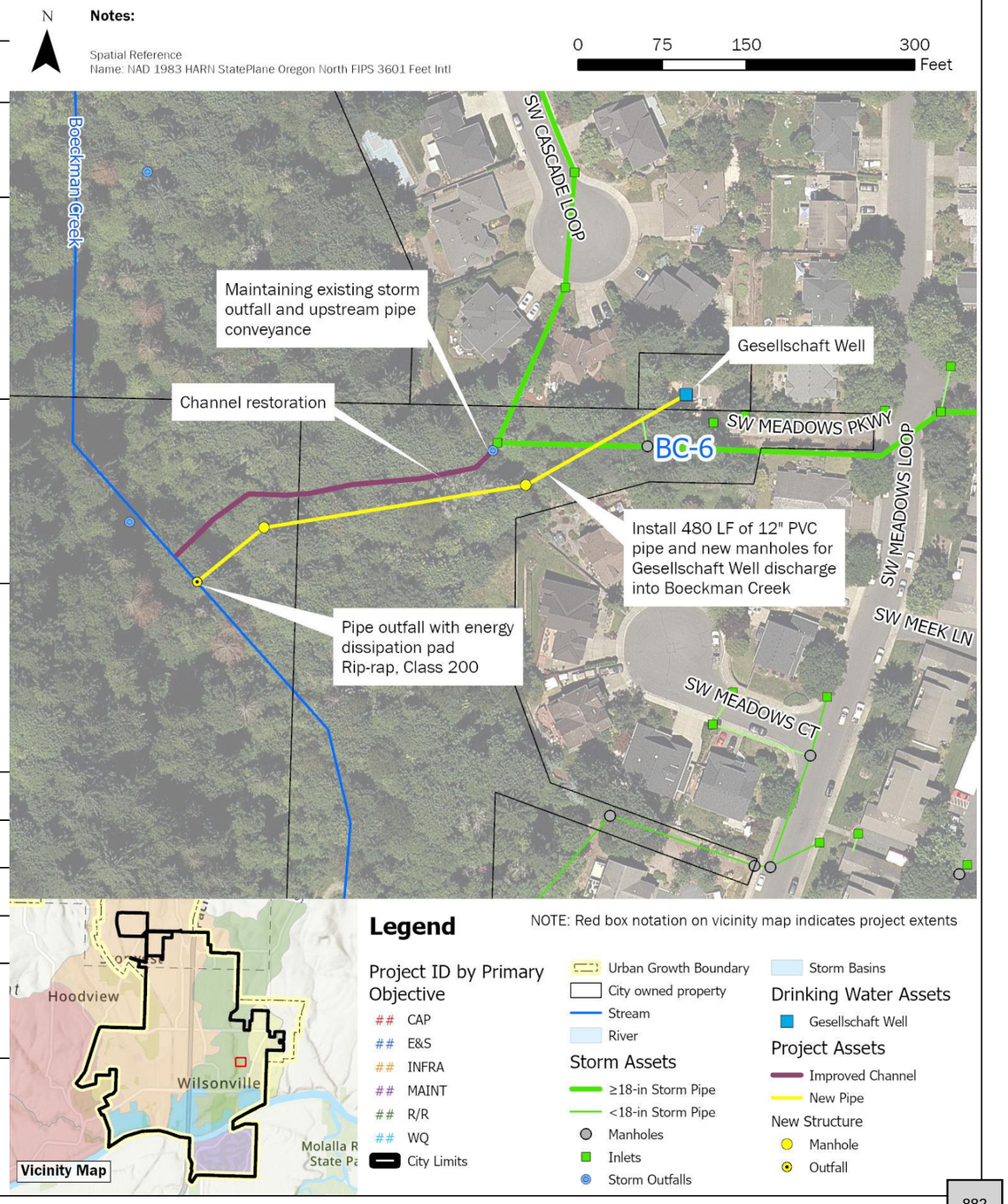
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$279,000	
	Design / Construction Admin. (13.5%)	$38,000	
	Engineering & Permitting (30%)	$84,000	
	Total Cost	**$400,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



Brown AND Caldwell

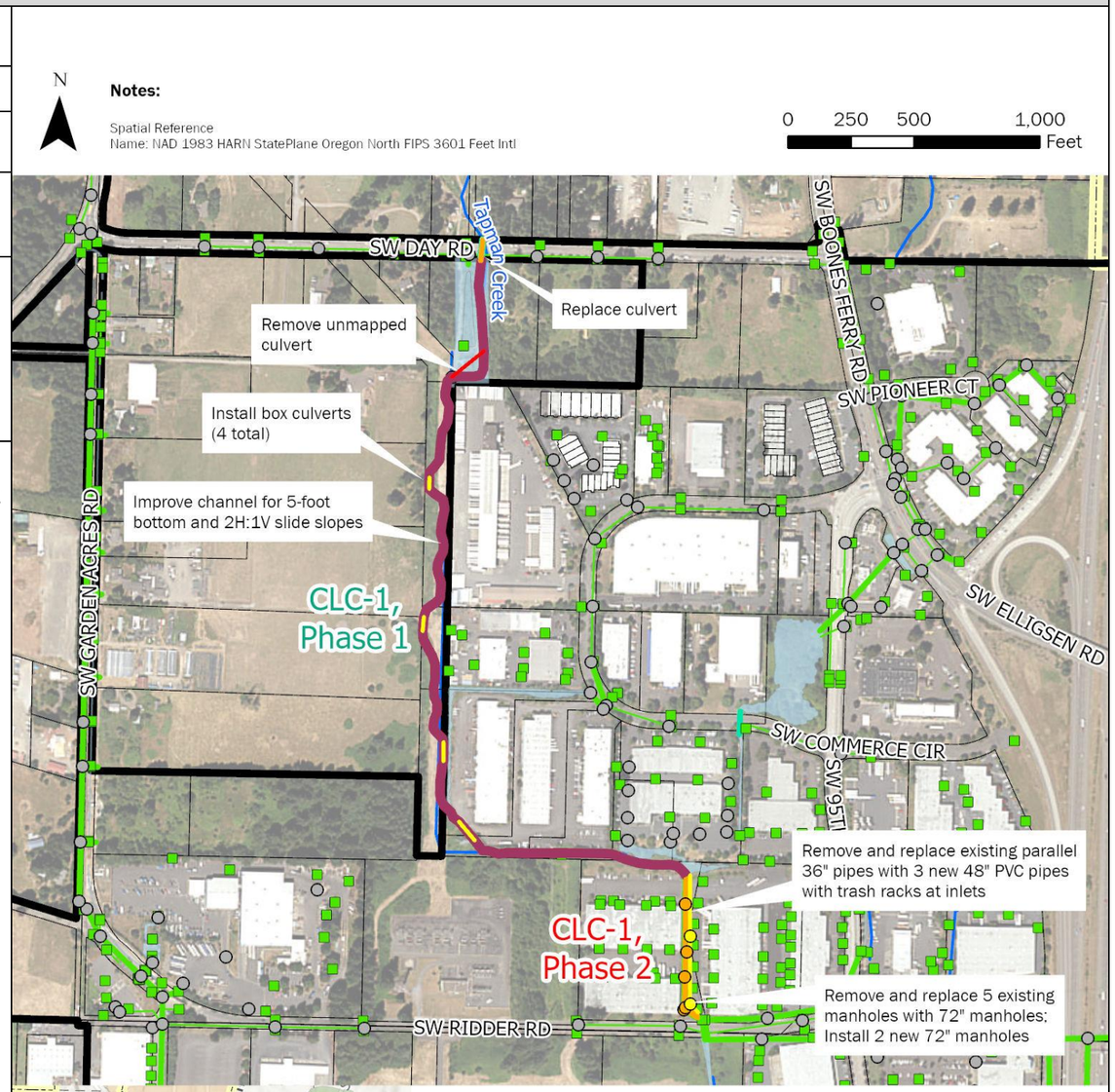
City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9	**Contributing Drainage Area**	944 acres
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing, approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF, 48-inch PVC parallel storm pipes. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1 | Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

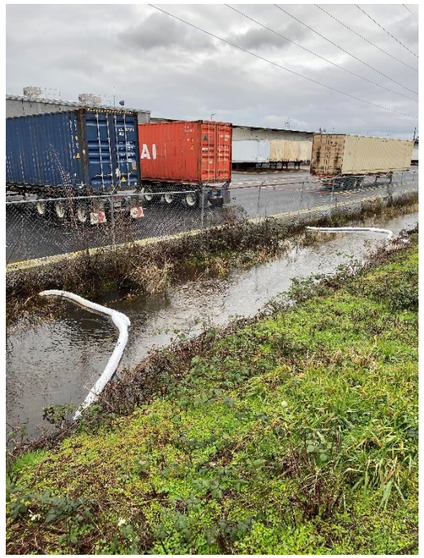
	Phase 1	*Phase 2*
Capital Expense Total	$5,860,000	$2,738,000
Design / Construction Admin. Phase 1: 3.5% + $200K Phase 2: 13.5%	$405,000	$370,000
Engineering & Permitting (30%)	$1,758,000	$821,000
Total Cost	**$8,020,000**	**$3,930,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

Additional Figures

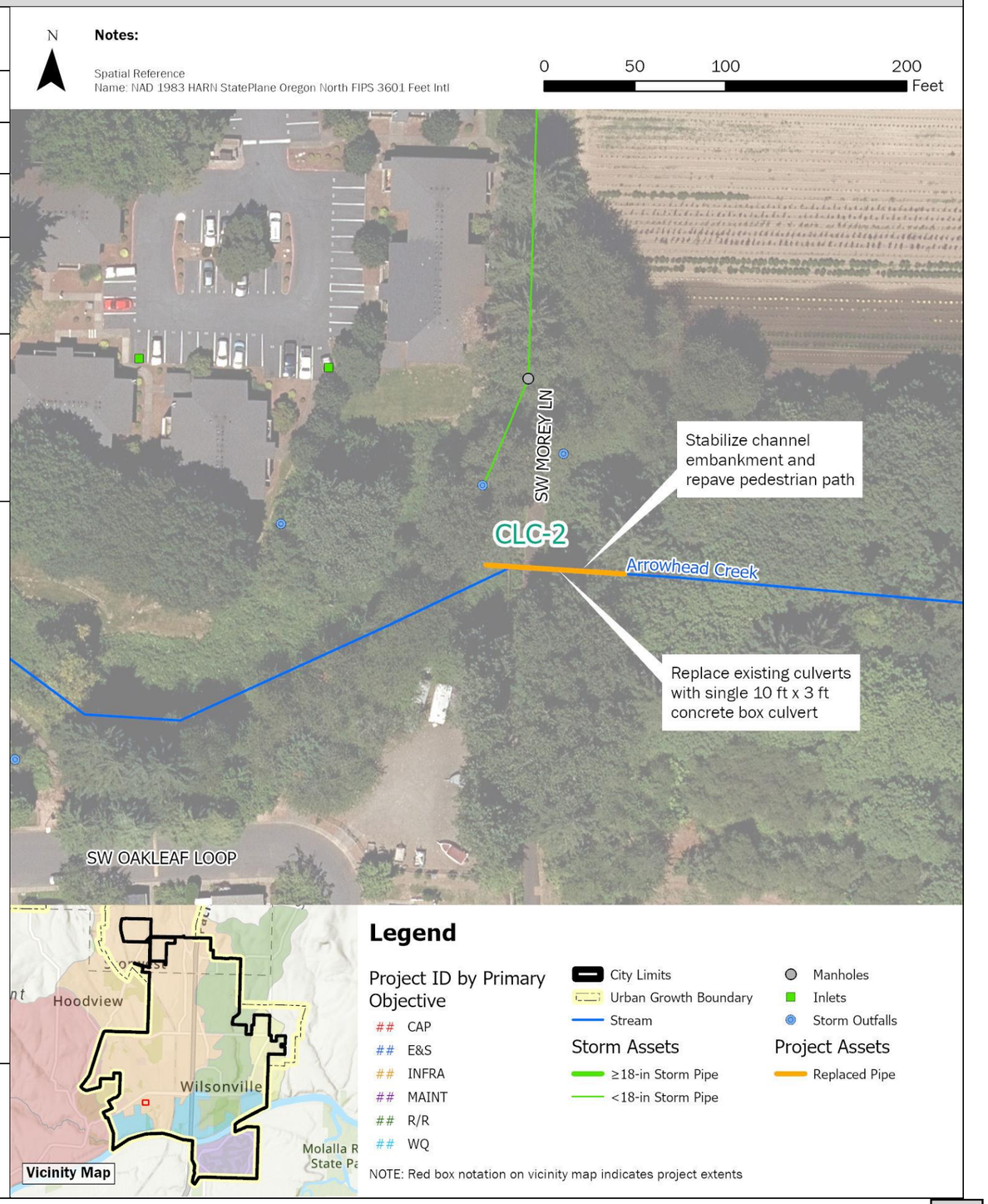
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



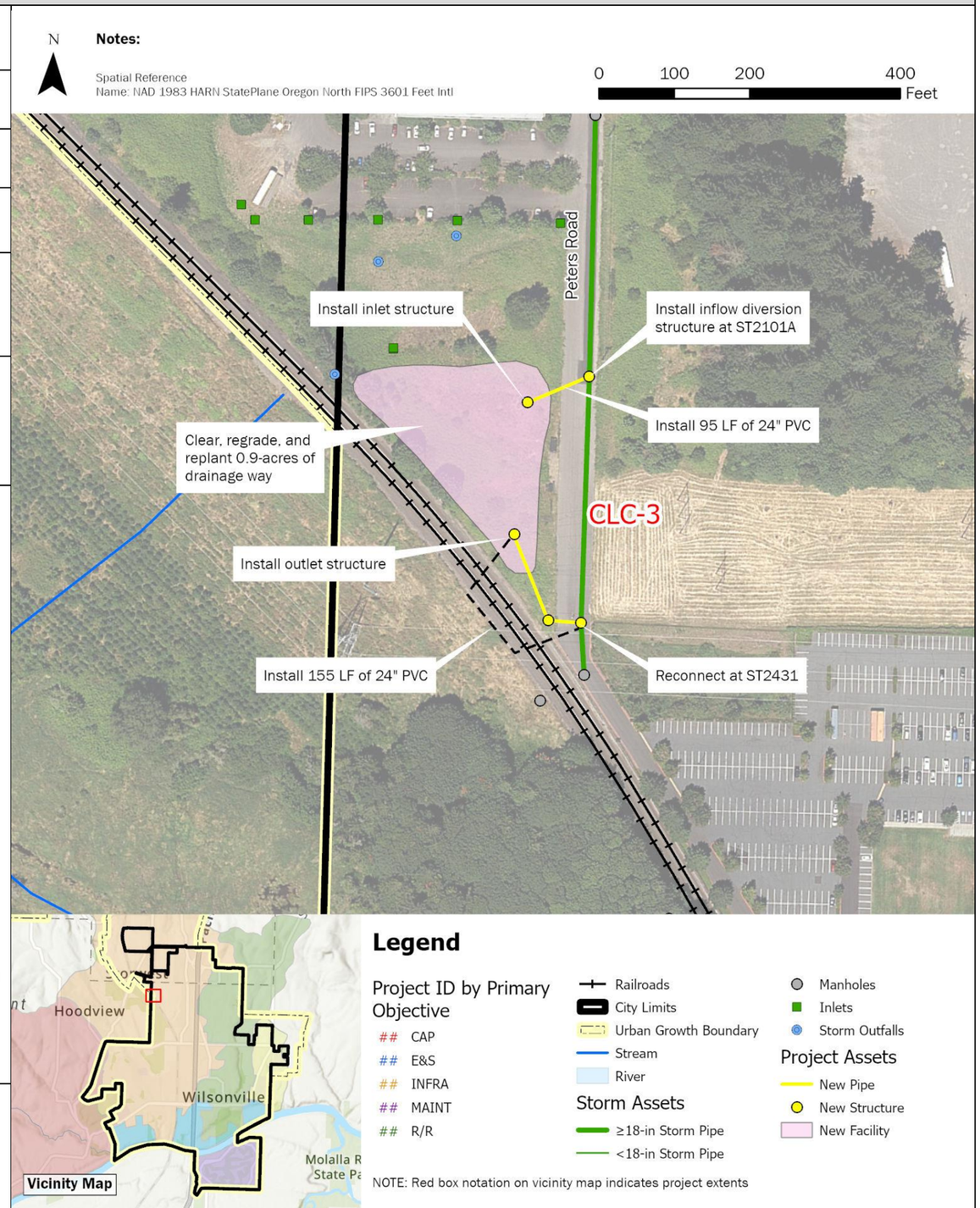
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	
Design Considerations / Assumptions	• Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts. • Culvert sizing to be confirmed with final design. • Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.	
Estimated Project Cost	Capital Expense Total	$179,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$290,000**
Project Cost Notes	• Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction. • No costs included for access - assumed access can be attained through pedestrian path. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,200 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 26,000 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install 50 LF of 6-inch HDPE underdrain pipe. • Install pond underdrain media in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.		



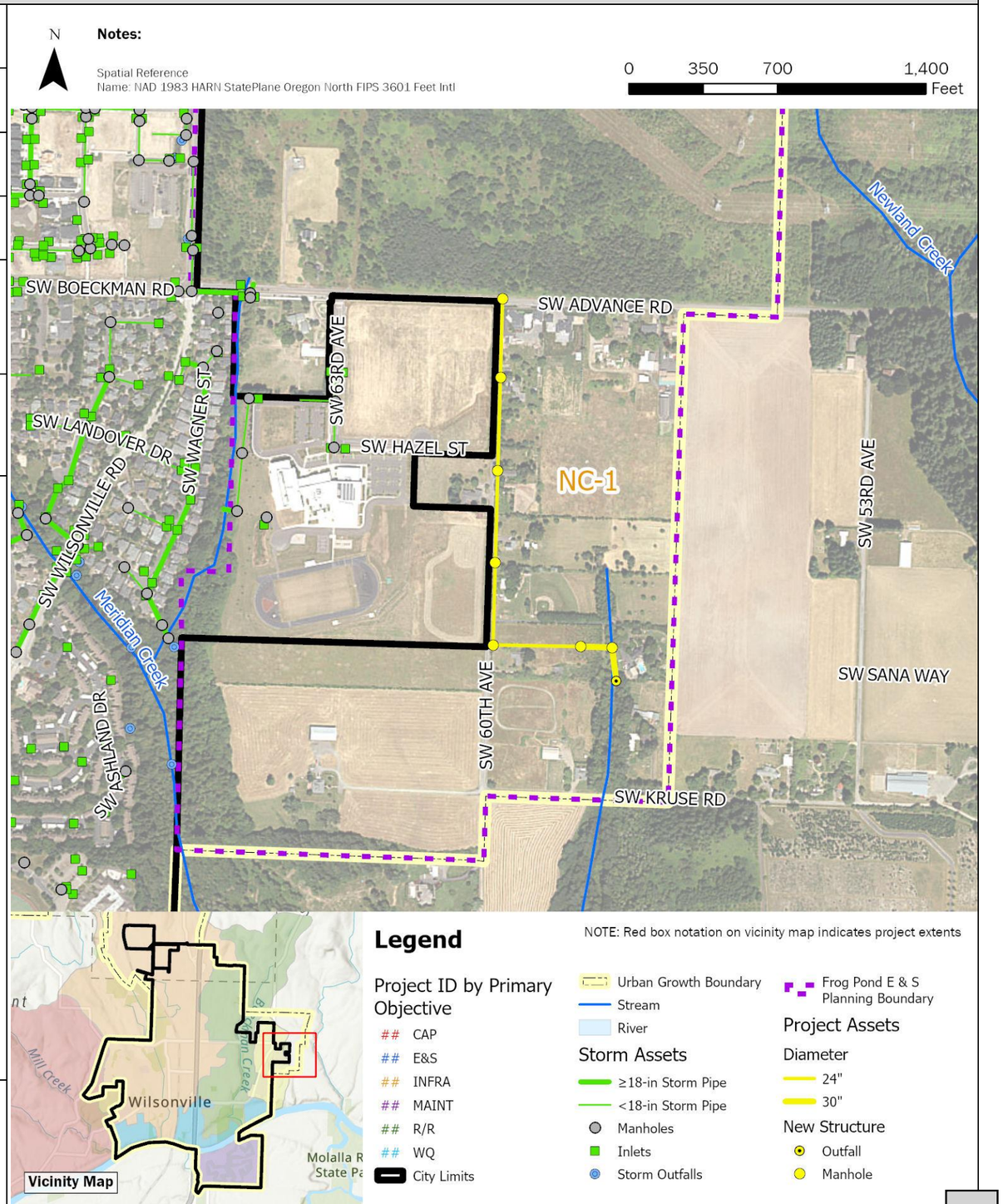
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$2,897,000
	Design / Construction Admin. (3.5% + $200K)	$301,000
	Engineering & Permitting (20%)	$579,000
	Total Cost	**$3,780,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing. • A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

Garden Acres Detention Pond (May 2023)

NC-1	Frog Pond East and South Conveyance Piping (Basin K1 only)		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	61 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	The full 2022 Frog Pond East and South Master Plan stormwater conveyance layout has been simplified for this CP to only include the storm main and outfall along SW 60th Ave to outfall near unnamed tributary (under SW Kruse Rd). This drainage basin is referred to in the Master Plan as K1 (encompassing approx. 61 acres). Project details are as follows: • Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.		



NC-1	Frog Pond E and S Conveyance Piping	

Design Considerations / Assumptions

- Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area.
- The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure by basin is detailed below:
  - **K1**: install 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; 3- 48-inch manholes, 7-60-inch manholes and 1 outfall.
  - **K2**: install 220 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall.
  - **M1-A**: install 2,630 LF of 12-inch PVC pipe, 8- 48-inch manholes, and 1 outfall.
  - **M1-B**: install 1,050 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall.
  - **M2**: install 400 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall.
  - **M3**: install 1,160 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall.
  - **N1**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall.
  - **N2**: install 7,670 LF of 18-inch PVC pipe, 3- 48-inch manholes, and 1 outfall.
  - **N3**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall.
  - **N4**: install 1,150 LF of 18-inch PVC pipe, 5- 48-inch manholes, and 1 outfall.
  - **N5**: install 730 LF of 12-inch PVC pipe, 3- 48-inch, and 1 outfall.
- Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs.
- Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.

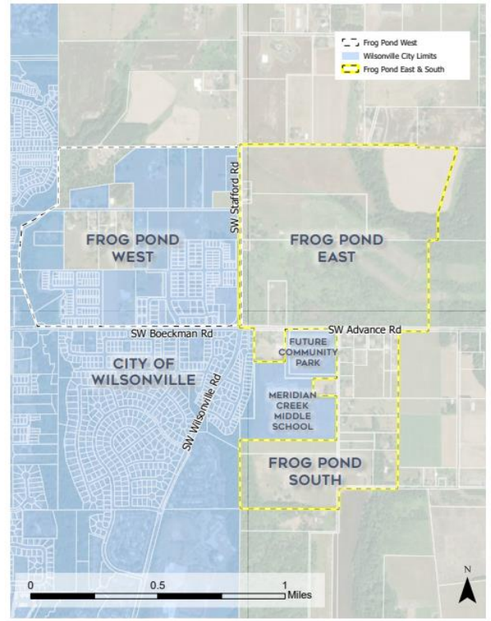
Estimated Project Cost

Capital Expense Total	$3,064,000
Design / Construction Admin. (13.5%)	$414,000
Engineering & Permitting (20%)	$613,000
Total Cost	**$4,090,000**

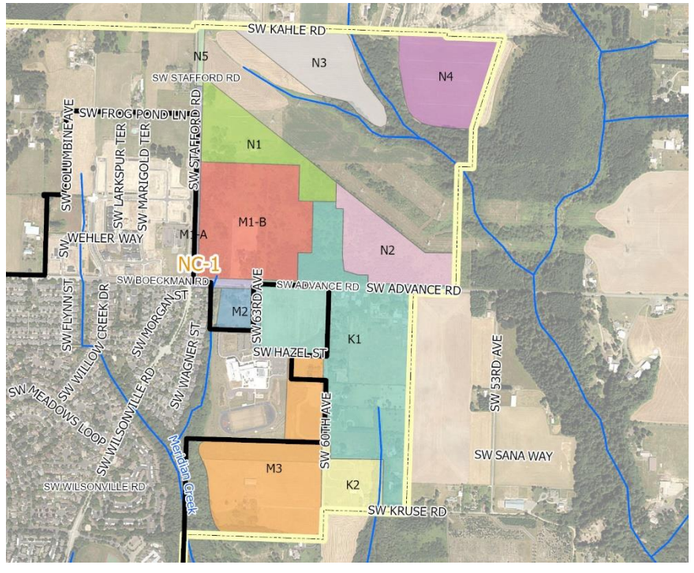
Project Cost Notes

- Cost estimates assume use of PVC for all new pipe materials.
- Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs.
- No earthwork beyond trenchwork is included.
- Only the main stormwater pipes along SW 60th Ave towards the outfall (24-inch and 30-inch in diameter) are included in the project estimate, per City direction.
- Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate.

Additional Figures

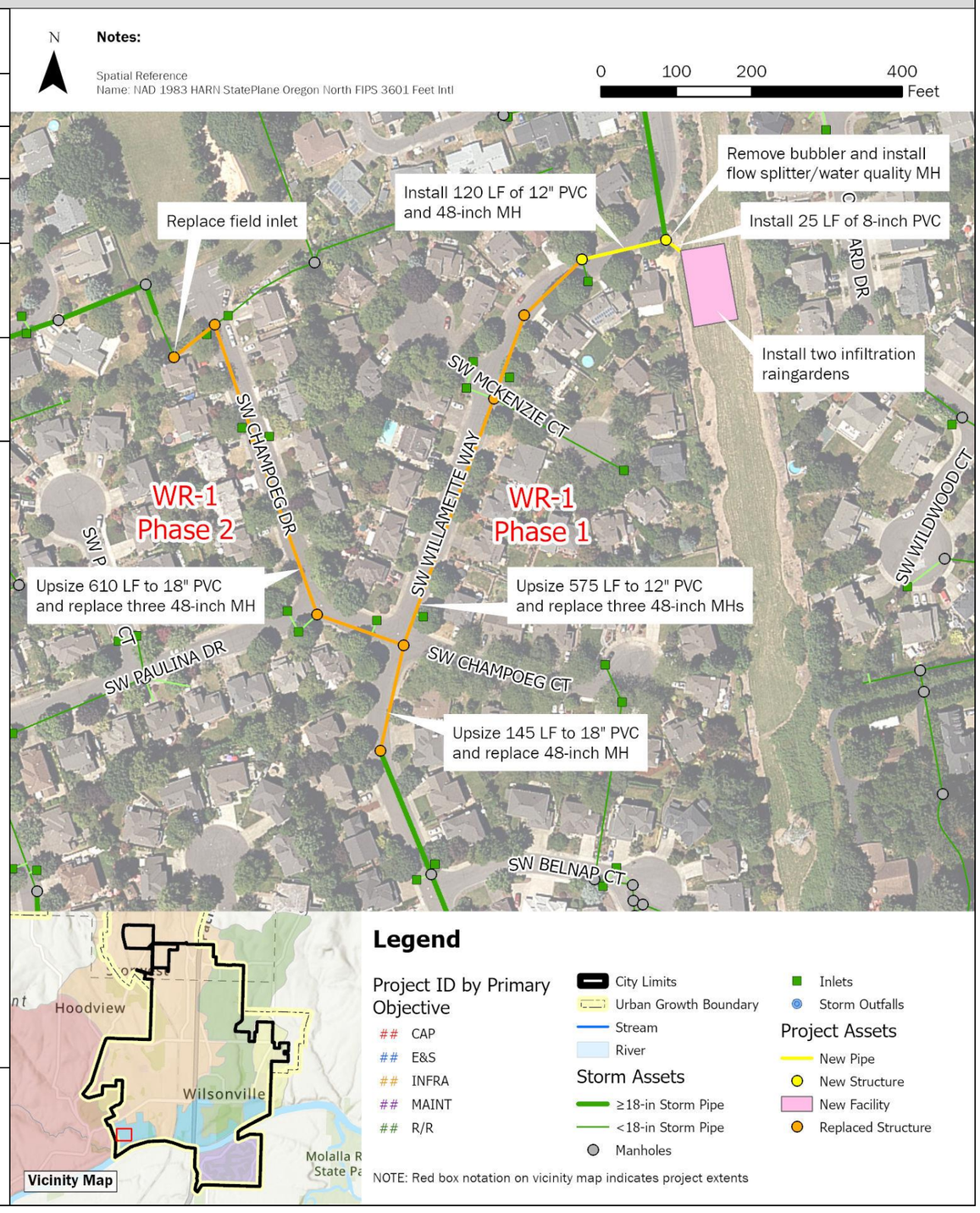


Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

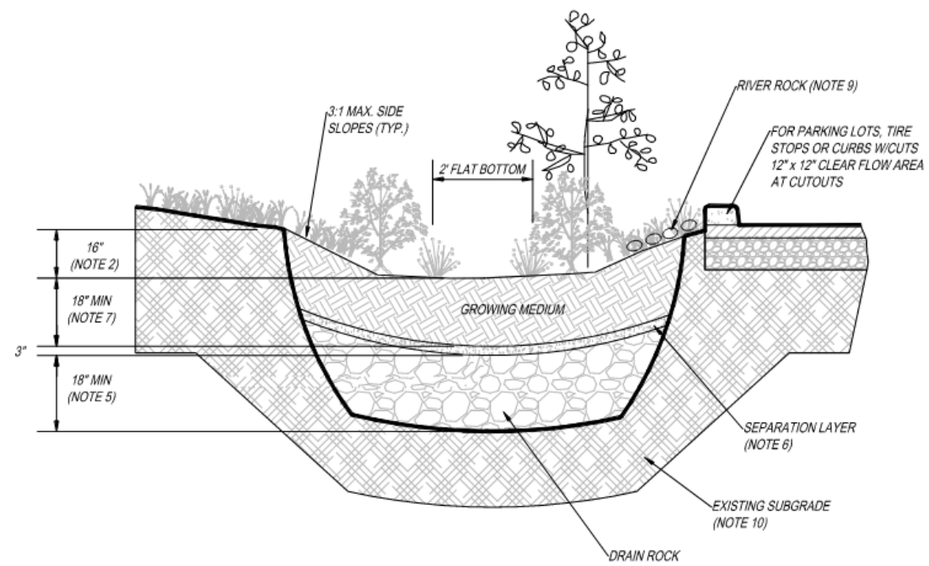
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,729,000	$811,000
Design / Construction Admin. (13.5%)	$233,000	$109,000
Engineering & Permitting (20%)	$ 346,000	$162,000
Total Cost	**$2,310,000**	**$1,080,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

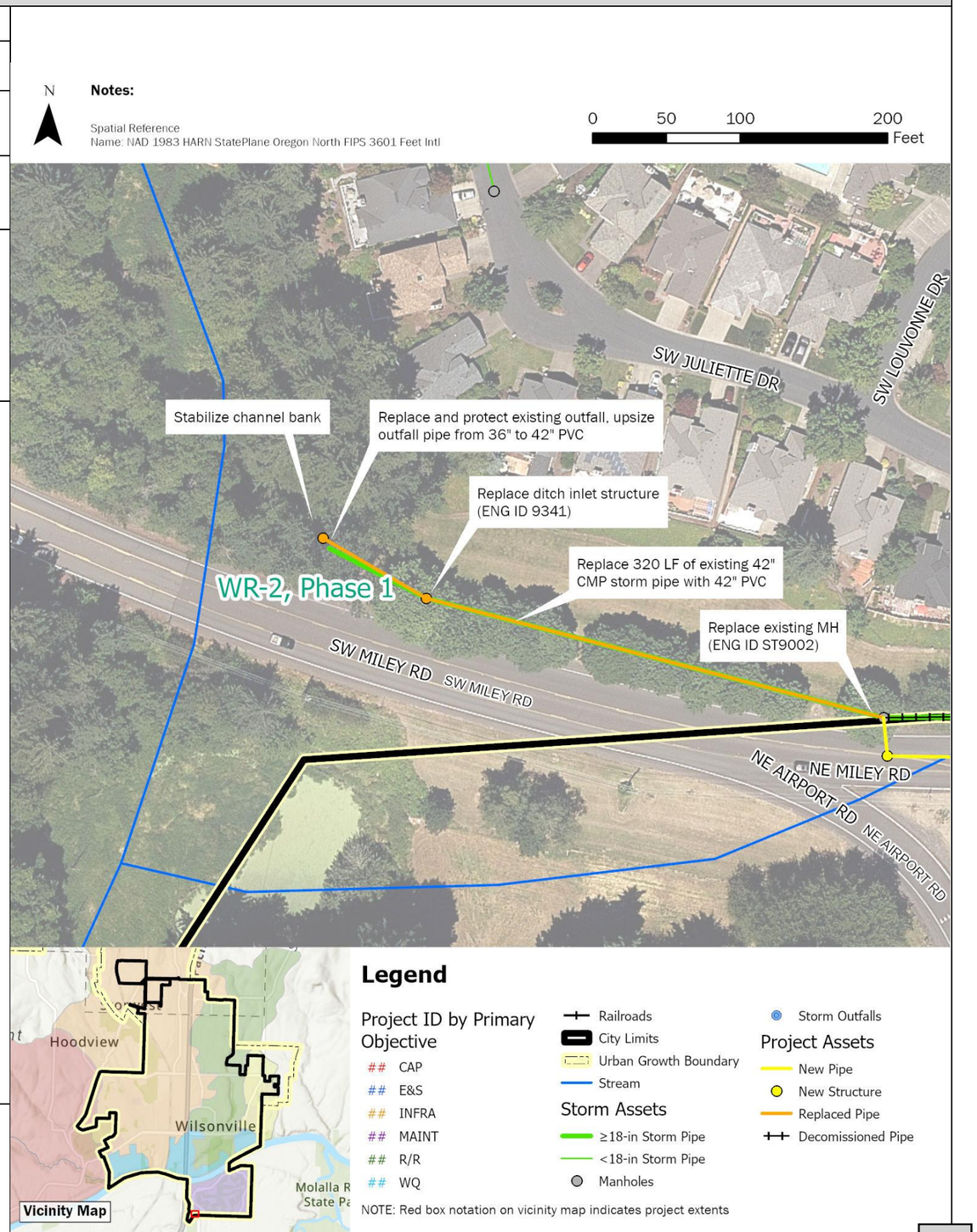
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5	**Contributing Drainage Area**	138.0 acres
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

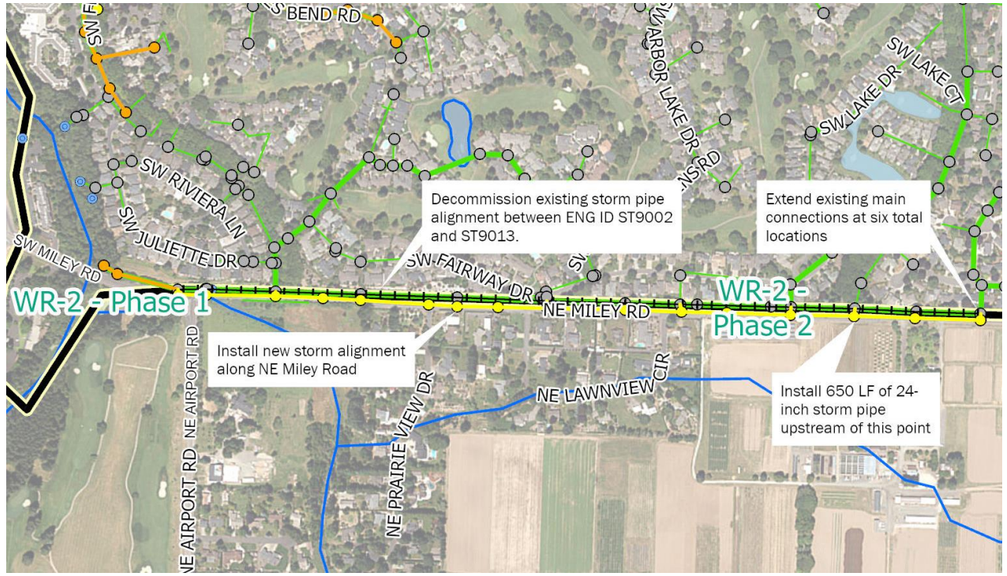
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

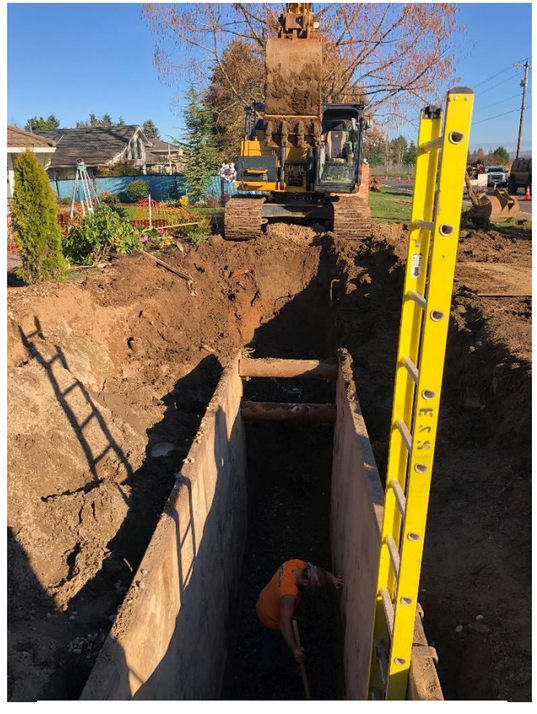
	Phase 1	*Phase 2*
Capital Expense Total	$574,000	$7,720,000
Design / Construction Admin. Phase 1: 13.5% Phase 2: 3.5% + $200K	$77,000	$470,000
Engineering & Permitting (30%)	$172,000	$2,316,000
Total Cost	**$820,000**	**$10,510,000**

Project Cost Notes

- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

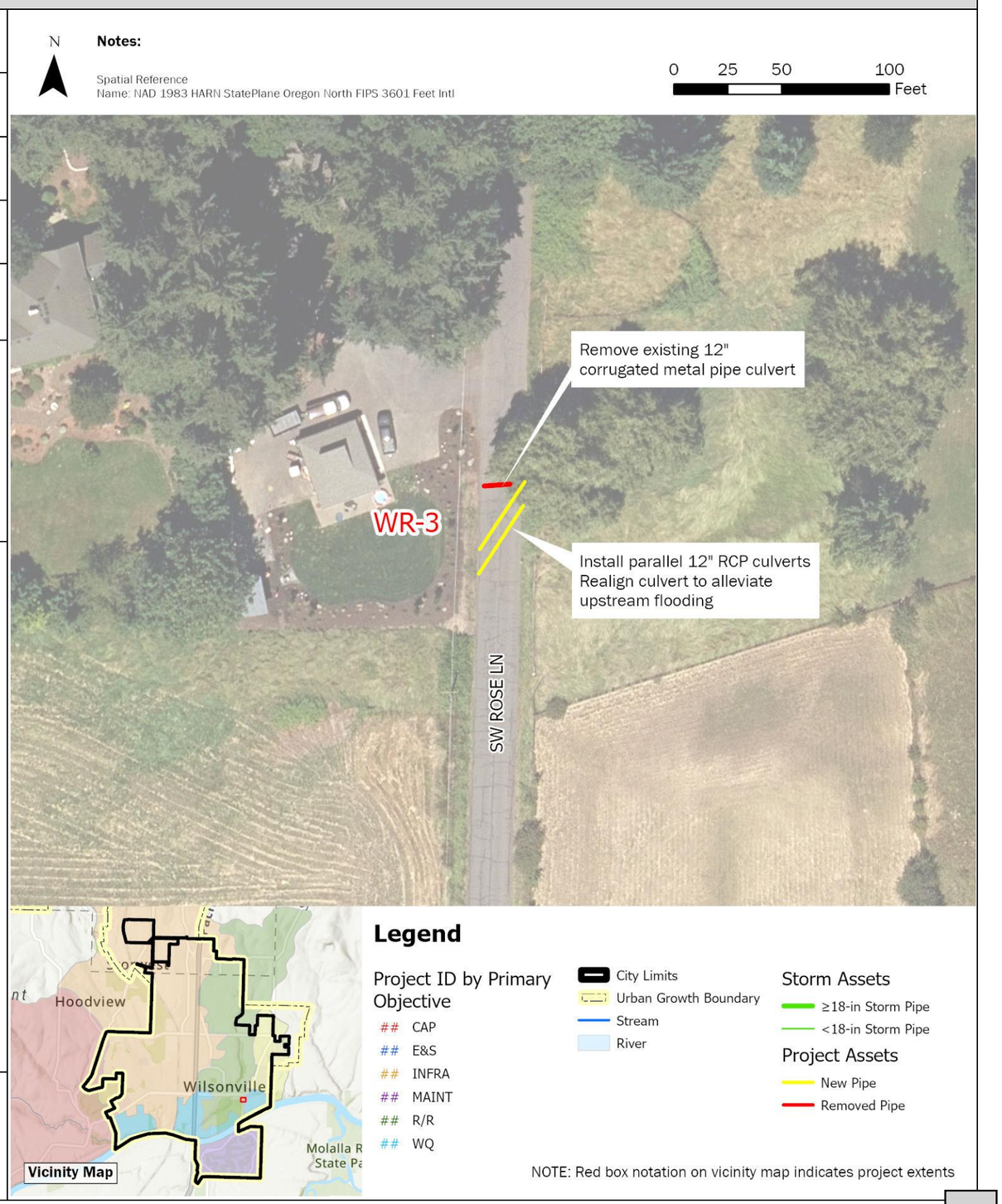


Sinkhole observed at upstream end of Miley Road alignment



Temperary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		



WR-3	Rose Lane Culvert Replacement	

Design Considerations / Assumptions

- Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover.
- Minimum 12-inch cover on top of culvert.
- Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway.
- Maximum allowable depth for roadside ditches is 2-feet.
- Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP.
- Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.

Estimated Project Cost

Capital Expense Total	$86,000
Design / Construction Admin. (Cap)	$35,000
Engineering & Permitting (Cap)	$75,000
Total Cost	**$200,000**

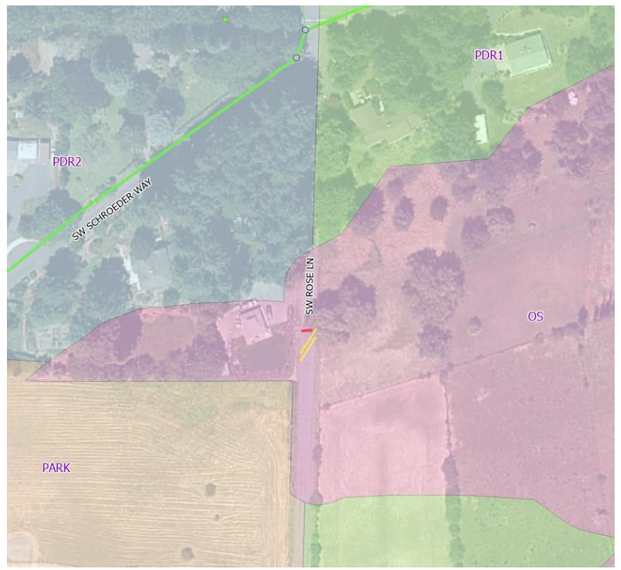
Project Cost Notes

- Modifications to the roadway beyond trenching were not developed as part of the cost estimate.
- Surveying is required.
- Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included.
- A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30	**Contributing Drainage Area**	159 acres
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Replace existing Charbonneau East Outfall (STD9005). • Replace one 72-inch manhole (ST9014). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes (ST9020 to ST9242). • Replace nine 60inch manholes (ST9017 to ST9019, and ST9027 to ST9031).		

WR-4 — Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

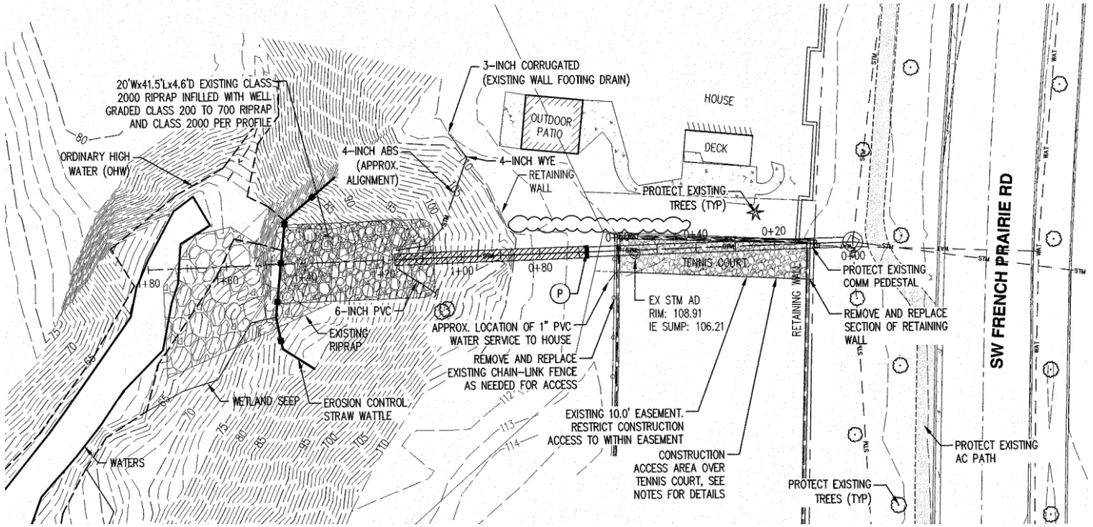
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$201,000	$3,325,000
Design / Construction Admin. Phase 1: 25% Phase 2: 13.5%	$50,000	$449,000
Engineering & Permitting Phase 1: 50% Phase 2: 20%	$101,000	$665,000
Outreach Coordination (Flat Rate - Phase 1 only)	$250,000	N/A
Total Cost	**$600,000**	**$4,400,000**

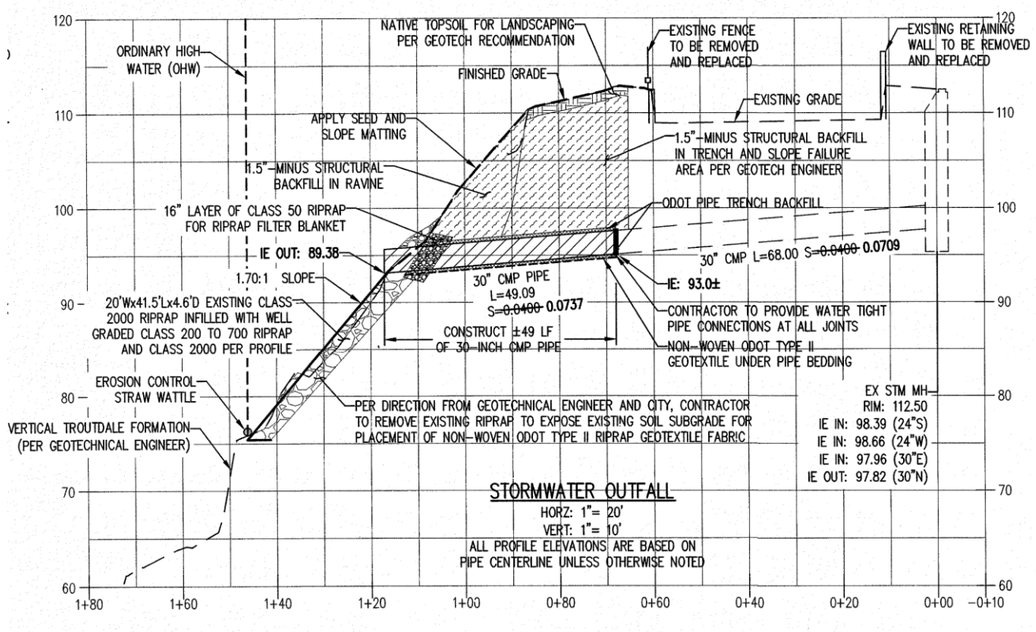
Project Cost Notes

- Due to in-water work and private property constraints, Phase 1 engineering and permitting multiplier was set to 50%. Design/Construction Administration multiplier was set to 25% per direction from the City.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures

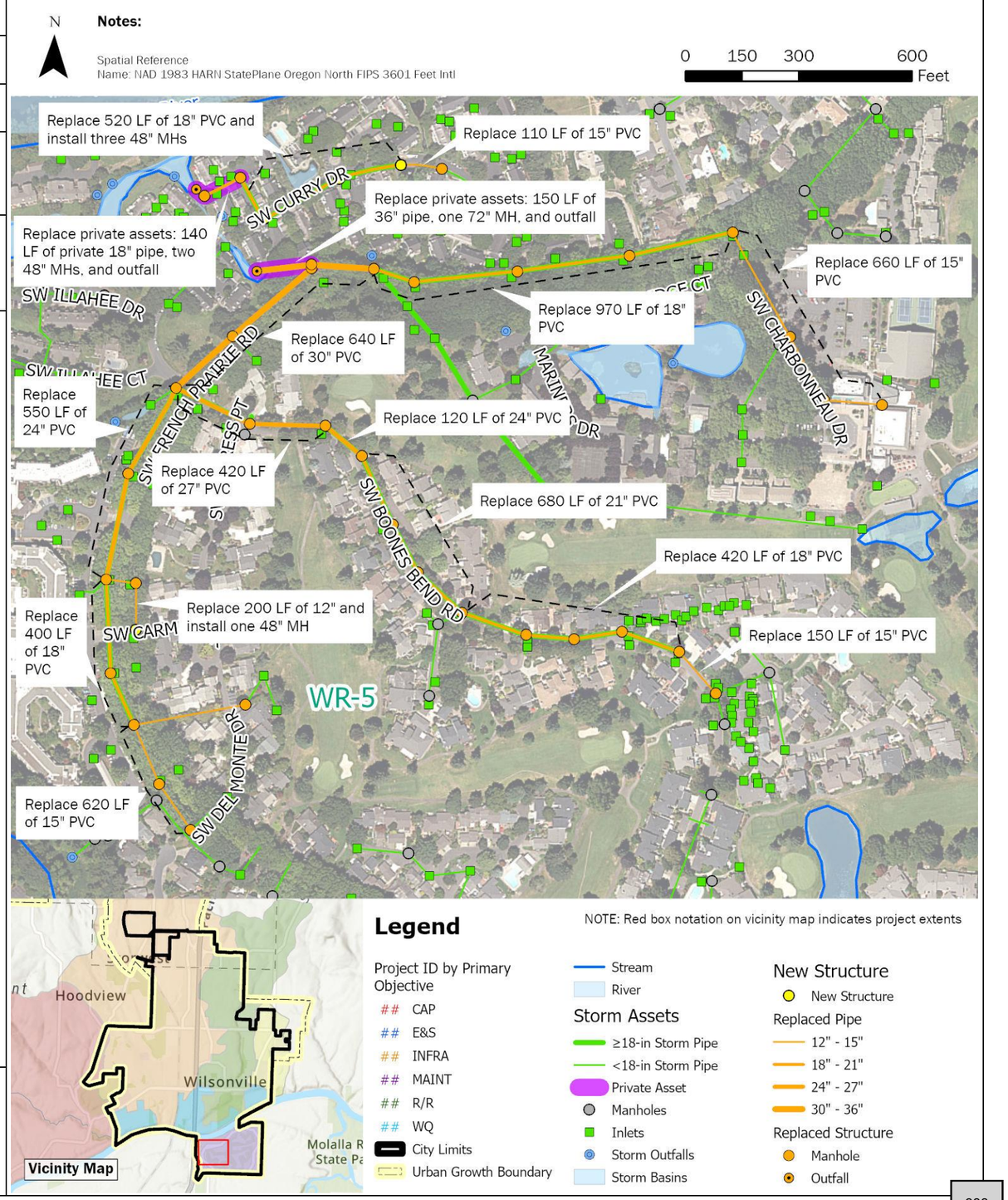


Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping. Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): • Pipe replacement along SW Curry Drive: ○ Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). ○ Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892). ○ Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). ○ Replace private outfall (CARTE ID: 15). ○ Replace two private 48-in manholes (CARTE ID 1892 and 1383). ○ Install three 48-inch manholes. • Pipe replacement along SW French Prairie Road: ○ Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) ○ Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). ○ Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown) ○ Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). ○ Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). ○ Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). ○ Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown). ○ Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. *Continued on page 2.*		



WR-5	Charbonneau West Stormwater Improvements	

Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road:
	  ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058).
	  ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055).
	  ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051).
	  ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050).
	  ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040).
	  ○ Replace eight 48-in manholes; and replace three 60-in manholes.	

Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated.
	• Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe.
	• Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters.
	• The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement:
	  ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892).
	  ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041.
	  ○ Two 72-in: ST9067 and ST9041	

Estimated Project Cost	Capital Expense Total	$8,235,000
	Design / Construction Admin. (3.5% + $200K)	$488,000
	Engineering & Permitting (20%)	$1,647,000
	Total Cost	**$10,370,000**
Project Cost Notes	• A modified Design/Construction Administration multiplier was applied per direction from the City. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Appendix E: Capital Project Cost Estimates

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Earthwork			
General Earthwork/Excavation	CY	78	City of Wilsonville, provided by Zach Weigel December 2023
Excavation, to onsite stockpile	CY	20	For site grading (not structural). Source: BC Assembly using RSMeans pricing.
Fill, imported clean	CY	115	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Fill, from onsite stockpile	CY	60	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Embankment	CY	35	City of Wilsonville, provided by Zach Weigel December 2023
Structural Earth Wall	SF	50	City of Wilsonville, provided by Zach Weigel December 2023
Clear and Grub brush including stumps	AC	22,000	Source: ODOT 2022Q4, Item 0320-010000R, avg award + 10%. This item INCLUDES stump removal
Clearing and Grubbing	AC		ODOT does not have a bid item without stump removal.
Amended Soils and Mulch	CY	165	Source: ODOT 2022Q3, Item 1040-0194000K (Compost mulch), avg award + 10%
Jute Matting, Biodegradeable	SY	8	Source: ODOT 2022Avg, Item 0280-0105010,20,30,40 avg, avg award + 10%
Tree removal	EA	1,200	City of Wilsonville, provided by Zach Weigel December 2023
Geotextile	SY	7	Source: ODOT 2022Q4, Item 0350-010000J (drainage geotex Type 1), avg award + 10%
Energy dissapation pad - Rip-Rap, Class 50	CY	161	Source: ODOT 2022Avg, Item 0390-010500K, avg award + 10% - **ANDREW SAID NOT TO USE THIS ONE**
Energy dissapation pad - Rip-Rap, Class 100	CY	124	Source: ODOT 2022Avg, Item 0390-010800K, avg award + 10%
Energy dissapation pad - Rip-Rap, Class 200	CY	81	Source: ODOT 2022Avg, Item 0390-011000K, avg award + 10%
Dewatering (pipeline construction)	DAY	550	Recommend $550/day minimum for pipeline construction
Dewatering (other)	LS	5,000 - 50,000	Select as needed based on project needs (T. Suesser April 2023)
Drain Rock	CY	110	City of Wilsonville, provided by Zach Weigel December 2023
Streambed Cobble	TON	120	City of Wilsonville, provided by Zach Weigel December 2023
Water Quality Facility Installation			
Outflow Control Structure	EA	20,000	City of Wilsonville, provided by Zach Weigel December 2023
Swale Flow Spreader	EA	20,000	Unique facility (ditch inlet + outflow control) - City spec S-2225
Facility Inlet Structure	EA	10,000	Same as Outflow Control Structure
Water Quality Facility Plantings with Trees	SF	40	City of Wilsonville, provided by Zach Weigel January 2024
Rain Garden/ Swale	SF	130	City of Wilsonville, provided by Zach Weigel December 2023
Stormwater Planter	SF	180	City of Wilsonville, provided by Zach Weigel December 2023
Gravel Access Road	SF	5	2023RSMeans, for 9" thick gravel with geotextile
Beehive Overflow	EA	6,100	City of Wilsonville, provided by Zach Weigel December 2023
Structure Installation			
Field Ditch Inlet	EA	5,600	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 9-12' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	City of Wilsonville, provided by Zach Weigel December 2023
8'x8'x10' Concrete Vault	EA		
Precast Concrete Manhole (72", >12' deep)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Contech CDS (Model CDS3025, 72")	EA		
StormFilter (2-cartridge catch basin unit, 18" cartridges)	EA		
Drywell (48", 20-25' deep)	EA	14,100	Source: BC Assembly using RSMeans pricing
Curb Inlet	EA	8,300	Source: ODOT 2022Q4, Item 0470-0304000E (Concrete inlet, Type CG-1), avg award + 10%
ADA Ramp	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Catch Basin, all types	EA	8,300	Same as Curb Inlet
Concrete Fill - UIC Decomissioning	EA		
Connection to Existing Lateral	EA	6,000	City of Wilsonville, provided by Zach Weigel December 2023
Connection to Existing Structure, standard	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Abandon Existing Pipe, no excavation (12")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (15"-18")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (21"-24")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (27"-36")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, fill with grout	CF	8	Source: BC Assembly using previous bid pricing
Abandon Existing Structure	EA	3,400	Source: ODOT 2022Q4, Item 0490-0117000E (filling abandoned structures), avg award + 10%
Demo pipe	LF	30	Assumes 12" RCP pipe. Does not include excavation. Source: BC Assembly using RSMeans pricing
Remove existing pavement	SY	120	City of Wilsonville, provided by Zach Weigel January 2024
Remove structure	EA	1,700	Source: ODOT 2022Q4, Item 0310-0105000E (removal of manholes), avg award + 10%
Plug Existing Pipe, up to 18" dia, at manhole	EA	1,800	Source: BC Assembly using RSMeans pricing.
Plug Existing Pipe, up to 36" dia, at manhole	EA	2,300	Source: BC Assembly using RSMeans pricing.
Retrofit diversion structure	EA	50,000	Conservative estimate to retrofit diversion structure on seimens property. Options include raising invert elevation, plugging altogether, etc.
Check dams	EA	570	Aggregate Type 1 (Erosion Control) check dam. Source: ODOT 2022Q4, Item 0280-0106010E, avg award + 10%
Stem wall check dam	LF	600	Assume similar to retaining wall, 4' wide footing x 1' deep (buried 1' deep) with 4' tall wall x 12" th. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, larger than 48" pipe	EA	35,000	Assume approx 8' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA	25,000	Assume approx 5' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA		
Outfall Improvements	EA		
Restoration/Resurfacing			
Non-Water Quality Facility Landscaping	AC	27,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (Non-irrigated)	AC	36,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	City of Wilsonville, provided by Zach Weigel December 2023
Planting and Bioengineered Restoration	SY	60	City of Wilsonville, provided by Zach Weigel December 2023
4-foot Chain Link Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Split Rail Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Hydroseed, large quantities	AC	22,000	Source: ODOT 2022Avg, Item 1030-0110000R (Perm seeding, mix No. 2), avg award + 10%
Seeding, small quantities (< 5,000 sf)	SF	0.68	Source: ODOT 2022Q4, Item 1030-0138000J (lawn seeding), avg award + 10%
Sidewalk Installation	SF	17	Source: ODOT 2022Avg, Item 0759-0128000J (concrete walks), avg award + 10%
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	Source: ODOT 2022Avg, Item 0495-0100000J, avg award + 10%

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Permeable Paver Installation	SF	46	Source: ODOT 2022Avg, Item 0760-010000J (Unit pavers), avg award + 10%
Porous Asphalt Paving	SF	5	Source: 2023RSMeans, Item 32-12-16.13, 0600 (1" porous friction course over 3" bit course) adjusted to include hauling
Concrete Curbs	FT	74	Source: ODOT 2022Avg, Item 0759-0103000F (conc curb & gutter), avg award + 10%
Retaining wall, block	SF	119	Source: ODOT 2022Avg, Item 0596-B002000A (Retaining wall, prefab modular gravity), avg award + 10%
Retaining wall, CIP concrete	SF	250	City of Wilsonville
Retaining wall, sheet pile	SF	190	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Retaining wall, soldier pile	SF	210	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Root wad	EA	61	Source: Oregon, OH bid tab 2019 escalated
Trash rack	EA	5,600	Same as Field Ditch Inlet. City of Wilsonville, provided by Zach Weigel December 2023
Pipe Unit Cost			
Underdrain Pipe, 4"	LF	55	City of Wilsonville
Underdrain, 6" perforated HDPE	LF	60	City of Wilsonville
HDPE, 12", 10' to invert, not in road	FT	171	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, not in road	FT	179	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 10' to invert, in road	FT	470	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, in road	FT	567	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, not in road	FT	298	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, not in road	FT	310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, in road	FT	649	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, in road	FT	778	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 8", 10' to invert, not in road	FT	136	Interpolated
PVC, 12", 10' to invert, not in road	FT	206	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 10' to invert, not in road	FT	293	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 15' to invert, not in road	FT	215	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 15' to invert, not in road	FT	304	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 10' to invert, in road	FT	506	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 12", 15' to invert, in road	FT	602	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 15", 10' to invert, in road	FT	535	Interpolated from equivalants at 12" and 18" diam, MT 7/7/24
PVC, 15", 15' to invert, in road	FT	666	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 10' to invert, not in road	FT	249	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 15' to invert, not in road	FT	259	Interpolated from equivalants at 12" and 18" diam, SG 1/23/25
PVC, 18", 10' to invert, in road	FT	563	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 18", 15' to invert, in road	FT	731	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 24", 10' to invert, not in road	FT	381	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, not in road	FT	393	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 21", 10' to invert, in road	FT	647	Interpolated from equivalants at 18" and 24" diam, MT 7/7/23
PVC, 21", 15' to invert, in road	FT	796	Interpolated from equivalants at 18" and 24" diam, SG 1/23/24
PVC, 21", 15' to invert, not in road	FT	348	Interpolated from equivalants at 18" and 24" diam, SG 1/23/25
PVC, 24", 10' to invert, in road	FT	732	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, in road	FT	860	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 27", 10' to invert, in road	FT	805	Interpolated from equivalants at 24" and 30" diam, MT 7/7/23
PVC, 30", 10' to invert, not in road	FT	477	Interpolated from equivalants at 24" and 36" diam, MT 6/29/23
PVC, 30", 10' to invert, in road	FT	879	Interpolated from equivalants at 24" and 36" diam, MT 6/29/24
PVC, 36", 10' to invert, not in road	FT	573	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, not in road	FT	591	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 10' to invert, in road	FT	1,027	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, in road	FT	1,220	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 42", 10' to invert, not in road	FT	703	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 42", 10' to invert, in road	FT	1,169	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 48", 10' to invert, not in road	FT	834	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, not in road	FT	855	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 10' to invert, in road	FT	1,310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, in road	FT	1,536	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, not in road	FT	198	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, not in road	FT	207	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, in road	FT	498	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, in road	FT	594	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 15", 15' to invert, in road	FT	326	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 18", 15' to invert, in road	FT	391	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 24", 10' to invert, not in road	FT	303	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, not in road	FT	315	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 10' to invert, in road	FT	653	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, in road	FT	782	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 27", 15' to invert, in road	FT	766	Interpolated from equivalants at 24" and 36" diam, MT 7/06/23
RCP, 30", 10' to invert, in road	FT	866	Interpolated from equivalants at 24" and 36" diam, MT 6/30/23
RCP, 36", 10' to invert, not in road	FT	625	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, not in road	FT	642	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 10' to invert, in road	FT	1,079	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, in road	FT	1,272	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, not in road	FT	877	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, not in road	FT	898	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, in road	FT	1,353	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, in road	FT	1,579	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, not in road	FT	1,375	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, not in road	FT	1,401	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, in road	FT	1,861	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, in road	FT	2,151	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
Box Culvert (8' x 3')	FT	705	Source: 2023RSMeans, Item 33-42-11.60, 0200, excavation/backfill not included
Box Culvert (10' x 3')	FT	950	Source: 2023RSMeans, Item 33-42-11.60, 0300, excavation/backfill not included
Box Culvert (12' x 3')	FT	2070	Source: 2023RSMeans, Item 33-42-11.60, 0400, excavation/backfill not included
Contingencies and Multipliers			
Mobilization/Demobilization	LS	10%	
Erosion and Sediment Control	LS	3%	
Contingency	LS	40%	Updated per City of Wilsonville
Traffic Control/Utility Relocation	LS	5-10%	Dependent on work in ROW
Surveying	LS	5%	
Clackamas County Permitting	LS	8.83%	Applicable to Miley Road, added 6/22/23 per Kerry's instructions
Capital Expense Total (including contingency)			

Unit Cost Table			
Item	Unit	Proposed Unit Cost Mar 2023	Notes, Unit Cost Mar 2023
Design/Construction Administration (%)	LS	13.5%	Reflects City staff technical and administrative needs to execute the project. Per City of Wilsonville, assume minimum of $35,000.
Engineering and Permitting (%)	LS	20-30%	In-water dependent and capped on a case-by-case basis at $500,000 per City of Wilsonville. Per City of Wilsonville, minimum of $75,000.

BC-1: Library Pond

Key Project Elements

- Retrofit the existing Library Pond stormwater detention facility to meet current City PWS and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years.
- Install a pond outlet structure in compliance of current design standards.
- Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media.
- Install 15-ft wide, 25-ft long access road for maintenance access. Assume existing gate can be maintained.
- Remove and replace 70 LF of 18" CSP pipe at new design depth, approx. 15' deep.

Design Assumptions

- The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V.
- Facility sizing is based on adherence to the City's Public Works Standards (PWS), Chapter 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool.
- To size the pond in accordance with PWS design standards, approximately 48 acres require onsite treatment and flow control prior to discharge into Library Pond detention facility.
- Total pond depth includes drain rock (15"), separation layer (3"), and growing media (18"), in accordance with the 2015 PWS Section 3, Appendix A landscape and soil media requirements.
- Inlet and outlet pipe sizes are anticipated to remain unchanged. The outlet structure (standard drawing ST-6110) assumes an additional field inlet for 100-year overflow event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,350	$47,000
Fill, from onsite stockpile	CY	60	1,289	$77,340
Clear and Grub brush including stumps	AC	22,000	0.70	$15,400
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	324	$35,648
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Gravel Access Road	SF	5	375	$1,875
Water Quality Facility Plantings with Trees	SF	40	13,550	$542,000
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Demo pipe	LF	30	70	$2,100
Remove existing pavement	SY	120	210	$25,200
Remove structure	EA	1,700	1	$1,700
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	70	$4,200
PVC, 18", 15' to invert, not in road	FT	304	70	$21,252
Project Sub-Total				$863,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$86,300
Erosion and Sediment Control	LS	3%		$25,890
Contingency	LS	40%		$345,200
Traffic Control/Utility Relocation	LS	5%		$43,150
Surveying	LS	5%		$43,150
Capital Expense Total (including contingency)				$1,407,000
Design/Construction Administration (%)	LS	13.5%		$190,000
Engineering and Permitting (%)	LS	20%		$281,000
			TOTAL	$1,880,000

BC-2: Ash Meadows Flow Mitigation

Key Project Elements

- Plug flow diversion structure at Siemens Pond B.
- Upsize culvert under Boeckman Road from 30" to 48" PVC.
- Upsize culvert under SW Parkway Ave. from 36" to 48" PVC.
- Construct flow control structure at upstream end of culverts under Ash Meadows Road.
- Regrade and restore drainage way between Ash Meadows Road and Parkway Avenue.

Design Assumptions

- Excavate 18" depth for amended soils for entire 55,000 sq ft footprint area, per City Standards.
- Final design will include confirmation of flow control structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,056	$238,368
Clear and Grub brush including stumps	AC	22,000	1.3	$28,600
Amended Soils and Mulch	CY	165	1,019	$168,135
Tree removal	EA	1,200	30	$36,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	40	$3,240
Dewatering (other)	LS	50,000	1	$50,000
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Demo pipe	LF	30	175	$5,250
Retrofit diversion structure	EA	50,000	1	$50,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.3	$78,000
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, in road	FT	1,310	175	$229,268
Project Sub-Total				$924,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$92,400
Erosion and Sediment Control	LS	3%		$27,720
Contingency	LS	40%		$369,600
Traffic Control/Utility Relocation	LS	15%		$138,600
Surveying	LS	20%		$184,800
Capital Expense Total (including contingency)				$1,737,000
Design/Construction Administration (%)	LS	13.5%		$234,000
Engineering and Permitting (%)	LS	50%		$869,000
Geotechnical	LS	Flat Rate		$100,000
			TOTAL	$2,940,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1

Key Project Elements

- Construct a detention pond at Canyon Creek Park that would receive drainage from the wetland complexes described under Phase 2.

Design Assumptions

- Canyon Creek (phase 1) work includes only the installation of a vegetated facility at Canyon Creek Park and necessary conveyance.
- Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	13,900	$1,084,200
Clear and Grub brush including stumps	AC	22,000	1.6	$34,470
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.6	$94,008
4-foot Chain Link Fence	LF	60	1,130	$67,800
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$2,142,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$214,200
Erosion and Sediment Control	LS	3%		$64,260
Contingency	LS	40%		$856,800
Traffic Control/Utility Relocation	LS	5%		$107,100
Surveying	LS	5%		$107,100
Capital Expense Total (including contingency)				$3,491,000
Design/Construction Administration (%)	LS	3.5% + $200K		$322,000
Engineering and Permitting (%)	LS	30%		$1,047,000
			TOTAL	$4,860,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2

Key Project Elements

• Construct a series of linear wetland complexes to replace the existing Wiedemann ditch. Existing ditch would be enhanced to provide additional floodplain storage and mitigate flows received from Sysco ditch.

Design Assumptions

• Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
• Final design will include confirmation of weir sizing and layout.
• Final design will include confirmation of vegetated facility plantings and structure sizing.
• Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	25,600	$1,996,800
Clear and Grub brush including stumps	AC	22,000	3.6	$79,924
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Facility Inlet Structure	EA	10,000	1	$10,000
Structure Installation				
Gravel Access Road	SF	5	18,000	$90,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.6	$217,975
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$3,223,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$322,300
Erosion and Sediment Control	LS	3%		$96,690
Contingency	LS	40%		$1,289,200
Traffic Control/Utility Relocation	LS	5%		$161,150
Surveying	LS	5%		$161,150
Capital Expense Total (including contingency)				$5,253,000
Design/Construction Administration (%)	LS	3.5% + $200K		$384,000
Engineering and Permitting (%)	LS	30%		$1,576,000
			TOTAL	$7,210,000

BC-4: Boeckman Creek Stabilization at Colvin Lane

Key Project Elements

- Remove existing outfall pipe.
- Install approx. 70 LF of new outfall pipe with angle closer to parallel with creek channel.
- Install bioengineered plantings to stabilize streambank.
- Remove corrugated plastic pipe in existing channel bottom.

Design Assumptions

- Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. No cost included for access.
- Exact stabilization measures to be determined during project design.
- Assumes clearing/grubbing including stumps can include removal of existing corrugated pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	194	$15,132
Clear and Grub brush including stumps	AC	22,000	0.20	$4,400
Jute Matting, Biodegradeable	SY	8	90	$720
Embankment	CY	35	50	$1,750
Amended Soils and Mulch	CY	165	83	$13,695
Tree removal	EA	1,200	5	$6,000
Energy dissapation pad - Rip-Rap, Class 100	CY	124	10	$1,240
Drain Rock	CY	110	56	$6,160
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	1,500	$60,000
Structure Installation				
Demo pipe	LF	30	30	$900
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	360	$21,600
Pipe Unit Cost				
HDPE, 12", 15' to invert, not in road	FT	179	150	$26,895
PVC, 12", 10' to invert, not in road	FT	206	70	$14,399
Project Sub-Total				$173,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,300
Erosion and Sediment Control	LS	3%		$5,190
Contingency	LS	40%		$69,200
Traffic Control/Utility Relocation	LS	5%		$8,650
Surveying	LS	5%		$8,650
Capital Expense Total (including contingency)				$282,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$85,000
			TOTAL	$410,000

BC-5 Memorial Park Swale Retrofit

Key Project Elements

- Remove the existing WQ swale and relocate it at the bottom of the hill.
- Only designing for the WQ storm event (treatment only in the BMP Sizing Tool).
- Swale design is based on a retrofit approach. Facility sizing per PWS is not possible within available space. Design of swale with variance from design criteria (top width maximum) may allow for optimization of available space.
- Ideally keep swale outside of the 100-yr floodplain, but not a permit issue if within since it is not infiltration based.

Design Assumptions

- Remove 90 LF of 10-inch corrugated steel pipe (SD5041 and SD5042).
- Remove 120 LF of 12-inch corrugated steel pipe (SD5044).
- Remove: manhole (ST5098); inlet structure (CARTE ID 568); and outfall structure (CARTE ID 19).
- Fill existing swale and revegetate area.
- Replace 60 LF of 12" CSP with 18" PVC (SD5046); replace 2 48" MHs (ST5200 and ST5208).
- Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206).
- Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole.
- Install 50 LF of 12-inch PVC.
- Install 140 LF of 6-inch perforated HDPE underdrain pipe.
- Install inflow spreader with rip-rap pad, beehive overflow structure, and outfall to the creek.
- Install a new meandering water quality swale with 1 ft of drain rock and 1.5 ft of amended soil.
- Install split rail fence along pedestrian path north of the swale.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	55	$1,100
Fill, from onsite stockpile	CY	60	55	$3,300
General Earthwork/Excavation	CY	78	265	$20,670
Energy dissapation pad - Rip-Rap, Class 200	CY	81	2.2	$178
Drain Rock	CY	110	90	$9,900
Amended Soils and Mulch	CY	165	135	$22,275
Water Quality Facility Installation				
Beehive Overflow	EA	6,100	1	$6,100
Swale Flow Spreader	EA	20,000	1	$20,000
Facility Inlet Structure	EA	10,000	1	$10,000
Water Quality Facility Plantings with Trees	SF	40	2,400	$96,000
Structure Installation				
Demo pipe	LF	30	210	$6,300
Remove structure	EA	1,700	3	$5,100
Connection to Existing Structure, standard	EA	10,000	2	$20,000
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Outfall Improvements	EA	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Non-Water Quality Facility Landscaping	AC	27,000	0.5	$13,500
Split Rail Fence	LF	60	160	$9,600
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	140	$8,400
PVC, 12", 10' to invert, not in road	FT	206	50	$10,285
PVC, 12", 10' to invert, in road	FT	506	60	$30,360
PVC, 18", 10' to invert, not in road	FT	293	110	$32,247
Project Sub-Total				$387,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$38,700
Erosion and Sediment Control	LS	3%		$11,610
Contingency	LS	40%		$154,800
Traffic Control/Utility Relocation	LS	5%		$19,350
Surveying	LS	5%		$19,350
Capital Expense Total (including contingency)				$631,000
Design/Construction Administration (%)	LS	13.5%		$85,000
Engineering and Permitting (%)	LS	30%		$189,000
			TOTAL	$910,000

BC-6 - Gesellschaft Water Well Channel Restoration

Key Project Elements

- Existing outfall (STD3008) and upstream stormwater pipes can remain unchanged for the contributing 25 acres.
- Bypass the channel entirely by piping the weekly discharge from the well to the bottom of the slope into Boeckman Creek.
- Pipe is sized using PWS, smallest diameter (12-inch) to convey the flows.
- Weekly discharge of well volume is unknown, ODWR well logs were reviewed to verify that pipe size works with likely flows.
- Water discharge conveyance designed to comply with stormwater conveyance standards.

Design Assumptions

- Install approx. 480 LF of 12-inch PVC.
- Install 2 MHs along the new pipe alignment.
- Intall outfall and energy dissipation pad with Class 200 riprap.
- Restore the eroded discharge channel (approx. 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	214	$16,692
Energy dissapation pad - Rip-Rap, Class 200	CY	81	8	$648
Structure Installation				
Outfall Improvements	LS	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	345	$20,700
Pipe Unit Cost				
PVC, 12", 10' to invert, not in road	FT	206	480	$98,736
Project Sub-Total				$171,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,100
Erosion and Sediment Control	LS	3%		$5,130
Contingency	LS	40%		$68,400
Traffic Control/Utility Relocation	LS	5%		$8,550
Surveying	LS	5%		$8,550
Capital Expense Total (including contingency)				$279,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$84,000
			TOTAL	$400,000

CLC-1: Day Road Stormwater Improvements, Phase 1

Key Project Elements

- Replace the double-barrel 36-inch culverts that cross Day Road.
- Construct the channel improvements and culvert installations proposed by AKS in 2019 report (concept A-3).

Design/ Cost Assumptions

- The AKS concept was modeled and incorporated into BC's updated InfoSWMM model, which included updated hydrology.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers were maintained in this estimate for consistency with other capital project estimates.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	26,500	$2,067,000
Structural Earth Wall	SF	50	16,900	$845,000
Clear and Grub brush including stumps	AC	22,000	3	$66,000
Jute Matting, Biodegradeable	SY	8	4,950	$39,600
Energy dissapation pad - Rip-Rap, Class 100	CY	124	125	$15,500
Streambed Cobble	TON	120	900	$108,000
Water Quality Facility Installation				
Gravel Access Road	SF	5	15,000	$75,000
Structure Installation				
Demo pipe	LF	30	50	$1,500
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.2	$192,000
Pipe Unit Cost				
PVC, 36", 10' to invert, in road	FT	1,027	180	$184,932
Box Culvert (10' x 3')	FT	950	200	$190,000
Project Sub-Total				$3,595,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$359,500
Erosion and Sediment Control	LS	3%		$107,850
Contingency	LS	40%		$1,438,000
Traffic Control/Utility Relocation	LS	5%		$179,750
Surveying	LS	5%		$179,750
Capital Expense Total (including contingency)				$5,860,000
Design/Construction Administration (%)	LS	3.5% + $200K		$405,000
Engineering and Permitting (%)	LS	30%		$1,758,000
			TOTAL	$8,020,000

CLC-1: Day Road Stormwater Improvements, Phase 2

Key Project Elements

- Upsize the two existing parallel storm pipes located beneath the parking lot of Tax Lot 500, from 36-inch to 48-inch.
- Install a third, parallel 48-inch storm pipe.

Design/ Cost Assumptions

- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits. The establishment of similar onsite retention standards for Tualatin discharge may mitigate future flooding of this area.
- The small ponds at inlet of culverts across Ridder was not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	7	$126,000
Demo pipe	LF	30	1,200	$36,000
Restoration/Resurfacing				
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, not in road	FT	834	1,800	$1,500,840
Project Sub-Total				$1,680,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$168,000
Erosion and Sediment Control	LS	3%		$50,400
Contingency	LS	40%		$672,000
Traffic Control/Utility Relocation	LS	5%		$84,000
Surveying	LS	5%		$84,000
Capital Expense Total (including contingency)				$2,738,000
Design/Construction Administration (%)	LS	13.5%		$370,000
Engineering and Permitting (%)	LS	30%		$821,000
			TOTAL	$3,930,000

CLC-2: Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Key Project Elements

- Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert.
- Stabilize and restore embankment and channel after culvert replacement.
- Repave pedestrian path after culvert replacement.

Design Assumptions

- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	45	$3,510
Fill, imported clean	CY	115	45	$5,175
Embankment	CY	35	90	$3,150
Clear and Grub brush including stumps	AC	22,000	0.10	$2,200
Energy dissapation pad - Rip-Rap, Class 200	CY	81	10	$810
Structure Installation				
Demo pipe	LF	30	70	$2,100
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	270	$16,200
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
Box Culvert (10' x 3')	FT	950	70	$66,500
Project Sub-Total				$110,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,000
Erosion and Sediment Control	LS	3%		$3,300
Contingency	LS	40%		$44,000
Traffic Control/Utility Relocation	LS	5%		$5,500
Surveying	LS	5%		$5,500
Capital Expense Total (including contingency)				$179,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$290,000

CLC-3: Garden Acres Pond Retrofit

Key Project Elements

• Retrofit existing detention pond to increase storage capacity and water quality treatment along Peters Road and provide detention during high flow events.

Design Assumptions

• Install an inflow diversion structure at Peters Road (ST2101A).
• Install 95 LF of 24-inch PVC culvert at inlet of upsized detention pond.
• Increase existing detention pond capacity by 25,600 ft3 and lower pond invert to 196-ft elevation.
• Clear, regrade, and replant 0.9-acres of drainage way to ensure a low-flow drainage path and healthy vegetation.
• Install 155 LF of 24-inch PVC culvert at outlet of upsized detention pond.
• Install an outlet control structure at Peters Road (ST2431).
• Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,220	$251,160
Clear and Grub brush including stumps	AC	22,000	0.9	$19,800
Amended Soils and Mulch	CY	165	1,240	$204,600
Drain Rock	CY	110	1,030	$113,300
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	22,310	$892,400
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	980	$58,800
Pipe Unit Cost				
Field Ditch Inlet	EA	5,600	1	$5,600
Connection to Existing Structure, standard	EA	10,000	4	$40,000
PVC, 24", 10' to invert, not in road	FT	381	205	$78,023
PVC, 24", 10' to invert, in road	FT	732	45	$32,918
Project Sub-Total				$1,777,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$177,700
Erosion and Sediment Control	LS	3%		$53,310
Contingency	LS	40%		$710,800
Traffic Control/Utility Relocation	LS	5%		$88,850
Surveying	LS	5%		$88,850
Capital Expense Total (including contingency)				$2,897,000
Design/Construction Administration (%)	LS	3.5% + $200K		$301,000
Engineering and Permitting (%)	LS	20%		$579,000
			TOTAL	$3,780,000

NC-1: Frog Pond E and S Conveyance Pipe Installation

Key Project Elements

- Install stormwater collection system for main alignments in basin K1 identified in the Frog Pond East and South Master Plan.

Design Assumptions

- Pipe sizes and alignment was taken directly from the Frog Pond E and S Master Plan. This area was not included in the InfoSWMM modeling effort for this SMP.
- Install 2,050 LF of 24-inch PVC pipe.
- Install 310 LF of 30-inch PVC pipe.
- Install seven 60-inch manholes.
- Install 1 outfall.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Outfall Improvements	EA	10,000	1	$10,000
Pipe Unit Cost				
PVC, 24", 10' to invert, in road	FT	732	2,050	$1,499,575
PVC, 30", 10' to invert, in road	FT	879	310	$272,630
Project Sub-Total				$1,880,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$188,000
Erosion and Sediment Control	LS	3%		$56,400
Contingency	LS	40%		$752,000
Traffic Control/Utility Relocation	LS	5%		$94,000
Surveying	LS	5%		$94,000
Capital Expense Total (including contingency)				$3,064,000
Design/Construction Administration (%)	LS	13.5%		$414,000
Engineering and Permitting (%)	LS	20%		$613,000
			TOTAL	$4,090,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 1

Key Project Elements

- Remove existing Morey's Landing Bubbler (STD6604).
- Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement.
- Install a flow control diversion structure and low flow pipe at Willamette Way E to route water quality events to new raingardens and high flow events to the stormwater collection system along SW Willamette Way.
- Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall.
- Install 120 LF of 12-inch PVC on SW Willamette Way for flow exceeding the water quality event.
- Upsize 575 LF of 10-inch CPS to 12-inch PVC on SW Willamette Way (SD6629, SD6630, SD6632).
- Upsize 145 LF of 10-inch CSP to 18-inch PVC on Willamette Way (SD6638).
- Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).

Design Assumptions

- The raingardens (Phase 1) were sized as a filtration facility using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP will be constructed as an infiltration facility, pending infiltration testing. It is to be designed per the City's standard details for the selected BMP structure and used to treat the 1" water quality event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,055	$41,100
Fill, from onsite stockpile	CY	60	1,289	$77,340
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	376	$41,360
Water Quality Facility Installation				
Rain Garden/ Swale	SF	130	120	$15,600
Geotextile	SY	7	2.5	$18
Energy dissapation pad - Rip-Rap, Class 100	CY	124	1	$124
Water Quality Facility Plantings with Trees	SF	40	5,782	$231,280
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	305	$18,300
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Structure Installation				
Remove structure	EA	1,700	6	$10,200
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	5	$60,000
Pipe Unit Cost				
PVC, 8", 10' to invert, not in road	FT	136	25	$3,394
PVC, 12", 15' to invert, not in road	FT	215	120	$25,740
PVC, 12", 10' to invert, in road	FT	506	575	$290,950
PVC, 18", 10' to invert, in road	FT	563	145	$81,635
Connection to Existing Structure, standard	EA	10,000	4	$40,000
Project Sub-Total				$1,029,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$102,900
Erosion and Sediment Control	LS	3%		$30,870
Contingency	LS	40%		$411,600
Traffic Control/Utility Relocation	LS	10%		$102,900
Surveying	LS	5%		$51,450
Capital Expense Total (including contingency)				$1,729,000
Design/Construction Administration (%)	LS	13.5%		$233,000
Engineering and Permitting (%)	LS	20%		$346,000
			TOTAL	$2,310,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 2

Key Project Elements

- Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637).
- Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).

Design Assumptions

- Flows over the water quality event will be routed to the Belknap Court outfall (part of Phase 2 network).
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Demo pipe	LF	30	610	$18,300
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	3	$36,000
Pipe Unit Cost				
PVC, 18", 10' to invert, in road	FT	563	610	$343,430
Connection to Existing Structure, standard	EA	10,000	8	$80,000
Project Sub-Total				$483,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$48,300
Erosion and Sediment Control	LS	3%		$14,490
Contingency	LS	40%		$193,200
Traffic Control/Utility Relocation	LS	10%		$48,300
Surveying	LS	5%		$24,150
Capital Expense Total (including contingency)				$811,000
Design/Construction Administration (%)	LS	13.5%		$109,000
Engineering and Permitting (%)	LS	20%		$162,000
			TOTAL	$1,080,000

WR-2: Miley Road Stormwater Improvements - Phase 1

Key Project Elements

- Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall.
- Restore approx. 30 ft of channel bank on either side of new outfall.
- Replace area drain (ENG ID 9341).
- Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002).
- Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH.

Design Assumptions

- Access to outfall for removal and replacement is assumed feasible - costs have not been included for access requirements

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	100	$7,800
Embankment	CY	35	100	$3,500
Clear and Grub brush including stumps	AC	22,000	0.1	$2,200
Jute Matting, Biodegradeable	SY	8	100	$800
Energy dissapation pad - Rip-Rap, Class 200	CY	81	50	$4,050
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Demo pipe	LF	30	400	$12,000
Outfall Improvements	EA	10,000	1	$10,000
Remove structure	EA	1,700	2	$3,400
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	55	$3,300
Pipe Unit Cost				
PVC, 42", 10' to invert, not in road	FT	703	400	$281,380
Project Sub-Total				$352,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$35,200
Erosion and Sediment Control	LS	3%		$10,560
Contingency	LS	40%		$140,800
Traffic Control/Utility Relocation	LS	5%		$17,600
Surveying	LS	5%		$17,600
Capital Expense Total (including contingency)				$574,000
Design/Construction Administration (%)	LS	13.5%		$77,000
Engineering and Permitting (%)	LS	30%		$172,000
			TOTAL	$820,000

WR-2: Miley Road Stormwater Improvements - Phase 2

Key Project Elements

- Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road.
- Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road.
- Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011.
- Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral.
- Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall.
- Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.

Design Assumptions

- Costs for connections to existing system under brick wall have been assumed for connections and pipe length only. Constructability to be verified during detailed design.
- Costs assume that existing pipe alingment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	10	$140,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	3	$54,000
Connection to Existing Lateral	EA	6,000	19	$114,000
Abandon Existing Pipe, fill with grout	CF	8	3705	$29,640
Pipe Unit Cost				
PVC, 12", 15' to invert, in road	FT	602	80	$48,136
PVC, 18", 15' to invert, in road	FT	731	80	$58,476
PVC, 24", 10' to invert, in road	FT	732	650	$475,475
PVC, 24", 15' to invert, in road	FT	860	40	$34,408
PVC, 36", 10' to invert, in road	FT	1,027	3055	$3,138,707
PVC, 42", 10' to invert, in road	FT	1,169	530	$619,438
Project Sub-Total				$4,736,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$473,600
Erosion and Sediment Control	LS	3%		$142,080
Contingency	LS	40%		$1,894,400
Traffic Control/Utility Relocation	LS	5%		$236,800
Surveying	LS	5%		$236,800
Clackamas County Permitting	LS	8.83%		$418,189
Capital Expense Total (including contingency)				$7,720,000
Design/Construction Administration (%)	LS	3.5% + $200K		$470,000
Engineering and Permitting (%)	LS	30%		$2,316,000
			TOTAL	$10,510,000

WR 3 - Rose Lane Culvert Replacement

Key Project Elements

- Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available).
- Install approximately 40 LF of parallel 12-inch RCP culverts.
- Reconfiguring culvert diagonally across roadway to move it away from the residental building (garage) and remove hard bends.
- Maintain 12-inch pipe cover in roadway (minimum amount).

Design Assumptions

- Assuming recommended culvert sizing is sufficent to convey H/H flows. Unable to easily model due to lack of stream information (seasonal stream in wetland).
- Survey required.
- Roadwork beyond trenching not evaluated.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Clear and Grub brush including stumps	AC	22,000	0.05	$1,100
Structure Installation				
Demo pipe	LF	30	25	$750
Field Ditch Inlet	EA	5,600	2	$11,200
Pipe Unit Cost				
RCP, 12", 10' to invert, in road	FT	498	80	$39,864
Project Sub-Total				$53,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$5,300
Erosion and Sediment Control	LS	3%		$1,590
Contingency	LS	40%		$21,200
Traffic Control/Utility Relocation	LS	5%		$2,650
Surveying	LS	5%		$2,650
Capital Expense Total (including contingency)				$86,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$200,000

WR-4: Charbonneau East Stormwater Improvements, Phase 1

Key Project Elements

- Upsize and replace the existing stormwater outfall (serving Charbonneau development) along the Willamette River.

Design Assumptions

- Remove and replace existing Charbonneau East Outfall.
- Upsize 115 LF of 30-inch pipe discharging to Willamette River to 36-inch diameter PVC.
- Replace 72-inch manhole (ST9014).

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Connection to Existing Structure, standard	EA	10,000	1	$10,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	145	$11,745
Restoration/Resurfacing				
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	115	$65,907
Project Sub-Total				$116,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,600
Erosion and Sediment Control	LS	3%		$3,480
Contingency	LS	50%		$58,000
Traffic Control/Utility Relocation	LS	5%		$5,800
Surveying	LS	5%		$5,800
Capital Expense Total (including contingency)				$201,000
Design/Construction Administration (%)	LS	25.0%		$50,000
Engineering and Permitting (%)	LS	50%		$101,000
Outreach Coordination	LS	Flat Rate		$250,000
			TOTAL	$600,000

WR-4: Charbonneau East Stormwater Improvements, Phase 2

Key Project Elements

- Upsize and replace stormwater network along SW French Prairie Rd or SW Old Farm Rd.

Design Assumptions

- Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end).
- Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242).
- Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020).
- Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019).
- Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017).
- Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027).
- Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).
- Replace eight 48-inch manholes.
- Replace nine 60-inch manholes.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	4	$48,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	4	$60,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	5	$70,000
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	4	$88,000
Connection to Existing Structure, standard	EA	10,000	12	$120,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	910	$460,460
PVC, 15", 10' to invert, in road	FT	535	1,200	$641,400
PVC, 18", 10' to invert, in road	FT	563	310	$174,530
PVC, 30", 10' to invert, in road	FT	879	360	$316,602
PVC, 24", 10' to invert, in road	FT	732	570	$416,955
PVC, 30", 10' to invert, in road	FT	879	300	$263,835
Project Sub-Total				$1,979,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$197,900
Erosion and Sediment Control	LS	3%		$59,370
Contingency	LS	40%		$791,600
Traffic Control/Utility Relocation	LS	10%		$197,900
Surveying	LS	5%		$98,950
Capital Expense Total (including contingency)				$3,325,000
Design/Construction Administration (%)	LS	13.5%		$449,000
Engineering and Permitting (%)	LS	20%		$665,000
			TOTAL	$4,440,000

WR-4: Charbonneau West Stormwater Improvements

Key Project Elements

- Replace stormwater network along SW French Prairie Road, SW Curry Drive, SW Boones Bend Road

Design Assumptions

- Replace 200 LF of 12-inch pipe along SW French Prairie Road with PVC (ENG ID: ST9048 to ST9281)
- Replace a total of 1,540 LF of 15-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace a total of 2,450 LF of 18-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace 680 LF of 21-inch pipe along SW Boones Bend Road with PVC.
- Replace 670 LF of 24-inch pipe along SW French Prairie Road and SW Boones Bend Road with PVC.
- Replace 420 LF of 27-inch pipe along SW Boones Bend Road with PVC.
- Replace 640 LF of 30-inch pipe along SW Boones Bend Road with PVC.
- Replace 170 LF of 36-inch pipe along SW Boones Bend Road with PVC.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	29	$348,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	2	$36,000
Connection to Existing Lateral	EA	6,000	15	$90,000
Outfall Improvements	EA	10,000	2	$20,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	200	$101,200
PVC, 15", 10' to invert, in road	FT	535	1,540	$823,130
PVC, 18", 10' to invert, in road	FT	563	2,450	$1,379,350
PVC, 21", 10' to invert, in road	FT	647	680	$440,130
PVC, 24", 10' to invert, in road	FT	732	670	$490,105
PVC, 27", 10' to invert, in road	FT	805	420	$338,300
PVC, 30", 10' to invert, in road	FT	879	640	$562,848
PVC, 36", 10' to invert, in road	FT	1,027	170	$174,658
Project Sub-Total				$4,902,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$490,200
Erosion and Sediment Control	LS	3%		$147,060
Contingency	LS	40%		$1,960,800
Traffic Control/Utility Relocation	LS	10%		$490,200
Surveying	LS	5%		$245,100
Capital Expense Total (including contingency)				$8,235,000
Design/Construction Administration (%)	LS	3.5% + $200K		$488,000
Engineering and Permitting (%)	LS	20%		$1,647,000
			TOTAL	$10,370,000

Charbonneau R&R Program

Key Project Elements

- Replace pipe in Charbonneau District that isn't being replaced by another CIP or hasn't been recently replaced. Recently replaced pipe was designated by the City as anything replaced between 2015-2022.
- Assume minimum pipe size of 12-inch. Assume all other pipe is replace-in-place.
- Assume replacements of all manholes (except those excluded from above mentioned projects).

Design Assumptions

- Replace 19,460 LF of 12-inch diameter PVC pipe.
- Replace 4,590 LF of 15-inch diameter PVC pipe.
- Replace 3,620 LF of 18-inch diameter PVC pipe.
- Replace 1,210 LF of 21-inch diameter PVC pipe.
- Replace 750 LF of 24-inch diameter PVC pipe.
- Replace 180 LF of 27-inch diameter PVC pipe.
- Replace 340 LF of 30-inch diameter PVC pipe.
- Replace 470 LF of 36-inch diameter PVC pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	120	$1,440,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	13	$195,000
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	3	$54,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	15	$210,000
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	2	$46,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	13,470	$6,815,820
PVC, 12", 15' to invert, in road	FT	602	2,500	$1,504,250
PVC, 12", 10' to invert, not in road	FT	206	3,210	$660,297
PVC, 12", 15' to invert, not in road	FT	215	280	$60,060
PVC, 15", 10' to invert, in road	FT	535	2,220	$1,186,590
PVC, 15", 15' to invert, in road	FT	666	570	$379,805
PVC, 15", 10' to invert, not in road	FT	249	1,680	$419,034
PVC, 15", 15' to invert, not in road	FT	259	120	$31,086
PVC, 18", 10' to invert, in road	FT	563	1,870	$1,052,810
PVC, 18", 15' to invert, in road	FT	731	880	$643,236
PVC, 18", 10' to invert, not in road	FT	293	630	$184,685
PVC, 18", 15' to invert, not in road	FT	304	240	$72,864
PVC, 21", 10' to invert, in road	FT	647	670	$433,658
PVC, 21", 15' to invert, in road	FT	796	520	$413,699
PVC, 21", 15' to invert, not in road	FT	348	20	$6,963
PVC, 24", 10' to invert, in road	FT	732	410	$299,915
PVC, 24", 10' to invert, not in road	FT	381	340	$129,404
PVC, 27", 10' to invert, in road	FT	805	180	$144,986
PVC, 30", 10' to invert, in road	FT	879	340	$299,013
PVC, 36", 10' to invert, not in road	FT	573	240	$137,544
PVC, 36", 15' to invert, in road	FT	1,220	230	$280,577
Project Sub-Total				$17,101,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$1,710,100
Erosion and Sediment Control	LS	3%		$513,030
Contingency	LS	40%		$6,840,400
Traffic Control/Utility Relocation	LS	10%		$1,710,100
Surveying	LS	5%		$855,050
Capital Expense Total (including contingency)				$28,730,000
Design/Construction Administration (%)	LS	13.5%		$3,879,000
Engineering and Permitting (%)	LS	20%		$5,746,000
			TOTAL	$38,360,000

Appendix F: Library Pond Analysis

Technical Memorandum

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan Update

Project No.: 156157

Technical Memorandum

Subject: Library Pond Evaluation

Date: June 14, 2023

To: Kerry Rappold, City of Wilsonville

From: Brown and Caldwell

Prepared by: Shelby Gilmartin, E.I.T

Reviewed by: Angela Wieland, P.E.

Limitations:

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Executive Summary

This Technical Memorandum (TM) describes a sizing evaluation conducted on the Library Pond stormwater detention facility (also referred to as the Memorial Park Pond). This evaluation was conducted as part of the City's 2023 Stormwater Master Plan (SMP) Update to determine capital project needs (specific to retrofit of the Library Pond), as well as policy recommendations (to be documented in the SMP) related to redevelopment of the Wilsonville Town Center, which contributes stormwater to the Library Pond.

This evaluation utilized the City of Wilsonville's BMP Sizing Tool, which is intended for use in conjunction with the *2015 Stormwater & Surface Water Design & Construction Standards,* as well as historic as-built drawings, results from the InfoSWMM model, Geographic Information System (GIS) data, and the *2019 Wilsonville Town Center Plan* to analyze pond sizing and ability to effectively mitigate stormwater flows under three development scenarios. The development scenarios reflect unique land cover and impervious conditions specific to pre-development (Oak Savanna) land use conditions, existing (current) land use conditions, and future (Town Center build-out) land use conditions.

Section 1: Background

The Library Pond Stormwater Detention Facility (Library Pond) was originally constructed in the 1980s. Modifications were made to the pond in 1992 as part of the Memorial Park site improvements. These improvements include enlarging the pond, installing new stormwater piping, an outfall, and inlet, as well as enclosing the pond with a chain-link fence.

The Library Pond receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, east of Interstate 5 and adjacent to Wilsonville Road. The Library Pond discharges to a piped collection system, which outfalls to an unnamed tributary to Boeckman Creek approximately 750 feet downstream of the Library Pond. Boeckman Creek is a tributary to the Willamette River. Water quality monitoring has been conducted at the Library Pond since the late 1990's in accordance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit. Although operating as a regional stormwater facility, there are several notable characteristics of the pond that may contribute to observed capacity and water quality issues:

- There is no flow control/orifice structure or emergency overflow type structure, thus providing limited detention benefit.
- Vegetation is overgrown with invasive species and sediment has accumulated along the pond bottom, limiting pond capacity and water quality function.
- As shown in the as-builts and verified on-site, the facility has very steep side slopes (estimated to be 2H:1V), limiting facility access and maintenance.
- City staff have experienced ongoing challenges with debris removal at existing ditch inlet, which serves as the outlet from the pond so impounded trash can quickly result in a flooding issue.

Hydraulic analysis of the Library Pond conducted for the SMP in 2022 indicates that flooding occurs during the 25-year future development condition. This finding is confirmed by City staff who have observed flooding of the Wilsonville Public Library parking lot and Memorial Drive near the entrance to Memorial Park. The contributing drainage area to the Library Pond is subject to redevelopment in both the near term and long term as part of the Wilsonville Town Center Plan (adopted May 6, 2019).

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The three phases of the Willamette Town Center Plan include:

- Phase I - infill and redevelopment of vacant and/or underutilized land over the next 10 years (approx. 2019-2029). This will focus on areas where landowners can develop new buildings on vacant or underused parking without impacting existing businesses. The mostly likely type of redevelopment occurring will be existing retail and commercial buildings, multifamily residential, and some mixed-use development.
- Phase 2 - redevelopment, multiuse, and parking garage integration in the next 10-20 years (approx. 2029-2039). This phase includes office and mixed-use development with attached structured parking leading to the redevelopment of surface lots, redesign of the street grid because of development, and streetscape management.
- Phase 3 – the full build out will include high-density, mixed-use buildings, completion of pedestrian networks and vehicle roadways, and reallocation of parking facilities behind or integrated into buildings. This phase is anticipated to occur in the next 20+ years (approx. 2039-TBD).

The City anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with private redevelopment and public improvements in the Town Center Plan area. Design and construction of the Library Pond retrofit may be funded exclusively through system development charges (SDCs) applied to Town Center redevelopment, allowing the City to charge Town Center development a fee-in-lieu.

Section 2: City of Wilsonville Stormwater Design Standards

Over the past decade, stormwater management practices in Oregon have evolved to require consideration of hydromodification as well as more traditional water quality and peak flow (detention) requirements. Hydromodification is the change in runoff patterns caused by land use and impervious area changes that result in the degradation of stream channels and water quality (i.e., stream erosion from the extended duration of peak flows). Traditional stormwater treatment and detention design practices typically analyze pre- and post-development peak flows associated with a standard (i.e., 24-hour) synthetic design storm. A hydromodification standard requires continuous simulation flow modeling to evaluate both peak flow but also the duration of flows exceeding a specific recurrence interval. Adherence to a hydromodification standard assumes that peak flow and flow duration for the post-development condition does not exceed the pre-developed condition for a range of geomorphically significant flows—those capable of moving sediment and eroding streambanks. For the City of Wilsonville, the range of geomorphically significant flows is established as 42 percent of the 2-year flow to the 10-year flow.

Given the complexity of evaluating stormwater controls to adhere to a hydromodification standard, municipalities that have adopted a hydromodification standard have also developed tools to aid developers with design.

2.1 Design Standards

The City's Public Works Design Standards (PWS) (i.e., *City of Wilsonville's 2015 Stormwater & Surface Water Design & Construction Standards, Section 3*) were updated in December 2015 to emphasize low-impact development (LID) facilities that incorporate infiltration to address both pollutant reduction and flow control as well as develop facility sizing to address hydromodification impacts.

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2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater facilities for hydromodification-based standards. The BMP Sizing Tool (last updated in 2017) is used in conjunction with the City's PWS and by developers and engineers to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate the following BMP types:

- Rain Garden - Filtration and Infiltration
- Stormwater Planter - Filtration and Infiltration
- Vegetated Swale - Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The tool was developed based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration is based on the facility soil subgroup. Groups A1 – B3 include infiltration rates greater than 0.50 in/hr and are considered acceptable for use with infiltration facilities. Groups C1 – D1 reflect infiltration rates from 0.02 – 0.49 in/hr and are considered acceptable for use with filtration facilities. Infiltration facilities use only infiltration to manage runoff. Filtration facilities include piped underdrain systems and orifice controls.

The following table is an excerpt from the *User's Guide for the BMP Sizing Tool* which shows the BMP sizing dimension for each facility type. The focus for this analysis will be on the capabilities of the Detention Pond for treatment and flow control settings in the tool.

Table 4. BMP Dimensions Required for the Sizing Tool to Apply

Facility	Drain Rock, min. in.	Separation Layer, in.	Growing Media, min. in.	Ponding Depth, in.	Freeboard, min. in.	Side Slope, ratio	Bottom Width, min. in.	Liner
Stormwater Planter - Filtration	12	3	18	12	4	0	18	If required
Stormwater Planter - Infiltration	28	3	18	12	4	0	30	No
Rain Garden - Filtration	18	3	18	12	4	3:1 max	24	If required
Rain Garden - Infiltration	18	3	18	16	N/A	3:1 max	24	No
Vegetated Swale - Filtration	12	3	18	12	4	3:1 max	24	If required
Vegetated Swale - Infiltration	18	3	18	12	N/A	3:1 max	24n	No
Detention Pond	15	3	18	Per sizing model (12 in. min.)	12[a]	3:1 max	N/A	If required

a. The surface area of the detention pond, the filtration rain garden and the filtration swale sized by the tool does not take freeboard into account. In addition, see Note 12 on the Detention Pond detail regarding an emergency spillway.

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Although the table states a side slope ratio of 3H:1V max for detention ponds, the 2015 PWS section 301.4.09 states a General Facility Design Requirement that stormwater management facilities shall not exceed 4H:1V up to the maximum design water elevation. The initial analyses used 4H:1V sizing requirements. After review by the City, the scenarios were refined to optimize pond sizing and incorporated a 3H:1V side slope to maximize potential storage at Library Pond.

For detention ponds, the tool can be used to either calculate a simple geometry or a custom geometry. A simple geometry uses a known surface area or depth and entered slope to calculate the bottom area and depth or surface area (whichever was initially an unknown variable). While the custom geometry relies on known depth, area, and flow values. For each configuration option, the BMP Sizing Tool routes the post-development flow through the pond, performs statistical analyses for flow duration and peak flow criteria, and reports if the pond is sized adequately.

For ponds sized using simple geometry, the required outlet dimensions for the pond will be calculated. This includes inverts and dimensions of lower orifice, upper orifice, and overflow weir which correspond to the provided facility schematic (see Figure 1). Figure 1 depicts the main features of the outlet structure with the locations of their inverts. The overflow weir is at 1 foot below the 10-year pond water surface elevation. It is assumed that the pond will need to include additional freeboard (typically 1 foot) above the 10-year water surface elevation.

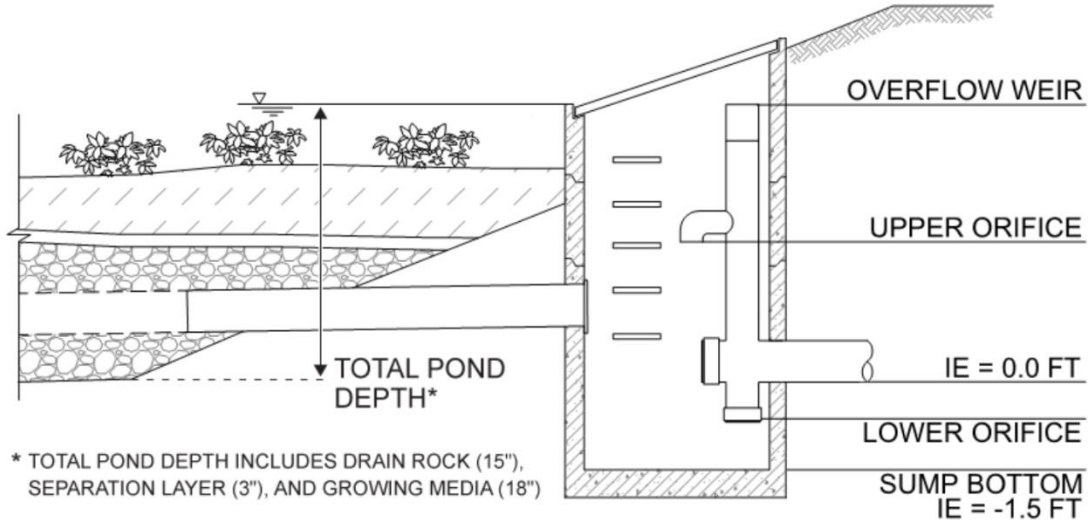

Figure 1. Detention pond facility schematic

The BMP Sizing Tool also calculates flow duration and peak flow frequency curves to compare pre-development to post-project flows. The curves represent the flow and duration over the range of geomorphically significant flows (i.e., lower threshold of 42 percent of the 2-yr storm and an upper threshold of the 10-yr storm). When a pond is adequately sized the mitigated post-development curve (blue per the BMP Sizing Tool output) falls below the pre-development curve (red per the BMP Sizing Tool output). It will also be sized to ensure treatment of 80 percent of the average annual runoff.

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Section 3: Evaluation and Methodology

With the 2015 updates to the PWS, the Library Pond as it exists today does not meet the City's current stormwater design and construction specifications. This TM documents the evaluation of the existing pond location and footprint against several pre- and post- development scenarios. The process used for this evaluation of the facility includes:

1. Utilize facility as-builts, the InfoSWMM model, and the Town Center Plan to determine the current pond facility size, contributing drainage area and land use, and the pond's stage storage curve;
2. Determine if the current pond storage volume and outlet structure address current flows reflective of existing development conditions and pre-development flows reflective of historic land use conditions, as required in the 2015 PWS;
3. Use the BMP Sizing Tool to compare pond sizing and outlet adjustments, assuming existing development conditions and historic land use conditions, to meet the minimum criteria in the City's design standards;
4. Locate potential impervious areas within the Town Center redevelopment for upstream, low impact development (LID) planter facilities to meet the City's water quality treatment and flow control requirements associated with the City's established hydromodification standard;
5. Use the BMP Sizing Tool to iterate and optimize pond sizing and outlet configurations in conjunction with LID sizing/placement to meet the City's design standards in conjunction with future development of the Town Center and associated site constraints, and
6. Document LID placement needs associated with future development to determine fee-in-lieu policy implications.

To evaluate Library Pond sizing in conjunction with the above-mentioned process, the 11 subbasins (delineated as part of the SMP) that drain into the Library Pond were subdivided based on various land cover and impervious conditions reflective of pre-development, existing, and future development conditions. Under future development conditions, the Town Center development plans include demolition of existing stormwater infrastructure and installation of new pipes to convey stormwater drainage in conjunction with the proposed roadway configuration.

Because the existing footprint of the pond, approximately 0.7 acres, is constrained by limitations (roadways, trees, etc.), simple pond sizing was employed by holding the pond surface area constant and allowing the BMP Sizing Tool to calculate a required pond depth and bottom surface area.

3.1 Discharge Management Areas

The BMP Sizing Tool requires users to first delineate Discharge Management Areas (DMAs), also referred to as subcatchments, which are used to define a contributing drainage area to each planned BMP facility on a site. The BMP Sizing Tool has limitations on the size of individual DMAs to individual LID facilities. In addition, to facilitate iteration of scenarios related to BMP sizing, flexibility had to be incorporated into the DMAs. Therefore, the contributing drainage area to the Library Pond had to be categorized and subdivided.

The DMAs were initially developed by subdividing each of the 11 subbasins (totaling 179.8 acres) into their respective Hydrologic Soil Groups (HSGs) - either B, C, or D (note: soils that fell into a dual-HSG category are reflected by the less infiltrating soil. For example, a soil in group C/D was calculated as HSG D). The total area of analysis was found to be 35% HSG B, 42% HSG C, and 23% HSG D, with the actual site of Library Pond in HSG B soils.

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The areas were then further subdivided by land cover to separate existing roadways/Right-of-ways (ROWs) from private property. Existing ROW areas were confirmed against the future Town Center Plan to ensure the area would remain roadways in the future development condition. Similarly, building (rooftop) area and pavement areas were also designated and digitized to inform the delineation of DMAs. An example of how this hierarchy was implemented is shown in Figure 2.

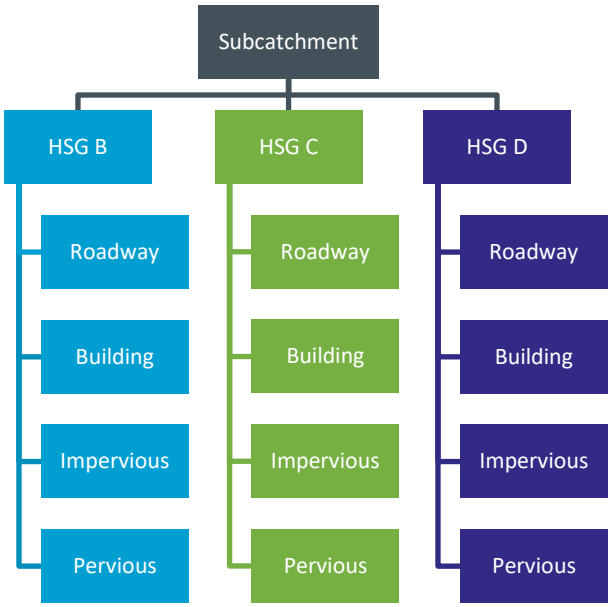

Figure 2. Example hierarchy of how the subcatchments were divided into DMAs

The DMAs were set-up to meet each of the three (3) initial scenarios for evaluation:

1. Pre-development (Oak Savanna) to existing conditions (today)
2. Pre-development (Oak Savanna) to future conditions (Town Center build out)
3. Existing conditions (today) to future conditions (Town Center build out)

To accommodate each of these scenarios, a total of 98 individual DMAs were established to represent the soil characteristics and development types over the 11 subcatchments. Each of the DMAs has a unique pre-development and post-development surface types associated with a specific soil type.

A database and specific naming convention was used to track DMAs and associated information. DMAs were named by subcatchment number, HSG letter, the existing development type, and the future development type. For example, a DMA from scenario 3 may read as 3414_D_Ex_Perv_Fu_Imp with an area of 3,995 square feet. This naming convention indicates that this DMA is currently a pervious surface (noted as Grass in the tool) but is anticipated to become an impervious surface (Conventional Concrete or Asphalt) under the full Town Center development.

3.2 Best Management Practices

Although the BMP Sizing Tool has eight (8) available facility types to develop sizing, this analysis focused on the Detention Pond with treatment and flow control to represent the Library Pond. Since the Library Pond is located in HGL B soils, the more conservative group B value (called B3 in the tool) with an infiltration rate of 0.50-0.99 in/hr was used to represent these soils. This range was verified against data from the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) soil survey database which identified the soil in this area to be primarily Willamette silt loam with a saturated hydraulic conductivity (Ksat) between 0.57-1.98 in/hr.

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The pond was modeled using both custom and simple geometry in the tool in order to compare existing pond sizing as well as determine sizing and outlet control adjustments. The custom geometry was used in the BMP Sizing Tool to represent the existing facility under current and future conditions to confirm if it meets design standards. For the custom sizing, the geometry data was extracted from the InfoSWMM model (based on the 1992 as-built data) to determine the depth in feet (ft), area in square feet (sq ft), and flow in cubic feet per second (cfs) based on modeled stage storage for the 10-year storm event. The stage storage information extracted from InfoSWMM is listed in Table 1.

Table 1. Library Pond Stage Storage

Depth (ft)	Area (sq ft)	Flow (cfs)
0	0	0
1	10,018	9.4
2	17,859	14.3
5	23,522	19.7
9	32,670	Not reached in 10-year storm
10	34,848	Not reached in 10-year storm

It is assumed that usable storage within the pond must remain below the elevation of the chain link fence at its lowest position (near the outlet structure where it passes under the road). This elevation contour of 147 ft is considered the upper limit of the pond with a calculated surface area of 30,130 sq ft. The lowest full elevation contour of the pond was calculated to be 137 ft with a surface area of 17,800 sq ft. It was assumed that the existing footprint of the pond is a hard constraint, and the surface area of the pond could not be expanded.

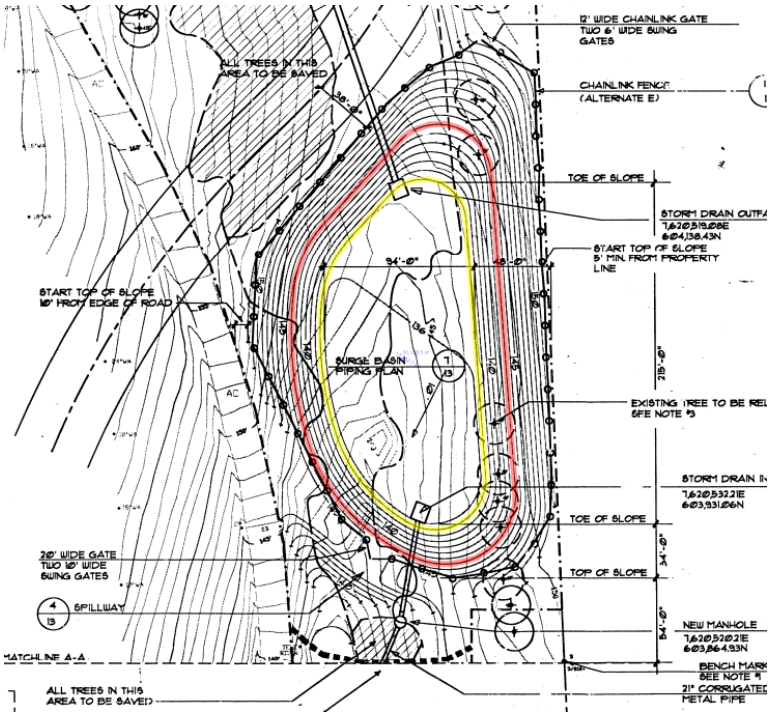

Figure 3. Library Pond 1992 as-builts, upper 147 ft contour (red) and lower 137 ft contour (yellow)

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Alternatively, the simple geometry calculation was used to confirm modifications needed to retrofit the pond to current PWS design standards, based on each of the scenarios. The simple geometry could be run with either a known pond surface area, a known depth, or both. If one variable is unknown the tool calculates it based on the provided information for the surface area and/or depth and slope (H:V), as well as calculated the bottom area of the pond. Values for the surface area and slope were rounded to the nearest whole number for calculations.

Since the detention pond is being evaluated to meet both the water quality and flow control criteria, the BMP Sizing Tool was used to evaluate and size the pond facility to address peak flow duration matching for flows ranging from 42 percent of the 2-year peak flow to the 10-year peak flow as well as ensure treatment of 80 percent of the average annual runoff.

Section 4: Scenarios

The following three (3) scenarios were established to compare past, present, and future conditions of the Town Center Development area and associated sizing of the Library Pond. Each scenario was input into the BMP Sizing Tool to see how the system (pond) would respond under the varying development assumptions, with accompanying scenarios evaluated to confirm what level of retrofit or policy change regulating upstream LID installations are needed to meet the City's design standards.

4.1 Scenario 1: Pre-development to Existing Conditions

This scenario simulated pre-development conditions, referred to as Oak Savanna in the 2015 PWS, and existing development conditions to confirm whether the existing Library Pond sizing is adequate to meet design standards. The contributing drainage area under existing conditions is 47 percent impervious. In comparison, Oak Savanna is considered 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type.

Simply comparing the aerial photography from 1992 (which is not representative of Oak Savanna but represents the oldest web accessible archived image) to aerial imagery from 2022, it is evident that this area has experienced a large amount of development over the past 30 years.

Figure 4. Aerial images of site and surrounding area

Left: after retrofit in June 1994

Right: July 2022, representative of existing condition.

4.1.1 Pond Sizing Evaluation

Simulation of the Library Pond configuration in the BMP Sizing Tool indicates that the existing pond does not meet the current stormwater design standards per the 2015 PWS. The existing pond geometry was entered into the tool using stage storage information from the 1992 as-builts and SMP InfoSWMM model. As seen in Figure 5, the blue line represents the discharge occurring from the pond and it is consistently higher than the red, pre-development (Oak Savannah) flow frequency and flow duration curves. Library Pond in its current configuration does not adequately match the pre-development curves and additional pond storage is needed.

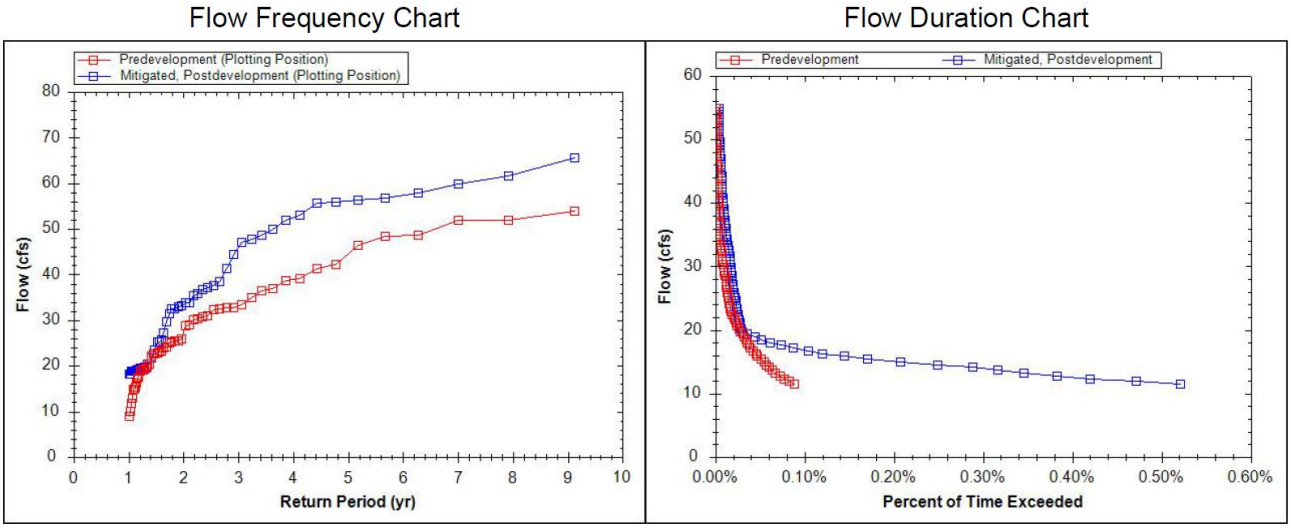

Figure 5. Curves based on existing stage storage information from as-builts

Pre-development shown in red. Mitigated, Post-Development shown in blue.

4.1.2 Pond Retrofit Evaluation

The BMP Sizing Tool was used to simulate additional scenarios associated with the pond configuration and size, as outlined in Table 2, to calculate pond retrofits required to meet current design standards. The BMP Sizing Tool calculations show that significant design modifications are required to ensure the pond is adequately sized; specifically the pond would need to be retrofit to have 1H:1V side slopes with a depth of nearly 24 feet (Figure 6) to adhere to the City's hydromodification standard (see Attachment A, Scenario 1A). This design fails to meet the design criteria for detention ponds having 3H:1V slopes and results in an excessively deep detention facility. Retrofit of the pond to meet City design standards based on existing development conditions is considered infeasible.

Table 2. Scenario 1 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information per as-builts				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, geometry doesn't work
	1:1	Auto calculate depth	23.98	15,780	Yes, sized adequately

Note: there is some variation between calculated depths with the same slope based on the tool and the outset structure sizing/configuration.

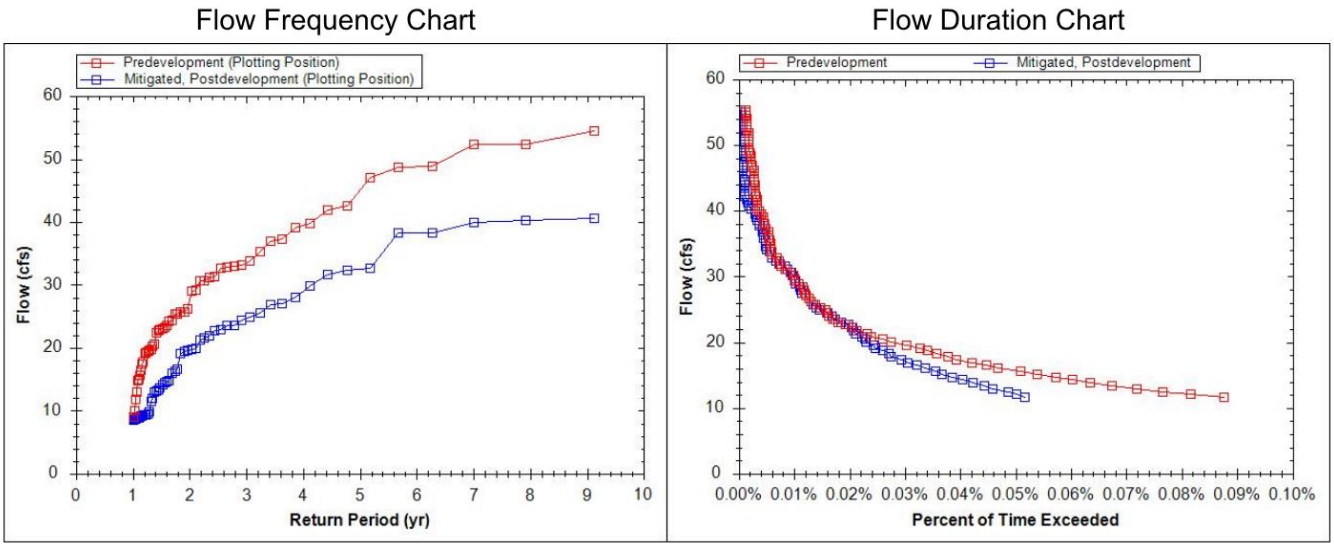

Figure 6. Flow frequency and duration curves if retrofit is to have 1H:1V side slopes and a depth of nearly 24 feet

Pre-development (red) to Existing condition (blue)

4.1.3 Onsite Flow Mitigation Evaluation

An additional, theoretical investigation was conducted to see how much of the current contributing drainage area to Library Pond would need to be managed onsite (i.e., routed to onsite LID) for the pond to meet current design standards.

To evaluate, the BMP Sizing Tool was used to automatically size the detention pond, maintaining the existing pond surface area of 30,130 sq. ft., and adjusting the side slopes to meet the PWS of 3H:1V. The automatic sizing mode to calculate the depth and bottom area of the pond. DMAs were then selectively removed from contributing area to the detention pond with the assumption that removed DMAs would require onsite stormwater management (retention) and use of LID such as planters or raingardens.

By removing approximately 20 percent of the existing total drainage area (roughly 36 acres of impervious surface or 43% of the contributing impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. This reduces the total drainage area to the Library Pond to 143.3 acres. The resulting pond sizing requires deepening the Library Pond to 15.08 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,906 sq. ft. See Attachment A, Scenario 1B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.08 feet and 3H:1V side slopes is as follows in Figures Figure 7 and Figure 8.

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Structure	Size
Lower Orifice Diameter	9.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	25.2 in
Upper Orifice Invert	9.8 ft
Weir Length	6.3 ft
Weir Invert	13.6 ft

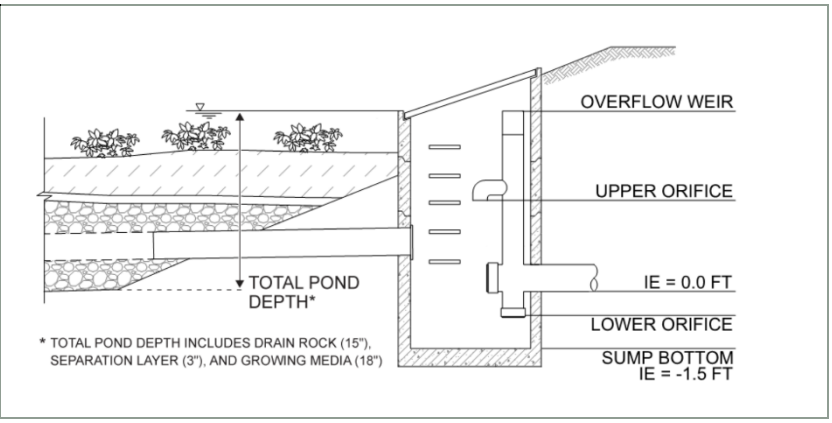

Figure 7. Scenario 1 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

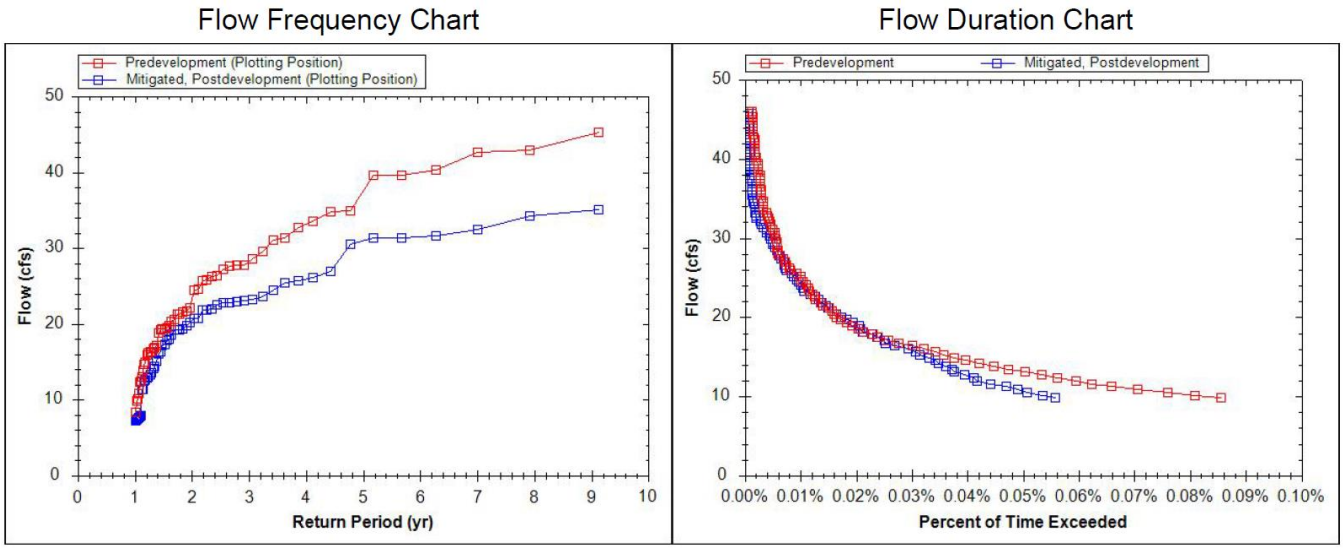

Figure 8. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to existing condition (blue)

4.2 Scenario 2: Pre-development to Future Conditions

The second scenario was simulated in the BMP Sizing Tool, comparing pre-development conditions, referred to as "Oak Savanna" in the 2015 PWS, to the future development conditions outlined in the Town Center Plan at full build out (20+ year planning horizon) to confirm sizing needs for the Library Pond. The contributing drainage area under future conditions is 53 percent impervious. In comparison, Oak Savanna is 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type. Like Scenario 1, expansion of the existing footprint of the pond, approximately 0.7 acres, is not possible due to constraining site limitations (roadways, trees, etc.).

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Library Pond Evaluation TM_v4

4.2.1 Pond Sizing and Retrofit Evaluation

Based on Scenario 1 findings, it is assumed that the existing pond sizing would not meet the City's design standards as is in conjunction with future redevelopment of the Town Center area (Figure 9). Since the existing pond configuration does not meet the City's design standards for existing development conditions, it was not expected that the pond is adequately sized for future development conditions either.

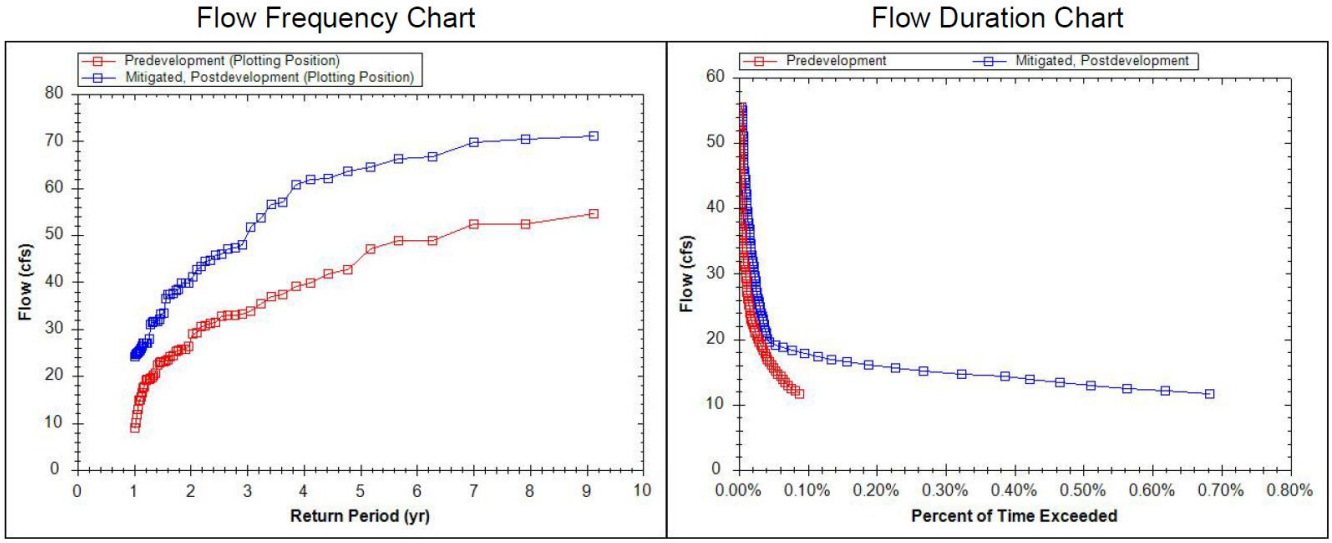

Figure 9. Flow frequency and duration curves based on existing stage storage information from as-builts

Pre-development shown in red and future development conditions shown in blue.

The BMP Sizing Tool was simulated for the additional scenarios outlined in Table 3 to calculate the required pond sizing and retrofit needs. As shown in Table 3 and Figure 10, like with the previous scenario, the BMP Sizing Tool calculated that the pond would have to be retrofit to have 1H:1V side slopes with a depth of approximately 30.4 feet and a bottom geometry of over just over 12,700 sq. ft to meet current design standards (see Attachment A, Scenario 2A). However, these detention pond design criteria do not meet the 2015 PWS requirements.

Table 3. Scenario 2 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, not large enough
	1:1	Auto calculate depth	30.40	12,719	Yes, sized adequately

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Library Pond Evaluation TM_v4

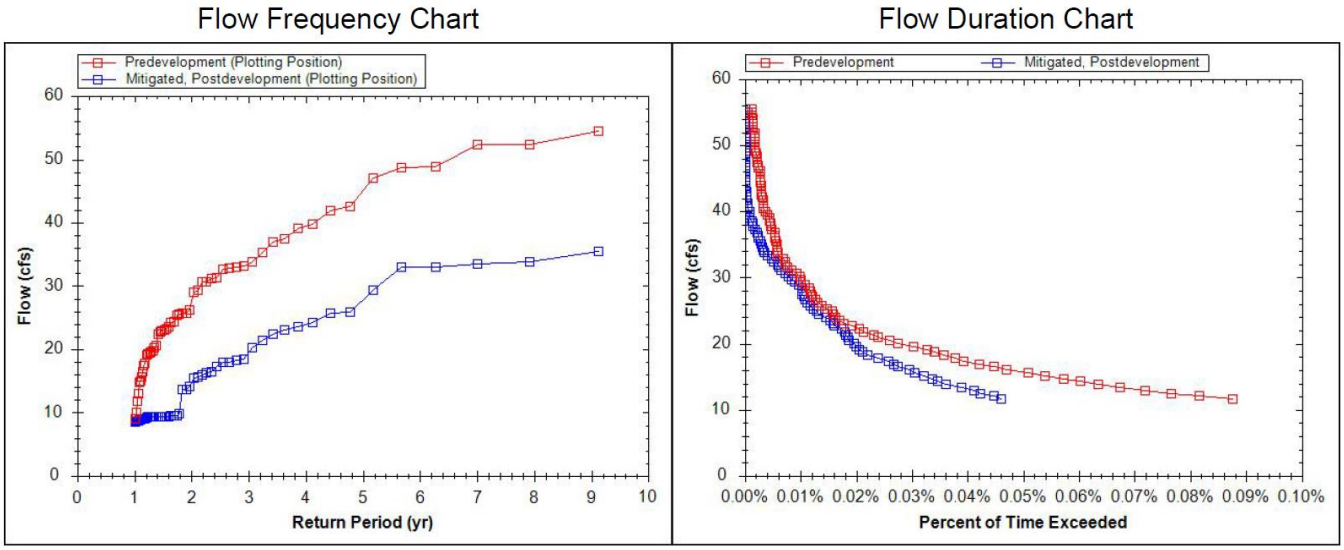

Figure 10. Flow and durations curves if retrofit was to have 1H:1V side slopes with a depth of over 30 feet.

Pre-development (red) to future development conditions (blue).

4.2.2 Onsite Flow Mitigation Evaluation

Based on these findings, a secondary analysis for Scenario 2 was developed. Similar to Scenario 1, this analysis removed select DMAs from contributing to the pond, assuming that these areas could be treated by additional LID facilities, to determine how much of Town Center property would require onsite stormwater management in order for Library Pond to meet City design standards.

Again, to evaluate the reduction in DMAs, the BMP Sizing Tool maintained the existing surface area of 30,130 sq. ft., set the slope to meet the City directed use of the PWS maximum of 3H:1V, and used the automatic sizing mode to calculate the depth and bottom area of the pond.

By removing approximately 27 percent of the total contributing drainage area (approximately 48 acres impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. All 48 acres of removed DMAs were impervious surfaces and represents all roadways (approximately 27 acres) plus an additional 21 acres of impervious area. **The removed impervious surfaces to be redirected constitutes 50 percent of the total new or redeveloped impervious surfaces contributing to the pond.** This removed area was assumed rerouted to infiltration planters onsite and modeled in the BMP Sizing Tool through a series of Stormwater Water Planter BMPs that connect to Library Pond as upstream LIDs. Although site-specific infiltration testing would be needed to confirm whether an infiltration or filtration-based LID is needed, for integration into the BMP Sizing Tool an infiltration planter that provides treatment and flow control was selected. Since the facility infiltration rate at Library Pond is associated with HSG B3 (0.50-0.99 in/hr), for purposes of this initial analysis the same infiltration rate was assumed as a representative of the soils for the LID facilities. With a portion of contributing drainage area removed, the total drainage area to Library Pond to 131.8 acres. The resulting pond sizing requires deepening the Library Pond to 15.04 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,946 sq. ft. See Attachment A, Scenario 2B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.04 feet and 3H:1V side slopes is as follows in Figure 11 and Figure 12.

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Library Pond Evaluation TM_v4

Structure	Size
Lower Orifice Diameter	10.6 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	27.4 in
Upper Orifice Invert	10.1 ft
Weir Length	6.3 ft
Weir Invert	14.0 ft

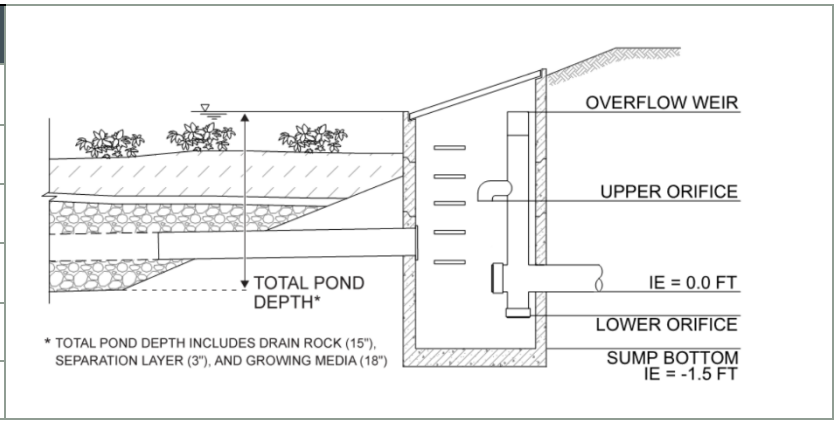

Figure 11. Scenario 2 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

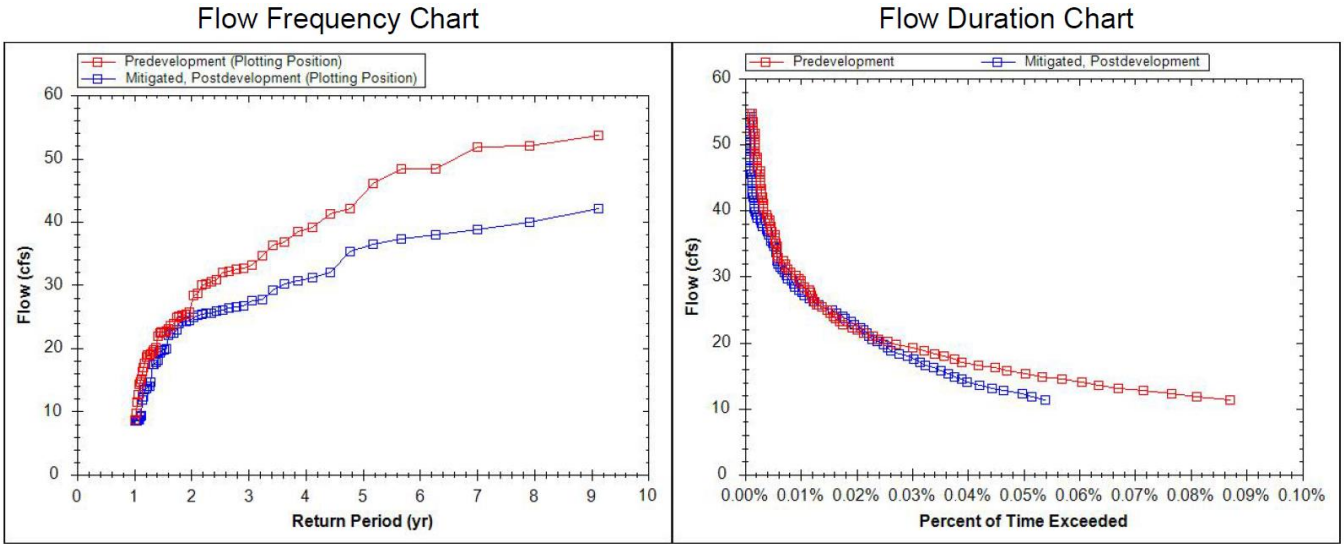

Figure 12. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to future development condition (blue).

4.3 Scenario 3: Existing to Future Conditions

The last scenario assumes that adherence to the City's design standards could be accomplished by allowing redevelopment of Town Center to adhere to predevelopment flows reflecting existing land use conditions as opposed to historic (Oak Savannah) land cover conditions. The contributing drainage area under existing conditions is 47 percent impervious and under future conditions increases to 53 percent impervious through both redevelopment and the addition of approximately 10 acres of impervious surface. As seen in Figure 13, the Town Center development plans anticipate redevelopment of many currently developed and impervious areas, which is why the amount of impervious area only increases by about 7 percent. However, all redevelopment area is subject to the City's design standards including utilization of Green Infrastructure and Low Impact Development (GI/LID) strategies to mitigate stormwater.

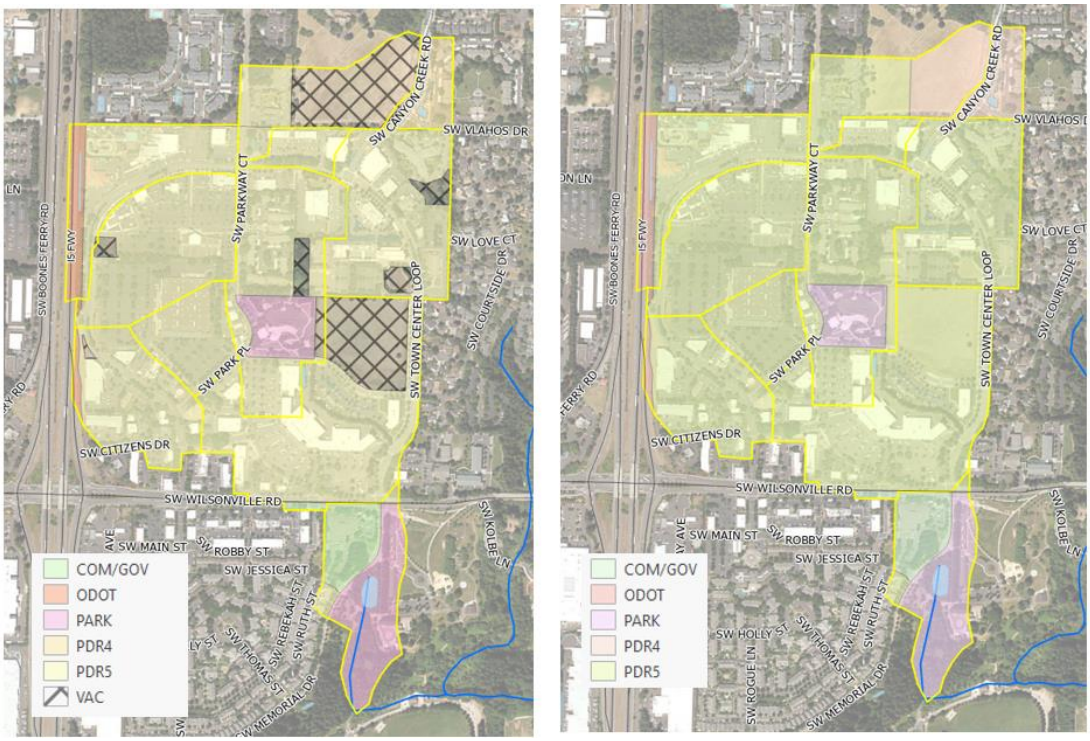

Figure 13. Existing land use at 47% impervious (left); future land use at 53% impervious (right)

The BMP Sizing Tool was run through the following scenarios outlined in Table 4 to calculate how the existing pond may handle future flows as well as design modifications that would be required.

Assuming pre-development conditions reflect existing land use, the pond as-is does not adequately meet City design standards for sizing. Some modifications to Library Pond are required, specifically the pond needs to be deepened to approximately 7.1 feet, which includes 3 feet of media at the bottom of the facility and adjustment of side slopes to 4:1 is required. Utilizing this comparison methodology, this approach requires a policy change since for the City since it redefines "pre-development" from historic (Oak Savanna) land coverage to current land use conditions.

Table 4. Scenario 3 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	7.09	13,656	Yes, sized adequately
	3:1	Auto calculate depth	6.24	18,534	Yes, sized adequately

Note: Additional analysis of slopes 2H:1V and 1H:1V were not recorded as the 4H:1V and 3H:1V slope design standard slope meets sizing requirements.

The pond schematic and structure sizing reflect a depth of 7.09 feet and 4H:1V side slopes is as follows in Figure 14 and Figure 15.

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Library Pond Evaluation TM_v4

Structure	Size
Lower Orifice Diameter	16.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	40.9 in
Upper Orifice Invert	4.8 ft
Weir Length	6.3 ft
Weir Invert	6.1 ft

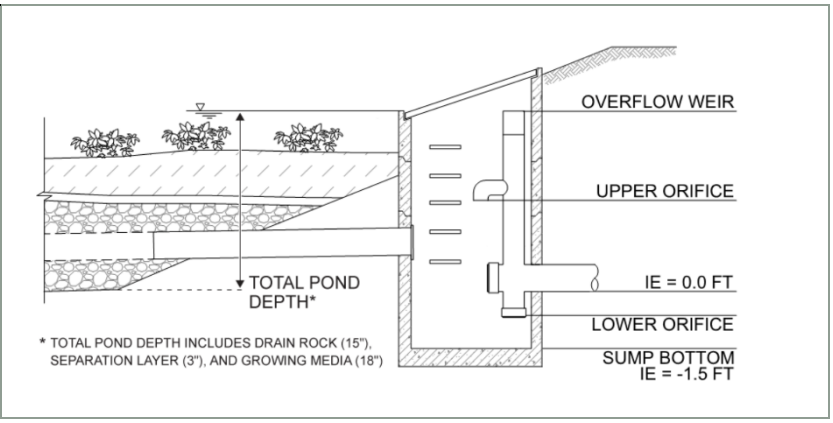

Figure 14. Scenario 3 outfall structure sizing and schematic for reduced contributing drainage area and 4H:1V sides slopes

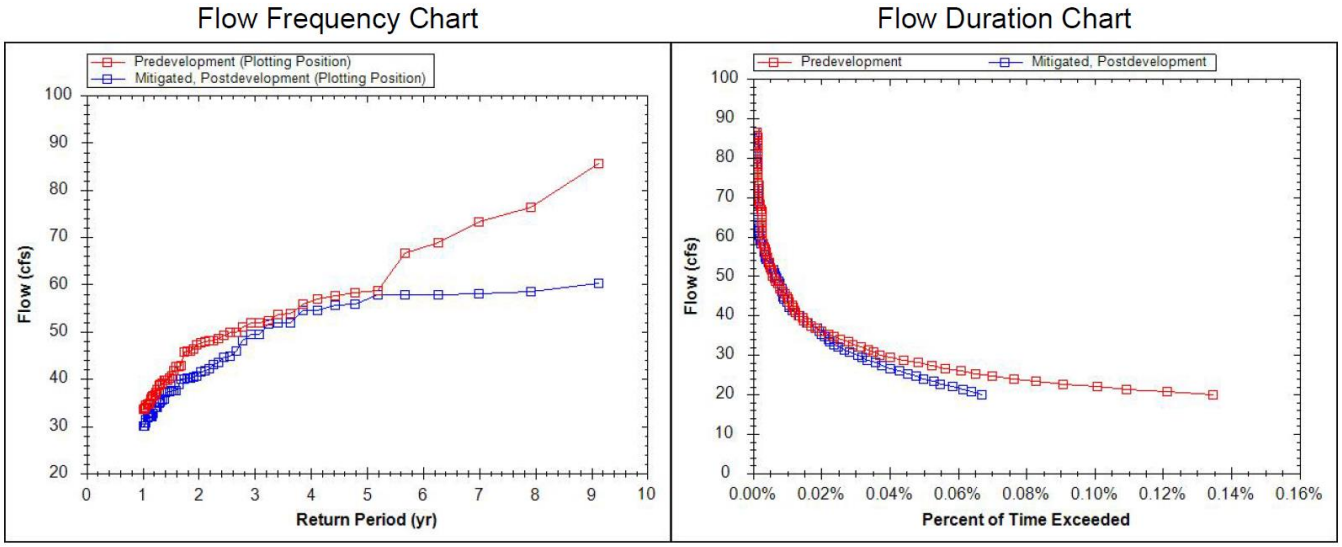

Figure 15. Flow and durations curves show adequate sizing for 4H:1V side slopes at 7.09 feet deep

Existing development conditions (red) to future development conditions (blue).

Section 5: Conclusions

Scenarios simulated using the BMP Sizing Tool for Library Pond indicate there are limited options to retrofit the pond to meet the existing stormwater design standards. Table 5 summarizes the scenarios iterated and the resulting design adjustments (retrofit) required for Library Pond based on assumptions discussed in Section 4.

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Library Pond Evaluation TM_v4

Table 5. Scenario Summary							
Scenario No.	Scenario Description and Land Cover Conditions	Total Contributing Area (acres)	Meets Hydraulic Requirements?	Pond Retrofit Requirements		Meets Pond Design Criteria?	Notes
				Slope (H:V)	Depth (feet)		
1.A	Pre-Development Land Cover to Existing Land Cover	179.8	Yes	1:1	21.33	No	Pond sides are too steep and pond is too deep
1.B	Pre-Development Land Cover to Existing Land Cover	143.3	Yes	3:1	15.08	Yes	Requires onsite mitigation (retention) for 36 acres of existing impervious area
2.A	Pre-Development Land Cover to Future Land Cover	179.8	Yes	1:1	32.01	No	Pond sides are too steep, and pond is too deep
2.B	Pre-Development Land Cover to Future Land Cover	131.8	Yes	3:1	15.04	Yes	Requires onsite mitigation (retention) for 48 acres of existing impervious area
3	Existing Land Cover to Future Land Cover	179.8	Yes	4:1	7.09	Yes	Requires an established policy adjusting the definition of pre-developed land cover for Town Center redevelopment.

As seen in Table 5, Scenarios 1A and 2A are unable to meet the 2015 PWS stormwater design standards for ponds, specific to side slope (both are 1H:1V and the standard is 3H:1V) and depth. Only if onsite retention occurs for a portion of the upstream contributing drainage area will pond retrofit be able to meet the City's design standards. Only Scenario 3 allows for the entire upstream contributing drainage area to be managed by Library Pond and the pond adhere to design criteria outlined in the PWS. This pond retrofit can be designed with a more gradual 4H:1V slope, and results in a reasonable pond depth of 7.09 feet deep, which is shallower than the existing Library Pond with the 3 feet of required media in the bottom.

However, Scenario 3 mandates a policy change to adjust pre-development land cover from historic Oak Savanna to current land use conditions. This consideration will need to be evaluated by the City.

If a policy change related to the pre-development condition associated with Town Center is not possible, Scenarios 1B and 2B reflect the percentage and acreage of impervious area that would need to be retained or managed onsite using GI/LID BMP facilities and no longer routed to Library Pond. The following assumptions were made to estimate the amount of onsite infiltration planters required to offset 48 acres of impervious surfaces in the future condition (or 50% of the total new or redeveloped impervious area to Library Pond).

- Pre-development conditions are grass cover per PWS Oak Savanna designation with soil conditions reflective of the associated HSG;
- Soil and infiltration characteristics for the LID facilities are similar to that of the Library Pond, characterized as B3 (0.5-0.99 in/hr infiltration), which prompts use of an infiltration facility;
- Per Appendix B of the BMP Sizing Tool User Manual, onsite LID sizing would equate to a sizing factor of approximately 7.4, based on an area weighted average of sizing factors and soil characteristics for area removed from the Library Pond drainage area.

Using the above assumptions, onsite retention of 48 acres of impervious surface is possible using approximately 154,725 sq. ft. (3.6 acres) of infiltration planters located throughout the Town Center development. It should be noted that site-specific infiltration testing may result in adjustment of the LID sizing and/or need for a filtration-based facility to be used instead.

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Retrofit of the Library Pond would require regrading and structural improvements, resulting in a 3:1 side slope and depth of 15.04 feet. This is a conservative design approach and conservative design assumptions based on onsite management of approximately 48 acres of the contributing drainage area to Library Pond onsite. Pond sizing may vary depending on the use and characteristics of upstream LID.

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Library Pond Evaluation TM_v4

References

Stormwater & Surface Water Design & Construction Standards, Section 3, "Public Works Standards," City of Wilsonville, 2015, pp.1-104.

User's Guide for the BMP Sizing Tool, City of Wilsonville and City of Oregon City, 2017, pp. 1-23.

Wilsonville Town Center Plan, City of Wilsonville, 2019, pp. 1-104.

Attachment A: BMP Sizing Tool Scenario Reports

1. Scenario 1 – Stage Storage Report
2. Scenario 1A – Automatically Calculated Depth Report
3. Scenario 1B – Automatically Calculated Depth Report – Reduced Area
4. Scenario 2 – Stage Storage Report
5. Scenario 2A – Automatically Calculated Depth Report
6. Scenario 2B – Automatically Calculated Depth Report – Reduced Area
7. Scenario 3 – Stage Storage Report
8. Scenario 3A – Automatically Calculated Depth Report

WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Existing

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	5.00	30,130.0	0	150,650.0	96,416.0	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

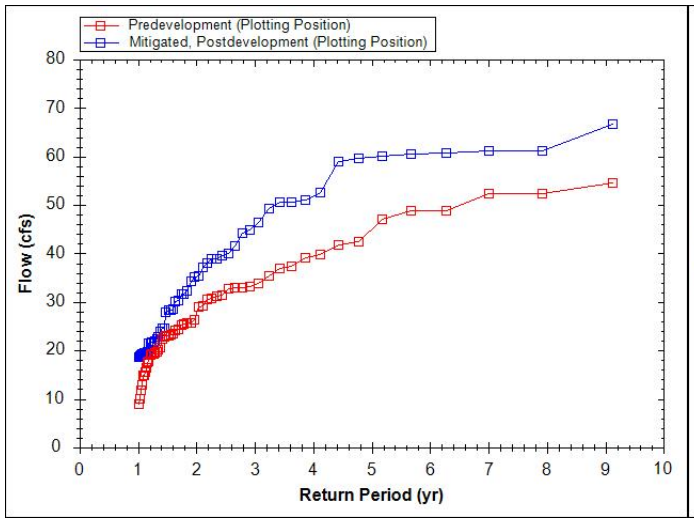
Custom Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

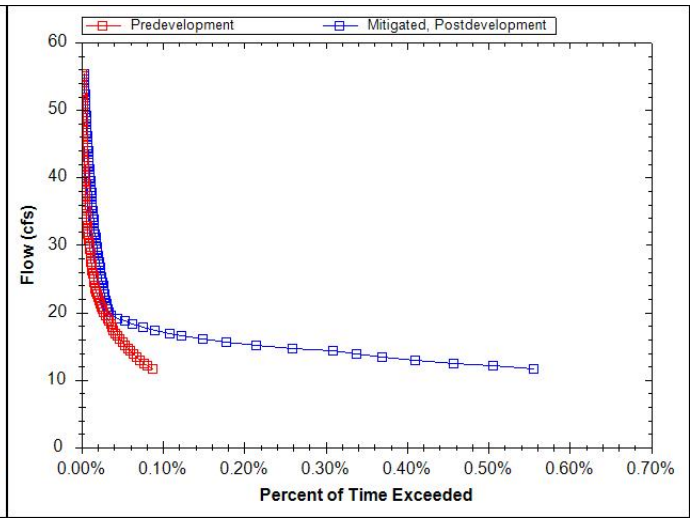
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
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3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
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3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	23.98	30,130.0	1	541,267.4	511,485.0	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

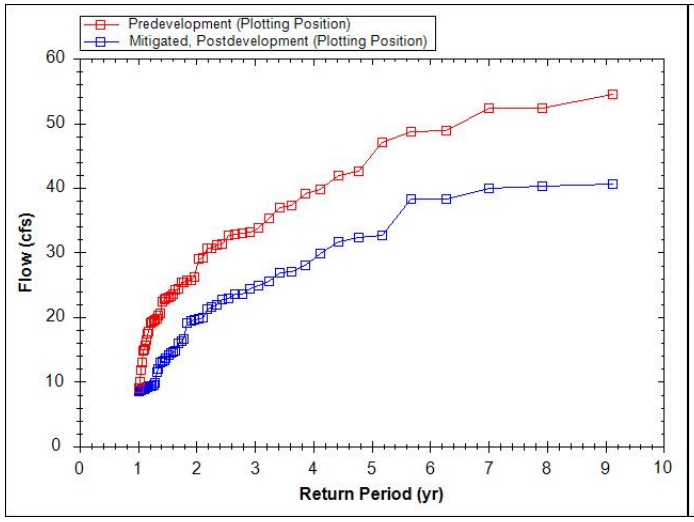
Shape Curve

Depth (ft)	Area (sq ft)
24.0	30,130.0

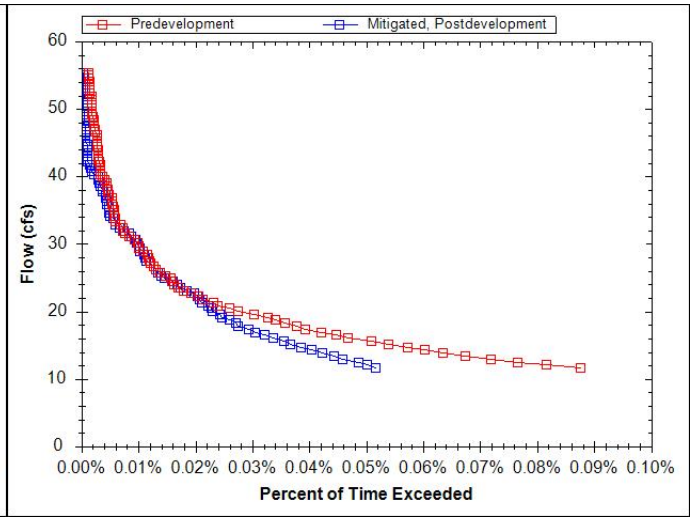
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.5
Upper Orifice Invert(ft)	16.1
Upper Orifice Dia (in)	24.5
Overflow Weir Invert(ft)	23.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	NA
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	NA
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	NA
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	NA
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	NA

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	NA
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	NA
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	NA
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	NA
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	NA
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	NA
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	NA
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	NA
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	NA
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	NA
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	NA
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	NA
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	NA

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	NA
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	NA
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	NA

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	15.08	30,130.0	3	258,676.8	243,359.2	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

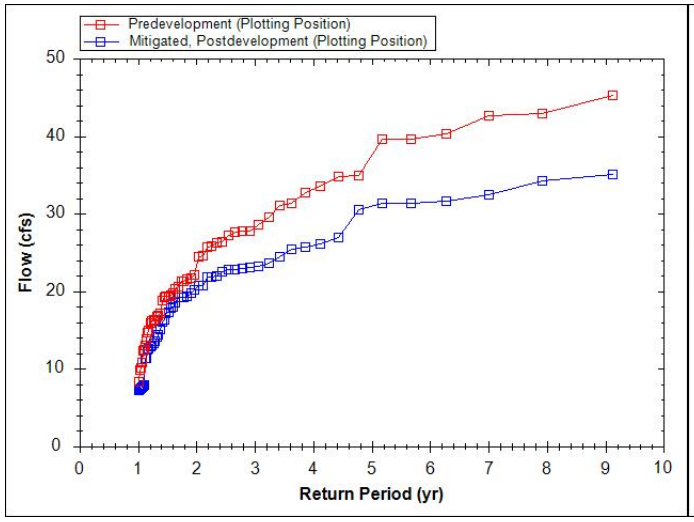
Shape Curve

Depth (ft)	Area (sq ft)
15.1	30,130.0

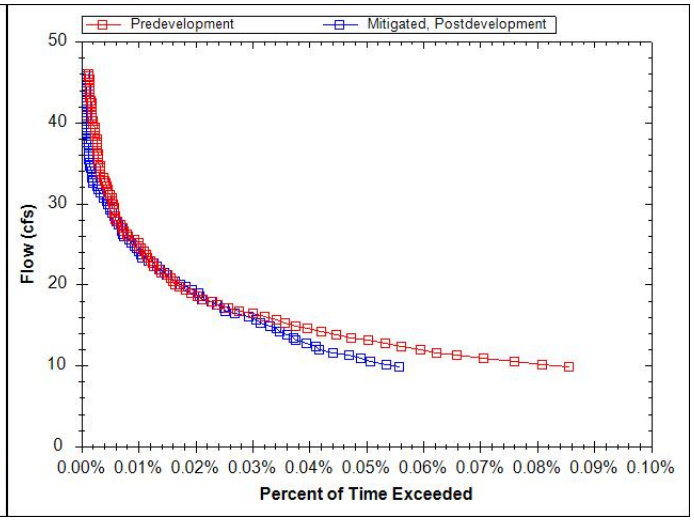
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.9
Upper Orifice Invert(ft)	9.8
Upper Orifice Dia (in)	25.2
Overflow Weir Invert(ft)	13.6
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

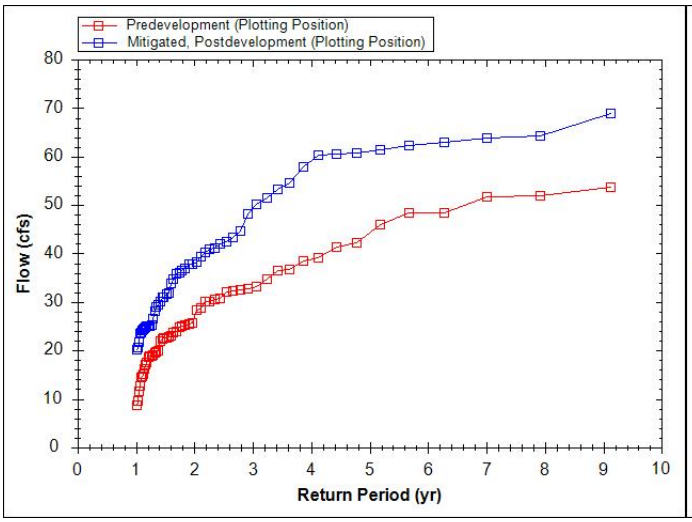
Custom Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

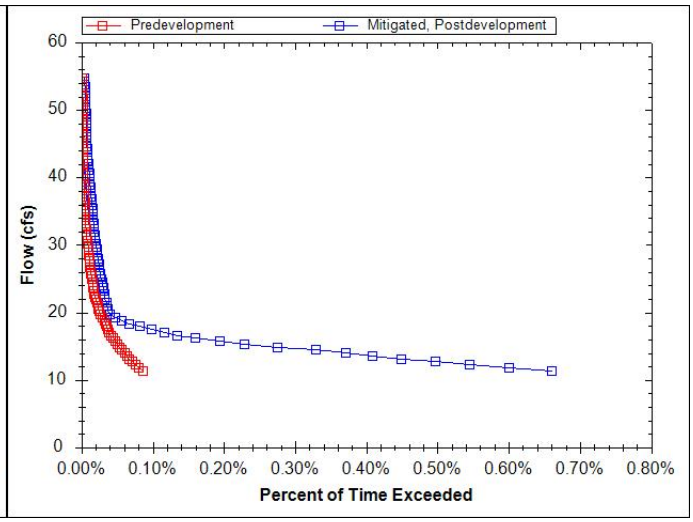
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

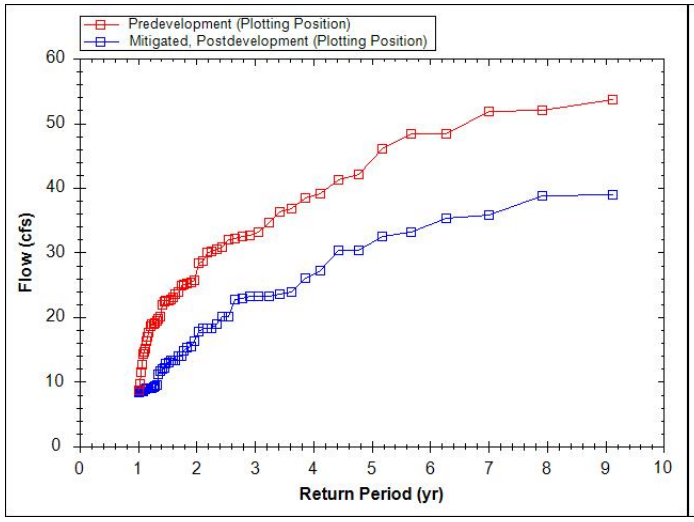
Shape Curve

Depth (ft)	Area (sq ft)
30.4	30,130.0

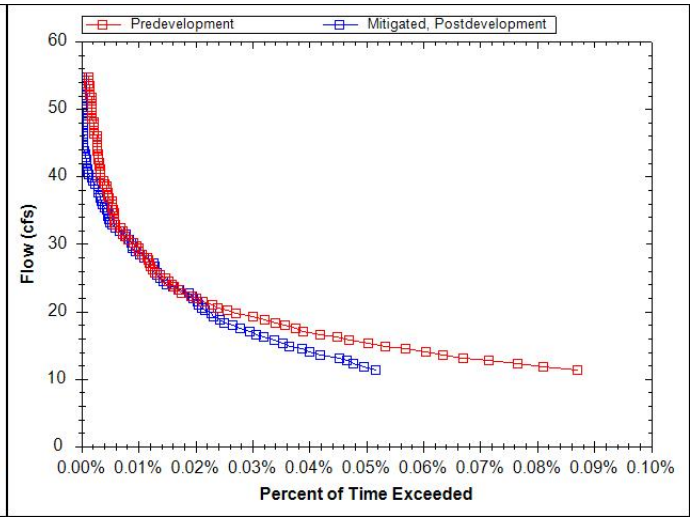
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	7.5
Upper Orifice Invert(ft)	38.8
Upper Orifice Dia (in)	19.5
Overflow Weir Invert(ft)	56.9
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Planter 2
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Planter 2
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Planter 3
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Planter 2

			ncrete		
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Planter 4
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Planter 3
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Planter 1
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Planter 3
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Planter 3
3420_B_Bdg	13,450	Grass	Roofs	B	Planter 6
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Planter 4
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Planter 3

3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Planter 2
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Planter 3
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Planter 2
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Planter 3
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Planter 3
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Planter 2
3402_C_Bdg	250,938	Grass	Roofs	C	Planter 6
3402_B_Perv	385,991	Grass	Grass	B	Library

					Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Planter 1
3402_B_Bdg	330,195	Grass	Roofs	B	Planter 5
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Planter 1
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Planter 4

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Planter 1	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	31,696.4	31,697.0	0.0
Planter 2	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	43,376.2	43,377.0	0.0
Planter 3	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	23,933.0	23,933.0	0.0
Planter 4	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	14,129.5	14,357.0	0.0
Planter 5	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	49,529.3	54,273.0	0.0
Planter 6	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	12,055.0	12,247.0	0.0

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	15.04	30,130.0	3	258,400.3	243,002.9	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

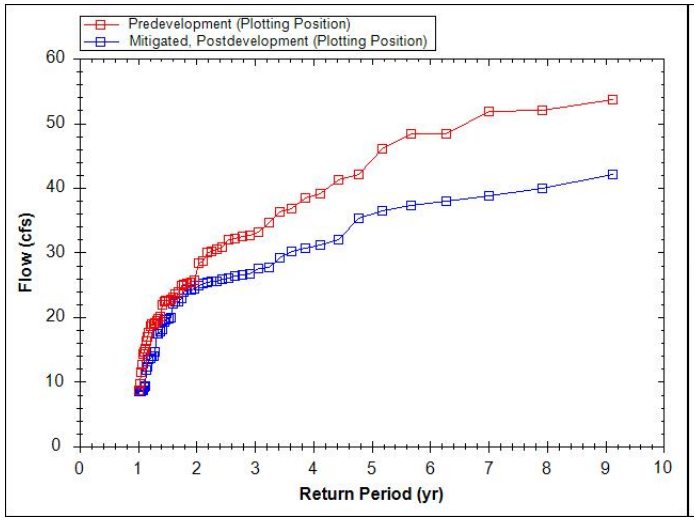
Shape Curve

Depth (ft)	Area (sq ft)
15.0	30,130.0

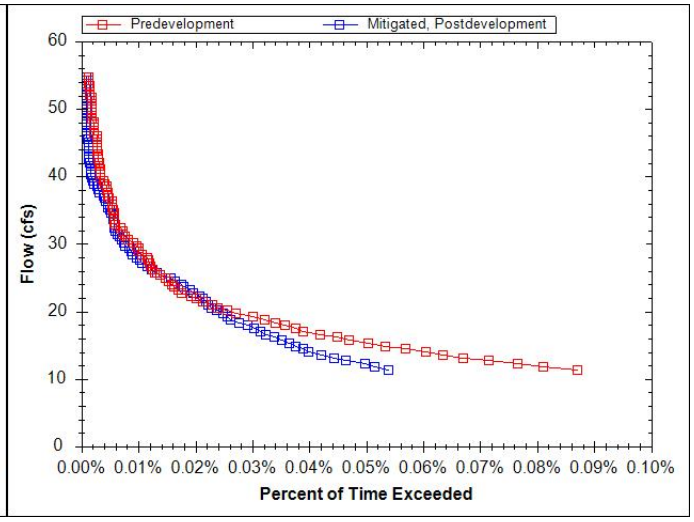
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	10.6
Upper Orifice Invert(ft)	10.1
Upper Orifice Dia (in)	27.4
Overflow Weir Invert(ft)	14.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

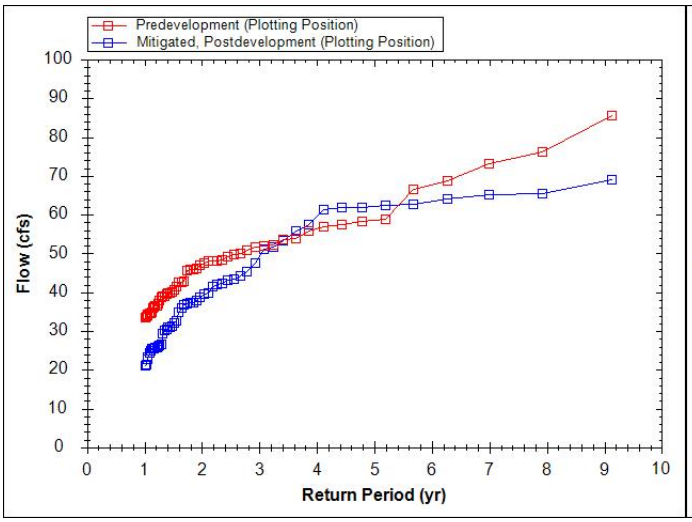
Custom Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

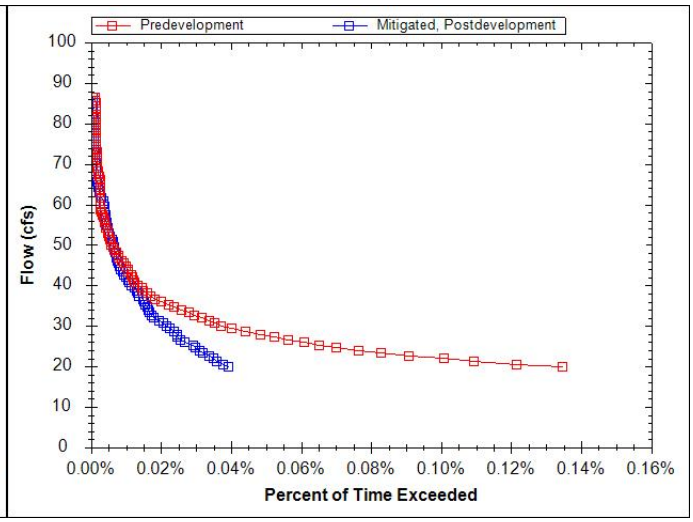
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

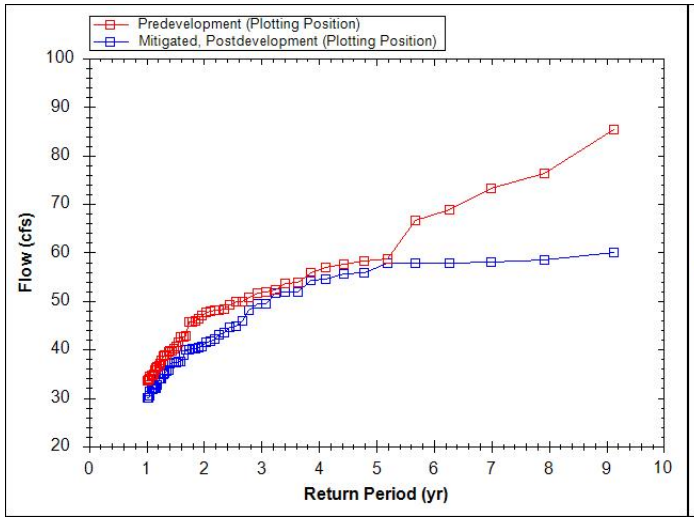
Shape Curve

Depth (ft)	Area (sq ft)
7.1	30,130.0

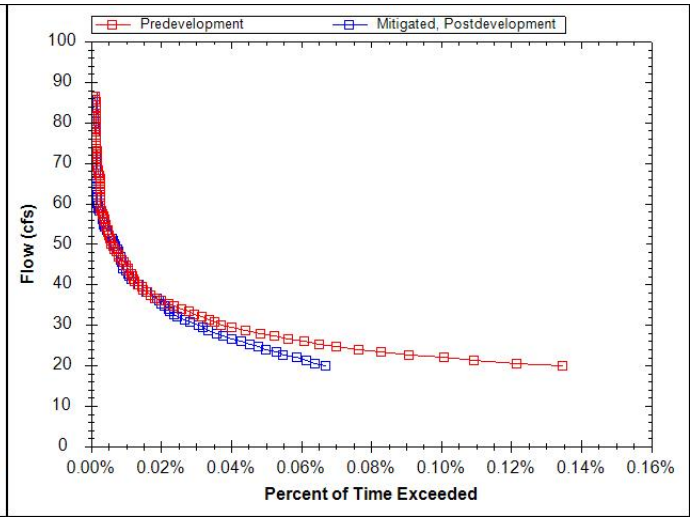
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	16.9
Upper Orifice Invert(ft)	4.8
Upper Orifice Dia (in)	40.9
Overflow Weir Invert(ft)	6.1
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



Appendix G: Staffing Evaluation

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan

Project No.: 156157.002.001

Staff Analysis Tables

Subject: Stormwater Staffing Analysis

Date: January 24, 2024

To: Kerry Rappold, City of Wilsonville

From: Angela Wieland, Brown and Caldwell

Prepared by: Shelby Gilmartin, EIT

Reviewed by: Angela Wieland, PE

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List of Abbreviations

BMP	Best Management Practice
CCTV	Closed-circuit Television
City	City of Wilsonville
CP	Capital Project
CREST	Center for Research in Environmental Sciences & Technologies
DEI	Diversity, Equity, and Inclusion
EC	Construction Site Runoff Control
Ft	Feet
FTE	Full-Time Employee
FY	Fiscal Year
Hr	Hour
HPSE	High Pollutant Source Facilities
ILL	Illicit Discharge Detection and Elimination
IND	Industrial and Commercial Facilities
IPM	Integrated Pest Management
LF	Linear Feet
NPDES	National Pollution Discharge Elimination System
OM	Pollution Prevention and Good Housekeeping for Municipal Operations
OSHA	Occupational Safety and Health Administration
PC	Post-Construction Site Runoff for New Development and Redevelopment
PEO	Public Education and Outreach
PI	Public Involvement
SF	Square Feet
SMP	Stormwater Master Plan
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TBD	To Be Determined
TM	Technical Memorandum (Tech Memo)
WERK	Wilsonville Environmental Resource Keepers

Assumptions

A. This staffing analysis assumes that existing City staff is able to implement the current stormwater program (pre-2022 conditions). Additional activities not previously conducted by the City under current staffing were used to create the estimates of additional staff resource needs. Additional activities include those associated with the reissued NPDES MS4 permit (2021) and implementation of the proposed Capital Projects (CP) in the Stormwater Master Plan (2023).

B. One (1) FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year.

C. Assume that 100 percent of Engineering and Permitting Costs are for use of a consultant, and 100 percent of Design/Construction Administration Costs are required for internal City staff.

D. The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021 – Sept. 30, 2026) – reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.

E. Stormwater Master Plan (SMP) implementation is projected on an annual basis and assumes a 20-year CP implementation schedule from 2024-2043, with higher project projects occurring sooner:

- High Priority (2024-2028); Medium Priority (2029-2033); and Low Priority (2034-2043).
- Capital Projects costs are averaged over the 20-year implementation period and shown as a standard annual value. While in practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.

Where applicable the following asset assumptions are divided between 1) those needed to maintain existing assets and commitments under the Stormwater Management Program (SWMP) BMPs and meet the requirements of the NPDES MS4 permit and 2) those for future assets constructed as part of the SMP Capital Projects. If not distinguished, the assumption applies to newly constructed assets.

F. Piped Conveyance System

- *For SWMP BMPs*: CCTV and cleaning activities were evaluated as part of the maintenance evaluation in SMP TM#1 and this program requires an additional 0.5 FTE to meet current maintenance needs.
- *For SMP CPs*: 250 ft of pipe cleaning can be accomplished per hour, and 200 ft of closed-circuit television inspections (CCTV) can be accomplished per hour. Inspection and maintenance to occur on at least 15 percent of City pipes annually (assuming cleaning/inspection will occur four times over 20-year CP cycle).
    - Perforated pipe does not require regular cleaning and inspection and is anticipated to only occur if needed.
    - Pipe connections/laterals are not included in the annual maintenance estimate.
    - Pipe inspection and maintenance activities require a 2-person crew.

G. Manholes

- *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
- For *SMP CPs:* 0.5 hr/facility/year is needed for maintenance of a standard manhole. 1.0 hr/facility/year is needed for inspection and maintenance of a water quality manhole.
    - Manhole inspection and maintenance activities require a 2-person crew.

H. **Catch Basins**
   - *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
   - *For SMP CPs:* 0.5 hr/facility/year is needed for maintenance.
     - Catch basin maintenance requires a 2-person crew.

I. **Vegetated Systems (swales, rain gardens, planters, etc.):**
   - *For SWMP BMPs:* Maintenance activities associated with vegetated system were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 1.25 FTE to meet maintenance needs.
   - *For SMP CPs:* 8 hr/facility/year for inspection and maintenance for public systems.
     - Vegetated system inspections and maintenance requires a 2-person crew.

J. **Ditches**: 20 ft of ditch maintenance can be accomplished per hour.
   - Maintenance is required once every 5 years.
   - Ditch maintenance requires a 2-person crew.

K. **Outfalls**: 0.5 hr/facility/year is needed for inspection and maintenance of outfalls.
   - Outfall inspection and maintenance requires a 2-person crew.

L. **Inlets/Outlets**: 0.5 hr/facility/year is needed for inspection and maintenance of inlets/outlets.
   - Inlet/outlet inspection and maintenance requires a 2-person crew.

M. **Detention Pond**: 16 hrs/facility/year is needed for inspection and maintenance of detention ponds.
   - Detention pond inspection and maintenance requires a 2-person crew.

N. **Culverts:** 2 hr/facility/year is needed for culvert cleaning and inspection.
   - Culvert inspection and cleaning requires a 2-person crew.

O. **Private Water Quality Facilities:** 4 hr/facility/year is required for inspections.
   - The City holds *Stormwater Maintenance and Access Easement Agreements* with private water quality facilities owners to actively maintain facilities in conformance with City of Wilsonville's Public Work Standards and annually inspect and report on the facility.
   - Private water quality facility inspections require a 1-person crew.

P. **Restoration/Stabilization:** Planting and bioengineered restoration/stabilization is a single installation and does not require annual maintenance.

Q. **Replacement or Removal:** Replacement or removal of assets does not require continued maintenance and is not accounted for as additional annual maintenance activity.

R. **Driveways/Pathways:** Addition of, or modifications to driveways, accessways, or paths does not require annual maintenance. These facilities will be maintained only when identified as needed.

S. **Street Sweeping:** 165 hr/year is needed for street sweeping of all curbed areas. This work is completed by a contractor.

T. **Training:** Assume general training includes 3 staff and industrial/commercial training includes 1 staff.

NOTE: Recommended Programs developed for the SMP (P-1 to P-3, and P-5 to P-6) are outlined in the SMP Table 7-1 as an annual cost only and not staff hours which is why it was removed from the Public Works/Maintenance Staffing and Community Development/Engineering Staffing sections. Program P-4 is included in *SMP Implementation - Community Development/Engineering Staffing Assessment* analysis.

NPDES MS4 Permit Driven Activities (per 2022 SWMP)

Public Works/Maintenance Staffing Assessment

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr).	3	2 hrs/yr 6 hrs/permit term	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/ equipment costs	• Organizing public outreach programs such as Adopt-a-Road and WERK Day. • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	N	No Change.			N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.						
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	N	No Change.			N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
OM-2	Routine Road Maintenance	Conduct street sweeping, maintenance, and winter weather protocols.	N	No Change.			N	• Sweep all curbed City streets monthly. • Schedule and conduct street maintenance activities during dry weather conditions. • Continue to sponsor the Adopt-a-Road program, Bulky Waste Day, and Fall Leaf Collection Day.						
			Y	Implement Winter Weather Response Plan (2021) – including snow removal, sanding, chemical application, and proper management of materials. Staff time is winter conditions dependent, assume additional 40-hrs for additional tracking of materials and activities per year.	1	40 hrs/yr	N	N/A – New requirement.	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)
OM-3	Pest Management	Follow the IPM Plan (2018) principles for public landscape maintenance.	N	No Change.			N	• Track the amount of pesticides and fertilizers applied to public property and general areas of application. • Estimate number and area of sites where the planting of native vegetation was incorporated into the maintenance activities.						
			Y	Publish annual IPM activity on City website (assume 1-hr/year).	1	1 hr/yr	N	N/A – New requirement.	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)
OM-4	Conveyance System Cleaning	Maintain and repair public stormwater conveyance system components including the storm sewer pipes,	Y	• Conduct CCTV inspection of approximately 15% of the public stormwater conveyance system (>6-inch pipe) annually. • Inspect other public conveyance systems as required.	Analysis in SMP TM#1		N	• Inspect public conveyance system annually for maintenance needs. • Maintain and repair public conveyance system as needed based on inspections.	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		manholes, outfalls, culverts, and swales.	Y	Refine the internal inspection guidelines annually to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hr/permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-5	Catch Basin Cleaning	Inspect, maintain, and repair public stormwater catch basins annually during dry season.	N	No Change.	Analysis in SMP TM#1		N	• Clean all high-priority public catch basins annually and remaining public catch basins over a 4-year period. • Inspect catch basins for maintenance and repair needs during catch basin cleaning activities. Schedule repair activities as needed, based on inspections.	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)
			Y	Refine the internal inspection guidelines to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hrs/ permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
			Y	Update tracking database during each maintenance cycle (assume 10-hr/year).	1	10 hrs/yr	N	N/A	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.	Analysis in SMP TM#1		N	• Inspect public structural controls annually; maintain and repair as needed. • Maintain GIS “atlas” for both public and private.	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)
			Y	In conjunction with post-construction standards updates, by Dec. 1, 2024, update the City’s internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) used in the City (assume 40-hr for refinement, review and periodic update).	1	40 hrs by Dec. 2024	N	N/A	20 hrs (0.012 FTE)	20 hrs (0.012 FTE)	--	--	--	8 hrs (0.005 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) annually over the permit term.	1	6 hrs/permit term	N	N/A	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)
NPDES MS4 Driven Activities Subtotal of Public Works/Maintenance Staff Cost					Annual Staff Time (Hours)				3,395.4	3,395.4	3,375.4	3,375.4	3,375.4	3,383.4
					Annual Staff Time (FTE)				2.06	2.06	2.05	2.05	2.05	2.05
					Staffing contingency (FTE) (estimated at 20% to account for unscheduled maintenance and response)				0.41	0.41	0.41	0.41	0.41	0.41
					NPDES MS4 Public Works/Maintenance Activities Sub-Total staff cost (FTE)				2.47	2.47	2.46	2.46	2.46	2.46

Community Development/Engineering Staffing Assessment

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-1	Public Education Participation	• Promote public awareness through City newsletters, doorhangers, social media, and website. • Annually publish 2 articles/year in the Wilsonville Business Newsletter and 3 articles/year educating the public on stormwater issues.	N	No change.			Y – printing	During the 2021-22 reporting year, 5 educational/informational articles were published in the City newsletter and 4 were posted to the City's social media pages.						
		Engage the City's DEI Committee to identify additional language translations needs of the public, if necessary.	Y	Twice over permit term engage with the DEI Committee to verify that materials are translated into representative languages for the public. Assume two 1-hour meetings.	1	2 hrs/ permit term	N	N/A – Committee was formed in 2021.	--	1 hr (0.001 FTE)	--	1 hr (0.001 FTE)	--	0.4 hrs (0.001 FTE)
		Support regional public education campaigns and programs.	N	No change (varies by year).			Y - financial support	• Financially support regional public education campaigns and programs. • During the 2021-22 reporting year, the City contributed $15,000 to Friends of Trees.						
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr). Assume 40-hr/yr to develop trainings.	2	40 hrs/yr	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Staff attend Clackamas County co-permittee meetings to engage in collective efforts related to education, monitoring, and NPDES requirements.	N	No change.			Y – Cost sharing (as applicable).	Coordinate with other Clackamas County co-permittees regarding regional water quality efforts through scheduled co-permittee meetings.						
PI-1	Public Involvement and Participation	Provide opportunity for public participation in the development, implementation, and modification of the City's stormwater management program.	Y	• Maintain a publicly accessible website with the SWMP, Monitoring Plan, annual reports, program contact information, educational/reference materials, and reporting requirements for illicit discharges. • Provide a 30-day public comment period, and consider comments received for updates to the Monitoring Plan, the SWMP, and other strategy documents as required. • Maintain MS4 Document Library on website. Assume 8 hr/year for website management.	1	8 hrs/yr	N	N/A – new requirement.	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/equipment costs	• Organizing public outreach programs (e.g., Adopt-a-Road and WERK Day). • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
		Review and update the City's IDDE SOP to clarify enforcement procedures and response timeframes in conjunction with the NPDES MS4 permit.	Y	Review and update IDDE SOP by Dec. 1, 2023. Assume 8-hrs to review and update annually. Consult will support 2023 update.	1	8 hr/yr	N	Implement existing IDDE SOP (2012).	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
								and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-3	MS4 Mapping	Continually maintain the online GIS mapping and digital inventory.	Y	• Continually maintain the online GIS mapping for public viewing. • Add municipal structural stormwater controls within 1 year of receiving the as-builts. • As necessary, create a tracking system for repeat illicit discharges. Assume 24-hr/year for updates.	1	24 hr/yr	N	N/A – new requirement.	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	Y	By Dec. 1, 2023, review and update high priority locations and criteria, as necessary, based on outcomes from inspections and other public reporting. Update locations on mapping and in the IDDE SOP (assume 10 hours for review).	1	10 hrs by Dec. 2023	N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.	10 hrs (0.006 FTE)	--	--	--	--	2 hrs (0.001 FTE)
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	Y	Report any updates or modifications to the 2020 Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (assume 20 hrs for review).	1	20 hrs by Dec. 2024	N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	--	--	--	4 hrs (0.002 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
		Update enforcement response procedures and escalating enforcement language.	Y	By Dec. 1, 2023, review and, if necessary, update enforcement response procedures and escalating enforcement specific to erosion and sediment control in City Code and Public Works Standards (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
PC-1	Stormwater Planning and Development Review	The City provides land use and planning review to meet goals related to the management of natural resources, transportation, housing, public facilities and services, and open spaces and parks.	N	Continue to require all new and redevelopment projects that add or replace 5,000 SF or more of impervious surface to implement the City's Stormwater and Surface Water Design and Construction Standards Review plans for compliance with stormwater requirements.			N	• Track number of development applications reviewed for compliance with the City's stormwater requirements. • Track new and redeveloped impervious surface in conjunction with annual reporting requirements.						
			Y	By Dec. 1, 2023, as necessary, review and document updates to the City's LID Guidebook and Public Works Standards to refine preferred LID/GI approaches and strategies for development within the ROW (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
			Y	By Dec. 1, 2024, as necessary, update Section 3 of the Public Works Standards to include reference to either the Numeric Stormwater Retention Requirement (NSSR) or Alternative Site Performance Standards (assume 100-hrs for review). Consultant will support update.	2	100 hrs by Dec. 2024	N	N/A	50 hrs (0.03 FTE)	50 hrs (0.03 FTE)	--	--	--	20 hrs (0.012 FTE)
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
			Y	Ensure litter control language is included in new event contracts and facility rental agreements (assume 8-hr for language draft and inclusion).	1	8 hrs (immediate update)	N	N/A – New requirement.	8 hrs (0.005 FTE)	--	--	--	--	1.6 hrs (0.001 FTE)
			Y	By Dec. 1, 2024, review and update the SWPPP for consistency with current use, practices, and new facility installations (assume 40-hr for review and 8-hr per year for updates). Consultant will support update.	1	40 hrs by Dec. 2024 + 8 hrs/yr	N	N/A	28 hrs (0.017 FTE)	28 hrs (0.017 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	16 hrs (0.010 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment

Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.			N	• Inspect public structural controls annually and maintain and repair as needed. • Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.						
			Y	In conjunction with updates to post-construction standards, by Dec. 1, 2024, update the City's internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) being used in the City (assume 120-hr for review).	1	120 hrs by Dec. 2024	N	N/A	60 hrs (0.036 FTE)	60 hrs (0.036 FTE)	--	--	--	24 hrs (0.015 FTE)
OM-7	Private Structural Facility Operation and Maintenance	The City requires maintenance of private structural stormwater controls through implementation of the Stormwater Maintenance and Access Easement agreements and submittal of a Stormwater Operations and Maintenance Plan.	N	No Change.			N	• Track agreements on file for private structural control facilities. • Track number of private annual inspection and maintenance reports received annually. • Maintain GIS database for private structural facilities.						
			N	No change, but as additional development and new facilities are added, additional time will be needed for tracking and inspection documentation (assume 8-hr/year for additional facility tracking).	1	8 hrs/yr	N	• Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-8	Develop Planning Documents in Support of Water Quality	The City assesses flood control, transportation, and other infrastructure projects during planning stages to identify and mitigate potential negative impacts and/or enhance benefits for the water quality of receiving water bodies.	Y	• By Dec. 1, 2023, complete public outreach related to the updated 2023 Stormwater Master Plan (assume 30-hr for outreach).	1	30 hrs by Dec. 2023	N	N/A	30 hrs (0.018 FTE)	--	--	--	--	6 hrs (0.004 FTE)
			Y	• Implement water quality, flood control, and natural resource CIPs in accordance with the effective Stormwater Master Plan. • Track the status of the City's Stormwater Master Planning efforts. • Track the number of CIP/retrofit projects implemented each year and discuss the added benefit (water quality,	1	40 hrs/yr	N	N/A	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
				hydromodification, habitat restoration, etc.) of each. • Map the location and drainage area of water quality CIPs/retrofits as they are constructed. Assume 40-hrs/year for CIP implementation and tracking.										
			Y	By Dec. 1, 2023, document and submit a summary of outcomes the City's 2015 Retrofit Strategy and 2015 Hydromodification Assessment, in accordance with the 2023 Stormwater Master Plan (assume 20-hrs for review).	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) over permit term. • Assume 6-hrs annually for engineer.	1	6 hrs/yr	N	N/A	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)
NPDES MS4 Permit Driven Activities Subtotal of Community Development/Engineering Staff Cost								Annual Staff Time (Hours*)	430	322	182	182	182	260
								Annual Staff Time (FTE)	0.26	0.19	0.11	0.11	0.11	0.16

**Summary values rounded to nearest whole hour.*

Note: No staffing contingency includes for Community Development/Engineering NPDES MS4 Permit Driven Activities .

NPDES MS4 Permit Driven Activities (per 2022 SWMP) Summary

NPDES MS4 Permit Driven Activities – Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Annual NPDES MS4 Activities Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	Public Works/Maintenance Annual Staff Time	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for Public Works/Maintenance (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	Community Development/Engineering	0.26	0.19	0.11	0.11	0.11	0.16
	Total Staff Time (NPDES MS4 Activities)	2.73	2.66	2.57	2.57	2.57	2.62

Stormwater Master Plan Implementation

Master Plan implementation staffing timing varies based on CP implementation schedule and prioritization. Staffing assessment tables averages projects over 20-year planning period.

Public Works/Maintenance Staffing Assessment

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
BC-1	Library Pond Retrofit	Clear, regrade, and replant 0.7-acre detention pond.	Y	M	16 .0	2	32.0	Y	33.0	0.02
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 70 LF of new perforated pipe.	N	F						
		Replace 70 LF of pipe.		Q						
		Install driveway for maintenance access.		R						
BC-2	Ash Meadows Flow Mitigation	Clear, regrade, and replant 1.3-acres of drainageway.	Y	M	16.0	2	32.0	Y	33.0	0.02
		Install 1 inlet.		L	0.5	2	1.0			
		Replace 175 LF of pipe.		Q						
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	Clear, regrade, and replant 1.6-acres of storage facility (detention pond).	Y	M	16.0	2	32.0	Y	115.3	0.07
		Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes).		I	40.0	2	80.0			
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 350 LF of pipe.		F	0.6	2	1.3			
		Install 1 new manhole.		G	0.5	2	1.0			
BC-4	Boeckman Creek Stabilization at Colvin Lane	Install 70 LF of new pipe.	Y	F	0.1	2	0.2	Y	16.2	0.01
		Reconstruct 150 LF of vegetated swale.		I	8.0	2	16.0			
		Install planting and bioengineered restoration of 600 LF of stream corridor.	N	P						
		Remove 30 LF of existing outfall pipe.		Q						
BC-5	Memorial Park Swale Retrofit	Install 2,400 SF vegetated water quality swale.	Y	I	8.0	2	16.0	Y	21.2	0.013
		Install 50 LF of new pipe.		F	0.1	2	0.2			
		Install 1 swale inflow spreader.		L	0.5	2	1.0			
		Install 1 overflow structure.		L	0.5	2	1.0			
		Install 1 new outfall.		K	0.5	2	1.0			
		Replace 1 manhole with a flow splitting/WQ manhole.		G	1.0	2	2.0			
		Replace 110 LF of pipe.	N	Q						
		Install 140 LF of perforated pipe.		F						
		Replace 2 manholes.		Q						
		Fill existing 1,500 SF swale and revegetate area.		P						

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Remove 210 LF of existing pipe.		Q						
		Remove 1 manhole.		Q						
		Remove 1 swale inlet structure.		Q						
		Remove 1 outlet structure.		Q						
BC-6	Gesellschaft Water Well Channel Restoration	Install 480 LF of new pipe.	Y	F	0.9	2	1.7	Y	4.7	0.003
		Install 2 new manholes.		G	1.0	2	2.0			
		Install 1 outfall.		K	0.5	2	1.0			
		Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	N	P						
CLC-1	Day Road Stormwater Improvements	Install 200 LF of open-bottom or box culverts (4 total).	Y	N	8.0	2	16.0	Y	27.1	0.016
		Install 180 LF of culverts (1 total).		N	2.0	2	4.0			
		Install 600 LF of pipe.		F	1.1	2	2.2			
		Install 2 manholes.		G	0.5	2	2.0			
		Install 3 trash racks at pipe inlets.		L	0.5	2	3.0			
		Regrade and reconstruct approx. 4,500 feet of open channel.	N	P						
		Replace 1,800 LF of pipe with 600 LF of pipe.		Q						
		Replace 7 manholes.		Q						
		Remove 50 LF of existing culvert.		Q						
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	Replace 70 LF of box culvert.	N	N				Y	0.0	0.0
		Install 70 LF of planting and bioengineered restoration/stabilization measures along path.		P						
		Repave 600 SF of pedestrian path.		R						
CLC-3	Garden Acres Pond Retrofit	Install 1 flow diversion structure.	Y	L	0.5	2	1.0	Y	35.0	0.021
		Install 250 LF of new pipe.		F	0.5	2	1.0			
		Install 1 outlet control structure.		L	0.5	2	1.0			
		Clear, regrade, and replant 0.9-acres of pond.		M	16.0	2	32.0			
		Remove 25,600 CY of fill from existing pond.	N	Q						
		Install 50 LF of perforated pipe.		F						
NC-1	Frog Pond East and South Conveyance Pipe Installation	Install 2,360 LF of new pipe.	Y	F	4.2	2	8.5	Y	10.5	0.006
		Install 1 outfall.		K	0.5	2	1.0			
		Install 7 manholes.		G	0.5	2	1.0			
WR-1	SW Willamette Way/ Morey's Landing Stormwater Improvements	Clear, grade, and replant 0.12-acres of raingarden.	Y	I	8.0	2	16.0	Y	18.4	0.011
		Install 1 flow control diversion structure.		L	0.5	2	1.0			
		Install 120 LF of new pipe.		F	0.2	2	0.4			

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Install 1 manhole.		G	0.5	2	1.0			
		Replace 1,330 LF of pipe.	N	Q						
		Remove existing bubbler.		Q						
		Replace 7 manholes.		Q						
		Replace field inlet.		Q						
WR-2	Miley Road Stormwater Improvements	Install 4,195 of new pipe.	Y	F	7.6	2	15.1	Y	30.1	0.018
		Install 15 manholes.		G	7.5	2	15.0			
		Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert.	N	P						
		Replace 400 LF of pipe.		Q						
		Replace 1 manhole.		Q						
		Replace 1 area drain.		Q						
		Extend 240 LF of existing main connections to the new pipe alignment.		F						
		Reconnect 13 existing curb inlets.		F						
WR-3	Rose Lane Culvert Replacement	Install 80 LF of new pipe.	Y	F	0.1	2	0.2	Y	2.2	0.001
		Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch.		J	1.0	2	2.0			
		Remove 25 LF of pipe.	N	Q						
WR-4	Charbonneau East Stormwater Improvements	Replace 3,765 LF of pipe.	N	Q				Y	0.0	0.0
		Replace 18 manholes.		Q						
		Replace 1 outfall.		Q						
WR-5	Charbonneau West Stormwater Improvements	Install 4 manholes.	Y	G	2.0	2	4.0	Y	4.0	0.002
		Replace 34 manholes.	N	Q						
		Replace 6,770 LF of pipe.		Q						
		Replace 2 outfalls.		Q						
City-1	Flow Monitoring and Rain Gauge Installation Hydromodification Assessment and Stream Survey	Install 1 rain gauge.	Y	Consultant Support				Y	Consultant Support	
		Install 3+ flow meters.								
City-2	Porous Pavement Pilot Study	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	Consultant Support				Y	Consultant Support	
City-3	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
City-4	Flow Monitoring and Rain Gauge Installation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
						SMP Implementation Subtotal of Public Works/Maintenance Staff Cost		Average Annual Staff Time (hours)	350.7	
								Average Annual Staff Time (FTE)	0.21	

Community Development/Engineering Staffing Assessment

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
BC-1	Library Pond Retrofit	• Clear, regrade, and replant 0.7-acre detention pond. • Install 1 new outlet structure. • Install 70 LF of new perforated pipe. • Replace 70 LF of pipe. • Install driveway for maintenance access.	Y	$1,880,000	$190,000	0.95	0.048	1,567.5	78.4
BC-2	Ash Meadows Flow Mitigation	• Clear, regrade, and replant 1.3-acres of drainageway. • Install 1 inlet. • Replace175 LF of pipe.	Y	$2,940,000	$234,000	1.17	0.059	1,930.5	96.5
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	• Clear, regrade, and replant 1.6-acres of storage facility (detention pond). • Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes). • Install 1 new outlet structure. • Install 350 LF of pipe. • Install 1 new manhole.	Y	Ph 1: $4,860,000	Ph 1: $322,000	1.61	0.081	2,656.5	132.8
				Ph 2: $7,210,000	Ph 2: $384,000	1.92	0.096	3,168.0	158.4
BC-4	Boeckman Creek Stabilization at Colvin Lane	• Install 70 LF of new pipe. • Reconstruct 150 LF of vegetated swale. • Install planting and bioengineered restoration of 600 LF of stream corridor. • Remove 30 LF of existing outfall pipe.	Y	$410,000	$38,000	0.19	0.010	313.5	15.7
BC-5	Memorial Park Swale Retrofit	• Install 2,400 SF vegetated water quality swale. • Install 50 LF of new pipe. • Install 1 swale inflow spreader, 1 overflow structure and 1 new outfall. • Replace 1 manhole with a flow splitting/WQ manhole. • Replace 110 LF of pipe. • Install 140 LF of perforated pipe. • Replace 2 manholes. • Fill existing 1,500 SF swale and revegetate area. • Remove 210 LF of existing pipe. • Remove 1 manhole, 1 swale inlet structure, and 1 outlet structure.	Y	$910,000	$85,000	0.43	0.021	701.3	35.1
BC-6	Gesellschaft Water Well Channel Restoration	• Install 480 LF of new pipe. • Install 2 new manholes. • Install 1 outfall. • Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	Y	$400,000	$38,000	0.19	0.010	313.5	15.7

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
CLC-1	Day Road Stormwater Improvements	• Install 200 LF of open-bottom or box culverts (4 total). • Install 180 LF of culverts (1 total). • Install 600 LF of pipe. • Install 2 manholes. • Install 3 trash racks at pipe inlets. • Regrade and reconstruct approx. 4,500 feet of open channel. • Replace 1,800 LF of pipe with 600 LF of pipe. • Replace 7 manholes. • Remove 50 LF of existing culvert.	Y	Ph 1: $8,020,000	Ph 1: $405,000	2.03	0.101	3,341.3	167.1
				Ph 2: $3,930,000	Ph 2: $370,000	1.85	0.093	3,052.5	152.6
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• Replace 70 LF of box culvert. • Install 70 LF of planting and bioengineered restoration/stabilization measures along path. • Repave 600 SF of pedestrian path.	Y	$290,000	$35,000	0.18	0.009	288.8	14.4
CLC-3	Garden Acres Pond Retrofit	• Install 1 flow diversion structure. • Install 250 LF of new pipe. • Install 1 outlet control structure. • Install 50 LF of perforated pipe. • Clear, regrade, and replant 0.9-acres of pond. • Remove 26,500 CY of fill from existing pond.	Y	$3,780,000	$302,000	1.51	0.076	2,491.5	124.6
NC-1	Frog Pond East and South Conveyance Pipe Installation	• Install 2,360 LF of new pipe. • Install 1 outfalls. • Install 7 manholes.	Y	$4,090,000	$414,000	2.07	0.104	3,415.5	170.8
WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements	• Clear, grade, and replant 0.12-acres of raingarden. • Install 1 flow control diversion structure. • Install 120 LF of new pipe. • Install 1 manhole. • Replace 1,330 LF of pipe. • Remove existing bubbler. • Replace 7 manholes. • Replace field inlet.	Y	Ph 1: $2,310,000	Ph 1: $233,000	1.17	0.058	1,922.3	96.1
				Ph 2: $1,080,000	Ph 2: $109,000	0.55	0.027	899.3	45.0

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
WR-2	Miley Road Stormwater Improvements	• Install 4,195 of new pipe. • Install 15 manholes. • Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert. • Replace 400 LF of pipe. • Replace 1 manhole. • Replace 1 area drain. • Extend 240 LF of existing main connections to the new pipe alignment. • Reconnect 13 existing curb inlets.	Y	Ph 1: $820,000	Ph 1: $77,000	0.39	0.019	635.3	31.8
				Ph 2: $10,510,000	Ph 2: $470,000	2.35	0.118	3,877.5	193.9
WR-3	Rose Lane Culvert Replacement	• Install 80 LF of new pipe. • Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch. • Remove 25 LF of pipe.	Y	$200,000	$35,000	0.18	0.009	288.8	14.4
WR-4	Charbonneau East Stormwater Improvements	• Replace 3,765 LF of pipe. • Replace 18 manholes. • Replace 1 outfall.	Y	Ph1: $600,000	Ph 1: $50,000	0.25	0.013	412.5	20.6
				Ph 2: $4,440,000	Ph 2: $449,000	2.25	0.112	3,704.3	185.2
WR-5	Charbonneau West Stormwater Improvements	• Install 4 manholes. • Replace 34 manholes. • Replace 6,770 LF of pipe. • Replace 2 outfalls.	Y	$10,370,000	$488,000	2.44	0.122	4,026.0	201.3
P-4[E]	Charbonneau Repair/ Replacement Program	• Replace 30,620 LF of pipe. • Replace 153 manholes.	Y	$38,360,000	$3,879,000	19.40	0.970	32,001.8	1,600.1
City-1	Flow Monitoring and Rain Gauge Installation	• Install 1 rain gauge. • Install 3+ flow meters.	Y	TBD, project will vary		Consultant Support			
City-2	Hydromodification Assessment and Stream Survey	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	TBD, project will vary		Consultant Support			
City-3	Porous Pavement Pilot Study	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
City-4	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	TBD, project will vary		Consultant Support			

SMP Implementation Subtotal of Community Development/Engineering Staff Cost		
	Total Staff Time	43.04 FTE / (71,008 hrs)
	Annual Average Staff Time [B]	2.15 FTE / (3,550 hrs)
	City Engineering Staff already designated for Capital Project work [C]	*1.0 FTE*
	Additional Annual Average Community Development/Engineering Staff Time Needed [D]	**1.15 FTE**

[A] *Most projects use a 13.5% multiplier for Design/Construction Administration, but a select group of projects were designated by the City to use a 3.5% + $200K value instead to better represent anticipated conditions.*

The projects with the adjusted multiplier include BC-3 Phases 1 & 2, CLC-1 Phase 1, CLC-3, WR-2 Phase 2, and WR-5.

WR-4 Phase 1 was designated by the City to use a 25% multiplier for Design/Construction Administration.

[B] *Summary values rounded to nearest whole hour.*

[C] *The City already has 1.0 FTE designated to work on Capital Projects, this amount was subtracted from the total calculated staff time.*

[D] *This value represents the additional annual average Community Development/Engineering staffing need of the City to complete the Capital Projects.*

[E] *Proposed program efforts are generally anticipated to be conducted using existing staffing resources or within allocated annual budgets. The Charbonneau R/R Program (P-4) will require dedicated City Engineering resources to schedule and manage specific contracts to adhere to the anticipated 20-year program duration. As such, Design/ Construction Administration costs were specifically calculated for this program and used to inform the required staffing needs.*

Stormwater Master Plan Staffing Summary

SMP Implementation - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary						
	Annual SMP Implementation Staff Cost Schedule (FTE)					
	2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	0.21	0.21	0.21	0.21	0.21	0.21
Community Development/Engineering	1.15	1.15	1.15	1.15	1.15	1.15
Total Staff Time	1.36	1.36	1.36	1.36	1.36	1.36

Combined Staffing Assessment Summary

Combined - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Combined Annual Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for NPDES MS4 Driven Activities (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	SMP Implementation	0.21	0.21	0.21	0.21	0.21	0.21
	Public Works/Maintenance Staffing Summary (FTE)	2.68	2.68	2.67	2.67	2.67	2.67
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.26	0.19	0.11	0.11	0.11	0.16
	SMP Implementation	1.15	1.15	1.15	1.15	1.15	1.15
	Community Development/Engineering Staffing Summary (FTE)	1.41	1.34	1.26	1.26	1.26	1.31

Appendix H: Comprehensive Plan Review

Comment Log

6500 SW Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville
Project Title: Stormwater Master Plan
Project No.: 156157
Subject: Review of Wilsonville Comprehensive Plan
Date: December 16, 2021

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
1	K. Reininga	C-8	Storm Drainage Plan Paragraph 2, Line 2	Add other parameters here [currently includes temperature and turbidity] like metals, toxics, nutrients…
2	K. Reininga	C-8	Storm Drainage Plan Paragraph 3, Line 2	Remove word 'detention.'
3	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 2	Include mention of water quality.
4	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 3	Add "Prepared in X and updated in X" after Stormwater Master Plan.
5	K. Reininga	C-8	Policy 3.1.7	The need to prioritize green infrastructure and infiltration should be reflected in the policy statement. It may be preferred to keep language general and say compliance with the City's standards is required and then those priorities reside there. Or, an implementation measure could be added to address the new permit requirements for LID and retention. Numbering appears to be incorrect, as this should be Policy 3.1.9.
6	K. Reininga	C-8	Policy 3.1.7 Paragraph 1, Line 6	Add "peak rate" after "volume".
7	K. Reininga	C-9	Implementation Measure 3.1.7.b, Line 3	Add Municipal Separate Storm Sewer System (MS4) before the word permit as there are other types of NPDES permits.
8	K. Reininga	C-9	Implementation Measure 3.1.7.c, Line 9	Remove word 'detention.'
9	K. Reininga	C-9	Implementation Measure 3.1.7.e	City to confirm this implementation measure is still applicable.
10	K. Reininga	C-9	Implementation Measure 3.1.7.f, Line 3	Clarification need. It is not clear what Option A is referring to.
11	K. Reininga	C-10	Implementation Measure 3.1.7.h, Line 3	"Development Review Board" - Is this still the appropriate reference?

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
12	K. Reininga	C-10	Implementation Measure 3.1.7.k, Line 5	Has this now been done? Reference: "For that area along Coffee Lake Creek, a hydrology study to establish the 100-year flood elevation will be required prior to development approval."
13	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 1	Insert word "peak" in single-storm drainage runoff.
14	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 5	Revise to say stormwater management facilities here instead of detention or retention facilities.
15	K. Reininga	C-11	Implementation Measure 3.1.7.n, Line 7	Has this been done? "The appropriate criteria will be established and implemented through the City's Public Works Standards."
16	K. Reininga	C-11	Implementation Measure 3.1.7.r, Line 3	Replace "detention/retention basin" with the term stormwater management facility.

Stormwater Master Plan Update

City Council Work Session

February 22, 2023

Kerry Rappold
Natural Resources Manager

Angela Wieland
Brown & Caldwell

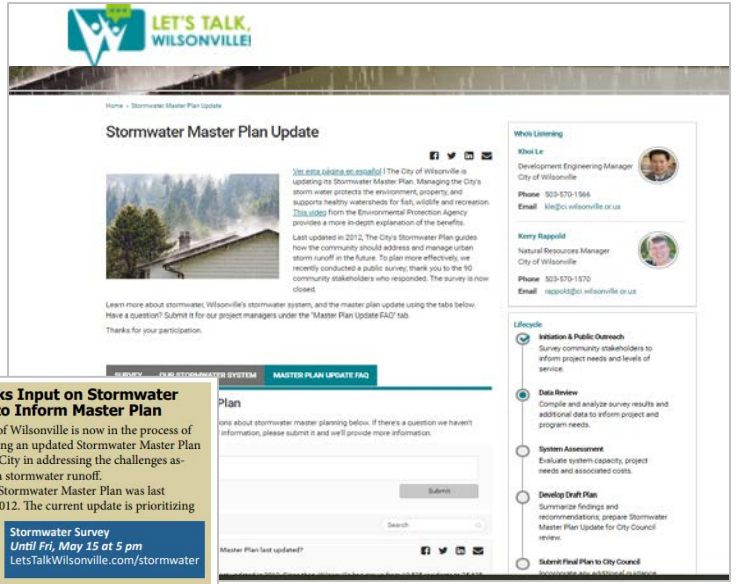
WILSONVILLE
OREGON

Discussion Topics

- Stormwater Management in Wilsonville
- Master Plan Development Process
- Regulatory Drivers and Overlap
- Project Needs/ Technical Evaluations
- Capital Project and Program Overview
- Next Steps

Stormwater Management in Wilsonville

- Outreach moved online to educate community and gather feedback
  - Web page with traditional open house materials – hosted on *letstalkwilsonville*
  - English and Spanish versions
  - Boones Ferry Messenger article
  - Social media
- External Stormwater Survey
  - April 1 – May 15, 2021
  - English and Spanish versions
  - 90+ participants
  - 97% favorable impression of Wilsonville's stormwater services
  - Provided areas of concern



City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

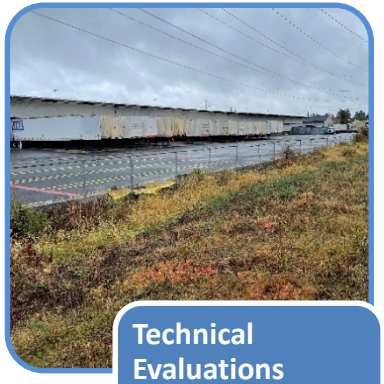
The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-1566 or kle@ci.wilsonville.or.us.

Master Plan Development Process

Project Needs Assessment

- Data Collection
- Public Survey
- Staff Interviews
- Site Visits
- Problem Area Identification



Technical Evaluations

H/H Modeling

Stream Assessment

Water Quality Retrofits

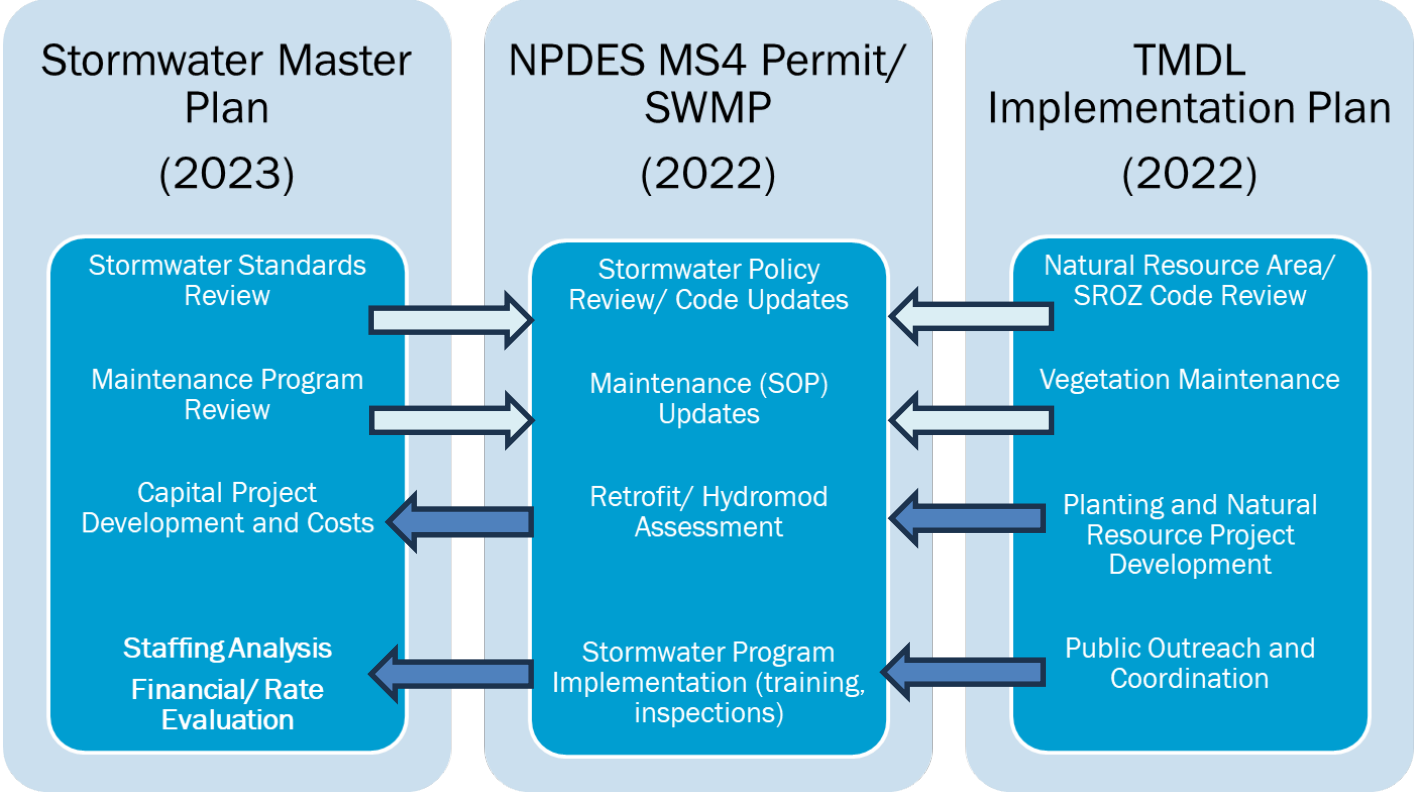
Capital Program Development

- Projects (Capital and Planning)
- City-wide Programs
- Policies
- Cost Estimation

Capital Program Implementation

- Staffing
- Project Prioritization
- Documentation
- Stakeholder Outreach

Regulatory Drivers and Overlap



Project Needs Identification

Problem Area Identification

- Surveys (Internal and External)
- Field Visits
- 33 Locations

Technical Analysis

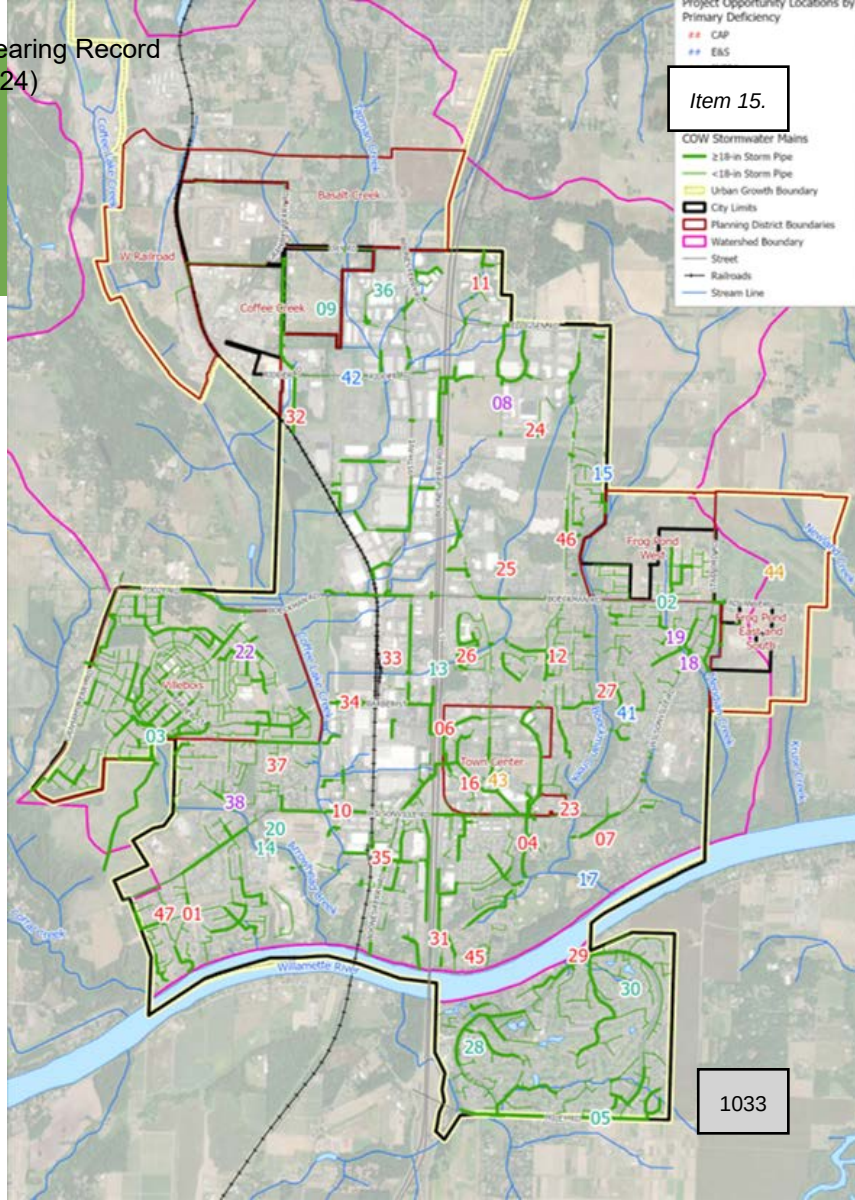
- Modeling
- Stream Assessment
- Water Quality Retrofits
- Maintenance Evaluations

Project Opportunities

- 47 Project Opportunity Locations
- CIP Workshops

Capital Program Development

- Project Objectives
  - Capacity
  - Maintenance
  - Repair/ Replacement (System Condition)
  - Infrastructure Need (growth areas)
  - Water Quality
  - Erosion and Sediment Control/ Instream
- Project Categorization
  - Funded Project
  - Program Need
  - Policy Need
  - Future/ Unfunded Project



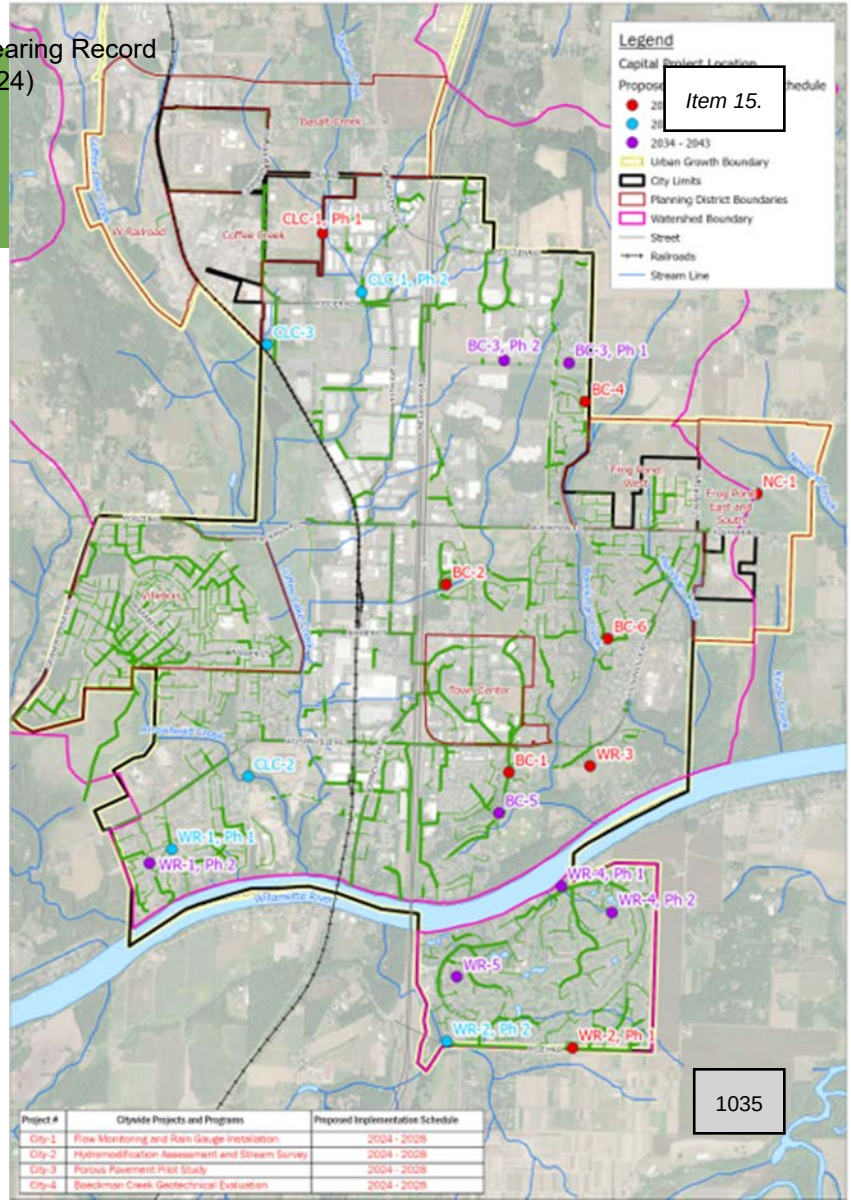
Capital Projects (Funded)

- One-time cost
- 15 Capital Projects
  - Fact sheets
  - Detailed Cost Estimates
- Four Planning Projects
- Project Scheduling
  - Near Term (2024-2028)
  - Mid Term (2029-2033)
  - Long Term (2034-2043)

	Near Term	Mid Term	Long Term
Capital Project Cost	18.86M	20.82M	29.47M
Planning Project Cost	$280,000	$30,000	$60,000
TOTAL	19.14M	20.85M	29.53M

Near-Term Projects

- Capital Projects (select)
  - CLC-1 Day Road Stormwater (Phase 1)
  - WR-2 Miley Road Stormwater (Phase 1)
  - BC-2 Ash Meadows Flow Mitigation
  - BC-4 Boeckman Creek Stabilization at Colvin Lane
- Planning Projects



Program Needs (Annual)

	Name	Annual Cost
P-1	Localized Drainage Improvements Program	$100,000
P-2	Water Quality Retrofit Program	$200,000
P-3	Repair and Replacement (R/R), citywide	$275,000
P-4	Charbonneau R/R	1.92M
P-5	Riparian Vegetation Management Program	$25,000
P-6	Stormwater Facility Enhanced Maintenance Program	$25,000
TOTAL		2.54M

Staffing Analysis

- Public Works (Roads and Stormwater Sections)
  - More immediate need
    - Deferred Maintenance
    - Maintenance of new assets
- Community Development/ Engineering
  - Extended need
    - Capital Project Implementation
    - NPDES/ TMDL Regulatory

	Activity	Staffing Increase (FTE)
Public Works/ Stormwater	Regulatory	2.5
	Capital	0.2
	TOTAL:	2.7
Community Development/ Engineering	Regulatory	0.2
	Capital	1.2
	TOTAL:	1.4

Implementation

	Annual	Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-2043)
Capital Project Cost	---	18.86M	20.82M	29.47M
Planning Project Cost	---	$280,000	$30,000	$60,000
Program Cost	2.54M			
Staffing (Public Works)		2.5 FTE		0.2 FTE
Staffing (Engineering)		0.2 FTE	1.2FTE	
TOTAL	2.54M	19.14M + 2.7 FTE	20.85M + 1.2 FTE	29.53M + 0.2

Next Steps

Public Meetings/ Review

Virtual Open House

Plan Adoption and Rate Study

City Council Meeting Action Minutes
February 22, 2024

COUNCILORS PRESENT
Mayor Fitzgerald
Council President Akervall
Councilor Linville
Councilor Berry
Councilor Dunwell

STAFF PRESENT
Amanda Guile-Hinman, City Attorney
Andrew Barrett, Capital Projects Eng. Manager
Bill Evans, Communications & Marketing Manager
Bryan Cosgrove, City Manager
Chris Neamtzu, Community Development Director
Kerry Rappold, Natural Resources Manager
Kimberly Veliz, City Recorder
Mark Ottenad, Public/Government Affairs Director
Robert Wurpes, Chief of Police
Stephanie Davidson, Assistant City Attorney
Zach Weigel, City Engineer
Zoe Mombert, Assistant to the City Manager

AGENDA ITEM	ACTIONS
WORK SESSION	**START:** 5:01 p.m.
A. Draft Stormwater Master Plan	Staff sought the Council's feedback on a draft of the Stormwater Master Plan Update, developed to identify and prioritize capital needs, and to present strategies aimed at maintaining, restoring, and enhancing local watersheds and meeting engineering, environmental and land use needs.
B. Public Contracting Code Update	Staff shared an update on a project to review the City's public contracting code, and sought the Council's direction on several changes under consideration to make the City's procurement of goods and services more efficient, less confusing, more equitable, and in alignment with current public contracting laws.
REGULAR MEETING	
<u>Mayor's Business</u> A. Declaration of 35th Anniversary of Sister City Relationship	The Mayor read a declaration of the 35th anniversary of the Sister City relationship of Wilsonville, Oregon and Kitakata, Japan. Council 5-0 ratified the declaration.
B. Upcoming Meetings	Upcoming meetings were announced by the Council President as well as the regional meetings she attended on behalf of the City.

C. Appointment of Council Member to Willamette Valley Commuter Rail Advisory Committee	Council asked to consider appointed t Willamette Valley Commuter Rail Advisory Committee.
Communications A. Crime Stats	The Wilsonville Police Chief provided a summary of data on the volume and types of crimes taking place in Wilsonville. Chief Wurpes noted a decline in property-related crimes in 2023. Following the presentation Council discussed and moved to accept the Measure 110. Legislative House Bill (HB) 4002-24 pre booking diversion letter. Passed 5-0.
Consent Agenda A. **Resolution No. 3114** A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Professional Services Agreement With Brown And Caldwell, Inc. For Engineering Consulting Services For The Boeckman Creek Flow Mitigation Project (Capital Improvement Project No. 7068) B. Minutes of the January 18, 2024 Council Meeting.	The Consent Agenda was approved 5-0.
New Business **A. Resolution No. 3123** A Resolution Of The City Of Wilsonville Amending Resolution No. 3046 To Further Phase-In The Implementation Of The Parks System Development Charge For Single-Family Residential Development. **B. Resolution No. 3124** A Resolution Of The City Of Wilsonville Adopting The Findings And Recommendations Of The 2023 Solid Waste Collection Rate Report, Amended January 2024, And Modifying The Republic Services Rate Schedule For Collection And Disposal Of Solid Waste, Recyclables, Organic Materials And Other Materials, Effective February 1, 2024, Amended On February 22, 2024.	Resolution No. 3123 was adopted, 5-0. Resolution No. 3124 was adopted, 5-0.

C. <u>Resolution No. 3125</u> A Resolution Of The City Of Wilsonville Referring To The Electors Of The City Of Wilsonville The Question Of Amending The City Charter To Refine Mayoral Term Limits In Certain Circumstances.	Resolution No. 3125 was amended and adopted, 5-0.
D. <u>Resolution No. 3126</u> A Resolution Of The City Of Wilsonville Referring To The Electors Of The City Of Wilsonville The Question Of Amending The City Charter To Clarify The Calculation Of Years Of Service Relating To Term Limits.	Resolution No. 3126 was amended and adopted, 5-0.
<u>Continuing Business</u> A. **<u>Ordinance No. 886</u>** An Ordinance Of The City Of Wilsonville Annexing Approximately 5.00 Acres Of Property Located At 7252 SW Frog Pond Lane For Development Of A 17-Lot Residential Subdivision.	Ordinance No. 886 was adopted on second reading by a vote of 5-0.
B. **<u>Ordinance No. 887</u>** An Ordinance Of The City Of Wilsonville Approving A Zone Map Amendment From The Clackamas County Rural Residential Farm Forest 5-Acre (RRFF-5) Zone To The Residential Neighborhood (RN) Zone On Approximately 5.00 Acres Located At 7252 SW Frog Pond Lane For Development Of A 17-Lot Residential Subdivision.	Ordinance No. 887 was adopted on second reading by a vote of 5-0.
<u>Public Hearing</u> A. None.	
<u>City Manager's Business</u>	The City Manager shared staff had no contact with the Village at Main Center new property owners.
<u>Legal Business</u>	No report.
ADJOURN	10:28 p.m.

PLANNING COMMISSION

WEDNESDAY, FEBRUARY 14, 2024

WORK SESSION

3. Stormwater Master Plan (Rappold) (45 minutes)

PLANNING COMMISSION MEETING
STAFF REPORT

Meeting Date: February 14, 2024	**Subject:** Draft Stormwater Master Plan **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☐ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☒ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Review and provide comment on the Draft Stormwater Master Plan.	
Recommended Language for Motion: N/A	
Project / Issue Relates To:	

☒Council Goals/Priorities: Protect and Preserve Wilsonville's Environment	☒Adopted Master Plan(s):	☐Not Applicable

ISSUE BEFORE PLANNING COMMISSION:
Staff and the consultant will present the draft Stormwater Master Plan (SMP).

EXECUTIVE SUMMARY:
In 2012, the City adopted the Stomwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., Urban Growth Boundary (UGB) expansion areas) and new stormwater management requirements (i.e., National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) Permit) that need to be addressed as part of the update. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a survey was conducted to gather feedback from the community about the proposed SMP. Ninety respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

Since 2021, the consultant team has been working on data collection, problem area identification, modeling of the stormwater system, retrofit analysis, Capital Improvement Program (CIP) projects, and developing the policies that will guide the implementation of the SMP. In developing the SMP, a number of new elements were included:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality) and Total Maximum Daily Load (TMDL) Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon DEQ) to determine the appropriate management and project objectives in the SMP.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The CIP addresses the variety of issues and problems associated with the City's public stormwater system and represents a critical piece in the overall management of the system. Projects were prioritized to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as water quality retrofit and local drainage improvements, were developed to address regulatory drivers and support proactive system maintenance.

A total of 15 capital projects were identified to address current and future storm drainage infrastructure needs over the 20-year planning period. Due to phasing for some of the projects,

these 15 capital projects represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts. The CIP projects, which are divided into annual, high priority (2024-28), medium priority (2029-33), and low priority, have an estimated total cost of $72,065,000.

On October 11, 2023, staff presented the Executive Summary and the Capital Improvement Program at a Planning Commission work session.

Discussion Questions
The following would be helpful feedback from the Planning Commission at this work session:

- What feedback on questions does the Planning Commission have on the full Stormwater Master Plan?

EXPECTED RESULTS:
The SMP includes goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Program, fee in lieu of construction program, and draft and final versions of the SMP. The recommended capital improvements will provide the basis for an analysis of stormwater rates and system development charges (SDCs) that are necessary to fund the projects needed to meet permit requirements and the City's stormwater management needs.

TIMELINE:
The project team will incorporate feedback received from both the Planning Commission (February 14, 2023 work session) and the City Council (February 22, 2023 work session) into the final SMP. Adoption of the SMP by the Planning Commission is scheduled for March 13, 2023. The City Council public hearing is scheduled for April 1, 2024.

CURRENT YEAR BUDGET IMPACTS:
The amended fiscal year 2023-2024 Budget for CIP#7064 includes $77,425 in storm operations and system development charge funds.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the SMP. The Public Engagement Plan incorporated the City's existing public engagement tools, including Let's Talk Wilsonville and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities. The forthcoming Storm System Rate Study and SDC Update will also include a public engagement process with outreach to utility customers and the development community.

POTENTIAL IMPACTS or BENEFIT TO THE COMMUNITY:
The SMP will benefit the community by providing goals and policies and an updated Capital Improvement Program to serve a growing population and meet environmental regulations.

ALTERNATIVES:
The project team considered and evaluated numerous alternatives to provide the needed storm drainage improvements necessary to meet the City's system management needs and permit requirements. The recommended Capital Improvement Program implements the needed improvements in a way that is efficient and cost effective.

ATTACHMENTS:

1. Draft Stormwater Master Plan

Stormwater Master Plan

February 2024 // **DRAFT**

WILSONVILLE
OREGON

DRAFT

Stormwater Master Plan

Prepared for
City of Wilsonville, Oregon
February 2024

This is a draft and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

Brown AND Caldwell

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552
T: 503.244.7005

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DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the end of this document.
Planning Commission Meeting - February 14, 2024
Wilsonville Draft Stormwater Master Plan Public Draft (2-2-24)
Stormwater Master Plan

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List of Abbreviations

AACE	Association for the Advancement of Cost Engineering
ac	acre
BC	Brown and Caldwell
BMP	best management practice
CB	catch basin
CCTV	closed-circuit television
cfs	cubic feet per second
COM/GOV	Commercial/Government
CIP	capital improvement program
City	City of Wilsonville
CPs	capital projects
CPP	corrugated polyethylene pipe
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DIP	ductile iron pipe
DS	downstream
EPA	U.S. Environmental Protection Agency
E&S	Erosion and Sediment
fps	feet per second
ft	feet/foot
GIS	geographic information system
H	horizontal
H/H	hydrologic and hydraulic
HSG	Hydrologic Soil Group
IGA	Intergovernmental Agreements
in.	inch/inches
IND	Industrial
INST	Institutional
I-5	Interstate 5
LA	Load Allocation
LF	linear foot/feet
LID	low impact development
MEP	maximum extent practicable
MH(s)	manhole(s)
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
Plan	Stormwater Master Plan
PVC	polyvinyl chloride
PWS	Wilsonville Public Works Standards
RA	Rural Agricultural
RCP	reinforced concrete pipe
ROW	right-of-way
R/R	repair/replacement
SDC	System Development Charge
SF	square feet
SMP	Stormwater Master Plan
SOPs	standard operating procedures
SROZ	Significant Resource Overlay Zone
SSURGO	Soil Survey Geographic Database
TM	technical memorandum
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UGB	Urban Growth Boundary
US	upstream
USCS	Unified Classification System
V	vertical
VAC	Vacant
WDC	Wilsonville Development Code
WLA	Waste Load Allocation
WQ	water quality

Acknowledgements

The Brown and Caldwell Team, including Waterways Consulting, Inc. and Consor (formerly Barney and Worth) would like to extend thanks to the following staff and stakeholders for assistance in completing this Stormwater Master Plan:

- Kerry Rappold, Natural Resources Manager and City Project Manager
- Andy Sheehan, Asset Management Coordinator
- Sean Shortes, Engineering Tech II

Wilsonville Internal Stakeholders

- Zach Weigel, City Engineer
- Andrew Barrett, Capital Projects Manager
- Amy Pepper, Development Engineering Manager
- Dan Pauly, Planning Manager
- Jim Cartan, Environmental Specialist
- Delora Kerber, Public Works Director
- Martin Montalvo, Operations Manager
- Brad Painter, Roads and Stormwater Supervisor
- Bill Evans, Communications and Marketing Manager

City Council

- Mayor Julie Fitzgerald
- Kristin Akervall, Council President
- Dr. Joann Linville, Councilor
- Caroline Berry, Councilor
- Katie Dunwell, Councilor

City Planning Commission

- Ronald Heberlein, Chair
- Jennifer Willard, Vice-Chair
- Nicole Hendrix
- Andrew Karr
- Kamran Mesbah
- Kathryn Neil

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include the need to: 1) address changing regulatory requirements; 2) reassess the storm system based on completion of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), 3) accommodate new and redevelopment activities, and 4) address observed system deficiencies warranting additional study.

This 2024 SMP identifies and prioritizes projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth. The SMP development process includes the:

- Evaluation of project needs and system improvements as identified by City staff.
- Development of validated hydrologic and hydraulic (H/H) model to confirm capacity issues and to assess anticipated flooding frequency and severity.
- Assessment of stormwater system retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risks to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality issues at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. Project needs were initially identified through the distribution of surveys to City staff and the public, a literature-based and Geographic Information System (GIS) data review, and site visits and staff interviews. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of this effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvements, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, the continued applicability of water quality projects not implemented from the 2012 SMP, and the ability to integrate water quality into other project needs, CP and program needs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby referred to as Kruse Creek for this SMP) to inform locations where stream morphology may

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be or is currently impacted by changes to upstream land use, and in response to changes in flow, infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) model developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities constructed since 2012. CPs installed since 2012 were also incorporated into the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and projected future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing level needs and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into staffing recommendations for both Public Works and Community Development/Engineering.

Project/Program Development and Prioritization. Project opportunities from the various technical evaluations were consolidated and developed into CPs and programs. CP development included conceptual design, facility sizing, and cost estimation. CPs were prioritized based on multiple criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing drainage area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater funding evaluations.

General Recommendations

The following project, program, and policy actions are recommended to improve and enhance the performance of the storm drainage infrastructure throughout the city:

1. Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
2. Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
3. Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
4. Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
5. Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.
6. Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
7. Clearly document CP and program costs and schedule to inform future funding and rate analyses.

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Capital Project Summary

Individual and city-wide CPs, as well as stormwater programs, were developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified 15 CPs (representing 20 individually costed project phases) and 4 city-wide planning projects, including conceptual cost estimates and respective priorities. Figure ES-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
Capital Projects							
BC-1	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	$1,880,000	11%	X		
BC-2	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	$2,940,000	27%	X		
BC-3-Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	$4,860,000	19%			X
BC-3-Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	$7,210,000	19%			X
BC-4	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	$410,000	19%	X		
BC-5	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	$910,000	2%			X
BC-6	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	$400,000	1%	X		
CLC-1-Phase 1	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	$8,020,000	38%	X		
CLC-1-Phase 2	Day Road Stormwater Improvements, Phase 2	• **Capacity**	$3,930,000	38%		X	

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Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	$290,000	6%		X	
CLC-3	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	$3,780,000	35%		X	
NC-1	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	$4,090,000	79%	X		
WR-1-Phase 1	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **Capacity** • Water Quality	$2,310,000	2%		X	
WR-1-Phase 2	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **Capacity**	$1,080,000	2%			X
WR-2-Phase 1	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	$820,000	--		X	
WR-2-Phase 2	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$10,510,000	--			X
WR-3	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	$200,000	10%	X		
WR-4-Phase 1	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	$600,000	--			X
WR-4-Phase 2	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$4,440,000	--			X
WR-5	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	$10,370,000	--			X
City-wide Planning Projects							
City-1	Flow Monitoring and Rain Gauge Installation	• **Capacity**	$100,000	N/A	X		
City-2	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	$30,000/ event	N/A	X	X	X
City-3	Porous Pavement Pilot Study	• **Water Quality**	$100,000	N/A	X		
City-4	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	$150,000	N/A	X		
				TOTAL:	**$19.14M**	**$20.85M**	**$29.53M**

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. City-wide planning projects are designated as "City".

*b. Primary objectives addressed are identified in **BOLD**.*

c. % Related to Growth refers to SDC-eligible projects and the proportional cost attributable to growth.

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Program Summary

In addition to the identified CPs, the following programs were identified to address regulatory drivers and support proactive stormwater system maintenance. These programs, objectives, and estimated annual cost are listed in Table ES-2 and described below:

- **Local Drainage Improvements Program (P-1).** Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).
- **Water Quality Retrofit Program (P-2).** Establish an annual funding mechanism to integrate low impact development (LID) and/or green infrastructure (GI) in conjunction with street improvements, public improvements, and other utility projects. This program supports the City's retrofit strategy and regulatory objectives by adding water quality treatment in areas that do not currently have treatment.
- **City-wide Repair/Replacement Program (P-3).** Allocate funds to conduct replacement of public pipe and outfalls (outside of the Charbonneau development area) in conjunction with inspection results and asset management efforts.
- **Charbonneau Repair/Replacement Program (P-4).** Allocate funds to conduct replacement of public pipe and structures within the Charbonneau development area in accordance with the Charbonneau Consolidated Improvement Plan (2014). Excludes portions of the system identified by CPs WR-4 and WR-5.
- **Riparian Vegetation Management Program (P-5).** Allocate funds to conduct riparian and/or in-channel vegetation restoration and maintenance including removal of invasive plant species.
- **Vegetative Facility Maintenance Program (P-6).** Allocate funds to conduct restorative maintenance for select stormwater facilities (public and private) in the City where larger-scale maintenance is needed and/or maintenance agreements are not in place or executed.

Table ES-2. Program Costs

Project Number	Project Name	Objective(s) Addressed	Estimated Annual Cost
City-Wide Programs			
P-1	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	$100,000/yr
P-2	Water Quality Retrofit Program	• **Water Quality** • Capacity	$200,000/yr
P-3	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$275,000/yr
P-4	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$1,920,000/yr
P-5	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	$25,000/yr
P-6	Vegetative Facility Maintenance Program	• **Water Quality** • Maintenance	$25,000/yr
		Annual Total	$2,545,000/yr

*Note: Primary objectives addressed are identified in **BOLD**.*

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Implementation

CPs, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP) as described in this SMP.

To ensure effective implementation of the CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP. The purpose of this analysis was to inform recommendations as needed for additional Public Works Operations and Community Development engineering staff.

An additional 2.7 FTE in Public Works Operations and 1.4 FTE in Community Development/Engineering are recommended to accommodate new projects and programs defined in this SMP as well as to address deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the implementation schedule and respective funding needs of capital investments. The City will need to develop a financial plan to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, should reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

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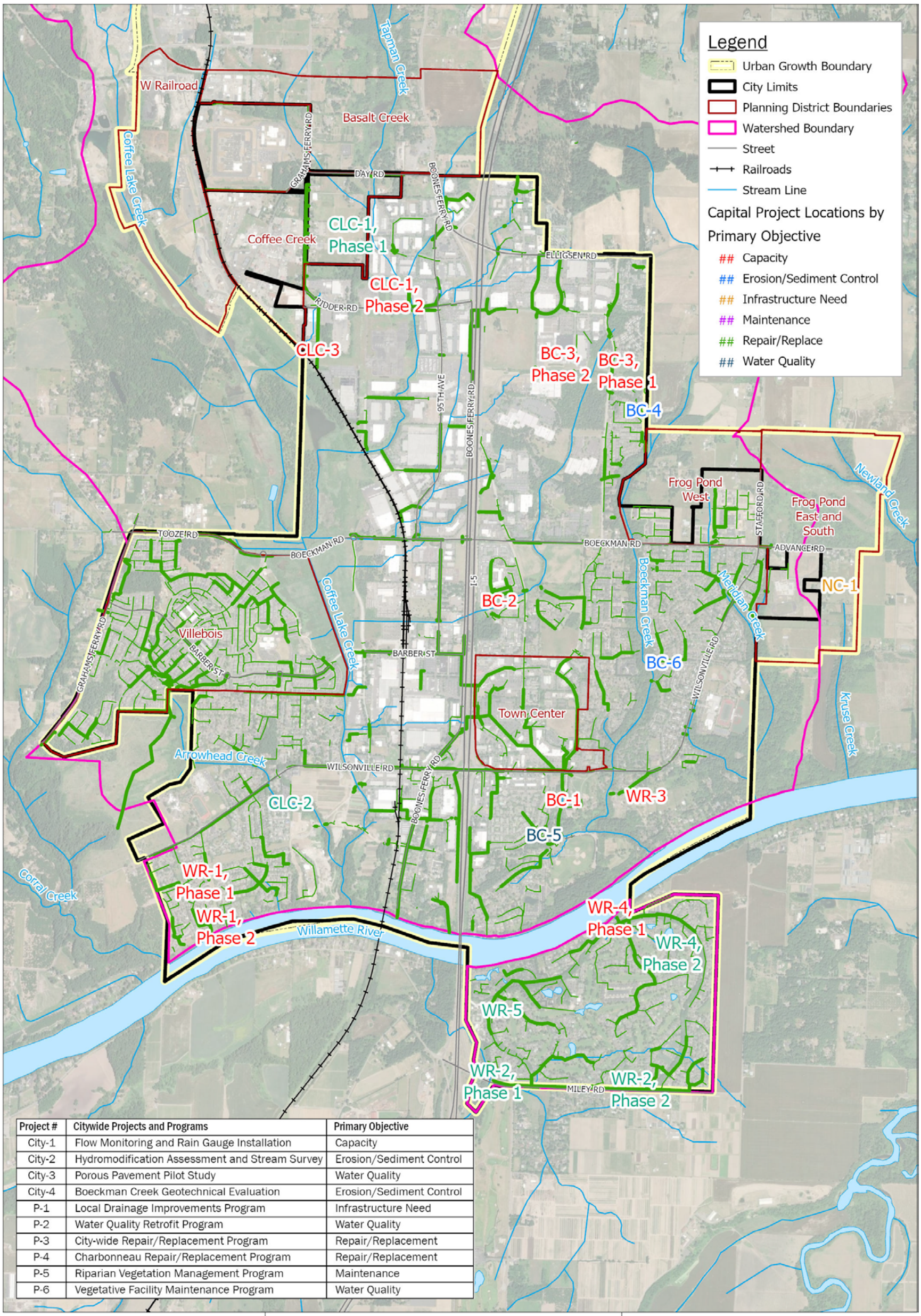

Project #	Citywide Projects and Programs	Primary Objective
City-1	Flow Monitoring and Rain Gauge Installation	Capacity
City-2	Hydromodification Assessment and Stream Survey	Erosion/Sediment Control
City-3	Porous Pavement Pilot Study	Water Quality
City-4	Boeckman Creek Geotechnical Evaluation	Erosion/Sediment Control
P-1	Local Drainage Improvements Program	Infrastructure Need
P-2	Water Quality Retrofit Program	Water Quality
P-3	City-wide Repair/Replacement Program	Repair/Replacement
P-4	Charbonneau Repair/Replacement Program	Repair/Replacement
P-5	Riparian Vegetation Management Program	Maintenance
P-6	Vegetative Facility Maintenance Program	Water Quality

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Capital Projects City-1 to City-4 and Programs P-1 to P-6 are citywide and not specific to a single location.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure ES-1: City of Wilsonville Capital Improvement Program Overview

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Section 1

Introduction

The City of Wilsonville (City) developed this Stormwater Master Plan (SMP or Plan) to guide stormwater and drainage-related capital project (CP), program, and policy decisions over a 20-year planning period.

The City's overall storm drainage system includes approximately 87 miles of piped and open channel (e.g., ditch, stream) conveyance, in addition to stormwater treatment and detention facilities for stormwater management. Most of the City's stormwater is collected and conveyed from north to south, discharging to the Willamette River via major stream corridors including Boeckman Creek (eastern portion of the City) and Coffee Lake Creek (western portion of the City). This SMP collectively considers both piped and open channel conveyances as part of the overall storm drainage system.

This Plan documents the processes and methods used to evaluate the City's storm drainage infrastructure, City stormwater programs, and maintenance activities. Results of the evaluation provide the City with projects, programs, and policies for implementation over the next 20 years and support future funding evaluations and stormwater utility rate and system development charge (SDC) calculations.

1.1 Need for a Master Plan

The City's previous SMP was completed in 2012, setting the course for stormwater management policies and CPs for the last decade. CPs and programs were proposed, prioritized, and scheduled (short term, midterm, long term, and unfunded) in the 2012 SMP, and some of the higher priority projects have been initiated or constructed. However, for some unconstructed and unfunded projects, the project needs have changed, and warrant reconsideration based on development drivers and regulatory needs.

In 2012, project prioritization focused more on project complexity and cost versus other objectives that are of increased importance (e.g., safety, recurring maintenance, water quality, erosion, and stream protection). New regulatory drivers, including the City's reissued 2021 Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit and the Oregon Department of Environmental Quality's (DEQ's) 2021 finalization of the 2019 Revised Willamette Basin total maximum daily load (TMDL) for mercury prompted increased consideration of water quality objectives as part of the capital project and program development effort.

Since 2012, new and re-development activities are rapidly occurring within the City's urban growth boundary (UGB). New infrastructure is continually being added, and ongoing maintenance of new infrastructure can strain City resources. The City also needs a proactive plan to address existing capacity deficiencies and aging and failing infrastructure, while considering resource limitations and development trends.

This SMP addresses water quantity, quality, and natural resource management for constructed drainage systems and stream corridors under the City's management.

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1.2 Master Plan Objectives

The City's overarching goal for this SMP is to guide storm drainage infrastructure improvements over a 20-year implementation period. Improvements must address maintenance/system condition issues, capacity issues, and water quality needs into the future. Specific objectives of the City's SMP include the following:

- Establish a process for evaluating and prioritizing stormwater needs in Wilsonville.
- Solicit information from staff to inform the identification of project needs and improvements.
- Identify known areas of flooding and other storm drainage problems, and provide project solutions related to collection, conveyance, treatment, and natural resource protection.
  - Update the City's existing hydrologic and hydraulic (H/H) model to evaluate system capacity based on current system information and updated land use and development conditions as obtained from the City's Planning Division.
  - Integrate findings and project needs stemming from stormwater planning documents completed since 2012 (i.e., 2015 Retrofit Plan, 2015 Hydromodification Assessment, development-specific master plans, etc.).
- Identify programmatic and planning opportunities to address areas of frequent maintenance needs, system condition deficiencies, and water quality concerns on a City-wide scale.
- Support long-term staffing and funding of the City's stormwater utility.
- Support current, pending, and future regulatory requirements and drivers through CPs, programs and policy recommendations.

This Plan is intended to support regulatory directives under the City's NPDES MS4 Permit and total maximum daily load (TMDL) obligations.

1.3 Approach

The City developed this SMP using an initial, collaborative planning approach with Community Development (Engineering and Planning divisions) and Public Works to assess known storm drainage problem areas and identify areas where the addition, replacement, or retrofit of infrastructure is needed to address an issue.

Targeted system evaluations were conducted to investigate water quality or natural resource opportunities and confirm capacity limitations. Following system evaluation efforts, Project Opportunity Areas were defined and vetted with the project team to inform the development of capital project and program concepts and costs.

This overall process allowed the City to develop multi-benefit projects that target areas of the City likely to be prioritized and funded in a capital improvement program.

Figure 1-1 outlines the approach used to develop this Plan. Detail related to specific evaluation efforts can be found in the following technical memorandums:

- Technical Memorandum #1 (TM1)- Stormwater Basis of Planning (February 2022), not included directly in this SMP document, but much of the content and figures have been integrated into this SMP document.
- Technical Memorandum #2 (TM2)-Geomorphic Reconnaissance of Boeckman, Meridian, and Arrowhead Creeks (May 2022), included in this SMP as Appendix C.
- Technical Memorandum #3 (TM3)-Hydrologic and Hydraulic Modeling Methods and Results, included in this SMP as Appendix B.

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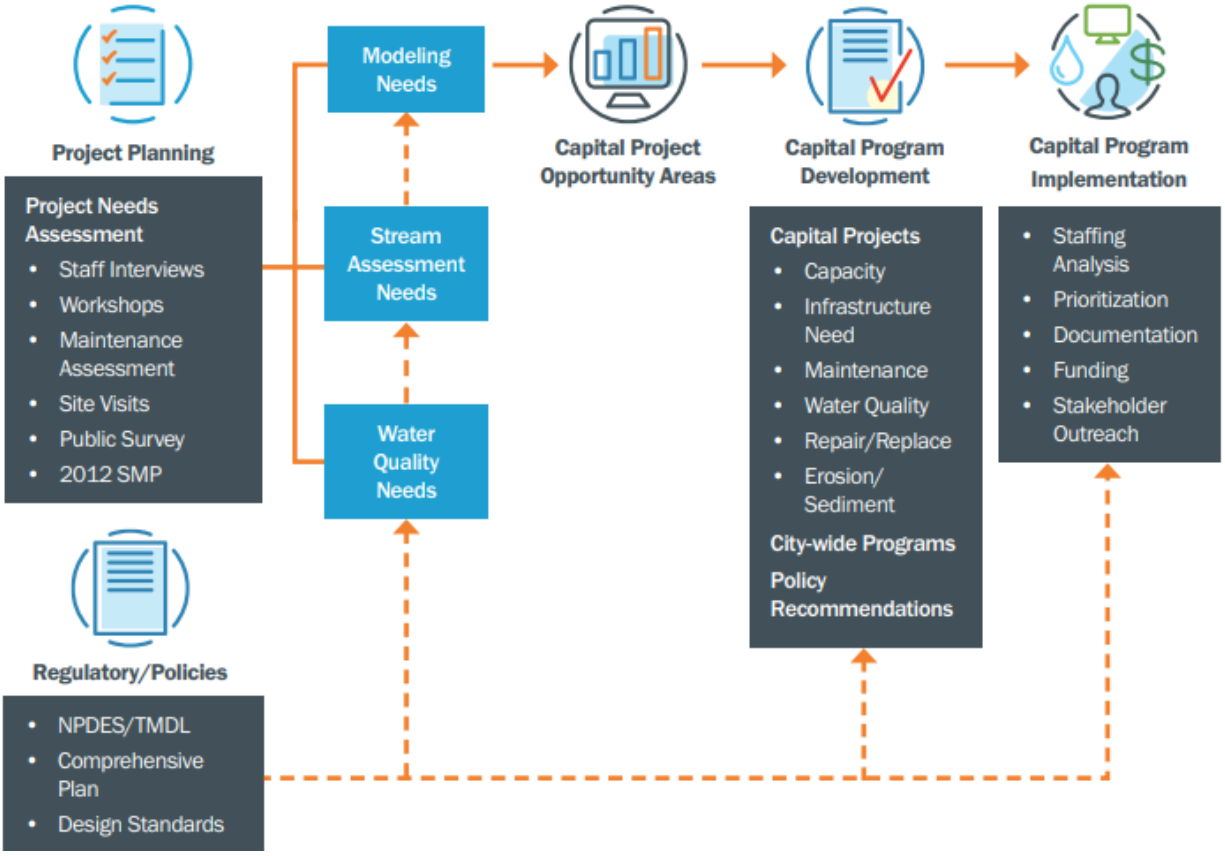

Figure 1-1: Stormwater Master Plan Approach

1.4 Supporting Documents

In addition to the 2012 SMP, several development-specific drainage reports and technical studies prepared since 2012 helped inform project development efforts. Many of these documents contain proposed infrastructure and capital improvements that have been integrated into capital projects proposed in this SMP. However, individual development master plans should still be referenced for detailed design concepts in these development areas. A summary of the reports and studies reviewed and considered for this SMP are listed in Table 1-1.

Additional detail related to regulatory drivers including the 2015 Retrofit Assessment and 2015 Hydromodification Assessment is provided in Section 2.6.

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Table 1-1. Existing Stormwater Planning Documentation and Reports		
Report	Date	Summary and application to the SMP
City of Wilsonville Stormwater Master Plan	2012	Recommends capital improvement projects to achieve city wide stormwater goals and objectives. Projects completed or in progress include SD4208 & SD4209, BC-4, BC-7, ST-6, ST-7, SD9030-9037, SD9013-9021, SD9060, ST-5, LID1, SD9022-9029, ST-9, and WD-3.
Villebois Village Master Plan	2013	Establishes projected land use categories/density requirements for the 2,300 residential unit development. Onsite and regional stormwater management concepts for treatment and detention are outlined.
Charbonneau Consolidated Improvement Plan	2014	Documents pipe replacement projects to address capacity deficiencies and poor condition of the existing stormwater collection system. Includes prioritization of stormwater pipe replacement in conjunction with other utilities (sanitary, water, etc.).
Stormwater Retrofit Plan	2015	Provides an updated prioritization of capital project needs stemming from the 2012 SMP, focusing on water quality criteria.
Hydromodification Assessment	2015	Provides an evaluation of hydromodification risk in stream corridors within the City, as well as recommended actions (including projects) for the City to implement.
Frog Pond Area Plan/West Master Plan	2015/2017	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage. The Frog Pond West Master Plan does not include information about proposed storm drain infrastructure, as that is detailed in the Area Plan.
Basalt Creek Concept Plan	2018	Provides preferred land use and recommends high-level concepts for transportation and infrastructure planning for the Basalt Creek Planning Area.
Town Center Plan	2019	Documents the proposed reconfiguration of existing stormwater infrastructure in conjunction with redevelopment of the Town Center area. Preliminary concepts send additional flow to the Library Detention Pond and remove an existing high flow bypass structure directing runoff west across I-5.
TMDL Implementation Plan	2019/2022	Outlines programmatic activities and best management practices (BMPs) implemented by the City to address instream temperature.
Frog Pond East/South Master Plan	2022	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage.

1.5 Master Plan Organization

Following this introductory Section 1, this SMP is organized as follows:

- Section 2 includes a description of the study area characteristics.
- Section 3 outlines the basis of planning, including the project needs assessment (identification of stormwater problem areas), water quality retrofit evaluation, and additional background to support the project identification and development effort.
- Section 4 summarizes the geomorphic stream assessment.
- Section 5 describes H/H modeling methods and results of the stormwater drainage system capacity evaluation and the identification of capacity-related capital project needs.
- Section 6 summarizes the stormwater capital project development effort, including development of project opportunity areas and determination of final capital project and program needs.
- Section 7 provides an overview of the implementation elements of the capital improvement program, including results of the stormwater staffing analysis specific to Public Works and Community Development, as well as project prioritization and policy recommendations.

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Section 2

Study Area Characteristics

This section provides an overview of study area characteristics, including location, topography, soils, land use, climate and rainfall, drainage system configuration, community perspectives, and regulatory objectives.

Referenced figures depicting study area characteristics are located at the end of this section.

2.1 Location and Study Area

The City of Wilsonville (City) is located primarily in Clackamas County with the northern portion of the City located in Washington County. The City is approximately 17 miles south of Portland, Oregon in the Willamette River Valley. The Willamette River runs west-east in the vicinity of the City, generally forming the southern City boundary with the majority of the City situated to the north of the river. The Charbonneau District is located south of the Willamette River (Figure 2-1). Interstate 5 (I-5) runs north to south through the center of the City and influences topography and drainage patterns.

The City covers six major basins within the city limits with topography that causes each basin to ultimately drain to the Willamette River (see Figure 2-2 at the end of this section). The waterways that define the major basins include Mill Creek (including the Corral Creek tributary), Coffee Lake Creek (including the Tapman Creek tributary), Boeckman Creek, and Meridian Creek which all flow from north to south and drain to the Willamette River. Developed areas adjacent to the Willamette River directly discharges to the Willamette River via pipe or open channel, and these areas are indicated on Figure 2-2, at the end of this section, as the Charbonneau basin and Willamette River direct basin. Together, Coffee Lake Creek/Tapman Creek and Boeckman Creek drain about 71 percent of the total city area, and their watershed boundaries extend outside the city limits and the urban growth boundary (UGB). The Coffee Lake Creek watershed is the largest, covering approximately 50 percent of the city area within the UGB.

The future Frog Pond East and South Planning District (within the UGB but partially within and outside of current City limits) will drain to Newland Creek, a tributary to the Willamette River, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby known as Kruse Creek in this SMP).

Some drainage systems in the city have also been re-routed to accommodate new development. For example, a historical flow diversion was constructed to re-route flows from Arrowhead Creek (in the Coffee Lake Creek watershed) to Legacy Creek (outside of the city limits), and a current flow diversion is used to re-route flow from the middle tributary of Coffee Lake Creek toward upstream Boeckman Creek. While efforts have been made to redirect flows back to their historical points of discharge, impacts can still be observed.

Table 2-1 summarizes the major basins and contributing drainage areas, both within the city limits/UGB and outside of the UGB. The defined study area for this SMP reflects areas of the City where hydrologic modeling was conducted, and the study area includes all areas within the city limits and UGB, with the exception of the Frog Pond East and South Planning District, located in the Newland and Kruse Creek basins. This area is predominately outside of the current UGB and subject to basin-specific master planning for utility placement (see Section 3.5).

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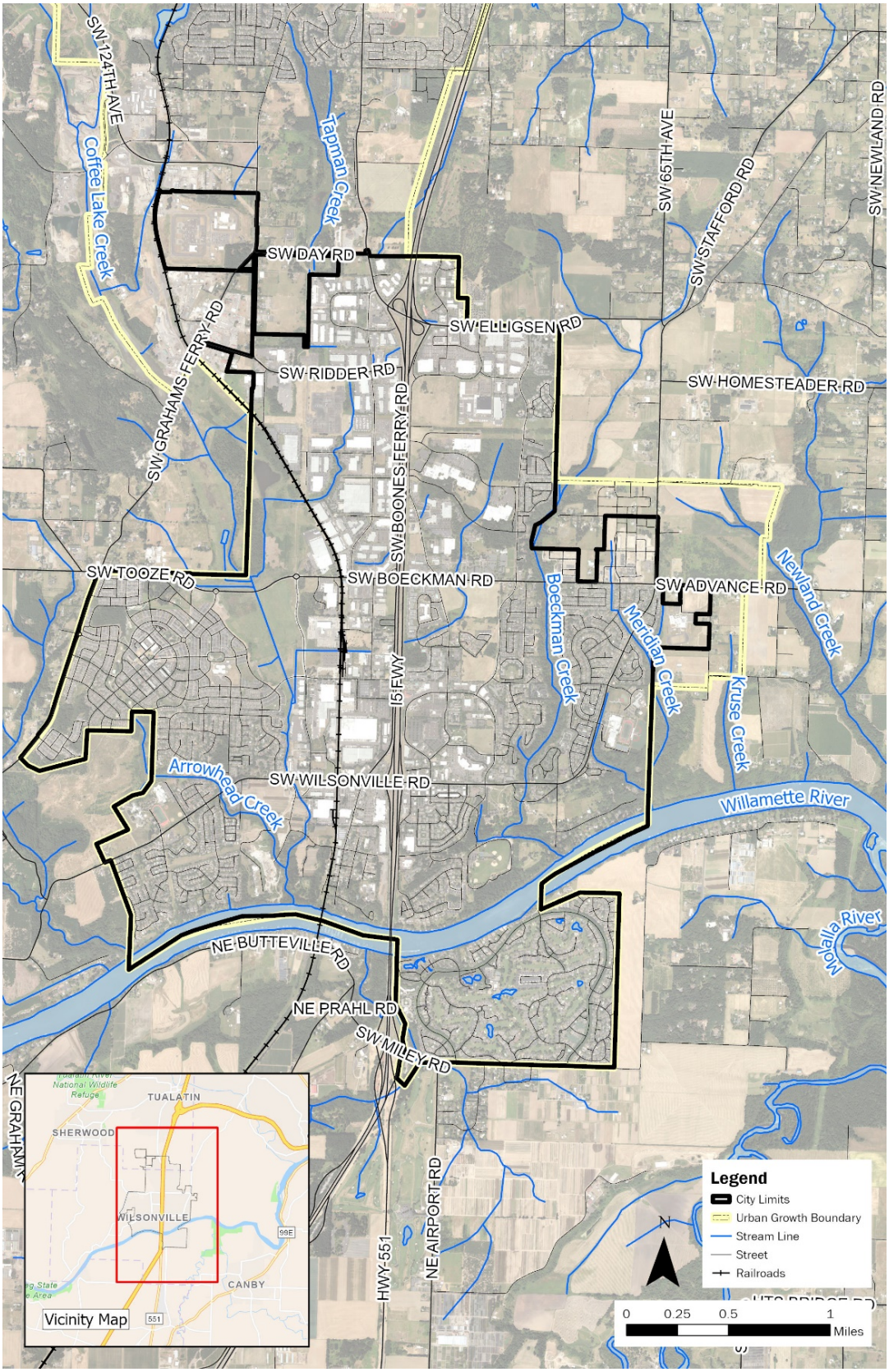

Figure 2-1: Location Overview

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Table 2-1. Study Area Overview				
Basin	Study Area (ac)			Total Study Area (ac)
	Within City Limits	Outside of City Limits (within the UGB)	Outside UGB	
Major Basins				
Boeckman Creek	1,096	70	806	1,972
Charbonneau	478	0	4	482
Coffee Lake Creek	2,332	1,418	1,412	5,162
Mill Creek[a]	101	0	10,424	10,525
Meridian Creek	283	100	87	470
Willamette River	505	0	0	505
Total	**4,795**	**1,588**	**12,733**	**19,116**
Related Basins				
Kruse Creek	13	55	231	299
Newland Creek	0	138	3,098	3,236

a. Area outside UGB is provided for informational purposes and does not contribute to City infrastructure.

2.2 Topography/Soils

Wilsonville's natural topography is characterized by steep hillsides on the eastern edge of the city, along the Boeckman Creek corridor, and relatively flat topography and floodplain area around Coffee Lake Creek basin and the associated Coffee Lake wetlands along the western portion of the city. Elevation within the city ranges from approximately 380 feet in the headwaters of Coffee Lake Creek to approximately 60 feet at the Willamette River.

Soil characteristics within the city vary by watershed. Soils within the city are generally limited in infiltration capability (Hydrologic Soil Group (HSG) C/D), although large areas of HSG B soils along the Willamette River and in the headwaters of Tapman Creek have higher infiltration rates. Soils are generally silty or silty loam, except along the canyon portion of Boeckman Creek, which are combination silt and sand. The downstream reach of Coffee Lake Creek also has a higher portion of gravel and cobble substrate materials than other city areas (ODFW, 2006).

Soils are an important watershed characteristic for evaluating potential runoff rates and volumes. Soils information for the study area was sourced from the National Resources Conservation Service (NRCS) Soil Survey online tool. Soil information is based upon data obtained from a 2016 publication from the U.S. Department of Agriculture, NRCS titled "Soil Survey (SSURGO) Database for Columbia County, Oregon."

For this SMP, soil texture classifications were considered for hydrologic modeling purposes. These texture classifications include various parameters that approximate soil runoff and infiltration potential. Generally, soils with sandy or silt textures have higher rates of infiltration and lower runoff potential, whereas soils with clay textures have lower rates of infiltration and high runoff potential.

Table 2-2 lists the NRCS Soil Texture Classes by percent coverage and by basin. Most of the study area (80 percent) is in the Silt Loam soil texture class. This soil class is characterized as, more than 70 percent silt, 50 percent or less sand, and less than 30 percent clay by weight.

Figure 2-3, at the end of this section, shows the soil texture classifications throughout the study area.

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Table 2-2. Soil Textures within the Study Area (by % of major basin)						
Basin	Clay	Loam	Sandy Loam	Silt Loam	Silty Clay Loam	Total
Boeckman Creek	0%	1%	0%	95%	4%	100%
Charbonneau	0%	67%	2%	30%	1%	100%
Coffee Lake Creek	7%	12%	0%	76%	5%	100%
Mill Creek	0%	0%	0%	97%	3%	100%
Meridian Creek	0%	0%	0%	100%	0%	100%
Willamette River	0%	16%	6%	74%	4%	100%
Total by Combined Area	**4%**	**11%**	**1%**	**80%**	**4%**	**100%**

2.3 Land Use and Population

The City resides within the Metro UGB, and as such development in and around Wilsonville is coordinated with Metro and the surrounding jurisdictions. The City has grown from a rural farming community to a thriving city encompassing approximately 7.8 square miles (approximately 5,000 acres) and is home to over 26,500 residents. The City's population has increased by approximately 3.6 percent annually over the last decade; increasing from approximately 19,509 in 2010 to 26,597 in 2022.[1]

Land use within the City of Wilsonville includes residential, commercial, and industrial, with most of the commercial and industrial development located along the I-5 corridor. Open space areas are scattered throughout the City and include a number of parks, wetlands, and riparian areas.

2.3.1 Development Conditions

Wilsonville is primarily developed within the current city limits; however, there are areas of undeveloped and underdeveloped land that are anticipated to redevelop and densify over this SMP planning period. These areas include the Town Center Planning District and existing low-density residential in the southern portion of the City.[2]

New development is projected to occur in designated future planning areas within the UGB. These future planning areas include the Coffee Creek Planning Area (industrial development), Basalt Creek Planning Area (industrial development), Frog Pond West Planning Area (residential development), and Frog Pond East and South Planning Area (residential and institutional development). The City uses a similar master planning process for the planning areas to guide infrastructure planning and provide opportunities to mitigate natural resource impacts, including the protection and restoration of adjacent stream channels.

1 United States Census Bureau (2022), https://www.census.gov/quickfacts/fact/table/wilsonvillecityoregon#

2 House Bill (HB) 2001 was adopted by the Oregon Legislative Assembly in June 2019, and it promotes middle housing to increase housing options for Oregon citizens. As such, areas zoned as "single family residential" had to be reclassified to allow for duplexes, triplexes, and other middle housing options.

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2.3.2 Land Use Coverage and Imperviousness

For this SMP, land use categories, coverages, and impervious percentages by land use category were initially prepared by the City's Planning Division and reviewed by BC to accurately reflect existing conditions and future development/densification anticipated because of House Bill (HB) 2001.[3]

Existing and future land use coverages for the study area are provided in Figure 2-4 and Figure 2-5 at the end of this section. Land use/zoning consolidation and reclassification, as well as associated impervious percentages by land use are reflected in Table 2-3. Additional description of the process for developing updated land use GIS coverages and impervious percentage estimates are reflected in Section 5.4.

Future land use coverage within the city limits or a defined concept planning area assumes that all developable (vacant) lands will develop into their underlining zoning category. In addition, specific residential areas in the City may adjust to a denser land use category (i.e., PDR2 to PDR5) per HB 2001. Aside from these situations, the existing land use coverage is generally assumed to be retained for the future development condition.

Table 2-3. Land Use Categories

Land Use Categories (2012)	Land Use Categories (Updated)	Calculated Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15 [b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential-Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used.

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City (October 2021).

b. Based on the adjusted impervious percentage value per the Boeckman Road Hydraulic Evaluation and model calibration (December 2021).

[3] Key revisions to City zoning coverage made for this SMP include the adoption of the "Planned Development Residential" (PDR) nomenclature to define residential lands, the subsequent removal of the "Villebois" designation for a subset of residential, multi-family residential, and commercial areas, and the addition of several previously uncategorized land use types.

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2.4 Climate and Rainfall

Wilsonville's climate is characterized by cool wet winters and warm summers. Most rainfall occurs between October and March. On average, December is the wettest month with an average of 7.1 inches of precipitation. July and August are the warmest and driest months with average high temperatures above 80 degrees Fahrenheit and less than 1 inch of rain per month.

The average annual precipitation for the Portland metropolitan area ranges from 37 to 43 inches, with an average of 1.8 inches of snowfall annually. There is currently no rain gage within the City of Wilsonville's jurisdiction, so the Aurora State Airport (UAO) rain gage (approximately 5 miles to the south) is used as a proxy. Based on the UAO data, Wilsonville averages 43 inches of rainfall a year and 2 inches of snowfall annually. Rainfall data from Clean Water Services (CWS) was also used to supplement H/H modeling and model validation efforts.

The lack of, and need for, local rainfall data has led the City to prioritize the installation of a rain gage and at least three flow meters as funded through the city-wide CP "City-1" (see Section 7 for more information). Acquisition of localized and real-time precipitation data allows the City to prepare for and support mitigation of precipitation-related impacts of climate change including increased rainfall intensities, storm surges and flooding, which are likely to affect many urban systems and services.

Current climate and rainfall projections show wide ranging uncertainty regionally and are not time scales typically used for designing storm systems. Therefore, modifications to the City's Public Works Design Standards (PWDS) and design storm events were not proposed for this SMP and associated CP sizing. However, urban planning is key to developing and implementing responses to changing precipitation patterns in urban systems. Incorporation of tools such as updated design storms reflecting local precipitation patterns are one way to adapt the SMP as necessary to address climate change. As data becomes available, the City will continue to work to identify how climate change is likely to impact the City's ability to operate its facilities and meet policy, program, and project objectives.

2.5 Drainage System

The City maintains an asset inventory of their stormwater collection system in GIS that contains various attribute fields depending on the asset class. This information is continually updated by City staff as new information becomes available, either from field investigations or as-built records.

The City manages approximately 83 miles (approximately 439,100 linear feet [LF]) of stormwater drainage pipe and culverts. Table 2-4 summarizes City-owned pipe and culvert system assets mapped (in GIS) throughout the City, as well as approximately 4 miles of mapped streams.[4]

4 Data for Tables 2-4 through 2-6 was sourced from City-provided GIS databases in 2021.

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Table 2-4. System Asset Inventory-Public (City) Pipe/Culvert/Stream (mapped in GIS), City-wide							
Diameter (in)	Length (ft) by basin						Total (ft)
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
<12	11,941	11,168	21,115	532	1,104	6,514	52,375
12-18	53,046	35,189	126,356	11,591	17,799	29,216	273,196
20-27	9,469	6,104	28,636	1,205	2,772	6,125	54,311
30-36	7,326	8,358	18,855	0	1,045	4,047	39,632
42-48	1,807	823	6,054	0	0	4,381	13,064
54-60	60	0	169	0	0	0	229
72-84	424	0	250	0	0	0	674
Total Pipe [a]	84,072	61,641	201,437	13,328	22,720	50,284	433,481
Total Culvert [b]	1,412	212	3,035	322	331	284	5,596
Total Pipe & Culvert	85,484	61,853	204,472	13,650	23,051	50,568	439,077
Total Mapped Stream [c]	5,791	2,718	11,003	0	2,760	197	22,469

a. Pipe refers to active, public mainlines only, excludes laterals.

b. Ownership, maintenance responsibility, and life cycle status of culverts not identified in GIS data-all available data is included in total length.

c. Mapped stream/creek total length clipped to area within city limits and excludes Willamette River shoreline.

Tables 2-5 and 2-6 summarize major City-owned storm structures, such as clean outs, inlets, manholes, stormwater treatment facilities, and outfalls.

Table 2-5. System Asset Inventory – Storm Structures (City ownership)							
Facility	Number by basin						Total
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
Clean out	566	95	656	3	104	109	1,533
Inlets [a]	618	423	1,363	101	203	292	3,000
Manholes [b]	619	304	1,574	119	158	307	3,081
Outfalls	77	5	117	18	21	24	262

Note: Excludes identified county, ODOT and private infrastructure.

a. Inlets include all inlet types: area drains, beehive inlets, catch basins, curb inlets, and other.

b. Includes all manhole types. Ownership not identified in GIS attribute data.

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Table 2-6. System Asset Inventory-Water Quality Facilities (City ownership/maintenance responsibility)

Facility	Number / Footprint Area (SF) by basin												Total	
	Boeckman Creek		Charbonneau		Coffee Lake Creek		Mill Creek		Meridian Creek		Willamette River (direct)			
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Infiltration Vault [a]	1	N/A	0		2	N/A	0		0		3	N/A	6	N/A
Vegetated Facility [b]	113	37,248	0		44	213,420	2	1,432	50	46,234	3	3,443	212	301,777
Pond	6	35,758	0		4	58,518	0		0		1	992	11	95,268

a. GIS data do not include the configuration of an infiltration vault. Based on communications with City staff, an infiltration vault is likely a proprietary filtration vault (e.g., Contech StormFilter). Infiltration vaults have N/A listed in the area column as these are point locations and not dependent on facility surface size.

b. Includes swales, lined planters, and filtration rain gardens.

Figure 2-6, at the end of this section, provides an overview of the stormwater collection system throughout the City including stormwater mains, manholes, outfalls and public stormwater treatment and detention facilities as of 2021. The City's GIS data reflecting both public and private stormwater treatment and detention/retention facilities is continuously updated by City staff, the most up to date record can be found at https://www.wilsonvillemaps.com/.

2.6 Regulatory Drivers

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing provisions of the federal Clean Water Act pertaining to stormwater discharges and surface water quality. DEQ issues permits related to surface water discharges, establishes water quality criteria for waterbodies based on designated beneficial use, and conducts studies and evaluations to determine whether a waterbody adheres to water quality standards.

Regulatory drivers considered in the context of this SMP include Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit requirements and the Total Maximum Daily Load (TMDL) program and associated 303(d) listings for receiving waters.

2.6.1 NPDES Permit Requirements

The City is a co-permittee on the Clackamas County Phase 1 NPDES MS4 permit, along with 13 other jurisdictions in Clackamas County, for management of stormwater runoff. Other neighboring co-permittees include the cities of West Linn, Lake Oswego, and Oregon City.

The NPDES MS4 permit program regulates the discharges of stormwater to receiving waters from urbanized areas and requires permitted municipalities to develop and implement stormwater control measures to address water quality. As a co-permittee, the City is independently responsible for the implementation of their permit, although coordination through intergovernmental agreements (IGAs) with co-permittees is commonplace to help efficiently address programmatic needs such as public education and monitoring. The City's NPDES MS4 permit was reissued in October 2021 after being administratively extended when the previous permit expired in 2017. Most recently, the effective NPDES MS4 permit was modified in May 2023 to address a change in monitoring requirements.

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Implementation of the City's NPDES MS4 permit is outlined in their 2022 Stormwater Management Program document (SWMP). Stormwater activities or best management practices (BMPs) are outlined to address the elements of the permit including:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Stormwater Management for New Development and Redevelopment
- Pollution Prevention and Good Housekeeping for Municipal Operations
- Industrial and Commercial Facilities
- Monitoring and Reporting
- Stormwater Management Facilities Operation and Maintenance Activities

In addition to the elements above, the reissued NPDES permit requires an assessment of outcomes from the 2015 Hydromodification Assessment and 2015 Retrofit strategy, which was due to DEQ by December 1, 2023. This review required an evaluation of progress made under both plans and, as necessary, establishing new goals, priorities, and projects. This SMP incorporates goals and project identification efforts conducted for both documents (see Section 3.2 Water Quality Retrofit Analysis and Section 4 Stream Assessment), as well as identifies new projects and programs to support efforts in the future.

The continued consideration of water quality in conjunction with planning and development efforts is addressed within the City's NPDES MS4 permit, further necessitating the need for this SMP to address stormwater treatment, particularly in locations where treatment is not provided.

2.6.2 TMDL and 303(d) Listings

Wilsonville is in the Middle Willamette River watershed. All areas within the city limits and associated concept planning areas discharge either directly or indirectly to the Willamette River between river mile (RM) 37 and 40.

On September 21, 2006, DEQ finalized a TMDL for the Willamette Basin. The TMDL addressed water quality impairment of the Middle Willamette River and its tributaries and included previously approved TMDLs by reference. The Willamette Basin TMDL addressed bacteria, mercury, and temperature, and included wasteload allocations (WLAs) and load allocations (LAs) specific to Designated Management Agencies (DMAs), except for mercury, as it required additional monitoring and analysis prior to the development of allocations.

On November 22, 2019, DEQ issued the Final Revised Willamette Basin Mercury TMDL, which was in turn submitted and disapproved by the United States Environmental Protection Agency (USEPA) due to questions related to the identification of sources and associated concentrations used to define WLAs and LAs. On February 4, 2021, the Willamette Basin mercury TMDL was reissued by the USEPA, including WLAs specific to the stormwater.

Table 2-7 summarizes the TMDL pollutants and associated LAs and WLAs applicable to Wilsonville. The City's 2022 TMDL Implementation Plan specifies temperature management activities targeting effective shade as well as natural resource and stream channel restoration and riparian cover. Additionally, in conjunction with NPDES MS4 obligations, the City is required to develop pollutant load reduction benchmarks at the end of each permit cycle to quantify TMDL pollutant load reduction estimates due to stormwater management activities and facilities. This requires the continual

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installation of water quality treatment facilities to ensure progress is made towards TMDL pollutant load reduction goals.

Additional water quality impairments relevant to the City are reflected in the effective (2018/2020) 303(d) list for receiving waters within the City. Parameters of concern for the Middle Willamette River include aldrin, biological criteria, DDT/DDE, dieldrin, and polychlorinated biphenyls (PCBs). Such parameters represent additional targeted parameters for pollutant reduction with the City's stormwater program, as TMDLs are slated for development for these parameters in the future.

Table 2-7. TMDL Summary for Wilsonville

TMDL	Year	Subbasin(s)	TMDL Parameters	TMDL Surrogate Parameters	WLA	LA
Willamette River	2006	Middle Willamette	• Mercury • Bacteria (*E. coli*) • Temperature	Effective shade (surrogate for temperature)	• Mercury = 97% [a] • Bacteria = 75-88% reduction [b]	Temperature = 85-95% effective shade

a. Air deposition is the primary source of mercury for MS4 permittees. Through the City's reissued (2021) MS4 NPDES permit, the City was required to prepare a mercury minimization assessment and BMP effectiveness analysis to assess pollutant removal potential.

b. The WLA for bacteria varies according to season and discharge location. A 75% reduction in bacteria load is applicable for areas directly discharging to the Willamette River and a 75% reduction is applicable during the fall, winter, and spring seasons for areas discharging to tributaries. An 88% reduction during the summer season is applicable for areas that discharge to tributaries.

2.6.3 Regulatory Program Integration

Development of this SMP provides a unique opportunity to address regulatory requirements in the context of capital improvement program development, as outlined below:

- The City's 2021 NPDES MS4 permit includes expanded stormwater program and maintenance activities that will require additional stormwater resources and staffing, and such needs have been considered when developing capital project and program costs in this SMP (see Section 3.2 and Section 7.3).
- Updates to the 2015 Retrofit Plan and the 2015 Hydromodification Assessment (as required by the 2021 NPDES MS4 permit) are reflected with updated project needs identified and prioritization reflected in this SMP.
- Ongoing preservation and maintenance of stream channel vegetation and planting activities, as reflected in the 2022 TMDL Implementation Plan, are supported by capital project and program efforts (see Section 4).

Regulatory requirements have the potential to influence the City's overall stormwater capital program throughout the 20-year SMP implementation period. Figure 2-7 shows the correlation between the regulatory programs and SMP components. It reflects how requirements and activities conducted independently under individual regulatory programs help inform each other, as well as how the SMP is the primary mechanism to support capital and program funding and staffing resources that collectively benefits all programs.

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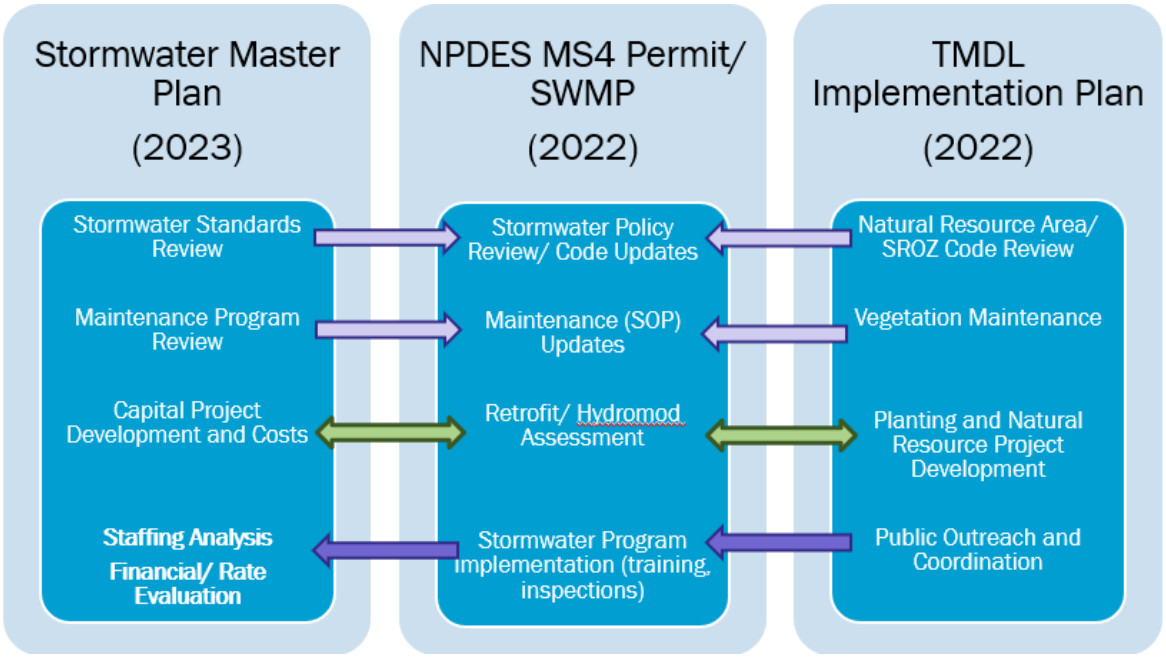

Figure 2-7: SMP and Regulatory Connectivity

2.7 Comprehensive Plan Review

All cities and counties in Oregon are required to adopt Comprehensive Plans and implement ordinances in conformance with the Statewide Planning Goals. Comprehensive Plans direct land use and development within local jurisdictions and must be legislatively adopted by the City and reviewed by the Land Conservation and Development Commission for compliance with Statewide Planning Goals. Local land use decisions must be made in conformance with the provisions and policies of the City's Comprehensive Plan.

The City of Wilsonville Comprehensive Plan (October 2018, updated June 2020) is periodically reviewed to ensure it is current and reflective of continued compliance. BC reviewed the City's Comprehensive Plan with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit. Review comments are associated with the Public Facilities and Services, under the subcategory heading "Storm Drainage Plan". Comments and suggested changes are summarized below:

- Under Policy 3.1.8, page C-8 related to the Storm Drainage Plan, to be more consistent with the MS4 NPDES permit, the reference to pollutants "temperature and turbidity" should be updated to include additional pollutants of concern.
- Under Policy 3.1.8, page C-8 and throughout the plan, there are references to "detention facilities". These references imply that detention is the main or sole type of facility used for stormwater management. Given the focus of the MS4 NPDES permit on green infrastructure, low impact development, and infiltration/retention, the term "detention facilities" should be replaced with a broader term such as "stormwater management facilities" or itemized to include more recently prioritized types of facilities.
- Under Policy 3.1.7 (based on numbering, it should be Policy 3.1.9), there is reference to constructing facilities to improve stormwater quality and control the volume of runoff. To be comprehensive this should be expanded to include reference to controlling peak rates of runoff.

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While not related to the MS4 permit, implementation measures related to natural resource areas and overlay zones in the Environmental Resources and Community Design Section (e.g., Implementation Management Measures 4.1.5.e, 4.1.5.m, and 4.1.5.n) were reviewed but no proposed adjustments are recommended in the context of the SMP.

2.8 Stormwater Operations

Stormwater-related maintenance activities are managed by the City of Wilsonville's Public Works Department, Roads and Stormwater Section. Stormwater-related planning, NPDES MS4 and TMDL compliance, and engineering activities are managed under the Community Development Department in the Engineering Division.

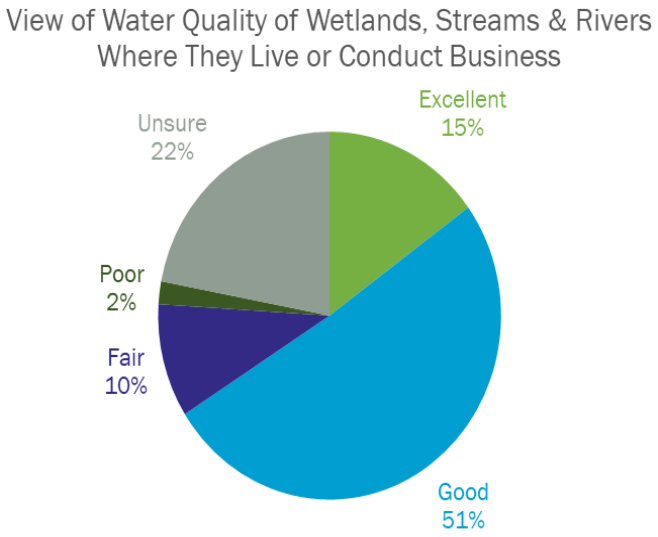
The City of Wilsonville's Public Works Roads and Stormwater Section currently has 2.74 full-time equivalent (FTE) to support ongoing stormwater maintenance efforts (0.4 FTE Stormwater Supervisor and 2.34 FTE Utility Maintenance Specialists). Of the 2.34 FTE Utility Maintenance Specialists, 2.0 FTE are dedicated to stormwater and the other 0.34 FTE reflect staff that assist with underground utility locating, but not dedicated to stormwater. Occasionally, additional coordination with Parks and Recreation is required to supplement staff to conduct routine and response-driven maintenance activities (time not reflected in the FTE summary).

The City of Wilsonville Community Development Department in the Engineering Division includes 1.5 FTE that are responsible for NPDES MS4 and TMDL compliance and directly support the Public Works Roads and Stormwater Section with facility inspections and other activities. Additional Engineering staff oversee and manage capital projects, as well as perform stormwater development review activities.

2.9 Community Perspectives

Outreach efforts were conducted at the beginning of the SMP process, in part, to obtain a better understanding of City perceptions of stormwater, as well as the perception of stormwater services provided by the City.

A public survey was advertised from April 1 to May 15, 2021, on the City's *Let's Talk Wilsonville* web platform. Interested citizens and community members were invited to participate. The survey was provided in both English and Spanish, and 90 participants completed the survey, encompassing both residential and business customers. The survey also provided a forum for participants to describe observed issues and concerns with the stormwater system operation and functionality.



Public surveys help confirm the types of capital projects most beneficial to the community

Findings from the survey indicated that more than 65 percent of the participants believe water quality in wetlands, streams, and rivers in Wilsonville are of excellent or good condition and 97 percent of participants the City had a positive impression of Wilsonville's stormwater services. For both residential and business customers, removal of pollutants before runoff enters streams; the improvement of water quality and habitat; and management of flood/flooding problems (in pipes and facilities) were identified as the most important stormwater services.

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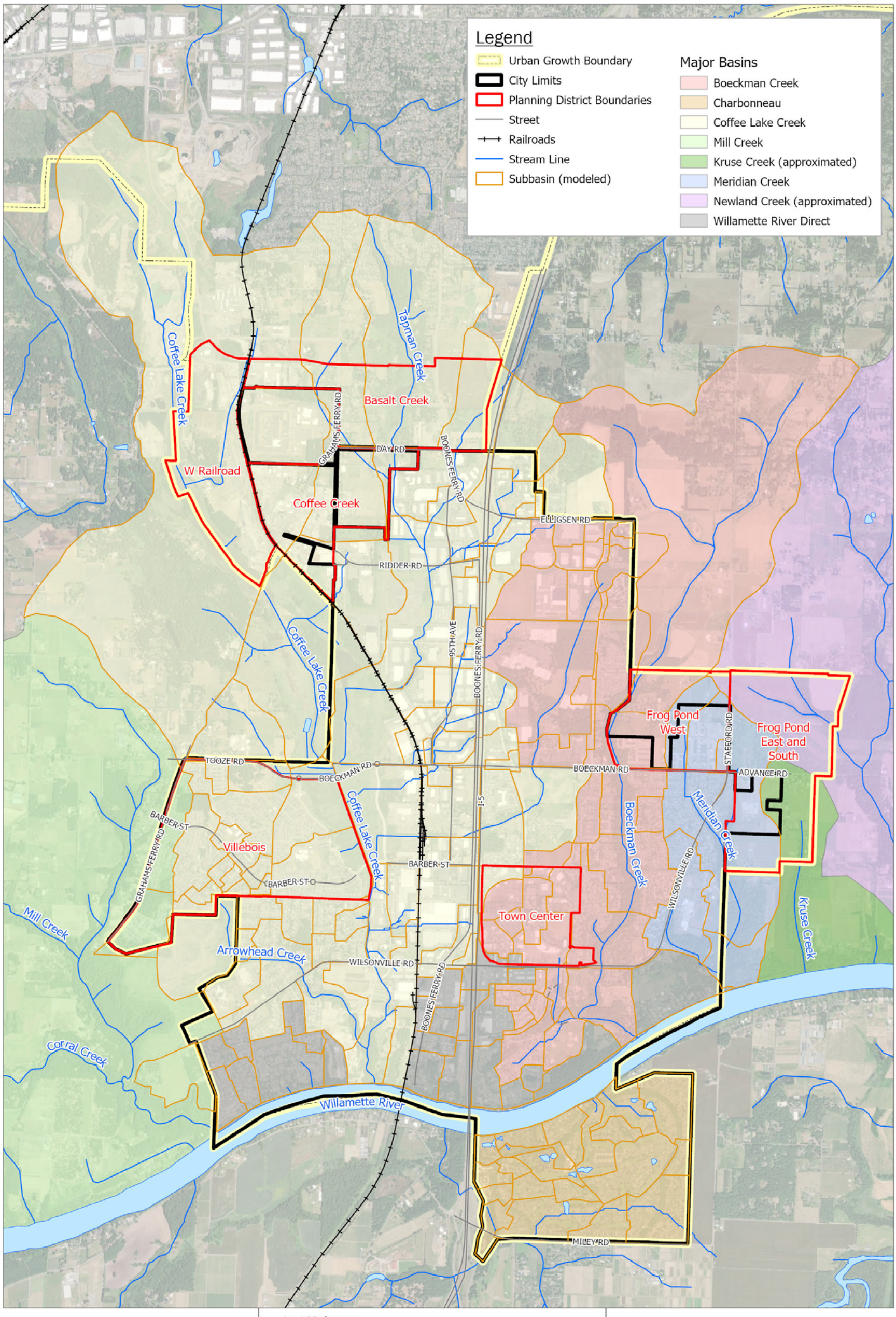

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-2: Major Basins and Planning Areas

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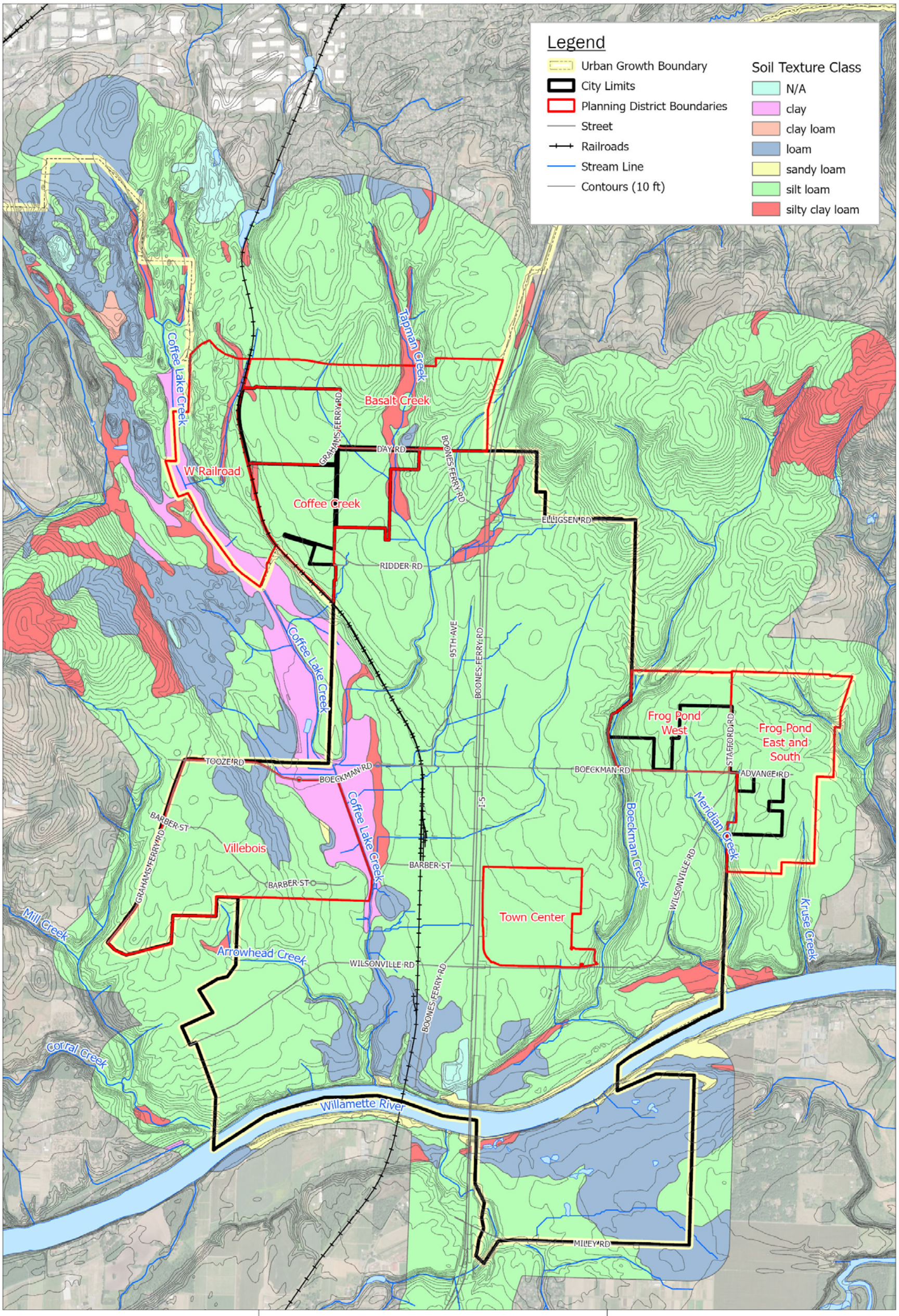

Figure 2-3: Soils and Topography

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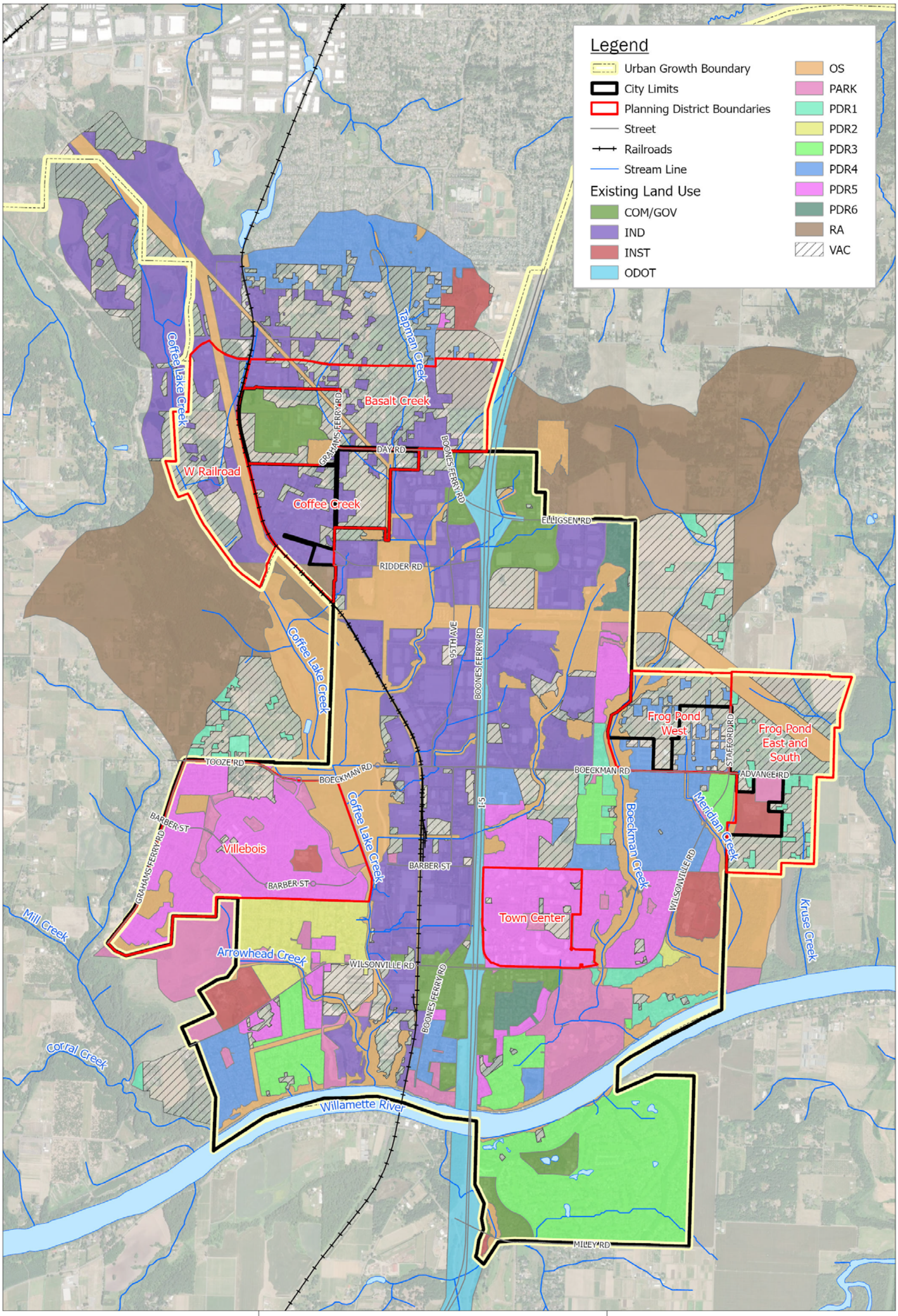

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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0 0.25 0.5 1 Miles

Figure 2-4: Existing Land Use Condition

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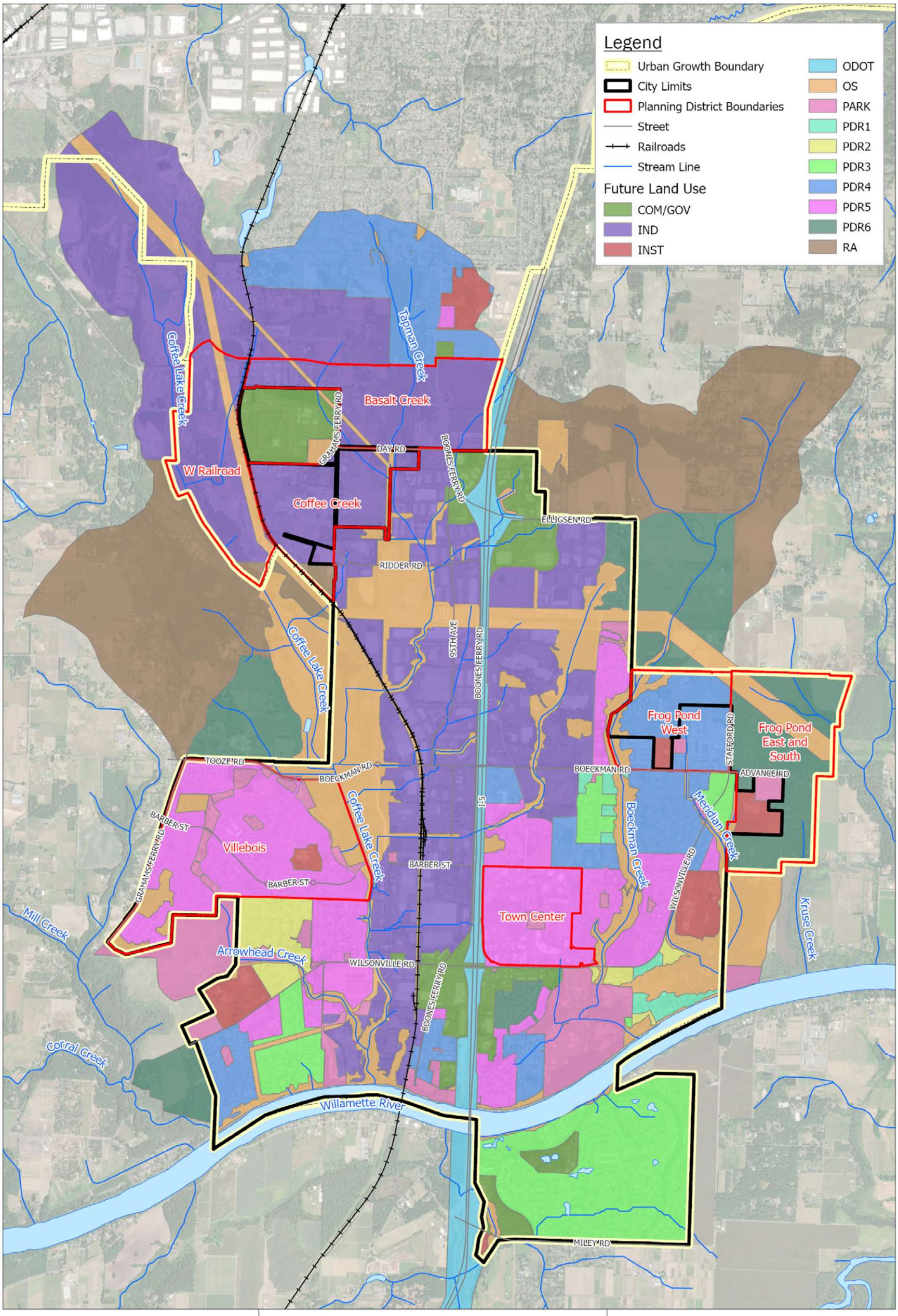

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-5: Future Land Use Condition

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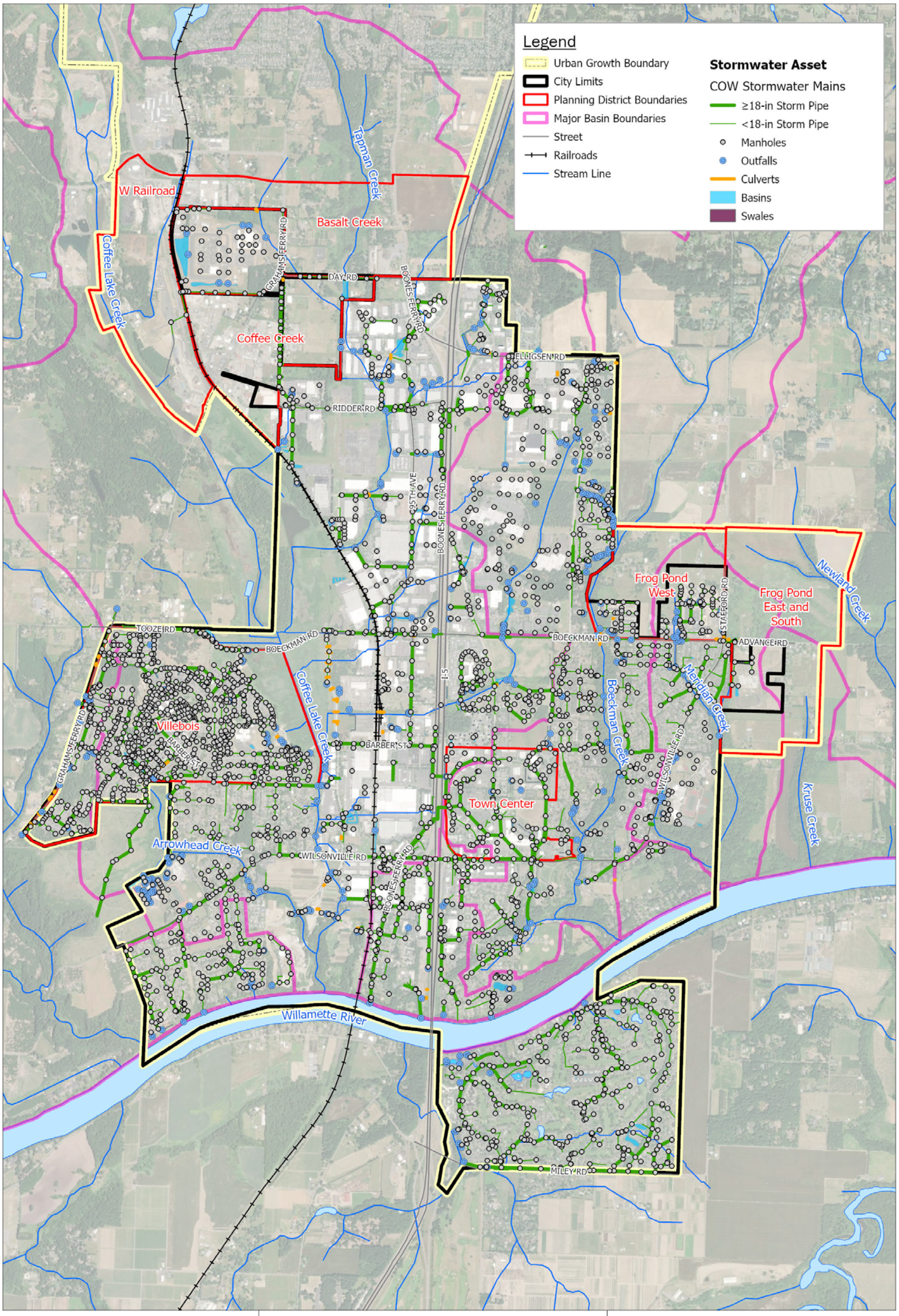

Figure 2-6: Stormwater System Overview

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Section 3

Basis of Planning

This section summarizes the overall project planning process and the process to identify stormwater problem areas and water quality retrofit needs, which collectively inform capital project needs identification and development efforts.

This project planning process allowed the City to develop information for areas and activities most likely to be prioritized and funded in a capital improvement program. This process qualified project and program needs in consideration of the SMP objectives, including rectifying known areas of stormwater drainage problems and flooding; enhancing and/or expanding water quality treatment and flow control; and identifying programmatic opportunities to address stormwater needs on a city-wide scale.

Appendix A includes background documentation related to the project planning activities, including a Stormwater Problem Area matrix (Appendix A, Table A-1) and a Project Opportunity Matrix (Appendix A, Table A-2). Identified project opportunities stem from the individual assessment of problem areas (Section 3.1), water quality retrofit opportunities (Section 3.2), stream assessment efforts (Section 4), and H/H modeling results (Section 5).

Referenced figures are included at the end of this section.

3.1 Problem Area Identification

A collaborative approach with Community Development and Public Works staff, as well as the public, was used to identify known stormwater problem areas where infrastructure improvement, replacement, or retrofit may be needed. Problem areas were initially identified through a combination of City staff surveys and follow-up discussions, an external survey (distributed via a virtual open house platform), review of the 2012 SMP, field investigations, and a Project Planning Workshop.

Problem areas were documented in a Stormwater Problem Area Matrix (Appendix A, Table A-1) by primary and secondary deficiency category (i.e., capacity issue, instream erosion/sediment issue, maintenance, and repair and replacement). In addition, portions of the stormwater system requiring refinement/update or expansion of the existing H/H model, as well as locations to be investigated as part of the stream assessment were identified. Problem areas are mapped by primary deficiency (see Figure 3-1 at the end of this section).

3.1.1 City Staff Surveys

In February 2021, surveys were distributed to City staff requesting input on specific locations of reported capacity deficiencies, system condition issues (i.e., pipe and open channel), frequent maintenance needs, and water quality opportunities.

On March 16, 2021, Public Works and Community Development staff collaborated and provided a summary table and accompanying map reflecting 39 problem area locations. Some locations and descriptions provided from Community Development staff overlapped with locations identified by Public Works. Specific issues included culvert misalignments, use of bubblers, standing water in roads and easements due to a lack of system capacity, flooding at open channels, crushed or

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improperly abandoned pipe, the buildup of sediment at catch basins, and damaged outfall structures.

3.1.2 External Stakeholder Surveys

To help facilitate external communications to the public (i.e., citizens and business community), a survey was prepared for external stakeholders to solicit information regarding drainage issues and project needs. External stakeholders included community members, businesses and community groups, developers and contractors, and neighboring jurisdictions.

The Let's Talk Wilsonville web platform was used to publish the external survey as well as provide general background information related to stormwater, the City's current stormwater system, and the purpose of the SMP. The external survey was publicized using local publications (i.e., Boones Ferry Messenger) as well as social media.[5] Website content was also translated into Spanish.

The external survey was open from April 1 to May 15, 2021, and included general demographic questions and questions intended to assess the level of understanding of the participant with respect to stormwater utilities. Additional questions related to values and level of service were also included. The survey included an opportunity for the participant to directly identify problem areas/locations and issues of concern.

The external surveys resulted in the identification of four additional problem areas that are documented in the Problem Area Matrix (Appendix A, Table A-1).

3.1.3 2012 Stormwater Master Plan

The City's 2012 SMP identified 50 stormwater CPs. Project categories included pipe replacement, planning/studies, restoration projects, and low impact development (LID) projects. Sixteen of the projects identified in the 2012 SMP were either completed or are in progress. Some of the proposed pipe replacement projects were subsequently reflected in the Charbonneau Infrastructure Plan (2014).

Outstanding (non-constructed) projects from the 2012 SMP were reviewed against identified problem areas and seven locations directly overlapped. The remainder of projects from the 2012 SMP were discussed with the City during a project coordination call to confirm the need to include the associated project area directly in the Problem Area Matrix. Because hydrologic modeling methods for this plan deviate from the 2012 SMP, and additional assessment efforts (water quality retrofit assessment, stream assessment) were conducted for this SMP, the City opted to independently evaluate project needs for this SMP update instead of relying on previous outdated work.

3.1.4 Project Planning Workshop

A Project Planning Workshop was conducted with City staff on August 24, 2021, to review data compilation efforts and the identification of the stormwater problem areas. The objective of the workshop was to solicit additional detail on the nature of each problem area, add any additional problem areas suggested by the City, and to categorize the problem areas by potential solution (whether project-based or programmatic).

A total of 46 problem areas were identified for discussion. Discussion included the size and scale of the anticipated project and whether a capital project solution or programmatic approach may be taken to address the issue. Problem area locations were also reviewed to establish 1) the need to conduct a site visit; 2) a need to expand model extents to evaluate the problem area; and 3) whether

[5] The current website is: Stormwater Master Plan Update | Let's Talk, Wilsonville! (letstalkwilsonville.com).

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there is benefit in including the location as part of the stream assessment effort. From the workshop, 22 locations requiring site visits were flagged and scheduled. Seven locations were flagged for consideration as part of the stream assessment effort.

3.1.5 Field Investigation

An initial field investigation was conducted September 27, 2021, to verify stormwater problem areas and assess potential project concepts in conjunction with the Project Planning Workshop. A total of 14 problem areas were visited, clustered into seven discrete site visit locations. The site visits provided BC staff with an opportunity to discuss each of the problem areas and better understand the overall drainage patterns and system to advance discussion of modeling needs and capital project concepts.

Subsequent site visits were conducted to inform H/H model validation, water quality retrofits, and capital project development efforts, and those field investigation efforts are discussed under the respective sections.

3.1.6 Results

The Problem Area Matrix (Appendix A, Table A-1) includes the findings from the Project Planning Workshop and field investigation efforts, and documents whether the problem area and potential project solution required additional evaluation as part of the stream assessment and/or hydraulic modeling (via expansion of the existing modeling extents). Problem area locations, including those where a site visit was conducted are reflected in Figure 3-1 at the end of this section.

Of the comprehensive list of 46 identified problem area locations, 11 locations were not anticipated to warrant a project or program solution but were maintained in Table A-1 for reference. Seven locations were identified for further evaluation as part of the stream assessment effort, and eight locations were identified for evaluation as part of the capacity analysis.

Following field investigations and additional evaluation efforts, vetted problem areas were carried forward as Project Opportunity Areas (see additional discussion in Section 6.1) and CP needs. Project Opportunity Areas are documented in Appendix A, Table A-2.

3.2 Maintenance Evaluation

Per Section 3.1, some problem areas were identified as the result of deferred maintenance or due to a relatively minor drainage issue that may not warrant capital project funding. These issues can be more efficiently addressed by expansion of the City's maintenance program (with increased staffing) and/or by defining a programmatic need that can be annually funded.

Maintenance activities and staffing allocations were discussed during a series of two interviews with Public Works staff in late 2021. Staff labor estimates by department and maintenance activity were compiled for use during interviews. The interviews were used to verify the current (as of 2021) maintenance activities, maintenance frequencies and internal processes to issue work orders. The City's Public Works Department uses Cartegraph for asset management, and Cartegraph refers to features (assets) in the City's GIS system to specify where maintenance is required.

Table 3-1 summarizes the primary stormwater maintenance activities conducted by the City of Wilsonville's Public Works Roads and Stormwater Section, along with a summary of the frequency and ability of the stormwater staff to meet maintenance targets (whether they are NPDES MS4 Permit-related or individual Public Works goals). Table 3-1 does not reflect an extensive list of activities but rather reflects the primary activities with a regulatory driver.

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Table 3-1. City Maintenance Activities and Potential Implementation Gaps

Activity	NPDES MS4 SWMP Requirement	Frequency Required [a]	Annual Target [a]	Regularly Meeting Target? (Y/N) [b]	Required Crew Size	Stormwater Staff Time (per person)	Department	Increased Staffing Need (Y/N)
TV inspection	Not explicitly stated	Annual	15% (60,000 LF) of public conveyance system >6"	N	2	200 ft/hr	Public Works (see Cartegraph Work Flow Process 8.0)	Y
Pipeline cleaning	Y	Annual	As required based on inspections	Y	2	250 ft/hr	Public Works	N
Priority CB inspection and cleaning	Y	Annual	All	Y	2	0.5 hr/facility	Public Works	N
Other CB inspection and cleaning (public)	Y	Every 4 years	25% of total	N	2	0.5 hr/facility	Public Works	Y
Culvert inspections and cleaning	Y	Annual	20%	Uncertain	2	2 hr/facility	Public Works	Potential
WQ MH inspection/cleaning	Y	Annual	150	N	2	1 hr/facility	Public Works	Y
Street sweeping [c]	Y	Monthly	All curbed	Y	NA	165 hours total annually	Contractor	N
System repair and maintenance	Y	As needed	-	Y	2	Varies	Public Works	N (Programmatic approach recommended)
Public water quality facility inspections	Y	Annual	All	N	2	1 hr/facility	Community Development/ Public Works	N
Public water quality facility maintenance [c]	Y	Annual	Public works performs maintenance independent of inspection results	Y (magnitude varies)	2	1-16+ hrs/facility	Public Works	Potential
Public water quality facility maintenance (landscaping)	Y	Annual	All	Y (magnitude varies	NA	291 hours	Public Works	Potential
Private WQ facility inspections [d]	Y	Annual	Varies	Y	1	4 hr/facility	Community Development	N

a. Based on the documentation in the 2022 SWMP Document and/or as documented in the City's Stormwater Maintenance Schedule.

b. Based on the available documentation in the NPDES MS4 annual reports or as provided by Public Works. This column reflects the ability of the Roads and Stormwater Section to conduct this work independently (not requiring staff supplementation from other Sections or Divisions).

c. Activity requirements vary based on inspection results.

d. Current GIS data does not differentiate types of facilities in the "basins" GIS layer. Basins includes ponds, swales, planters, and raingardens.

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3.2.1 Staffing Estimates to Support Maintenance Activities

In accordance with Table 3-1, additional staffing is required to conduct routine maintenance activities in conjunction with NPDES MS4 permit requirements. Estimated staffing needs were initially calculated based on required staff time and length/number of assets (see Section 2.5) and discussed with the Public Works Operations Manager to better incorporate the following staffing considerations:

- Approximately 35 percent of time reserved for stormwater maintenance ultimately supports other departments and emergency response needs. Because many maintenance activities require a crew of two people, the Public Works Roads and Stormwater Section (with 2.74 FTE) is unable to consistently conduct routine maintenance activities and be available to respond to emergencies.
- Based on detailed staff labor estimates compiled by the City, approximately 15 percent of work orders issued by the Stormwater Division are cancelled, which means staffing limitations are preventing the work orders from being completed.

Additional staffing estimates assume that one FTE equals approximately 1,650 hours of work after deducting estimated annual leaves, training, and other non-task related hours (Personal communication with Martin Montalvo, Public Works Department Operations Manager, November 17, 2021). The following maintenance activities were evaluated and additional staff support needs estimated.

- **CCTV Inspections:** Closed-circuit television (CCTV) inspections for stormwater and sanitary were historically contracted out by the City, but in 2021, the City took over delivery of the work. Stormwater CCTV efforts do not routinely occur. The City maintains a Public Works goal of inspecting 15 percent of their public collection system (>6 inches in diameter) annually, which is approximately 60,000 LF of pipe. Stormwater Division staff are needed to operate the CCTV equipment and review of the CCTV reports.

  Recommendation = 0.5 FTE

- **Non-priority Catch Basin/Pollution Control Manhole Cleaning:** The City regularly maintains identified priority catch basins, but routine cleaning of all catch basins is more challenging with current Roads and Stormwater section staffing levels (i.e., clean all catch basins on a 4-year cycle).

  Recommendation = 0.25 FTE

- **Vegetated System Maintenance:** LID facilities (swales/planters) and stormwater basins (ponds) require more extensive maintenance than traditional gray infrastructure (e.g., filter vaults, underground detention facilities, etc.). Maintenance activities include debris removal, vegetation removal and replacement, regrading, replacement of amended soil media, inlet and outlet cleaning, and repair of structural components. Some activities may occur during each maintenance effort (e.g., annually), whereas some may be conducted once every few years.

  Current staffing levels and maintenance efforts do not account for/include vegetation/soil replacement or the large-scale reconstruction/replanting of facilities that are not operating property. Additional staffing needs will help ensure a more proactive program for inspection and maintenance, as well as development of a standard operating procedure (SOP) to guide vegetated system maintenance (both shorter term and larger scale).

  Recommendation = 1.25 FTE (assuming annual maintenance of 4 hours for vegetated facilities; 16 hours for ponds).

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A total of two additional FTE are estimated to address recurring and deferred maintenance activities exclusive to the Public Works Roads and Stormwater Section. Final maintenance-related staffing recommendations in conjunction with the 2022 SWMP Document and identified CPs per this SMP are referenced in Section 7.3.

3.2.2 Programmatic Needs

The Project Planning Workshop and subsequent interviews with Public Works staff also identified the following ongoing programmatic activities that, if routinely conducted, could offset individual CP needs. These programmatic concepts were refined and are detailed in conjunction with CP development activities in Section 6.

- **Repair and Replacement (R/R) Program**. Dedicated funding is needed to repair/replace all public pipe 12-inches and greater within the City limits over a defined timeframe to address lifecycle costs.
- **Localized Drainage Improvements**. Dedicated funding is needed to assist with minor system configuration or installation needs or to respond to recurring maintenance needs.
- **Inlet Replacement Program**. Dedicated funding is needed to relocate and/or install curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues.
- **Green Street Retrofit Program.** A dedicated program is needed to retrofit local streets, which may include, depending on the feasibility, porous pavement overlays and/or green street facilities to promote additional infiltration and water quality treatment.

3.3 Water Quality Retrofit Analysis

Opportunities to incorporate water quality treatment are necessitated by the regulatory drivers in place for the City and supported by the community and public goals to protect water quality. These water quality retrofits can be accommodated through the addition of new water quality and/or detention facilities or the reconfiguration of existing facilities.

The problem area identification effort was focused on capacity and maintenance issues (Section 3.1) and did not focus on water quality objectives. Therefore, a separate analysis was conducted to identify locations where water quality could be integrated into the developed landscape or where pending development and future transportation projects could be leveraged to initiate construction of new facilities. To support the analysis, a GIS desktop evaluation was conducted to map public property (classified as vacant, parks, open space, or City-owned), ponds (public and private), water quality projects from the 2012 SMP, existing stormwater facility contributing drainage areas, and future transportation corridors.

Based on a review of the mapping and City staff preferences, the following objectives (strategies) were developed to guide the water quality retrofit analysis for this SMP:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects reflect water quality-related projects per the 2012 SMP. Review and integration of findings from the 2015 Retrofit Assessment was conducted to support compliance with requirements of the 2021 NPDES MS4 permit.
2. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation to address erosion/hydromodification issues.
3. Integrate water quality and/or flow control into existing project opportunity areas (where possible).

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Identification of new facilities to support future development and growth is not a preferred retrofit strategy, given the fact that private development will already be required to adhere to the City's prescriptive stormwater design standards.

Figure 3-2, at the end of this section, reflects source information used for the water quality retrofit analysis, as well as the resulting project needs.

3.3.1 2015 Retrofit Assessment Update

The City's 2015 Stormwater Retrofit Plan documents the City's stormwater policies, projects, and programs intended to improve water quality in areas of the City that are currently underserved or lacking stormwater quality controls. The 2015 Retrofit Plan included a review of twenty, non-constructed capital projects (CPs) per the City's 2012 SMP and 2014 Capital Improvement Program that had a water-quality element. Updated scoring criteria that focused on water quality objectives were applied to each project. Criteria included:

- Progress toward meeting TMDL Wasteload Allocations (i.e., bacteria and mercury)
- Priority areas for treatment (focusing on areas with no structural stormwater treatment facility and high pollutant generating areas [commercial/industrial land uses])
- Temperature control (meet the shade targets identified in the TMDL)
- Erosion prevention and control (i.e., retrofit of outfalls or stream channel restoration where active erosion results in the transport of excess sediment, increased turbidity and reduced instream water quality).
- Additional objectives (including project integration, maintenance, livability/sustainability, safety, and land acquisition).

For this SMP, the prioritized projects per the City's 2015 Retrofit Plan were reviewed to confirm: 1) projects completed and/or where a project need may have changed, and 2) projects that should be carried forward as part of this SMP.

Results of this review are detailed in Table 3-2. Identified project needs are carried forward as a Project Opportunity Area.

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	16	Viable project, but could be reflected in program (Section 6.5)		X	
LID7	SW Wilsonville Road Stormwater Planters	No	No	16	Viable project, but could be reflected in program (Section 6.5)		X	
CLC-10B	Coffee Creek Storm Projects	No	Yes	16	Not Applicable-reflects 2012 SMP CLC-1. Project number is unique to the Retrofit Assessment source document.			X
BC-5	Boeckman Creek Outfall Realignment	No	No	13	• Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. • Erosion issues not identified/confirmed in 2022 stream assessment effort. • Project location overlaps potential Boeckman Road mitigation site (Creekside Apartments). See Project Opportunity Area #23.	X		
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	13	• Referenced as a long-term project need from source document of retrofit assessment. • Project location overlaps with a portion of the Boeckman Road mitigation area (Siemens/Ash Meadows). Current METRO project may also negate the project need.			X
BC-4	Gesellschaft Water Well Channel Restoration	No	No	13	Project still viable and construction may occur in conjunction with other infrastructure projects (Interceptor Trail).	X		
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	13	Viable project, but could be reflected in program (Section 6.5)		X	
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	12	• Short term/High priority CIP need per source document from retrofit assessment. • Project locations may overlap potential Boeckman Road mitigation site (Canyon Creek Park). See Project Opportunity Area #24.	X		
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	12	• Mid-term project need from source document of retrofit assessment. • See Project Opportunity Area #9.	X		
WD-4A	Willamette Way West Outfall Replacement	No	No	11	Project location is being monitored. No immediate project needs.			X
WD-4B	Belknap Ct Outfall Protection	Yes	No	11	Complete. Remove from list.			X

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
WD-4C	Morey Ct West Outfall Protection	Yes	No	11	Complete. Remove from list.			X
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	9	• Project involves rehab of five existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. • Erosion issues not identified/confirmed in the 2022 stream assessment. • Targeted retrofit of culverts has already occurred.			X
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	9	• Project was intended to enhance the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream. Mid-term project need from source document of retrofit assessment. • Project location overlaps with potential Boeckman Road flow mitigation site. See Project Opportunity Area #23.	X		
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	8	• Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. • See Project Opportunity Area #9.	X		
CLC-2	SW Parkway Avenue Stream Restoration	No	No	8	• Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.			X
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	8	• Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.			X
CLC-8	Coffee Lake Creek Restoration	No	No	8	• Project is no longer needed. This location is associated with 5th and Kinsman Project-Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.			X
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Limited access onto private property.			X
CLC-4	Ridder Road Wetland Restoration	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Not a high priority need for future restoration, but maintain as a future Project Opportunity Area.	X		

a. The overall score is per the 2015 Retrofit Assessment and considered for this 2024 SMP as an indication of the preferred water quality projects per the 2012 SMP.

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3.3.2 New Retrofit Opportunities

In addition to project needs maintained from the 2015 Retrofit Assessment, several opportunities to integrate water quality and/or flow control into existing, underutilized facilities or another Project Opportunity Area were identified. These opportunities and their preliminary retrofit concepts are summarized in Table 3-3.

Table 3-3. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Underutilized Facility	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-in-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. Piped stormwater system may be reconfigured to provide a flow control benefit. Opportunity to help mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Underutilized Facility and Existing Project Opportunity	Existing swale is not draining properly. Swale needs retrofit and potential relocation.
Canyon Creek Park	Existing Project Opportunity	Existing Park property has potential for construction of a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

3.4 Boeckman Road Hydraulic Evaluation and Mitigation Opportunities

Concurrent with development of this SMP, Wilsonville is constructing improvements to Boeckman Road from SW Canyon Creek Road to SW Stafford Road, as part of a Progressive Design-Build project. The Boeckman Road Corridor Project (BRCP), initiated in 2021, involves widening and reconstruction of the road, including removal of an existing culvert and instream flow control structure (FCS) on Boeckman Creek immediately north of Boeckman Road. The removal of the culvert and FCS prompted earlier planning efforts and a technical evaluation of Boeckman Creek. Opportunities for water quality and flow control mitigation within the Boeckman Creek watershed were identified and considered with project planning efforts for this SMP.

In 2021, a hydraulic evaluation of Boeckman Creek was conducted to evaluate potential changes to flows and water surface elevations (WSE) in Boeckman Creek due to removal of the FCS and the existing culvert crossing (Boeckman Road Hydraulic Evaluation, January 2022). The City's existing H/H InfoSWMM model (also used for this SMP) was refined and calibrated to reflect existing hydraulic performance. Efforts to identify potential off-site flow mitigation were initiated in 2022 with significant participation from City staff and the Progressive Design-Build consultant team. Both upland and instream mitigation locations were evaluated based on specific criteria including contributing drainage area and available storage capacity.

Four potential mitigation locations were ultimately identified as preferred locations. Preferred mitigation locations are referenced in the Project Opportunity Matrix for this SMP (see Appendix A, Table A-2).

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3.5 Growth-Related Considerations

A particular focus for this SMP is future development/growth areas, as these areas are expected to develop in the near term and require new stormwater infrastructure including pipe and stormwater management facilities. Such future development may result in increased impervious area and additional stormwater runoff.

Specific growth areas of interest for this SMP include those areas documented in the Basalt Creek Concept Plan (2018), the Town Center Plan (2019), and the Frog Pond East/South Concept Plan (2022). These growth areas represent Project Opportunity locations because new public infrastructure is required and may be funded (in part) by the City. Therefore, cost estimates for new infrastructure are required for inclusion in the overall stormwater CIP.

3.5.1 Basalt Creek Concept Planning Area

With the adoption of the Basalt Creek Concept Plan by the cities of Tualatin and Wilsonville in August 2018, efforts are underway to amend the City's Comprehensive Plan and Transportation System Plan to promote industrial development in the area. Downstream capacity deficiencies on Tapman Creek require further study and planning to address increases in impervious surface due to anticipated development. Development in the Tapman Creek basin will be subject to differing onsite stormwater management standards for new and redevelopment activities. The City of Tualatin, in the upstream portion of the basin, implements Clean Water Services (CWS) standards, whereas the City of Wilsonville regulates stormwater locally. Despite differing standards and requirements, all drainage from the Basalt Creek concept planning area will ultimately drain through City infrastructure before entering Coffee Lake Creek.

The Day Road area, including Commerce Circle, is identified as a problem area (Appendix A, Table A-1) and Project Opportunity Area (Appendix A, Table A-2) and receives flow directly from new development in the Basalt Creek Concept Planning area. Policies related to onsite stormwater management in the upstream portions of the basin may be considered to help mitigate existing, downstream capacity constraints.

3.5.2 Town Center Planning Area

The Town Center Plan (2019) addresses a key redevelopment area in the city, located north of Wilsonville Road in the Boeckman Creek basin. Redevelopment of the Town Center area is anticipated to require major reconfiguration of the existing stormwater collection system. The Town Center Plan proposes the demolition of several segments of existing stormwater trunkline and the installation of new piping alignments in conjunction with City ROW. As a result of these improvements, additional flow is anticipated to be conveyed to the downstream Library Detention Pond, south of Wilsonville Road in Memorial Park.

Inclusion of new infrastructure associated with the Town Center redevelopment area is reflected as a Project Opportunity in Appendix A, Table A-2 (Figure 3-3). In addition, the Library Pond is identified as a current problem area, as well as a Project Opportunity. Policies related to the use of the Library Pond as a fee-in-lieu strategy/facility for treatment and/or flow control for upstream redevelopment are described in Section 6.3.4.

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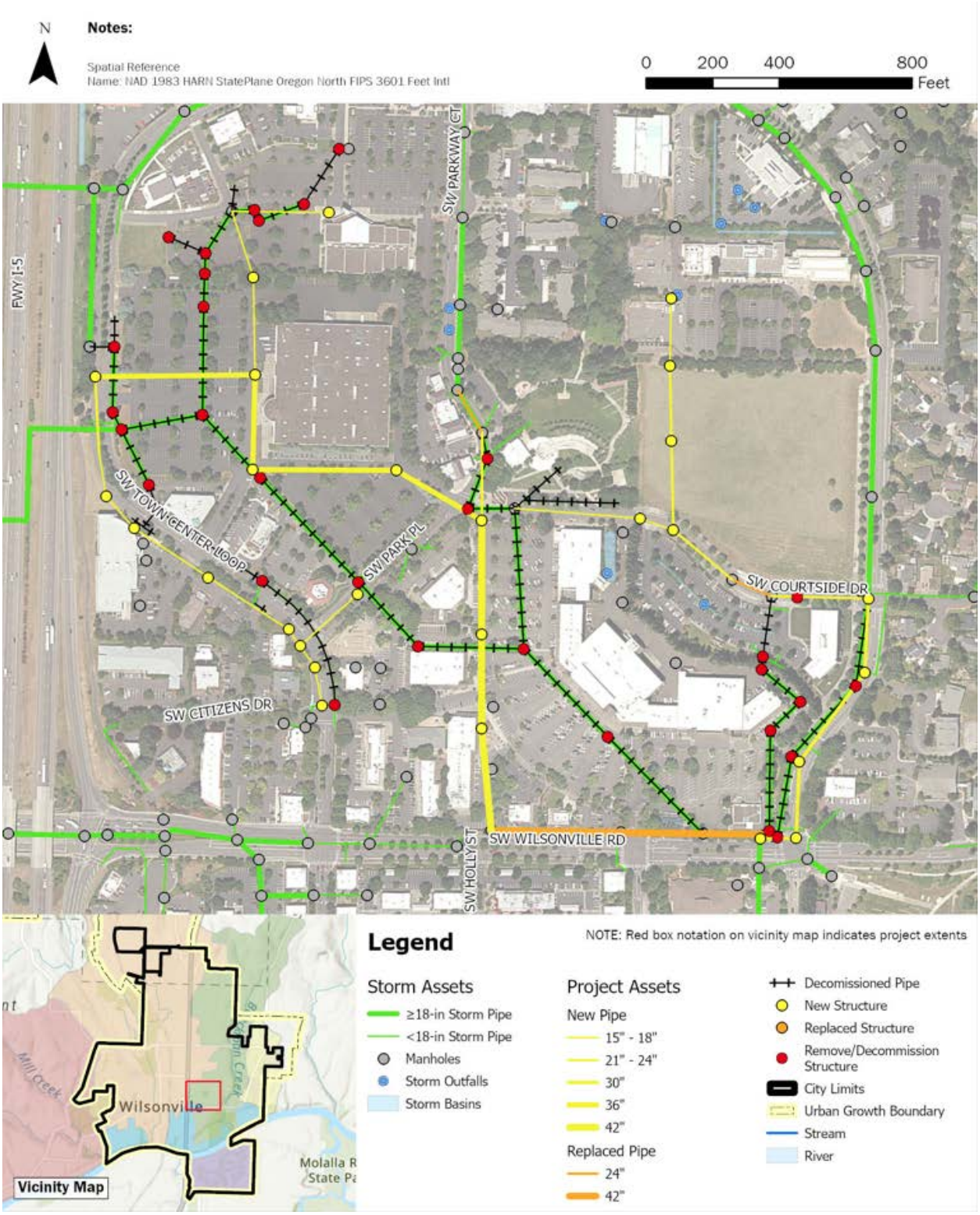

Figure 3-3: Town Center Stormwater Infrastructure Proposal

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3.5.3 Frog Pond East and South Planning Area

The Frog Pond East and South Planning Area is located east of the existing Frog Pond development, adjacent to Advance Road in the Newland Creek basin. New development warrants the installation of new stormwater trunklines and outfalls in dedicated City ROW. Inclusion of new infrastructure associated with the Frog Pond East and South Planning Area is reflected as a Project Opportunity Area (Appendix C, Table C-2).

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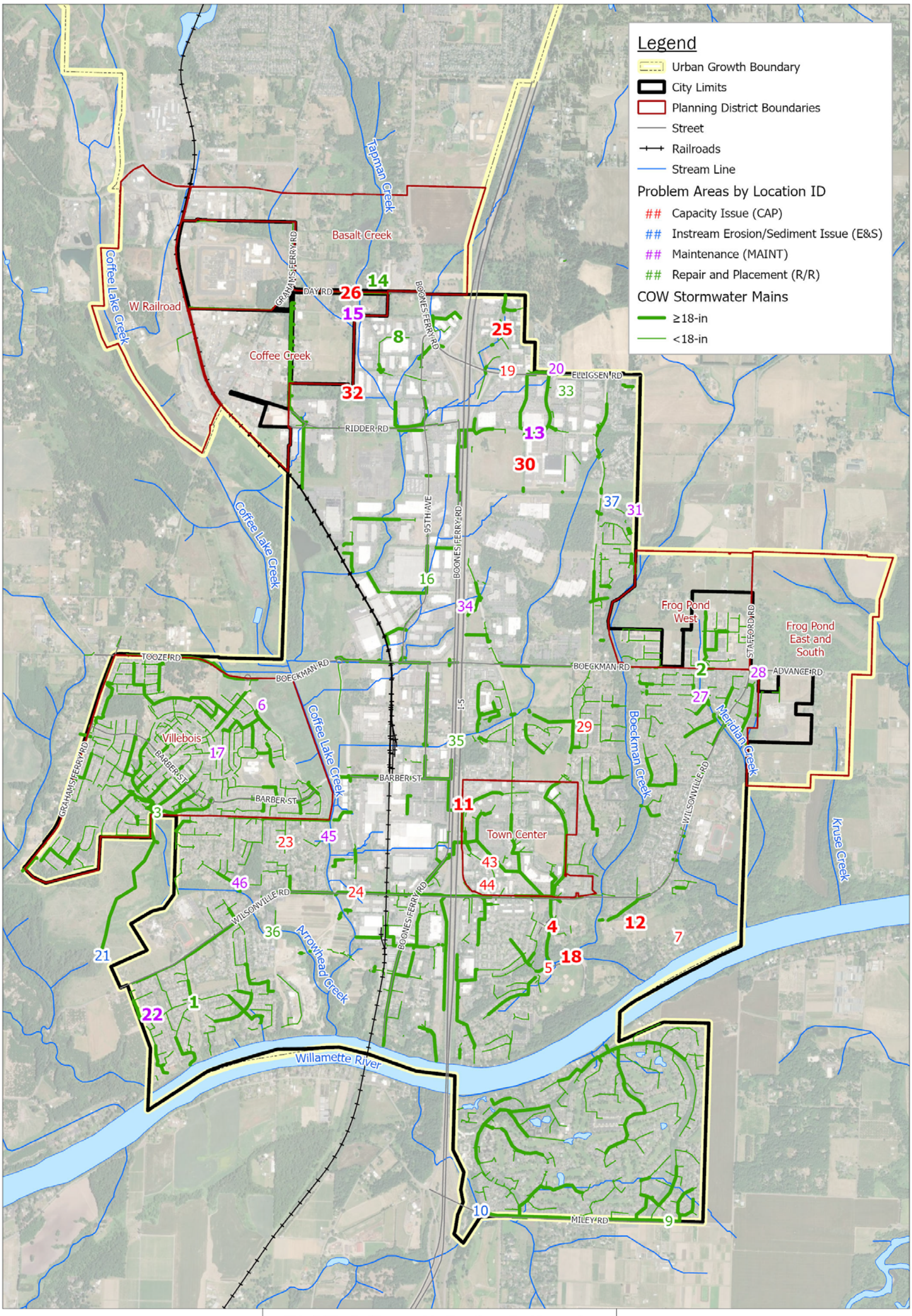

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Bold location IDs represent locations where a site visit occurred.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 3-1: Problem Area Location

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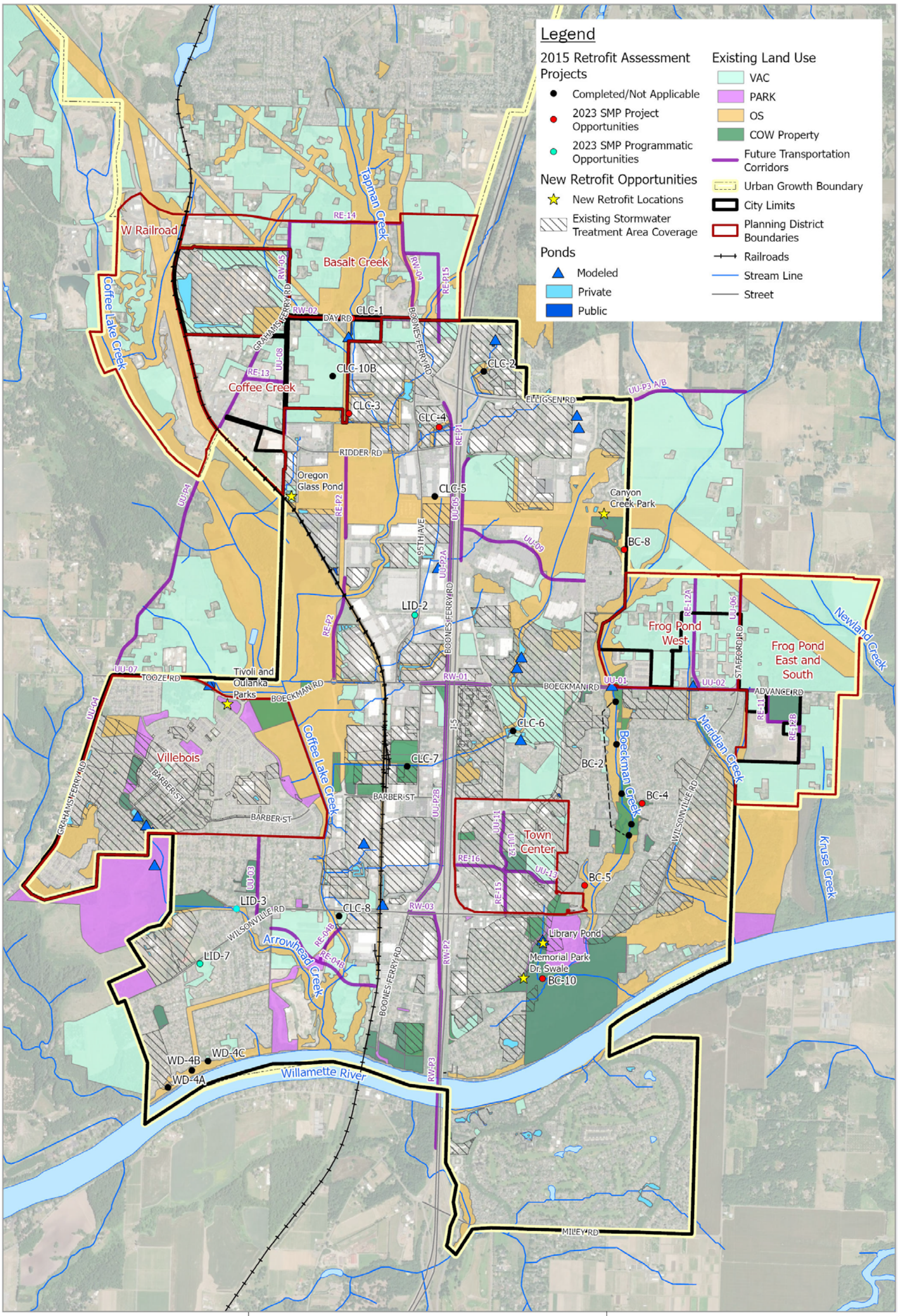

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 3-2: Water Quality Retrofit Analysis

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Section 4

Stream Assessment

Tributary stream channels to the Willamette River are an important element of the overall stormwater collection and conveyance system in the city. Stream channels provide conveyance and storage of water and sediment and provide habitat for aquatic and terrestrial species.

This section outlines results of the stream assessment conducted for this SMP to inform project, program, and policy recommendations. The stream assessment effort helps improve the understanding of hydraulic processes in the selected reaches, as well as identify infrastructure risks associated with changes in stream hydraulics. The stream assessment is described in additional detail in Appendix C. Project Opportunities stemming from the results of the Stream Assessment are detailed below and referenced in the Project Opportunity Matrix (Appendix A, Table A-2).

4.1 Regulatory Background

The City of Wilsonville prepared a 2015 Hydromodification Assessment in accordance with requirements of the City's 2012 NPDES MS4 permit. The 2015 Hydromodification Assessment focused on aspects of hydromodification[6] that are addressed in NPDES MS4 permits, specifically erosion, sedimentation, and alteration of stormwater flow, volume, and duration that may cause or contribute to water quality degradation. Efforts included a GIS desktop assessment, targeted field assessment, and review of existing planning documents and policies to inform the development of strategies and approaches to address hydromodification. Findings from the 2015 Hydromodification Assessment reflect the following:

- Observed stream channels indicate historical hydromodification impacts; minor impacts are observed in locations of concentrated flow or development encroachment.
- Current City programs and policies appear to be effective at addressing hydromodification indicators.
- Current land use and future development patterns show there is a potential for future flow increases; however, the City's current land use policies and updated stormwater design standards are in line with best practices to address hydromodification; and
- The City has identified, and is implementing projects to address hydromodification (per their 2012 SMP).

Recommendations from the 2015 Hydromodification Assessment included the following:

- Implement key capital projects to address instream hydromodification problems including erosion at stormwater outfalls and sites with historic channel modifications.
- Continue to monitor known problem areas.
- Continue to develop and implement master plans for new development areas that address natural resource and channel restoration needs.

[6] The U.S. Environmental Protection Agency (EPA) broadly defines hydromodification as the alternation of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources."

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This SMP update includes a focus on instream channel conditions and erosion prevention in conjunction with capital project development. To inform capital project and program needs, as well as directly address the recommendations per the 2015 Hydromodification Assessment, a geomorphic stream assessment was conducted for select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse creeks to better understand the stream processes and identify infrastructure at risk due to changes in stream hydraulics.

Channel incision and aggradation can inform locations of active erosion and hydromodification risk

4.2 Objectives and Methods

The stream assessment included stream walks along priority reaches as well as desktop mapping and analysis. The objectives of the stream assessment were to:

- Provide a baseline assessment of existing physical stream conditions.
- Identify existing problem areas, such as locations of channel instability or excessive erosion that may impact private or public infrastructure.
- Assess the potential for changes and impacts to the stream channel.
- Recommend capital, operational, maintenance or other solutions or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The stream assessment was conducted by Waterways Consulting, Inc. (Waterways) to reflect the continued evaluation of stream channel conditions as recommended by the 2015 Hydromodification Assessment. Information collected as part of this assessment should be referenced and used during future inspection efforts to help assess improvements and degradation.

In accordance with the Problem Area Identification effort (Section 3.1), City staff identified priority and secondary assessment locations in the city based on the observed hydromodification impacts, land accessibility, future development potential (and the ability to establish a baseline condition of the stream), and history of staff or citizen complaints/concerns.

Figure 4-1 identifies specific stream reaches investigated for the Stream Assessment, as well as the secondary assessment locations not investigated as part of this effort that may be considered in the future.

4.2.1 Stream Walks

Stream walks were conducted over four days, in November 2021 and January 2022 in the Meridian, Boeckman, and Arrowhead Creek basins. Additional stream walks were conducted in October 2023 in the Newland Creek and Kruse Creek basins. Stream walk locations are identified generally in Figure 4-1 at the end of this section. Specific reach numbering associated with stream walk locations can be referenced in Appendix C.

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Stream walk activities included a review of key geomorphic features, stream and bank conditions, and infrastructure. During the stream walks, photographs were taken to document stream characteristics and conditions. Physical and biological stream conditions were noted and mapped and included:

- General vegetation condition.
- In-stream and hillslope erosion processes (incision, aggradation, and hillslope failures).
- Location of stormwater outfalls, exposed pipes, bridges, culverts, affected roads and trails.
- Wildlife activity (presence of beaver dams).
- Heavily eroded banks, headcuts, and bedrock outcrops.

Photo logs and stream reach summary sheets were developed to identify cross section and physical condition characteristics for each reach at the time of the stream walk (see Appendix A).

4.2.2 Desktop Analysis

The desktop assessment included compilation and analysis of geospatial data, including infrastructure, topographic, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for Boeckman, Meridian, Arrowhead, Newland, Kruse and Tapman[7] creeks. A REM shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream.

Waterways also created and analyzed topographic and geologic cross sections and stream longitudinal profiles to develop a set of field maps identifying streams and stormwater infrastructure identified during the field component.

4.3 Findings and Results

Observations made during the stream walks were used to qualitatively identify current stream channel deficiencies and potential strategies for improvement.

Table 4-1 summarizes the general findings by stream reach. Locations where ongoing vegetation management/invasive removal is needed are identified, as well as locations where future monitoring for impacts is recommended. Locations considered a Project Opportunity (see Appendix A, Table A-2) are also identified, and these locations were discussed with the City for consideration as a capital project (see Section 6). Additional detail on these locations is provided in Appendix C.

Of note, the downstream portion of Kruse Creek (Reach 4) was unable to be accessed due to bank stability issues. Future annexation and development activity along Kruse Creek should incorporate a geotechnical evaluation and consider setbacks from the top of canyon, given ongoing landslide risk.

[7] Tapman Creek is referred to as Basalt Creek in TM2.

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Table 4-1. Summary of Stream Assessment Findings

Stream	Assessment Date(s)	Reach No.[a]	Beaver Dam Presence (Y/N)	Infrastructure at Risk? (Y/N)	Invasive Vegetation Present? (Y/N)	Field Observations	Vegetation Management Need? (Y/N)	Ongoing Monitoring Need? (Y/N)	Project Opportunity? (Y/N)
Boeckman Creek	Nov. 19 and 24, 2021	2-9	Y	N	Y	Stream reaches appear laterally confined and vertically stable.	Y	Y	N
Boeckman Creek	Jan. 25, 2022	1	N	Y	N	Risk of channel incision and lateral erosion due to lack of stable beaver dams and seasonal variability in the backwater conditions on the Willamette River.	N	Y	Y
Meridian Creek	Nov. 26, 2021	1	N	Y	Y	Stable stream reaches due to bedrock base level control and lateral confinement. Obstructed culvert at Wilsonville Road (30") results in backwater conditions.	Y	Y	Y
Meridian Creek	Nov. 26, 2021	2	N	Y	Y	Historic channel incision and head cuts, but active head cuts not readily observed. Obstructed culvert at Willow Creek Drive and downstream stabilization measures in place.	Y	Y	Y
Arrowhead Creek	Jan. 25, 2022	2-3	Y	N	Y	General stream stability due to shallow hardpan and abundant beaver dams. Riparian vegetation management needed to ensure beaver activity.	Y	Y	N
Arrowhead Creek	Jan. 25, 2022	4	Y	Y	Y	Culvert at pedestrian crossing is failing. Upstream portion of culvert not evaluated due to access issues.	Y	Y	Y
Kruse Creek	Oct. 26, 2023	1-2	N	N	Y	Moderately incised channel but appears relatively stable. Riparian corridor in relatively good condition, but non-native (ivy and English holly) was noted in Reach 1.	Y	Y	N
Kruse Creek	Oct. 26, 2023	3-4	Unknown	Unknown	Unknown	Reach 4 was inaccessible due to deep channel incision and unstable banks. High groundwater table and seeps and springs contributing to natural stability issues.	Unknown	Y	N
Newland Creek	Oct. 26, 2023	1-3	N	N	N	Reaches are highly incised and likely to incise further. Culvert at SW Kahle Road is acting as grade control and likely preventing additional headcut. Riparian corridor is in good condition, but narrower in reaches 2 and 3.	N	Y	N
Newland Creek	Oct. 26, 2023	4	Y	N	N	Gradient is flatter with in-channel wood and debris dams. Reach 4 is at risk of bank stability, but only one head cut observed. Riparian corridor is in good condition.	N	Y	N

a. Reach numbering can be referenced in Appendix C.

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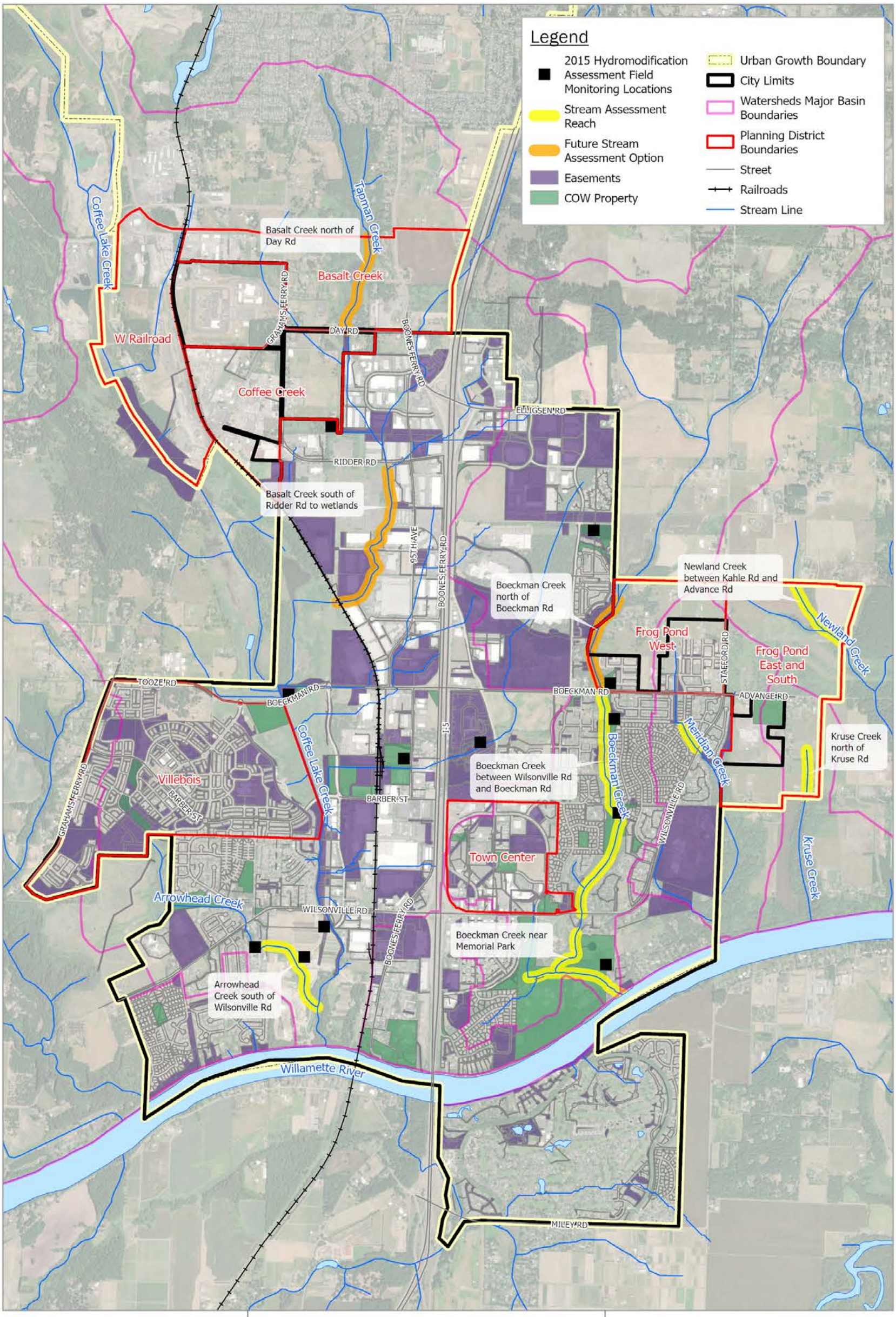

Brown AND Caldwell

City of Wilsonville
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 4-1: Stream Assessment

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Section 5

Capacity Evaluation

Stormwater conveyance is the primary function of the City's storm drainage infrastructure. This section summarizes the H/H system modeling methods and results to verify and identify conveyance capacity limitations.

H/H modeling conducted for this SMP used the City's existing InfoSWMM model, which was originally developed as part of the 2012 SMP effort. The model includes major hydraulic components of the City's stormwater drainage system including public stormwater pipe (15-inch-diameter and greater) and open channel conveyances defined by a simplified trapezoidal geometry. Capacity deficiencies within the study area were identified and/or problem areas validated using the H/H model.

This section summarizes the updates to the City's 2012 InfoSWMM model for this SMP effort, as well as the H/H modeling approach and results.

H/H modeling assumptions, methods and results are described in additional detail in Technical Memorandum #3 (TM3), included in this SMP as Appendix B. Referenced figures are included at the end of this section.

5.1 Objectives and Approach

The City's existing InfoSWMM model was used to simulate the hydraulic performance of select pipe and open-channel systems and evaluate the capacity limitations of City-owned stormwater infrastructure.

Targeted updates to the City's existing model were conducted where updated development activities, CP installations or identified problem areas were identified and there was a need to quantify system capacity to help develop project solutions.

For this SMP, the following modeling approach was generally used to update the H/H model and evaluate conveyance capacity:

1. Review available data (via GIS, as-builts, etc.) to compare mapped infrastructure (i.e., pipe size, slope, etc.) and existing model profiles. Update the existing hydraulic model accordingly.
2. Compile a list of known and suspected problem areas and identify areas where modeling is needed to inform corrective measures. Expand the hydraulic model extents accordingly.
3. Refine the existing subbasin delineation based on the updated hydraulic model coverage.
4. Develop an updated city-wide hydrologic model to estimate stormwater runoff generated for existing and future development conditions.
5. Validate modeled flooding using historical rainfall records, and anecdotal flooding information (photographs, City records),
6. Verify capacity constraints and identify potential sources or causes of flooding with City staff (preliminary flooding results); and
7. Use the validated hydraulic model to document existing capacity deficiencies for inclusion as Problem Opportunity Areas.
8. Use the validated hydraulic model to develop potential solutions to capacity problems (see Section 6).

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5.2 Stormwater Design Standards and Performance Criteria

Design standards and criteria related to the sizing and evaluation of stormwater infrastructure are described in the City of Wilsonville's Public Works Standards (PWS), Section 3 Stormwater & Surface Water Design and Construction Standards, as revised in December 2015.

Additional planning guidelines are described in the City of Wilsonville Code (WC), Chapter 4 Wilsonville Development Code (WDC). The WDC defines assumptions related to the concept planning district designations, overlays and open space designations, and general development regulations that inform land use coverage and hydrologic modeling assumptions for this project.

5.2.1 Planning and Sizing Criteria

Stormwater sizing/design criteria will ultimately be used to both assess the existing stormwater system for deficiencies and guide the design of capital projects in the context of the SMP. Planning and sizing design criteria for select infrastructure components are outlined in Table 5-1. Design storms referenced in the design criteria are outlined in Table 5-2.

Table 5-1. Wilsonville Drainage Standards and Design Criteria

Criteria	Source	Value
Water Quality Facility Design	• PWS 301.4.04.c	• Provide water quality treatment for a design storm of 1 inch in 24 hours. • Design water quality facilities to capture and treat 80% of the average annual runoff volume to the MEP with the goal of 70% TSS removal. • See BMP Sizing Tool.
Water Quantity Facility Design	• PWS 301.4.09.d • PWS 301.4.09.e • PWS 301.4.09.f	• Properties or development draining directly to and within 300 ft of the Willamette River or the Coffee Lake wetlands are exempt from the flow control standards. • Maximum water storage depth for the 100-year storm should not exceed 4 ft deep. • Side slopes should not exceed 4H:1V up to the maximum design water surface elevation; maximum exterior side slopes = 2H:1V. • At least 25% of the pond perimeter should be vegetated with maximum slide slopes of 3H:1V. • See BMP Sizing Tool.
Conveyance Piping Design	• PWS 301.1.10.e • PWS 301.1.13 • PWS 301.8.02 • PWS 301.8.02.c • PWS 301.9.03.b	• Mainline pipes shall be 12 inches in diameter. • Design pipes for conveyance of the 25-year undetained storm (emergency overflow structures should be designed for the 100-year storm). • A minimum of 1 ft of freeboard should be provided between the hydraulic grade line and the top of the structure or finished grade. • Mainline pipes should be reinforced concrete pipe (RCP), ductile iron pipe (CIP), polyvinyl chloride pipe (PVC), or corrugated polyethylene pipe (CPP). Pipe and fittings shall consist of one type of material throughout.
Culvert Design	• PWS 301.1.14 • PWS 301.7.02	• Culverts shall be designed for the 100-year storm. • All culverts shall be designed for fish passage in accordance with ODFW's "Fish Passage Criteria," or latest edition, unless exempt by ODFW or the City. • The headwater elevation must be at least 1 foot lower than road or parking lot subgrade. • New culverts ≤18 inches in diameter: the maximum headwater elevation (measured from the inlet invert) should not exceed 2x the pipe diameter. • New culverts >1 8 inches in diameter: the maximum headwater elevation should not exceed 1.5x the pipe diameter.

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Table 5-1. Wilsonville Drainage Standards and Design Criteria		
Criteria	**Source**	**Value**
Open Channel Design	• PWS 301.1.13.f • PWS 301.6.02	• Open channels shall be designed for the 25-year undetained storm with a minimum of 1 ft of freeboard. • Channel lining material is site specific. • The minimum slope for the flow line is 1% where practicable, but flow shall not be less than 2 fps (unless approved by City).
Pipe Cover	• PWS 301.8.02m Table 3.8 Minimum Pipe Cover	• 36" of cover: Nonreinforced, RCP Class III, Other Pipe Materials • 24" of cover: RCP Class IV • 12" of cover: RCP Class V, AWWA C-900, AWWA C-905, DIP
Structure Spacing	• PWS 301.8.06	• The maximum distance between structures (manholes, area drains, and catch basins-excluding clean outs) is 400 ft.
Outfalls to Open Channel Waterways	• PWS 301.6.04	• Design bank stabilization for the 25-year storm. • Flows from outfall structures should be directed downstream, typically no less than 30 degrees from perpendicular to waterway flow. • Outfalls must be located at higher elevations than the downstream mean low water. • Plantings (willows or other approved plantings) every 2 ft.
Manhole Design	• PWS 301.8.01 • PWS 301.9.01 • PWS 301.4.11	• Manholes are required at least every 400 ft (unless approved by the City). Required placement includes at every grade change, change in pipe size, change in alignment, pipe connection greater than 6 inches, and at the end of the main lines. • Manhole sizing: • 48-inch-diameter manhole for pipe ≤24 inches in diameter • 60-inch-diameter manhole for pipe 27 to 36 inches in diameter and pretreatment manholes • 72-inch-diameter manhole for pipe ≥42 inches in diameter • Maximum of four pipes entering/exiting a manhole. • Minimum free drop of 0.20 ft, maximum free drop of 1.5 ft.
Catch Basins/Curb Inlets	• PWS 301.8.04 • PWS 301.8.05 • PWS 301.8.05.b	• Must be designed for the 10-year storm. • All catch basins must have a sump (unless approved by the City). • Maximum of three catch basins may be connected in a series before connecting to the mainline. • Curb inlets should be constructed with an 18"minimum sump and 6 ft deep from the top of grate to the lowest pipe invert. • Between the inlet and the mainline or mainline structure, the maximum length of pipeline shall be 60 ft for 12" pipe, unless additional length is required to cross the street ROW.

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service. Design storms evaluated in this SMP include the 2-, 10-, 25-, and 100-year recurrence interval 24-hour events as well as water quality events. Design storms are listed in the City's PWS and listed in Table 5-2. The rainfall distribution for these design storms is based on a Unified Soil Classification System (USCS) Type IA distribution.

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Table 5-2. Design Storm Depths	
Design storm event	Rainfall depth, inches
2-yr, 24-hr	2.50
10-yr, 24-hr	3.45
25-yr, 24-hr	3.90
100-yr, 24-hr	4.50
Water Quality Event , 24-hr	1.00

5.2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater treatment and flow control facilities in consideration of instream hydromodification impacts. The BMP Sizing Tool (updated 2017) is intended to be used in conjunction with the City's PWS to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate facility sizes for the following BMP types:

- Rain Garden-Filtration and Infiltration
- Stormwater Planter-Filtration and Infiltration
- Vegetated Swale-Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The BMP Sizing Tool was developed and calibrated based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration-based facilities is based on the facility soil subgroup. Infiltration rates greater than 0.5 in/hr are considered acceptable for use with infiltration facilities and can be used to meet treatment and flow control standards directly. Infiltration rates less than 0.5 in/hr require use of filtration facilities that include piped underdrain systems and orifice controls to meet flow control requirements.

Use of the BMP Sizing Tool represents a shift away from traditional stormwater detention design practices to match pre- and post- development peak flows for standard (i.e., 24-hour) synthetic design storms. Instead, the tool sizes facilities to match the duration of post development peak flows to pre-development levels for the range of flows anticipated to be the most erosive. The BMP Sizing tool was used to size several CPs in this SMP as well as to evaluate policy recommendations associated with use of the Library Pond to support treatment and flow control requirements associated with the Town Center redevelopment. Additional information related to the Library Pond evaluation is discussed in Section 6.3.4 and Appendix F.

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5.3 Model Evaluation Criteria

Stormwater infrastructure was evaluated using the H/H model for capacity per the design criteria defined in Table 5-1. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding where the hydraulic grade line (HGL) exceeds the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level.

For capacity deficient locations where a CP was recommended and developed (see Section 6), the goal was to adhere to the PWS and accommodate the minimum of 1 foot of freeboard between the HGL and the ground surface.

5.4 Model Refinement

Wilsonville developed a city-wide H/H model using the Innovyze InfoSWMM model platform for the 2012 SMP. Localized model updates were incorporated in 2019.

For this SMP, updates to the model datum, hydrologic input parameters, hydraulic model extents and select hydraulic infrastructure were completed. Additional detail related to datum corrections and hydrologic model refinements are included in TM1, which are independent from this SMP. Specific locations of hydraulic model refinement, as well as more detailed explanation of the model validation effort are outlined in Appendix B.

5.4.1 Datum Conversion

As part of the GIS data review process, initiated in 2021, BC reviewed rim and invert elevation data stored in the City's GIS with LiDAR data to identify consistency regarding the vertical datum. Results of this GIS-based spatial analysis indicated inconsistency between recorded datums within the City's GIS dataset, which prompted a similar comparison effort on the City's 2012 InfoSWMM model.

Based on the model comparison results, the original (2012) hydraulic model appeared to rely on inconsistent vertical datums for select model elements. Through discussions with the City, this inconsistency was due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted hydraulic model elevations to be consistent with the City's current standard of NAVD88. Successful conversion of the existing model to NAVD88 was completed in June 2021.

5.4.2 Hydrologic Model Refinement

Hydrologic model refinements included updated subbasin delineations, existing and future land use coverage, and land-use based impervious percentages. With the adjusted subbasin delineation, updated area-weighted average values for infiltration parameters and impervious areas were assigned for each subbasin. In addition, updated subbasin areas, slopes and widths were calculated.

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The City's 2012 SMP reflected an initial subbasin delineation within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and made updates based on:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

A summary of the updated subbasin delineation by major basin is presented in Table 5-3. Please note Newland Creek (and its associated drainage area) is outside the designated study area for the H/H model and not included in Table 5-3.

Table 5-3. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

As introduced in Section 2.3, City staff developed an updated existing and future (full build-out) land use coverage using City zoning and comprehensive plan designations plus specific overlays where development is restricted (e.g., Significant Resource Overlay Zone (SROZ), METRO vacant/developable lands, City maintained vacant lands, Bonneville Power Administration (BPA) easements, significant wetlands, public parks/natural areas etc.). Impervious coverage by land use designation was based on digitization of impervious area (from aerial imagery) for representative tax lots within each existing land use category and calculated by the City as an area-weighted impervious percentage.

Land use categories reflecting reclassification due to HB 2001, as well as calculated impervious percentages are provided in Table 2-3.

5.4.3 Hydraulic Model Refinement and Model Validation

Updates to the City's 2012 InfoSWMM hydraulic model were completed from May 2021 to May 2022. Hydraulic model updates included areas of model expansion, primarily in new growth areas since the 2012 SMP was completed or identified problem areas, and updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects.

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The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments recommended as part of the Boeckman Road Hydraulic Evaluation (January 2022).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

Discussion of preliminary model flooding results with City staff focused on newly identified 25-year flooding locations where the 2012 SMP did not define a CP to address flooding under existing land use conditions. In general, City staff agreed with the preliminary flooding results presented by the model. However, based on results of the validation exercise, additional hydraulic model updates were warranted in select locations based on updated information provided by the City.

These locations included:

- **Charbonneau SW French Prairie Rd. Outfall**. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- **Library Pond**. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- **Penske Truck Rental Property**. Model revised to reflect updated culvert information underneath the parking lot based on as-built drawings.
- **Wilsonville Distribution Center Pond**. Model revised to reflect the pond outlet structure based on as-built drawings.

Figure 5-1, at the end of this section, summarizes the hydraulic modeling extents as well as locations where the hydraulic model was expanded or updated, including updates based on model validation efforts.

5.5 Model Results and Project Opportunity Area Identification

Upon completion of the model validation effort, detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm.

H/H model inputs and results are summarized for the hydrologic and hydraulic models in Appendix B, Attachment B, Tables B-2 and B-3, respectively.

5.5.1 Hydrologic Model Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events.

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are

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primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow).

Although flow attenuation with new development is anticipated through implementation of the City's stormwater design standards, for purposes of this SMP, CP sizing is based on unmitigated flows. In addition, policy recommendations may be considered to ensure that for capacity limited infrastructure, additional efforts are made to retain and mitigate stormwater flows onsite.

5.5.2 Hydraulic Model Results and Project Opportunity Areas

Hydraulic model results identify locations with the potential for flooding and the need to develop CPs to increase conveyance capacity. As described in Section 5.2, flooding within the model is defined as locations where the hydraulic grade line exceeded the structure's rim elevation. Flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storms were also simulated to identify the minimum flooding frequency. Table 5-4 and Figure 5-2, at the end of this Section, summarize the 18 locations that are anticipated to experience flooding under the existing conditions. Generally, all modeled flooding locations are designated as Project Opportunity Areas unless indicated otherwise, and the "priority need" column in Table 5-4 indicates whether a flooding location is confirmed by City staff as necessitating a CP or program to address.

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Table 5-4. Modeled Capacity Deficiencies

Flooding Location ID (Figure 5-2)	Basin	Location Description	Minimum Flooding Frequency	Flooding Predicted in 2012 SMP? (Y/N)	Project Opportunity Area (Y/N)	Priority Need
1	Charbonneau	Miley Road	10-yr	Y	Y	Y
2	Charbonneau	French Prairie Rd and Old Farm Rd	2-yr	Y	Y	Y
3	Willamette	Parkway Ave/Metolius Ln	10-yr	Y	Y	N
4	Willamette	SW Miami	25-yr	N	Y	N
5	Boeckman	Memorial Dr	2-yr	Y	Y	Y
6	Boeckman	Canyon Creek Rd	10-yr	Y	Y	N
7	Boeckman	Sysco Ditch	10-yr	N	Y	N
8[a]	Boeckman	Elligsen Rd	10-yr	Y	N	N
9	Coffee	Shrine Center Pond	2-yr	Y	Y	Y
10	Coffee	Commerce Circle Ditch	2-yr	Y	Y	Y
11	Coffee	Garden Acres	2-yr	N (not modeled)	Y	Y
12[b]	Coffee	Coffee Creek Wetlands	2-yr	Y	N	N
13	Coffee	Boberg Rd and RR crossing	10-yr	N	Y	N
14	Coffee	I-5 Culverts	25-yr	N	Y	N
15	Coffee	Barber Street	25-yr	Y	Y	N
16	Willamette	River Fox Park	2-yr	N	Y	Y
17	Willamette	Lower Boones Ferry	2-yr	Y	Y	N
18[c]	Coffee Lake	Boeckman Corp. Center Pond	10-yr	Y	N	N

a. *Flooding likely due to modeled routing (large subbasin at the upstream end of model). City indicated no Project Opportunity Area designation needed.*

b. *Generalized modeled cross sections are underrepresenting the actual storage. City indicated no Project Opportunity Area designation needed.*

c. *Model configuration questions exist in regard to an existing flow control structure in this area. City staff report no flooding and so this area was not included as a Project Opportunity at this time.*

Three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and required alternatives analysis to ensure that City objectives and preferences will be achieved. These locations are discussed further in Section 6.3 and include:

- Flooding Location ID 2: Charbonneau (French Prairie and Old Farm Road)
- Flooding Location ID 10: Commerce Circle Ditch (Day Road)
- Flooding Location ID 11: Garden Acres

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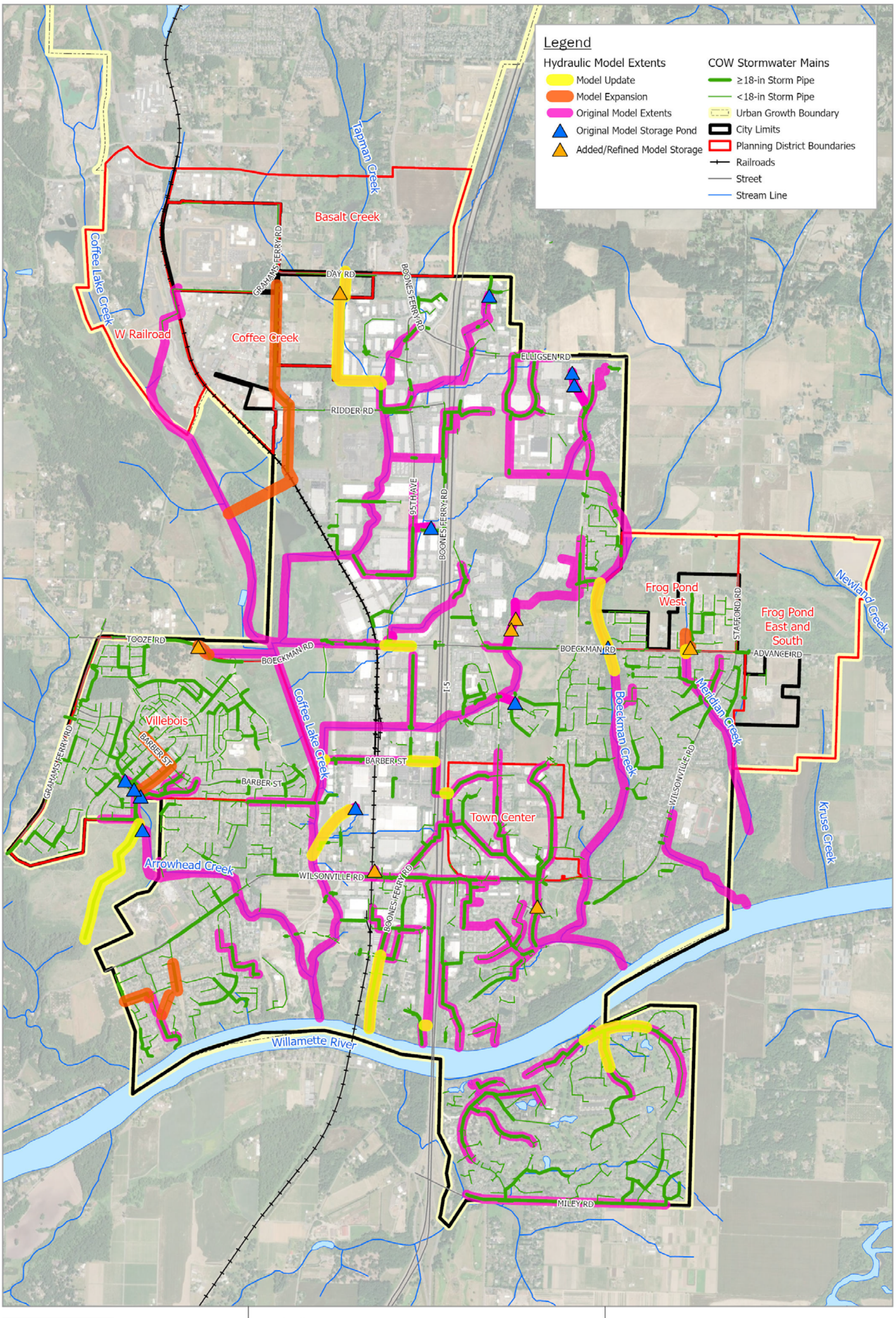

Figure 5-1: Hydraulic Model Overview

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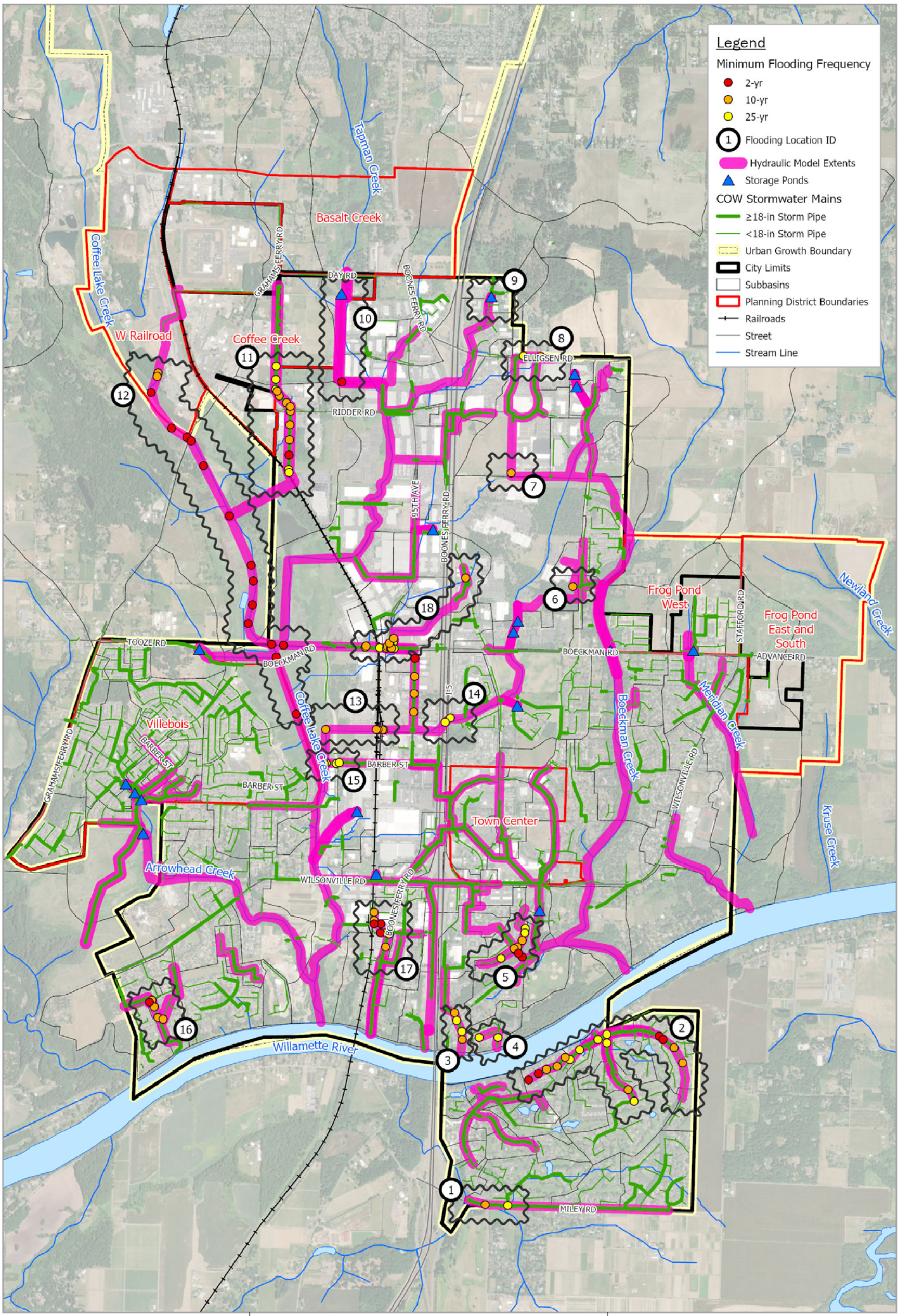

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 5-2: Capacity Deficiencies
(Existing Land Use)

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Section 6

Capital Program Development

Project planning and technical analyses as outlined in Sections 3, 4, and 5 of this SMP resulted in the identification of 47 Project Opportunities, which represent locations with a potential need for a Capital Project (CP) or program as part of the overall stormwater Capital Improvement Program (CIP).

Input from City staff helped focus the projects and programs selected for inclusion in the CIP on addressing the most immediate needs. Project Opportunities not developed into recommended CPs are documented in this SMP as future project needs, although full project descriptions and costs are not developed as part of this SMP.

This section describes the process to develop CPs from Project Opportunities. A detailed list of Project Opportunities is provided in Appendix A, Table A-2. Resulting fact sheets for identified CPs are provided in Appendix D and detailed cost estimates for identified CPs are provided in Appendix E.

6.1 Capital Project Needs Identification

Project Opportunities stemming from the Problem Area identification effort (Section 3.1); Water Quality Retrofit Assessment (Section 3.3); Stream Assessment (Section 4) and Model Evaluation (Section 5) were compiled into a matrix to facilitate discussion amongst Public Works and Community Development/Engineering staff. Areas with overlapping project needs were consolidated into a single Project Opportunity area to facilitate development of multi-objective project concepts.

6.1.1 Project Opportunity Matrix

The Project Opportunity matrix (Appendix A, Table A-2) details the source of the Project Opportunity; the relative deficiency or objective the project would address; and how the system evaluation activities support the project need. If applicable, the Problem Area Location (Appendix A, Table A-1) is also identified. Figure 6-1, at the end of this section, identifies all Project Opportunity Locations by primary deficiency category.

6.1.2 Capital Project Workshops

Two capital project planning workshops were held in the spring of 2023 with members of Public Works and Community Development/Engineering to discuss which Project Opportunities should be prioritized for project development. Staff considered the feasibility of construction during a 20-year Capital Improvement Plan (CIP) implementation period in the selection of locations warranting a capital project, as well as recurring maintenance activities, known/reported capacity deficiencies, and pending development drivers. These identified priority locations (i.e., Project Opportunities identified as “costed capital project needs” per Table A-2) include a conceptual project design and cost estimate that will ultimately factor into future financial evaluations and rate studies.

In some cases, an immediate project need was not identified, and instead a program to address activities at a city-wide scale was the preferred approach. These programmatic needs are identified with an annual funding mechanism (see Section 6.5). In other cases, the Opportunity Area does not warrant a more immediate project, but a project may become more necessary in the future. Those areas are identified as “unfunded capital project need” per Table A-2. These Project Opportunities

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are typically associated with a modeled capacity deficiency that was not confirmed or substantiated by city staff.

Of the Project Opportunity Areas, 22 locations resulted in a capital project conceptually designed and costed in this SMP. Notes from the respective workshops are detailed in Table A-2.

6.2 Capital Project Sizing and Design Assumptions

CP sizing generally follow the City's PWS and design criteria summarized in Table 5-1 as detailed below.

- **Capacity Projects**. Projects to replace stormwater infrastructure, including pipes and culverts, are sized in accordance with the City's PWS unless noted. Pipelines are sized for the 25-year, 24-hour design event under future land use conditions and culverts for the 100-year, 24-hour design event under future land use conditions. Where possible, replaced infrastructure was sized to adhere to the minimum one-foot freeboard between the HGL and top of structure.
- **Water Quality Facility**. For purposes of conceptual sizing and cost estimation, the BMP Sizing Tool was used to size treatment or treatment and flow control facilities in accordance with the specified facility type.
- **New Infrastructure**. Several capital projects require new infrastructure in locations where no storm system currently exists. In the case of the Frog Pond East and South Planning Area, infrastructure sizing per the concept plan was maintained for CP development and costing. For other areas, new infrastructure was sized in accordance with the City's PWS. New infrastructure alignments are in the public right-of-way (ROW). However, it should be noted that final design may require additional structures, alternate alignments, or deeper/shallower infrastructure than assumed for this conceptual project design to address utility conflicts and other constraints not identified as part of this SMP. Survey will be required to verify elevations and locations.

For certain CPs, the project description and costs are developed with a phased approach, splitting the overall project into multiple phases that may be funded and constructed on different timelines. This approach was applied to specific, higher-cost projects for this SMP. These selected projects are generally associated with the same Project Opportunity area but have separate, independent components. In some cases, additional flow monitoring and model calibration may influence the scope or size of the proposed improvements and as such, portions of the project may be delayed, warranting scheduling as a different phase.

For phased projects, Phase 1 project elements should be constructed first, and Phase 2 project elements may be conducted later or following additional evaluation efforts.

6.3 Project Alternative Analysis

In developing CP concepts, a more in-depth evaluation of alternatives was warranted for select locations. These locations include Day Road, Charbonneau, and Garden Acres Road. These areas have complicated drainage patterns and reflect Project Opportunities where a single project solution may not resolve all deficiencies.

A description of the alternatives analysis and H/H model development is provided below for these locations, identified by their Project Opportunity ID. Additional background and description of the preferred design concept is provided in the respective fact sheets (Appendix D).

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6.3.1 Day Road/Commerce Circle (Project Opportunity ID#9)

Tapman Creek, between Day Road and Ridder Road, is conveyed through a series of culverts and open channels before it enters a piped section just north of Ridder Road. The open channels include reaches of negative slope and limited capacity and storage potential. Flooding has been observed at adjacent industrial properties, and the catchment area upstream includes the Basalt Creek Planning Area (see Section 3.5.1). Pending, and future, development from the Coffee Creek Industrial Area and Basalt Creek Planning Area may increase the frequency and severity of flooding.

In 2019, AKS prepared a facility siting alternatives report, which included design concepts expected to alleviate flooding during the existing land use condition. The report did not include analysis of alternatives' performance under future land use conditions.

For this SMP, the preferred AKS concept as well as other system configurations were analyzed for both existing and future development conditions using the updated H/H model. Model results validated the AKS report's conclusion that the preferred concept would alleviate flooding under existing land use conditions, but flooding under future land use conditions is still predicted.

Therefore, to augment the preferred AKS alternative, additional system configuration alternatives were evaluated, including use of a surface detention facility, pipe/culvert upsizing at Day Road, and piped conveyance system upsizing north of Ridder Road. The 25-year storm was used to evaluate flooding, and water surface elevations (WSE) predicted during the 100-year storm were also compared to the elevation of adjacent structures. Results of the additional alternatives evaluation are shown in Table 6-1.

Table 6-1. Day Road Evaluation Summary

Alternative	25-Year Flooding Result		100-Year Flooding Result	
	Existing Land Use	Future Land Use (unmitigated)	Existing Land Use	Future Land Use (unmitigated)
Existing Conveyance	Flooding at multiple points in system	Extensive system flooding	WSE at or above structures at multiple locations	WSE at or above structures at multiple locations
AKS Preferred Concept (AKS)	None	Extensive system flooding	Approx. 2 ft freeboard to structures	WSE at or above structures
AKS + Detention Pond	None	Flooding at multiple points in system	Not analyzed[a]	WSE at or above structures
AKS + Upsizing pipes upstream of Ridder Rd	None	Flooding at multiple points in system	Not analyzed[a]	Approx. 1 ft freeboard to structures
AKS + Detention Pond + Upsizing pipes upstream of Ridder Rd	None	Minimal flooding	Not analyzed[a]	Approx. 1 ft freeboard to structures

a. Alternative not analyzed because it was assumed to have good or better performance than the AKS Preferred Concept.

Evaluation of alternatives considered the relative costs and benefits associated with the alternatives. For example, the addition of a detention pond involves significant costs and logistical challenges, while model results still predict flooding, albeit reduced, for this alternative. Ultimately, the City selected the alternative that included both the preferred AKS concept and upsizing of pipes upstream of Ridder Road. See Appendix F, CP CLC-1, Phases 1 and 2.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. Application of the City's design standards are anticipated to mitigate some of the increased flow associated with future land use.

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However, the larger drainage area to this conveyance system includes area outside of city limits, creating further uncertainty about flow mitigation. In conjunction with this CP, a policy defining and directing the implementation of design standards in the Coffee Creek Industrial Area (as well as other new development areas currently outside of the UGB but draining towards capacity-limited infrastructure and stream corridors) is recommended. In addition, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.2 Charbonneau East (Project Opportunity ID#30)

The Charbonneau East Project Opportunity reflects the continuation of identified pipe replacement and system upsizing along SW French Prairie Rd and SW Old Farm Road. The 2012 SMP identified both capacity and condition limitations throughout the Charbonneau basin. The 2014 Charbonneau Consolidated Improvement Plan categorizes the stormwater infrastructure in this neighborhood as Storm Priority 1 and 2, and efforts to replace deficient infrastructure are ongoing (Figure 6-2). Specific to the SW French Prairie Rd and SW Old Farm Road systems, some pipe upsizing and replacement has already occurred in the downstream portions of the system.

Figure 6-2: Charbonneau Consolidated Improvement Plan (2014), Charbonneau East

In accordance with this SMP, H/H modeling confirmed continued flooding along the extents of SW French Prairie Rd and SW Old Farm Road due, in part, to an undersized outfall pipe discharging to the Willamette River. Reported condition deficiencies also exist.

Various alternatives were evaluated to reduce the extent and coverage of flooding predicted under existing (25-year) and future development scenarios, while considering the portions of the piped collection system that have already been replaced. Due to space limitations, above ground detention was ruled out as a method of flow control to minimize the need for widespread pipe upsizing. Alternatives evaluated included inline detention along SW French Prairie Rd and/or SW Old Farm Rd,

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both at the upstream end and downstream end, as well as the upsizing and replacement of the outfall.

Alternatives were presented to the City in a workshop, and ultimately inline detention alternatives were not selected due to existing sanitary utility conflicts, space (limited ROW) constraints, maintenance concerns, as well as cost implications of replacing recently constructed infrastructure. The selected alternative includes a phased approach reflecting upsizing of the outfall to the Willamette River under Phase 1, and selective upsizing/replacing the remaining condition-limited pipes along SW French Prairie Rd and SW Old Farm Rd under Phase 2. See Appendix F, CP WR-4, Phases 1 and 2.

Like with the Day Road CP, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.3 Garden Acres (Project Opportunity ID#32)

The stormwater collection system along Peters Road is undersized with several pipe constrictions and a downstream pipe constriction at the P&W railroad crossing on the south end of Peters Road. The larger catchment area upstream includes portions of the Coffee Creek Industrial Area and West Railroad Planning Area. Pending development may increase the frequency and severity of flooding.

Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO. Stormwater is currently diverted towards a public stormwater pond on the 10450 SW Riddler Road parcel west of Peters Road to reduce flow through undersized storm piping (Figure 6-3). The existing pond does not have an outlet control structure and based on aerial imagery and site visits, appears to overflow to an existing stormwater ditch west of the pond along the railroad ROW.

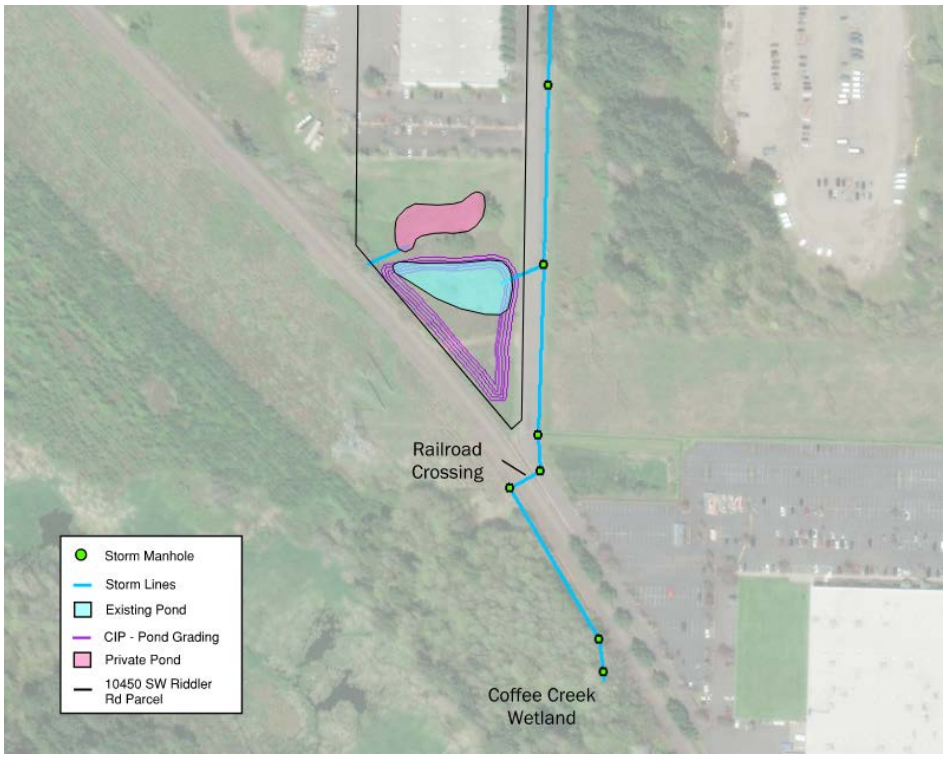

Figure 6-3: Garden Acres Pond (within Coffee Lake Wetlands)

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Several alternatives were evaluated to retrofit the existing public pond to provide additional treatment and storage (detention) of stormwater during high flow events. In addition, reconfiguration of the pond to establish a discharge route from the pond to the stormwater collection system in Peters Road would also reduce the amount of overflow to the railroad ROW. Design alternatives include expansion of the public pond footprint and available storage capacity, including one scenario to utilize additional storage capacity in a private detention pond (currently serving private development).

H/H model scenarios to optimize the storage capacity needed and relieve reported flooding in Peters Road during the 25-year storm event were developed and presented to City staff in a workshop setting. The City opted to increase the existing pond storage capacity to 39,000 cubic feet, fully utilizing the existing parcel while maintaining separation from the private pond located to the north. See Appendix F, CP CLC-3.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. As with the Day Road CP, application of the City's design standards is anticipated to mitigate and offset some of the increased flow associated with future land use. The Garden Acres system reflects another area of the City where adherence to current stormwater design standards requiring retention/mitigation of flows to pre-development conditions is needed, as the CP does not completely alleviate all modeled flooding in the system.

6.3.4 Library Pond Analysis (Project Opportunity ID#4)

The Library Detention Pond (Library Pond), located in Memorial Park, was originally constructed in the 1980s and receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, predominately associated with the Town Center Planning Area. Although operating as a regional detention facility, the current pond configuration has structural and sizing limitations preventing it from adhering to the City's current PWS as a water quality and flow control facility.

Dense, overgrown vegetation and accumulated sediment, combined with a lack of an outlet control structure, limits Library Pond's capacity and water quality function.

The city anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with redevelopment of the Town Center Planning Area. Therefore, as part of this SMP, a sizing evaluation was conducted to confirm capital project needs (specific to retrofit of the pond to meet current operations), as well as policy recommendations applicable to the Town Center Planning Area to allow the Library Pond to offset onsite stormwater treatment and flow control needs associated with redevelopment.

The BMP Sizing Tool was used to evaluate sizing of the Library Pond in conjunction with 1) varying pre-development conditions (to facilitate adherence to the City's flow control standard), 2) varying coverage of onsite stormwater management facilities applied to

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redevelopment areas, and 3) varying site and depth constraints associated with retrofit of the Library Pond (while maintaining the same pond footprint). Detailed findings and results of the sizing evaluation are contained in Appendix F.

Results of the evaluation conclude that there are limited redevelopment options to retrofit the Library Pond to current design standards under future development conditions. Scenarios are described in Appendix F, Table 5, with Scenario 2B and Scenario 3 being the sole options that meet pond design criteria under future development conditions.

Scenario 2B requires onsite mitigation (treatment and flow control) of approximately 50 percent of all redeveloped impervious surface, which requires redevelopment to adhere to the stormwater standards as outlined in the PWS including definition of pre-developed land cover condition and pond design criteria. Scenario 3 requires the City to approve of a policy change, allowing the definition of pre-development for the Town Center Planning Area to conform with existing development conditions (as opposed to pre-developed land cover).

For purposes of capital project development, Scenario 2B was assumed for costing and reflected in the CP fact sheet. See Appendix F, CP BC-1. In conjunction with this CP, a policy defining and directing redevelopment in the Town Center Planning Area is required. The policy needs to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment.

6.4 Cost Estimate Assumptions

CP costs are based on the total capital investment necessary to complete a project (i.e., engineering through construction). Unit costs for project (construction) elements are generally based on recent bid tabs and stormwater master planning efforts and (as necessary) adjusted for 2023 based on a historical cost index. City staff validated unit costs used in this SMP. Cost estimates presented in this SMP are Association for the Advancement of Cost Engineering (AACE) Class 5 Conceptual Level or Project Viability Estimates. Actual costs may vary from these estimates between -50 percent to +100 percent, although changes to design may result in cost differences outside of this anticipated range.

Project cost estimates use unit cost information for construction elements and generally apply a 40 percent construction contingency and multipliers to account for traffic control/utility relocation (5-10 percent), erosion control (3 percent), surveying (5 percent) and mobilization (10 percent). The range in traffic control/utility relocation is based on location (arterial vs. local street). Additional multipliers to account for engineering and permitting (20-30 percent) and construction administration (13.5 percent) are applied to the total construction cost with contingencies. The range in engineering and permitting costs is based on the anticipated permitting level of effort, such as whether in-water work is anticipated. Variations from these assumptions are noted on the project fact sheets in Appendix D.

Due to the resulting construction cost of select projects, the cost applicable to engineering and permitting and construction administration was capped in certain cases. For planning purposes, costs were rounded to the nearest $1,000 for engineering and permitting and construction administration; total project cost was rounded to the nearest $10,000 for budgeted purposes.

Appendix E includes unit costs developed for this SMP and presents the planning-level cost estimates for capital projects. Cost assumptions related to program recommendations are described in Section 6.5.

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Land acquisition and easements are not included in the cost estimates, as most projects are located on City property or within the City right-of-way (ROW).

6.5 Programmatic Recommendations

During the problem area identification (Section 3.1) and project planning efforts (Section 6.1), select maintenance-related, regulatory-driven, and condition-related project needs were consolidated into program recommendations, to address issues at a city-wide scale instead of as multiple, stand-alone individual projects.

The following programs defined below support the successful management of a municipal stormwater system. Implementation will result in cost savings by providing for proactive maintenance, replacement, and repair, as well as contracting efficiencies for smaller, localized project needs.

Costs proposed for the programs are estimated based on current City spending and vetted with City staff. Funding may accumulate over multiple years to be used on a larger cost effort.

6.5.1 Localized Drainage Improvements (P-1)

This program would dedicate funding to assist with minor system configuration/reconfiguration or installation needs or in response to a recurring maintenance need. Improvements funded under this program are not anticipated to require extensive engineering services and would help address localized issues that do not warrant a standalone capital project. These improvements may include relocation and/or installation of curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues, as well as the installation of additional inlets and laterals (to address localized flooding or lack of infrastructure) and the minor regrading and replanting of conveyance ditches and swales.

An annual cost of $100,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- Wilsonville Road and Kinsman Road (Project Opportunity ID #10),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Commerce Circle (Project Opportunity ID #36),
- Serenity Way (Project Opportunity ID #37),
- SW Camelot Street (Project Opportunity ID #38), and
- SW Del Monte Ct (regular maintenance need reported during staff interviews).

6.5.2 Water Quality Retrofit Program (P-2)

This program stems from the project planning efforts and the stormwater retrofit analysis. This program involves the opportunistic incorporation of LID features (planters, curb bump outs, bioretention basins, porous pavement overlays, etc.) to address water quality in conjunction with other transportation, public improvement, or utility planning projects. These types of retrofit activities promote additional infiltration and water quality treatment, which are core values reflected in results from the public survey and external stakeholder outreach efforts. Efforts will help address NPDES MS4 retrofit requirements and TMDL compliance. Targeted locations may include collector roadways, park properties, and residential neighborhoods with limited or no existing water quality treatment.

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An annual cost of $200,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Green Streets/LID Facilities (Project Opportunity ID #39),

6.5.3 Repair and Replacement (R/R) Program (P-3)

CCTV is one of the least expensive and most robust methods to document, assess, and identify condition-related issues in the piped stormwater network. The City's Public Works Road and Storm Section is implementing their CCTV program in accordance with staffing recommendations.

An R/R Program is used to budget the design and construction of improvements stemming from a CCTV and Asset Management Program. The gathered information and subsequent ranking of pipe and infrastructure condition will inform the locations where pipes need to be repaired or replaced in accordance with available funding and schedule. An R/R Program is key to the long-term sustainability of the stormwater collection system. An R/R program ensures that replacement is scheduled for older infrastructure nearing the end of its useful life before failure, as well as prioritizing damaged or failing pipes identified through the CCTV Program.

This program includes dedicated funding to repair/replace all public pipe 12-inches to 48-inches in diameter in-kind within the city limits over a 100-year timeframe. This fund would utilize results of the CCTV inspections to proactively schedule necessary replacement projects and exclude Charbonneau infrastructure, as replacement of a significant portion of the system is underway via a separate program effort in accordance with the Charbonneau Consolidated Improvement Plan (2014) (see Section 6.5.4).

Based on the City's asset inventory, this requires the replacement of approximately 3,700 LF of public stormwater pipe and associated manholes annually, reflecting a present-day construction cost (excluding contingencies and multipliers) of approximately $2.66M/year. However, this estimate does not consider ongoing pipe replacement efforts in CIP implementation and other drainage improvements. The estimate also excludes unknowns related to pipe age and associated lifespan of plastic pipe. As such, the City opted to allocate an additional $275,000 per year (approximately 10 percent of the annually calculated amount for this program.

6.5.4 Charbonneau R/R Program (P-4)

Since 2014, the City has implemented stormwater R/R efforts in the Charbonneau basin as part of the Charbonneau Consolidated Improvement Plan. The Charbonneau Consolidated Improvement Plan identified improvements across four utilities and consolidated utility improvements based on priority and location over a 20+ year period. To date, approximately 12,900 linear feet of pipe has been replaced. Project identification and H/H modeling efforts as part of this SMP identified two CP needs (WR-4, Phases 1 and 2 and WR-5) that incorporate pipe upsizing and direct pipe replacement in the Charbonneau basin.

This R/R program reflects direct replacement of remaining public pipe identified in the Charbonneau Consolidated Improvement Plan that has not been replaced or costed as a CP in this SMP (see Figure 6-4). This program includes in-kind replacement of approximately 30,000 linear feet of public pipe and 150 manhole structures. Pipe replacement will use PVC; pipe diameters less than 12 inches are assumed to be replaced with 12-inch pipe in accordance with the PWDS. A program duration of 20 years is maintained in conjunction with the Charbonneau Consolidated Improvement Plan.

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Program costs were calculated directly and incorporate contingency, and multipliers as outlined in Section 6.4 (see Appendix E for a detailed cost estimate). The present-day construction cost (including contingencies and multipliers) is approximately $38.36M, resulting in an annualized program cost of approximately $1.92M per year.

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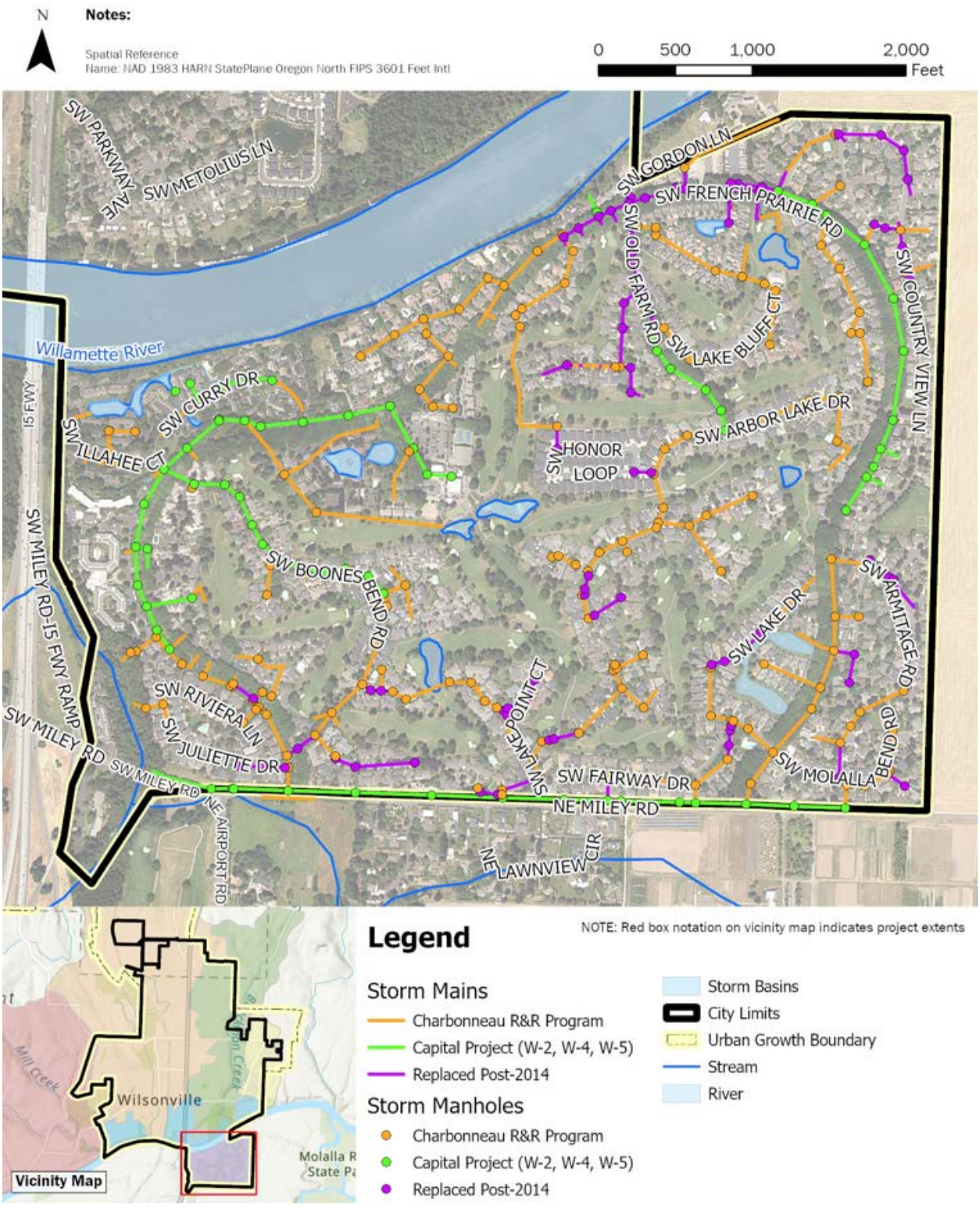

Figure 6-4: Charbonneau R/R Program Coverage

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6.5.5 Riparian Vegetation Management Program (P-5)

This program includes dedicated funding to conduct riparian vegetation management and maintenance activities along stream corridors including removal of invasive species. This need was identified in the Stream Assessment (Section 4 and Appendix C), as there was dense coverage of invasive species including Himalayan blackberry, reed canary grass, and English ivy. In some cases, extensive vegetation prevented data collection efforts. These efforts support NPDES MS4 and TMDL (temperature management) initiatives.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas and specific locations noted in the Stream Assessment (Appendix C) that would potentially benefit from this program include:

- Boeckman Creek Reaches 2-9 (Stream Assessment identified vegetation management need)
- Kruse Creek Reaches 1-2 (Stream Assessment identified vegetation management need)
- Meridian Creek in Landover Park (Reaches 1 and 2) (Project Opportunity ID #18 and #19)
- Arrowhead Creek Reach 4 (Project Opportunity ID #20)
- Boeckman Creek Instream Flow Mitigation and Restoration (Project Opportunity ID #27)

6.5.6 Stormwater Facility Enhanced Maintenance Program (P-6)

This program establishes a dedicated funding mechanism supporting Public Works staff efforts to conduct more reactive and extensive maintenance of public and private vegetated stormwater facilities. Although routine maintenance of public facilities is addressed in conjunction with existing maintenance activities and staffing levels, occasionally additional support is needed to conduct a more robust, restorative maintenance effort on a larger, regional facility or address widespread replacement of amended soils and vegetation on LID/GI facilities.

Private facilities subject to this program would include those where private facility maintenance agreements are not in place and/or not being implemented after enforcement efforts are conducted. Maintenance on private facilities where a maintenance agreement is on file may be subject to reimbursement.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- Pond F and other ponds in Villebois (Project Opportunity ID #5),
- SW Daybreak Street and SW Morningside Avenue (Project Opportunity ID #12),
- Oulanka and Tivoli Parks (Project Opportunity ID #22)

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6.6 Project and Program Numbering and Naming

CP numbering is applied to all location-specific capital projects, based on major basin. The project numbering convention maintains consistency with the 2012 SMP and includes a major basin abbreviation and number to indicate the individual project location. Phasing is defined within the project numbering. Project naming incorporates the location and primary objective of the project in the title.

Major basin abbreviations used for project numbering are listed below:

- Boeckman Creek (BC)
- Coffee Lake Creek (CC), includes projects associated with Tapman Creek drainage area
- Willamette River (WR), includes projects associated with the Charbonneau planning area
- Newland Creek (NC)

Four planning-related capital projects are identified and numbered with a “City” prefix.

Programmatic activities are numbered P-1 through P-6 and reflect city-wide implementation and an annual funding need.

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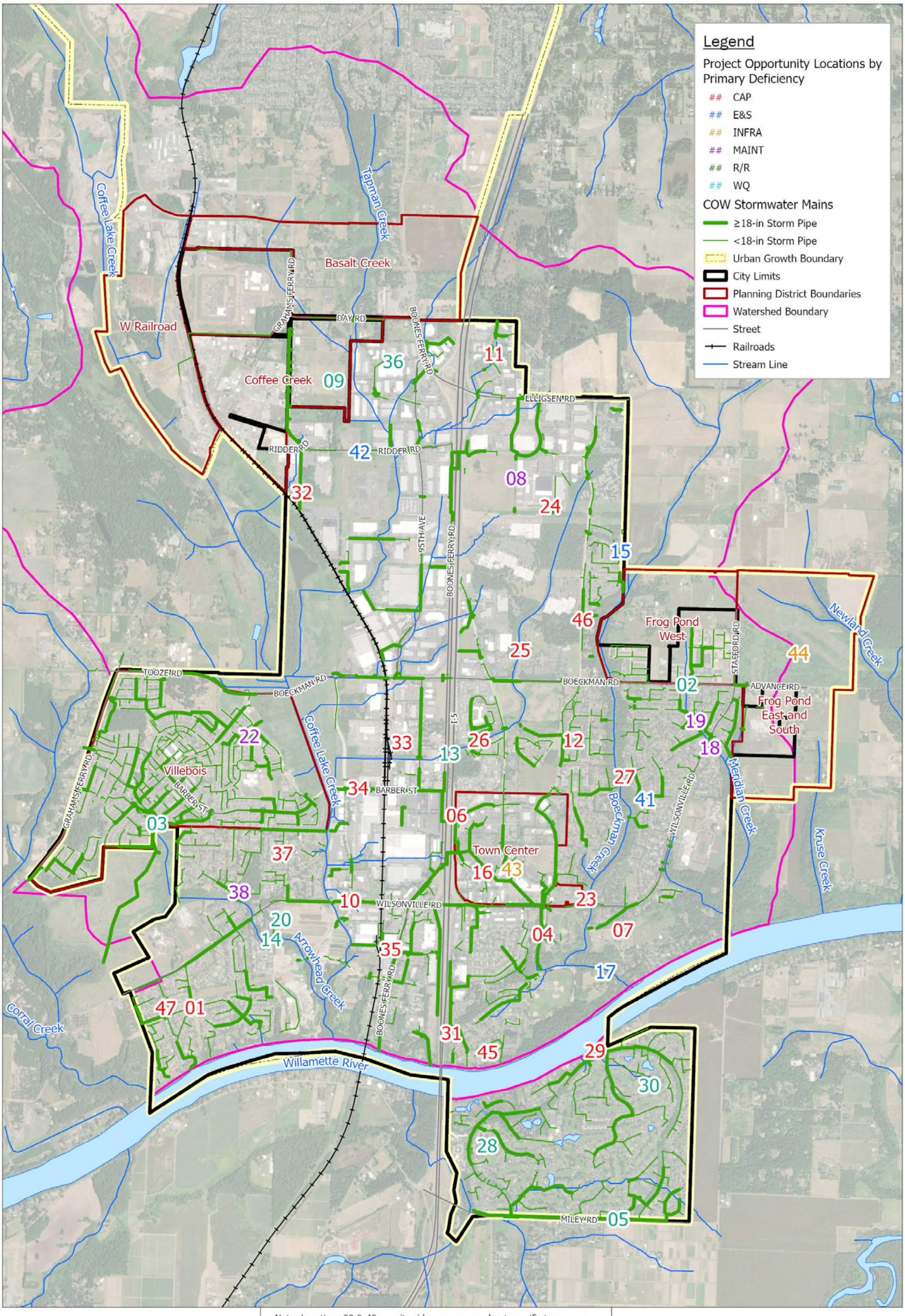

Note: Locations 39 & 40 are citywide programs and not specific to an area.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N
0 0.25 0.5 1 Miles

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 6-1: Project Opportunity Locations

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Section 7

Capital Improvement Plan

This section summarizes the capital projects, programs, and policy recommendations identified through the master planning process, collectively comprising the City's Stormwater Capital Improvement Plan (CIP).

A total of 15 capital projects (CPs) are identified to address current and future storm drainage infrastructure needs related to system capacity, repair and replacement (R/R), a lack of infrastructure, recurring maintenance, instream erosion and sediment accumulation, and water quality. Considering multiples phases for some projects, these 15 CPs represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts.

CP recommendations are considered a one-time cost and are shown in Figure 7-1, located at the end of this section.

In addition to the 15 CPs, there are four, city-wide planning projects that are also considered a one-time cost. These planning projects are described in Section 7.2.

Six programmatic recommendations are identified, including addressing ongoing support for localized drainage improvements, city-wide system repair and replacement (R/R) needs, water quality retrofits and expanded stormwater facility maintenance needs, and riparian vegetation management. Program recommendations are considered an annual cost, as described in Section 6.5, and intended to support ongoing asset management efforts.

Section 7.1 summarizes the recommended actions costed for this SMP. Section 7.2 summarizes the overall CIP, and Section 7.3 outlines the staffing analysis to assess Public Works and Engineering staffing needs in support of this SMP and regulatory obligations.

7.1 Summary of Recommended Actions

Project, program, and policy recommendations in this SMP are proposed to improve and enhance drainage infrastructure and water resources throughout the City, as summarized by the following recommended actions.

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
- Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
- Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
- Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.

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- Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
- Clearly document capital project and program costs and schedule to inform future funding and rate analyses.

7.2 Capital Improvement Program Recommendations

CP locations are mapped in Figure 7-1, at the end of this section, based on the following objectives (identified in **BOLD**):

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table 7-1 lists all CP and program recommendations and references the associated Project Opportunity Area as defined in Section 6. A brief description of the project and summary of project objectives are also included. Most projects address multiple objectives. Table 7-1 also reflects the anticipated implementation schedule for the CP, based on prioritization efforts. Corresponding CP fact sheets with more detailed project information are provided in Appendix D.

The portion of total project cost considered eligible for funding via system development charges (SDCs) is also provided in Table 7-1. Projects solely related to planning, repair & replacement, and maintenance were determined not eligible for SDCs, as they do not address required improvements associated with new or redevelopment. The portion of the total project cost considered SDC eligible is calculated based on the increase in flow associated with anticipated development, using percent increase in impervious coverage as a surrogate.

Description of the four planning-related projects (City-1, City-2, City-3, and City-4) are provided below. Planning projects require specific, scheduled budget allocations and so were added to the overall stormwater CIP.

7.2.1 Flow Monitoring and Rain Gauge Installation (City-1)

This planning project includes the installation of three flow monitors, installed in the piped stormwater collection system, as well as the installation of one rain gauge to assess stormwater flow and aid in the more refined calibration of the City's InfoSWMM model. Additional flow monitoring and model calibration will help confirm the need for and sizing of select CPs, particularly where City staff have not yet observed flooding issues, but the model is predicting flooding.

Recommended locations for installation of flow monitoring include locations with a phased, capacity-related CP and pending new development. They include locations in each of the three major basins: Coffee Lake Creek, Boeckman Creek, and the Willamette basin (e.g., Charbonneau). CPs potentially informed by this effort include Day Road Stormwater Improvements (Project ID CLC-1), Garden Acres Pond Retrofit (Project ID CLC-3), Morey's Landing (Project ID WR-1), Charbonneau East (WR-4), and Charbonneau West (WR-5).

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The project duration (for costing purposes) is estimated at 12 months, and the cost estimate of $100,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

7.2.2 Hydromodification Assessment and Stream Survey (City-2)

This planning project includes follow up monitoring efforts related to the 2022 geomorphic assessment of select high priority reaches as conducted for this SMP (see Appendix C). Although the focus of the assessment was to identify existing and potential future risks associated with hydromodification, the assessment also provided a baseline within the study areas to assess changes in channel, floodplain, and riparian condition over time. This was done by documenting locations of noticeable bank erosion, headcuts, neglected or compromised riparian corridor, grade control locations, and other points of interest.

Data collection efforts will use similar protocols and data sheets developed during the 2022 assessment along these high priority reaches to provide continuous monitoring of stream impacts associated with upstream development activities or hydromodification mitigation strategies. The assessment will be both field-based, consisting of stream walks along the select reaches, and qualitative, including descriptions of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure. Reaches recommended for ongoing evaluation per the 2022 assessment include Boeckman Creek (reaches 2, and 9), Meridian Creek (reaches 1 and 2), Arrowhead Creek (reaches 2 and 3), Newland Creek (reaches 1-4), and Kruse Creek (reaches 1-3).

Additionally, the City may want to establish baseline conditions associated with identified “secondary” locations that were not included in the 2022 geomorphic assessment effort. This new evaluation may be conducted in addition to or in lieu of ongoing monitoring at select reaches.

The complete assessment will be documented in a technical memorandum summarizing the results for inclusion in TMDL and/or NPDES MS4 reporting.

This project is estimated to be completed every three years and/or following a high flow event that exceeds the 10-yr discharge. A project cost of $30,000 per monitoring event is reflected in Table 7-1 and is assumed to occur once during initial 5-year CIP implementation period; once during the second 5-year CIP implementation period; and twice during the third, 10-year CIP implementation period.

7.2.3 Porous Pavement Pilot Study (City-3)

This planning project stems from the City’s NPDES MS4 Retrofit Strategy, water quality project objectives, TMDL drivers, and the need to expand water quality treatment to areas lacking in treatment. To date, use of pervious pavement, porous asphalt or other permeable road and drive surfaces has not been used in the public right-of-way (ROW). This pilot study would include the installation of a porous pavement overlay in conjunction with pavement resurfacing efforts in the City. Water quality monitoring may be conducted to confirm/inform stormwater pollutant reduction, as local research efforts have indicated water quality benefits (i.e., reduction of sediment, bacteria, heavy metals, and organic compounds) can be observed, even with an overlay versus full pavement replacement with pervious pavement.

Recommended locations for implementation of the pilot project have not yet been identified but are anticipated to coordinate with scheduled pavement maintenance. A project duration (for costing purposes) is estimated at 24 months and scheduled during the first 5-year CIP implementation period, and the cost estimate of $100,000 for this effort is based on recent efforts in the City of Milwaukie. This estimate has not been validated or based on a detailed scope.

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7.2.4 Boeckman Creek Geomorphic and Geotechnical Evaluation (City-4)

This planning project is to conduct a geomorphic and geotechnical evaluation on Reach 1 of Boeckman Creek, where continued risk of channel incision and bank erosion exists. This project stems from a recommendation in the 2022 geomorphic assessment, which was unable to confirm source, rate, or extent of bank failure in the reach (see Appendix C). A holistic evaluation of backwater conditions, geomorphic conditions and a geotechnical assessment of slope stability and potential bank stabilization techniques is recommended.

The project duration (for costing purposes) is estimated at 12 months, and a cost estimate of $150,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID	Basin/ Waterbody	Project/Program Name	Objectives [b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost [c]	SDC Eligible Cost [c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-1	4	Boeckman Creek	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	Existing Library Pond facility, east of SW Memorial Drive in Memorial Park	132.0	• Clear, regrade, and replant 0.7 acre detention pond, including adding 3 ft required rocks and media to pond bottom. • Install a new outlet structure. • Replace 70 LF of 18-inch CSP pipe. • Install 70 LF of 6-inch perforated HDPE underdrain. • Install 15-foot-wide, 25-foot-long road for maintenance access.	$1,880,000	$213,000		X		
BC-2	25, 26	Boeckman Creek	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	East of SW Ash Meadows Rd, West of SW Parkway Ave, and north of SW Greenway Dr	295.0	• Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Update 80 LF of 36-inch culvert at SW Parkway Ave to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at Ash Meadows Cir. • Clear, regrade, and replant 1.3 acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.	$2,940,000	$798,000		X		
BC-3-Phase 1	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	Canyon Creek Park, north of SW Carriage Oaks Ln	295.0	• Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe.	$4,860,000	$920,000				X
BC-3-Phase 2	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	Existing Wiedemann Ditch alignment, south of Sysco property	295.0	• Clear, regrade, and replant approximately 2.1 acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot-wide, 1,500-foot-long access road west of Canyon Creek Road.	$7,210,000	$1,365,000				X
BC-4	15	Boeckman Creek	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	Boeckman Creek corridor adjacent to Canyon Creek Estates and bounded on the west by SW Roanoke Dr	358.0	• Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch-diameter PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of 150 LF of vegetated swale in accordance with the City's PWS.	$410,000	$78,000		X		
BC-5	21	Boeckman Creek	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	Within Memorial Park, north of the parking lot by the baseball fields and south of SW Memorial Dr	33.0	• Remove 90 LF of 10-inch CSP (SD5041 and SD5042). • Remove 120 LF of 12-inch CSP (SD5044). • Remove: manhole (ST5098), swale inlet structure (CARTE ID 568), and outlet structure (CARTE ID 19). • Fill existing 1,500 SF swale and revegetate area. • Replace two 48-inch manholes (ST5200 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Replace manhole ST5208 with a 72-inch flow splitting/WQ manhole. • Install 2,400 SF vegetated water quality swale with 1 foot of drain rock and 1.5 feet of amended soil. • Install 140 LF of 6-inch perforated HDPE underdrain pipe. • Install 50 LF of 12-inch PVC pipe. • Install structures for the new swale: swale inflow spreader with rip-rad pad, beehive overflow structure, and outfall to the creek.	$910,000	$22,000				X

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-6	41	Boeckman Creek	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	Boeckman Creek riparian area near Wilsonville High School, at the Gesellschaft well site (29001 SW Meadows Pkwy)	25.0	• Install approx. 480 LF of 12" PVC pipe to convey discharge flows from the well maintenance. • Install two new 48-inch manholes. • Install outfall with 8 CY of Class 200 rip-rap to the creek. • Restore approx. 310 LF of the existing channel with coir log check dams and matting, and re-vegetating with native trees and shrubs.	$400,000	$2,000		X		
CLC-1 - Phase 1	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	Open channel alignment south of Day Rd	944.0	• Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 180 LF of two barrel, 36-inch diameter PVC culverts at Day Road.	$8,020,000	$3,054,000		X		
CLC-1 - Phase 2	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 2	• **Capacity**	North of Ridder Rd through Tax Lot 500	944.0	• Remove 1.200 LF of existing pipe. • Upsize 1,800 LF of existing 36-inch parallel storm pipes to 48-inch. • Replace seven 72-inch manholes. • Install 3 trash racks.	$3,930,000	$1,497,000			X	
CLC-2	20	Coffee Lake Creek	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	Arrowhead Creek culvert crossings under pedestrian path at the south end of SW Morey Ln	421.0	• Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.	$290,000	$16,000			X	
CLC-3	32	Coffee Lake Creek	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	Existing public pond in an industrial area along Peters Rd between SW Graham's Ferry Rd to the west, SW Day Rd to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.	231.0	• Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.	$3,780,000	$1,339,000			X	
NC-1	44	Newland Creek	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	East of SW Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. Only K1 Basin of Frog Pond East and South.	61.0	• Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.	$4,090,000	$3,222,000		X		

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-1 - Phase 1	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **System Capacity** • Water Quality	Along Willamette Wy East from SW Pkwy Dr to the Belknap Ct Outfall, including greenfield along BPA easement	46.0	• Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).	$2,310,000	$45,000			X	
WR-1 - Phase 2	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **System Capacity**	SW Champoeg Dr	46.0	• Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 - SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).	$1,080,000	$21,000				X
WR-2 - Phase 1	5	Willamette River	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	Miley Rd outfall	138.0	• Replace and upsize 80 LF outfall pipe (from area drain with ENG ID 9341 to outfall) from 36-inch CMP to 42-inch PVC. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe between area drain (9341) and MH (ST9002) with same diameter 42-inch PVC. • Replace and lower invert of MH (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 25 feet along the channel upstream and downstream of the outfall.	$820,000	$0		X		
WR-2 - Phase 2	5	Willamette River	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	Miley Rd from NE Airport Rd to eastern intersection with SW French Prairie Rd	138.0	• Install approx. 530 LF of new 42-inch pipe from replaced MH ST9002 to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch diameter manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install 10 new 60-inch diameter manholes and approx. 3015 LF of new 36-inch storm pipe along NE Miley Road from SW French Prairie Road to new manhole adjacent to MH ST9011. • Install 2 new 48-inch diameter manholes and approx. 650 LF of new 24-inch storm pipe from the new manhole adjacent to MH ST9011 to new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets along new NE Miley Road alignment - approximately 13.	$10,510,000	$0			X	
WR-3	7	Willamette River	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	SW Rose Ln between SW Wilsonville Rd and SW Montgomery Wy	14.0	• Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370). • Install approx. 40 LF of parallel 12-inch RCP culverts. Realign the culverts at a diagonal across the road with the same outlet location. • Reinforce stormwater conveyance around property near culvert to move water into ditch.	$200,000	$19,000		X		
WR-4 - Phase 1	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	SW French Prairie outfall	159.0	• Remove and replace existing Charbonneau East Outfall (ENG ID: STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch PVC discharging to Willamette River (ENG ID: STD9005 to ST9014). • Replace one 72-inch manhole (ST9014).	$600,000	$0				X

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-4 - Phase 2	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	SW French Prairie Rd and SW Old Farm Rd	159.0	• Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes. • Replace nine 60-inch manholes.	$4,440,000	$0				X
WR-5	28	Willamette River	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	SW Curry Dr, SW French Prairie Rd, and SW Boones Bend Rd	54.0	• Pipe replacement along SW Curry Drive: • Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). • Replace 520 LF of 18-in pipe with PVC (new manhole to PRIVATE manhole CARTE ID: 1892). • Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). • Replace private outfall (CARTE ID: 15). • Replace two private 48-in manholes (CARTE ID 1892 and 1383). • Install three 48-in manholes. • Pipe replacement along SW French Prairie Road: • Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) • Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). • Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 - ENG ID unknown) • Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). • Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). • Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). • Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall - ID unknown). • Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. • Pipe replacement along SW Boones Bend Road: • Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). • Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). • Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). • Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). • Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). • Replace eight 48-in manholes; and replace three 60-in manholes.	$10,370,000	$0				X
City-1	N/A	City-wide	Flow Monitoring and Rain Gauge Installation	• **Capacity**	City-wide	N/A	• Location of one rain gauge and installation of a minimum of three flow meters over a 12-month duration to aid in Info-SWMM model calibration and validation of project needs/phasing.	$100,000	N/A		X		

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
City-2	18, 19, 27	Boeckman, Meridian, and Newland	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	Stream corridors associated with developing portions of the Boeckman Creek, Meridian Creek and Newland Creek basins	N/A	• Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	$30,000/event	N/A		X	X	X
City-3	40	City-wide	Porous Pavement Pilot Study	• **Water Quality**	City-wide	N/A	• Implementation of a porous pavement overlay and associated water quality monitoring to inform more widespread applications.	$100,000	N/A		X		
City-4	17	Boeckman Creek	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	Downstream 750' of the Boeckman Creek stream corridor	N/A	• Geomorphic and geotechnical evaluation of the downstream 750' of Boeckman Creek at the confluence with the Willamette River.	$150,000	N/A		X		
P-1	5, 7, 10, 17	City-wide	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	City-wide	N/A	• Installation of small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow). • Relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues	$100,000/yr	N/A	X			
P-2	8, 11, 39, 40	City-wide	Water Quality Retrofit Program	• **Water Quality** • Capacity	City-wide	N/A	• Design and install opportunistic LID or green infrastructure (porous pavement overlays, regional facilities, stormwater planters/curb bump outs) along streets, within public property, and/or within available ROW to provide water quality treatment.	$200,000/yr	N/A	X			
P-3	N/A	City-wide	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	City-wide	N/A	• Conduct prescriptive replacement of public pipe and structures s over a 100-year period. Use results of CCTV analysis to inform locations.	$275,000/yr	N/A	X			
P-4	29	Willamette River	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	Charbonneau Basin	478.0	• In-kind repair and replacement of public pipe and manholes within the Charbonneau basin, in accordance with the Charbonneau Consolidated Improvement Plan. Excludes pipes replaced within the last 10-years (since 2014) and CP WR-4, Phases 1 and 2 and WR-5.	$1,920,000/yr	N/A	X			
P-5	18, 19, 20, 27	City-wide	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	City-wide	N/A	• Conduct riparian and/or in-channel vegetation maintenance including removal of invasives.	$25,000/yr	N/A	X			
P-6	5, 12, 22	City-wide	Stormwater Facility Enhanced Maintenance Program	• **Water Quality** • Maintenance	City-wide	N/A	• Conduct restorative maintenance on select public and private stormwater facilities.	$25,000/yr	N/A	X			
									TOTAL	$2.545M	$19,140,000	$20,850,000	$29,530,000

N/A: Not Applicable

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. Citywide planning projects are designated as "City". Programs (to be funded annually) are prefaced with a P designation.

*b. Primary objective (for mapping purposes) is identified in **BOLD**.*

c. Estimated costs and SDC eligible costs are described in Section 7 of the SMP and detailed cost summaries provided in Appendix E. City-wide planning projects and solely related to Repair/Replacement or Maintenance are not eligible for SDCs and the SDC eligible cost is indicated as N/A. For projects with no developable lands in the upstream contributing drainage area, the portion of project cost associated with SDCs is $0.

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7.3 Future/Unfunded Capital Project Opportunities

Table 7-2 summarizes potential, additional CP needs as identified during project planning efforts and documented in the Project Opportunity Matrix (Appendix A, Table A-2). However, these are considered unfunded capital projects for purposes of this SMP, as needs are more undefined and/or staff have not observed specific deficiencies in these areas. In some cases, a standalone CP may not be necessary if the project opportunity can be addressed as part of a program activity (i.e., Localized Drainage Improvement [P-1]).

Specific cost estimates have not been developed and schedule for implementation not established for these projects.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
8	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch. Downstream N-S drainage swale has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	N	Y	• Install WQ manhole(s) or other facilities to remove sediments from public runoff.
11	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	A city-owned pond receives a small amount of drainage and requires frequent maintenance (due to undersized catch basins). Model predicts flooding within the pond and outlet.	CAP		Y	N	N	• Improve maintenance access from the Shrine Center parking lot. • Expand/retrofit pond to improve water quality function and outlet configuration.
17	Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River.	E&S		N	Y	N	• Planning project (City-4) proposed to evaluate source and potential, structural repairs first. • Channel stabilization and grade control (retaining/crib wall or soldier pile) pending planning study feedback.
22	Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	Four private swales—have not been maintained consistently	MAINT	WQ	N/A	N	Y	• Acquire private swales and conduct restorative maintenance.
23	Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	Underutilized irrigation pond adjacent to Boeckman Creek. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	N/A	N	Y	• Expand water quality treatment through retrofit of existing facility. • Will require private property partnership.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
31	Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Pipe upsizing and realignment as necessary.
34	Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		Y	N	N	• Pipe upsizing and realignment as necessary. No immediate need.
35	Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		Y	N	Y	• Pipe upsizing and realignment as necessary. No immediate need.
42	Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	--	N	Y	• Future restoration/retrofit opportunity.
43	Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		--	N	Y	• Additional assets/re-piping is development driven. • New/decommissioned infrastructure pending development activities.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
45	SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
46	Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
47	River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.

N/A = not applicable.

a. Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.

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7.4 Staffing Evaluation

A supplemental staffing analysis was conducted to support the earlier, maintenance-related staffing evaluation described in Section 3.2. This analysis included both Public Works and Engineering staffing needs in conjunction with 1) new regulatory obligations associated with the City's 2021 NPDES MS4 permit and 2022 Stormwater Management Program (SWMP) Document, and 2) implementation of this SMP.

Specific to implementation of this SMP, additional Engineering staff are required to execute and manage the CPs over the 20-year CIP (see the construction administration cost by CP included in Appendix E). Additional Public Works staff support will be needed to maintain additional assets resulting from CP implementation. Figure 7-2 summarizes the departments and associated activities resulting in the need for additional staff. Summary tables and documentation related to this evaluation are included in Appendix G.

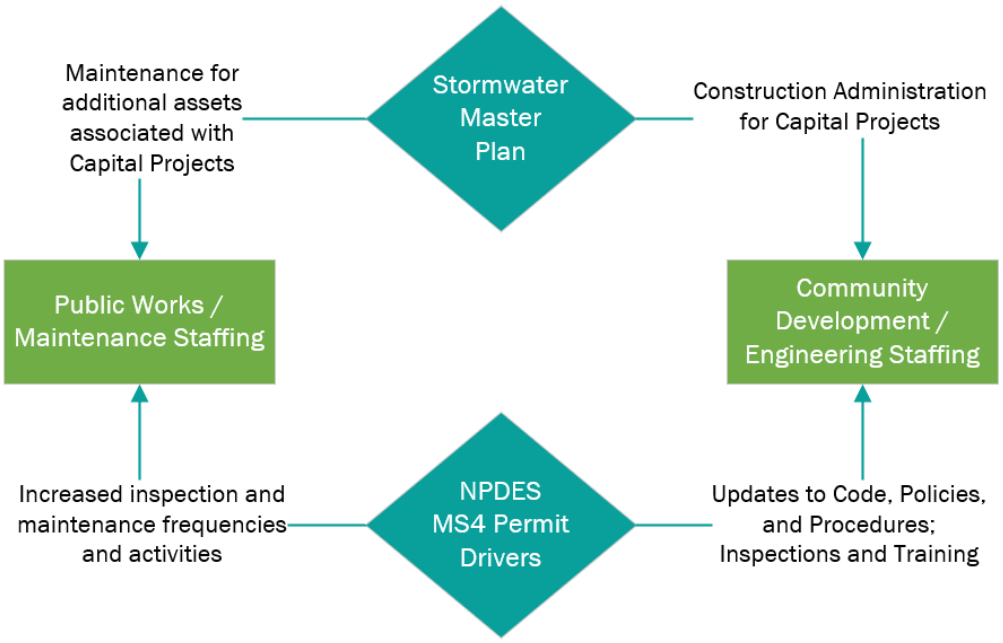

Figure 7-2: Staffing Evaluation Considerations

7.4.1 Assumptions

The following general assumptions were used to develop the staffing evaluation for both Public Works Stormwater staff and Engineering staff. Detailed assumptions specific to staffing estimates by activity are outlined in Appendix G.

- Except for the additional Public Works staffing needs identified in Section 3.2 for deferred maintenance, it is assumed that existing Public Works and Engineering staffing levels were adequate to implement the City's stormwater program and CP implementation prior to reissuance of the City's NPDES MS4 permit or implementation of this SMP. Thus, only additional activities are used to inform additional staff resource needs.
- One FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year (as confirmed by City staff).

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- The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021-Sept. 30, 2026) - reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.
- CPs are assumed implemented on an annual basis, and the CIP is assumed to be implemented over a 20-year implementation schedule, ranging from 2024-2043. Given uncertainty with schedule, CP costs are averaged across the 20-year implementation schedule equally. In practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.
- For the CPs listed in this SMP, 100 percent of engineering and permitting costs will be used for consultant support, and 100 percent of design/construction administration costs will be required for City Engineering staff.

7.4.2 Results

Table 7-3 provides a summary of the combined Public Works/Stormwater and Community Development/Engineering staffing needs for both the NPDES MS4 Permit driven activities and CP implementation activities. Detailed staffing projections, as reported in Appendix G, reflect FY 2023-2027 in alignment with the NPDES MS4 Permit timeline. However, staffing projections are relatively consistent when annualized and reflect the ongoing implementation of regulatory requirements over the 5-year permit period, as well as an annual average over a 20-year CIP implementation period. Thus, the annual average staffing is reflected below, and rounded to the nearest 0.1 FTE.

Table 7-3. Combined Staffing Assessment Summary

		Increased Staffing (FTE)
		Annual Average
Public Works/Stormwater Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.1
	Staffing contingency for NPDES MS4 Driven Activities [a]	0.4
	CP Implementation	0.2
	Public Works Staffing Total	2.7
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.2
	CP Implementation	1.2
	Community Development Staffing Total	1.4

a. Staffing contingency estimated at 20% to account unscheduled maintenance and response.

For Public Works (Roads and Stormwater Section), an increase of approximately 2.5 FTE is recommended to address both deferred and additional maintenance activities as defined with the reissued NPDES MS4 permit. This increase reflects a 20 percent contingency to account for additional, unscheduled activities as well as prescriptive maintenance efforts. An additional 0.2 FTE increase is anticipated for maintenance of new infrastructure (assets) associated with CIP implementation. However, timing of this 0.2 FTE may vary in accordance with construction of CPs and could be delayed over the 20-year implementation period.

For Community Development (Engineering Division), an increase of approximately 0.2 FTE is recommended to address additional tracking and inspection needs as defined with the reissued NPDES MS4 permit. This may be accommodated through reallocation of existing staffing or contracted support. An additional 1.2 FTE is anticipated to manage and execute contracts for CP design and construction services. This increase accounts for the 1.0 FTE of engineering staff

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currently dedicated to overseeing stormwater CP implementation, and reflects the additional staffing need. As with Public Works staffing, timing of this 1.2 FTE may vary in accordance with design and construction schedules and could be delayed over the 20-year implementation period. It should be noted that cost estimates for programmatic activities (i.e., Projects P-1 through P-5) have not been included in the staffing projections.

7.5 Project Prioritization

Project prioritization is an important component of the stormwater master planning process and can provide direction in sequencing projects in accordance with City objectives. This section summarizes the prioritization of CPs for implementation.

For this SMP, a CP prioritization tool was developed to assist with project prioritization. This Multi-Criteria Decision Analysis (MCDA) tool was developed using Microsoft Excel and includes prioritization criteria, scoring mechanism, and weighting factor schemes to present graphical and numeric rankings of CPs. The MCDA tool normalizes City-assigned scores for each criterion and project, which allows better differentiation of relative project performance (difference between best and worst options) and balances variability in scoring. Normalized scores were multiplied by their associated weights and summed to represent the overall project priority. The MCDA tool is intended to be updated on a continual basis; as projects are constructed, they can be removed from the ranking tool and new projects can be included as master plans are updated.

It should be noted that the overall stormwater CIP includes several new programs established to facilitate improvements without dedicated, individual CP consideration. Programs are not prioritized as part of this effort.

7.5.1 Prioritization Criteria

Proposed CPs are developed to address a variety of objectives including increased capacity, new infrastructure needs, maintenance, repair & replacement, water quality, and instream erosion/sediment control.

In consideration of the varied scope of proposed CPs and overlapping project objectives, the following scoring categories were used as the basis for developing project prioritization criteria.

- **System Operations**: System operations is a collective category representing capacity deficiencies, regular or recurring maintenance needs, and safety and accessibility as related to the location of a proposed issue or deficiency.
- **System Condition:** System condition reflects known problem areas where repair or replacement of an asset addresses a known or immediate issue.
- **Compliance:** Compliance reflects a CPs ability to address regulatory drivers including NPDES MS4 permit needs (water quality retrofits needs), TMDL and shade management drivers, and hydromodification risk.
- **Other:** Other criteria including contributing drainage area, project sequencing and phasing, construction constraints and funding source.

Table 7-4 summarizes the evaluation criteria and scoring guide. The scoring guide helps score projects consistently and advises others that may need to apply the tool in the future. A range of scores, from 0 to 3, is applied to each criterion for every project to yield an unweighted total score. As the City implements projects over time, and as priorities change and evolve, these criteria and the scoring guide can be revised in the CP prioritization tool.

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Table 7-4. Project Prioritization Criteria

Criteria	Scoring Definition (3 = High; 2 = Medium; 1 = Lower; 0=Does not address)			
	High (H)	Medium (M)	Lower (L)	Does not address
System Operation-Capacity	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses an existing capacity deficiency per hydraulic modeling efforts.	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses a lack of infrastructure (infrastructure need)	• Addresses a future capacity/infrastructure need.	• May provide some capacity benefit, but the location has not been identified as an existing or future capacity deficiency.
System Operation-Maintenance	• Addresses a location that has frequent citizen complaints and onsite response requirements.	• Addresses a location that has frequent citizen complaints and will reduce existing maintenance needs.	• Addresses a location that has less frequent citizen complaints and will reduce existing maintenance needs.	• Project does not address existing maintenance deficiency or lack of infrastructure
System Operation-Safety and Accessibility	• Reduces risk near a transit line, school, or backbone utility	• Mitigates risk, including system relocation into the public ROW to avoid collateral damage, safety concerns on private property.	• Reduces risk to non-essential property/minor roadways/structures.	• The identified problem is not anticipated to address safety concerns.
System Condition	• Addresses an immediate system condition need (problem area) where delay may result in immediate property damage or safety concerns.	• Addresses a system condition need (problem area) where delay may result in additional infrastructure deterioration or property damage.	• Replaces an existing City asset.	• The project does not include replacement of an existing asset.
Compliance-Water Quality	• Provides new or enhanced water quality treatment to address pollutants of concern, qualifying as a retrofit project with potential for fee-in-lieu	• Restores or enhances water quality function or coverage, qualifying as a retrofit project only.	• Provides some water quality benefit through sedimentation.	• The project does not include water quality treatment.
Compliance-Vegetation Management	• Restores shade protection (within 100' of stream bank) to address temperature TMDL	• Enhances riparian corridor vegetation coverage; removes invasive species	• Enhances upland vegetation conditions/characteristics.	• No plantings or vegetation enhancement associated with project construction
Compliance-Hydromodification	• Addresses area of known or observed instream erosion that could result in property damage or infrastructure failure.	• Addresses area of known or observed instream erosion that could result in bank stability issues.	N/A	• Project does not address area of known hydromodification impacts
Other-Contributing Area	• Project has regional impacts (drainage area is > 100 acres)	• Project has subbasin impacts (drainage area is > 10 acres)	• Project has local impacts (drainage area is < 10 acres)	
Other-Sequencing	• Project is required as a pre-requisite or preliminary project before another prioritized project need.	N/A	N/A	• Project construction scheduling would not be impacted by other project scheduling needs.
Other-Traffic and Accessibility	• Project construction is not expected to impact traffic or private property	• Construction may impact residential streets.	• Construction may impact collector streets.	• Construction will impact arterial streets or structures on private property are expected
Other-Development Drivers	• Project is a prerequisite to a current construction project.	• Project is required to support future growth and development or a planning area.	N/A	N/A
Other-Funding Source	• Project is eligible for funding via SDCs (50% or greater)	• Project is eligible for funding via SDCs (25%-50%)	• Project is eligible for funding via SDCs (up to 25%)	• Project is not eligible for SDC funding.

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7.5.2 Scoring and Weighting Factors

Every CP was reviewed by the City Engineer, Natural Resource Manager, and Public Works Operations Supervisor and scored by assigning a "0" through "3" score to each criterion in accordance with the scoring definitions (Table 7-4).

The MCDA tool includes the ability to incorporate weighting factors schemes that vary based on the importance of various scoring categories and individual criteria. Weighting factor schemes were established in collaboration with City staff including 1) an initial weighting with emphasis on system condition and balanced weights within the system operation and compliance categories, 2) adjusted weighting to emphasize on project sequencing (part of the other category), and 3) emphasis on criteria prioritized by Public Works.

Results of the various weighting schemes were compared, and outcomes discussed internally by the City. These schemes resulted in relatively consistent prioritization of projects, with some projects moving slightly up or down in ranking depending on the scheme. Ultimately, the city selected the initial weighting scheme and opted to make some related project scheduling adjustments in accordance with Public Works feedback. Resulting weighting factors are provided in Table 7-5.

The final, average score for each criterion were multiplied by the weighting factors associated with the select weighting factor scheme and summed for a final project score creating a project ranking.

Table 7-5. Selected Weighting Schema

Scoring Category	Category Weight (%)	Criteria	Criteria Weight (%)
System Operation	30	System Operation - Capacity	10
		System Operation - Maintenance	10
		System Operation - Safety and Accessibility	10
System Condition	25	System Condition	25
Compliance	25	Compliance - Water Quality	8.33
		Compliance - Vegetation Management	8.33
		Compliance - Hydromodification	8.33
Other	20	Other - Contributing Area	5
		Other - Sequencing	5
		Other - Traffic and Accessibility	5
		Other - Development Drivers	2.5
		Other - Funding Source	2.5

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7.5.3 Prioritization Results

The CP prioritization tool provides a bar graph that illustrates scoring results (see Figure 7-3). Each bar represents the total score, and each colored segment of the bar represents a specific evaluation criterion so the user can see which criterion played the most prominent role in the scoring results for each project.

The prioritization and ranking of the CPs were reviewed and used to inform the ultimate project scheduling (see Figure 7-1). In general, the highest scoring priority projects are scheduled in the next 5 years (2024-2028); the next level of priority projects are scheduled in the following 5 years (2029-2033); and the remaining priority projects are scheduled 10 years from now (2034-2043). Based on the total number and cost of projects within any one timeframe, some project schedules were adjusted per City feedback (see Table 7-1).

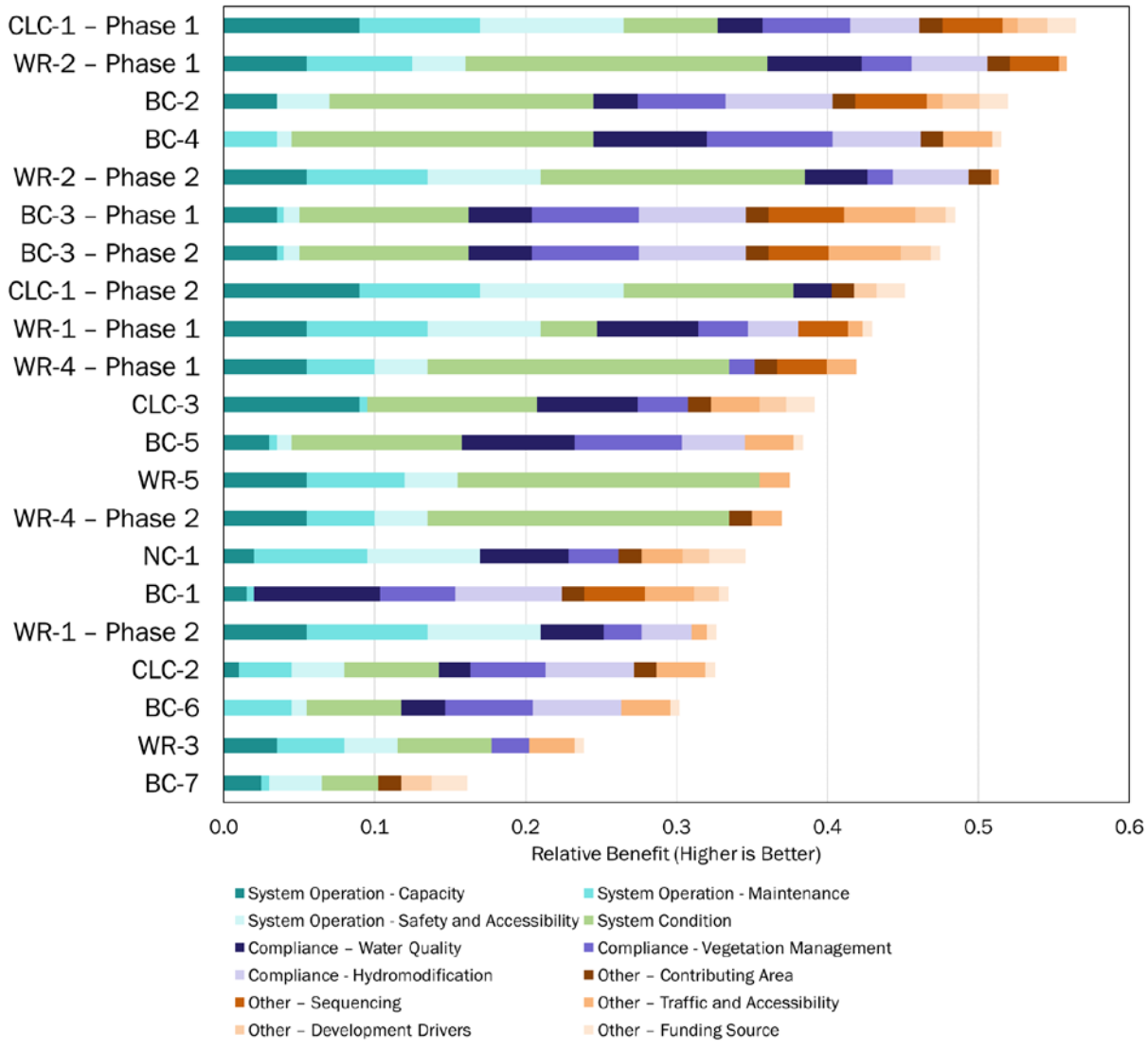

Figure 7-3: Prioritization Results

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7.6 Policy Recommendations

The following policy recommendations pertaining to the implementation of this SMP and associated CIP have been referenced in this SMP and are summarized for City consideration:

7.6.1 Stormwater Design Standards Applicable to Town Center

As described in Section 6.3.4, utilization of the Library Pond to mitigate stormwater treatment and flow control for Town Center redevelopment requires a site-specific stormwater design standard applicable to the Town Center property.

The City will need to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment. Onsite treatment and flow control will need to be provided for 50% of the redeveloped property (both private and public ROW).

7.6.2 Comprehensive Plan Updates

As summarized in Section 2.7, the City of Wilsonville Comprehensive Plan was reviewed with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit to ensure it is current and reflective of continued compliance.

A detailed summary of proposed modifications to the Comprehensive Plan are provided in Appendix H.

7.6.3 Design Standards for New Development and Growth Areas

Capacity-related CPs are sized in accordance with future growth and development, both within the city limits and outside city limits to the extent future zoning is established. Most area subject to new development will be within the City's jurisdiction and subject to the city's stormwater design standards that mimic pre-development flow conditions and require the use of infiltration-based facilities to the maximum extent feasible.

Site constraints occasionally prevented CP design to adhere to the City's design criteria, and in a few cases, flooding or system surcharge is still anticipated with implementation of CPs. Implementation of the City's stormwater design standards help ensure maximum capacity in the downstream stormwater collection system.

There are a few key locations in the City where future development outside of the city limits will be subject to another jurisdictions stormwater design standards (i.e., CP CLC-1: Day Road Stormwater Improvements). Establishing consistent stormwater design standards and design metrics for key Planning Areas (Coffee Creek Industrial Planning Area, Basalt Creek Planning Area) that encompass neighboring jurisdictions including Clean Water Services and the City of Tualatin is recommended to ensure that onsite retention and flow mitigation are applied to these new development areas. This mitigation should mimic pre-development site conditions to reduce the risk of downstream capacity and hydromodification impacts, as well as preserve water quality.

7.6.4 Stormwater Facility Tracking and Maintenance for Private Facilities

The City's GIS inventory of stormwater treatment and detention facilities is currently being updated to include consistent facility naming conventions (i.e., swales, raingardens, detention ponds) and inclusion of ownership information (specific to private facilities). Such updates will allow better integration between mapping and asset management, as well as allow geographic tracking of maintenance activities and responsibilities.

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The City's Stormwater Operations and Maintenance Plan is required for newly installed private facilities to ensure that the owners recognize responsibility for inspections and maintenance of their private stormwater facilities. The Stormwater Operations and Maintenance Plan requirements went into effect in 2012 and require submittal of an Annual Inspection and Maintenance Report by May 1 each year. The City conducts private facility inspections annually, targeting facilities that did not return an Annual Inspection and Maintenance Report.

In conjunction with the identification of problem areas and Project Opportunity Areas, private facilities are routinely observed to have deficient system maintenance, due to inconsistent and infrequent maintenance. In cases where the private facility is not being maintained and functionality is compromised, the City may consider a policy to reassign maintenance responsibility for existing private stormwater facilities and conduct maintenance in accordance with public facility maintenance protocols and schedules, subject to reimbursement by the private facility owner. Implementation of this proposed policy is supported through P-5: Stormwater Facility Enhanced Maintenance Program.

7.7 Next Steps

Following adoption of this Plan, a financial analysis will be required to evaluate the City's current stormwater utility rate and SDCs to ensure adequate funding is available for implementation of CPs and programs outlined in this SMP. The resulting financial plan will provide a funding structure in accordance with the defined LOS that allows the City to implement the CPs and programs as costed and scheduled in this SMP while meeting other financial obligations and policy objectives.

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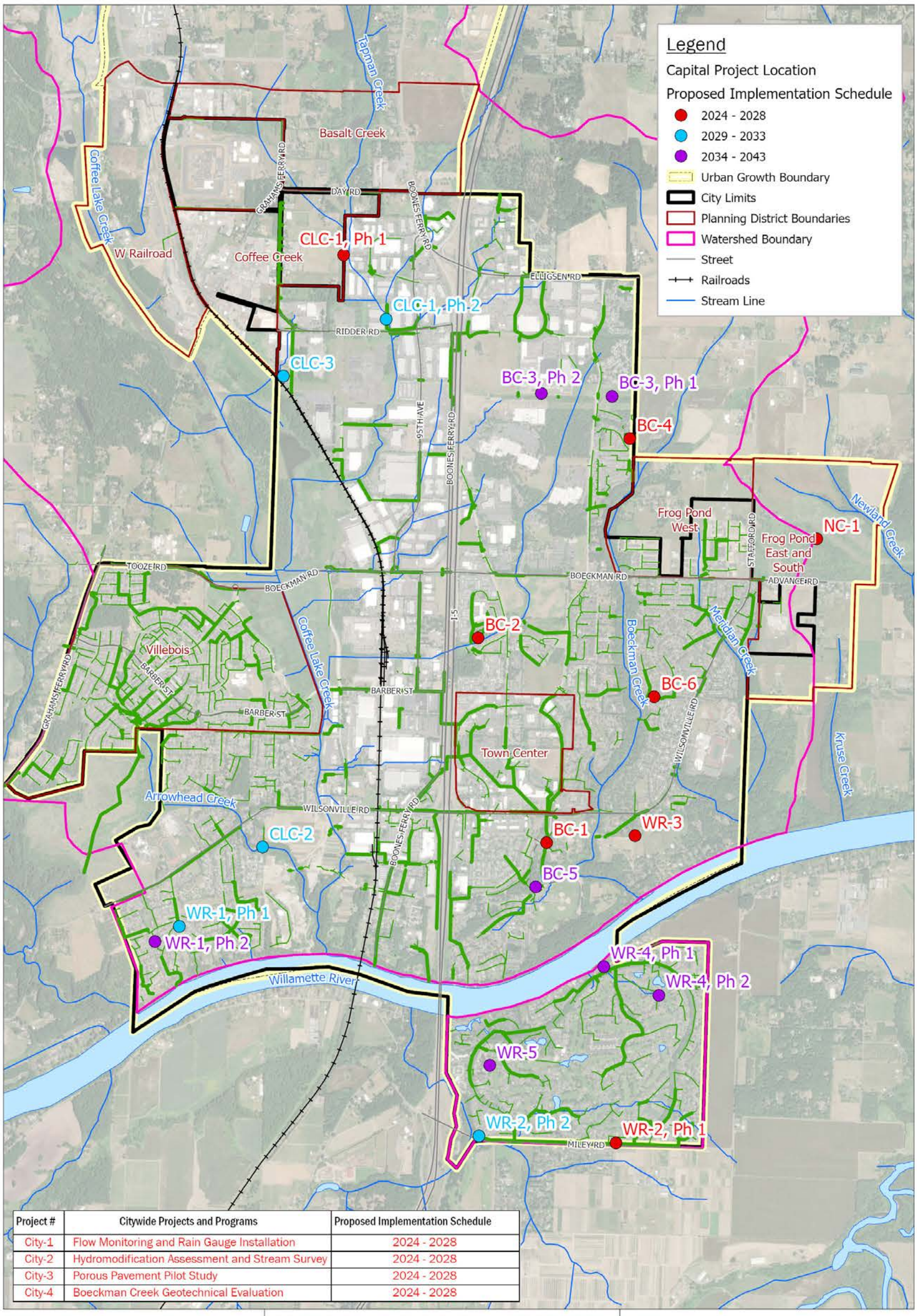

Project #	Citywide Projects and Programs	Proposed Implementation Schedule
City-1	Flow Monitoring and Rain Gauge Installation	2024 - 2028
City-2	Hydromodification Assessment and Stream Survey	2024 - 2028
City-3	Porous Pavement Pilot Study	2024 - 2028
City-4	Boeckman Creek Geotechnical Evaluation	2024 - 2028

Note: Planning Projects City-1 to City-4 and Programs P-1 to P-6 are all city-wide and not specific to a location. Programs P-1 to P-6 assume annualized funding.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N
0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 7-1: Capital Improvement Projects Prioritization

Section 8

Limitations

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

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Appendices

Appendix A: Project Planning Matrices
Appendix B: TM #3: Stormwater Modeling Methods, Assumptions, and Results
Appendix C: TM #2: Stream Assessment
Appendix D: Capital Project Fact Sheets
Appendix E: Capital Project Cost Estimates
Appendix F: Library Pond Analysis
Appendix G: Staffing Evaluation
Appendix H: Comprehensive Plan Review

Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix
Table A-2: Project Opportunity Matrix

Appendix B: TM #3: Stormwater Modeling Methods, Assumptions, and Results

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

Appendix E: Capital Project Cost Estimates

Appendix F: Library Pond Analysis

Appendix G: Staffing Evaluation

Appendix H: Comprehensive Plan Review

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Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix
Table A-2: Project Opportunity Matrix

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Public Works Community Development	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass easement area under the power line and to the river. The design (location) is flawed and the water flows into the yard of the homes that back up against the easement, requiring sandbags to redirect flow.	R/R		Y	Recent outfall projects on Belknap and Morey Lane. AKS study (2017) indicated current pipe size is not sufficient to redirect flow into pipe to SW Belnap Ct outfall. AKS study identified alternatives. Meetings have occurred with BPA related to locating a pond.	Any pond option on the BPA easement would require coordination and adequate BPA utility access. There is a high-pressured fuel line running N-S on the E edge of the easement that would need to be avoided. Infiltration rates anticipated to be high. Project development considerations: Need to understand infiltration rates for pond/gsi feasibility. Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. Both pond/GSI and pipe upsizing in one project unlikely System modeling would be needed to assess flows and size detention.	Y	N	Y*	N
2	Frog Pond ditch and culvert under Boeckman Rd.	Public Works	Ongoing flooding issue at 6920 SW Boeckman Rd. House - foundation is only 2-3 in. higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R		Y	Area has presented an ongoing issue. Model extension is needed.	Existing culvert along Boeckman Road is directed toward the homeowner's garage, where peak flows come very close to the foundation. Project development considerations: Project needed to right size the culvert underneath Boeckman Rd (currently not in the model). A box culvert may be easier to maintain. Pipe the drainage along Boeckman Road beyond the property owner's house where the channel has additional vertical drop. Projects may be implemented as part of the Boeckman Road improvements	Y	Secondary	Y*	N
3	Pond F	Public Works	Possible design flaw and blockages impeding flow; potential maintenance issue.	R/R	MAINT	N		Not visited but discussed with PW staff. Pond is already included in model but scheduled for reconfiguration.	N	N	TBD	TBD
4	Library Pond	Public Works Community Development	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP		Y	City wants to include Library Pond expansion in fee in lieu program for Town Center redevelopment. Current configuration/ contributing drainage area in model overestimates flow contribution. Model updates needed to more accurately reflect existing drainage area to pond.	Flow from the pond is a ditch inlet that requires maintenance to keep clear from vegetation and debris (currently there is a temporary fence installed for this purpose). Project development considerations: Phase 1: retrofit the pond outlet structure to include an emergency overflow for consistency with current standard pond details. Clear vegetation and debris. Phase 2: construct flow control structure per standard details and pond outlet structure to accommodate per future growth. Include a dedicated maintenance access path. No as-builts/drainage report available to confirm existing stage-storage. Model updates required to refine the current contributing drainage area (hydrology) and evaluate capacity.	N	Primary	Y*	N

[1] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[2] Stream assessment locations identified as priority or secondary.
[3] Priority project location identified with a *

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
5	Memorial Lift Station - current location	Public Works	Ditch behind lift station occasionally overflows during heavy precipitation.	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
6	Regional Parks 7 & 8; SW Coffee Lake Dr. Level Spreader	Public Works	Level spreader does not drain properly causing erosion issues	MAINT	E&S	N	Appears to be an operational issue only.	Not visited.	N	N	N	N
7	SW Montgomery Way	Public Works Community Development 2012 SMP	Channel and culvert issues are causing flooding. Future development (PDR1) is anticipated upstream of problem area.	CAP		N	City staff have not reported recent flooding issues here and don't consider it a project need any longer. 2012 MP identified a CIP (WD-1) for this location. Limited GIS information available to conduct modeling. City staff have not reported recent flooding issues here and don't consider it a project need any longer.	Not visited.	N	N	N	N
8	Commerce Circle near Delta Logics parking lot	Public Works Community Development	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	Contributing drainage area to pipeline is unclear.	Improperly abandoned storm line is not shown in the GIS. Pipe is on private property north of the street. Project/ program development considerations: Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. Current sink hole is causing a safety concern. Additional as-built research is needed to identify lateral connections to the abandoned pipe.	N	N	N	Y
9	Miley Rd sinkhole	Public Works 2012 SMP	Collapsed mainline due to age and pipe corrosion has caused a sinkhole. Remaining pipe is failing and needs replacement.	R/R		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents.	Not visited.	N	N	Y	TBD
10	Miley Rd outfall	Public Works 2012 SMP	Significant scouring into jurisdictional wetland.	E&S		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents. Erosion issues are entering a jurisdictional wetland and thus replacement is beyond scope for maintenance.	Not visited.	N	N	Y*	N

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Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
11	Town Center Loop near Les Schwab Tire Shop	Public Works Community Development	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Town Center redevelopment will impact high flow bypass for flows towards Library Pond.	CAP		Y	In 2015, ODOT installed a reducer on the 18" pipe that outfalls west before entering ODOT culvert under I-5.	ODOT reducer (12" as verified by PW 10-11-21) limits the existing 18" pipe that outfalls west to the ODOT culvert underneath I-5. Town Center redevelopment will remove the high flow bypass that currently sends flow south towards Library Pond. PW has observed flooding along Town Center Loop W via the CBs that tie into this current high flow bypass line. Project development considerations: **Model development needed to determine when it floods, and project need for existing conditions.** **Future conditions will be driven by adherence to Town Center plan.**	Y	N	Y	N
12	Rose Ln culvert	Public Works Community Development 2012 SMP	Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	City has implemented programmatic activities to resolve the issues but is still a problem. **2012 MP identified a CIP (WD-2) for this location.** **Limited GIS information available to conduct modeling.** Boeckman Road project may inform need.	Culvert underneath Rose Lane floods as vegetation on the upstream side blocks flow and drainage overtops the road and floods the neighbor's yard/garage on the downstream side. Drainage patterns here take several hard turns and is very flat. Project development considerations: **Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field.**	N	N	Y	N
13	SW Parkway Ave south of Costco	Public Works	N-S drainage swale south of Parkway has filled with sediment, surcharging the roadway drainage system, and resulting in ongoing maintenance. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	MAINT	CAP	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. **Location is already included in hydraulic model extents.**	Sysco ditch experiences high sedimentation rates due to minimal grade for the first section of the ditch. Sysco has plans to develop the lot to the west of the ditch, but timeline for this is unknown. Project development considerations: **Since this is a complicated issue (Sysco owns ditch but receives drainage from others both public/private), City may install WQ manhole (s) to remove sediments from public runoff. This would isolate any additional sediment accumulated in Sysco ditch to private sources.** **Hydraulic model review is needed to confirm long stream profile for potential improvement opportunities.** **Public works confirmed 36" pipe from Costco to 40" pipe to Sysco ditch (may attribute to Costco backwater).**	N	N	TBD	TBD
14	Culvert south of Day Rd.	Public Works	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #15/26.	R/R		Y	Location is already included in hydraulic model extents. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	Y	Secondary	Y*	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
15	South of Day Road ponds near power lines behind businesses	Public Works 2012 SMP	Without brush clearing, the ponds south of Day Road back up and flow onto the road. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #14/26.	MAINT		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-1) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	Area studied as part of AKS Coffee Creek Facility Study. Effort worked to identify infrastructure needs and alternatives). The 2012 MP also included several capital projects to address these issues. Project development considerations: AKS study did not directly incorporate survey into existing condition model (extra effort required to incorporate survey independently into the hydraulic model). AKS study does not alleviate flooding.	Y	Secondary	TBD	TBD
16	95th Ave north of Hillman Rd.	Public Works	Crushed storm pipe found during CCTV inspection.	R/R		N	Location is already included in hydraulic model extents. Per City (10-1-21), replacement being completed as CIP #7062 95th Avenue Storm Line Repair. North repair is replacement of 120 LF of existing 24" CMP with 24" PVC (Carte ID 2335). South Repair is replacement of 44 LF of 15" CMP with 15" PVC (Carte ID 2337).	Not visited.	N	N	N	N
17	Mont Blanc in Villebois	Public Works	Tree planted in front of inlet blocking drainage into swale	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
18	Memorial Park drainage area behind the barn	Public Works	Same drainage ditch that causes issues with Memorial lift station (see Location ID5).	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
19	NW intersection of Elligsen Road and SW Parkway Ave near 76 gas station	Public Works External Survey	During heavy precipitation the CB backs up and floods the road at the corner	CAP		N	Additional CBs were installed with roadway improvements at low points and has alleviated flooding issue.	Visited surrounding property area and confirmed no issue.	N	N	N	N
20	NE corner of Elligsen Road and SW Parkway Center	Public Works	Sediment from the agriculture area north of Elligsen Road impacts Pheasant Ridge RV Park detention pond.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
21	NW corner of Graham Oaks parking lot	Public Works	Erosion around outfall sends debris into creek.	E&S		N	Outfall included in model for capacity only, does not evaluate erosion. Public Works filled with CDF and is continuing to monitor for erosion.	Not visited.	N	N	N	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
22	Converted bubbler River Fox Park & SW Preakness	Parks Department (via) Public Works	Piped collection system is outside of the ROW and pipe diameter is reduced. Leaf debris affects the manhole in front of 11591 SW Preakness limits flow to mainline to Willamette Way East causing flooding. "Bubbler" manhole at fenceline acts like a sump.	MAINT	CAP	Y	Manhole (Cartograph # 57) surcharges and water exits the system, overflowing to inlet Cart #1240. Issue is capacity and whether the manhole should be redesigned to actually be a bubbler and not a surcharged manhole.	Complicated SW configuration. Pipe size changes from 24" to 18" to 12". Based on conversations with the property owner at 11242 SW Champoeg Dr (adjacent to inlet grate in SW corner of park) no flooding occurs here. Project development considerations: May consider installation of a pipe to directly tie runoff that is coming from Preakness Dr. into the MH at the end of Champoeg Dr. Following site visit, PW confirmed with Parks that this is nonissue. Clearing grates of any leaf debris addresses the issue. Future CCTV at this location may be warranted to confirm configuration.	N	N	N	N
23	Cul-de-sacs west of Serenity Way	Public Works	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul-de-sac.	Not visited but confirmed that additional inlets can be included in a programmatic effort.	N	N	N	Y
24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Public Works	Recurring flooding at catchbasins occurs after cleaning.	CAP	MAINT	Still Needed	Location is already included in hydraulic model extents.	Not visited.	N	N	TBD	TBD
25	SW Salish Ln at intersection with Parkway Ave	Public Works	Undersized catch basins cause flooding (ponding in SE corner by pond).	CAP		Y	Location is already included in hydraulic model extents, but with limited detail. As-builts provided from City reflect drainage ditches but no cross sections for ditches.	City pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Project development considerations: Need improved access (for a vactor truck) to the WQ MH and pond maintenance (like Library Pond). Access should be from the Shrine Center parking lot. Refinement of the model extents not needed.	N	N	Y	TBD
26	Day Rd culvert at Tapman Creek near PGE substation	Public Works	Undersized culvert over capacity causing flooding. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Areas #14/15.	CAP		Y	Location is already included in hydraulic model extents. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	N	Secondary	Y*	N
27	Storm basin SW Iron Horse St & SW Willow Creek Dr	Public Works	Reoccurring maintenance issues causing flooding; mix of private and City maintained structures	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
28	SW Advance Rd btwn Stafford Rd & SW 63rd Ave	Public Works	Outfall blockage issues caused by vegetation. City cannot access to fix	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
29	SW Daybreak St & SW Morningside Ave	Public Works	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond	CAP		N	Renaissance Pond is included in existing hydraulic model. City confirmed configuration and pond outlet to west.	Not visited.	N	N	TBD	N
30	Sysco drainage ditch south of Parkway Ave	Public Works Community Development	Historical flooding issues; can no longer be accessed due to newly constructed fence. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	CAP	MAINT	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. Location is already included in hydraulic model extents.	See Problem #13. Same issue.	N	N	Y	TBD
31	Off Canyon Creek Road; catch basin in a residential backyard	Public Works	When farmer plows the field east of area debris enters catch basin and causes backups.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
32	Drainage ditch west & south of Delta Logistics	Public Works 2012 SMP	Overflow floods parking lot/channel conveyance issues. Related to Problem Area#15.	CAP		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-3) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15. Same issue.	Y	Secondary	Y*	N
33	Elligsen Rd and Parkway Center Dr near Jeep Dealership	Public Works	Bubbler does not operate as designed; runoff goes over road.	R/R		N	Bubbler location is mapped incorrectly (located on SW Canyon Creek Rd near Burns Way). Issue deemed to be not significant by COW staff.	Not visited.	N	N	N	N
34	95th Ave at Grace Chapel	Public Works Community Development	Outfall blockage in ODOT right of way.	MAINT		N	Appears to be an operational issue requiring coordination with ODOT.	Not visited.	N	N	N	N
35	Culverts under I-5	Public Works	End of design life and need to be replaced (already modeled). Various locations along Parkway Ave & Boones Ferry Rd.	R/R		Still Needed	Locations already included in hydraulic model extents. Requires coordination with ODOT.	Not visited.	N	N	TBD	TBD

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
36	Culverts under Jobsey Ln. and Arrowhead Creek	Public Works 2012 SMP	Damaged and old culverts (already modeled), need to be replaced	R/R		Y	Locations already included in hydraulic model extents. 2012 MP identified a CIP (CLC-9) for this location.	Not visited.	N	N	Y	TBD
37	Boeckman Creek N of Colvin Ln.	Public Works	Erosion of streambank and migrating channel.	E&S		N	Potential stream survey evaluation area	Not visited.	N	Primary	Y	N
38	Villebois neighborhoods	Public Works	Ponding issues in front of mailboxes.	R/R		N	Staff is unaware of any ponding in this area. Existing modeling extents are adequate.	Not visited.	N	N	N	N
39	Villebois neighborhood	Public Works	Concerns about the various detention ponds and whether they are being maintained appropriately. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issues.	MAINT		Still Needed	HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the City maintains the inlets and outlets. Grahams Ferry Pond has some design issues associated with the WQ manhole and adjacent inlets. Tooze Pond needs to be added to the hydraulic model (need stage-storage curve).	Not visited but discussed with PW. Pond maintenance is an ongoing issue. Recommend dedicated program to address and review of SOPs.	Y	N	TBD	Y
40	Citywide	Public Works	1996 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
41	Citywide	Public Works	2006 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
42	Citywide	Public Works	2015 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
43	Town Center Loop W - Shari's	External Survey	Drainage issues -Shari's parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
44	Town Center Loop W - Starbucks	External Survey	Drainage issues -Starbucks parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
45	Coffee Creek	External Survey	Lots of trash within creek at various locations (especially at choke points).	MAINT		N	Locations already included in hydraulic model extents, but need to verify configuration.	Not visited but location discussed with PW. Modeling refinements to incorporate the 30" and 36" lines from the Coca Cola Pond, starting at Seely Road to Coffee Creek.	Y	N	N	N
46	29851/29840 SW Camelot St	External Survey	Flooding from storm drain street grate. Grate clogs with debris .	MAINT		N	Appears to be an operational issue.		N	N	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
1	1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Willamette River	Staff Surveys	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass area within the BPA power line easement and to the river. 2012 AKS study identified deficient pipe capacity, preventing flow from reaching SWM Belknap Court outfall. Water flows into yards adjacent to the easement, requiring sandbags to redirect flow.	R/R	WQ	Y	Y	Y	N	Y	• Project area is adjacent to high pressure fuel line. • Project will require continued coordination with BPA to locate water quality facility and maintain utility access. • Need to understand infiltration rates for retention/GSI feasibility. • Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. • GSI and pipe upsizing in one project unlikely	Y- WR-1, Phase 1 and 2	--	--	--
2	2	Frog Pond ditch and culvert under Boeckman Rd.	Meridian Creek	Staff Surveys H&H Model	Ongoing flooding issue at 6920 SW Boeckman Rd. Culvert along Boeckman Road directs flows toward an existing garage. The foundation is only 2-3 inches higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R	CAP	Y	Y	Y	Y	N	• Project Fact Sheet and Cost Estimate prepared March 2022. • Project currently in design as part of the Boeckman Road improvements • Piped drainage system extended along Boeckman Road beyond the existing house, where the channel has additional vertical drop.	N	N	N	N
3	3, 39	Pond F and other ponds in Villebois	Coffee Lake Creek	Staff Surveys	Concerns whether various private detention ponds are being maintained appropriately. HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the city maintains the inlets and outlets. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issue.	R/R	MAINT	Y	Y, except for Grahams Ferry Pond	N	N	Y	• H/H model updated to include relevant facilities. • Active maintenance implemented by HOA. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement. • Per City (6/9/23) – Pond F swales above the level spreader have been cleaned out and are no longer causing issues.	N	N	Y- P-6	Y
4*	4	Library Pond	Boeckman Creek	Staff Surveys Retrofit Analysis H&H Model	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP	WQ	Y	Y	Y	N	Y	• Primary objective is to accommodate redevelopment of the Town Center; secondary is to accommodate Boeckman mitigation needs. • As-builts (stage-storage) incorporated into H&H evaluation.	Y – BC-1	--	--	Y

N/A = Not Applicable
Project Opportunities in gray have been removed from consideration for further project development.
[1] Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.
[2] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[3] Stream assessment locations identified as priority or secondary.
[4] Costed Project needs = Y were confirmed with City during on 3-15-23 and require a conceptual design, fact sheet and cost estimate. Unfunded Project needs will be documented in the SMP but will not have a conceptual design or cost associated. The resulting Project ID is listed for reference.
[5] Project Opportunity Locations affiliated with the Boeckman Road mitigation efforts are indicated with a *.

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					Ongoing challenges with debris removal at existing ditch inlet (which serves as outlet from pond). City has considered expanding the pond as part of the fee in lieu program for Town Center redevelopment.								• BC to document findings specific to future policy requirements and cost improvements to the pond to adhere to current design criteria. • Policy recommendation –Require portions of redevelopment to install onsite treatment and flow control to ensure capacity in Library Pond as a fee-in-lieu opportunity.				
5	9, 10	Miley Rd sinkhole and outfall	Charbonneau	Staff Surveys 2012 SMP H&H Model	2012 MP CIP SD9000 to SD9069. Collapsed mainline due to age and pipe corrosion has caused a sinkhole at eastern edge of pipe alignment. Challenge is exacerbated by steep slopes. Remaining pipe along Miley Rd. is failing and needs replacement. Significant scouring into jurisdictional wetland. Upstream capacity deficiencies indicated by H/H modeling (preliminary flooding location #1).	R/R	CAP	Y	Y	Y	N	N	• Steep slopes will require geotechnical evaluation. • Erosion issues are entering the jurisdictional wetland, and beyond the scope of maintenance actions, such as adding riprap to dissipate energy at the outfall. • Upstream end is collapsed (replacement in kind) and upsizing with outfall. Alignment is under private retaining wall. • Modeled capacity deficiencies at the upstream portion of the alignment (due to hydrologic inputs)	Y – WR-2, Phase 1 and 2	--	--	--
6	11	Town Center Loop near Les Schwab Tire Shop	Boeckman Creek	Staff Surveys	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Existing reducer (12” control on 18” pipe) was installed in 2015 to limit flow toward ODOT culvert under I-5. Restriction contributes to upstream problems through Town Center Loop. Town Center redevelopment will remove the high flow bypass for flows towards Library Pond.	CAP		Y	Y	N	N	N	• Model does not reflect flooding in this location. • Future conditions will be driven by adherence to Town Center Plan. • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
7	12	Rose Ln culvert	Willamette River	Staff Surveys 2012 SMP	2012 MP identified a CIP WD-2 for this location. Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage pattern is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	N	N/A	N	N	• Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field. • Consider opportunity to construct project in conjunction with future upstream development (PDR1). • Discussion during 3-15 Wksp confirmed historic project need requiring cost estimate.	Y – WR-3	--	--	--
8	13, 30	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	N-S drainage swale south of Parkway has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	Y	Y	N	Y	• Public works confirmed 36” pipe from Costco to 40” pipe to Sysco ditch (may attribute to Costco backwater). • Sysco intends to expand its footprint at this location, so private development may alleviate immediate open channel issue.	N	Y	Y-P-1	--

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					Ditch is owned and maintained by private owner (Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch.								• Future Project/ Program Recommendation - City may install WQ manhole(s) or other facilities to remove sediments from public runoff (Localized Drainage Improvements Program or Green Street/LID Retrofit). This would isolate any additional sediment accumulated in the ditch to private sources (could be done as part of a program activity).				
9	14, 15, 26, 32	Open channel system from Day Rd. to Ridder Rd	Coffee Lake Creek	Staff Surveys 2012 SMP H&H Model	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Existing AKS design does not fully alleviate modeled flooding.	R/R		Y	Y	Y	N	Y	• AKS Coffee Creek system evaluation included additional survey that was incorporated into model as part of validation efforts. AKS evaluation did not include impoundment (incorporated into BC model) or updated hydrology. • Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement. • Discussion during 3-15 Wksp indicated purchasing the adjacent (to the west) parcel for installation of the detention pond (AKS concept) is complicated by access road issues. • BC to confirm feasibility of improvements and 100-year WSE with respect to adjacent structures. City to confirm what level of future flooding is acceptable. • Policy recommendation – May be required to limit/ confirm adherence to City stormwater standards upstream (north) of Day Rd and establish similar standards for Tualatin discharge. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs.	Y – CLC-1, Phase 1 and 2 and City-1	--	Y-P-5	Y
10	24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Coffee Lake Creek	Staff Surveys	Recurring flooding at catch basins occurs even after cleaning.	CAP	MAINT	N	Y	N	N	Y	• Reconstruction is occurring so this may not be a pressing issue; future deficiencies to be addressed as part of a program (Localized Drainage Improvements Program)	N	N	Y-P-1	N
11	25	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	Undersized catch basins cause flooding (ponding in SE corner by pond). A city-owned pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Model predicts flooding within the pond and outlet. Pond configuration is based on original model build from 2012 SMP (preliminary flooding location #10).	CAP		Y	Y	Y	N	N	• Need improved access for a vactor truck to access the WQ MH and pond for maintenance. Access should be from the Shrine Center parking lot. • Refinement of the model extents or pond configuration determined to not be needed. • Program Recommendation - Localized Drainage Improvements Program or Green Street/LID Retrofit.	N	Y	Y-P-1	N

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													• Other option would be documentation of an unfunded project for maintenance enhancement.				
12*	29	SW Daybreak St & SW Morningside Ave	Coffee Lake Creek	Staff Surveys	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond. Opportunity to improve water quality treatment through retrofit and reconfiguration of existing pond property.	CAP		Y	N	N	N	Y	• Possible pond retrofit to increase storage capacity and improve water quality treatment. • Location is also affiliated with Boeckman Road mitigation alternative locations and Ash Meadows (Project Opportunity Location #26), but not a prioritized location. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	N	Y- P-6	Y
13	35	Culverts under I-5	Coffee Lake Creek	Staff Surveys H/H Model	End of design life and need to be replaced. Various locations along Parkway Ave & Boones Ferry Rd (crossings from E-W).	R/R		N	Y	Y	N	N	• Project may be referred to ODOT; not one that the City would initiate. • Locations already included in hyd. model.	N	N	N	N
14	36	Culverts under Jobsey Ln. and Arrowhead Creek	Coffee Lake Creek	2012 SMP Stream Assessment	2012 MP identified CIP CLC-9 for this location. Damaged and old culverts (already modeled), need to be replaced	R/R	E&S	Y	Y	N	Y	N	• Locations already included in hydraulic model. • Combine with Project Opportunity #20.	Y – CLC-2	--	N	N
15	37	Boeckman Creek N of Colvin Ln.	Boeckman Creek	Staff Surveys 2012 SMP	2012 MP identified BC-8 (Canyon Creeks Estate Pipe Removal) for this location. Erosion of streambank and migrating channel reported in downstream portion of the project site.	E&S	WQ	Y	Y	N	N	N	• Consider more detailed stream survey evaluation to understand channel constraints and extents of potential planting. • Per meeting on 3-8, City confirmed ongoing issue. Refer to 2012 SMP.	Y – BC-4	--	N	N
16	43, 44	Town Center Loop W - Shari's and Starbucks	Boeckman Creek	External Survey	Drainage issues - Shari's and Starbucks parking lot (down the road from each other).	CAP		N	Y	N	N	TBD	• May be localized ponding addressed with addition of inlets (programmatic). • This issue was identified to be addressed through the Town Center Plan (2019). • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
17		Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Significant risk of continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River. Several properties have experienced bank failures and loss of land, and an active	E&S		Y	Y	N	Y	Y	• Consider upstream opportunities to reconnect floodplain, allow high flows to expand laterally, and dissipate channel energy. • Boeckman Road mitigation efforts (in progress) include evaluation of the tributary channel to the	Y- City-4	Possible	N	N

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					landslide is impacting the backyard and deck of one of the properties.								main reach of Boeckman and potential modification to increase upstream retention. • Per 3-15 Wksp, efforts may include stabilizing the channel and apply grade control; geotechnical investigation; retaining/ crib wall or soldier pile. • June 2023 – Per City - location to part of ongoing monitoring project (planning project need)				
18		Meridian Creek in Landover Park - Reach 1 (US of Wilsonville Rd.)	Meridian Creek	Stream Assessment	Sediment-clogged culvert (30-inch) at the Meridian Creek Crossing at Wilsonville Road. Culvert is mostly obstructed and appears to cause ponding during storm runoff.	MAINT	E&S	Y	Y	N	Y	N	• Consider location of ponding and whether infrastructure is being impacted. • If ponding is isolated to park and not overtopping any roadways or impacting private property, then maybe this isn't a problem that needs to be fixed. It's effectively a detention pond. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
19		Meridian Creek in Landover Park - Reach 2 (DS of Willow Creek Dr.)	Meridian Creek	Stream Assessment	Culvert outlet at upstream end of reach is clogged and backs up water underneath Willow Creek Dr. PVC SW outfall along reach is undermined (STA 1,100) and 6-foot section has washed out and moved downstream.	MAINT	E&S	Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • Traffic impacts to Willow Creek Drive during culvert replacement. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y-City-2	N	Y-P-5	N
20		Arrowhead Creek at Pedestrian Bridge (Reach 4)	Coffee Lake Creek	Stream Assessment	Culvert at upstream end of reach (at pedestrian crossing) is failing and should be considered for replacement.	R/R		Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • See Project Opportunity #14.	Y – CLC-2	N	N	N
21*		Memorial Park (Swale Retrofit, Pipe Upsizing, and Mitigation)	Boeckman Creek	Retrofit Analysis H/H Model	Swale at Memorial Dr. is not draining properly. Potential concept is to extend swale all the way along the road or relocate to the base of hill. Modeling evaluation indicates that the pipe system after convergence point at Memorial Drive has a constriction resulting in backwater and upstream system flooding (preliminary flooding location #5).	MAINT	CAP	Y	Y	Y	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Location is also affiliated with Boeckman Road mitigation alternative location (raising of pedestrian trail to detain flow from entering Boeckman Creek). • Relocation of swale allows for offline facility construction. •	Y – BC-5	--	N	N
22		Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	6 swales haven't been maintained properly - 2 are City owned and 4 need to be retrofitted and taken over by City	MAINT	WQ	Y	N	N/A	N	Y	• Level spreaders aren't working well. • Opportunity to expand water quality treatment through retrofit of existing facility. • June 2023 – Per City – PW already fixed the swales. Instead, recommend unfunded project or program for restorative maintenance of facilities (especially private). Current PW staffing doesn't support private facility maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	Y-P-6	Y

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23*		Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	City staff have identified a former irrigation pond near this apartment complex adjacent to Boeckman Creek. This location may have potential to provide additional storage or provide mitigation measures. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	Y	N	N/A	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Boeckman Road mitigation efforts originally identified as a potential flow mitigation site but was not prioritized for alternative evaluation. • Will require private property partnership. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	N	Y
24*		Wiedeman Ditch/ Canyon Creek Park/BPA Easement	Boeckman Creek	Boeckman Road Mitigation Study 2012 SMP Retrofit Analysis	City staff identified potential project opportunity to construct a regional wetland or drainage facility at this location (would require BPA coordination). Facility would be able to manage runoff from Argyle Square, Sysco, and other future developments to help offset Boeckman Creek flows. This location is adjacent to previously identified erosion issues within Canyon Creek Estates (BC-8).	CAP	WQ	Y	N	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention through retrofit of existing facility. • Boeckman Road mitigation efforts evaluated storage capabilities in Wiedeman Ditch and Canyon Creek. This location is one of the preferred alternatives. • Will require coordination with BPA. • Potential mitigation opportunity for Sysco redevelopment (discussions in progress).	Y – BC-3, Phase 1 and 2	--	N	N
25*		Mentor Graphics/Siemens Ponds	Coffee Lake Creek	Boeckman Road Mitigation Study	Existing series of ponds located on Siemens property (8005 Boeckman Rd) currently only provide flow through storage. Ponds have potential to be modified to provide detention or reconfigured to divert less flow to Boeckman Creek during large storm events.	CAP		Y	Y	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention capacity through retrofit of existing facility. • Boeckman Road mitigation efforts included evaluation of potential bypass for low flow conditions and reroute from Boeckman to Coffee Creek watershed (in line with historic drainage patterns). See Project Opportunity #26. This location is one of the preferred alternatives.	Y – BC-2	--	N	N
26*		Mentor Graphics/Siemens Flow diversion structure and Ash Meadows Detention	Coffee Lake Creek	Boeckman Hydraulic Eval TM	Eliminate flow diversion structure on private property that diverts flows to Boeckman Creek during high flows (Project Opportunity Area 25). To account for additional flow returning to the Coffee Lake Creek drainage basin, utilize the Ash Meadows area to detain flows prior to entering the ODOT culvert underneath I-5. Utilize the volume of the natural depression near Ash Meadows to detain flows during large storm events.	CAP	WQ	Y	Y	N	N	N	• Boeckman Road mitigation efforts evaluated flow control potential at this location. This location is one of the preferred alternatives. • May require additional capital improvement projects downstream of Ash Meadows to ensure adequate conveyance capacity is available. • Will require coordination with ODOT.	Y – BC-2	--	N	N
27*		Boeckman Creek Instream flow mitigation and restoration	Boeckman Creek	Boeckman Hydraulic Eval TM	Within Boeckman Creek, several concepts have been identified to provide flow mitigation for projected increases in flow.	CAP	E&S	Y	Y	N	Y	Y	• Boeckman Road mitigation efforts indicated that instream improvements wouldn't provide the level of flow protection required.	Y- City-2	N	Y- P-5	N

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				Retrofit Analysis	Specific locations within Boeckman Creek have not been identified at this stage: • Beaver Analogs: Increase the depth and size of natural ponding within the creek. This would supplement the existing population of beavers and dams currently within Boeckman Creek. • Channel Improvements: Protect, harden, or slow flow in areas potentially impacted by the change in creek flows. May include the addition of large woody debris, large root wads, grade control structures or other appropriate measures to protect threatened stream banks."								• Program need - Instream restoration or vegetation enhancement. Project needs may stem from monitoring efforts.				
28		Charbonneau West - SW French Prairie Rd and SW Boones Bend Rd.	Charbonneau	2012 SMP	Stormwater system within the western portion of Charbonneau was identified in the 2012 SMP as a location that requires replacement	R/R	CAP	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • The 2012 SMP and subsequent Charbonneau Plan identified the piped infrastructure at this location in need of repair and replacement. • Per 3-15 Wksp, City confirmed need to cost out capital project for this area per the R/R Chabonneau Infrastructure Master Plan.	Y – WR-5	--	N	N
29		Charbonneau East- SW French Prairie Rd Outfall and SW Edgewater	Charbonneau	H/H Model 2012 SMP	Model predicts flooding at this outfall and along the SW Edgewater piped system. Predicted flooding along this system generally starts at the 10-yr design storm, while the most upstream pipe segments along SW Edgewater are predicted to start at the 2-yr design storm. Restriction is caused by undersized outfall (30") in comparison to upstream pipe segments (36"). This outfall pipe was replaced in 2018 during an emergency repair but was not upsized to 36" per the recommendation from the 2012 SMP.	CAP	R/R	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Wallis Engineering is currently designing the portion of the system on Edgewater that contributes to this outfall. Per City (11-2-22), no capital project needed for Edgewater component.	N	N	Y- P-4	N
30		Charbonneau East- SW French Prairie Rd and SW Old Farm Rd piped system	Charbonneau	2012 SMP	Model predicts flooding throughout these piped systems starting at the 2-yr design storm due to insufficient capacity at the outfall pipe (Project Opportunity #29). Flooding at this location could impact the residential properties within Charbonneau.	R/R	CAP	Y	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Alternatives evaluated include inline detention upstream along SW French Prairie Rd and/or SW Old Farm Rd and replacement of outfall. Due to space limitations a detention pipe within the roadway cannot provide adequate flow control. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs. • City to confirm how much modeled flooding is acceptable.	Y – WR-4, Phase 1 and 2 and City-1	--	N	N

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31		Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding at several nodes along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		N	Y	Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Per 3-15 Wksp, PW Ops confirmed no immediate project need.	N	Y	N	N
32		Garden Acres Rd./Peters Rd.	Coffee Lake Creek	H/H Model Retrofit Analysis	Model predicts flooding along N-S piped system along Garden Acres that crosses the RR tracks and outfalls to Coffee Creek wetlands. Model flooding starts at the 2-yr design storm. City concern with obtaining easement/ coordinating with railroad to upsize pipe. Flooding at this location during the 2-yr design storm is concerning as in the future the contributing drainage area will further develop which will exacerbate this issue.	CAP		Y	Y	Y	N	TBD	• Prior to outfall, there are several smaller size pipe constraints constricting flow and causing surcharge. • As-builts were received for the existing ponds (two private, one public) located near the outfall (at the location of several small diameter pipes) of the Garden Acres Rd./Peters Rd. piped system. • Potential pipe rerouting and new outfall was evaluated to divert flow away from the undersized storm piping along Peters Rd. and towards a separate outfall to Coffee Creek. Per meeting 3-29, not a preferred option because would require new outfall. • Expanded pond to help mitigate flow downstream.	Y – CLC-3	--	N	N
33		Boberg Rd. and RR crossing	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding along N-S pipe prior to discharging into open channel starting at the 2-yr design storm. Predicted flooding also at two large diameter culverts flowing E-W underneath RR tracks. Flooding at this location could impact the industrial properties along Boberg Rd.	CAP		N	Y	Y	N	N	• May be addressed in conjunction with Opp Area #32.	---	N	N	N
34		Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		N	Y	Y	N	N	• Per H/H results, immediate project need is unlikely.	N	Y	N	N
35		Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along piping that conveys private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		N	Y	Y	N	Y	• Modeled flooding may be due in part to hydrology node placement. • Large parking lots in adjacent areas could be potential for retrofit with pervious pavements or stormwater planters for stormwater collection. • Will require coordination with private property owners. • Per Wksp 3-15, City is unaware of existing issue here.	N	Y	N	N

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36	8	Commerce Circle near Delta Logics parking lot	Coffee Lake Creek	Staff Survey	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	N	--	N	N	• Discussion during Public Works during site visit concludes no project need. • Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. • Additional as-built research is needed to identify lateral connections and drainage area to the abandoned pipe. • Program Recommendation - Localized Drainage Improvements Program or Repair and Replacement.	N	N	Y-P-1	N
37	23	Cul-de-sacs west of Serenity Way	Coffee Lake Creek	Staff Survey	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	N	--	N	N	• Program Recommendation - Localized Drainage Improvements Program. Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul de sac.	N	N	Y-P-1	N
38	46	29851/29840 SW Camelot St	Coffee Lake Creek	External Survey	Flooding from storm drain street grate. Grate clogs with debris.	MAINT	WQ	N	N	--	N	N	• Appears to be an operational issue. • Program Recommendation - Localized Drainage Improvements Program.	N	N	Y-P-1	N
39		Green Streets/LID Facilities	N/A	Retrofit Analysis	Develop a program to install LID facilities in conjunction with planned roadway improvements. Potential locations as listed in the Retrofit Assessment include SW Camelot, SW Wilsonville Road, and SW Hillman.	R/R			N	--	N	Y	• Program Recommendation – Water Quality Retrofit Program.	N	N	Y-P-2	N
40		Porous Pavement Pilot Study	N/A	Retrofit Analysis	Evaluate feasibility of porous pavement for future paving projects.	R/R			N	--	N	Y	• Consider applicability as a planning project to do porous pavement overlays for water quality in conjunction with pavement restoration/ improvement needs.	Y-City-3	N	N	N
41		Gesellschaft Water Well Channel Restoration	Boeckman Creek	2012 SMP Retrofit Analysis	Erosion is occurring within the drainage channel that enters Boeckman Creek.	E&S		N	N	--	N	Y	• Determined to be a higher priority retrofit location per 2015 Retrofit Assessment. • Per Wksp 3-15, project per 2012 SMP needed for funding.	Y – BC-6	N	N	N
42		Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	N	N	--	N	Y	• Determined to be a low priority retrofit location per 2015 Retrofit Assessment. • Discussion needed during planning workshop to confirm that funded project is not warranted.	N	Y	N	N
43		Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		Y	N	--	N	Y	• Conveyance sizing is based on no onsite controls. • Library Pond analysis will be used to support onsite (private) collection system requirements. • Additional assets/ re-piping is development driven. No defined project need, pending redevelopment.	N	Y	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
44		Frog Pond E and S Conveyance Piping	Newland Creek	Community Development Frog Pond East and South Master Plan	Public stormwater collection pipe and outfall along SW 60th Ave. (>15" diameter) per Frog Pond Master Plan.	INFRA		N	N	--	Y	Y	• Frog Pond E and S Master Plan complete in December 2022. • Additional stream assessment conducted in October 2023 baselined receiving water characteristics. • SMP incorporates trunk line and outfall associated with proposed system along SW 60th.	Y – NC-1	--	N	N
45		SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
46		Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
47		River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N

Appendix B: TM#3: Stormwater Modeling Methods, Assumptions, and Results

Technical Memorandum: Hydrologic and Hydraulic Modeling Methodology and Results

Brown AND Caldwell

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Technical Memorandum

FINAL

Prepared for: City of Wilsonville

Project Title: Stormwater Master Plan

Project No.: 156157

Technical Memorandum #3

Subject: Hydrologic and Hydraulic Modeling Methodology and Results

Date: March 7, 2023 (Final)

To: Kerry Rappold, City of Wilsonville

From: Michael Glass, P.E.
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Limitations:

This document was prepared solely for Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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List of Abbreviations

BC	Brown and Caldwell
BRCP	Boeckman Road Corridor Project
CIP	capital improvement program
City	City of Wilsonville
CMP	corrugated metal pipe
COM	Commercial
CPs	capital projects
CWS	Clean Water Services
GIS	geographic information system
GOV	Government
HB	House Bill
H/H	hydrological and hydraulic
HGL	hydraulic grade line
IND	Industrial
INST	Institution
LID	low impact development
LIDAR	Light Detection and Ranging
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NRCS	National Resource Conservation Service
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
PVC	polyvinyl chloride
PWS	Public Works Stadards
RA	Rural Agriculture
RCP	reinforced concrete pipe
SMP	Stormwater Master Plan
TM	Technical Memorandum
TMDL	total maximum daily load
TSS	total suspended solids
UGB	urban growth boundary
VAC	Vacant

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Section 1: Introduction

The City of Wilsonville (City) is developing an updated Stormwater Master Plan (SMP) to improve the understanding of stormwater system characteristics and infrastructure in the city. The SMP will include a capital improvement program (CIP) reflecting prioritized capital projects (CPs) and programmatic activities to address conveyance, capacity, water quality, and natural resource enhancement for existing and future development.

To document efforts completed as part of the SMP update, a series of Technical Memorandums (TM) have been developed. Technical Memorandum #1 (TM#1): Stormwater Basis of Planning (2/18/22) documented data collection and compilation efforts, presents applicable regulatory and design criteria, identifies stormwater problem areas (informing hydrologic and hydraulic [H/H] model updates), as well as preliminary project and programmatic concepts. Technical Memorandum #2 (TM#2): Geomorphic Analysis (5/25/22) documented field stream assessments for select stream channels within the City and identifies areas for additional consideration as a capital project.

This Technical Memorandum #3 (TM#3) builds upon the previously completed TMs to document the methodology and results of the H/H model activities. Topics covered in TM#3 include:

- H/H model evaluation criteria.
- Hydrologic model updates, including development of revised input parameters.
- Hydraulic model updates and expansion efforts, including refinement of existing modeled elements and the inclusion of additional stormwater infrastructure.
- Model validation approach, objectives, and adjustments.
- H/H model results under applicable design storm events, including identification of capacity limitations to inform development of capital projects.
- Next steps, including the comprehensive summary of project opportunities to inform CP development.

Section 2: Design Storm and Model Evaluation Criteria

The City's 2012 SMP developed a city-wide H/H model using the Innovyze InfoSWMM model platform. BC reviewed the City's existing H/H model and initiated updates as described in Sections 2.2 and 5.4 of TM#1. In addition, Brown and Caldwell (BC) reviewed Section 3 of the City's Public Works Standards (PWS) to outline planning criteria and sizing/design criteria to assess the existing stormwater system for deficiencies. This review is detailed in Section 4 of TM#1.

Section 2.1 identifies design storms that will be simulated for the H/H model and how model results will be used to assess compliance with the Surface Water Design and Construction Standards outlined in Section 3 of the City's PWS, revised December 2015.

2.1 Design Storms

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service.

Design storms used for this study include the 2-, 10-, 25-, and 100-year, 24-hour recurrence interval events. The rainfall distribution for these design storms is based on the standard National Resource Conservation Service (NRCS) Type IA storm, which is applicable to western Oregon, Washington, and northwestern California. Table 1 lists the design storm rainfall depths used in the hydrology model, as listed in the City's PWS.

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Table 1. Design Storm Depths	
Design Storm Event	Rainfall Depth (inches)
2-year, 24-hour	2.5
10-year, 24-hour	3.45
25-year, 24-hour	3.9
100-year, 24-hour	4.5

2.2 Model Evaluation Criteria

Stormwater infrastructure within the H/H model will be evaluated for capacity per the design criteria established in the PWS. The PWS reflects design criteria for new infrastructure and will also be the basis for design of future CPs developed as part of this SMP. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.
  - For new culverts 18 inches in diameter or less, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed two times the pipe diameter or three times the pipe diameter with a seepage collar, unless an exception is approved by the City.
  - For new culverts larger than 18 inches in diameter, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed 1.5 times the pipe diameter, unless an exception is approved by the City Engineer.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation conducted in Section 7 identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding which consisted of locations where the HGL exceeded the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level. For capacity deficient locations where a CP is developed, recommended projects will follow the PWS to allow for the minimum of 1 foot of freeboard between the HGL and ground surface. For additional information on PWS design standards and criteria as it relates to this SMP, refer to TM#1 Section 4.

Section 3: Hydrologic Model Development

The hydrologic model developed for this SMP update utilizes InfoSWMM version 15.0 and the RUNOFF method, which is consistent with the original modeling approach for the 2012 SMP. The RUNOFF method is a simple yet well-established method for simulating subbasin hydrology that utilizes the Green-Ampt method for calculating infiltration.

The necessary parameters for the RUNOFF method when utilizing the Green-Ampt method for infiltration includes subbasin area, slope, width, impervious percentage, hydraulic conductivity, initial moisture deficit, and suction head. The hydrologic module in InfoSWMM converts rainfall into stormwater runoff based on design storm parameters (i.e., volume and intensity of rainfall) and the hydrologic input parameters listed above.

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This section includes detailed descriptions of the methodology used in determining each of the hydrology model input parameters to update the original model.

3.1 Subbasin Delineation

The total contributing drainage area to City owned stormwater infrastructure is approximately 8,728 acres and extends beyond both the City limits and the urban growth boundary (UGB) in some locations. This total contributing drainage area represents the study area for the SMP and is organized by watershed or major basin. The study area is further subdivided into subbasins as shown on Figure A-1 of Attachment A. The receiving water body for all watersheds is the Willamette River.

The City's 2012 SMP developed subbasin delineations within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and updated based on the following City provided information:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

From this revised subbasin delineation, ArcGIS Pro was used to calculate individual subbasin areas for use as a hydrologic input into the model. A summary of the subbasins by major basin is presented in Table 2. Please note Newland Creek (and its associated drainage area) is outside the designated study area and not included in Table 2.

Table 2. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau [a]	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

a. The Charbonneau basin discharges to the Willamette River (direct) but was classified as a separate major based due to its location south of the Willamette River versus north.

The largest basins within the study area are the Boeckman Creek and Coffee Creek/Tapman Creek watersheds. These watersheds represent over 80 percent of the contributing drainage area from which the City manages stormwater runoff.

Subbasin names throughout the watershed are consistent with those developed for the 2012 SMP. This naming convention includes a unique four-digit ID (e.g., 1100, etc.) to classify each individual subbasin. Per the 2012 SMP, deviations from this convention include several subbasins that are instead named in accordance with the detention facility they drain to (e.g., CANYON_N etc.).

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Modification to subbasin naming for this SMP update only occurred when the original subbasin delineations were subdivided to provide a greater level of hydrologic detail. Split basins use “A” or “B” in the suffix to the original subbasin ID for identification purposes.

3.2 Subbasin Slope and Width

The RUNOFF method requires both subbasins slope and width parameters which are a function of the revised subbasin delineation discussed in Section 3.1. To approximate these two physical parameters for modeling purposes, the subbasin slope was first calculated based on the longest flow path line within each individual subbasin. Flow path lines were generated for each subbasin in ArcGIS Pro using automated spatial processing tools. These tools approximate the flow path line as the straight-line distance between the highest and lowest elevation points (based on LIDAR) in the subbasin. The auto generated flow path lines for each subbasin were then reviewed, and manually adjusted as necessary to correct instances where the flow path lines did not appear to represent reality. Examples of this includes flow path lines that did not follow the existing topography or followed a path outside of the subbasin due to an oddly shaped catchment or other nonstandard configuration. Subbasin slope was then calculated based on the flow path line length and upstream and downstream elevations. Subbasin width was then calculated for each subbasin by dividing the subbasin area by the flow path line length.

3.3 Infiltration Conditions and Soils

Soil classification and infiltration are important characteristics to consider when developing and evaluating runoff flow rates and volumes for subbasins. Soil classifications within the study area were identified using the NRCS Soil Survey. Soil information is based upon 2020 soil survey data in Clackamas and Washington County, Oregon. Soil texture class information for the study area is presented on Figure A-2 of Attachment A.

There are multiple methods that can be used to simulate infiltration associated with each soil type. For this project, the Green Ampt method was selected which is consistent with the 2012 SMP approach. The Green Ampt method was used due to its ability to be applied City-wide and for its use of parameters that can be sourced from available soil data without the need for field work.

The Green Ampt method requires the following input parameters for each soil texture classification:

- Average Capillary Suction. A measure of the water transport through soils due to surface tension acting in soil pores.
- Initial Moisture Deficit. The fractional difference between soil porosity and actual moisture content.
- Saturated Hydraulic Conductivity. A physical parameter reflective of the rate at which water moves through saturated soil.

All input parameters for soil texture classifications were based on the reference values in Table 6-1 of the City’s 2012 SMP and confirmed against published literature values. These values have been reproduced as Table 3.

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Table 3. Soil Infiltration Parameters (Green Ampt Method)				
Soil Texture Class	Saturated Hydraulic Conductivity (inches/hour)	Initial Moisture Deficit (fraction)	Suction Head (inches)	Percent of Contributing Drainage Area (%)
Sand	4.74	0.41	1.93	0
Loamy Sand	1.18	0.39	2.40	0
Sandy Loam	0.43	0.37	4.33	1
Loam	0.13	0.35	3.50	12
Silt Loam	0.26	0.37	6.69	79
Sandy Clay Loam	0.06	0.26	8.66	0
Clay Loam	0.04	0.28	8.27	0
Silty Clay Loam	0.04	0.26	10.63	4
Sandy Clay Loam	0.02	0.21	9.45	0
Silty Clay Loam	0.02	0.23	11.42	0
Clay	0.01	0.21	12.60	4

An area-weighted average value was assigned to each subbasin for each input parameter based on the distribution of soil texture class within the subbasin. The average input parameters for each subbasin are listed in Attachment B, Table B-2.

3.4 Land-Use and Impervious Percentage

Area-weighted impervious percentages were assigned to each subbasin based on an associated percent imperviousness for each land-use coverage in the City. Land use coverage and percent imperviousness by land use were adjusted from values used in the 2012 SMP due to refined zoning categories (i.e., impacts of House bill [HB] 2001) and improved methodology for calculating impervious coverage.

Land-use categories and coverages (reflecting existing development conditions and future, full-build out development conductions) were developed with the City in October 2021 using City zoning, comprehensive plan designations, developable lands/open space coverage, floodplain and wetland area designations, and impervious area coverages. The methodology of developing representative, current percent impervious percentages for each land-use coverage for this study is summarized in Section 2.3.2 of TM#1. A summary of the updated land use categories and associated impervious percentages are shown in Table 4 below.

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Table 4. Land-Use Categories		
SMP 2012 Categories	SMP Category	Representative Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15[b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential–Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City.

b. Adjusted as part of the calibration process for the Boeckman Creek Hydraulic Evaluation TM (1/31/22). See Section 5.1 of the TM.

An area-weighted average impervious percentage by subbasin was calculated for both existing and future development conditions based on the contributing land use and associated land-use based impervious percentages. The future land use coverage assumes conversion of vacant lands that are developable to their underlying zoning or comprehensive plan designation. The existing and future impervious percentage for each subbasin is listed in Attachment B, Table B-2 and shown in Attachment A, Figures A-3, and A-4.

The revised hydrologic input parameters discussed in this section inform the amount of runoff generated and ultimately routed through the hydraulic model as discussed in Section 4.

Section 4: Hydraulic Model Development

The City's existing InfoSWMM H/H model was initially developed as part of the 2012 SMP effort with minor, localized revisions for the Elligsen Pump-to-Waste evaluation completed in 2019. This most recent version of the H/H model was provided to BC in March 2021 and additional hydraulic updates were made as necessary for this SMP effort. The following subsections provide a description of the key hydraulic inputs required for the model and a summary of the hydraulic updates completed for this SMP.

4.1 Hydraulic Input Parameters

The InfoSWMM hydraulic model includes a network of nodes connected by conduits to represent the City's stormwater system in the model environment. Hydraulic information required by the model is stored within each node or conduit dataset. Within each node or conduit element, various hydraulic information is stored to govern the calculations and flow routing performed by the model.

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4.1.1 Node Data

Model nodes include structures such as manholes, outfalls, storage facilities and junctions. These elements are informed by the City's GIS. Model nodes also include other relevant connection points in the system not defined in the GIS such as connection points between continuous open channel segments. Key model node attributes are listed in Table 5.

Table 5. Model Node Attributes

Attribute	Value
ID	The ID is maintained from the original 2012 SMP model. New nodes were assigned an ID based on the City's GIS attribute information.
Invert elevation	Invert elevation of the junction in feet (vertical datum NAVD88)[a]
Rim elevation	Elevation at the ground level in feet (vertical datum NAVD88)[a]
Storage Volume (if applicable)	Stage storage relationship (Depth vs. surface area)

a. Vertical datum of GIS data discussed in Section 4.2.1.

Storage nodes within the model allow for the simulation of ponds, underground detention, and other flow control facilities within the City's stormwater network. Each storage node is assigned a stage storage relationship (depth. vs. surface area) to represent the available volume of storage at a given water elevation. Table 6 lists the storage facilities included within the H/H model, including both those reflected in the 2012 SMP and those newly added or modified as part of this SMP update.

Table 6. Model Storage Nodes

Storage Node ID	Description	SMP update status
POND_LIBRARY	Library Pond (Memorial Dr.)	Updated
POND_E1	Villebois–Palermo Park dry pond	No adjustment
POND_E2	Villebois–Palermo Park dry pond	No adjustment
POND_F	Villebois–Palermo Park dry pond	No adjustment
COCA-COLA_POND	Coca Cola Facility Pond (SW Kinsman Rd.)	No adjustment
RENAISSANCE_POND	Renaissance Development Pond (SW Canyon Creek Rd.)	No adjustment
STAFFORD_POND	Al Kader Shrine Center pond (SW Parkway Ave.)	No adjustment
WILSONVILLE_DIST_CTR_POND	Wilsonville Distribution Center pond (Boones Ferry Rd.)	No adjustment
TONKIN_NISSAN_POND	Tonkin Wilsonville Nissan Pond (SW 95th Ave.)	No adjustment
CANYON_CR_PH2_DET	Canyon Creek Business Park underground detention facility	No adjustment
CANYON_CR_ARCH_PIPE	Canyon Creek Business Park underground detention facility	No adjustment
POND_BOECKMAN	Area upstream of Boeckman Rd. flow control structure	Updated
SIEMENS_POND_B	Private pond on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
SIEMENS_POND_C&D	Private ponds on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
STAFFORD_MEADOWS_1_BASIN	Frog Pond West–Stafford Meadows pond (Boeckman Rd.)	Added
DAY_RD_IMPOUNDMENT	Impoundment south of Day Rd.	Added
TOOZE_POND	Villebois–Calais East (Tooze Rd.)	Added

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4.1.2 Conduit Data

Key attributes for conduits (i.e., pipes, culverts, and open channels) include ID, length, invert elevations, slope, shape (i.e., circular, or open channel cross-section), inlet and outlet losses, and Manning's roughness coefficient. The existing model conduit ID and naming convention was maintained for this SMP update. In locations where new conduits were integrated into the model, an ID was assigned based on the City's GIS attribute information.

Manning's roughness coefficient "n" is dependent on the material of the conduit. Table 7 provides a list of the roughness values applied, which are consistent with the documentation for the 2012 H/H model.

Table 7. Model Conduit Roughness

	Manning's *"n"* Roughness Coefficient
Pipe Material and Open Channel	Polyvinyl chloride (PVC) Pipe: 0.011
	Reinforced Concrete Pipe (RCP): 0.013
	Concrete Pipe: 0.013
	Corrugated Metal Pipe (CMP): 0.024
	Open channels: 0.035

4.2 Hydraulic Updates

Hydraulic model updates completed for this SMP update include model expansion, primarily in new growth areas since the previous 2012 SMP was completed or in identified problem areas (see TM#1), and model updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects. These areas were discussed in a System Status and Modeling Extents workshop with City Staff in August 2021 to identify/confirm the specific locations for hydraulic model updates and documented in TM#1. Hydraulic updates used the City's GIS data (provided June 2021) as the primary source information and supplemented by City provided as-built drawings and field verification where necessary. Additional hydraulic model refinement described outside of this section was completed as part of the model validation adjustments discussed in Section 5.3.

4.2.1 Vertical Datum Resolution

The original hydraulic model used inconsistent vertical datums to reflect elevations of hydraulic model elements. Based on discussions with the City, this inconsistency was determined to be due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted all existing hydraulic model elevations to be consistent with the City's current standard of NAVD88. Details and assumptions related to the identification and correction of datums is included in TM#1, Section 2.1.2. With this effort complete, future hydraulic updates (Section 4.2.2) were able to be integrated into the model under a consistent datum.

4.2.2 Model Update and Area Expansion Locations

Hydraulic model updates were completed from May 2021 through May 2022 as additional data were received and concurrently with the problem area identification process (see TM#1 Section 5.1). This process supported the initial identification of stormwater problem areas for the City, as locations requiring modeling to validate an observed problem. Additionally, expanded modeling helps to identify new problem areas or predict future problem capacity deficiencies.

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Table 8 summarizes the specific locations of hydraulic model updates that were integrated into the City's InfoSWMM model for this SMP update. Comprehensive locations of hydraulic model updates are shown in Attachment A, Figure A-5.

Table 8. Hydraulic Model Update Summary

Date Completed	Type of Revision	Rationale for Update	Location	Description
May 2021	Update	Topographic survey	Boeckman Creek	Integrated open channel cross-sections surveyed in the vicinity of Boeckman Rd. crossing. Revised stage storage relationship of Boeckman Pond based on survey information.
June 2021	Update	Constructed capital project	Charbonneau	Revised model to incorporate Charbonneau pipe upsizing associated with CP SD9022-9025 (Old Farm Rd. Phase I) and CP SD9014-9016, & SD9030 (French Prairie Drive Phase II).
June 2021	Update	Constructed capital project	Barber Street	Revised model to incorporate pipe upsizing along Barber St. associated with CP SD4208 and SD4209.
August 2021	Update	GIS discrepancy	ODOT yard west of I-5	Updated diameter of modeled culvert from 40-in to 42-in to match GIS data.
August 2021	Update	GIS discrepancy	Boones Ferry Rd.	No model adjustment needed north of 5th St. for existing 24-in pipe segment. City rectified GIS data to match the 24-in pipe shown in model. Model adjusted south of 5th St. to reflect pipe upsizing to 30-in shown in GIS.
August 2021	Update	GIS discrepancy	Wilsonville Rd.	No model adjustment needed. City rectified GIS data to match 30-in pipe shown in model.
August 2021	Update	GIS discrepancy	Graham Oaks Nature Park	Adjusted model to follow correct piping alignment shown in GIS.
August 2021	Update	GIS discrepancy	Boeckman Rd. (west of I-5)	Adjusted pipe diameter to 24-in to reflect latest GIS data.
August 2021	Update	GIS discrepancy	Hillman Ct.	No model adjustment needed. City rectified GIS data to match 24-in pipe shown in model.
October 2021	Update	Problem area and site visit	Kinsman Rd.	Model adjusted to incorporate field measurements (rim and measure-down elevations) collected by Public Works.
October 2021	Update	Problem area and site visit	Town Center Loop	Model adjusted to incorporate field measurement of ODOT reducer (12-in) collected by Public Works.
November 2021	Expansion	Problem area and site visit	Tooze Pond	Model expanded to include Tooze Pond detention facility. Stage-storage relationship estimated form City provided as-built drawings.
November 2021	Update	Problem area and site visit	Day Rd. to Ridder Rd.	Model updated with culvert information (diameter, length, inverts) surveyed in 2019 as part of the Coffee Creek Stormwater Facility Study. Surveyed open channel information not incorporated.
November 2021	Update	Boeckman Creek Hydraulic TM	Boeckman Road flow control structure	Integrated as-built information to update flow control structure elevations and the storage capacity of the pond upstream of the flow control structure.
November 2021	Update	Boeckman Creek Hydraulic TM	Mentor Graphics/Siemens	Model updated based on survey information collected as part of the Boeckman Road Improvement Hydraulic Evaluation. Survey information included geometry and elevations of the Boeckman Creek diversion structure and weirs. Onsite Siemens ponds added to the model based on as-built drawings.

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Table 8. Hydraulic Model Update Summary				
Date Completed	Type of Revision	Rationale for Update	Location	Description
December 2021	Expansion	New growth	Garden Acres Rd.	Expand model to include piped stormwater infrastructure along Garden Acres Rd. to Coffee Creek outfall.
December 2021	Expansion	New growth	Villebois	Expand model to include additional large diameter (>18-in) pipe within the Villebois planning district.
December 2021	Expansion	Problem area and site visit	Willamette Way E	Expand model to include additional infrastructure associated with Belnap Court outfall and Bonneville Power Administration (BPA) easement outfall.
February 2022	Update/Expansion	Problem area and site visit	Meridian Creek at Boeckman Rd. (Frog Pond)	Revised Meridian Creek culvert information based on City provided as-built drawings. Expanded model to include the open channel and "Stafford Meadows 1 Basin" detention pond upstream of the culverts.
May 2022	Expansion	Problem area and site visit	Day Rd. impoundment	Impoundment south of Day Rd. added to model based on as-built information provided by the City.

Section 5: Model Validation

The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. Flow monitoring and model calibration was not specifically conducted as part of this SMP update. The validation process involved several successive steps, as described below, leading to refinement of model input data to ultimately support the use of the H/H model to identify and develop CPs under this SMP update. The validation process included discussion of intermediate modeling results with the City during regular project check in meetings, which informed additional hydraulic modeling updates where the incorporation of as-built information was necessary.

The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments determined as part of the Boeckman Road Hydraulic Evaluation (1/31/22).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

5.1 Boeckman Road System Calibration

The Boeckman Road Hydraulic Evaluation (1/31/22) is a separate but concurrent study conducted as a precursor to the Boeckman Road Corridor Project (BRCP). This study utilizes the same, updated, citywide InfoSWMM H/H model as being updated for this SMP. The study calibrated the H/H model for the Boeckman Creek basin based on flow monitoring data collected at the Boeckman Road flow control structure from March to June 2021. This flow data represents drainage from approximately 1,400 acres of the study area, specifically the upper Boeckman Creek watershed that drains to the Boeckman Road flow control structure.

Calibration adjustments integrated into the H/H model are summarized in Table 9 below.

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Table 9. Boeckman Rd. Hydraulic Evaluation Calibration Adjustment Summary	
Adjustment	**Description**
1. Baseflow addition	Added constant 0.4 cubic feet per second of inflow to the Boeckman Creek system and simulated the three preceding months of rainfall to replicate antecedent conditions.
2. Residential Agriculture (RA) Land Use Impervious Percentage	Revised the initial RA impervious percentage from 6 to 15 percent. This adjustment affected hydrology citywide.
3. Mentor Graphics/Siemens survey results (2022)	Updated model to better represent existing conditions of private stormwater infrastructure, which included the Boeckman Creek diversion structure and weirs.

These calibration adjustments result in model results that match (within 3 percent) the peak instream flow for the selected calibration storm (June 11-15, 2021). Since conveyance infrastructure is sized based on peak flows, matching peak flow was the primary objective for this calibration effort. Detailed results of this calibration process including assumptions and rationale are described in the Boeckman Creek Hydraulic Evaluation TM, dated 1/31/22.

The calibration adjustments were applied to the citywide H/H model as the initial validation step for this SMP update. The anticipated impact from these calibration adjustments is not expected to be substantial; however only adjustment #2 from Table 9 directly impacts basins outside of Boeckman Creek watershed. Residential agriculture (RA) land use only comprises a small portion of the study area (approximately 14 percent), and most of this area is outside of the city limits. As such, additional validation efforts beyond the Boeckman Road Hydraulic Evaluation calibration adjustments alone were needed to sufficiently validate the citywide model.

5.2 Model Validation

To further validate the City-wide model, a validation storm event from January 4 to 7, 2022, was selected by City staff for simulation in the H/H model. This event was identified based on reported flooding observed by Public Works staff near Day Road and Commerce Circle (NW portion of City limits). Available information for this storm event included anecdotal accounts of flooding, photographs, and water surface measurements. The 15-minute rainfall data was collected from a nearby rain gauge.

Public Works staff provided several photographs from January 6 (time unknown) to document the reported ponded water south of Day Road as shown in Figure 1.

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Figure 1. Validation observations (south of Day Road)

To correlate observed standing water conditions with measured data, BC staff collected a water depth measurement downstream of the observed flooding per Figure 2 (left) on January 7, 2022 at 11 a.m.. This measurement was collected at one of the 48-inch culverts underneath Ridder Road. While this measurement was collected after the peak of the storm event, water levels within the culvert remained high, as the culvert was approximately 67 percent full as shown in Figure 2 (right) below.

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Figure 2. Validation measurement location (48-in. culvert underneath Ridder Road)

Left: Location of culvert. Right: Depth of water in culvert.

Rainfall data for this validation storm event was obtained from a rain gauge owned and operated by Clean Water Services (CWS) located along 99W Pacific Hwy between King City and Sherwood near the Tualatin National Wildlife Refuge. The gauge is identified by CWS as "LTR" and is approximately 5.75 miles from the Boeckman Road and Boeckman Creek crossing. This rain gauge was also used for the model calibration effort conducted for the 2012 SMP. The validation storm event rainfall is plotted (15-minute increments) on Figure 3, and storm characteristics are summarized in Table 10.

Table 10. Validation Storm Event

Statistic	Storm 1
Start Date/Time	1/4/22, 12:00
End Date/Time	1/7/22, 12:00
Duration, hours	72
Total Rainfall, inches	1.76
Peak Intensity, inches/hour	0.28

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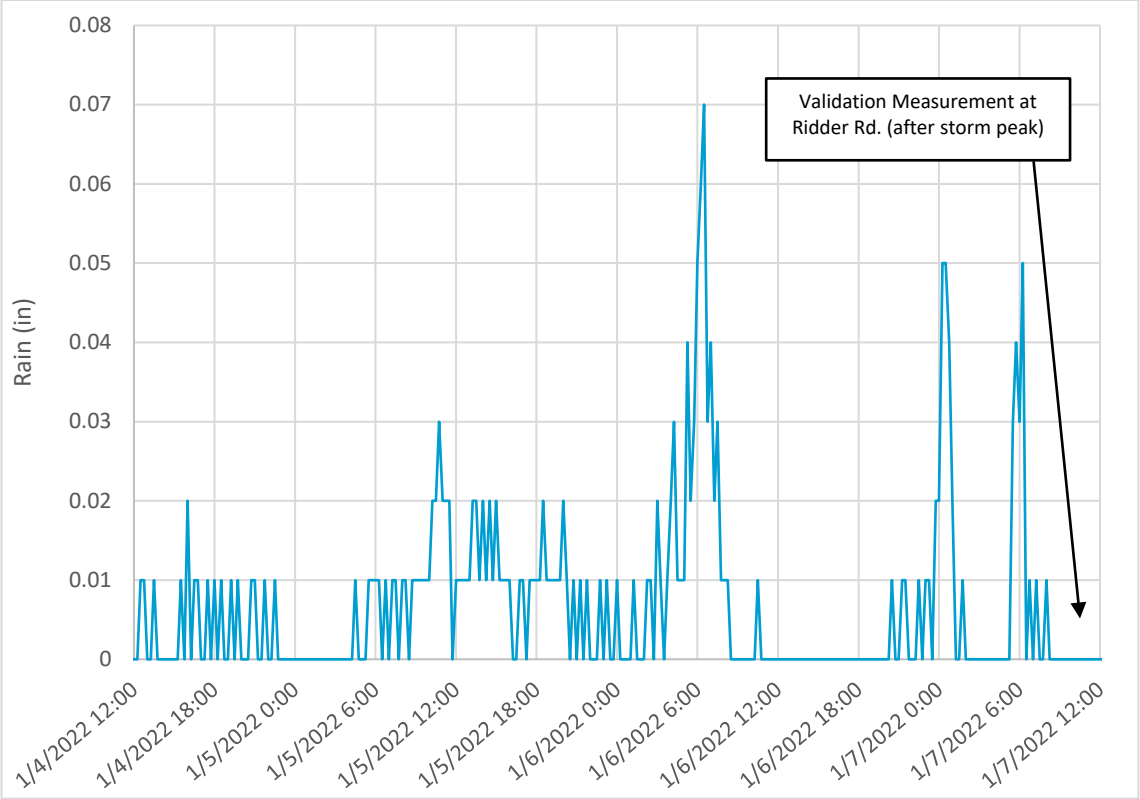

Figure 3. January 2022 validation storm event

5.2.1 Model Simulation

The validation storm was simulated in the H/H model to attempt to replicate the observed water surface elevations within the culverts at Ridder Road. The validation model simulation was unable to replicate observed conditions (i.e., standing water), indicating a discrepancy between the model results, City staff observations and BC measurements. The validation model results underpredicted the water depth measurements collected at the culverts underneath Ridder Road (Figure 2). While field measurements indicate that the culverts were approximately 67 percent full, the validation model predicted that the culverts would only be 11 percent full during that same period of the storm.

The discrepancy between the measured and simulated water surface elevation was attributed to the model not fully representing actual upstream hydraulic conditions from the culverts at Ridder Road. The modeled hydraulic reach between Day Road and Ridder Road includes simplified geometry to represent the open channel conveyance (trapezoidal cross-sections) and does not include the large wetland area north of Day Road nor the impoundment directly south of Day Road. In addition, it is suspected that during the storm event, the buildup of vegetation and sediment along this reach significantly contributed to backwater conditions and elevated water surface levels throughout the system.

5.2.2 Hydraulic Model Updates (Commerce Circle)

Adjustments to the system hydrology and hydrologic input parameters were briefly discussed with City staff but ultimately not made to resolve the large discrepancy in water surface elevations at the Ridder Road culverts. Rainfall patterns and storm volumes can vary significantly, and the rainfall gauge used to obtain the rainfall data is a relatively far distance from the validation location. Also, any adjustment to the hydrologic input parameters to increase flows at this location may have unintended consequences (i.e., impact CP sizing in other locations). The drainage area to the Ridder Road culverts is relatively small compared to the

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overall City's contributing drainage area. Therefore, it was decided that hydrologic adjustments associated with the model validation effort are not preferred and hydraulic model refinements should be made.

The hydraulic model between Day Road and Ridder Road was reviewed and updated based on available survey data within the general system area. Representative channel cross-sections were developed using the preliminary design information for AKS' 2019 Coffee Creek Stormwater Facility Study including the topographic data for the area collected by the survey team. This provided a more accurate representation of channel geometry in comparison to the conceptual trapezoidal channels included in the 2012 SMP model, although the change in the model results for the validation storm was marginal.

5.3 Preliminary Flooding Results and Additional Model Adjustments

With the large disparity in validation model results in the Day Road and Commerce Circle system (Section 5.2), it was decided jointly with the City to use a more comprehensive approach to qualify other flooding locations throughout the City.

Preliminary model results (reflecting validation adjustments described above) were discussed with the City in May 2022. This review focused on newly identified flooding locations (i.e., the 2012 SMP did not define a CP to address flooding in a specific location) throughout the City based on the 25-yr design storm (City's conveyance standard) under existing conditions. The preliminary flooding results were reviewed to identify and confirm deficiencies within the City's drainage network.

Locations with predicted flooding were cataloged in a summary table (Attachment B, Table B-2) and mapped (Attachment A, Figure A-6). City staff provided input on the preliminary modeled flooding locations as well as provided additional information (as-builts) to help refine the model prior to producing finalized results. City staff confirmed known flooding locations and locations where model flooding may not be indicative of a real-world issue.

In general, City staff agreed with the preliminary flooding results presented by the model. Preliminary flooding locations where City staff were not aware of issues were reviewed in detail to confirm their hydraulic configuration and whether the contributing drainage area and subbasin delineation was representative. For several locations where flooding had not been previously known by City staff, modeled flooding was resolved by further subdividing subbasins to simulate runoff entering the piped hydraulic system more accurately. It was decided jointly with the City that these adjustments were reasonable to resolve the issues and further effort should focus on the higher priority locations.

Additional locations (per Attachment A, Figure A-6) warranted hydraulic updates based on updated information provided by the City. These locations include:

- Location #2 Charbonneau SW French Prairie Rd. Outfall. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- Location #6 Library Pond. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- Location #11: Penske Truck Rental Property. Model revised to reflect updated culvert information underneath parking lot based on as-built drawings.
- Location #15: Wilsonville Distribution Center Pond: Model revised to reflect pond outlet structure based on as-built drawings.

Following hydraulic model adjustments, several locations are still predicted to flood despite City staff not being aware of any issues. These locations are outlined in Attachment B, Table B-1 as location IDs without narrative in the "City Validation Notes" column. Completion of the City-driven validation adjustments to the hydraulic model concluded the validation effort for the model. As previously discussed, traditional validation

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efforts for this H/H model were not feasible due to limited data. BC relied on feedback from City staff as part of this validation effort as it provided the most realistic path forward to continue with the capacity evaluation (Section 7) and advance CP development without requiring additional extensive data collection or flow monitoring.

Section 6: Future Flow Condition Modeling Analysis

During the model development process (Sections 3 and 4), BC evaluated different future flow assumption methodologies to determine impacts on runoff rates and ultimately CP sizing.

This analysis was initiated based on efforts to expedite design of a culvert replacement project at Meridian Creek at Boeckman Road (Problem Area #2) in February 2022. In this location, upstream development complies with current City stormwater design standards and incorporates various low impact development (LID) and flow control facilities and practices. As the sizing of CPs is typically independent of the presence of onsite facilities, the impact of onsite treatment and flow control on CP sizing was considered. While the immediate applicability of this effort was intended to inform this specific design effort (implemented and funded as part of the Boeckman Road Corridor Project), it was acknowledged that the future flow assumptions established here should apply to CPs developed as part of this SMP. This section documents the analysis for application to the SMP.

6.1 Background

The 2012 SMP developed CPs with a future flow condition that assumed each contributing subbasin would be fully built out to its zoning coverage. Future condition hydrology was developed from this future land use condition to size applicable stormwater infrastructure (i.e., pipes, culverts, ponds, etc.).

Since adoption of the 2012 SMP, the City revised their Stormwater and Surface Water Design and Construction Standards (2015). As part of this revision, developers are required to maintain pre-development runoff characteristics to minimize the effects of sediment transport and erosion, as described in Section 301.1.05 below:

> Stormwater management facilities shall be designed to maximize groundwater recharge through the process of infiltration of runoff into vegetated facilities and the use of what is referred to as Low Impact Development (LID) facilities and/or flow controls to address hydromodification.
>
> *Section 301.1.05, Wilsonville Stormwater and Surface Water Design and Construction Standards, 2015*

Compliance with this requirement provides a level of flow control for new development that was not accounted for in the 2012 SMP methodology for estimating future flows. If the same methodology is used, there is a potential to oversize CPs, as any upstream flow mitigation provided by LID facilities may reduce the peak flow to be managed by the constructed CP. The objective of this analysis was to evaluate whether implementation of onsite LID facilities should adjust the future flow methodology for CP development.

6.2 LID Facilities Modeling Approach

Evaluating the direct impact of future LID facilities associated with future development using the InfoSWMM H/H model is inherently difficult as the configuration and location of these facilities is unknown. InfoSWMM is capable of modeling specific LID facilities through its hydraulic module, but requires several known inputs such as invert elevations, depth/storage curves, outlet structure geometry, and specific locations within the drainage system to accurately retain and route flow.

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Due to the absence of this information, the impact of future LID facilities was estimated through InfoSWMM's hydrologic module, specifically by adjusting the Sub-Area routing feature. The Sub-Area routing default within InfoSWMM routes all impervious and pervious area associated with a subbasin directly to the outlet (outlet routing). An optional configuration called percent routing, allows for a percentage of the impervious area within a subbasin to be routed over the pervious area within a subbasin prior to reaching the outlet. This is illustrated in Figure 4, originally published in the EPA Storm Water Management Model Reference Manual Volume I, Hydrology.

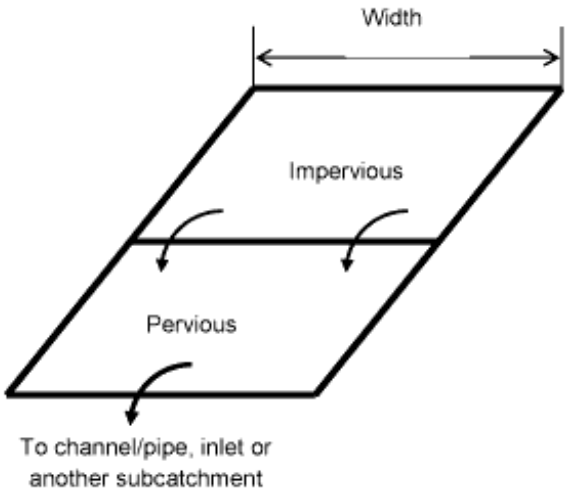

Figure 4. Percent routing diagram

Use of this percent routing feature within InfoSWMM is a simple routing mechanism. Available literature on this routing feature reflects its usage to approximate impacts of LID facilities within a subbasin, as it slows the timing of peak flow and allows for flow attenuation and additional infiltration.

The percent routed can range from 0 percent (direct outlet routing) to 100 percent (all runoff from impervious area routed to pervious area). To assess the sensitivity of the percent routing option on peak flows within the model, three different future alternative scenarios were simulated in addition to the traditional outlet routing model:

- PERV=75 percent
  - Routes 75 percent of impervious area over pervious area (less conservative)
- PERV=50 percent
  - Routes 50 percent of impervious area over pervious area
- PERV=25 percent
  - Routes 25 percent of impervious area over pervious area (more conservative)
- Outlet Routing
  - Impervious area and pervious area are routed directly to outlet (most conservative)

6.3 Results

The different future alternative scenarios were simulated for several design storms to assess relative impact on peak flows specific to the location of the Meridian Creek culvert replacement project. Results for the 10-yr design storm and the 100-yr design storm (culvert design standard) are shown below on Figures 5 and 6, respectively.

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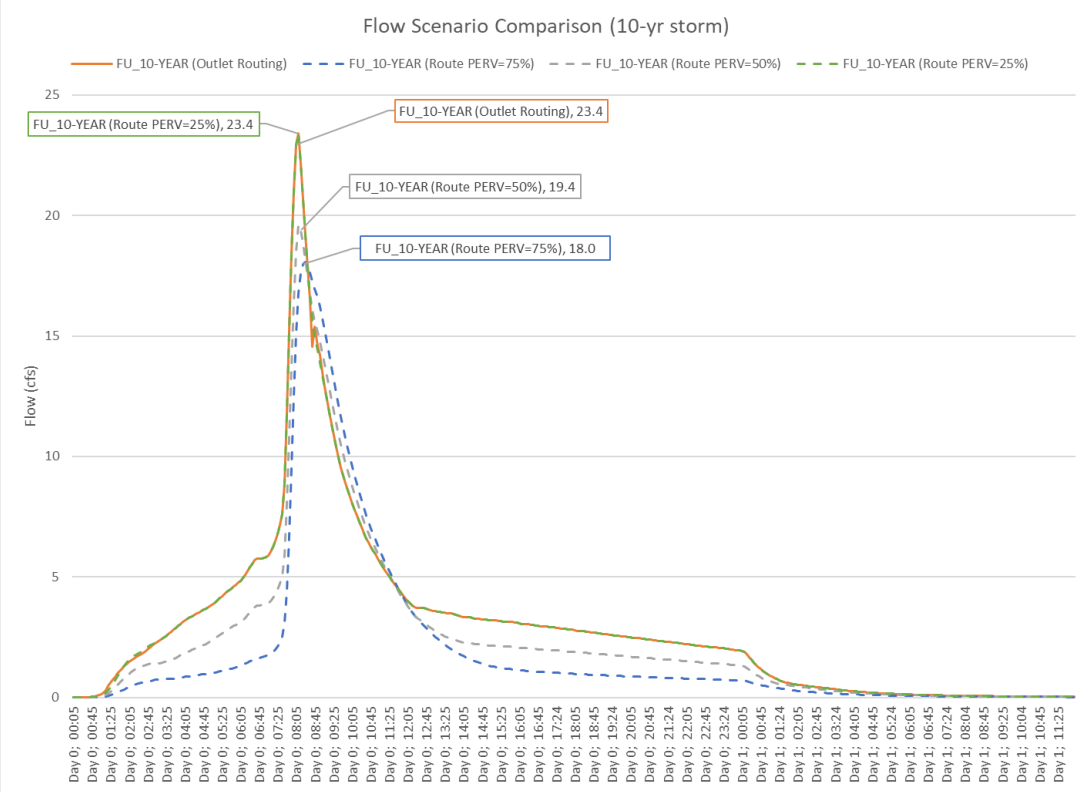

Figure 5. Meridian creek culvert–10-yr design storm

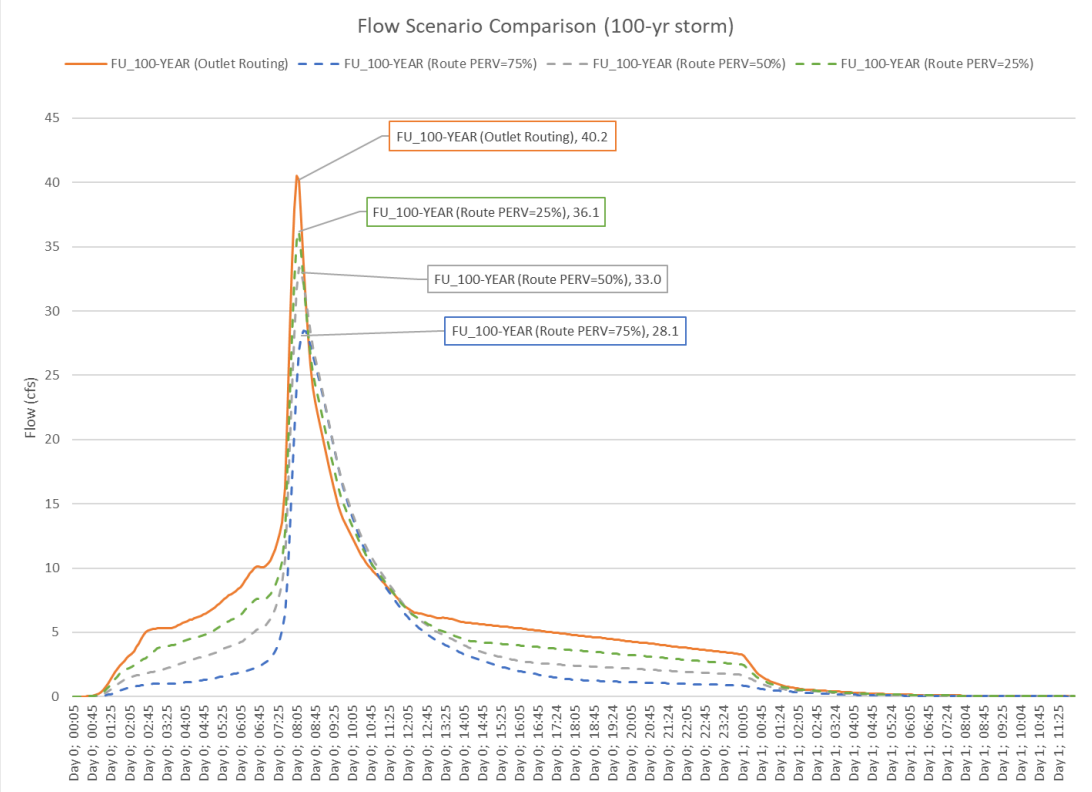

Figure 6. Meridian creek culvert–100-yr design storm

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Based on these sensitivity model runs, the following conclusions regarding peak flow percent routing were reached:

- Increasing percent routing for a subbasin reduces anticipated peak flows.
- Percent routing has a greater impact on anticipated peak flows for larger design storms (i.e., 100-yr design storm)
- Percent routing has a greater impact on subbasins with lower impervious percentages (undeveloped/vacant lands).
- For smaller design storms (i.e., 10-yr design storm) the anticipated peak flow difference between outlet routing and PERV=25 percent is insignificant.

Based on these conclusions, and the desire to build some conservatism into the sizing for future CPs, it was decided jointly with the City to proceed with future condition modeling without subbasin percent routing. It was acknowledged that this approach may lead to the oversizing of some stormwater infrastructure; however, this would only be where the contributing drainage area is primarily undeveloped.

Section 7: H/H Model Evaluation and Results

Upon completion of the model validation effort (Section 5), detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm. H/H model inputs and results are summarized for the hydrologic and hydraulic models in Tables B-2 and B-3, of Attachment B, respectively. The following sections present the findings resulting from the model and how the model will inform CP development efforts.

7.1 Hydrologic Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events. Future land use conditions represent the development of developable (vacant) lands per their associated zoning category or adjusted zoning coverage for select, developed lands based on anticipated zoning in accordance with House Bill (HB) 2001.[1]

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. Attachment A, Figure A-7 presents subbasins within the study area and their anticipated increase in peak flows (based on percentage) from existing to future land use conditions.

The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow). As noted in Section 6, flow attenuation during new development is anticipated through implementation of the City's stormwater design standards, but for purposes of this SMP, CP sizing will be based on unmitigated flows.

Detailed hydrologic inputs and peak flow results for all subbasins and design storms are included in Attachment B, Table B-2.

[1] HB 2001 was passed by the 2019 Oregon State Legislature and requires Cities to allow for middle housing (e.g., duplexes) for properties zoned as single family residential.

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7.2 Hydraulic Results

Hydraulic model results identify flooding locations with the intent to develop CPs to increase conveyance capacity and resolve flooding. For purposes of this evaluation, and as referenced in Section 2.2, flooding within the model was defined as locations where the hydraulic grade line exceeded the node rim elevation. Node flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storm flooding locations were also identified as shown in Attachment A, Figures A-8 and A-9. Using results from the three design storms, flooding locations were discussed with the City and cross-referenced with the Problem Area Matrix (Table A-1 of TM#1) to confirm the need to develop a CP for inclusion in the SMP.

As described in Attachment B, Table B-1, there are a total of 17 locations that continue to experience flooding in the existing condition. Of these, three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and may require alternatives analysis to ensure that City objectives and preferences will be achieved. Description of these key flooding locations is provided below.

7.2.1 Charbonneau

Flooding is predicted within the SW French Prairie Rd. area of the Charbonneau District during rainfall events starting at the 2-yr design storm. Deficiencies (capacity and condition) in stormwater infrastructure within Charbonneau were previously identified in the 2012 SMP and subsequent Charbonneau Consolidated Improvement Plan (2014). Since the completion of those studies, some of the recommended pipe improvements have been completed and as-builts or revised GIS is integrated into the updated hydraulic model (see Table 8).

As part of the model validation exercise (Section 6), this area was reviewed in detail to investigate predicted flooding in the model since model results should incorporate completed pipe upsizing projects. Discussions with City staff led to an in-depth review of the as-builts for an emergency outfall repair project adjacent to 31233 SW Edgewater Pl. completed in 2019. Review of the as-builts indicated that the damaged section of the 30-inch corrugated metal pipe (CMP) was removed and replaced with a lined 30-inch CMP. The outfall pipe was not upsized to 36-inches as recommended by the 2012 SMP due to limitations associated with the emergency repair. While the lining of the pipe increases flow (reduces pipe roughness), the H/H model still indicates this section of pipe is a bottleneck in the system resulting in an elevated hydraulic grade line upstream of the outfall as shown on Figure 7 below.

To address predicted flooding, CP development at this location will evaluate options to incorporate detention into the upstream (non-replaced) portions of the collection system, to reduce peak flows downstream. Since available space is limited within the area, concepts that utilize a limited footprint such as detention pipes will be explored.

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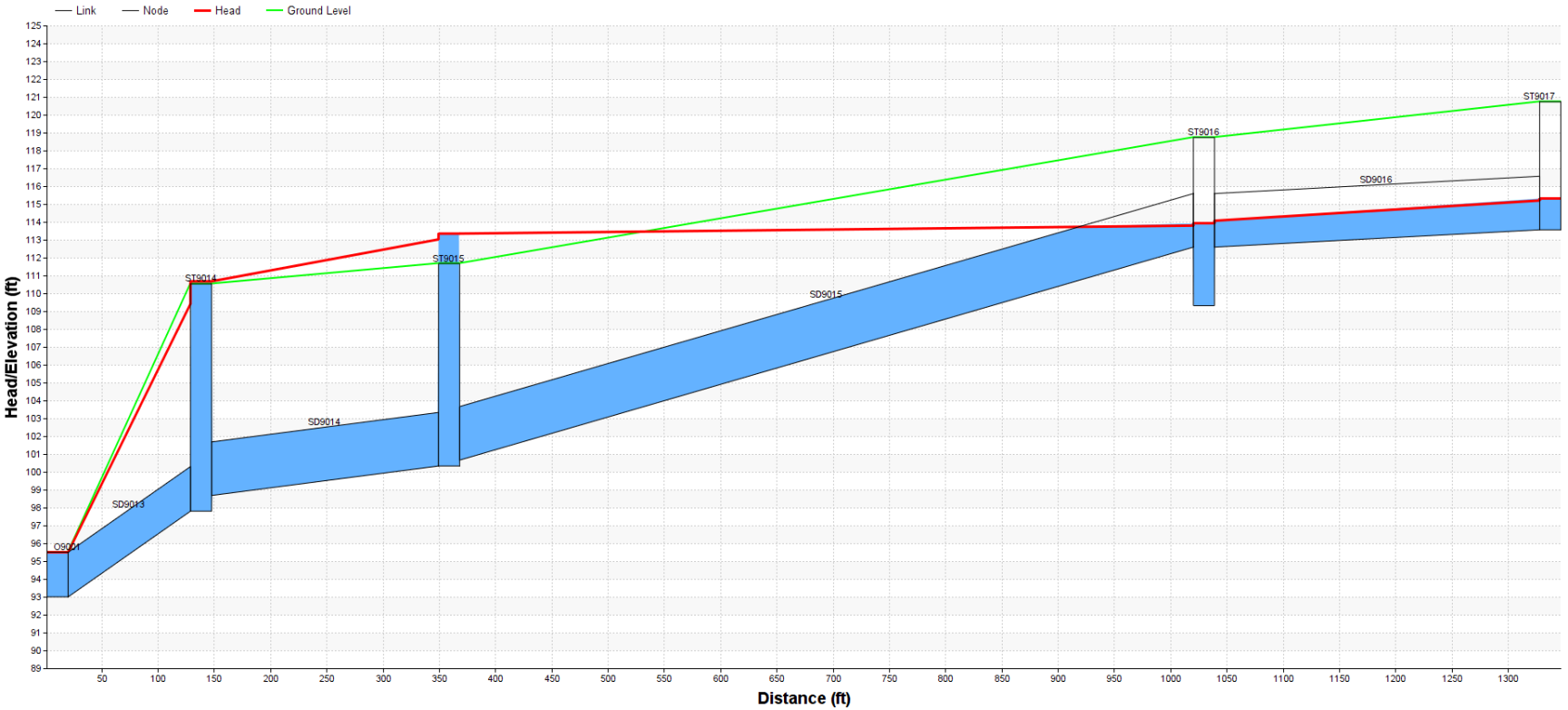

Figure 7. Charbonneau outfall–hydraulic grade line 25-yr design storm

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7.2.2 SW Garden Acres Rd./Peters Rd.

Starting at the 2-yr design storm, flooding is anticipated along the stormwater collection system running north to south along SW Garden Acres Rd. and Peters Rd. The modeled capacity issue at this location is caused by a constriction due to undersized pipes (24-inch/27-inch) prior to the system discharging to the Coffee Lake Creek wetlands as shown on Figure 8 below. The upstream drainage area to this piped system is expected to develop into a high impervious land use type (industrial) and as such currently contains large diameter conveyance pipes (42-inch/48-inch). Future development will further exacerbate the predicted flooding at this location. This location is a known issue for the City, and a CP will be developed at this location to address the capacity issues.

Early discussions with the City have identified potential issues to upsize the undersized pipe, due to the fact the alignment transects the railroad right-of-way and discharges to a greenspace property owned by Metro. To avoid railway and Metro conflicts, the City has suggested retrofit of existing (private and public) ponds along the pipe alignment near the terminus of Peters Road to provide additional flow mitigation (discussed further in Section 8.1). In addition, alternative alignments may also be considered to divert runoff from the identified pipe constriction near the existing outfall. One possibility that could avoid the railroad right-of-way and Metro property would be to install new piping along SW Clutter Rd. to the west and along Grahams Ferry Rd. to the south to outfall into Coffee Lake Creek wetlands. This concept is preliminary and will need to be investigated and tested further with the City once CPs start to be developed.

7.2.3 Commerce Circle and Day Road

Starting at the 2-year design storm, model results indicate that the open channel to the west of Commerce Circle continues to be a flooding problem area. Banks of the open channel and the existing impoundment adjacent to Day Road are expected to overtop during larger storm events. These model results are consistent with the modeling/CP development for the 2012 SMP, and the follow up study “Coffee Creek Stormwater Facility Study” completed by AKS in 2019.

This location has several deficiencies within the waterway such as undersized culverts, heavy buildup of vegetation/debris, and segments with negative grade. Historically, this location has been particularly difficult to address due to space constraints, limited available grade, and the original drainage design allowing for the adjacent parking lots to flood to provide detention. This SMP update will build upon previous preliminary design concepts to develop a refined option for implementation.

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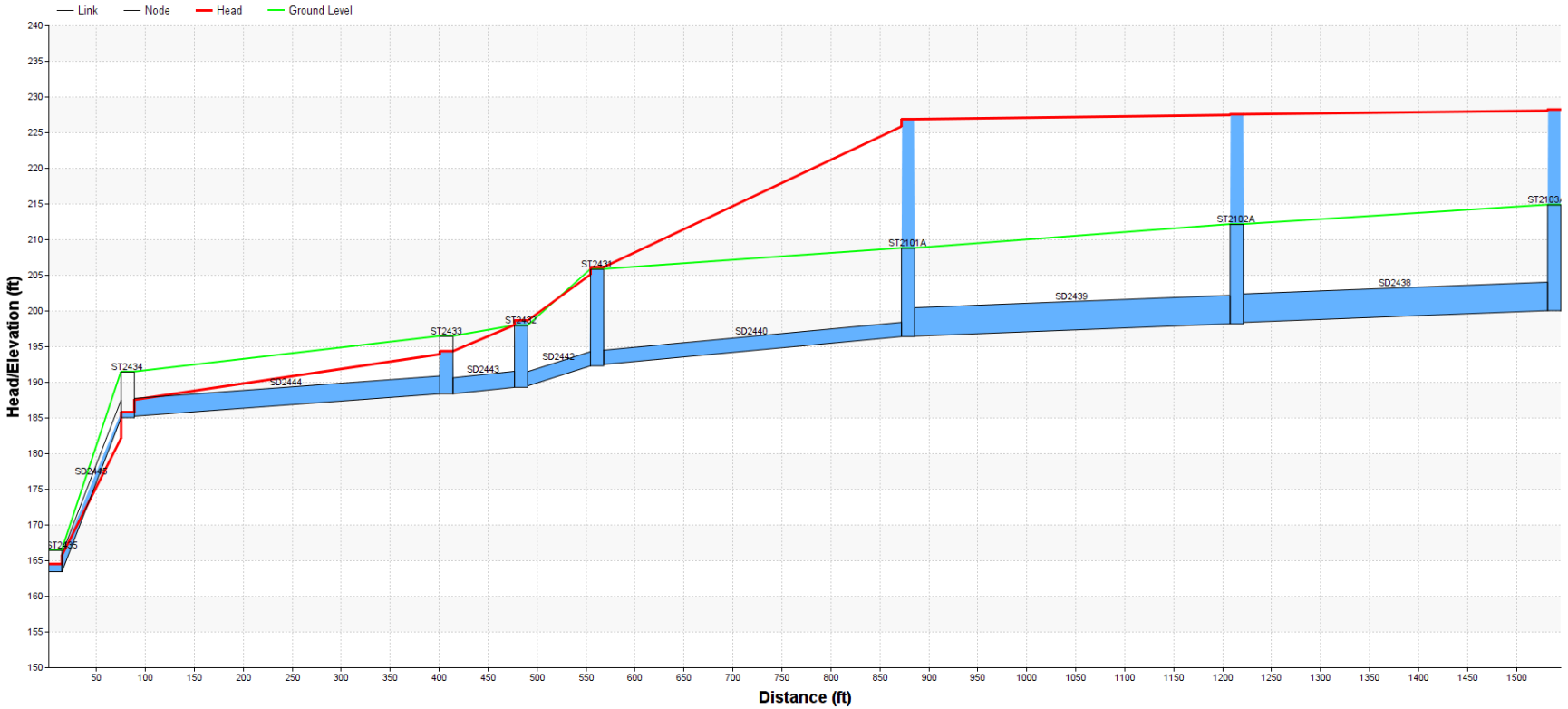

Figure 8. Peters Road–hydraulic grade line 25-yr design storm

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Section 8: Retrofit Analysis

In conjunction with the H/H modeling evaluation of the City's stormwater system, BC initiated efforts to investigate additional project opportunity locations where the addition of new water quality and/or detention facilities or the reconfiguration of such facilities can provide regulatory or development benefit within the City.

To assist in this analysis, a working map was developed to facilitate the identification of potential retrofit locations. Key elements displayed on this figure included potential property (classified as vacant, parks, open space, or City owned), ponds (public and private), water quality projects from the 2012 SMP, best management practice drainage areas, and future transportation corridors. This retrofit figure is included in Attachment A, Figure A-10.

Based on review of the retrofit analysis figure and City staff preferences, the following objectives (strategies) were developed to guide the retrofit analysis:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects generally align with water quality-related projects per the 2012 SMP. This effort supports requirements of the 2021 National Pollutant Discharge Elimination System municipal separate storm sewer permit, which requires permittees to revisit the 2015 Retrofit Assessment and provide a status update.
2. Integrate water quality and/or flow control into existing project opportunity areas (where possible).
3. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation.

Identification of new facilities to support anticipated development and growth was not considered a preferred retrofit strategy, given the fact that private development already has to adhere to the City's prescriptive stormwater design standards. These strategies helped to inform the retrofit projects and program discussed below.

8.1 Potential Retrofit Project Locations

Retrofit project locations were organized into two primary categories: previously identified locations and new opportunity locations. Applicable and relevant project opportunities are discussed in the following subsections to document potential locations for future CP development.

8.1.1 Previously Identified Opportunities

The 2012 SMP originally identified 14 restoration and 7 LID projects. These projects were reassessed and prioritized as part of the 2015 Retrofit Assessment.

For this SMP update, these projects were revisited to confirm implementation status and continued applicability in conjunction with current retrofit objectives. To track these projects and document discussions with City staff, Table 11 below was produced.

In this table, eight projects were removed (see gray shading) from consideration either due to them already being completed or no longer being feasible. Most projects were deemed still applicable and thus have been retained for inclusion in the overall project opportunity list.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	**16**	4	2	2	2	3	1	0	2	Reflect in Program
LID7	SW Wilsonville Road Stormwater Planters	No	No	**16**	4	2	2	2	3	1	0	2	Reflect in Program
CLC-10B	Coffee Creek Storm Projects	No	Yes	**16**	4	2	2	2	2	1	1	2	Not Applicable–reflects CLC-1. Project number is unique to the Retrofit Assessment source document.
BC-5	Boeckman Creek Outfall Realignment	No	No	**13**	2	0	0	3	3	2	1	2	Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with a Boeckman Road mitigation need (Creekside Woods Pond). Not considered a retrofit but keep as a Project Opportunity Area.
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	**13**	2	2	3	2	0	3	0	1	Referenced as a long-term project need from source document of retrofit assessment. Project location overlaps with Siemens/Ash Meadows. Current METRO project may also negate the project need. Remove from Project Opportunity List.
BC-4	Gesellschaft Water Well Channel Restoration	No	No	**13**	2	0	1	3	2	1	1	3	Project may be constructed in conjunction with other infrastructure projects (Interceptor Trail). Not considered a retrofit but keep as a Project Opportunity Area.
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	**13**	4	3	2	2	0	1	0	1	Reflect in Program
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	**12**	2	0	1	3	0	2	1	3	Short term/High priority CIP need per source document from retrofit assessment. Maintain as a retrofit project and keep as a Project Opportunity Area (combined with problem area).
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	**12**	0	0	3	1	3	2	1	2	Mid-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
WD-4A	Willamette Way West Outfall Replacement	No	No	**11**	2	0	0	3	0	2	1	3	Project location is being monitored. No immediate project need. Remove as a Retrofit project and Project Opportunity Area.
WD-4B	Belknap Ct Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
WD-4C	Morey Ct West Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	**9**	0	0	0	1	3	2	1	2	Project involves rehab of 5 existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with other infrastructure projects. Not considered a retrofit but keep as a Project Opportunity Area.
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	**9**	0	0	3	0	2	2	0	2	BC-10 enhances the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream (Problem Area #52 & BC-9). Mid-term project need from source document of retrofit assessment. Project location overlaps with potential Boeckman Road flow mitigation site. Keep as a retrofit project and Project Opportunity Area.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	**8**	2	1	0	2	0	1	1	1	Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-2	SW Parkway Avenue Stream Restoration	No	No	**8**	0	0	3	1	0	2	0	2	Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.
CLC-8	Coffee Lake Creek Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed. This location is associated with 5th and Kinsman Project–Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-4	Ridder Road Wetland Restoration	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).

a. *Overall score is based on a maximum 23 points possible.*

TMDL = total maximum daily load

WLA = waste load allocation

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8.1.2 New Opportunities

In addition to the projects previously identified in the 2015 Retrofit Assessment, this SMP update identified several opportunities to integrate water quality and/or flow control into an existing project opportunity or retrofit an existing, underutilized facility. These opportunities and their preliminary retrofit concept are summarized in Table 12.

Table 12. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Existing Project Opportunity	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-and-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. piped stormwater system may be able to be reconfigured to provide a flow control benefit. Opportunity to help to mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Existing Project Opportunity and Underutilized Facility	Existing swale is not draining properly. Swale needs retrofit.
Canyon Creek Park	Existing Project Opportunity	Existing park property has potential to construct a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

While these are the opportunities identified to date, additional opportunities may be identified in the future especially with the current design efforts associated with the BRCP. As part of the BRCP, mitigation opportunities associated with Boeckman Creek are currently being identified and evaluated for future project development. Any projects that result from the BRCP will be coordinated with projects developed as part of the SMP update. At this time, preferred mitigation opportunity locations have also been integrated into the larger project opportunity list for this SMP.

8.2 Potential Programs

To allow for the opportunistic integration of water quality in conjunction with transportation or other utility replacement projects, this retrofit assessment identified two potential programs that would provide a general funding mechanism to support retrofit strategies. These programs include the following:

- Green Street/LID Facilities–Allocate approximately $250,000/year to support green street and LID facility installations of facilities in conjunction with already planned utility work for select roadway improvements. This would allow for continued expansion of water quality treatment areas in areas without any existing treatment.
- Porous Pavement Pilot Study–Allocate approximately $25,000/year to install porous pavement overlays in conjunction with scheduled pavement replacement or restoration efforts. This would allow the City to begin to evaluate feasibility of adopting porous pavement for future paving projects in the City.

These programs will be considered in conjunction with other CP planning. Additional program opportunities have previously been identified as outlined in TM#1.

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Section 9: Conclusions and Next Steps

Project identification and preliminary project concepts stemming from the H/H modeling (Section 7) and retrofit assessment (Section 8), as documented in this TM, have been integrated into a Project Opportunity Matrix (Attachment B, Table B-4). The Project Opportunity Matrix expands the Problem Area Matrix that was originally included as Table A-1 in TM#1. The Project Opportunity Matrix provides a comprehensive summary of project needs in the City and will be used to facilitate City discussions and identify preferred locations to develop CPs for the SMP update.

Following City review of this TM, BC will start evaluating priority flooding locations (see Attachment B, Table B-4) to assess alternatives and feasibility of preferred project concepts. Subsequent evaluation efforts will focus on other priority locations, as confirmed through the Capital Project Workshop (scheduled for February/March 2023). Refined project concepts and cost estimates will be developed for select (approximately 15) project opportunity locations, and results documented in the SMP in graphical and tabular format.

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Attachment A: Figures

Figure A-1: Subbasin Delineation
Figure A-2: Soils and Topography
Figure A-3: Existing Land Use Condition
Figure A-4: Future Land Use Condition
Figure A-5: Hydraulic Model Overview
Figure A-6: Preliminary Flooding Results (25-yr design storm)
Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %
Figure A-8: Hydraulic Results: Existing Condition Flooding Locations
Figure A-9: Hydraulic Results: Future Condition Flooding Locations
Figure A-10: Retrofit Analysis

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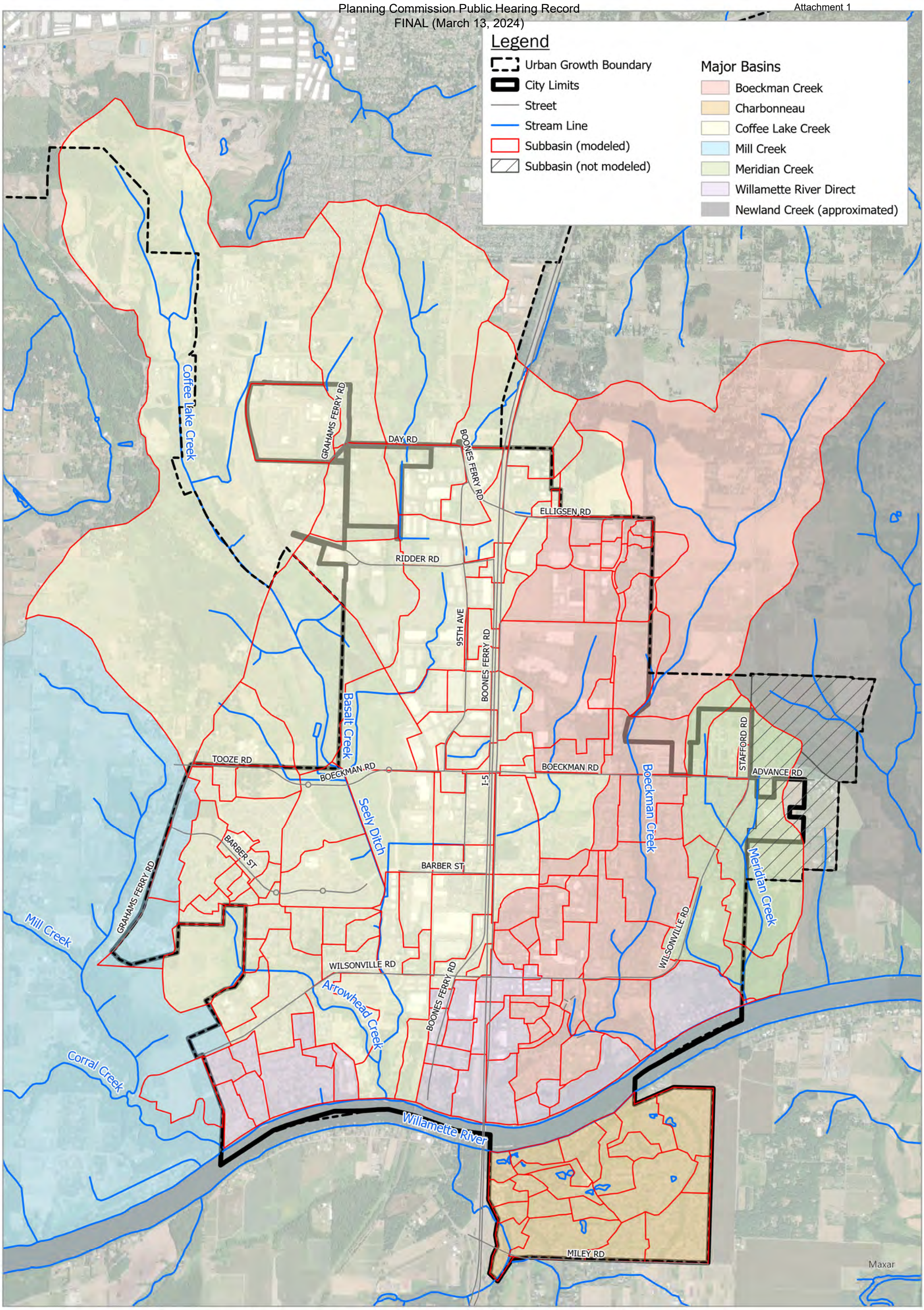

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Stormwater Master Plan

Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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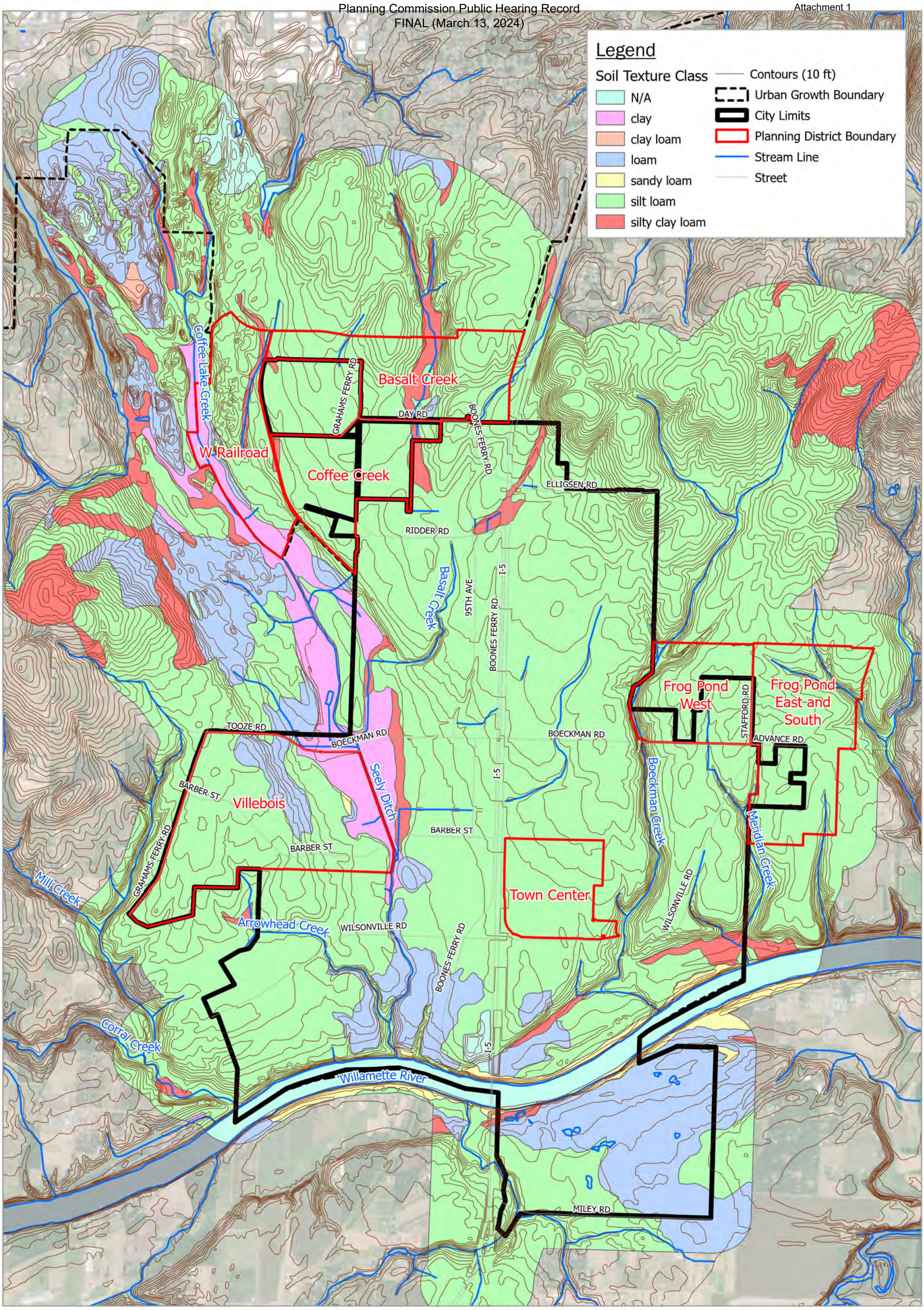
Feet

Date: 3/3/2023

Figure A-1: Subbasin Delineation



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Spatial Reference:
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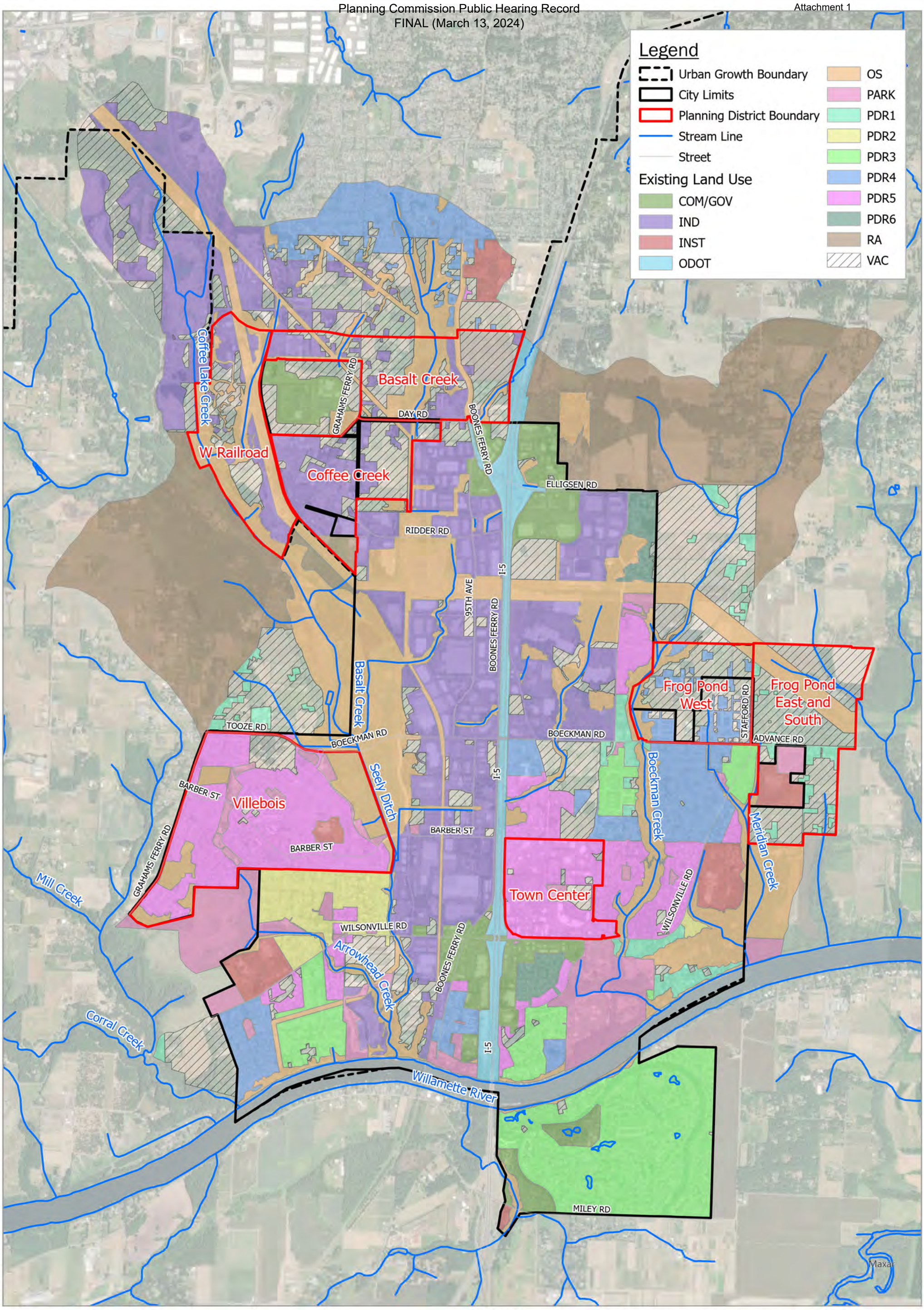
Feet

Date: 3/7/2023

Figure A-2: Soils and Topography



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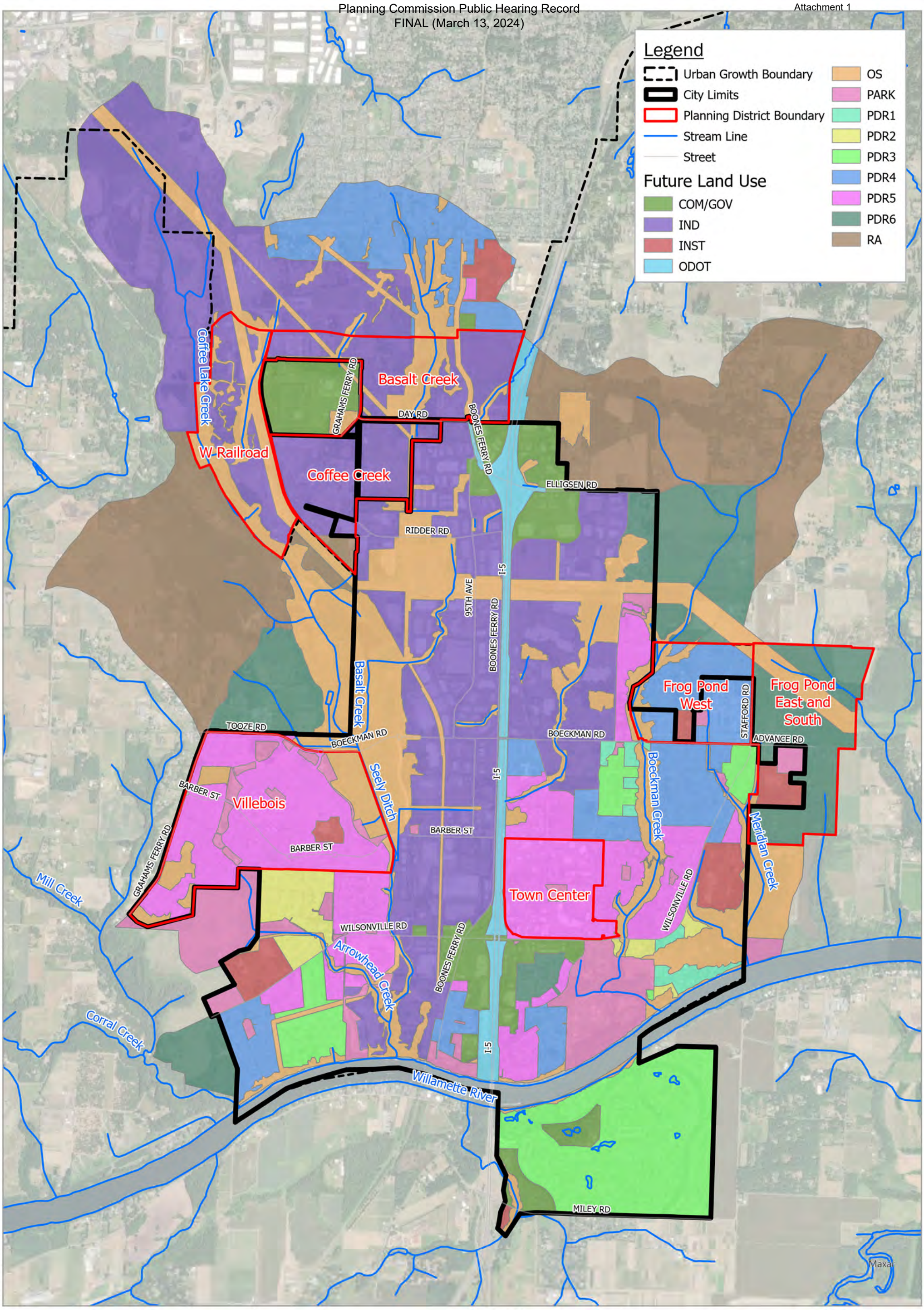
Feet

Date: 3/7/2023

Figure A-3: Existing Land Use Condition



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Spatial Reference:
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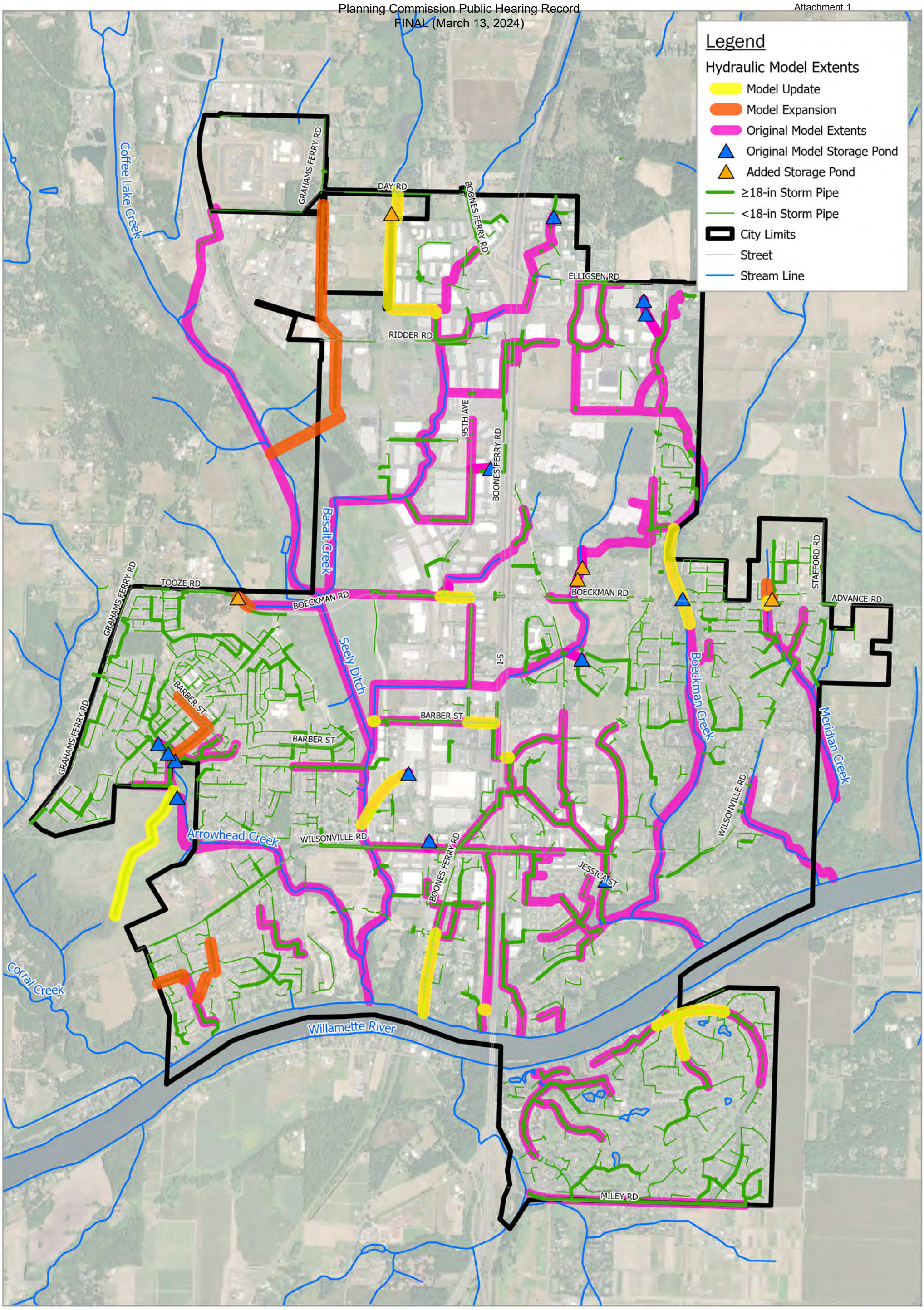
Feet

Date: 3/7/2023

Figure A-4: Future Land Use Condition



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Feet

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Figure A-5. Hydraulic Model Overview

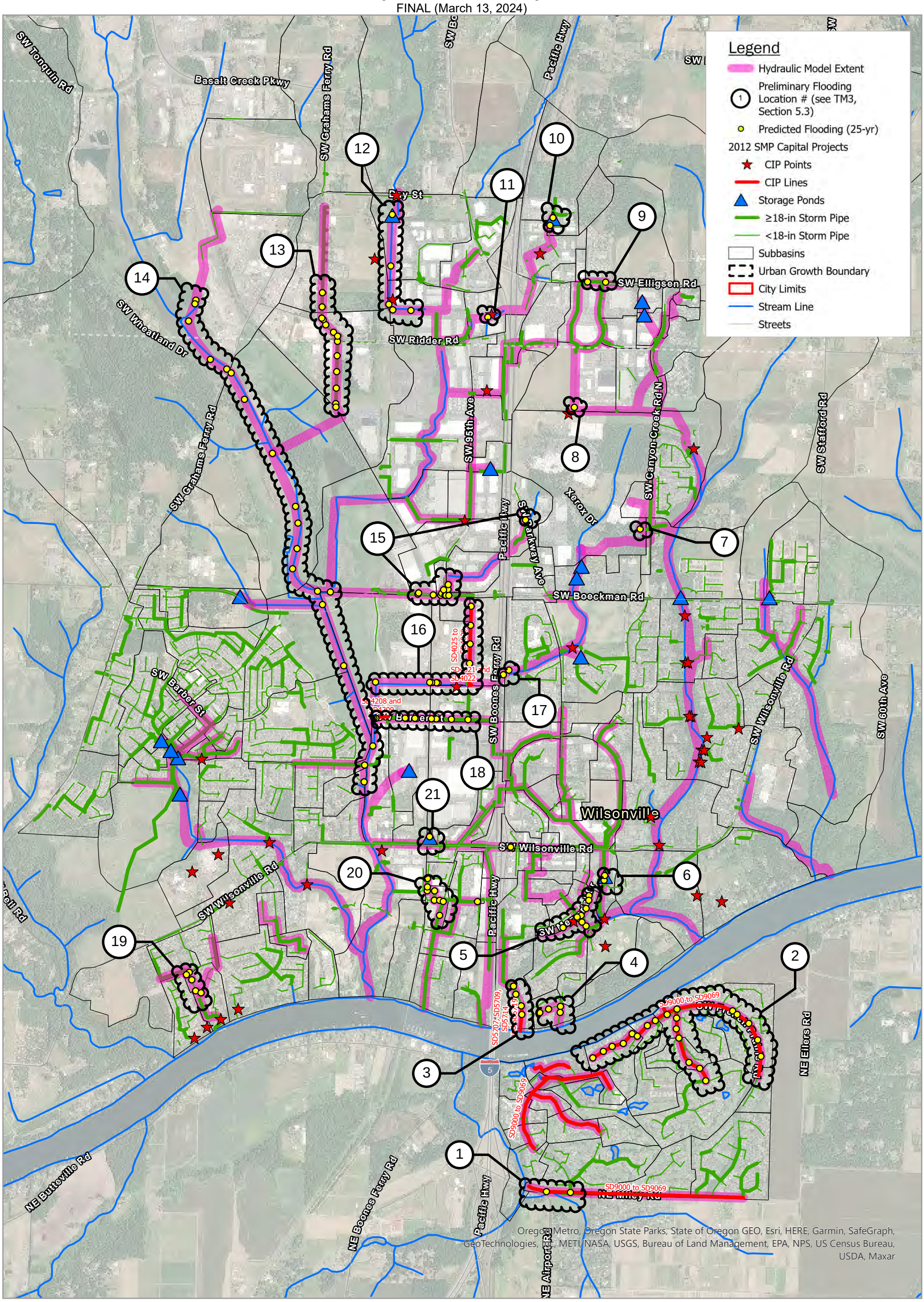

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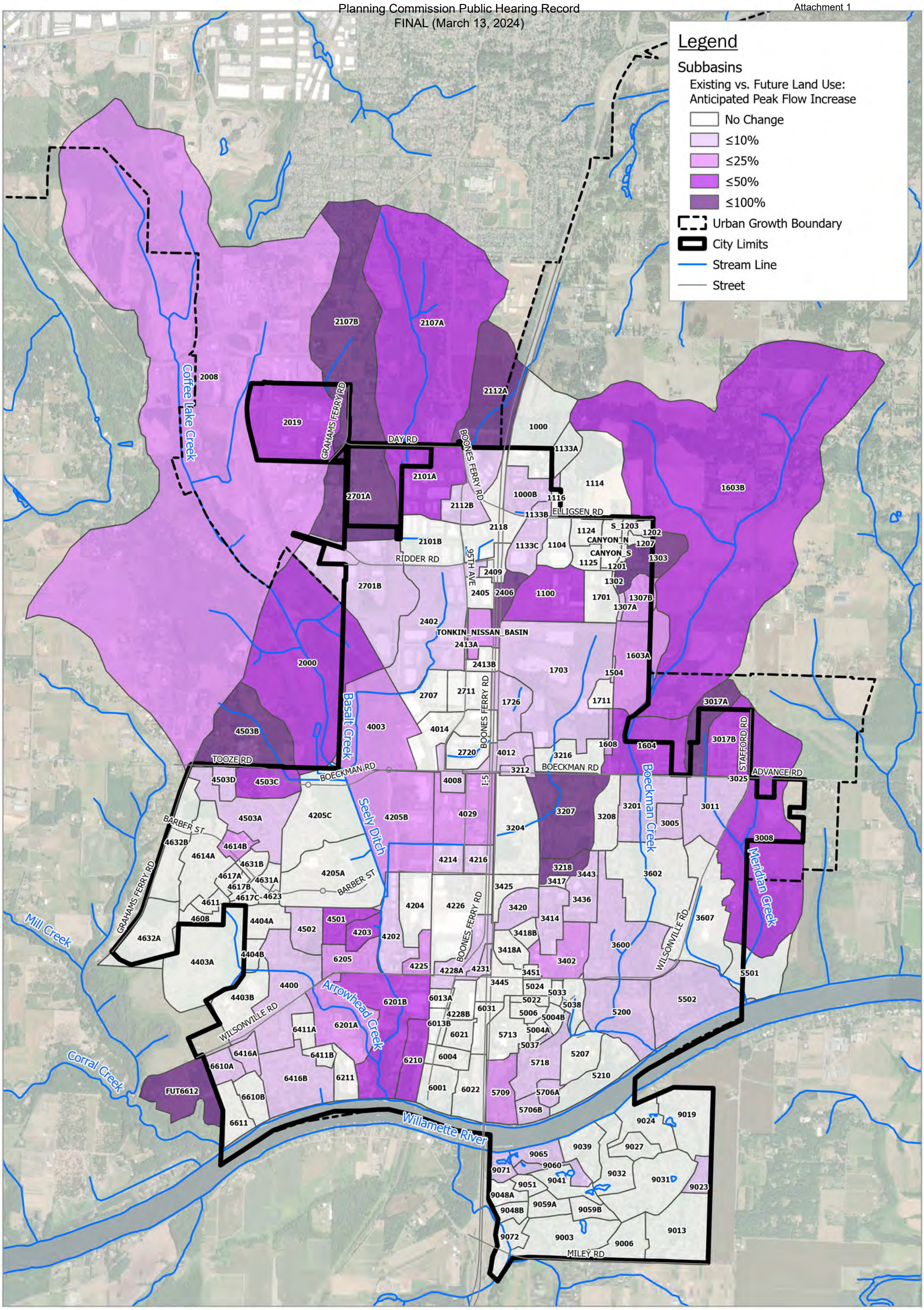
Figure A-6: Preliminary Flooding Results (25-yr design storm)



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Spatial Reference:
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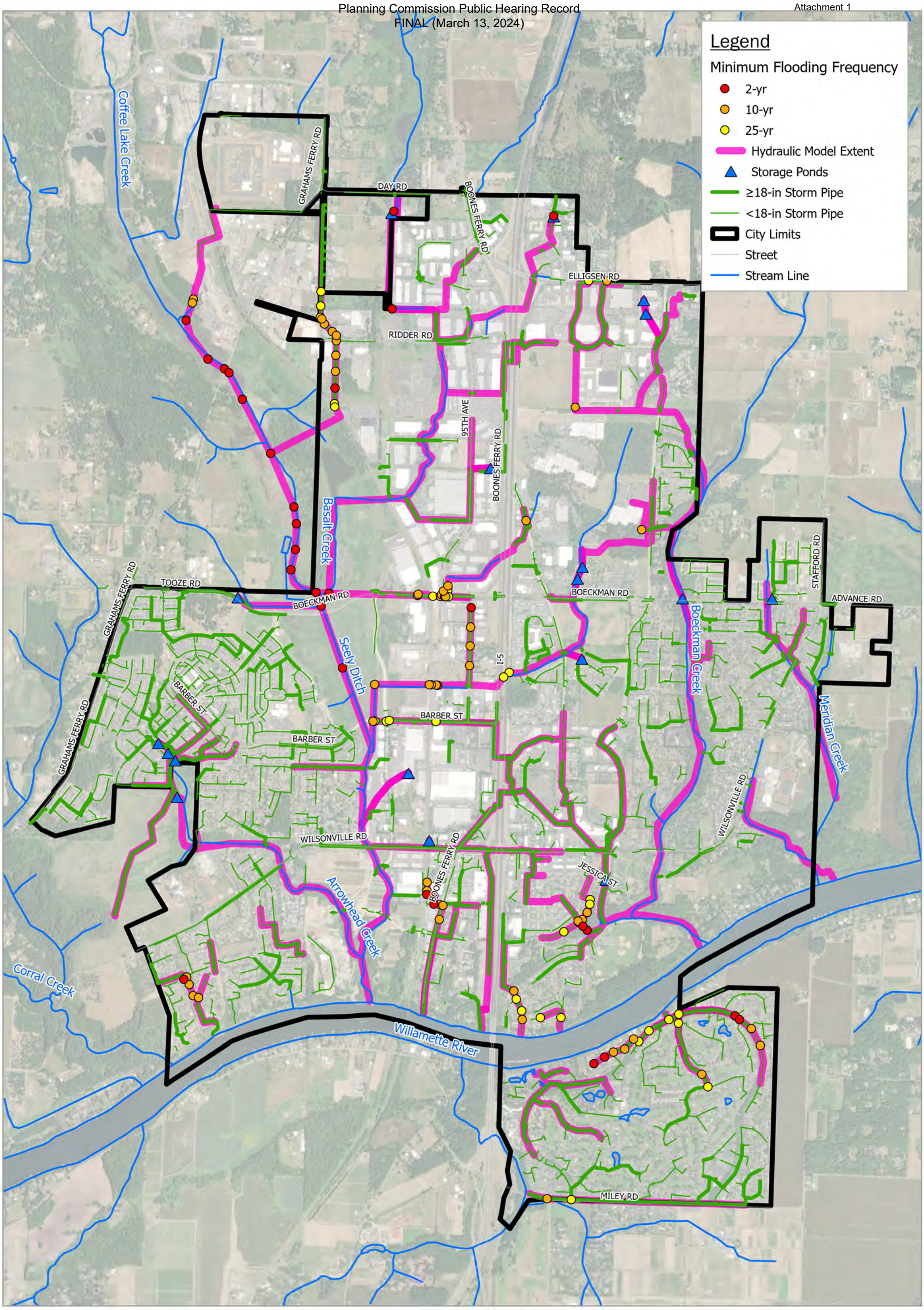
Date: 3/7/2023

Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %



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Spatial Reference:
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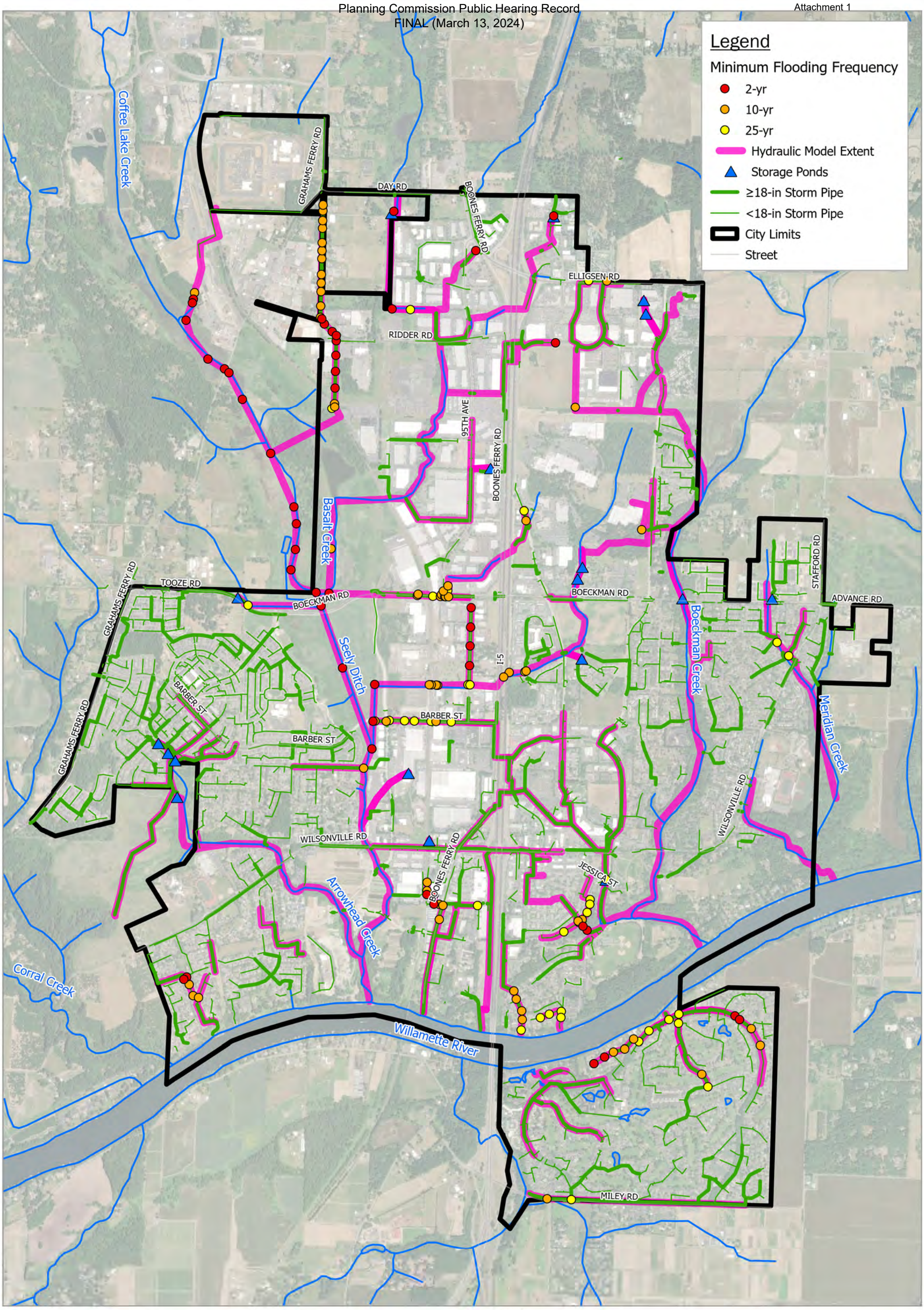
Feet

Date: 3/7/2023

Figure A-8. Hydraulic Results: Existing Condition Flooding Locations



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Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Feet

Date: 3/7/2023

Figure A-9. Hydraulic Results: Future Condition Flooding Locations

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Legend

2015 Retrofit Assessment

WQ Projects (higher priority in red text)
- Erosion Control
- Planting/Restoration
- Treatment
- BMP Drainage Area

Ponds
- Modeled
- Private
- Public

Existing Land Use
- VAC
- PARK
- OS
- COW Property
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Future Transp Corridors
- Street
- Stream Line

Basalt Creek
W Railroad
Coffee Creek
Villebois
Town Center
Frog Pond West
Frog Pond East and South
Coffee Lake Creek
Basalt Creek
Seely Ditch
Boeckman Creek
Meridian Creek
Arrowhead Creek
Corral Creek
Willamette River
I-5
95TH AVE
GRAHAMS FERRY RD
BOONES FERRY RD
DAY RD
BOECKMAN RD
TOOZE RD
BARBER ST
RIDDER RD
ELLIGSEN RD
WILSONVILLE RD
JESSICA ST
STAFFORD RD
MILEY RD
CLC-1
CLC-3
CLC-4
CLC-5
CLC-6
CLC-7
CLC-8
CLC-10B
LID-2
LID-3
LID-7
BC-2
BC-5
BC-8
BC-10
WD-4A
WD-4B
WD-4C
RE-14
RE-13
RE-P15
RE-P1
RE-P2
RE-P2A
RE-04B
RE-12A
RE-11
RE-12B
RE-15
RE-16
RW-01
RW-02
RW-03
RW-04
RW-05
RW-P2
RW-P3
UU-01
UU-02
UU-03
UU-04
UU-05
UU-06
UU-07
UU-08
UU-09
UU-10
UU-11
UU-12
UU-13
UU-P2A
UU-P2B
UU-P3 A/B
UU-P4

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Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Date: 3/7/2023

Figure A-10. Retrofit Analysis

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Attachment B: Tables

Table B-1: Preliminary Flooding Results

Table B-2: Hydrologic Model Inputs and Results

Table B-3: Hydraulic Model Inputs and Results

Table B-4: Working Project Opportunity Matrix *(removed for the 2024 SMP deliverable, instead refer to Appendix A, Table A-2 of the SMP for the final Project Opportunity Matrix)*

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Table B-1. Modeled Capacity Deficiencies

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
1	Charbonneau	Miley Rd.	Predicted flooding at 42" pipe segment upstream of Miley Rd. outfall.	10-yr	Rim elevations and inverts along pipe profile appears reasonable and match GIS data. No apparent issues.	None	10 (E&S)	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	N	Y	Y	City confirmed project need at this location for inclusion in the SMP.
2	Charbonneau	French Prairie Rd. & Old Farm Rd.	Flooding indicated throughout these piped systems. Model contains some pipe replacement projects completed as CIPs from the Charbonneau Consolidated Improvement Plan (2014). Small portion of all improvements recommended per the plan.	2-yr	Issues previously identified/documented in 2012 SMP and Charbonneau Consolidated Improvement Plan. Capacity issue appears to be the outfall piping (30") acting as a constriction to the upstream piping that was upsized (36") as part of the CIP.	Model previously was updated to reflect the completed CIPs. Asbuilts of the emergency outfall repair were provided and reviewed by BC. Confirmed model assumption of 30" diameter of outfall. Updated model to include revised pipe slope and Manning's roughness for installation of CMP liner based on provided asbuilt information.	None	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	Y (select phases completed)	Y	Y	Wallis Engineering is currently working on the design of pipe upsizing along SW French Prairie and SW Edgewater. City coordinated meeting between BC and Wallis with the goal to have the capacity deficiency identified by the SMP modeling effort (outfall pipe constriction) inform current design project. based on the capacity deficiency identified by the SMP modeling effort. This work is in progress and strategies are being discussed to provide flow detention to mitigate the model predicted flooding.
3	Willamette River	Parkway Ave./Metolius Ln.	Flooding at several nodes along N-S run of pipe. Constriction appears to be the small diameter pipe at the outfall and one conduit US.	10-yr	Invert elevations in MH prior to outfall are misaligned. Pipe sequence is 48">42">21">15" causing constriction. No GIS data available to verify the existing model data. Issue previously identified in previous MP.	None. Inverts and diameters appear odd but better information is not available in GIS to resolve. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	SD5707, SD5709, SD5714, and SD5719 (SW Parkway Pipes Replacement)	N	Y	?	
4	Willamette River	SW Miami	15" conveyance pipe with US node preliminary flooding results.	25-yr	Subbasin hydrology is inserted at most US node of each pipe segment to generate flow w/in all pipes. May not be fully representative of runoff received by US nodes in reality. There also is a pond that is not currently being modeled which may alleviate flooding to the system.	Original subbasin subdivided to try and address the suspected hydrology input issue. However flooding still predicted at this location.	None	N. However the drainage area to this location was revised from the original model.	None	N	Y	N	City does not recall issues at this location. Maintain this location as a flooding location however development of a project is not warranted.
5	Boeckman	Memorial Dr.	Piped system near Memorial Dr. swale predicts flooding.	2-yr	After convergence point at Memorial Dr. (ST5002) pipe sizes are 24">15">12">18">24" prior to outfall to Boeckman Creek causing the constriction and US flooding.	Asbuilts of the swale and piped system were provided and reviewed by BC. Asbuilts confirmed the model configuration, no adjustments required.	52 (swale issues)	Y	BC-9 (Memorial Drive Pathway and Storm Drain Repair)	Y	Y	Y	Based on confirmed pipe configuration and known issues at this location, project at this location is needed.
6	Boeckman	Library Pond	Preliminary Library Pond flooding, Depth >9' (pond max depth). and node DS of Library Pond outlet shows flooding	N/A	Unknown how previous model build accounted for amount of library pond storage or developed the outlet curve for flow leaving the pond. From site visit, outlet should just be a pipe w grate. Seems unlikely that pond would flood based on configuration.	Model updated per asbuilts to reflect pond outlet configuration	4 (CAP)	Y	None	N	N	Y	Project to be developed at this location to provide a flow control benefit for pond storage. Project need is primarily based on providing flow control for Town Center redevelopment and not for capacity (no issues observed by City).
7	Boeckman	Canyon Creek Rd (near Xerox)	Flooding at node that convey private SW (Xerox) to the S and then E across Canyon Creek Rd.	10-yr	Pipe sequence is 15">18">15">12">12" causing constriction at Canyon Creek Rd. Final 12" pipe is at 5%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	None		Y	N	City confirmed pipe configuration per as-built drawings. City does not recall this location as an issue and unlikely to be a project need.
8	Boeckman	Sysco Ditch	Flooding at US node of 30" culvert at end of N-S section of Sysco Ditch	10-yr	Issue (constriction) is at 30" culvert. Very steep slope @ 8.6%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	30 (CAP and MAINT)	N	BC-1 (Wiedeman Road Regional SW Detention/Stream Enhancement)		Y	N	Very limited grade. Flooding shown at upstream end of culvert and impacts downstream Costco property. Sysco owns property to west of ditch. Ditch can be removed (manmade) and they are proposing. Does not warrant a City project need - up to Sysco to resolve.
9	Boeckman	Elligsen Rd	Flooding along US nodes of 18" SW piping	10-yr	Model set up seems reasonable. Large subbasins is inserted at US end which may be causing the flooding. Trailer Park pond on N side of Elligsen is not currently in the model	None. Flooding likely can be disregarded here, otherwise additional routing likely needed for model (pond and open channel for routing purposes)	20 (MAINT)	Y	None		Y	N	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
10	Coffee Creek	Shrine Center Pond	Pond flooding (HGL>4.7' max pond depth) and DS node from pond outlet	2-yr	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	25 (MAINT Access)	Y	None		Y	Y (specfic to maintenance access only)	
11	Coffee Creek	NW of 95th Ave. and Ridder Rd. intersection	Preliminary flooding at US end of culvert that conveys flow E to W under a private parking lot (Penske Truck)	N/A	Rim elevation at US end of culvert appears low. GIS does not show culvert, so unable to verify inherited model data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	None	N	CLC-4 (Ridder Rd Wetland Restoration). Proj is immediately US of culvert that floods		N	N	Culvert under parking lot - private (Penske property) and not in GIS. City not aware of issues at this location but provided as-built information. -BC incorporated revised culvert information into model from provided asbuilts. US end of culvert flooding resolved.
12	Coffee Creek	Commerce Circle Ditch	Flooding throughout N-S run of ditch and culverts to the W of Commerce Circle	2-yr	See old MP and AKS study for issues that have been well documented. Current model has updated culvert inverts from survey	None	14/15/26 (R/R, MAINT, CAP)	Y	CLC-1 (Detention/Wetl and Facility near Tributary to Basalt Creek) and CLC-3 (Commerce Circle Channel Restoration)		Y	Y	Known important project area. Beaver dam, other unknowns may not be reflected in model and factor into current discrepancy in peak flow and WSE. Redevelopment application looking to build parking area west of channel and would have to span existing channel to other development area - no access from Day Road. -BC developed 4 representative cross-sections along the Commerce Circle Ditch based on AKS survey points. Model link geometry within this reach then revised accordingly. Note that survey data was unavailable for 1 model link and thus a revised cross-section was not developed for this section.
13	Coffee Creek	Garden Acres	N-S piped system along Garden Acres Rd. and Peters Rd. Outfalls to Coffee Creek wetlands.	2-yr	Prior to outfall there is several small diameter pipes (24") that cause constriction and elevated HGL that backs up system. Most other pipes in profile are large diameter (42"/36")	None. Model matches GIS info. City (Sean S.) provided as-builts of this outfall (1994) which showed this small diameter pipe near the outlet of piping run.	None	Not modeled	None		Y	Y	City not surprised by flooding here. This is a priority need in conjunction with build out of Coffee Creek area. Private development is currently having to overdetain. Higher priority need. Railroad and METRO coordination needed (outfalls to METRO property).
14	Coffee Creek	Coffee Creek Wetlands	Flooding throughout wetlands predicted	2-yr	Main issue is the generalization of cross-sections in the model(under represents the actual amount of storage in locations)	None	None	Y	None		Y	N	
15	Coffee Creek	Boeckman Corp. Center Pond	Flooding DS of flow control structure in model and at node near the US end. Flow control structure configuration rationale is unknown but appears to be the restriction	N/A	At very US end of this pipe segment there is a 30">12">24" which seems incorrect. GIS has same info	None. Would need to thouroughly look through asbuilts to modify how this flow control structure is modeled from scratch	None	Y	None		Y	N	US portion - on Parkway. No known issue DS portion - Car dealership - existing pond is mitigation for wetland. Flooding reported downstream of pond. City not aware of any flooding in area (may be an after effect of how pond was integrated into the model. - Based on asbuilt review, control structure configuration adjusted. Pond no longer floods during 25-yr storm event.
16	Coffee Creek	Boberg Rd. and RR crossing	Flooding along N-S pipe prior to discharging into ope channel. This was an area identified in original MP. Flooding also at two large diameter culverts (59" and 51"?!) flowing E-W underneath RR tracks	10-yr	Pipe profile looks reasonable. Previous CIP location. Culverts in model (in series) do not match configuration in GIS (parallel). GIS does not have diameters or inverts	None. Need more info about culverts to make updates	None	Y	SD4025-SD4029 (Boberg Rd Pipe Replacement)		Y	?	
17	Coffee Creek	I-5 Culverts	Flooding at culverts crossing I-5 from E to W	25-yr	Profile looks reasonable. Culvert size (36") can not be verified as that info is not in the GIS data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	35 (R&R)	N	None		Y	N	City thinks that flooding at this location is accurate. Maintain as a flooding location, however a project that upsizes ODOT culverts is unlikely.
18	Coffee Creek	Barber St	Flooding indicated at several DS nodes prior to outfall and at node near RR tracks	25-yr	DS flooding along this segment appears to be from backwatering of Coffee Creek (see location #14). Profile appears reasonable and matches the GIS data.	None	None	Y	SD4208 and SD4209 (Barber Street Pipe Replacement). -	N	Y	Unlikely	
19	Willamette River	River Fox Park (site visit	Flooding predicted within 12" pipes	2-yr	Profile looks reasonable and matches the GIS data.	None	22 (MAINT and CAP)	N	None	N/A	Y	Y	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
20	Willamette River	Lower Boones Ferry	Flooding along 18" Piped segment on private property.	2-yr	Hydrology is input at most US node to generate flow through all pipes, not reflective of reality for US node flooding.	Split subbasin at this location with assumption that they have the same hydrology characteristics. Model still indicates flooding during the 25-yr event.	None	Y	None	N/A	Y	?	
21	Coffee Creek	Wilsonville Distr Center Pond	Model predicts pond flooding	N/A	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	None	N. However the original model is configured incorrectly such that flow is not actually routed through the pond.	None	N/A	N	?	

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
1000	STAFFORD_POND	69.13	33.7	33.7	11.2	1616	6.85	0.36	0.25	14.3	14.3	23.9	23.9	29.8	29.8	38.7	38.7
1000B	ST1000	28.49	59.7	62.4	3.8	673	7.26	0.35	0.23	9.9	10.3	15.0	15.6	17.8	18.4	21.7	22.3
1100	ST1100	55.81	29.9	52.1	1.5	1516	6.69	0.37	0.26	9.8	16.6	15.2	24.7	18.2	29.1	22.8	35.2
1104	ST1104	21.55	82.2	82.2	1.7	625	6.69	0.37	0.26	9.8	9.8	14.3	14.3	16.6	16.6	19.6	19.6
1114	ST1114	74.81	15.3	15.3	7.8	1303	6.69	0.37	0.26	7.1	7.1	12.8	12.8	16.5	16.5	22.5	22.5
1116	ST1116	3.25	82.2	82.2	4.6	209	6.69	0.37	0.26	1.6	1.6	2.4	2.4	2.8	2.8	3.3	3.3
1124	ST1124	14.02	70.8	70.8	4.9	601	6.69	0.37	0.26	5.9	5.9	8.9	8.9	10.5	10.5	12.6	12.6
1125	ST1125	10.91	71.6	71.6	4.5	649	6.69	0.37	0.26	4.7	4.7	7.1	7.1	8.4	8.4	10.1	10.1
1133A	ST1002	14.12	10.0	10.0	11.9	412	6.69	0.37	0.26	1.0	1.0	2.5	2.5	3.5	3.5	5.1	5.1
1133B	ST1000	4.26	74.4	79.8	3.6	370	6.69	0.37	0.26	1.9	2.1	2.9	3.1	3.4	3.6	4.1	4.3
1133C	ST1132	25.05	74.2	80.6	2.1	766	6.69	0.37	0.26	10.5	11.3	15.5	16.7	18.1	19.4	21.6	22.9
1201	ST1201	2.75	66.1	66.1	5.6	151	6.69	0.37	0.26	1.1	1.1	1.7	1.7	2.0	2.0	2.4	2.4
1202	PST1202	4.78	64.1	64.1	11.9	588	6.69	0.37	0.26	2.0	2.0	3.2	3.2	3.8	3.8	4.6	4.6
1207	PST1207	4.10	64.1	64.1	14.5	392	6.69	0.37	0.26	1.7	1.7	2.7	2.7	3.2	3.2	3.9	3.9
1302	ST1302	0.70	39.5	39.5	1.8	68	6.69	0.37	0.26	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
1303	ST1303	35.38	19.2	51.4	5.6	841	6.69	0.37	0.26	4.2	10.7	7.4	16.3	9.4	19.5	12.6	23.9
1307A	ST1307	2.27	36.0	47.3	5.4	733	6.69	0.37	0.26	0.7	0.8	1.3	1.4	1.6	1.7	2.0	2.1
1307B	ST1402	20.17	36.0	47.3	5.4	733	6.69	0.37	0.26	4.4	5.8	7.3	9.1	9.1	11.0	11.7	13.8
1504	ST1504	1.09	37.0	43.6	2.8	82	6.69	0.37	0.26	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.8
1603A	ST1404A	63.03	30.0	37.1	3.8	1121	6.69	0.37	0.26	11.2	13.7	17.2	20.8	20.8	24.8	26.0	30.6
1603B	ST1603	809.84	12.6	26.7	3.5	3376	7.01	0.36	0.24	58.3	112.1	87.9	166.3	104.4	194.8	129.7	235.6
1604	POND_BOECKMAN	69.37	19.4	40.0	5.6	1559	6.69	0.37	0.26	8.3	16.5	14.3	25.7	18.2	31.0	24.4	38.7
1608	ST1608	3.82	49.3	62.5	4.1	209	6.69	0.37	0.26	1.1	1.4	1.9	2.2	2.3	2.7	2.8	3.2
1701	ST1701	25.65	40.7	40.7	2.2	907	6.69	0.37	0.26	6.2	6.2	9.6	9.6	11.6	11.6	14.4	14.4
1703	ST1703	171.87	41.3	46.8	1.5	2258	6.69	0.37	0.26	38.3	42.6	56.6	62.9	66.3	73.5	79.7	88.2
1711	ST1711	9.40	69.5	69.5	3.6	531	6.69	0.37	0.26	3.9	3.9	5.9	5.9	7.0	7.0	8.4	8.4
1726	ST1726	29.64	54.6	60.0	1.1	721	6.69	0.37	0.26	8.9	9.7	13.2	14.4	15.5	16.8	18.6	20.1
2000	ST2000	250.97	9.7	21.1	1.3	2548	8.82	0.30	0.14	16.6	32.0	30.9	52.7	30.4	55.3	30.9	59.8
2008	ST2008	1550.87	31.4	42.1	0.9	4917	6.57	0.34	0.19	194.4	238.8	292.4	358.6	343.9	421.2	415.2	507.8
2019	ST2019	102.09	48.4	76.9	3.6	2343	6.75	0.36	0.26	28.8	44.3	43.6	65.1	51.8	75.9	63.4	90.1
2101A	ST2120	69.86	43.0	62.5	2.9	1499	7.45	0.35	0.22	17.8	25.0	27.4	37.5	33.2	44.5	41.3	54.0
2101B	ST2101	44.71	50.7	50.7	1.4	1656	6.74	0.36	0.26	13.2	13.2	19.9	19.9	23.6	23.6	28.8	28.8
2107A	ST2123	359.21	24.0	41.2	1.2	2353	7.15	0.35	0.23	44.8	68.9	66.6	102.5	78.3	120.0	95.0	144.3
2107B	ST2123	178.65	22.1	55.4	1.9	1285	6.69	0.37	0.26	21.8	46.4	32.3	68.6	37.9	80.0	45.9	95.5
2112A	ST2112	88.70	15.9	56.5	2.9	1214	6.69	0.37	0.26	8.4	27.3	13.4	40.3	16.4	47.1	21.1	56.5
2112B	ST2112	43.89	62.6	71.3	2.9	854	6.69	0.37	0.26	15.4	17.3	22.7	25.4	26.6	29.7	31.9	35.4
2118	ST2118	42.69	52.3	52.3	2.0	571	7.85	0.34	0.19	12.1	12.1	18.4	18.4	21.8	21.8	26.6	26.6
2402	ST2402	112.36	39.2	41.2	1.6	1188	6.69	0.37	0.26	23.3	24.3	34.4	35.9	40.3	42.0	48.4	50.4

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
2405	ST2405	13.00	63.9	63.9	1.4	785	6.69	0.37	0.26	4.9	4.9	7.4	7.4	8.8	8.8	10.6	10.6
2406	ST2406	15.27	22.0	56.6	2.0	463	6.69	0.37	0.26	2.0	5.0	3.3	7.5	4.2	8.8	5.4	10.7
2409	ST2409	11.04	57.3	57.4	1.2	422	7.23	0.35	0.23	3.7	3.7	5.6	5.6	6.6	6.6	8.1	8.1
2413A	ST2413	2.04	46.8	50.2	1.1	73	6.69	0.37	0.26	0.6	0.6	0.8	0.9	1.0	1.0	1.2	1.3
2413B	ST2410	10.32	66.1	66.4	1.6	444	6.69	0.37	0.26	4.0	4.0	5.9	5.9	6.9	7.0	8.3	8.4
2701A	ST2119A	102.46	28.7	67.3	1.6	2586	6.69	0.37	0.26	17.4	38.2	26.8	56.4	32.3	65.9	40.4	78.7
2701B	ST2105A	128.40	39.2	41.1	1.8	2063	6.69	0.37	0.26	28.3	29.6	42.1	43.9	49.5	51.6	60.1	62.5
2707	ST2707	23.67	64.1	64.1	2.3	650	6.69	0.37	0.26	8.7	8.7	12.9	12.9	15.1	15.1	18.1	18.1
2711	ST2711	26.66	70.9	70.9	2.2	755	6.69	0.37	0.26	10.7	10.7	15.8	15.8	18.5	18.5	22.1	22.1
2720	ST2720	24.22	57.1	57.1	2.2	484	6.69	0.37	0.26	7.7	7.7	11.4	11.4	13.4	13.4	16.1	16.1
3005	ST3005	14.54	50.8	51.3	2.8	598	6.69	0.37	0.26	4.4	4.4	6.8	6.9	8.2	8.2	10.1	10.1
3008	ST3008	213.73	16.8	38.0	2.4	1453	6.69	0.37	0.26	20.4	41.6	30.5	61.4	36.1	71.7	44.2	85.9
3011	ST3011	51.74	45.7	46.3	2.8	2046	6.69	0.37	0.26	14.1	14.3	22.0	22.3	26.6	26.8	33.0	33.3
3017A	9067	36.66	10.9	46.6	1.5	600	6.69	0.37	0.26	2.4	9.3	4.0	13.8	4.9	16.2	6.5	19.4
3017B	STAFFORD_MEADOWS_1_BASIN	38.68	27.2	51.3	1.4	774	6.69	0.37	0.26	6.1	10.9	9.3	16.2	11.1	19.0	13.7	22.8
3025	ST3024	5.99	31.7	51.0	2.5	378	6.69	0.37	0.26	1.2	1.9	2.0	2.9	2.6	3.6	3.4	4.4
3201	ST3201	51.42	29.7	30.3	4.5	918	6.69	0.37	0.26	9.1	9.2	14.1	14.4	17.1	17.4	21.5	21.8
3204	ST3204	64.53	46.3	46.3	2.0	1078	6.69	0.37	0.26	16.7	16.7	24.7	24.7	29.1	29.1	35.1	35.1
3207	ST3207	78.25	17.7	56.7	2.1	1728	6.69	0.37	0.26	8.4	25.0	13.6	37.1	16.9	43.6	22.0	52.5
3208	RENAISSANCE_POND	25.07	41.1	41.2	0.9	587	6.69	0.37	0.26	5.8	5.8	8.6	8.6	10.1	10.1	12.2	12.2
3212	ST3212	7.21	62.2	66.8	2.1	366	6.69	0.37	0.26	2.7	2.8	4.0	4.3	4.8	5.0	5.8	6.1
3216	ST3208	30.40	62.0	62.0	2.0	881	6.69	0.37	0.26	10.8	10.8	16.0	16.0	18.8	18.8	22.6	22.6
3218	ST3218	14.44	19.6	51.8	1.8	415	6.69	0.37	0.26	1.7	4.3	2.8	6.5	3.5	7.6	4.6	9.3
3402	ST3402	34.92	41.4	52.6	1.4	1087	6.69	0.37	0.26	8.4	10.5	12.8	15.7	15.2	18.6	18.7	22.5
3414	ST3414	25.72	43.5	46.7	1.6	652	6.69	0.37	0.26	6.4	6.9	9.7	10.3	11.4	12.1	13.9	14.8
3417	ST3417	3.75	52.0	52.2	2.4	230	6.69	0.37	0.26	1.2	1.2	1.9	1.9	2.2	2.3	2.8	2.8
3418A	ST3421	14.99	51.6	52.0	0.6	631	6.69	0.37	0.26	5.6	5.7	8.9	8.9	10.4	10.4	12.2	12.3
3418B	ST3418	8.22	52.2	52.2	0.5	456	6.69	0.37	0.26	2.5	2.5	3.7	3.7	4.4	4.4	5.3	5.3
3420	ST3420	20.12	51.0	52.2	3.2	1215	6.69	0.37	0.26	6.2	6.4	10.0	10.2	12.1	12.3	15.0	15.2
3425	ST3425	15.60	51.2	51.3	1.2	378	6.69	0.37	0.26	4.5	4.5	6.6	6.6	7.8	7.8	9.4	9.4
3436	ST3436	22.08	48.4	52.2	1.8	734	6.69	0.37	0.26	6.2	6.7	9.4	10.1	11.2	11.9	13.7	14.5
3443	ST3443	4.70	49.2	51.3	2.3	314	6.69	0.37	0.26	1.4	1.5	2.2	2.3	2.7	2.8	3.4	3.5
3445	ST3445	23.46	63.5	63.5	2.6	930	6.69	0.37	0.26	8.7	8.7	13.2	13.2	15.5	15.5	18.8	18.8
3451	ST3451	3.55	56.1	56.1	0.9	289	6.69	0.37	0.26	1.2	1.2	1.8	1.8	2.2	2.2	2.7	2.7
3600	ST3600	91.20	41.5	43.1	3.7	1193	6.69	0.37	0.26	21.5	22.2	32.0	33.1	37.7	38.9	45.8	47.2
3602	ST3602	90.57	39.7	39.9	5.8	1918	6.69	0.37	0.26	21.4	21.5	33.1	33.3	40.0	40.1	49.9	50.0
3607	ST3606	82.77	36.5	36.5	2.9	916	6.70	0.37	0.26	16.9	16.9	25.0	25.1	29.4	29.5	35.6	35.7
4003	ST4003	95.74	18.9	22.1	1.7	1565	8.66	0.31	0.17	11.5	13.2	19.6	21.9	24.8	27.5	32.5	35.6

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4008	ST4008	12.06	67.5	70.9	3.3	714	6.69	0.37	0.26	4.9	5.1	7.4	7.7	8.8	9.1	10.6	10.9
4012	ST4012	22.39	59.4	66.3	2.0	626	6.69	0.37	0.26	7.6	8.4	11.3	12.4	13.3	14.6	16.0	17.5
4014	ST4014	41.33	66.2	66.2	2.7	710	6.69	0.37	0.26	14.9	14.9	22.0	22.0	25.7	25.7	30.8	30.8
4029	ST4029	59.74	51.7	64.5	2.7	1218	6.69	0.37	0.26	17.6	21.5	26.2	31.8	30.9	37.2	37.4	44.6
4202	ST4202	34.53	63.0	64.3	1.0	936	6.59	0.33	0.16	12.3	12.5	19.0	19.3	22.6	22.9	25.2	25.6
4203	ST4203	13.49	31.3	48.5	1.5	630	7.57	0.34	0.22	2.6	4.0	4.4	6.2	5.5	7.5	7.2	9.4
4204	COCA-COLA_POND	32.66	68.5	68.5	0.5	726	5.91	0.36	0.23	11.1	11.1	16.5	16.5	19.3	19.3	23.1	23.1
4205A	ST4205	89.30	40.5	40.5	3.2	1666	7.97	0.33	0.20	21.6	21.6	33.6	33.6	40.9	40.9	51.3	51.3
4205B	ST4205	113.36	28.3	34.3	1.3	2147	9.25	0.30	0.14	20.3	23.9	34.4	39.4	35.4	41.2	37.5	44.3
4205C	ST4000	79.50	29.0	29.0	3.2	1548	9.46	0.28	0.11	17.5	17.5	20.2	20.2	24.4	24.4	30.6	30.6
4214	ST4214	13.80	61.0	68.2	1.9	778	6.69	0.37	0.26	5.0	5.6	7.6	8.4	9.1	9.9	11.0	11.8
4216	ST4216	13.42	61.5	66.8	2.5	563	6.69	0.37	0.26	4.9	5.3	7.4	7.9	8.7	9.3	10.6	11.2
4225	ST4225	11.73	54.8	66.6	0.8	449	6.69	0.37	0.26	3.7	4.4	5.4	6.4	6.4	7.5	7.7	9.0
4226	WILSONVILLE_DIST_CTR_POND	65.84	68.0	68.0	1.0	1069	6.69	0.37	0.26	22.3	22.3	32.9	32.9	38.3	38.3	45.7	45.7
4228A	ST4228	28.98	72.6	74.3	1.4	623	6.69	0.37	0.26	11.2	11.4	16.4	16.8	19.2	19.5	22.8	23.2
4228B	ST6007	14.64	82.2	82.2	1.1	522	6.27	0.36	0.24	6.6	6.6	9.8	9.8	11.3	11.3	13.4	13.4
4231	ST4231	6.30	56.3	57.4	3.9	511	6.69	0.37	0.26	2.2	2.2	3.5	3.6	4.3	4.3	5.2	5.3
4400	ST4400	84.63	33.9	37.5	2.9	1896	6.69	0.37	0.26	16.9	18.6	26.1	28.5	31.4	34.1	39.2	42.2
4403A	ST4403	93.84	23.5	23.5	2.0	1987	6.88	0.36	0.25	13.2	13.2	20.7	20.7	25.2	25.2	32.1	32.1
4403B	ST4402	34.38	31.5	31.5	0.7	841	6.69	0.37	0.26	6.2	6.2	9.3	9.3	11.0	11.0	13.4	13.4
4404A	ST4639	19.90	32.9	32.9	2.6	672	6.69	0.37	0.26	3.9	3.9	6.3	6.3	7.7	7.7	9.8	9.8
4404B	ST4404	8.40	32.9	32.9	2.6	672	6.69	0.37	0.26	1.7	1.7	3.1	3.1	4.0	4.0	5.2	5.2
4501	ST4501	18.45	34.0	52.1	1.8	420	6.78	0.36	0.26	3.7	5.4	5.6	8.1	6.6	9.5	8.2	11.5
4502	ST4502	22.56	31.8	32.3	4.2	1035	6.69	0.37	0.26	4.4	4.5	7.6	7.7	9.6	9.7	12.5	12.6
4503A	ST4503	58.83	46.4	49.1	2.6	745	5.59	0.36	0.21	15.2	15.9	22.8	23.9	27.1	28.4	33.1	34.6
4503B	ST4503	81.06	6.2	64.1	3.9	1499	5.80	0.36	0.22	3.7	29.6	8.2	44.3	11.7	52.4	17.7	63.4
4503C	ST4503	30.20	13.8	39.1	5.7	899	5.86	0.33	0.14	4.2	8.5	9.9	15.3	8.3	15.0	8.8	16.5
4503D	TOOZE_POND	12.16	49.2	51.8	3.2	450	4.99	0.36	0.19	3.7	3.9	6.1	6.3	7.5	7.7	9.3	9.5
4608	ST4608	10.25	51.9	51.9	1.6	280	6.69	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4611	POND_E2	7.97	47.5	47.5	2.7	475	6.69	0.37	0.26	2.3	2.3	3.7	3.7	4.5	4.5	5.6	5.6
4614A	POND_E1	53.36	42.8	42.9	1.6	1058	6.69	0.37	0.26	12.9	12.9	19.2	19.2	22.6	22.6	27.4	27.4
4614B	ST4829	11.09	45.2	52.2	2.2	662	6.69	0.37	0.26	3.0	3.5	4.9	5.5	5.9	6.6	7.4	8.1
4617A	ST4610	6.68	52.1	52.1	1.6	378	6.69	0.37	0.26	2.1	2.1	3.2	3.2	3.8	3.8	4.7	4.7
4617B	ST4803	5.35	52.2	52.2	2.1	268	6.69	0.37	0.26	1.7	1.7	2.6	2.6	3.1	3.1	3.8	3.8
4617C	ST4617	4.89	52.2	52.2	2.2	310	6.69	0.37	0.26	1.5	1.5	2.4	2.4	2.9	2.9	3.6	3.6
4623	ST4623	4.26	52.2	52.2	1.2	453	6.69	0.37	0.26	1.4	1.4	2.2	2.2	2.6	2.6	3.3	3.3
4631A	ST4631	9.68	52.2	52.2	0.8	535	6.66	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4631B	ST4806	10.14	52.2	52.2	2.4	615	6.66	0.37	0.26	3.2	3.2	5.0	5.0	6.1	6.1	7.5	7.5

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4632A	04632A	49.06	31.8	31.8	1.7	814	6.69	0.37	0.26	8.9	8.9	13.4	13.4	15.8	15.8	19.4	19.4
4632B	04632B	41.58	43.7	43.7	1.2	674	6.69	0.37	0.26	9.9	9.9	14.6	14.6	17.1	17.1	20.5	20.5
5004A	ST5004	5.30	59.7	59.7	3.1	360	5.50	0.36	0.21	2.0	2.0	3.2	3.2	3.9	3.9	4.7	4.7
5004B	ST5028	6.65	54.3	54.3	4.2	380	6.69	0.37	0.26	2.2	2.2	3.5	3.5	4.2	4.2	5.2	5.2
5006	ST5006	9.00	64.1	64.1	1.1	589	6.69	0.37	0.26	3.4	3.4	5.1	5.1	6.0	6.0	7.3	7.3
5022	ST5022	4.80	70.7	70.7	0.9	304	6.69	0.37	0.26	2.0	2.0	2.9	2.9	3.4	3.4	4.1	4.1
5024	ST5024	7.31	78.8	78.8	1.2	645	6.69	0.37	0.26	3.4	3.4	5.1	5.1	5.9	5.9	7.0	7.0
5033	ST5033	4.32	71.8	71.8	3.3	476	6.69	0.37	0.26	1.9	1.9	2.9	2.9	3.4	3.4	4.2	4.2
5037	ST5037	2.66	49.2	50.3	3.5	135	4.36	0.35	0.16	0.9	0.9	1.5	1.5	1.8	1.9	2.0	2.0
5038	ST5038	15.24	43.6	43.6	7.1	553	6.69	0.37	0.26	4.0	4.0	6.6	6.6	8.1	8.1	10.2	10.2
5200	ST5200	64.84	21.6	23.9	4.8	1222	6.75	0.36	0.26	8.5	9.3	13.9	15.1	17.2	18.6	22.4	23.9
5207	ST5207	26.98	23.7	23.7	2.5	1176	6.91	0.36	0.24	4.0	4.0	7.2	7.2	9.1	9.1	12.4	12.4
5210	05210	37.10	23.5	23.5	10.3	3038	6.21	0.37	0.29	5.3	5.3	12.9	12.9	17.2	17.2	23.0	23.0
5501	ST5501	40.80	14.3	14.3	8.6	1077	7.94	0.33	0.19	4.6	4.6	10.2	10.2	14.2	14.2	19.9	19.9
5502	05502	75.65	12.7	13.9	7.8	1936	7.24	0.34	0.24	6.5	7.0	13.7	14.4	18.5	19.3	27.1	27.9
5706A	ST5703	8.78	43.6	47.1	3.6	607	5.51	0.36	0.24	2.4	2.6	4.1	4.3	5.1	5.3	6.5	6.7
5706B	ST5706	11.41	43.6	47.1	3.6	607	5.51	0.36	0.24	3.1	3.3	5.1	5.4	6.3	6.6	8.0	8.3
5709	ST5709	29.34	43.9	53.0	6.1	642	5.20	0.36	0.22	7.8	9.3	12.3	14.4	15.1	17.3	18.9	21.4
5713	ST5713	25.39	71.0	71.0	2.9	985	6.30	0.36	0.24	10.6	10.6	15.9	15.9	18.7	18.7	22.4	22.4
5718	ST5718	34.38	39.0	46.2	7.6	1251	6.12	0.34	0.16	9.6	11.0	17.7	19.3	21.9	23.6	23.1	25.2
6001	ST6001	24.29	39.6	39.6	10.7	1121	5.08	0.36	0.19	6.8	6.8	12.5	12.5	15.8	15.8	19.6	19.6
6004	ST6003	13.42	53.7	53.7	1.6	528	5.03	0.36	0.19	4.4	4.4	6.9	6.9	8.3	8.3	10.2	10.2
6013A	ST6013	6.55	73.9	73.9	1.3	1183	4.91	0.36	0.19	3.1	3.1	4.9	4.9	5.7	5.7	6.7	6.7
6013B	ST6007	9.69	73.9	73.9	1.3	1183	4.91	0.36	0.19	4.5	4.5	7.0	7.0	8.2	8.2	9.7	9.7
6021	ST6021	12.43	68.8	68.8	1.0	513	3.99	0.35	0.15	4.9	4.9	7.8	7.8	8.9	8.9	10.4	10.4
6022	ST6022	27.99	51.1	51.1	6.8	687	5.56	0.37	0.30	8.4	8.4	12.6	12.6	15.1	15.1	18.3	18.3
6031	ST6031	14.40	65.2	65.2	1.9	429	6.61	0.37	0.26	5.3	5.3	7.9	7.9	9.3	9.3	11.1	11.1
6201A	ST6412	56.66	34.1	42.4	1.9	885	5.81	0.36	0.22	11.1	13.5	16.9	20.3	20.2	24.2	25.1	29.6
6201B	ST6201	97.87	25.0	49.0	3.0	1101	4.90	0.36	0.19	14.6	26.4	23.2	40.1	28.4	47.8	36.2	58.4
6205	ST6205	25.21	37.1	49.6	2.3	757	6.71	0.36	0.25	5.6	7.3	8.7	11.1	10.5	13.3	13.2	16.3
6210	06210	26.56	23.8	51.5	4.4	551	4.29	0.35	0.17	4.2	8.4	7.8	13.4	10.1	16.2	12.0	19.0
6211	06211	16.53	37.7	37.7	10.1	587	4.46	0.35	0.17	4.5	4.5	8.3	8.3	10.4	10.4	12.2	12.2
6411A	ST6411	10.69	40.1	40.1	2.4	565	6.37	0.36	0.25	2.6	2.6	4.3	4.3	5.3	5.3	6.7	6.7
6411B	ST6405	7.47	40.1	40.1	2.4	565	6.37	0.36	0.25	1.9	1.9	3.2	3.2	4.0	4.0	5.1	5.1
6416A	ST6653	11.82	48.7	49.7	1.7	435	6.68	0.37	0.26	3.4	3.4	5.1	5.2	6.1	6.2	7.5	7.6
6416B	06416	59.26	34.8	36.5	5.6	1204	6.68	0.37	0.26	12.3	12.9	19.3	20.0	23.3	24.2	29.4	30.4
6610A	ST6610	15.48	44.9	46.9	2.6	789	6.69	0.37	0.26	4.2	4.4	6.7	6.9	8.1	8.4	10.2	10.5
6610B	ST6605	18.06	43.6	43.6	7.3	525	6.69	0.37	0.26	4.8	4.8	7.6	7.6	9.2	9.2	11.6	11.6

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Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
6611	06611	20.49	44.0	44.1	6.3	530	6.69	0.37	0.26	5.4	5.4	8.4	8.5	10.2	10.2	12.7	12.7
9003	ST9003	52.84	50.4	50.4	1.6	900	6.35	0.36	0.25	14.6	14.6	21.6	21.6	25.3	25.3	30.5	30.5
9006	ST9006	26.30	43.4	43.4	1.8	752	4.66	0.35	0.18	7.0	7.0	11.2	11.2	13.7	13.7	17.0	17.0
9013	ST9013	58.92	43.4	43.4	0.7	1462	4.40	0.35	0.17	14.7	14.7	22.9	22.9	27.6	27.6	32.4	32.4
9019	ST9019	46.34	43.4	43.4	2.0	995	3.51	0.35	0.13	12.2	12.2	18.9	18.9	20.6	20.6	25.2	25.2
9023	ST9023	11.00	42.7	43.4	1.5	481	4.61	0.35	0.18	3.0	3.0	4.9	5.0	6.1	6.1	7.6	7.7
9024	ST9024	30.75	41.9	41.9	4.5	727	3.57	0.35	0.16	8.3	8.3	13.8	13.8	17.3	17.3	19.0	19.0
9027	ST9027	14.17	43.4	43.4	3.2	799	3.50	0.35	0.13	4.3	4.3	7.3	7.3	7.7	7.7	9.7	9.7
9031	ST9031	56.63	43.4	43.4	1.3	1438	3.51	0.35	0.13	14.8	14.8	22.9	22.9	25.0	25.0	30.5	30.5
9032	ST9032	29.13	42.7	42.7	3.9	608	3.72	0.35	0.16	7.8	7.8	12.7	12.7	15.9	15.9	17.4	17.4
9039	ST9039	24.37	51.0	51.0	5.4	777	3.58	0.35	0.16	8.1	8.1	13.4	13.4	16.6	16.6	18.3	18.3
9041	ST9066	19.00	64.7	64.7	1.2	395	4.18	0.35	0.16	6.7	6.7	10.2	10.2	12.2	12.2	13.8	13.8
9048A	ST9044	11.52	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.8	3.8	6.3	6.3	7.6	7.6	9.4	9.4
9048B	ST9048	8.86	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.0	3.0	5.0	5.0	6.1	6.1	7.4	7.4
9051	ST9051	7.62	43.3	43.4	1.8	365	3.82	0.35	0.14	2.2	2.2	3.6	3.6	4.0	4.0	4.6	4.6
9059A	ST9053	13.59	43.4	43.4	1.4	582	6.15	0.36	0.24	3.5	3.5	5.5	5.5	6.6	6.6	8.3	8.3
9059B	ST9059	11.82	43.4	43.4	1.4	582	6.15	0.36	0.24	3.1	3.1	4.9	4.9	5.9	5.9	7.4	7.4
9060	ST9060	11.18	63.9	64.7	1.8	230	3.50	0.35	0.13	4.0	4.1	6.1	6.2	6.8	6.9	8.1	8.2
9065	ST9065	14.62	35.3	39.3	10.5	997	4.96	0.33	0.12	4.2	4.5	7.6	7.9	8.2	8.6	10.6	11.0
9071	09071	10.19	39.8	40.4	8.5	743	5.61	0.33	0.14	3.6	3.7	6.5	6.6	6.6	6.6	7.2	7.2
9072	09072	19.38	43.9	43.9	4.1	1126	6.69	0.37	0.26	5.2	5.2	8.7	8.7	10.7	10.7	13.5	13.5
CANYON_N	CANYON_CR_PH2_DET	7.24	70.4	70.4	9.3	367	6.69	0.37	0.26	3.1	3.1	4.8	4.8	5.6	5.6	6.8	6.8
CANYON_S	CANYON_CR_ARCH_PIPE	7.74	70.9	70.9	3.9	469	6.69	0.37	0.26	3.3	3.3	5.0	5.0	5.9	5.9	7.1	7.1
FUT6612	06612	50.30	3.7	64.1	5.1	1383	6.69	0.37	0.26	1.5	18.9	4.7	28.4	7.1	33.5	11.4	40.4
S_1203	1203	3.59	64.8	64.8	5.5	126	6.69	0.37	0.26	1.4	1.4	2.1	2.1	2.5	2.5	3.0	3.0
TONKIN_NISSAN_BASIN	TONKIN_NISSAN_POND	17.83	37.3	43.5	0.9	638	6.69	0.37	0.26	3.9	4.5	5.9	6.7	7.0	8.0	8.7	9.8

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
ST1202	1203	ST1202	CIRCULAR	1.5	-	262	276.62	265.7	3.87	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
17559	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
17558	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
SD6629	6652	ST6618	CIRCULAR	0.83	-	106.2	161.33	160.0	1.04	0.013	0.0	0.0	0.0	0.3	NF	0.0	0.0	0.0	1.8	NF
STAFFORD_MEADOWS_CHANNEL	9067	3316	STAFFORD_CHANNEL	88	3	410	214.8	212.8	0.50	0.035	2.4	3.8	4.8	6.3	NF	9.2	13.6	15.8	19.1	NF
SD2151	DAY_RD_IMPOUNDMENT	ST2107	CIRCULAR	2	-	192.4	227.55	227.5	0.07	0.01	17.4	16.7	16.4	16.4	2-yr, 24-hr	16.8	16.7	16.7	16.9	2-yr, 24-hr
SD5218	POND_LIBRARY	ST5215	CIRCULAR	1.5	-	69	140.76	136.0	4.08	0.013	19.3	22.2	22.2	22.2	100-yr, 24-hr	21.9	22.2	22.2	22.1	25-yr, 24-hr
PST1204	PST1202	PST1204	CIRCULAR	1	-	84.3	331.58	329.2	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1205	PST1204	PST1205	CIRCULAR	1	-	129.3	329.2	314.6	11.16	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1206	PST1205	PST1206	CIRCULAR	1	-	189.2	314.58	309.5	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1207	PST1206	PST1207	CIRCULAR	1	-	121.8	309.49	307.0	1.91	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1208	PST1207	PST1208	CIRCULAR	1	-	61.1	306.97	292.8	8.21	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.7	NF
PST1209	PST1208	PST1209	CIRCULAR	1	-	116.5	292.77	278.1	14.30	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
1203	PST1209	1203	CIRCULAR	1	-	23.3	278.08	276.6	1.50	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
SD1740	SIEMENS_POND_C&D	ST3208	CIRCULAR	2.5	-	77	208.45	207.0	1.95	0.013	2.8	6.1	8.3	11.8	NF	3.5	7.5	10.1	14.3	NF
SD1000	ST1000	ST1129	CIRCULAR	2.5	-	142.7	257.9	253.5	3.12	0.013	18.9	25.5	28.9	33.7	NF	19.5	26.2	29.7	34.6	NF
SD1001	ST1001	ST1000	CIRCULAR	1.5	-	900	270.05	257.9	1.24	0.013	7.2	8.3	7.9	8.1	NF	7.2	7.8	7.8	8.1	NF
SD1002	ST1002	ST1001	CIRCULAR	1.25	-	540	277.75	270.1	1.38	0.013	7.2	8.4	8.7	8.3	25-yr, 24-hr	7.2	8.1	8.1	8.2	25-yr, 24-hr
SD1100	ST1100	ST1700	CIRCULAR	2.5	-	72	241.73	239.2	3.59	0.013	36.2	49.6	57.9	72.9	10-yr, 24-hr	39.6	57.3	68.1	80.4	10-yr, 24-hr
SD1101	ST1101	ST1100	SYSCO	21	3.8	1170	244.65	241.7	0.25	0.035	28.5	43.6	48.3	52.6	NF	28.5	40.9	43.8	51.9	100-yr, 24-hr
SD1102	ST1102	ST1101	CIRCULAR	3.5	-	58	244.82	244.7	0.29	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1103	ST1103	ST1102	CIRCULAR	3.5	-	77	245.25	244.8	0.30	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1104	ST1104	ST1103	CIRCULAR	3	-	31	245.61	245.3	0.52	0.011	18.4	28.5	34.0	41.4	NF	18.4	28.5	34.0	41.5	NF
SD1105	ST1105	ST1104	CIRCULAR	2.5	-	150	250.61	245.6	3.20	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1106	ST1106	ST1105	CIRCULAR	2.5	-	332.6	253.77	250.6	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1107	ST1107	ST1106	CIRCULAR	2.5	-	170.5	255.79	253.8	1.07	0.011	8.7	14.6	18.2	22.8	NF	8.7	14.6	18.2	22.8	NF
SD1108	ST1108	ST1107	CIRCULAR	2.5	-	180	257.5	255.8	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1109	ST1109	ST1108	CIRCULAR	2.5	-	273.1	261.49	257.5	1.39	0.011	8.7	14.6	18.2	22.9	NF	8.7	14.6	18.2	22.9	NF
SD1110	ST1110	ST1109	CIRCULAR	2.5	-	218.1	266.69	261.5	2.29	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1111	ST1111	ST1110	CIRCULAR	2	-	112.9	267.03	266.7	0.30	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1112	ST1112	ST1111	CIRCULAR	1.5	-	100	271.56	267.0	4.53	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1113	ST1113	ST1112	CIRCULAR	1.5	-	67.4	272.22	271.6	0.68	0.013	7.1	12.4	15.7	20.4	25-yr, 24-hr	7.1	12.4	15.7	20.4	25-yr, 24-hr
SD1114	ST1114	ST1113	CIRCULAR	1.5	-	379.5	276.02	272.2	0.92	0.013	7.1	12.4	15.7	20.8	10-yr, 24-hr	7.1	12.4	15.7	20.8	10-yr, 24-hr
SD1115	ST1115	ST1110	CIRCULAR	2.5	-	47	268.44	266.7	2.32	0.012	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1116	ST1116	ST1115	CIRCULAR	2.25	-	79	270.48	268.4	2.58	0.013	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1117	ST1117	ST1103	CIRCULAR	2.75	-	238.4	246.52	245.3	0.31	0.013	10.6	15.9	18.4	22.0	NF	10.6	15.8	18.2	21.9	NF
SD1118	ST1118	ST1117	CIRCULAR	2.75	-	350.9	247.64	246.5	0.32	0.013	10.6	15.9	18.5	22.0	NF	10.6	15.9	18.3	21.9	NF
SD1119	ST1119	ST1118	CIRCULAR	2.75	-	293.1	262.81	247.6	5.18	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1120	ST1120	ST1119	CIRCULAR	1.5	-	309	267.58	262.8	1.48	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1121	ST1121	ST1120	CIRCULAR	1.5	-	277.3	271.88	267.6	1.44	0.013	5.9	8.9	10.5	12.4	NF	5.9	8.9	10.5	12.4	NF
SD1122	ST1122	ST1121	CIRCULAR	1.5	-	277.7	273.75	271.9	0.67	0.013	5.9	8.9	10.5	12.2	NF	5.9	8.9	10.5	12.2	NF
SD1123	ST1123	ST1122	CIRCULAR	1.25	-	105.6	276.24	273.8	2.12	0.013	5.9	8.9	10.5	12.2	100-yr, 24-hr	5.9	8.9	10.5	12.2	100-yr, 24-hr
SD1124	ST1124	ST1123	CIRCULAR	1.25	-	257.5	284.48	276.2	3.20	0.013	5.9	8.9	10.5	12.3	100-yr, 24-hr	5.9	8.9	10.5	12.3	100-yr, 24-hr
SD1125	ST1125	ST1118	CIRCULAR	1.75	-	193.8	251.13	247.6	1.28	0.013	4.7	7.1	8.4	10.1	NF	4.7	7.1	8.5	10.2	NF
SD1127	ST1126	ST1701	CANYON_CR	22	4	1500	246.95	237.5	0.63	0.035	12.5	19.9	24.0	31.1	NF	19.0	28.9	34.1	42.3	NF
SD1128	ST1128	ST2118	CIRCULAR	2.5	-	307.2	244.51	241.5	0.86	0.013	18.8	28.7	28.9	33.3	NF	19.3	28.8	29.4	34.1	NF
SD1129	ST1129	ST1128	BASALT_CR9	11	2	530	253.45	244.5	0.75	0.035	18.8	33.6	33.6	33.7	NF	19.3	38.5	38.5	34.3	NF
SD2411	ST1130	ST2407	CIRCULAR	2	-	727	240.02	236.7	0.43	0.024	8.7	9.4	9.8	10.4	NF	8.8	9.5	9.8	10.5	NF
SD2410	ST1130	ST2409	CIRCULAR	2	-	263.6	240.02	240.3	0.59	0.024	1.6	5.8	8.0	10.6	NF	2.1	6.2	8.2	10.8	NF
SD1130	ST1131	ST1130	CIRCULAR	2.75	-	105.9	242.76	240.0	0.32	0.024	10.5	15.4	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF
SD1131	ST1132	ST1131	CIRCULAR	2.75	-	399.7	244.2	242.8	0.31	0.024	10.5	15.5	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1132	ST1133	ST1132	CIRCULAR	1.25	-	282.4	247.5	244.2	0.64	0.013	0.0	0.0	0.0	0.1	NF	11.0	15.9	18.3	22.0	2-yr, 24-hr
SD1302	ST1200	ST1302	CIRCULAR	2.25	-	75	257.59	256.1	1.64	0.013	8.4	12.8	14.9	19.1	NF	8.4	12.8	14.9	19.1	NF
SD1200	ST1201	ST1200	CIRCULAR	2.25	-	180	260.31	257.6	1.46	0.013	8.5	12.8	14.9	19.1	NF	8.5	12.8	14.9	19.1	NF
SD1201	ST1202	ST1201	CIRCULAR	2	-	251.1	265.7	260.3	2.05	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
SD1126	ST1300	ST1126	CIRCULAR	3	-	68	247.22	247.0	0.40	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1300	ST1301	ST1300	CIRCULAR	3	-	121	248.45	247.2	0.55	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1301	ST1302	ST1301	CIRCULAR	2.5	-	323	256.11	248.5	2.18	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1303	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.33	0.011	1.4	2.8	3.6	4.3	NF	3.9	5.6	6.6	8.0	100-yr, 24-hr
SD1304	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.44	0.011	0.1	1.3	2.2	4.0	NF	3.1	5.4	6.4	7.9	100-yr, 24-hr
SD1305	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	0.44	0.011	2.7	3.2	3.5	4.3	NF	3.8	5.4	6.4	7.9	100-yr, 24-hr
SD1401	ST1304	ST1400	CIRCULAR	1.5	-	93.8	240.49	238.7	1.03	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1306	ST1305	ST1304	CIRCULAR	1	-	310.8	242.46	240.5	0.60	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1307	ST1306	ST1305	CIRCULAR	1.25	-	159	244.66	242.5	0.82	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1308	ST1307	ST1306	CIRCULAR	1.25	-	147.8	246.73	244.7	1.33	0.013	0.7	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1400	ST1400	ST1401	CIRCULAR	1.5	-	10	238.7	235.4	0.80	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1402	ST1401	ST1402	CIRCULAR	4	-	68	235.43	235.4	0.49	0.013	43.7	58.1	65.6	73.7	NF	50.9	65.0	71.1	79.1	NF
SD1403	ST1402	ST1403	BOECKMAN_CR	37	9	970	235.43	197.5	3.92	0.035	45.9	61.7	69.6	78.5	NF	53.5	68.8	75.5	83.9	NF
SD1404	ST1403	ST1404A	CIRCULAR	4	-	45	197.45	195.5	4.45	0.013	45.4	61.6	69.3	78.1	NF	53.1	68.6	75.2	83.6	NF
SD1405A	ST1404A	ST1404B	BOECKMAN_CR	37	9	1285	195.45	160.9	2.69	0.035	50.8	70.3	79.8	91.8	NF	59.7	78.6	88.7	102.5	NF
SD1405B	ST1404B	ST1603	BOECKMAN_CR	37	9	500	160.9	147.5	2.69	0.035	50.8	70.3	79.7	91.8	NF	59.7	78.6	88.4	102.2	NF
SD1602	ST1500	ST1600	CIRCULAR	2.5	-	221.5	203.36	194.6	2.06	0.011	0.3	0.4	1.5	3.1	NF	0.3	0.5	1.6	3.2	NF
SD1500	ST1501	ST1500	CIRCULAR	1.5	-	153	212.81	203.4	5.47	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1502	ST1502	ST1501	CIRCULAR	1.5	-	300.9	220.39	212.8	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1503	ST1503	ST1502	CIRCULAR	1.25	-	276	227.5	220.4	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1504	ST1504	ST1503	CIRCULAR	1.25	-	54	228.96	227.5	2.52	0.013	0.3	0.4	0.6	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1603	ST1600	ST1601	CIRCULAR	4	-	157.6	194.55	180.0	9.11	0.013	29.8	37.4	42.0	50.0	NF	31.3	39.9	44.8	56.1	NF
SD1604	ST1601	ST1602	CIRCULAR	4	-	169	180.04	156.6	14.03	0.013	29.8	37.4	42.0	50.2	NF	31.3	39.9	44.8	56.5	NF
SD1605	ST1602	ST1603	MENTOR_GRAPHICS	13	1	350	156.56	147.5	2.60	0.035	29.8	37.4	41.9	49.2	NF	31.3	39.9	44.8	54.5	NF
SD1607	ST1603	POND_BOECKMAN	BOECKMAN_CR_B	141.6	15.3	100	147.45	131.5	16.21	0.035	130.5	186.1	216.4	529.5	NF	196.0	278.7	707.7	651.9	NF
SD3200	ST1605	ST3200	CIRCULAR	5	-	300	131.45	127.6	1.29	0.024	124.0	161.8	210.5	289.9	25-yr, 24-hr	166.9	247.4	304.8	303.6	10-yr, 24-hr
SD1600	ST1608	ST1600	CIRCULAR	1.25	-	251	212.8	194.6	5.11	0.013	1.1	1.9	2.3	2.8	NF	1.4	2.2	2.7	3.2	NF
16687	ST1640	3316	CIRCULAR	1.5	-	125	214.82	212.8	1.54	0.011	3.7	4.9	5.3	5.9	NF	5.3	6.4	6.9	7.5	NF
SD1700	ST1700	ST1701	SYSCO-2	70	3	900	239.15	237.5	0.19	0.035	35.7	49.0	52.8	62.3	NF	39.3	52.2	59.7	70.3	NF
SD1701	ST1701	ST1702	SYSCO-3	24	5	350	237.45	236.2	0.35	0.035	43.5	57.9	65.4	73.8	NF	50.7	64.7	70.7	79.3	NF
SD1702	ST1702	ST1401	CIRCULAR	4	-	95	236.23	235.4	0.49	0.013	43.4	57.7	65.2	73.4	100-yr, 24-hr	50.6	64.6	70.7	78.7	100-yr, 24-hr
SD1703	ST1703	ST1704	CIRCULAR	4	-	56	208.45	210.4	0.18	0.013	24.9	30.8	34.7	40.2	NF	26.1	34.0	37.8	44.4	NF
SD1704	ST1704	ST1705	CIRCULAR	4	-	312	210.35	209.4	0.32	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1705	ST1705	ST1706	CIRCULAR	4	-	276.9	209.35	208.3	0.40	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1706	ST1706	ST1707	CIRCULAR	4	-	263.6	208.25	207.7	0.20	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1707	ST1707	ST1708	CIRCULAR	4	-	142.8	207.72	207.4	0.23	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1708	ST1708	ST1709	CIRCULAR	4	-	434.9	207.39	206.0	0.32	0.013	24.7	30.8	34.5	40.4	NF	26.0	33.4	37.6	44.4	NF
SD1709	ST1709	ST1710	CIRCULAR	4	-	277	205.99	200.6	1.93	0.013	24.8	30.8	34.6	42.4	NF	26.0	33.4	37.7	48.2	NF
SD1716	ST1710	ST1600	CIRCULAR	4	-	75	200.64	194.6	8.15	0.013	28.6	35.7	39.8	48.2	NF	29.8	38.1	42.9	54.5	NF
SD1710	ST1711	ST1712	CIRCULAR	1.25	-	310	217.25	215.0	0.71	0.013	3.9	5.9	7.1	8.4	100-yr, 24-hr	3.9	5.9	7.2	8.5	100-yr, 24-hr
SD1711	ST1712	ST1713	CIRCULAR	1.5	-	270	215.04	208.6	2.14	0.013	3.9	5.8	7.1	8.4	NF	3.9	5.8	7.2	8.4	NF
SD1715	ST1713	ST1500	CIRCULAR	1.5	-	128	208.58	203.4	9.93	0.013	0.0	0.0	1.0	2.5	NF	0.0	0.0	1.0	2.5	NF
SD1712	ST1713	ST1714	CIRCULAR	1.25	-	250.1	208.58	208.6	-0.28	0.013	3.9	5.3	6.2	6.5	NF	3.9	5.3	6.2	6.5	NF
SD1713	ST1714	ST1715	CIRCULAR	1	-	135	208.58	205.7	2.17	0.013	3.8	5.2	5.9	5.9	10-yr, 24-hr	3.8	5.3	5.9	5.9	10-yr, 24-hr
SD1714	ST1715	ST1710	CIRCULAR	1	-	20	205.65	200.6	25.88	0.013	3.8	5.2	5.9	5.9	NF	3.8	5.3	5.9	5.9	NF
SD2722	ST1717	ST2720	CIRCULAR	2	-	500	209.05	205.5	0.72	0.013	8.6	12.6	13.8	16.9	100-yr, 24-hr	9.3	13.0	14.5	17.2	100-yr, 24-hr
SD1717	ST1718	ST1717	TRAPEZOIDAL	30	2	50	209.45	209.1	0.80	0.035	8.7	12.9	13.8	17.4	100-yr, 24-hr	9.4	13.4	14.5	18.3	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1718	ST1719	ST1718	CIRCULAR	3.5	-	107	210.45	209.5	0.93	0.024	8.8	13.1	15.0	17.7	NF	9.5	14.2	15.9	18.9	NF
SD1719	ST1720	ST1719	ARCH	2.92	2	100	211.35	210.5	0.90	0.024	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.1	18.9	NF
SD1720	ST1721	ST1720	CIRCULAR	2	-	282.2	216.15	211.4	1.70	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	18.9	NF
SD1721	ST1722	ST1721	CIRCULAR	1.5	-	38.9	216.83	216.2	0.98	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	19.3	NF
SD1722	ST1723	ST1722	CIRCULAR	2	-	90	217.26	216.8	0.32	0.013	8.8	13.1	15.4	18.1	NF	9.5	14.2	16.5	19.3	100-yr, 24-hr
SD1723	ST1724	ST1723	CIRCULAR	1	-	40.9	217.39	217.3	0.05	0.011	8.8	13.1	15.3	18.1	25-yr, 24-hr	9.6	14.2	16.5	19.4	10-yr, 24-hr
SD1724	ST1725	ST1724	CIRCULAR	2.5	-	208	218.26	217.4	0.36	0.013	8.8	13.2	15.5	18.3	100-yr, 24-hr	9.6	14.4	16.6	19.7	100-yr, 24-hr
SD1725	ST1726	ST1725	CIRCULAR	2.5	-	34	218.56	218.3	0.56	0.013	8.9	13.2	15.5	18.6	NF	9.7	14.4	16.8	20.0	100-yr, 24-hr
SD2000	ST2000	ST4002	PRISON_OFFSITE6	33	3.5	820	139.95	139.5	0.06	0.035	127.8	162.0	174.8	191.0	2-yr, 24-hr	160.7	199.6	206.0	225.9	2-yr, 24-hr
SD2001	ST2001	ST2000	PRISON_OFFSITE6	33	3.5	331.9	140.15	140.0	0.06	0.035	157.8	187.7	190.6	190.8	2-yr, 24-hr	150.7	191.5	196.6	216.5	2-yr, 24-hr
SD2002	ST2002	ST2001	PRISON_OFFSITE5	40	3.5	630.6	140.45	140.2	0.05	0.035	143.6	179.7	178.7	184.3	2-yr, 24-hr	172.0	182.4	191.0	215.3	2-yr, 24-hr
SD2003	ST2003	ST2002	PRISON_OFFSITE4	19	3.5	359.2	140.95	140.5	0.14	0.035	166.1	167.6	177.3	181.0	2-yr, 24-hr	174.5	177.2	189.9	214.5	2-yr, 24-hr
SD2004	ST2004	ST2003	PRISON_OFFSITE4	19	3.5	1208.4	142.45	141.0	0.12	0.035	135.7	141.5	156.5	179.6	2-yr, 24-hr	145.3	175.5	189.3	214.1	2-yr, 24-hr
SD2005	ST2005	ST2004	PRISON_OFFSITE3	48	3	1322.9	142.95	142.5	0.04	0.035	121.1	143.8	156.6	177.1	2-yr, 24-hr	138.2	171.1	186.8	207.0	2-yr, 24-hr
SD2006	ST2006	ST2005	PRISON_OFFSITE2	23.4	2.3	705.4	143.85	143.0	0.13	0.035	132.5	173.0	192.3	219.2	2-yr, 24-hr	159.1	208.4	231.2	260.1	2-yr, 24-hr
SD2007	ST2007	ST2006	PRISON_OFFSITE2	23.4	2.3	46.3	143.95	143.9	0.22	0.035	137.8	182.4	203.7	232.9	2-yr, 24-hr	166.8	220.2	245.4	280.0	2-yr, 24-hr
SD2008	ST2008	ST2007	PRISON_OFFSITE2	23.4	2.3	195.6	144.15	144.0	0.10	0.035	140.3	187.1	209.8	241.4	2-yr, 24-hr	170.1	226.5	253.7	290.8	2-yr, 24-hr
SD2009	ST2009	ST2008	PRISON_OFFSITE2	23.4	2.3	1744.5	145.45	144.2	0.10	0.035	17.3	34.6	42.9	55.8	2-yr, 24-hr	19.8	39.8	54.8	73.7	2-yr, 24-hr
SD2010	ST2010	ST2009	PRISON_OFFSITE	20	4	108	150.46	145.5	4.18	0.035	29.5	78.9	115.0	90.8	10-yr, 24-hr	101.0	72.6	64.2	81.2	2-yr, 24-hr
SD2011	ST2011	ST2010	RECT_CLOSED	6	3	32	153.13	150.5	8.37	0.013	45.5	112.8	114.3	109.3	10-yr, 24-hr	110.2	115.1	81.6	86.6	2-yr, 24-hr
SD2012	ST2012	ST2011	PRISON_OFFSITE	20	4	89	160.54	153.1	8.35	0.035	28.7	54.1	57.9	62.4	100-yr, 24-hr	51.8	64.2	75.1	93.3	10-yr, 24-hr
SD2013	ST2013	ST2012	PRISON_OFFSITE	20	4	361	170.14	160.5	2.66	0.035	28.8	43.2	51.0	62.4	NF	43.8	64.2	77.1	89.5	100-yr, 24-hr
SD2014	ST2014	ST2013	RECT_CLOSED	6	3	32	170.46	170.1	1.00	0.013	28.8	43.1	51.0	62.5	NF	43.8	64.2	75.2	89.5	100-yr, 24-hr
SD2015	ST2015	ST2014	PRISON_OFFSITE	20	4	587	178.35	170.5	1.34	0.035	28.8	43.2	51.2	62.7	NF	43.9	64.5	75.6	89.8	NF
SD2016	ST2016	ST2015	CIRCULAR	3.5	-	279	187.75	178.4	3.37	0.013	28.8	43.3	51.4	62.9	NF	44.0	64.6	75.8	90.0	NF
SD2017	ST2017	ST2016	CIRCULAR	3.5	-	401	199.05	187.8	2.79	0.013	28.8	43.3	51.4	62.8	NF	44.0	64.6	75.8	90.0	NF
SD2018	ST2018	ST2017	CIRCULAR	3.5	-	551	201.95	199.1	0.50	0.013	28.8	43.4	51.4	62.9	NF	44.0	64.7	75.9	90.1	NF
SD2019	ST2019	ST2018	CIRCULAR	3.5	-	69	202.45	202.0	0.49	0.013	28.8	43.6	51.8	63.4	NF	44.2	65.1	75.9	90.1	NF
SD2403B	ST2100	ST2403	CIRCULAR	4	-	79.9	222.7	222.1	1.29	0.013	50.8	63.0	67.7	73.4	NF	58.7	69.1	72.9	77.5	NF
SD2403	ST2100	ST2403	CIRCULAR	4	-	80.8	222.7	222.1	0.84	0.013	46.1	59.5	64.6	70.1	NF	55.0	66.1	69.7	75.5	NF
SD2100	ST2101	ST2100	CIRCULAR	3	-	602.1	224.96	222.7	0.31	0.013	34.0	41.9	44.3	46.6	NF	42.8	48.0	49.3	51.2	NF
SD2101	ST2101	ST2100	CIRCULAR	3	-	603.7	224.96	222.7	0.28	0.013	33.9	41.8	44.2	46.5	NF	43.2	47.9	49.2	51.2	NF
SD2440	ST2101A	ST2431	CIRCULAR	2	-	327.1	196.41	192.3	1.19	0.013	37.9	47.3	51.3	56.2	2-yr, 24-hr	47.3	55.7	59.5	65.2	2-yr, 24-hr
SD2102	ST2102	ST2101	COMMERCE_CIR_DITCH	140.2	7.4	493.4	226.88	225.0	0.37	0.035	37.9	44.8	46.6	48.6	NF	45.0	48.8	49.9	50.3	NF
SD2439	ST2102A	ST2101A	CIRCULAR	4	-	346.6	198.2	196.4	0.50	0.013	38.8	54.5	55.8	70.9	10-yr, 24-hr	54.2	65.0	60.2	65.8	2-yr, 24-hr
SD2103	ST2103	ST2102	CIRCULAR	4	-	30	226.56	226.9	-1.07	0.024	37.9	42.6	44.4	46.1	NF	42.8	46.0	46.9	47.2	25-yr, 24-hr
SD2438	ST2103A	ST2102A	CIRCULAR	4	-	334.3	200.05	198.2	0.49	0.013	39.4	57.1	61.3	71.7	10-yr, 24-hr	57.6	62.7	63.5	69.7	2-yr, 24-hr
SD2104	ST2104	ST2103	BASALT_CR5_UPDATE	91.5	4	367.5	225.75	226.6	-0.22	0.035	38.1	43.3	44.2	45.0	2-yr, 24-hr	43.1	44.5	44.9	45.1	2-yr, 24-hr
SD2437	ST2104A	ST2103A	CIRCULAR	4	-	302.8	203.63	200.1	1.12	0.013	43.4	57.9	66.1	73.3	10-yr, 24-hr	59.9	69.9	71.2	75.6	2-yr, 24-hr
SD2105	ST2105	ST2104	CIRCULAR	4	-	96.7	226.41	225.8	0.68	0.024	39.7	44.1	45.9	47.4	NF	43.4	46.6	47.6	48.5	NF
SD2167	ST2105A	ST2104A	CIRCULAR	4	-	109.2	204.37	203.6	0.49	0.013	45.1	60.2	70.5	79.7	10-yr, 24-hr	63.2	76.4	77.6	80.1	2-yr, 24-hr
SD2106	ST2106	ST2105	COMMERCE_CIR_DITCH	42.1	9.8	754	226.75	226.4	0.05	0.035	41.0	44.6	46.7	48.8	NF	43.7	48.0	49.4	50.9	NF
SD2164	ST2106A	ST2105A	CIRCULAR	3.5	-	117.7	205.46	204.4	0.50	0.013	18.3	22.6	23.5	26.7	10-yr, 24-hr	35.8	43.4	44.2	43.4	2-yr, 24-hr
SD2107	ST2107	ST2120	COMMERCE_CIR_DITCH	26.4	7.4	965	227.47	226.7	0.08	0.035	28.8	28.8	29.1	29.5	NF	29.7	29.7	29.7	29.9	NF
SD2163	ST2107A	ST2106A	CIRCULAR	3.5	-	227.5	206.8	205.5	0.50	0.013	18.0	24.5	27.2	32.0	10-yr, 24-hr	42.2	48.6	48.5	50.6	2-yr, 24-hr
SD2108	ST2108	ST2101	BASALT_CR	24	5	300	228.84	225.0	1.27	0.035	22.8	34.0	40.2	50.4	NF	41.8	63.5	73.7	81.8	NF
17184	ST2108A	ST2107A	CIRCULAR	3.5	-	119.8	207.59	206.8	0.49	0.013	18.1	24.9	31.6	40.8	25-yr, 24-hr	41.9	48.0	48.4	48.5	2-yr, 24-hr
SD2109	ST2109	ST2108	BASALT_CR7	48	4	500	229.63	228.8	0.16	0.035	23.0	34.2	40.4	51.2	NF	42.1	63.9	74.2	85.8	NF
17195	ST2109A	ST2186	CIRCULAR	3.5	-	236.9	209.13	208.0	0.48	0.013	18.2	24.5	34.7	40.4	25-yr, 24-hr	40.5	47.4	47.7	47.6	10-yr, 24-hr
SD2110	ST2110	ST2109	CIRCULAR	3	-	70	230.56	229.6	1.33	0.013	23.0	34.4	40.6	52.0	NF	42.2	64.1	74.4	86.0	NF
17194	ST2110A	ST2109A	CIRCULAR	3.5	-	299.2	212.26	209.1	0.98	0.013	18.4	25.8	34.7	40.4	25-yr, 24-hr	40.3	47.4	47.6	47.9	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2111	ST2111	ST2110	BASALT_CR6	48	2	330	236.05	230.6	1.66	0.035	23.7	35.9	42.8	51.9	NF	44.3	64.1	74.4	86.0	NF
17203	ST2111A	ST2110A	CIRCULAR	3	-	177.8	214.19	212.3	0.80	0.013	17.4	26.8	34.5	40.4	100-yr, 24-hr	40.1	47.3	47.6	47.9	10-yr, 24-hr
SD2112	ST2112	ST2111	CIRCULAR	2	-	279.3	240.69	236.1	1.45	0.013	23.7	36.1	43.0	52.0	100-yr, 24-hr	44.4	64.2	74.5	88.8	10-yr, 24-hr
17201	ST2112A	ST2111A	CIRCULAR	3	-	178.4	215.82	214.2	0.80	0.013	17.4	28.7	34.3	40.5	100-yr, 24-hr	39.9	47.3	47.5	49.2	10-yr, 24-hr
SD2113	ST2113	ST2100	CIRCULAR	4	-	235.4	224.98	222.7	0.65	0.013	29.8	40.8	44.7	51.1	NF	30.2	41.0	45.2	51.6	NF
17269	ST2113A	ST2112A	CIRCULAR	3	-	329.5	218.27	215.8	0.68	0.013	17.4	27.5	34.2	40.5	100-yr, 24-hr	39.7	47.3	47.5	52.9	10-yr, 24-hr
SD2114	ST2114	ST2113	CIRCULAR	4	-	282.9	227.4	225.0	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17271	ST2114A	ST2113A	CIRCULAR	3	-	166	219.51	218.3	0.63	0.013	17.4	27.0	34.0	40.4	100-yr, 24-hr	39.5	47.2	50.3	57.1	10-yr, 24-hr
SD2115	ST2115	ST2114	CIRCULAR	4	-	242	229.45	227.4	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.0	45.2	51.7	NF
17280	ST2115A	ST2114A	CIRCULAR	3	-	166.1	220.95	219.5	0.75	0.013	17.4	27.6	33.7	40.4	100-yr, 24-hr	39.2	48.0	52.8	60.2	10-yr, 24-hr
SD2116	ST2116	ST2115	BASALT_CR11	16	4	150	233.95	229.5	3.00	0.035	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17282	ST2116A	ST2115A	CIRCULAR	2.5	-	300.4	224.4	221.0	0.98	0.013	17.4	28.8	33.5	40.2	100-yr, 24-hr	39.0	50.1	55.9	64.5	10-yr, 24-hr
SD2117	ST2117	ST2116	CIRCULAR	3	-	288	235.45	234.0	0.69	0.013	29.8	40.8	44.7	51.2	100-yr, 24-hr	30.3	41.1	45.2	51.8	100-yr, 24-hr
17285	ST2117A	ST2116A	CIRCULAR	2.5	-	159.9	226.55	224.4	1.22	0.013	17.4	26.7	33.2	40.2	NF	38.8	52.1	59.0	68.8	10-yr, 24-hr
SD2118	ST2118	ST2117	BASALT_CR10	44	4	380	241.45	235.5	1.45	0.035	30.8	45.2	50.3	59.7	NF	31.3	44.7	51.0	60.3	NF
17290	ST2118A	ST2117A	CIRCULAR	2.5	-	202.4	229.21	226.6	1.22	0.013	17.4	26.7	34.1	40.2	NF	38.5	53.8	61.8	72.8	10-yr, 24-hr
17291	ST2119A	ST2118A	CIRCULAR	2.5	-	120	230.56	229.2	0.96	0.013	17.4	26.7	32.4	40.2	100-yr, 24-hr	38.2	55.5	64.5	76.8	10-yr, 24-hr
SD2120	ST2120	ST2106	CIRCULAR	4	-	62	226.67	226.8	-0.13	0.024	41.8	45.3	47.2	49.5	NF	44.2	48.7	50.5	52.2	NF
SD2121	ST2121	ST2107	ARCH	3	1.67	53.8	228.59	227.5	2.10	0.024	14.1	13.5	13.2	13.3	NF	13.6	13.5	13.5	13.6	NF
DAY_RD_BYPASS_CHANNEL	ST2122	DAY_RD_IMPOUNDMENT	TRAPEZOIDAL	17	3	20	226.18	227.6	0.01	0.035	54.6	89.7	108.5	135.0	NF	105.6	163.5	193.1	233.5	NF
SD2122	ST2122	ST2121	COMMERCE_CIR_DITCH	20.9	3.7	583	226.18	228.6	-0.41	0.035	19.2	15.8	14.1	14.1	NF	14.4	14.1	14.1	14.4	NF
SD2123	ST2123	ST2122	CIRCULAR	3	-	43	226.37	226.2	0.44	0.024	66.6	98.9	116.2	140.8	NF	115.3	171.1	200.0	239.7	100-yr, 24-hr
17196	ST2186	ST2108A	CIRCULAR	3.5	-	42.6	207.99	207.6	0.47	0.013	17.6	24.7	34.8	40.4	25-yr, 24-hr	41.0	47.5	48.0	47.8	10-yr, 24-hr
SD2706	ST2400	ST2706	BASALT_CR3	42	5	1130	214.45	175.5	3.45	0.035	133.9	178.5	197.6	223.3	NF	155.1	196.9	214.7	238.8	NF
SD2400	ST2401	ST2400	BASALT_CR3	42	5	90	214.9	214.5	0.50	0.035	134.0	178.5	197.7	223.4	NF	155.1	197.0	214.8	238.9	NF
SD2401	ST2402	ST2401	BASALT_CR3	42	5	1110	220.95	214.9	0.55	0.035	134.3	178.7	197.9	223.6	NF	155.3	197.2	215.0	239.1	NF
SD2402	ST2403	ST2402	BASALT_CR8	38	5	1000	222.09	221.0	0.10	0.035	96.3	121.7	131.5	142.6	NF	113.1	134.4	141.9	152.3	NF
SD2404	ST2404	ST2402	BASALT_CR2	30	5	400	228.12	221.0	1.67	0.035	19.9	29.9	35.2	42.8	NF	23.1	33.6	39.0	47.1	NF
SD2405	ST2405	ST2404	CIRCULAR	4.5	-	250	228.12	228.1	0.00	0.013	19.9	29.9	35.2	42.9	NF	23.1	33.6	39.1	47.1	NF
SD2406	ST2406	ST2405	BASALT_CR	24	5	450	229.5	228.1	0.31	0.035	15.5	23.4	27.6	33.5	NF	18.7	27.2	31.5	38.0	NF
SD2407	ST2407	ST2406	CIRCULAR	3.5	-	677	236.7	229.5	1.06	0.011	13.8	20.6	24.1	28.9	NF	14.1	20.6	23.8	28.6	NF
SD2408	ST2408	ST2407	CIRCULAR	3	-	131	238.66	236.7	1.18	0.011	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2409	ST2409	ST2408	CIRCULAR	3	-	242.8	240.25	238.7	0.54	0.013	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2716	ST2410	ST2715	CIRCULAR	1.5	-	253	214.7	210.3	1.42	0.013	5.0	7.6	9.1	11.4	NF	5.1	8.1	9.7	11.9	NF
SD2412	ST2411	ST2410	CIRCULAR	1.25	-	284	217.44	214.7	0.84	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2413	ST2412	ST2411	CIRCULAR	1.25	-	415.1	221.01	217.4	0.85	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2414	ST2413	ST2412	CIRCULAR	1.25	-	318.4	223.72	221.0	0.82	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2442	ST2431	ST2432	CIRCULAR	2	-	69	192.31	189.3	4.08	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2443	ST2432	ST2433	CIRCULAR	2.25	-	67.6	189.3	188.4	1.35	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2444	ST2433	ST2434	CIRCULAR	2.5	-	335.6	188.39	185.1	0.94	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	25-yr, 24-hr
SD2445	ST2434	ST2435	CIRCULAR	2.5	-	65	185.05	163.5	35.23	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	NF
SD2446	ST2435	ST2004	PRISON_OFFSITE3	48	3	2000	163.45	142.5	1.05	0.035	37.4	47.1	51.2	56.2	NF	47.1	55.7	59.5	65.2	NF
SD2700	ST2700	ST4003	COFFEE_CR2	80	3.5	900	143.45	140.0	0.39	0.035	147.8	203.5	204.0	224.2	NF	170.4	192.2	226.7	298.4	10-yr, 24-hr
SD2701	ST2701	ST2700	COFFEE_CR2	80	3.5	1000	147.95	143.5	0.45	0.035	149.7	205.8	230.9	261.4	NF	172.0	223.8	248.1	278.0	NF
SD2702	ST2702	ST2701	COFFEE_CR2	80	3.5	1100	169.45	148.0	1.95	0.035	151.0	207.1	232.5	263.4	NF	173.3	225.7	250.1	280.6	NF
SD2703	ST2703	ST2702	COFFEE_CR	40	5	50	173.45	169.5	8.03	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2704	ST2705	ST2703	BASALT_CR4	44	4	350	173.95	173.5	0.14	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2705	ST2706	ST2705	BASALT_CR3	42	5	170	175.45	174.0	0.88	0.035	133.6	178.3	197.4	223.1	NF	154.9	196.7	214.5	238.6	NF
SD2707	ST2707	ST2705	CIRCULAR	2.5	-	48	178.69	174.0	6.79	0.013	24.2	35.8	40.7	47.6	NF	24.4	36.2	41.3	48.2	NF
SD2708	ST2708	ST2707	CIRCULAR	2.5	-	452	182.05	178.7	0.70	0.013	15.6	22.9	26.0	29.3	NF	15.7	23.3	26.6	30.1	NF
SD2709	ST2709	ST2708	CIRCULAR	2	-	274	188.85	182.1	2.30	0.013	15.6	23.1	26.3	29.5	NF	15.7	23.5	27.0	33.6	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2710	ST2710	ST2709	CIRCULAR	2	-	400	195.05	188.9	1.50	0.013	15.6	23.1	27.4	32.1	100-yr, 24-hr	15.7	23.5	30.2	32.2	100-yr, 24-hr
SD2711	ST2711	ST2710	CIRCULAR	2	-	400	200.45	195.1	1.30	0.013	15.6	23.1	27.3	32.7	100-yr, 24-hr	15.7	23.5	28.4	32.9	100-yr, 24-hr
SD2712	ST2712	ST2711	CIRCULAR	3	-	106.1	203.05	200.5	2.45	0.013	5.0	7.6	11.8	30.3	100-yr, 24-hr	5.1	8.0	13.4	29.9	100-yr, 24-hr
SD2713	ST2713	ST2712	CIRCULAR	2	-	247.2	205.72	203.1	0.76	0.013	5.0	7.6	9.1	14.3	NF	5.1	8.0	9.8	15.7	100-yr, 24-hr
SD2714	ST2714	ST2713	CIRCULAR	2	-	174.8	206.95	205.7	0.70	0.013	5.0	7.6	9.1	13.8	NF	5.1	8.0	9.7	16.9	100-yr, 24-hr
SD2715	ST2715	ST2714	CIRCULAR	1.75	-	293	210.3	207.0	1.04	0.013	5.0	7.6	9.1	11.7	NF	5.1	8.0	9.7	13.8	NF
SD2717	ST2716	ST4015	CIRCULAR	2.5	-	84.3	171.46	169.9	1.74	0.024	12.5	23.4	25.0	26.7	25-yr, 24-hr	13.7	24.1	25.5	26.9	25-yr, 24-hr
SD2718	ST2717B	ST2716	CIRCULAR	2.5	-	75	172.13	171.5	0.89	0.024	12.5	23.4	25.0	26.6	25-yr, 24-hr	13.8	24.1	25.5	26.8	25-yr, 24-hr
SD2719	ST2718	ST2717	COFFEE_CR	40	5	680	186.45	172.1	2.11	0.035	15.3	22.5	25.5	30.3	NF	15.9	23.0	26.1	31.0	NF
SD2720	ST2719	ST2718	ARCH	4.5	2.25	76	188.2	186.5	2.30	0.024	15.3	22.6	25.6	30.3	NF	16.0	23.1	26.2	31.0	NF
SD2721	ST2720	ST2719	COFFEE_CR	40	5	640	205.45	188.2	2.70	0.035	15.9	23.7	26.6	31.5	NF	16.6	24.0	27.3	32.8	NF
SD3000	ST3001	ST3201	CIRCULAR	1.25	-	111.7	171.92	113.5	25.67	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3001	ST3002	ST3001	CIRCULAR	1.25	-	71.5	180.31	171.9	11.82	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3002	ST3003	ST3002	CIRCULAR	1.25	-	116.4	188.52	180.3	7.07	0.011	4.4	6.8	8.1	10.2	NF	4.4	6.9	8.2	10.2	NF
SD3003	ST3004	ST3003	CIRCULAR	1.25	-	35	190.86	188.5	4.58	0.011	4.4	6.8	8.1	11.4	NF	4.4	6.9	8.2	10.6	NF
SD3004	ST3005	ST3004	CIRCULAR	1.25	-	293	195.52	190.9	1.53	0.011	4.4	6.8	8.1	10.7	NF	4.5	6.9	8.2	10.6	NF
SD3006	ST3007	03000	N_FORK_MERIDIAN_CR	22	4	5350	153.45	58.5	1.78	0.035	36.1	52.3	59.8	71.2	NF	61.6	85.8	98.4	120.8	NF
SD3007	ST3008	ST3007	N_FORK_MERIDIAN_CR	22	4	500	169.45	153.5	2.20	0.035	38.0	54.6	62.6	73.6	NF	63.6	88.7	101.6	123.8	NF
SD3008	ST3009	ST3008	N_FORK_MERIDIAN_CR	22	4	750	185.82	169.5	2.18	0.035	18.4	26.6	29.2	35.4	NF	24.5	30.8	34.9	46.1	NF
SD3009	ST3010	ST3009	CIRCULAR	2	-	63.8	190	185.8	6.57	0.011	18.4	26.6	29.2	40.5	NF	24.5	30.9	34.9	54.0	100-yr, 24-hr
SD3010	ST3011	ST3010	CIRCULAR	2	-	198	191.45	190.0	0.73	0.011	18.4	26.6	29.2	36.8	NF	24.5	30.9	34.9	49.3	100-yr, 24-hr
SD3011	ST3012	ST3011	N_FORK_MERIDIAN_CR	22	4	260	192.03	191.5	0.22	0.035	6.9	11.2	13.6	25.3	NF	14.6	18.0	19.5	37.2	100-yr, 24-hr
SD3012	ST3013	ST3012	CIRCULAR	3	-	101.9	198.56	192.0	6.42	0.013	6.4	9.9	11.9	25.2	NF	13.7	16.1	17.2	36.7	NF
SD3013	ST3014	ST3013	CIRCULAR	3	-	27.7	200.02	198.6	4.55	0.011	6.4	9.9	11.9	29.3	NF	13.7	16.1	17.2	36.7	NF
SD3014	ST3015	ST3014	CIRCULAR	3	-	116.1	204.42	200.0	3.79	0.013	6.4	9.9	11.9	17.3	NF	13.7	16.1	17.2	36.7	NF
SD3015	ST3016	ST3015	CIRCULAR	3	-	31.7	206.09	204.4	4.32	0.013	6.4	9.9	11.9	13.6	NF	13.7	16.1	17.2	53.3	NF
SD3016	ST3017	ST3016	N_FORK_MERIDIAN_CR	22	4	600	211.15	206.1	0.84	0.035	6.5	10.1	12.0	13.7	NF	13.7	16.1	17.2	18.9	NF
SD3017	ST3018	ST3011	CIRCULAR	2	-	158.4	203.41	191.5	3.18	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	15.6	NF
SD3018	ST3019	ST3018	CIRCULAR	2	-	61.4	204.08	203.4	1.01	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	7.0	NF
SD3019	ST3020	ST3019	CIRCULAR	2	-	266.8	205.51	204.1	0.50	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	5.0	NF
SD3020	ST3021	ST3020	CIRCULAR	1.5	-	56.5	209.33	205.5	4.48	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3021	ST3022	ST3021	CIRCULAR	1.5	-	203.2	210.35	209.3	0.40	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3022	ST3023	ST3022	CIRCULAR	1.25	-	38.7	211.86	210.4	0.41	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3023	ST3024	ST3023	CIRCULAR	1.25	-	220.6	212.84	211.9	0.40	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3201	ST3200	ST3201	BOECKMAN_CR_D	123.6	15.8	1100	127.59	113.5	1.29	0.035	124.0	161.8	188.4	281.1	NF	166.9	227.1	280.9	280.9	NF
SD3202	ST3201	ST3202	BOECKMAN_CR2	40	10	1100	113.45	111.5	0.18	0.035	132.6	172.7	195.5	285.6	NF	173.4	232.9	284.6	284.8	NF
SD3603	ST3202	ST3603	BOECKMAN_CR2	40	10	900	111.45	105.5	0.67	0.035	132.4	172.6	195.3	285.4	NF	173.3	232.1	284.5	284.8	NF
SD3203	ST3203	ST4025	CIRCULAR	3	-	100	177.45	177.0	0.50	0.013	39.1	51.4	56.3	70.1	25-yr, 24-hr	50.1	61.4	76.5	95.2	10-yr, 24-hr
SD3204	ST3204	ST3203	S_COFFEE_CR3	29	2	250	181.45	177.5	1.60	0.035	39.1	51.4	57.6	102.9	NF	50.1	94.4	109.5	118.2	25-yr, 24-hr
SD3220	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	15.6	23.8	27.0	24.4	100-yr, 24-hr	26.4	25.2	53.8	28.2	10-yr, 24-hr
SD3225	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	7.8	11.9	13.5	48.8	100-yr, 24-hr	13.2	50.4	26.9	56.4	10-yr, 24-hr
SD3221	ST3206	ST3205	S_COFFEE_CR2	30	2	750	190.73	183.5	0.97	0.035	23.6	36.1	43.2	54.5	NF	39.7	58.5	68.6	77.4	NF
SD3205	ST3207	ST3206	CIRCULAR	3	-	90.5	192.45	190.7	1.90	0.013	15.1	13.0	15.4	18.5	NF	25.6	19.7	22.4	58.5	NF
SD3206	ST3207	ST3206	CIRCULAR	2	-	90.6	192.45	190.7	0.79	0.013	8.6	23.2	28.0	36.1	NF	14.2	39.0	46.4	29.8	NF
SD3207	ST3208	ST3207	S_COFFEE_CR	16	2	1400	206.95	192.5	1.04	0.035	14.5	21.7	25.9	32.4	NF	14.8	22.4	27.0	34.7	NF
SD3208	ST3209	ST3208	CIRCULAR	1.5	-	204.1	210.24	207.0	1.20	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3209	ST3210	ST3209	CIRCULAR	1.5	-	218.1	212.35	210.2	0.88	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3210	ST3211	ST3210	CIRCULAR	1.5	-	50	213.1	212.4	1.30	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3211	ST3212	ST3211	CIRCULAR	1.5	-	38	213.53	213.1	0.66	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3418	ST3217	ST3417	CIRCULAR	1.25	-	279.3	188.65	186.5	0.70	0.013	1.7	2.8	3.5	4.5	NF	4.3	6.5	7.6	9.3	NF
SD3216	ST3218	ST3217	CIRCULAR	1.25	-	242.9	192.02	188.7	1.37	0.013	1.7	2.8	3.5	4.6	NF	4.3	6.5	7.6	9.3	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3400	ST3400	ST5039	CIRCULAR	4	-	88	158.96	155.2	0.48	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.5	87.7	NF
SD3401	ST3401	ST3400	CIRCULAR	3.5	-	17.3	159.33	159.0	2.14	0.013	27.6	42.8	50.7	62.4	NF	31.6	48.5	56.9	73.2	NF
SD3402	ST3402	ST3401	CIRCULAR	3.5	-	187.4	160.35	159.3	0.54	0.013	27.6	42.9	50.7	62.4	NF	31.6	48.5	56.9	70.5	NF
SD3403	ST3403	ST3402	CIRCULAR	3.5	-	400	162.32	160.4	0.44	0.013	19.3	30.7	36.5	45.3	NF	21.4	33.6	40.0	49.5	NF
SD3404	ST3404	ST3403	CIRCULAR	3	-	365	165.43	162.3	0.81	0.011	19.4	30.8	36.5	45.2	NF	21.5	33.6	39.8	50.7	NF
SD3405	ST3405	ST3404	CIRCULAR	2	-	410	170.29	165.4	0.89	0.011	7.6	11.4	13.5	16.4	NF	8.9	13.2	15.5	19.1	NF
SD3406	ST3406	ST3405	CIRCULAR	2	-	11.7	171.08	170.3	6.34	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3407	ST3407	ST3406	CIRCULAR	2	-	143	171.45	171.1	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3408	ST3408	ST3407	CIRCULAR	2	-	163	171.85	171.5	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3409	ST3409	ST3408	CIRCULAR	2	-	77	172.15	171.9	0.13	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3410	ST3410	ST3409	CIRCULAR	2	-	145	174.88	172.2	1.75	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.5	18.7	NF
SD3411	ST3411	ST3410	CIRCULAR	2	-	60	175.55	174.9	0.78	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3412	ST3412	ST3411	CIRCULAR	2	-	27.1	175.43	175.6	-0.81	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3413	ST3413	ST3412	CIRCULAR	2.5	-	145	176.1	175.4	0.46	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.8	NF
SD3414	ST3414	ST3413	CIRCULAR	2.5	-	20	176.25	176.1	0.75	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.3	15.6	18.8	NF
SD3415	ST3415	ST3414	CIRCULAR	1.5	-	268	178.63	176.3	0.73	0.013	1.2	1.8	2.2	2.8	NF	2.1	3.0	3.5	4.4	NF
SD3416	ST3416	ST3415	CIRCULAR	1.25	-	254	182.49	178.6	1.41	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3417	ST3417	ST3416	CIRCULAR	1	-	230.5	186.51	182.5	1.61	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3433	ST3417	ST3430	CIRCULAR	1.25	-	216.6	186.51	180.4	2.76	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3419	ST3418	ST3404	CIRCULAR	3	-	591	168.26	165.4	0.47	0.013	11.8	19.5	22.9	29.8	NF	12.6	20.3	24.3	31.5	NF
SD3420	ST3419	ST3418	CIRCULAR	3	-	429.1	169.25	168.3	0.23	0.013	9.4	15.9	18.8	24.1	NF	10.2	16.8	20.2	26.0	NF
SD3421	ST3420	ST3419	CIRCULAR	3	-	258	169.73	169.3	0.15	0.013	9.4	15.9	18.8	24.2	NF	10.2	16.8	20.3	26.0	NF
SD3422	ST3421	ST3420	CIRCULAR	1.75	-	247.8	170.98	169.7	0.50	0.013	3.2	6.2	7.0	9.3	NF	3.9	6.9	8.4	10.8	NF
SD3423	ST3421	ST4236	CIRCULAR	1.5	-	638	170.98	166.9	0.65	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD3424	ST3422	ST3421	CIRCULAR	1.75	-	59	170.81	171.0	-0.29	0.013	0.4	2.9	4.4	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3425	ST3423	ST3422	CIRCULAR	1.75	-	195	171.05	170.8	0.19	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3426	ST3424	ST3423	CIRCULAR	1.75	-	74.2	171.12	171.1	0.09	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.8	7.6	NF
SD3427	ST3425	ST3424	CIRCULAR	1.75	-	479.2	169.61	171.1	0.18	0.013	0.4	2.9	4.4	5.5	NF	1.7	4.9	5.8	9.3	100-yr, 24-hr
SD3428	ST3426	ST3425	CIRCULAR	1.75	-	85.1	169.79	169.6	0.21	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.3	8.0	100-yr, 24-hr
SD3429	ST3427	ST3426	CIRCULAR	1.5	-	297.3	173.44	169.8	1.20	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.8	8.0	100-yr, 24-hr
SD3430	ST3428	ST3427	CIRCULAR	1.5	-	434.9	178.86	173.4	1.21	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.3	NF
SD3431	ST3429	ST3428	CIRCULAR	1.5	-	171.5	179.89	178.9	0.59	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.0	NF
SD3432	ST3430	ST3429	CIRCULAR	1.5	-	65.7	180.41	179.9	0.65	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3434	ST3431	ST3400	CIRCULAR	3.5	-	51.4	160.46	159.0	0.90	0.013	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	18.6	NF
SD3435	ST3432	ST3431	CIRCULAR	2.5	-	257.6	163.39	160.5	1.04	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	17.8	NF
SD3436	ST3433	ST3432	CIRCULAR	2.5	-	287.9	166.73	163.4	1.09	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.6	17.8	NF
SD3437	ST3434	ST3433	CIRCULAR	2.5	-	262.1	169.86	166.7	1.12	0.011	7.6	11.6	13.8	16.9	NF	8.1	12.3	14.6	17.9	NF
SD3438	ST3435	ST3434	CIRCULAR	2.25	-	318.2	174.35	169.9	1.34	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3439	ST3436	ST3435	CIRCULAR	2.25	-	442.3	180.59	174.4	1.40	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3440	ST3437	ST3436	CIRCULAR	1.75	-	240	186.74	180.6	2.50	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3441	ST3438	ST3437	CIRCULAR	1.75	-	240	189.99	186.7	1.26	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3442	ST3439	ST3438	CIRCULAR	1.75	-	240	191.55	190.0	0.56	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3443	ST3440	ST3439	CIRCULAR	1.75	-	240	193.2	191.6	0.58	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3444	ST3441	ST3440	CIRCULAR	1.75	-	194.9	195.11	193.2	0.88	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3445	ST3442	ST3441	CIRCULAR	1.75	-	120	197.05	195.1	1.62	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3446	ST3443	ST3442	CIRCULAR	1.75	-	177	198.16	197.1	0.54	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3447	ST3444	ST6036	CIRCULAR	2	-	230	150.86	142.2	3.65	0.013	14.1	21.2	24.5	29.1	NF	14.1	21.2	24.1	29.0	NF
SD3448	ST3445	ST3444	CIRCULAR	1.5	-	66	156.67	150.9	7.70	0.013	14.1	21.2	27.1	32.0	25-yr, 24-hr	14.1	21.2	27.3	31.9	25-yr, 24-hr
SD3449	ST3446	ST3445	CIRCULAR	1.5	-	173.9	166.18	156.7	4.71	0.013	5.4	8.1	9.4	10.9	NF	5.4	8.1	9.4	10.9	NF
SD3450	ST3447	ST3446	CIRCULAR	1.5	-	29.7	166.66	166.2	1.62	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF
SD3451	ST3448	ST3447	CIRCULAR	1.5	-	198.7	168.66	166.7	1.06	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3452	ST3449	ST3448	CIRCULAR	1.5	-	214.2	171.41	168.7	1.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3453	ST3450	ST3449	CIRCULAR	1.25	-	178.4	175.05	171.4	2.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3454	ST3451	ST3450	CIRCULAR	1.25	-	268.6	175.8	175.1	0.28	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD5204	ST3600	ST5203	BOECKMAN_CR_WILSO	42.5	5.5	49	95.2	94.5	1.53	0.035	158.4	210.4	236.5	299.5	NF	194.7	256.7	297.1	299.4	NF
SD3601	ST3602	ST3600	BOECKMAN_CR2	40	10	1250	103.45	95.2	0.66	0.035	144.2	190.0	212.1	292.0	NF	182.6	244.0	290.5	290.8	NF
SD3602	ST3603	ST3602	BOECKMAN_CR2	40	10	600	105.45	103.5	0.33	0.035	132.1	172.5	195.1	285.4	NF	173.2	231.5	284.5	284.8	NF
SD5503	ST3605	ST5501	S_FORK_MERIDIAN_CR	22	4	1250	167.45	111.5	4.48	0.035	16.7	24.7	29.1	35.3	NF	16.7	24.8	29.1	35.3	NF
SD3605	ST3606	ST3605	S_FORK_MERIDIAN_CR	22	4	530	184.96	167.5	3.31	0.035	16.8	25.0	29.3	35.5	NF	16.8	25.0	29.4	35.6	NF
SD4206	ST4000	ST4205	SEALY_DITCH	80	3.5	1450	138.45	138.0	0.03	0.035	238.1	298.7	322.9	432.6	2-yr, 24-hr	347.9	459.9	437.7	382.8	2-yr, 24-hr
SD4000	ST4001	ST4000	SEALY_DITCH	80	3.5	1600	138.95	138.5	0.03	0.035	231.5	286.9	307.7	330.4	2-yr, 24-hr	291.9	318.2	340.1	370.9	2-yr, 24-hr
SD4001	ST4002	ST4001	SEALY_DITCH	80	3.5	400	139.45	139.0	0.13	0.035	240.2	269.7	286.4	320.0	2-yr, 24-hr	272.0	306.5	325.4	345.5	2-yr, 24-hr
SD4002	ST4003	ST4002	COFFEE_CR2	80	3.5	150	139.95	139.5	0.33	0.035	158.6	212.3	215.6	236.8	2-yr, 24-hr	173.2	204.2	227.8	264.8	2-yr, 24-hr
SD4003	ST4004	ST4003	COFFEE_CR2	80	3.5	1400	149.66	140.0	0.69	0.035	29.5	50.8	54.5	58.5	NF	31.1	51.5	54.8	58.8	NF
SD4004	ST4005	ST4004	CIRCULAR	3	-	75	150.66	149.7	1.33	0.024	30.5	51.7	55.3	59.1	100-yr, 24-hr	32.0	52.4	55.6	59.3	100-yr, 24-hr
SD4005	ST4006	ST4005	CIRCULAR	3	-	300	154.66	150.7	1.33	0.024	30.5	51.7	55.3	59.1	10-yr, 24-hr	32.0	52.4	55.6	59.3	10-yr, 24-hr
SD4006	ST4007	ST4006	CIRCULAR	2.5	-	390	167.15	154.7	3.08	0.024	19.0	33.6	34.2	35.1	25-yr, 24-hr	21.3	34.0	34.6	35.3	25-yr, 24-hr
SD4007	ST4008	ST4007	CIRCULAR	2.5	-	146	168.68	167.2	1.05	0.024	19.0	33.0	33.8	34.8	10-yr, 24-hr	21.3	33.5	34.1	35.3	10-yr, 24-hr
SD4008	ST4009	ST4008	CIRCULAR	2	-	88.5	172.51	168.7	3.27	0.024	7.6	11.6	12.4	14.7	10-yr, 24-hr	8.4	12.4	13.7	15.9	10-yr, 24-hr
SD4009	ST4010	ST4009	CIRCULAR	2	-	21.1	172.71	172.5	0.95	0.024	7.6	11.3	12.4	14.7	25-yr, 24-hr	8.4	12.2	13.7	16.0	10-yr, 24-hr
SD4010	ST4011	ST4010	CIRCULAR	2	-	58.9	176.05	172.7	5.59	0.024	7.6	11.2	12.5	14.8	25-yr, 24-hr	8.4	12.0	13.7	16.0	10-yr, 24-hr
SD4011	ST4012	ST4011	CIRCULAR	2	-	429.3	185.15	176.1	2.12	0.024	7.6	11.6	13.3	15.2	100-yr, 24-hr	8.4	12.7	14.4	16.5	100-yr, 24-hr
SD4012	ST4013	ST4006	CIRCULAR	3	-	29.7	156.9	154.7	5.87	0.013	14.9	21.5	25.4	30.2	10-yr, 24-hr	14.9	21.6	25.4	30.2	10-yr, 24-hr
SD4013	ST4014	ST4013	CIRCULAR	3	-	195	159.2	156.9	0.92	0.013	14.9	22.7	25.7	30.5	100-yr, 24-hr	14.9	22.0	25.7	30.5	100-yr, 24-hr
SD4014	ST4015	ST4008	CIRCULAR	2.5	-	44.1	169.86	168.7	1.00	0.024	12.5	23.5	25.0	26.8	10-yr, 24-hr	13.8	24.2	25.6	27.0	10-yr, 24-hr
SD4015	ST4016	ST4206	S_COFFEE_CR5	16	2	700	143.95	141.7	0.29	0.035	47.7	59.0	62.8	69.7	10-yr, 24-hr	58.3	65.8	70.8	75.5	2-yr, 24-hr
SD4016	ST4017	ST4016	S_COFFEE_CR6	10	2	1150	150.25	144.0	0.55	0.035	48.5	65.6	65.8	73.3	10-yr, 24-hr	62.9	68.1	74.8	78.7	10-yr, 24-hr
SD4017	ST4018	ST4017	CIRCULAR	4.92	-	40	151.01	150.3	1.90	0.013	55.0	69.3	70.4	80.9	10-yr, 24-hr	63.7	73.8	81.3	84.7	10-yr, 24-hr
SD4018	ST4019	ST4018	S_COFFEE_CR4	9	2	90	152.72	151.0	1.90	0.035	54.9	69.6	70.8	82.0	10-yr, 24-hr	64.2	74.3	82.5	85.5	10-yr, 24-hr
SD4019	ST4020	ST4019	CIRCULAR	4.25	-	35	153.4	152.7	1.94	0.013	55.3	69.9	73.8	83.2	10-yr, 24-hr	64.7	75.2	83.7	86.3	10-yr, 24-hr
SD4020	ST4021	ST4020	S_COFFEE_CR4	9	2	580	164.48	153.4	1.91	0.035	54.5	73.8	75.3	91.8	100-yr, 24-hr	67.8	78.9	92.7	94.6	25-yr, 24-hr
SD4021	ST4022	ST4021	CIRCULAR	3.5	-	30	165.05	164.5	1.90	0.013	38.7	64.1	68.6	70.9	100-yr, 24-hr	50.1	70.4	73.0	74.8	25-yr, 24-hr
SD4022	ST4023	ST4022	CIRCULAR	3.5	-	30	165.63	165.1	1.90	0.013	38.7	67.4	72.0	73.5	100-yr, 24-hr	50.1	73.6	76.9	77.5	25-yr, 24-hr
SD4023	ST4024	ST4023	S_COFFEE_CR	16	2	540	175.95	165.6	1.91	0.035	39.1	51.4	56.3	69.2	NF	50.1	60.6	74.6	93.9	100-yr, 24-hr
SD4024	ST4025	ST4024	CIRCULAR	3	-	200	176.95	176.0	0.50	0.013	39.1	51.4	56.3	70.3	25-yr, 24-hr	50.1	60.7	76.9	95.5	10-yr, 24-hr
SD4025	ST4026	ST4021	CIRCULAR	1.75	-	400	168.35	164.5	0.83	0.013	15.9	20.7	22.4	24.8	10-yr, 24-hr	19.1	22.8	24.1	27.7	2-yr, 24-hr
SD4026	ST4027	ST4026	CIRCULAR	1.75	-	410	173.35	168.4	1.20	0.013	15.9	22.1	22.8	25.9	10-yr, 24-hr	19.4	23.2	25.5	28.7	2-yr, 24-hr
SD4027	ST4028	ST4027	CIRCULAR	1.75	-	390	175.76	173.4	0.59	0.013	16.1	21.0	23.7	27.4	10-yr, 24-hr	19.7	24.3	27.2	30.8	2-yr, 24-hr
SD4028	ST4029	ST4028	CIRCULAR	1.5	-	401.5	178.5	175.8	0.66	0.024	16.1	22.3	25.4	29.9	2-yr, 24-hr	18.9	26.2	29.7	34.5	2-yr, 24-hr
SD4200	ST4200	ST6205	RECT_CLOSED	24	7	75	135.3	135.0	0.47	0.013	298.6	357.8	386.5	416.9	NF	311.2	383.8	417.8	456.5	NF
SD4201	ST4201	ST4200	COFFEE_CR3	27	4	520	135.95	135.3	0.13	0.035	298.5	357.8	386.4	430.5	100-yr, 24-hr	311.2	423.0	417.8	456.5	10-yr, 24-hr
SD4202	ST4202	ST4201	COFFEE_CR3	27	4	500	136.95	136.0	0.20	0.035	298.5	357.8	386.4	441.2	100-yr, 24-hr	311.4	448.2	451.5	456.5	10-yr, 24-hr
SD4203	ST4203	ST4202	COFFEE_CR3	27	4	300	137.15	137.0	0.07	0.035	292.6	351.6	380.3	471.9	100-yr, 24-hr	319.3	494.6	471.4	451.4	10-yr, 24-hr
SD4204	ST4204	ST4203	COFFEE_CR3	27	4	250	137.45	137.2	0.12	0.035	291.6	350.4	379.2	507.8	100-yr, 24-hr	377.4	504.2	488.8	450.1	2-yr, 24-hr
SD4205	ST4205	ST4204	COFFEE_CR3	27	4	540	137.95	137.5	0.09	0.035	288.8	347.5	376.1	466.2	100-yr, 24-hr	414.9	469.4	461.7	446.9	2-yr, 24-hr
SD4207	ST4206	ST4205	S_COFFEE_CR7	12	2	400	141.67	138.0	0.99	0.035	55.0	66.5	69.7	97.9	10-yr, 24-hr	73.2	94.5	98.2	82.1	2-yr, 24-hr
SD4208	ST4207	ST4206	CIRCULAR	3.5	-	41.4	142.21	141.7	1.30	0.024	15.1	20.0	23.6	26.7	25-yr, 24-hr	16.0	23.9	24.6	24.9	10-yr, 24-hr
SD4209	ST4208	ST4207	CIRCULAR	3.5	-	233.4	142.32	142.2	0.05	0.024	15.4	20.4	23.3	26.5	25-yr, 24-hr	16.4	23.2	24.3	24.8	10-yr, 24-hr
SD4210	ST4209	ST4208	CIRCULAR	2.25	-	65.9	142.77	142.3	0.64	0.013	15.4	20.6	23.1	25.8	100-yr, 24-hr	16.6	22.4	24.1	25.1	25-yr, 24-hr
SD4211	ST4210	ST4209	CIRCULAR	2.25	-	319.3	144.47	142.8	0.50	0.013	15.5	20.6	23.1	25.5	100-yr, 24-hr	16.6	22.5	24.1	25.3	25-yr, 24-hr
SD4212	ST4211	ST4210	CIRCULAR	2.25	-	204	145.39	144.5	0.40	0.013	15.5	20.6	23.1	27.7	100-yr, 24-hr	16.8	22.5	23.6	26.7	25-yr, 24-hr
SD4213	ST4212	ST4211	CIRCULAR	2	-	290	147.56	145.4	0.65	0.013	15.5	20.6	23.1	26.1	NF	16.9	22.5	23.7	26.1	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4214	ST4213	ST4212	CIRCULAR	2	-	57	148.95	147.6	1.91	0.013	15.5	20.6	23.1	26.3	100-yr, 24-hr	16.9	22.5	26.7	26.5	25-yr, 24-hr
SD4215	ST4214	ST4213	CIRCULAR	2	-	103.6	149.03	149.0	0.08	0.013	15.5	20.6	23.1	25.9	25-yr, 24-hr	16.9	22.5	25.5	26.9	10-yr, 24-hr
SD4216	ST4215	ST4214	CIRCULAR	2	-	317	151.3	149.0	0.72	0.013	10.5	13.6	14.9	17.9	100-yr, 24-hr	11.4	14.6	17.1	17.1	25-yr, 24-hr
SD4217	ST4216	ST4215	CIRCULAR	2	-	349.1	155.45	151.3	1.16	0.013	10.5	13.6	15.0	20.0	100-yr, 24-hr	11.3	14.6	20.1	20.0	25-yr, 24-hr
SD4218	ST4217	ST4216	CIRCULAR	2	-	265.9	159.75	155.5	1.47	0.011	5.7	6.4	8.0	16.1	100-yr, 24-hr	6.1	7.4	14.0	14.0	100-yr, 24-hr
SD4219	ST4218	ST4217	CIRCULAR	2	-	288.1	163.05	159.8	1.11	0.011	5.7	6.4	6.8	11.5	NF	6.1	6.8	8.4	10.6	NF
SD4220	ST4219	ST4218	CIRCULAR	1.5	-	39.1	164.14	163.1	1.38	0.011	5.7	6.4	6.7	8.3	NF	6.1	6.8	7.6	11.1	NF
SD4221	ST4220	ST4219	CIRCULAR	2	-	355	164.8	164.1	0.14	0.013	5.7	6.4	6.7	8.0	NF	6.1	6.8	7.6	9.3	100-yr, 24-hr
SD4222	ST4221	ST4220	CIRCULAR	2	-	355.8	165.89	164.8	0.29	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	11.4	100-yr, 24-hr
SD6207	ST4223	ST6205	CIRCULAR	4	-	82.2	138.64	135.0	0.18	0.013	33.7	54.1	60.3	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4224	ST4224	ST4223	CIRCULAR	4	-	371.1	139.59	138.6	0.20	0.013	33.7	54.1	60.4	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4225	ST4225	ST4224	CIRCULAR	4	-	365	140.31	139.6	0.20	0.013	33.7	54.2	60.4	65.3	NF	35.1	56.4	62.2	66.9	NF
SD4226	ST4226	ST4225	CIRCULAR	4	-	398.1	141.53	140.3	0.30	0.013	30.5	49.3	54.6	58.4	NF	31.3	50.5	55.2	58.8	NF
SD4227	ST4227	ST4226	CIRCULAR	3	-	361	143.64	141.5	0.58	0.013	15.8	24.8	29.9	34.6	NF	16.5	26.3	30.8	35.1	NF
SD4228	ST4228	ST4227	CIRCULAR	3	-	268.4	145.19	143.6	0.57	0.013	15.8	24.8	30.5	34.8	NF	16.5	26.3	31.4	35.1	NF
SD4229	ST4229	ST4228	CIRCULAR	3	-	68.6	145.77	145.2	0.85	0.024	2.2	3.5	4.4	5.1	NF	2.2	3.6	4.5	5.3	NF
SD4230	ST4230	ST4229	CIRCULAR	2.5	-	244	147	145.8	0.45	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.3	NF
SD4231	ST4231	ST4230	CIRCULAR	2.5	-	246.4	147.7	147.0	0.28	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.5	NF
SD4232	ST4232	ST4228	CIRCULAR	2.5	-	173.8	146.98	145.2	0.60	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4233	ST4233	ST4232	CIRCULAR	1.75	-	471.6	151.25	147.0	0.76	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4234	ST4234	ST4233	CIRCULAR	1.5	-	426	159.45	151.3	1.88	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4235	ST4235	ST4234	CIRCULAR	1.5	-	27.5	164.24	159.5	1.49	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4236	ST4236	ST4235	CIRCULAR	1.5	-	110.9	166.85	164.2	2.21	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD4241	ST4241	ST4242	CIRCULAR	2.5	-	80.5	143.45	142.1	1.74	0.013	0.6	0.7	0.9	1.3	NF	0.6	0.7	0.9	1.3	NF
SD4242	ST4242	ST4202	CIRCULAR	2.5	-	564	142.05	137.0	0.90	0.013	0.6	0.7	0.9	4.0	NF	0.6	3.1	2.7	1.3	NF
SD6413	ST4400	ST6413	CIRCULAR	4	-	100	161.45	159.5	2.00	0.013	52.4	71.8	80.9	92.7	NF	53.9	74.2	82.4	94.3	NF
SD4400	ST4401	ST4400	ARROWHEAD_CR2	28	6	400	163.45	161.5	0.50	0.035	32.7	47.0	55.5	65.6	NF	32.8	47.1	55.7	65.9	NF
SD4401	ST4402	ST4401	ARROWHEAD_CR	32	4	800	169.67	163.5	0.78	0.035	33.2	47.8	56.3	75.3	NF	33.2	47.8	56.5	76.0	NF
SD4402	ST4403	ST4402	ARROWHEAD_CR	32	4	100	170.45	169.7	0.78	0.035	25.4	35.8	42.1	58.0	NF	25.5	35.9	42.5	58.5	NF
SD4403	ST4404	ST4402	CIRCULAR	1.25	-	355	178.69	169.7	2.23	0.013	1.7	3.1	3.9	5.2	NF	1.7	3.1	3.9	5.2	NF
SD4500	ST4500	ST4204	CIRCULAR	2	-	421	143.57	137.5	1.44	0.013	8.1	13.0	15.9	21.2	NF	9.9	16.6	20.4	24.1	100-yr, 24-hr
SD4501	ST4501	ST4500	CIRCULAR	2	-	561	149.45	143.6	0.99	0.013	8.1	13.0	16.0	20.7	NF	9.9	15.6	18.9	24.4	NF
SD4502	ST4502	ST4501	CIRCULAR	1.5	-	473.6	167.3	149.5	2.81	0.013	4.4	7.6	9.5	12.5	NF	4.5	7.7	9.6	12.9	NF
SD4503	ST4503	ST4001	SEALY_CR	58	2	400	146.55	139.0	1.90	0.035	33.9	53.4	65.1	82.2	100-yr, 24-hr	63.2	94.0	110.8	133.4	25-yr, 24-hr
SD4600	ST4601	ST4600	CIRCULAR	2	-	57.2	195.67	190.2	0.49	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.3	4.7	5.8	NF
SD4601	ST4602	ST4601	CIRCULAR	2	-	101.1	195.67	195.7	0.01	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.1	4.7	5.8	NF
SD4602	ST4603	ST4602	CIRCULAR	2	-	135	195.87	195.7	0.15	0.013	3.0	4.3	4.6	5.8	NF	3.0	4.2	4.7	5.8	NF
SD4603	ST4604	ST4603	CIRCULAR	2	-	265.6	197.91	195.9	0.29	0.011	3.0	4.6	5.0	5.8	NF	3.0	4.5	5.0	5.8	NF
SD4604	ST4605	ST4604	CIRCULAR	2	-	165.8	198.78	197.9	0.40	0.011	3.0	4.5	5.3	6.1	NF	3.0	4.5	5.3	6.0	NF
SD4605	ST4606	ST4605	CIRCULAR	2	-	352.4	200.59	198.8	0.43	0.011	3.0	4.5	5.3	6.6	NF	3.0	4.5	5.3	6.6	NF
SD4606	ST4607	ST4606	CIRCULAR	1.5	-	58.5	201.4	200.6	1.04	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4607	ST4608	ST4607	CIRCULAR	1.5	-	186.5	202.57	201.4	0.41	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4612	ST4609	ST4614	CIRCULAR	2.5	-	36	196.32	196.0	0.28	0.01	7.1	8.3	8.5	11.2	NF	7.1	8.2	8.5	11.2	NF
SD4609	ST4610	ST4609	CIRCULAR	2.5	-	86	196.84	196.3	0.08	0.011	6.6	7.8	8.1	10.5	NF	6.6	7.8	8.0	10.5	NF
SD4610	ST4611	ST4610	CIRCULAR	2.5	-	125	197.42	196.8	0.16	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4611	ST4612	ST4611	CIRCULAR	2.5	-	102	198.17	197.4	0.34	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4613	ST4613	ST4609	CIRCULAR	1.5	-	42	197.53	196.3	0.50	0.01	0.5	0.6	0.6	0.8	NF	0.5	0.6	0.6	0.8	NF
SD4608	ST4614	ST4600	CIRCULAR	3	-	36	195.97	190.2	0.92	0.011	15.0	20.3	23.1	28.9	NF	15.5	20.8	24.0	29.7	NF
SD4614	ST4615	ST4600	CIRCULAR	2.5	-	103.5	195.7	190.2	0.38	0.013	5.8	8.1	9.5	12.6	NF	5.8	8.0	9.5	12.7	NF
SD4615	ST4616	ST4615	CIRCULAR	2.5	-	58.3	196.06	195.7	0.27	0.013	5.8	8.2	9.5	12.6	NF	5.8	8.1	9.5	12.8	NF
SD4616	ST4617	ST4616	CIRCULAR	2.5	-	151.3	196.68	196.1	0.28	0.013	5.8	8.5	9.5	12.6	NF	5.8	8.4	9.5	12.7	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4617	ST4618	ST4617	CIRCULAR	2.5	-	191.5	197.23	196.7	0.18	0.013	4.3	6.4	7.1	9.2	NF	4.3	6.4	7.0	9.2	NF
SD4618	ST4619	ST4618	CIRCULAR	2	-	134.6	198.35	197.2	0.68	0.011	1.4	2.2	2.5	3.2	NF	1.4	2.2	2.5	3.3	NF
SD4619	ST4620	ST4619	CIRCULAR	1.5	-	355.3	199.97	198.4	0.40	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.7	3.3	NF
SD4620	ST4621	ST4620	CIRCULAR	1.5	-	142	200.83	200.0	0.46	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4621	ST4622	ST4621	CIRCULAR	1.5	-	94.8	201.43	200.8	0.42	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4622	ST4623	ST4622	CIRCULAR	1.5	-	106.3	202.53	201.4	0.85	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4623	ST4624	ST4618	CIRCULAR	2	-	52.2	197.64	197.2	0.40	0.011	3.0	4.4	5.1	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4624	ST4625	ST4624	CIRCULAR	2	-	47.6	198.06	197.6	0.46	0.011	3.0	4.4	5.2	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4625	ST4626	ST4625	CIRCULAR	2	-	69.4	198.46	198.1	0.29	0.011	3.0	4.4	5.3	6.1	NF	3.0	4.4	5.2	6.2	NF
SD4626	ST4627	ST4626	CIRCULAR	2	-	58.4	198.89	198.5	0.39	0.011	3.0	4.4	5.3	6.2	NF	3.0	4.4	5.3	6.2	NF
SD4627	ST4628	ST4627	CIRCULAR	2	-	118.1	199.56	198.9	0.40	0.011	3.0	4.4	5.3	6.3	NF	3.0	4.4	5.3	6.3	NF
SD4628	ST4629	ST4628	CIRCULAR	1.5	-	44.5	200.15	199.6	0.88	0.011	3.0	4.4	5.3	6.5	NF	3.0	4.4	5.3	6.5	NF
SD4629	ST4630	ST4629	CIRCULAR	1.5	-	104.2	200.85	200.2	0.48	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4630	ST4631	ST4630	CIRCULAR	1.5	-	95.2	201.33	200.9	0.29	0.011	3.0	4.5	5.3	6.5	NF	3.0	4.5	5.3	6.5	NF
SD4641	ST4633	ST4634	CIRCULAR	2.5	-	18.1	190.22	190.2	0.39	0.013	10.4	18.4	24.7	35.2	NF	10.5	18.9	25.5	36.5	NF
SD4633	ST4634	ST4635	CIRCULAR	2.5	-	100.3	190.15	189.3	0.54	0.013	10.4	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4634	ST4635	ST4636	CIRCULAR	2.5	-	259.5	189.31	187.4	0.62	0.013	10.7	18.4	24.7	35.2	NF	11.6	18.9	25.5	36.5	NF
SD4635	ST4636	ST4637	CIRCULAR	3	-	262.3	187.4	189.4	-0.76	0.013	10.5	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4637	ST4638	ST4639	CIRCULAR	2.5	-	85.7	189.38	188.4	1.10	0.013	9.6	17.1	18.4	19.8	NF	9.7	17.3	18.5	19.9	NF
SD4638	ST4639	ST4403	ARROWHEAD_CR	32	4	1200	188.44	170.5	1.50	0.035	12.5	20.1	23.3	27.8	NF	12.5	20.4	23.6	28.0	NF
SD4640	ST4640	O-SDDI	CIRCULAR	3	-	3151.9	189.38	168.1	0.68	0.013	0.9	1.3	6.1	15.2	NF	0.9	1.6	6.8	16.3	NF
3594	ST4656	ST4767	CIRCULAR	2.5	-	67.9	200.74	197.9	3.89	0.013	7.9	12.3	15.1	18.5	NF	8.3	12.9	16.0	19.3	NF
SD4654	ST4767	ST4614	CIRCULAR	2.5	-	59	197.9	196.0	3.27	0.013	7.9	12.3	14.9	18.4	NF	8.3	12.9	15.8	19.1	NF
949	ST4768	ST4656	CIRCULAR	2.5	-	55.2	201.23	200.7	0.62	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
950	ST4802	ST4768	CIRCULAR	2.5	-	109.6	202.54	201.2	1.01	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4741	ST4803	ST4802	CIRCULAR	2.5	-	129.9	203.75	202.5	0.39	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4830	ST4804	ST4803	CIRCULAR	2.5	-	268.2	205.38	203.8	0.53	0.013	6.2	9.8	11.8	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4742	ST4805	ST4804	CIRCULAR	2.5	-	149.4	206.36	205.4	0.52	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4789	ST4806	ST4805	CIRCULAR	2.5	-	116.6	207.03	206.4	0.40	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.6	NF
SD4790	ST4828	ST4806	CIRCULAR	2	-	335.2	208.63	207.0	0.42	0.013	3.0	4.8	5.9	7.4	NF	3.5	5.4	6.5	8.1	NF
SD4752	ST4829	ST4828	CIRCULAR	2	-	335.2	211.99	208.6	1.00	0.013	3.0	4.9	5.9	7.4	NF	3.5	5.5	6.6	8.1	NF
SD5000	ST5000	ST5209	CIRCULAR	1	-	56	108.6	90.9	32.36	0.024	11.4	14.0	14.6	15.3	2-yr, 24-hr	11.4	14.0	14.6	15.3	2-yr, 24-hr
SD5001	ST5001	ST5000	CIRCULAR	1.25	-	120	124.12	108.6	12.89	0.024	11.4	14.3	14.7	15.3	10-yr, 24-hr	11.5	14.4	14.7	15.3	10-yr, 24-hr
SD5002	ST5002	ST5001	CIRCULAR	2	-	113	138.96	124.1	14.63	0.024	11.4	17.8	19.5	20.2	10-yr, 24-hr	11.5	17.8	19.5	20.2	10-yr, 24-hr
SD5003	ST5003	ST5002	CIRCULAR	1.5	-	34	145.4	139.0	2.44	0.024	6.5	10.0	11.3	13.3	10-yr, 24-hr	6.5	10.0	11.3	13.3	10-yr, 24-hr
SD5004	ST5004	ST5003	CIRCULAR	1.5	-	154.8	158.38	145.4	8.41	0.011	6.5	9.9	11.7	14.9	NF	6.5	9.9	11.7	14.9	NF
SD5005	ST5005	ST5004	CIRCULAR	1.5	-	129	161.19	158.4	2.02	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5006	ST5006	ST5005	CIRCULAR	1.5	-	319.1	163.74	161.2	0.74	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5007	ST5007	ST5006	CIRCULAR	1.25	-	84.1	164.9	163.7	0.43	0.011	1.2	1.7	2.0	3.1	NF	1.2	1.7	2.0	3.0	NF
SD5008	ST5008	ST5007	CIRCULAR	1.25	-	82.4	165.39	164.9	0.59	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5009	ST5009	ST5008	CIRCULAR	1.25	-	100	165.88	165.4	0.49	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5010	ST5010	ST5009	CIRCULAR	1.25	-	100	166.39	165.9	0.51	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5011	ST5011	ST5010	CIRCULAR	1	-	100	166.89	166.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5012	ST5012	ST5011	CIRCULAR	1	-	100	167.39	166.9	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5013	ST5013	ST5012	CIRCULAR	1	-	100	167.89	167.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5014	ST5014	ST5013	CIRCULAR	1	-	70.5	168.05	167.9	0.23	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5015	ST5015	ST5014	CIRCULAR	1.5	-	292.7	169.56	168.1	0.43	0.011	1.2	1.7	2.0	3.5	NF	1.2	1.7	2.0	3.5	NF
SD5016	ST5016	ST5015	CIRCULAR	1.5	-	248.9	170.98	169.6	0.49	0.011	1.2	1.7	2.0	3.7	NF	1.2	1.7	2.0	3.7	NF
SD5017	ST5017	ST5016	CIRCULAR	1.5	-	132.4	171.76	171.0	0.44	0.011	1.2	1.7	2.0	3.6	NF	1.2	1.7	2.0	3.6	NF
SD5018	ST5017	ST5018	CIRCULAR	1.5	-	169.7	171.76	171.1	0.23	0.011	0.8	1.2	1.5	1.8	NF	0.8	1.2	1.5	1.8	NF
SD5019	ST5018	ST5019	CIRCULAR	1.5	-	167.1	171.09	170.0	0.45	0.011	0.8	1.2	1.5	2.0	NF	0.8	1.2	1.5	2.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5020	ST5019	ST5020	CIRCULAR	1.5	-	109.3	170	169.4	0.38	0.011	4.2	6.3	7.2	7.6	NF	4.2	6.3	7.2	7.6	NF
SD5021	ST5020	ST3448	CIRCULAR	1.5	-	87.6	169.38	168.7	0.59	0.011	4.2	6.3	7.1	7.6	NF	4.2	6.3	7.1	7.6	NF
SD5022	ST5021	ST5017	CIRCULAR	1.25	-	100	172.92	171.8	0.96	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5023	ST5022	ST5021	CIRCULAR	1.25	-	100	173.42	172.9	0.50	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5024	ST5023	ST5019	CIRCULAR	1.5	-	154.3	171.31	170.0	0.63	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5025	ST5024	ST5023	CIRCULAR	1.25	-	159.8	172.11	171.3	0.38	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5026	ST5025	ST5002	CIRCULAR	2	-	88	145.03	139.0	0.92	0.024	4.1	6.5	6.9	7.6	10-yr, 24-hr	4.1	6.5	6.9	7.6	10-yr, 24-hr
SD5027	ST5026	ST5025	CIRCULAR	2	-	181	146.43	145.0	0.66	0.024	4.1	6.8	8.7	9.0	25-yr, 24-hr	4.1	6.8	7.7	9.0	25-yr, 24-hr
SD5028	ST5027	ST5026	CIRCULAR	1.25	-	180	152.77	146.4	3.36	0.024	4.1	6.6	7.3	7.9	25-yr, 24-hr	4.1	6.6	7.1	7.9	25-yr, 24-hr
SD5029	ST5028	ST5027	CIRCULAR	1.25	-	97	157.4	152.8	4.53	0.024	4.1	6.7	7.3	8.3	25-yr, 24-hr	4.1	6.6	7.2	8.3	25-yr, 24-hr
SD5030	ST5029	ST5028	CIRCULAR	1.25	-	27	157.89	157.4	1.37	0.024	1.9	3.0	4.1	4.9	100-yr, 24-hr	1.9	3.0	4.0	4.8	100-yr, 24-hr
SD5031	ST5030	ST5029	CIRCULAR	1.25	-	38.1	159.14	157.9	1.60	0.011	1.9	3.9	4.0	4.8	100-yr, 24-hr	1.9	3.8	4.0	4.8	100-yr, 24-hr
SD5032	ST5031	ST5030	CIRCULAR	1.25	-	88.3	160.04	159.1	0.79	0.011	1.9	3.3	3.9	4.8	NF	1.9	3.3	3.9	4.7	NF
SD5033	ST5032	ST5031	CIRCULAR	1.25	-	47.8	160.69	160.0	0.94	0.011	1.9	2.9	4.1	4.7	NF	1.9	2.9	4.1	4.7	NF
SD5034	ST5033	ST5032	CIRCULAR	1.25	-	372.1	164.77	160.7	1.04	0.011	1.9	2.9	3.8	4.7	100-yr, 24-hr	1.9	2.9	3.7	4.7	100-yr, 24-hr
SD5035	ST5034	ST5002	CIRCULAR	1.25	-	372	152.22	139.0	2.00	0.024	0.9	1.5	2.6	3.0	25-yr, 24-hr	0.9	1.5	2.6	3.0	25-yr, 24-hr
SD5036	ST5035	ST5034	CIRCULAR	1.25	-	179	161.98	152.2	5.21	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5037	ST5036	ST5035	CIRCULAR	1.25	-	119	167.87	162.0	4.74	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5038	ST5037	ST5036	CIRCULAR	1.25	-	188	169.38	167.9	0.69	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5219	ST5038	POND_LIBRARY	CIRCULAR	4	-	190	143.45	140.8	1.11	0.013	38.9	59.9	71.1	88.2	NF	43.5	66.0	78.4	96.6	NF
SD5039	ST5039	ST5038	CIRCULAR	4	-	308.1	155.16	143.5	0.92	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.4	87.5	NF
SD5200	ST5200	ST5204	BOECKMAN_CR2	40	10	1200	78.85	71.7	0.60	0.035	199.1	271.7	306.4	352.8	NF	234.8	306.3	337.9	380.4	NF
SD5201	ST5201	ST5200	BOECKMAN_CR2	40	10	930	94.45	78.9	1.68	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.1	NF
SD5202	ST5202	ST5201	KOLBE_BRIDGE	55	11	70	92.45	94.5	-2.86	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.2	NF
SD5203	ST5203	ST5202	BOECKMAN_CR2	40	10	430	94.45	92.5	0.47	0.035	158.3	210.3	236.4	299.5	NF	194.6	256.6	297.1	299.3	NF
SD5205	ST5204	ST5205	MEMORIAL_PARK_BRI	88	20	55	71.7	71.7	0.02	0.035	198.5	271.3	305.9	351.5	NF	234.6	304.8	336.3	379.1	NF
SD5206	ST5205	05200	BOECKMAN_CR2	40	10	1500	71.69	63.5	0.55	0.035	198.3	271.1	305.7	350.9	NF	234.5	304.2	335.7	378.7	NF
SD5207	ST5206	ST5200	BOECKMAN_CR	37	9	500	83.65	78.9	0.96	0.035	40.9	57.6	64.5	69.5	NF	43.2	59.3	66.3	71.8	NF
SD5208	ST5207	ST5206	BOECKMAN_CR	37	9	150	85.1	83.7	0.97	0.035	24.7	38.1	45.0	49.8	NF	26.2	39.8	46.7	52.0	NF
SD5210	ST5208	ST5207	CIRCULAR	2	-	201	87.14	85.1	1.02	0.024	11.4	14.0	14.6	15.3	NF	11.4	14.0	14.6	15.3	NF
SD5211	ST5209	ST5208	CIRCULAR	1.5	-	50	90.89	87.1	6.65	0.024	11.4	14.0	14.6	15.3	NF	11.5	14.0	14.6	15.3	NF
SD5212	ST5210	ST5206	CIRCULAR	1.75	-	164.3	102.15	83.7	5.61	0.024	19.3	20.0	21.9	21.9	NF	19.8	20.2	21.7	21.8	NF
SD5213	ST5211	ST5210	CIRCULAR	1.75	-	125	109.15	102.2	5.61	0.024	19.3	20.1	20.8	21.0	NF	20.0	20.2	21.0	20.8	NF
SD5214	ST5212	ST5211	CIRCULAR	1.75	-	105.4	115.05	109.2	5.61	0.024	19.3	20.1	20.8	21.1	NF	20.0	20.2	20.8	20.8	NF
SD5215	ST5213	ST5212	CIRCULAR	1.75	-	123.2	121.95	115.1	5.61	0.024	19.3	20.2	20.7	21.4	NF	20.0	20.2	20.7	20.7	NF
SD5216	ST5214	ST5213	CIRCULAR	1.75	-	108.9	128.05	122.0	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.9	20.9	20.9	20.8	NF
SD5217	ST5215	ST5214	CIRCULAR	1.75	-	141.1	135.95	128.1	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.8	20.9	20.9	20.8	NF
SD5501	ST5500	05500	S_FORK_MERIDIAN_CR	22	4	282.7	71.45	63.5	2.83	0.035	20.7	34.1	42.2	54.1	NF	20.7	34.1	42.3	54.2	NF
SD5502	ST5501	ST5500	S_FORK_MERIDIAN_CR	22	4	1130	111.45	71.5	3.54	0.035	20.8	34.3	42.5	54.4	NF	20.8	34.3	42.5	54.4	NF
SD5701	ST5701	05701	CIRCULAR	1.25	-	79.1	84.07	72.0	15.48	0.024	5.5	9.2	10.9	12.8	NF	5.9	9.7	11.2	13.4	NF
SD5702	ST5702	ST5701	CIRCULAR	1.25	-	158	86.6	84.1	1.60	0.013	5.5	9.2	10.9	13.1	25-yr, 24-hr	5.9	9.8	11.2	13.3	25-yr, 24-hr
SD5703	ST5703	ST5702	CIRCULAR	1.25	-	126	89.82	86.6	2.40	0.013	5.5	9.2	10.9	12.9	100-yr, 24-hr	5.9	9.8	11.3	13.0	100-yr, 24-hr
SD5704	ST5704	ST5703	CIRCULAR	1	-	103	95.76	89.8	4.68	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.3	100-yr, 24-hr
SD5705	ST5705	ST5704	CIRCULAR	1.25	-	160	96.61	95.8	0.40	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.2	25-yr, 24-hr
SD5706	ST5706	ST5705	CIRCULAR	1.25	-	199.8	97.61	96.6	0.40	0.013	3.1	5.1	6.1	7.6	25-yr, 24-hr	3.3	5.4	7.0	7.9	25-yr, 24-hr
SD5719	ST5707	ST5719	CIRCULAR	3.5	-	260	100.45	99.0	0.56	0.013	18.4	24.0	25.9	28.7	25-yr, 24-hr	19.8	24.6	27.1	29.6	10-yr, 24-hr
SD5708	ST5708	ST5707	CIRCULAR	4	-	270	101.32	100.5	0.32	0.013	18.4	24.6	28.6	33.5	25-yr, 24-hr	19.9	25.1	31.0	35.0	10-yr, 24-hr
SD5709	ST5709	ST5708	CIRCULAR	3.5	-	165	102.47	101.3	0.70	0.013	18.4	26.5	29.9	37.5	10-yr, 24-hr	19.9	27.5	33.7	39.5	10-yr, 24-hr
SD5710	ST5710	ST5709	CIRCULAR	4	-	246	107.43	102.5	1.79	0.011	10.6	18.1	19.9	24.2	NF	10.6	15.7	20.0	23.7	NF
SD5711	ST5711	ST5710	CIRCULAR	4	-	224.6	121.09	107.4	6.00	0.011	10.6	17.4	19.9	22.4	NF	10.6	17.4	19.4	22.4	NF
SD5712	ST5712	ST5711	CIRCULAR	4	-	314	137.34	121.1	5.15	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5713	ST5713	ST5712	CIRCULAR	4	-	358.4	150.79	137.3	3.73	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF
SD5714	ST5714	O5702	CIRCULAR	1.25	-	67	88.49	62.5	44.03	0.024	18.4	22.5	24.4	26.5	100-yr, 24-hr	19.7	22.9	25.0	26.9	100-yr, 24-hr
SD5209	ST5715	ST5207	BOECKMAN_CR	37	9	267	90	85.1	0.92	0.035	9.4	17.4	21.8	22.9	NF	10.9	19.1	23.5	25.0	NF
SD5715	ST5716	ST5715	CIRCULAR	2.5	-	198	90.69	90.0	0.35	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.2	23.6	25.2	NF
SD5716	ST5717	ST5716	CIRCULAR	2.5	-	131	91.23	90.7	0.26	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.3	23.6	25.2	NF
SD5717	ST5718	ST5717	CIRCULAR	2.5	-	123	91.7	91.2	0.22	0.013	9.6	17.6	21.9	23.1	NF	11.0	19.3	23.6	25.2	NF
SD5707	ST5719	ST5714	CIRCULAR	1.75	-	108	99	88.5	10.99	0.024	18.4	22.5	24.4	26.6	10-yr, 24-hr	19.7	22.9	25.1	27.0	10-yr, 24-hr
SD6000	ST6000	O6000	CIRCULAR	2.5	-	466.3	117.95	60.5	11.84	0.013	29.7	43.8	51.2	60.3	NF	29.7	43.8	51.2	60.3	NF
SD6001	ST6001	ST6000	CIRCULAR	2.5	-	182.4	122.86	118.0	4.23	0.013	29.8	43.9	51.3	60.3	NF	29.8	43.9	51.3	60.3	NF
SD6002	ST6002	ST6001	CIRCULAR	2.5	-	632.1	135.95	122.9	1.54	0.013	23.1	31.7	36.0	41.9	NF	23.1	31.7	36.1	41.9	NF
SD6003	ST6003	ST6002	CIRCULAR	2.5	-	167.5	137.28	136.0	0.79	0.013	23.1	31.8	36.1	41.5	NF	23.1	31.8	36.2	41.5	NF
SD6004	ST6004	ST6003	CIRCULAR	2.5	-	196.6	138.85	137.3	0.80	0.013	18.8	25.8	28.3	32.2	NF	18.8	25.8	28.3	32.2	NF
SD6005	ST6005	ST6004	CIRCULAR	2.5	-	68	139.17	138.9	0.47	0.013	14.0	18.2	20.0	22.6	NF	14.0	18.2	20.0	22.6	NF
SD6006	ST6006	ST6005	CIRCULAR	1.5	-	297.9	141.48	139.2	0.87	0.013	14.0	18.1	20.0	22.6	10-yr, 24-hr	14.0	18.1	20.0	22.6	10-yr, 24-hr
SD6007	ST6007	ST6006	CIRCULAR	2	-	302	142.11	141.5	0.21	0.013	14.0	18.5	20.4	23.3	10-yr, 24-hr	14.0	18.5	20.4	23.3	10-yr, 24-hr
SD6008	ST6008	ST6007	CIRCULAR	2	-	79	142.55	142.1	0.30	0.013	3.7	6.7	6.8	6.9	10-yr, 24-hr	3.7	6.5	6.8	6.9	10-yr, 24-hr
SD6009	ST6009	ST6008	CIRCULAR	2	-	112	142.9	142.6	0.31	0.013	3.7	6.2	6.1	6.2	10-yr, 24-hr	3.7	6.2	6.2	6.2	10-yr, 24-hr
SD6010	ST6010	ST6009	CIRCULAR	1.5	-	197	143.59	142.9	0.30	0.013	3.7	5.6	5.3	5.3	10-yr, 24-hr	3.7	5.6	5.4	5.3	10-yr, 24-hr
SD6011	ST6011	ST6010	CIRCULAR	1.5	-	154	144.25	143.6	0.30	0.013	3.5	4.8	4.8	5.4	10-yr, 24-hr	3.8	4.8	4.8	5.2	10-yr, 24-hr
SD6012	ST6012	ST6011	CIRCULAR	1.5	-	79	144.69	144.3	0.30	0.013	3.6	5.5	6.3	6.0	10-yr, 24-hr	4.0	5.4	5.8	6.3	10-yr, 24-hr
SD6013	ST6013	ST6012	CIRCULAR	1.5	-	177	145.43	144.7	0.31	0.013	3.5	6.2	5.5	7.5	10-yr, 24-hr	3.7	5.3	6.9	6.9	10-yr, 24-hr
SD6014	ST6014	ST6004	CIRCULAR	1.75	-	303.3	141.45	138.9	0.82	0.013	4.9	7.7	8.7	9.7	NF	4.9	7.7	8.7	9.7	NF
SD6015	ST6015	ST6014	CIRCULAR	1.5	-	290	143.21	141.5	0.52	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6016	ST6016	ST6015	CIRCULAR	1.5	-	251	144.97	143.2	0.70	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6017	ST6017	ST6016	CIRCULAR	1.5	-	89	145.42	145.0	0.51	0.013	4.9	7.8	8.8	9.7	NF	4.9	7.8	8.8	9.7	NF
SD6018	ST6018	ST6017	CIRCULAR	1.5	-	60	145.99	145.4	0.95	0.013	4.9	7.8	8.8	9.7	100-yr, 24-hr	4.9	7.8	8.8	9.7	100-yr, 24-hr
SD6019	ST6019	ST6018	CIRCULAR	1.5	-	160	147.08	146.0	0.68	0.013	4.9	7.8	8.8	9.8	100-yr, 24-hr	4.9	7.8	8.8	9.8	100-yr, 24-hr
SD6020	ST6020	ST6019	CIRCULAR	1.5	-	177	147.97	147.1	0.50	0.013	4.9	7.8	8.8	10.0	100-yr, 24-hr	4.9	7.8	8.8	10.0	100-yr, 24-hr
SD6021	ST6021	ST6020	CIRCULAR	1.25	-	114	148.43	148.0	0.18	0.013	4.9	7.8	8.8	10.3	25-yr, 24-hr	4.9	7.8	8.8	10.3	25-yr, 24-hr
SD6022	ST6022	O6001	I5	16	2	300	108.45	73.5	11.75	0.035	26.3	39.3	45.8	54.5	NF	26.3	39.3	45.9	54.4	NF
SD6023	ST6023	ST6022	I5	16	2	80	111.36	108.5	3.64	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6024	ST6024	ST6023	CIRCULAR	3.5	-	50	120.41	111.4	18.40	0.013	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6025	ST6025	ST6024	I5	16	2	20	123.14	120.4	13.78	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6026	ST6026	ST6025	I5	16	2	700	132.99	123.1	1.41	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6027	ST6027	ST6026	CIRCULAR	3.5	-	33	133.08	133.0	0.27	0.013	19.3	28.5	32.0	38.0	NF	19.3	28.5	32.0	38.0	NF
SD6028	ST6028	ST6027	CIRCULAR	3.5	-	394	134.09	133.1	0.26	0.013	19.3	28.5	32.0	38.1	NF	19.3	28.5	32.0	38.0	NF
SD6029	ST6029	ST6028	CIRCULAR	3.5	-	394	135.08	134.1	0.25	0.013	19.3	28.6	32.1	38.1	NF	19.3	28.6	32.1	38.1	NF
SD6030	ST6030	ST6029	CIRCULAR	3.5	-	394	136.06	135.1	0.25	0.013	19.3	28.7	32.1	38.3	NF	19.3	28.7	32.2	38.2	NF
SD6031	ST6031	ST6030	CIRCULAR	3.5	-	394	137.05	136.1	0.25	0.013	19.4	28.7	32.1	38.4	NF	19.4	28.7	32.2	38.4	NF
SD6032	ST6032	ST6031	CIRCULAR	3.5	-	394	138.03	137.1	0.25	0.013	14.1	21.1	23.4	27.6	NF	14.1	21.1	23.1	27.5	NF
SD6033	ST6033	ST6032	CIRCULAR	3.5	-	246	138.62	138.0	0.24	0.013	14.1	21.1	23.5	27.7	NF	14.1	21.1	23.3	27.6	NF
SD6034	ST6034	ST6033	CIRCULAR	3.5	-	254.4	139.24	138.6	0.24	0.013	14.1	21.2	23.8	27.8	NF	14.1	21.2	23.4	27.6	NF
SD6035	ST6035	ST6034	CIRCULAR	3	-	131	139.88	139.2	0.49	0.013	14.1	21.2	24.1	27.9	NF	14.1	21.2	23.5	27.7	NF
SD6036	ST6036	ST6035	CIRCULAR	2.25	-	131	142.21	139.9	1.40	0.013	14.1	21.2	24.3	28.0	NF	14.1	21.2	23.6	27.8	NF
SD6200	ST6200	O6200	COFFEE_CR4	27	4	650	79.45	62.2	2.66	0.035	370.6	484.3	525.3	529.3	NF	427.5	479.5	515.4	633.0	NF
SD6201	ST6201	ST6200	COFFEE_CR4	27	4	420	88.45	79.5	2.14	0.035	370.7	484.3	525.4	529.3	NF	427.6	479.7	515.6	633.1	NF
SD6202	ST6202	ST6201	ARROWHEAD_CR2	28	6	850	125.45	88.5	4.36	0.035	60.8	86.5	97.5	111.9	NF	64.3	92.2	102.9	117.2	NF
SD6203	ST6203	ST6202	ARROWHEAD_CR2	28	6	900	143.45	125.5	2.00	0.035	61.2	86.7	97.5	111.9	NF	64.5	92.4	103.0	117.3	NF
SD6205	ST6204	ST6201	COFFEE_CR4	27	4	900	123.95	88.5	3.95	0.035	323.6	384.7	413.8	443.0	NF	347.4	399.3	437.7	479.8	NF
SD6206	ST6205	ST6204	COFFEE_CR4	27	4	1300	134.95	124.0	0.85	0.035	323.6	384.7	413.8	443.1	NF	347.5	399.3	437.7	479.8	NF
SD6400	ST6400	O6400	CIRCULAR	2.5	-	10	146.95	145.0	20.41	0.011	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD6401	ST6401	ST6400	CIRCULAR	2.5	-	109	148.55	147.0	0.59	0.013	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF
SD6402	ST6402	ST6401	CIRCULAR	2.5	-	229.6	149.5	148.6	0.25	0.013	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6403	ST6403	ST6402	CIRCULAR	2.5	-	217.4	150.99	149.5	0.46	0.011	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6404	ST6404	ST6403	CIRCULAR	2.5	-	207	151.76	151.0	0.33	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6405	ST6405	ST6404	CIRCULAR	2	-	75.4	152.6	151.8	0.85	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6406	ST6406	ST6405	CIRCULAR	2	-	89	153.47	152.6	0.98	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6407	ST6407	ST6406	CIRCULAR	2	-	172.2	155.78	153.5	1.34	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6408	ST6408	ST6407	CIRCULAR	1.5	-	109.3	158.01	155.8	1.47	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6409	ST6409	ST6408	CIRCULAR	1.5	-	45.3	158.66	158.0	1.35	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6410	ST6410	ST6409	CIRCULAR	1.25	-	219.7	161.47	158.7	1.17	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6411	ST6411	ST6410	CIRCULAR	1.25	-	346	164.48	161.5	0.81	0.011	2.6	4.3	5.2	6.6	NF	2.6	4.3	5.2	6.6	NF
SD6204	ST6412	ST6203	CIRCULAR	4	-	70	149.45	143.5	8.60	0.013	61.4	86.8	97.5	111.9	NF	64.6	92.5	103.0	117.3	NF
SD6414	ST6413	ST6414	ARROWHEAD_CR2	28	6	50	159.45	158.7	1.56	0.035	51.8	71.4	80.6	92.6	NF	53.1	73.8	82.6	94.2	NF
SD6415	ST6414	ST6415	CIRCULAR	3.5	-	100	158.67	157.1	1.56	0.024	51.2	71.3	80.0	92.6	NF	52.2	73.6	82.2	94.2	NF
SD6412	ST6415	ST6412	ARROWHEAD_CR2	28	6	490	157.1	149.5	1.56	0.035	50.9	71.2	80.0	92.6	NF	51.8	73.6	82.2	94.2	NF
SD6601	ST6601	O6600	CIRCULAR	1.5	-	37.1	100.63	97.1	9.58	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6602	ST6602	ST6601	CIRCULAR	1.5	-	53.4	114.29	100.6	26.04	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6603	ST6603	ST6602	CIRCULAR	1.5	-	149.2	129.78	114.3	10.30	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6604	ST6604	ST6603	CIRCULAR	1.75	-	233.4	139.31	129.8	4.00	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6605	ST6605	ST6604	CIRCULAR	1.75	-	178.1	147.4	139.3	4.43	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6606	ST6606	ST6605	CIRCULAR	0.83	-	144.2	150.98	147.4	2.35	0.013	4.2	5.3	5.9	6.8	10-yr, 24-hr	4.3	5.4	6.0	6.9	10-yr, 24-hr
SD6607	ST6607	ST6606	CIRCULAR	1	-	120.7	153.15	151.0	1.62	0.013	4.2	5.4	6.1	7.1	10-yr, 24-hr	4.3	5.5	6.3	7.3	10-yr, 24-hr
SD6608	ST6608	ST6607	CIRCULAR	1	-	245	156.07	153.2	1.10	0.013	4.2	5.7	6.4	7.6	10-yr, 24-hr	4.3	5.8	6.6	7.8	10-yr, 24-hr
SD6609	ST6609	ST6608	CIRCULAR	1	-	165.6	158.29	156.1	1.08	0.013	4.2	6.0	7.1	8.6	10-yr, 24-hr	4.3	6.2	7.3	8.8	10-yr, 24-hr
SD6610	ST6610	ST6609	CIRCULAR	1	-	77	159.64	158.3	1.40	0.013	4.2	6.4	7.7	9.6	10-yr, 24-hr	4.4	6.7	8.0	9.8	10-yr, 24-hr
SD6630	ST6618	ST6619	CIRCULAR	0.83	-	117.9	160.03	155.8	3.32	0.013	0.0	0.0	0.1	0.4	NF	0.0	0.0	0.2	1.9	NF
SD6632	ST6619	ST6606	CIRCULAR	0.83	-	348.8	155.79	151.0	1.35	0.013	0.0	1.1	1.2	1.5	NF	0.0	1.2	1.2	1.5	100-yr, 24-hr
SD6616	ST6653	ST6654	CIRCULAR	1.5	-	210.7	171.05	167.7	1.57	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6617	ST6654	ST6655	CIRCULAR	1.5	-	197	167.65	161.9	2.89	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6619	ST6655	STD6604	CIRCULAR	2	-	213.9	161.85	161.0	0.42	0.013	3.4	5.1	6.1	7.4	NF	3.4	5.2	6.2	7.6	NF
SD9000	ST9001	09000	CIRCULAR	3	-	74	100.78	100.6	0.24	0.024	34.8	51.9	62.5	71.6	NF	34.8	51.9	62.5	70.7	NF
SD9001	ST9002	ST9001	CIRCULAR	3.5	-	317	101.89	100.8	0.32	0.024	34.8	51.9	62.5	71.6	10-yr, 24-hr	34.8	51.9	62.5	70.7	10-yr, 24-hr
SD9002	ST9003	ST9002	CIRCULAR	3.5	-	504.5	109.78	101.9	1.54	0.024	35.2	55.0	65.2	72.1	25-yr, 24-hr	35.2	55.0	65.2	71.1	25-yr, 24-hr
SD9003	ST9004	ST9003	CIRCULAR	3	-	436.8	119.75	109.8	2.17	0.013	21.1	33.2	40.0	45.9	NF	21.1	33.2	40.0	46.4	NF
SD9004	ST9005	ST9004	CIRCULAR	3	-	498	126.25	119.8	1.29	0.013	21.1	33.2	40.4	45.9	NF	21.1	33.2	40.4	46.6	NF
SD9005	ST9006	ST9005	CIRCULAR	3	-	460	127.45	126.3	0.24	0.013	21.1	33.2	40.5	53.2	NF	21.1	33.2	40.5	53.4	100-yr, 24-hr
SD9006	ST9007	ST9006	CIRCULAR	3	-	402.2	139.5	127.5	2.97	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.9	NF
SD9007	ST9008	ST9007	CIRCULAR	3	-	283.7	141.13	139.5	0.57	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.7	NF
SD9008	ST9009	ST9008	CIRCULAR	3	-	86.3	141.35	141.1	0.26	0.013	14.6	22.7	27.3	31.7	NF	14.6	22.7	27.3	31.7	NF
SD9009	ST9010	ST9009	CIRCULAR	3	-	379.9	143.25	141.4	0.50	0.013	14.6	22.7	27.4	31.7	NF	14.6	22.7	27.4	31.7	NF
SD9010	ST9011	ST9010	CIRCULAR	3	-	432.6	144.96	143.3	0.40	0.013	14.6	22.8	27.5	31.9	NF	14.6	22.8	27.5	31.9	NF
SD9011	ST9012	ST9011	CIRCULAR	2	-	315	147.48	145.0	0.27	0.013	14.7	22.9	27.6	31.9	NF	14.7	22.9	27.6	31.9	NF
SD9012	ST9013	ST9012	CIRCULAR	2	-	332	148.38	147.5	0.27	0.013	14.7	22.9	27.6	31.9	100-yr, 24-hr	14.7	22.9	27.6	31.9	100-yr, 24-hr
SD9013	ST9014	09001	CIRCULAR	2.5	-	117	97.82	93.0	4.11	0.018	54.8	83.2	88.4	94.1	100-yr, 24-hr	54.8	83.2	88.1	94.2	100-yr, 24-hr
SD9014	ST9015	ST9014	CIRCULAR	3	-	217	100.35	97.8	0.76	0.011	40.2	62.1	64.8	70.3	25-yr, 24-hr	40.3	62.2	64.5	70.4	25-yr, 24-hr
SD9015	ST9016	ST9015	CIRCULAR	3	-	701.7	109.33	100.4	1.70	0.011	14.4	19.6	22.5	27.6	NF	14.5	19.7	22.3	27.6	NF
SD9016	ST9017	ST9016	CIRCULAR	3	-	311	113.58	109.3	0.31	0.011	14.5	19.6	21.2	24.0	NF	14.5	19.7	21.2	24.0	NF
SD9017	ST9018	ST9017	CIRCULAR	1.75	-	240	115.7	113.6	0.84	0.024	14.5	19.7	21.2	23.7	2-yr, 24-hr	14.5	19.7	21.2	23.7	2-yr, 24-hr
SD9060	ST9019	ST9018	CIRCULAR	1.75	-	121.7	116.62	115.7	0.67	0.024	14.8	20.0	21.5	24.5	2-yr, 24-hr	14.8	20.0	21.5	24.6	2-yr, 24-hr
SD9018	ST9020	ST9019	CIRCULAR	1.5	-	309	118.6	116.6	0.56	0.013	3.9	6.1	6.3	7.4	10-yr, 24-hr	3.8	6.2	6.4	7.5	10-yr, 24-hr
SD9019	ST9021	ST9020	CIRCULAR	1.25	-	395	130.67	118.6	2.99	0.013	2.9	5.3	5.6	6.5	10-yr, 24-hr	3.0	5.4	5.7	6.5	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD9020	ST9022	ST9021	CIRCULAR	1.25	-	351	140.33	130.7	2.72	0.013	2.9	4.9	6.2	8.0	25-yr, 24-hr	3.0	4.9	6.3	8.0	25-yr, 24-hr
SD9021	ST9023	ST9022	CIRCULAR	1.25	-	453.5	145.89	140.3	1.20	0.013	3.0	4.9	6.2	7.9	100-yr, 24-hr	3.0	4.9	6.3	7.9	100-yr, 24-hr
SD9022	ST9024	ST9015	CIRCULAR	3	-	159.4	103.27	100.4	1.51	0.011	27.0	43.2	46.6	50.3	25-yr, 24-hr	27.0	43.5	46.4	62.5	25-yr, 24-hr
SD9023	ST9025	ST9024	CIRCULAR	3	-	238.4	106.07	103.3	1.17	0.011	18.8	29.5	30.4	34.5	100-yr, 24-hr	18.8	29.7	32.9	45.9	100-yr, 24-hr
SD9024	ST9026	ST9025	CIRCULAR	2.5	-	175.8	110.34	106.1	2.39	0.011	18.9	29.2	30.2	34.5	100-yr, 24-hr	18.9	29.4	32.9	38.3	25-yr, 24-hr
SD9025	ST9027	ST9026	CIRCULAR	2.5	-	271.6	117.35	110.3	2.58	0.011	18.9	29.1	30.2	35.0	NF	18.9	29.1	32.8	34.8	NF
SD9026	ST9028	ST9027	CIRCULAR	2	-	142	121.35	117.4	2.75	0.024	14.7	21.9	23.1	25.7	100-yr, 24-hr	14.7	21.9	23.0	25.7	100-yr, 24-hr
SD9027	ST9029	ST9028	CIRCULAR	2	-	160	125.35	121.4	2.44	0.024	14.7	21.9	23.1	25.9	100-yr, 24-hr	14.7	21.9	23.0	25.8	100-yr, 24-hr
SD9028	ST9030	ST9029	CIRCULAR	2	-	258	131.45	125.4	2.33	0.024	14.7	21.9	23.1	26.5	10-yr, 24-hr	14.7	21.9	23.0	26.4	10-yr, 24-hr
SD9029	ST9031	ST9030	CIRCULAR	2.5	-	296	135.35	131.5	1.28	0.024	14.7	22.9	27.0	28.8	25-yr, 24-hr	14.7	22.9	26.9	28.8	25-yr, 24-hr
SD9030	ST9032	ST9014	CIRCULAR	3	-	263.3	102.61	97.8	1.49	0.011	15.4	22.3	25.1	27.5	100-yr, 24-hr	15.4	22.3	25.1	30.4	100-yr, 24-hr
SD9031	ST9033	ST9032	CIRCULAR	1.75	-	202.4	103.63	102.6	0.45	0.024	7.7	10.9	13.1	16.7	100-yr, 24-hr	7.7	10.9	13.1	17.2	100-yr, 24-hr
SD9032	ST9034	ST9033	CIRCULAR	1.75	-	306.4	105.2	103.6	0.48	0.024	7.7	10.9	13.1	13.6	25-yr, 24-hr	7.7	10.9	13.1	14.9	25-yr, 24-hr
SD9033	ST9035	ST9034	CIRCULAR	1.5	-	118.7	107.06	105.2	0.40	0.013	7.7	10.9	12.8	12.6	25-yr, 24-hr	7.7	10.9	12.8	12.7	10-yr, 24-hr
SD9034	ST9036	ST9035	CIRCULAR	1.5	-	276	108.14	107.1	0.39	0.013	7.7	10.9	12.1	12.5	10-yr, 24-hr	7.7	10.9	12.1	12.5	10-yr, 24-hr
SD9035	ST9037	ST9036	CIRCULAR	1.5	-	242	108.87	108.1	0.39	0.013	7.7	10.6	12.5	13.5	10-yr, 24-hr	7.7	10.6	12.5	13.5	10-yr, 24-hr
SD9036	ST9038	ST9037	CIRCULAR	1.25	-	212.2	109.62	108.9	0.22	0.013	7.7	11.2	13.5	14.7	2-yr, 24-hr	7.7	11.2	13.5	14.7	2-yr, 24-hr
SD9037	ST9039	ST9038	CIRCULAR	1.25	-	260.1	110.29	109.6	0.22	0.013	7.9	12.4	15.1	16.6	2-yr, 24-hr	7.9	12.4	15.1	16.6	2-yr, 24-hr
SD9058	ST9040	ST9041	CIRCULAR	2.5	-	203	111.71	108.3	1.51	0.013	15.5	24.9	29.8	37.0	NF	15.5	24.9	29.8	37.0	NF
SD9057	ST9041	ST9068	CIRCULAR	2.5	-	275	108.31	104.0	1.21	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9038	ST9042	ST9040	CIRCULAR	2	-	294.3	114.63	111.7	0.98	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9053	ST9043	ST9066	CIRCULAR	1.5	-	961	122.65	108.0	1.51	0.013	4.0	6.0	6.7	8.0	NF	4.0	6.1	6.8	8.1	NF
SD9045	ST9044	ST9042	CIRCULAR	2	-	250	116.13	114.6	0.60	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9054	ST9045	ST9044	CIRCULAR	1.5	-	249.8	117.91	116.1	0.51	0.013	3.0	4.9	6.1	7.5	NF	3.0	4.9	6.1	7.5	NF
SD9056	ST9046	ST9045	CIRCULAR	1.5	-	150	118.6	117.9	0.33	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9055	ST9047	ST9046	CIRCULAR	1.25	-	168.6	120.31	118.6	0.87	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9046	ST9048	ST9047	CIRCULAR	1.25	-	148.2	121.19	120.3	0.59	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9047	ST9049	ST9040	CIRCULAR	2.25	-	217.2	114.26	111.7	1.06	0.013	8.8	13.8	16.2	20.2	NF	8.8	13.8	16.2	20.2	NF
SD9048	ST9050	ST9049	CIRCULAR	2	-	200.7	115.86	114.3	0.80	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9049	ST9051	ST9050	CIRCULAR	2	-	118	116.69	115.9	0.70	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9050	ST9052	ST9051	CIRCULAR	1.75	-	208	118.6	116.7	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9044	ST9053	ST9052	CIRCULAR	1.75	-	143	119.74	118.6	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9051	ST9054	ST9053	CIRCULAR	1.75	-	157	120.84	119.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9040	ST9055	ST9054	CIRCULAR	1.75	-	180	121.74	120.8	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9043	ST9056	ST9055	CIRCULAR	1.5	-	125	122.87	121.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9041	ST9057	ST9056	CIRCULAR	1.5	-	150	123.62	122.9	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9042	ST9058	ST9057	CIRCULAR	1.5	-	150	124.37	123.6	0.50	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9039	ST9059	ST9058	CIRCULAR	1.25	-	135	125.5	124.4	0.65	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9059	ST9060	ST9061	CIRCULAR	1.25	-	248.8	129.87	124.3	2.25	0.013	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.2	NF
SD9052	ST9061	ST9043	CIRCULAR	1.25	-	65.9	124.27	122.7	2.26	0.024	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.1	NF
SD9061	ST9062	ST9063	CIRCULAR	1.5	-	265.8	97.57	95.7	0.70	0.011	4.2	7.5	8.1	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9067	ST9063	ST9069	CIRCULAR	1.5	-	128	95.65	94.8	0.75	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.1	NF
SD9062	ST9064	ST9062	CIRCULAR	1.5	-	138.1	99.06	97.6	1.08	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.5	11.0	NF
SD9063	ST9065	ST9064	CIRCULAR	1.25	-	98.2	99.89	99.1	0.54	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.6	11.0	NF
SD9064	ST9066	ST9067	CIRCULAR	2.5	-	205	107.95	103.8	2.00	0.013	10.7	16.2	18.8	21.7	NF	10.7	16.3	18.9	21.8	NF
SD9065	ST9067	09003	CIRCULAR	3	-	145	103.75	100.0	2.60	0.013	26.2	40.9	48.4	58.6	NF	26.2	40.9	48.5	58.7	NF
SD9066	ST9068	ST9067	CIRCULAR	3	-	10	103.95	103.8	2.00	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9068	ST9069	ST9070	CIRCULAR	1.5	-	110	94.81	92.8	1.44	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9069	ST9070	09002	CIRCULAR	1.5	-	30	92.83	92.9	-0.27	0.011	4.1	7.5	8.0	10.6	NF	4.4	7.8	8.5	11.0	NF
1207	STD3400	ST4221	CIRCULAR	1.5	-	290.7	169.61	165.9	1.11	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	9.7	NF
SD4592	TOOZE_POND	ST4503	CIRCULAR	2	-	264	147.24	146.6	0.26	0.013	3.6	5.8	7.0	8.7	NF	3.8	6.0	7.3	9.0	NF

Table B-3. Hydaulic Model Inputs and Results																				
Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions					
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
1323	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1	-	38	146.45	141.5	1.32	0.013	1.8	2.7	3.5	22.9	100-yr, 24-hr	1.8	2.7	3.5	22.9	100-yr, 24-hr
4826	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1.5	-	30	146.45	141.5	22.88	0.024	14.9	22.9	22.3	4.4	100-yr, 24-hr	14.9	22.9	22.3	4.4	100-yr, 24-hr

NF = No Flooding

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

WATERWAYS CONSULTING, INC.

Ecological Restoration Design ~ Civil Engineering ~ Natural Resource Management

TECHNICAL MEMORANDUM - FINAL UPDATED

To: Angela Wieland, Brown and Caldwell

From: Waterways Consulting, Inc.

Date: January 30, 2024

Re: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead Creeks, Newland, and Kruse Creeks

Introduction

Brown and Caldwell (BC) was hired by the City of Wilsonville (COW) to prepare an updated Stormwater Master Plan that will develop an integrated and long-term approach for managing stormwater in the city. Wilsonville is one of Oregon's fastest growing cities, and its rapid growth has necessitated updates to previous Stormwater Master Plans (URS, 2012) to reflect changes in land use and improvements to stormwater management practices.

As part of this process BC requested that Waterways Consulting, Inc. (Waterways) conduct geomorphic stream assessments of a subset of stream segments within and adjacent to the City of Wilsonville to inform the updated Stormwater Master Plan. The assessments are meant to improve the understanding of stream processes in the selected reaches and to identify infrastructure risks associated with changes in creek hydrology as the city develops. The assessment was conducted in two phases with an initial phase that included evaluations of portions of Boeckman, Meridian and Arrowhead Creeks. The second phase, conducted in Fall 2023, included evaluations of portions of Newland Creek and an unnamed tributary to the Willamette River, referred to as Kruse Creek in this report.

Boeckman, Meridian, Arrowhead creeks (tributary to Coffee Lake Creek), Newland, and Kruse Creeks are small tributaries of the Willamette River flowing in narrow canyons bordered by thick deposits of fine-grained sediment deposited by the Missoula Floods. These creeks flow in confined valleys with steep, landslide-prone valley walls. In some areas, residential development encroaches to the edge of the adjacent terraces[1], while in other areas, including the assessed portions of Arrowhead Creek, Newland Creek, and Kruse Creek, the adjacent land use is agricultural, rural residential, or industrial. Large portions of the watersheds upstream of the assessment reaches have, are in the process of, or will be converted from open space to suburban residential neighborhoods. These land use changes have, and will continue to have, the potential to impact the morphology of these streams as the channels respond to changes in flow, direct modifications, and changes in sediment supply. This assessment focuses on evaluating the current condition of the channels within the study reach, identifies any ongoing infrastructure concerns associated with past hydromodification impacts, and evaluates the susceptibility of the streams to future hydromodification impacts.

[1] This assessment focuses only on stream-based hazards and concerns and does not address landslide risks on the valley walls.

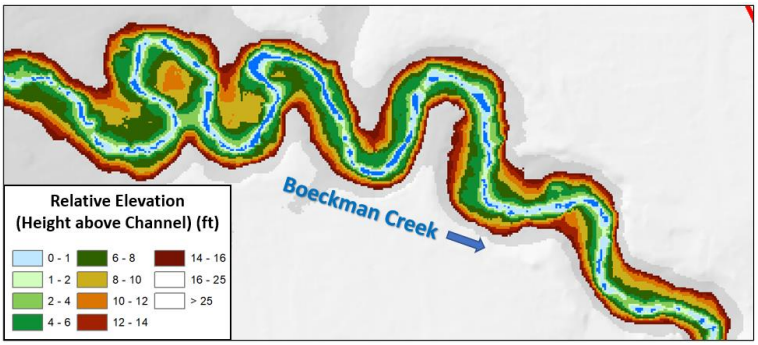
Approach

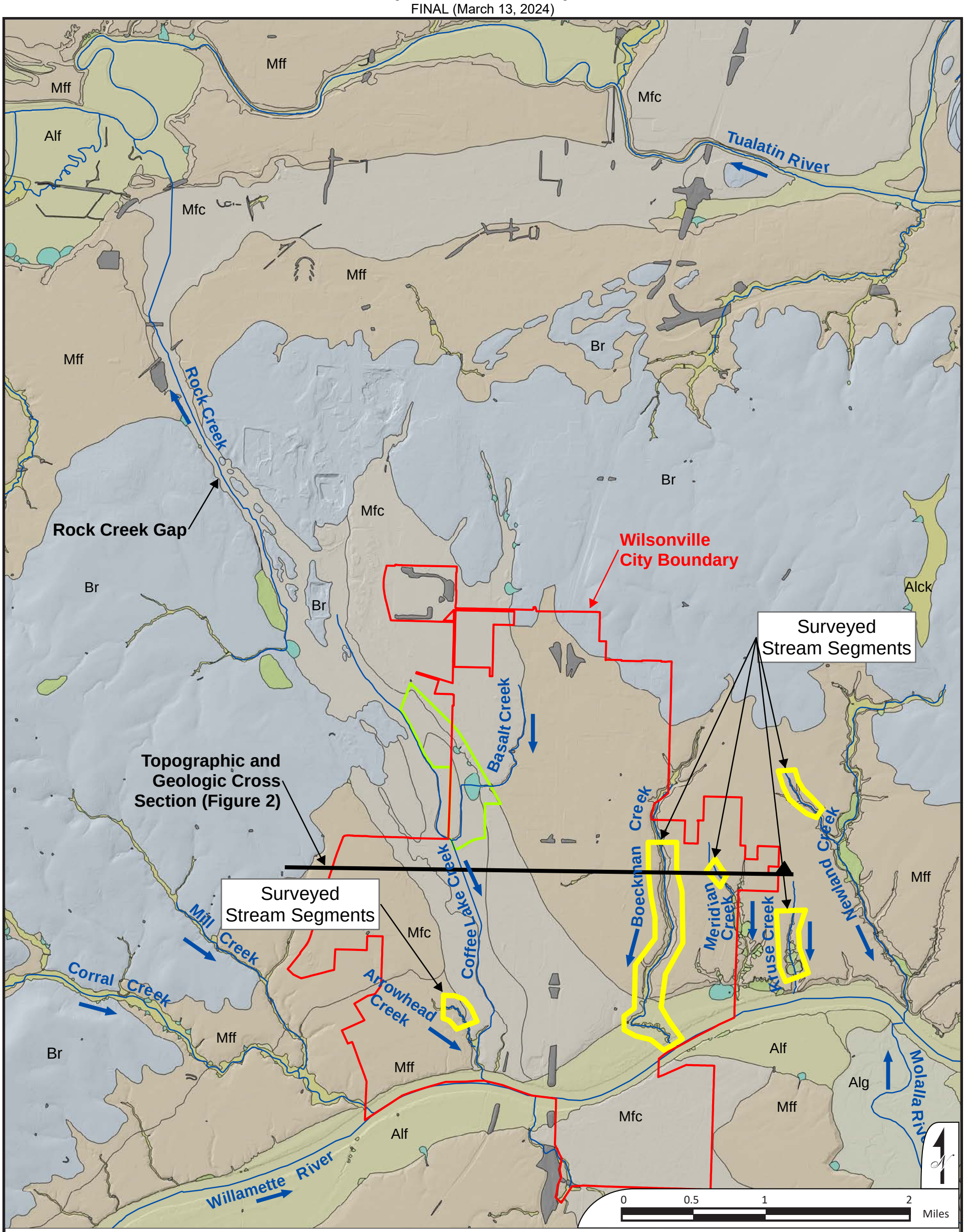
The purpose of the assessment is to understand and map the dominant geomorphic processes in the assessment reaches and identify any infrastructure-related issues that should be considered within the context of the updated Stormwater Master Plan. A key component of the assessment is the understanding that the reaches may be impacted by further hydromodification in the near future as a result of new upstream residential development or changes in other land use, such as agriculture or road development. Future efforts will include using the assessment information to identify potential Capital Improvement Projects (CIPs) or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The assessments consisted of reconnaissance-level field observations supported by desktop mapping and analysis. The field protocols involved an experienced geomorphologist walking a designated stream reach twice in one day, starting and ending at the same location. In the first pass, the geomorphologist traversed the channel by wading, mapping and collecting georeferenced photographs of individual point features of interest, such as beaver dams, bridges, culverts, exposed pipes, affected roads and trails, headcuts, bedrock outcrops, heavily eroding banks, etc. The locations of these point-scale features were recorded in a tabular format and later digitized (these point-scale observations are presented in the tables in **Appendix A** of this report). During the first pass, the geomorphologist subdivided the stream into mappable "subreaches," typically several hundreds to thousands of feet long, within which geomorphic conditions are relatively consistent and could be characterized. The second pass consisted of walking back through the reach and evaluating the subreaches' key geomorphic features, conditions, infrastructure risks, restoration opportunities, etc. The reach-scale observations were recorded in a matrix-based field form specifically developed for this project. Subreach summary tables for the surveyed reaches are provided later in this report.

The desktop component of this assessment included compilation and analysis of geospatial data, including infrastructure data, topographic data, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for each of the creeks within the assessment area. An REM is a topographic model created from a LiDAR elevation surface that shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream (e.g., **Figure 1**). The REMs for the creeks are provided as .tif files in a digital appendix to this report (**Appendix B**). In addition, as part of the desktop portion of the assessment Waterways created and analyzed topographic and geologic cross sections and stream longitudinal profiles and produced a set of field maps identifying streams and stormwater infrastructure identified during the field component. The field maps are provided as **Appendix C**.

Figure 1. *Example of Relative Elevation Model of Part of Lower Boeckman Creek*





Legend

City Limits

Stream Centerline

Coffee Lake Wetlands (City of Wilsonville)

Surficial Geology (from compilation by Ma et al., 2012)

- Af - Artificial Fill
- Alck - Creek Alluvium
- Alf - Fine Alluvium
- Alg - Coarse Alluvium
- Br - Columbia River Basalts
- Df - Debris Flow Fans
- Ls - Large Landslides
- Mfc - Missoula Flood Coarse Bedload Deposits
- Mff - Missoula Fine Flood Deposits

Ma, L., Madin, I.P., Duplantis, S., and K.J. Williams. 2012. LiDAR- Based Surficial Geologic Map and Database of the Greater Portland Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington. State of Oregon Department of Geology and Mineral Industries, Open File Report O-12-02.

Geologic and Geomorphic Setting Overview Map

Geomorphic Assessment of Wilsonville Creeks

WATERWAYS CONSULTING, INC. Santa Cruz, CA watways.com Portland, OR

FIGURE 2

Geologic and Geomorphic Setting

Geomorphic processes in the creeks that dissect the Wilsonville area are influenced by their recent geologic history (**Figure 2**). Wilsonville sits on sedimentary deposits laid down by the Missoula Floods (Bretz, 1969), a series of dozens of gigantic floods that inundated the Willamette Valley between approximately 20,000 and 14,000 years ago (O'Connor et al., 2020). These cataclysmic floods originated from Glacial Lake Missoula in Montana and traveled down the Columbia River valley. A constriction downstream from Portland hydraulically impounded these flows, causing backwater flooding up the Willamette Valley. One of the main flow pathways for the Missoula Floods into the Willamette Valley was through a path that includes Lake Oswego and the "Rock Creek Gap" north of Wilsonville (O'Connor et al., 2001) (**Figure 3**). At these locations, huge flows moving south into the Willamette Valley were concentrated through narrow gaps in bedrock, forming underwater vortices powerful enough to carve deep channels ("scablands") and lakes ("kolks") in the resistant basalt bedrock in these locations.

The City of Wilsonville lies on an alluvial fan that formed in these floods where concentrated floodwater moving into the Willamette Valley spread out after moving through the Rock Creek Gap. The sudden widening downstream of the gap caused giant lobes of poorly sorted gravel and boulders to deposit along a pathway that bisects the City of Wilsonville (**Figure 2**). Drill logs from Canby and Wilsonville indicate that these coarse-grained, poorly sorted Missoula Flood deposits (labeled ***Mfc*** on **Figure 2**) range from 50 to 120 feet thick and are typically covered with 5-15 feet of sand and silt (Allison, 1978). In Wilsonville, the north-south oriented swath of ***Mfc*** is bounded on both sides by finer grained Missoula Flood deposits (***Mff*** in **Figure 2**). These sediments are thick, stratified silt and clay deposits that cover much of the lowland Willamette Valley floor. The finer-grained sediments (***Mff***) were laid down at a later phase in the Missoula Floods when the Willamette Valley was ponded as the main floods moved through the Columbia River.

Figure 4 is an east-west topographic and geologic profile through the main creeks of Wilsonville, passing through several of the reaches included in this assessment. The profile illustrates the differences between the parallel north-south creeks flowing through Wilsonville. Coffee Lake Creek, the largest creek in the city, flows in an "underfit" valley created by the Missoula Floods, and is underlain by coarse Missoula Flood sediments (***Mfc***). This geological setting explains why the Coffee Lake Creek valley is a wide, flat valley containing ecologically important wetlands, along with other unique geologic features of Wilsonville area, such as scablands and kolks, including the ecologically important Coffee Lake Wetlands as well as the 3.5-acre kolk pond at the Tonquin geologic area managed by Metro.

In contrast with Coffee Lake Creek, Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks carved deeper canyons in thick deposits of fine-grained Missoula Flood deposits (***Mff***) (**Figure 4**). Boeckman Creek is in a narrow canyon as much as 100 feet deep, with steep, unstable hillslopes prone to landslides. Boeckman, Meridian, Arrowhead, and Newland Creeks appear to have incised through the softer deposits to the point where their beds have encountered more consolidated clay deposits, or in the case of Arrowhead, where it reached the base level established by Coffee Lake Creek. Th presence of marginally resistant, consolidated clay in the streambed in some locations on all of these creeks provides a degree of base level stability. In some cases, including Boeckman and Arrowhead, the creeks appear to be no longer incising, especially in the lower reaches of these watersheds. Conversely, the headwater reaches assessed on Meridian and Newland Creek, appear to be experiencing incision despite exposures of more consolidated substrates. The morphology of the channel and valley on Kruse Creek is more dominated by the presence of valley-wide landslides and a high groundwater table.

Figure 3. *Pathway of Missoula Floods into the Willamette Valley through Wilsonville (modified from Minervini et al., 2003)*

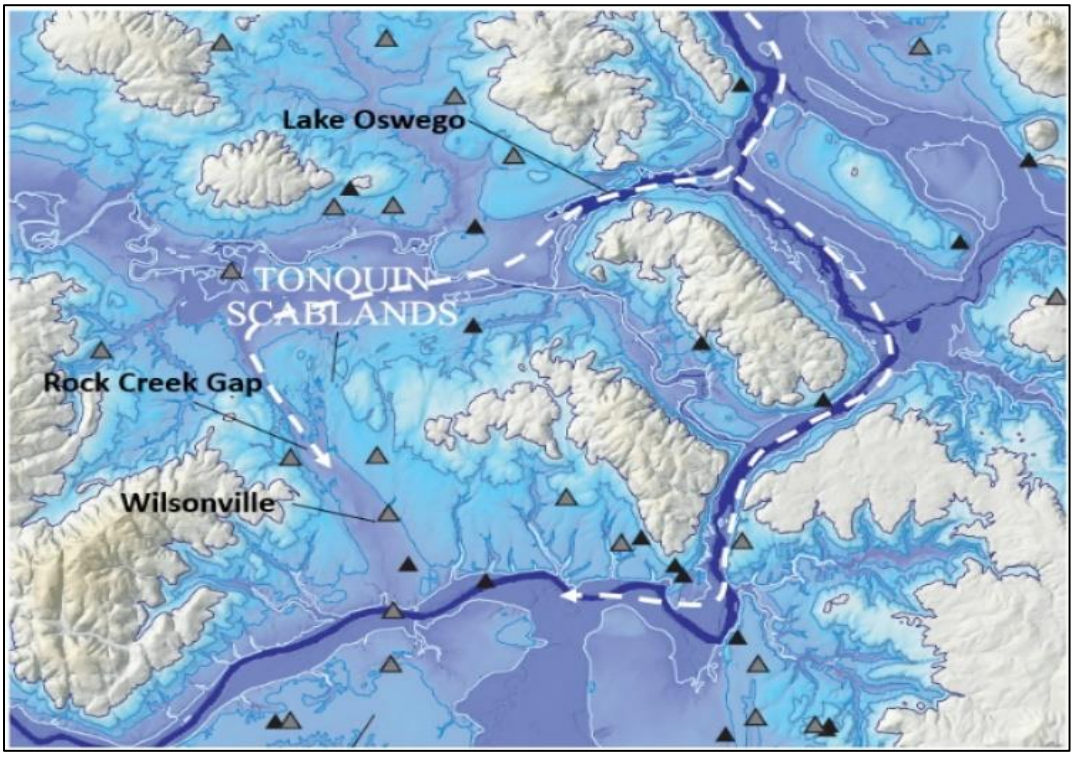
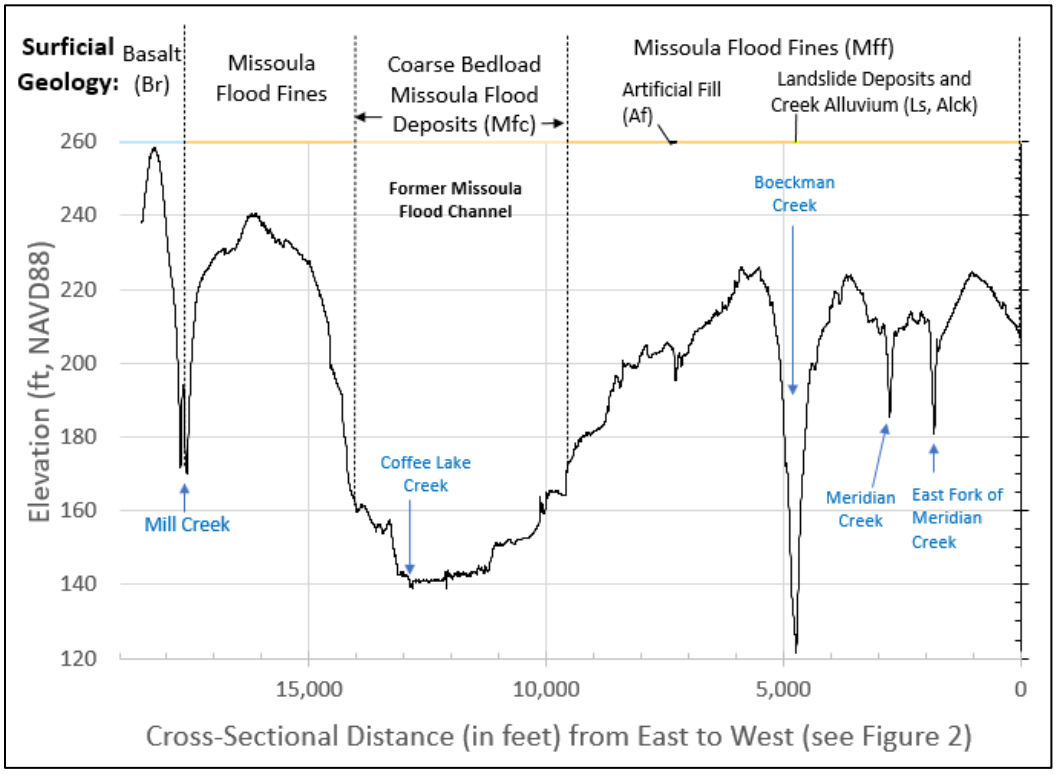


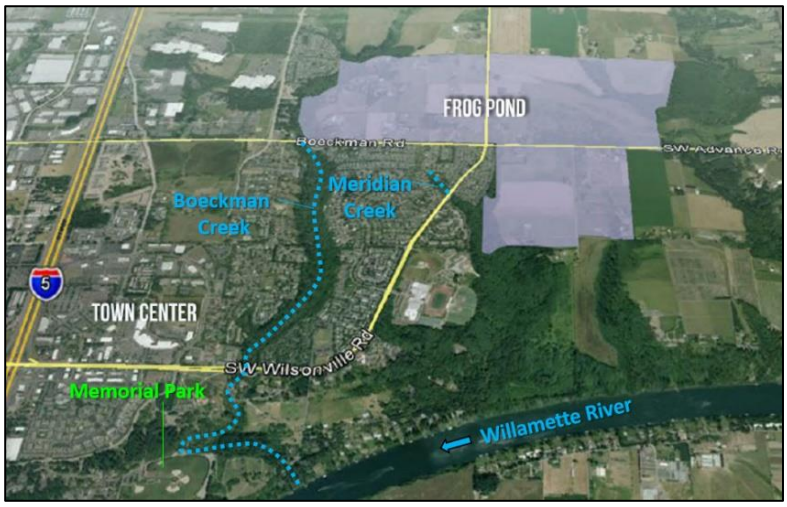
Figure 4. *Topographic and Geologic Cross Section Across the Wilsonville Area (See Fig. 2 for Profile Location)*



Human Impacts and Infrastructure

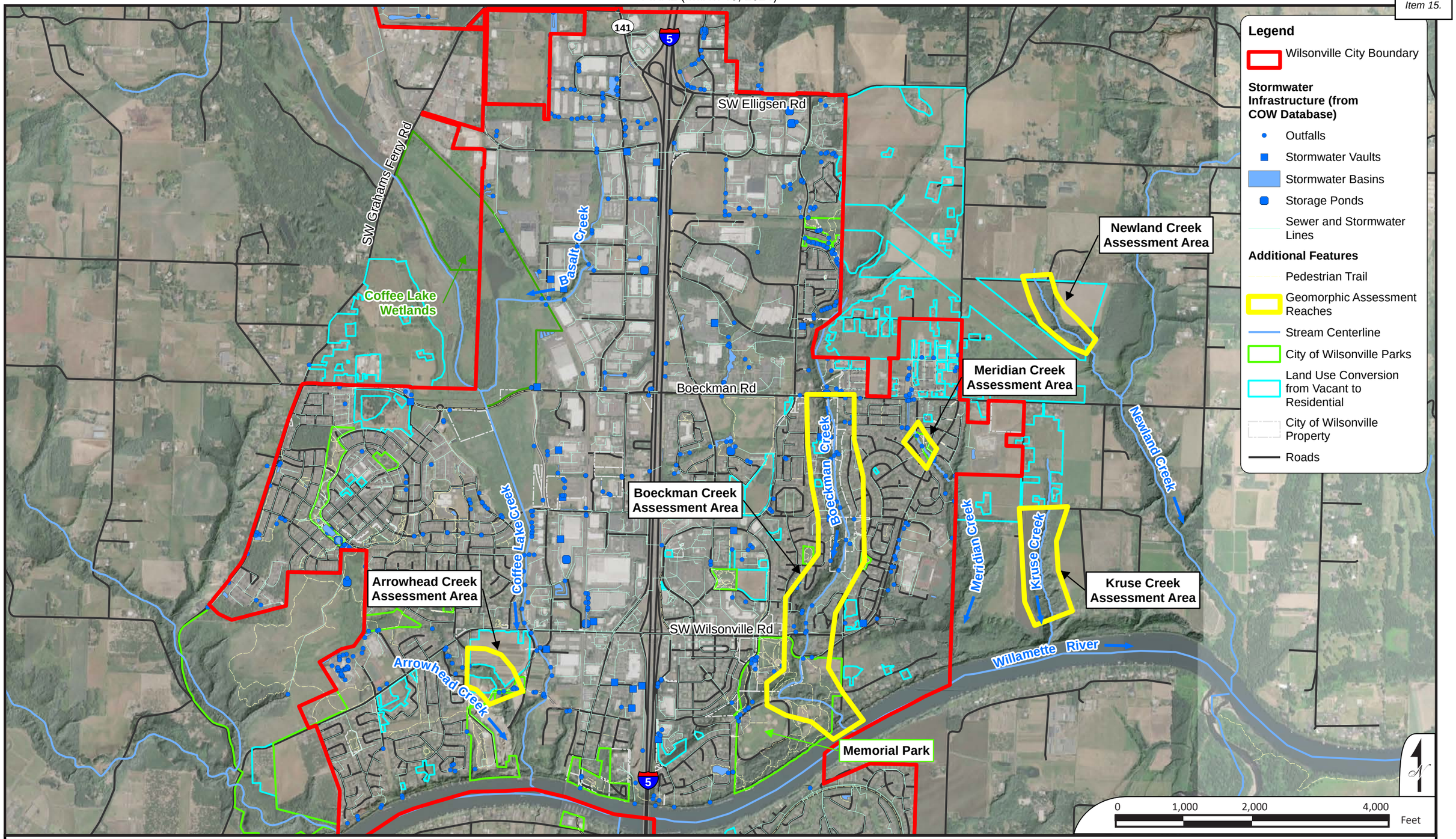
Most of the assessment reaches are adjacent to existing developed areas or are downstream of zones in the process of, or anticipated to be, converted from agricultural uses to residential developments (***Figure 5***). Hydromodification impacts in the assessment reaches are not limited to impacts associated with urban and residential development. Hydromodification impacts on these stream channels have been ongoing for over a century when the forested landscape was converted to agriculture, roads were built, culverts were installed, and fields were tile drained. These land use changes specifically intended to reduce water storage on the landscape while increasing the efficiency of runoff to adjacent waterbodies.

Figure 5. *Location of Phase 1 Assessment Reaches (dashed blue lines) relative to Existing and Planned Developed Areas (modified from APG. 2015)*



In the assessment reaches, Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks flow in incised canyons. Along Boeckman and Meridians Creeks, residences are built to the edges of the canyons and the streams flow in confined valleys 20 to 100 feet deep. Water enters the streams from paved areas through a complex network of stormwater pipes that discharge along the steep valley walls (***Figure 6***).

The assessment reaches in Boeckman and Meridian are downstream of recently developed areas within the Frog Pond Development Area, a 500-acre residential neighborhood under construction within the urban growth boundary (**Figure 5**). The Newland and Kruse Creek assessment reaches are located downstream of an undeveloped portion of the Frog Pond Development area located to the east of Wilsonville and Stafford Roads. The long-planned development will include residences, schools, parks, transit, and trails, including a new regional trail following Boeckman Creek along the assessment reach (APG, 2015). To mitigate for potential hydromodification impacts from the existing and proposed portions of the Frog Pond Development area on the assessment reaches and other receiving streams, the developments are implementing Best Management Practices (BMP's) that are specifically designed to maintain the natural hydrology and limit the discharge of stormflow off of newly created impervious surfaces. Both "upland" and "in-stream" strategies for mitigating hydromodification risks have been adopted by the City and are being implemented within newly developed portions of Wilsonville, including the Frog Pond area (Brown and Caldwell, 2015). Those BMP's include infiltration and detention facilities, neighborhood-based Low Impact Development strategies, retrofitting existing stormwater detention basins, rehabilitating stormwater outfalls along the creek, culvert upgrades, and riparian vegetation improvements. The assessment reaches, especially along Newland and Kruse Creeks, provides an opportunity to establish a baseline of channel conditions prior to development occurring in the contributing watershed.



Human Impacts and Infrastrucure Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 6

Field Observations

The assessment included 5 days of field time to document conditions in priority reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks. These reaches were prioritized by the City of Wilsonville based on the importance of the streams, likelihood of hydromodification impacts, land access, and available budget. Additional reaches may be added to the assessment in the future.

The highest priority reach was the section of Boeckman Creek from Boeckman Road to the Willamette River, an along-stream distance of 12,200 feet (2.3 miles) (**Figure 7**). The second priority for the assessment was the 600-foot-long (0.1-mile) reach of Meridian Creek adjacent to Willow Creek/Landover Park (also shown in the top right corner of **Figure 7**). Sections of Basalt Creek and Arrowhead Creek were also identified as potential assessment reaches. Arrowhead was prioritized for the assessment over Basalt Creek due to the lack of landowner agreements along Basalt Creek.

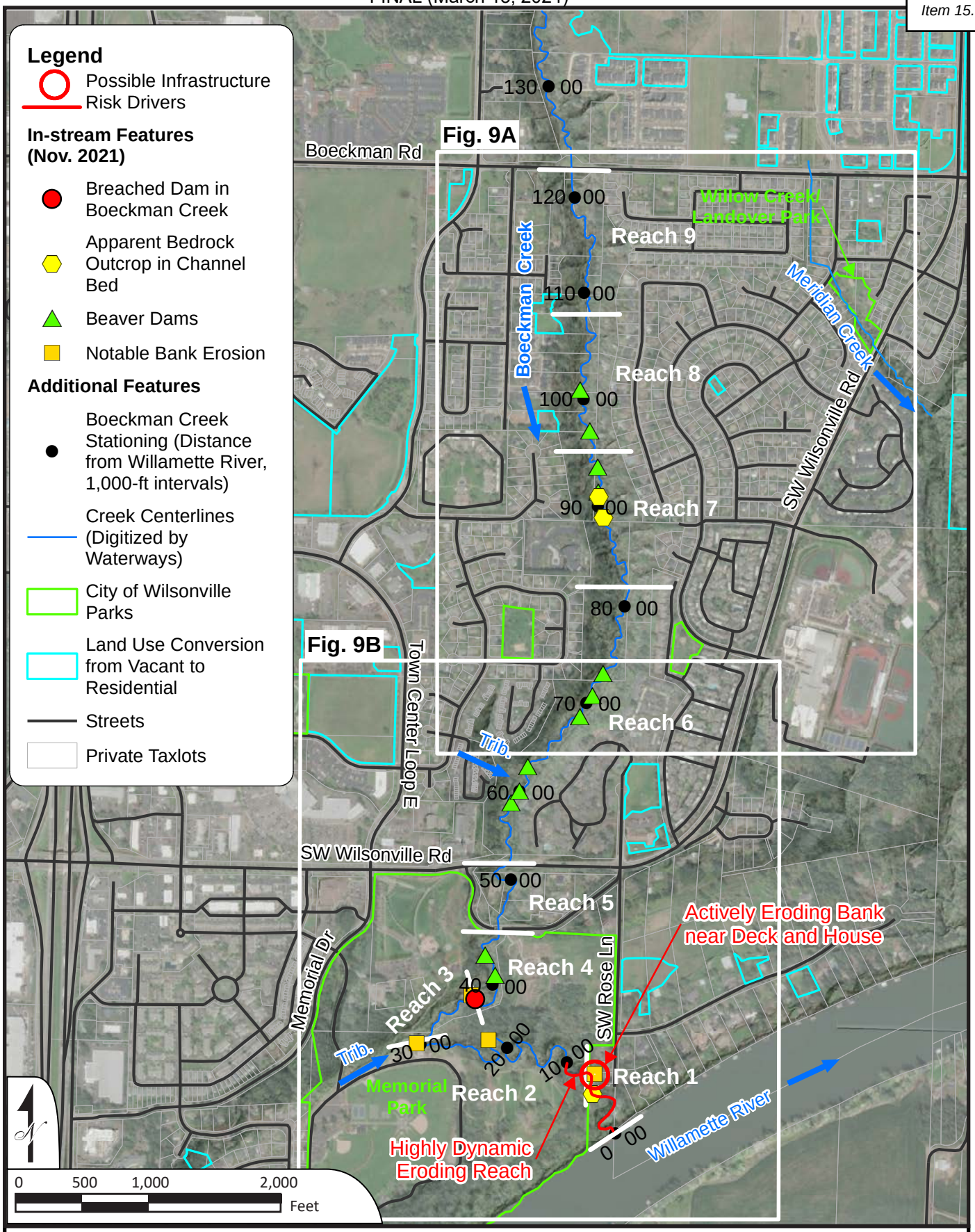
Approximately 1,000 feet (0.2 miles) was assessed on Arrowhead Creek. In Fall 2023, portions of Newland and Kruse Creeks that have the potential to be impacted by the Frog Pond Development or any additional eastward expansion of Wilsonville were also included in the assessment. Approximately 1,700 feet (0.3 miles) of Newland Creek and 2,200 feet (0.4 miles) of Kruse Creek was evaluated.

Boeckman Creek

The field assessment for Boeckman Creek occurred on November 19 and 24, 2021. The first day covered the lower reach within Memorial Park, from the private property boundary at Station 750 to Kolbe Lane (Sta. 4,500). The second day covered the reach from Wilsonville Road (Sta. 5,300) to Boeckman Road (Sta. 12,200). Two sections between the Willamette River and the private property boundary (Sta. 0 to 750) and between Kolbe Lane and Wilsonville Road (Sta. 4,500 to 5,300) were not accessed because those sections were on private property and Waterways did not have access permission. Permissions for the portion of private property located near the Willamette River were received in January 2022 and this section of channel (from Sta. 0 to 750) was assessed on January 25, 2022.

General Observations and Interpretations

- Specific point-scale observations of this section of Boeckman Creek are listed in **Appendix A1**.
- Boeckman Creek is confined within a narrow canyon bounded by steep valley walls prone to erosion and landsliding. At the bottom of the canyon, there is a meandering channel and a narrow, discontinuous floodplain covered by dense invasive species, especially Himalayan blackberry, reed canary grass, and English ivy. Very dense blackberry made for a difficult and slow traverse of the channel.
- Within the assessment reaches, Boeckman Creek has incised to a stable base level with a straight profile and relatively low gradient (about 0.6%), as illustrated in the longitudinal profile (**Figure 8**). The valley is graded to the Willamette River, and Boeckman Creek appears to no longer be actively incising, except in the most downstream reach at the confluence with the Willamette.
- The assessment area was subdivided into nine geomorphic sub-reaches ranging in length from 750 feet to 2,850 feet, within which geomorphic conditions and processes are relatively consistent. The subreaches are shown on the overview map (**Figures 7**), longitudinal profile (**Figure 8**), and detailed maps (**Figures 9a and 9b**). **Table 1** provides information and observations that characterize the geomorphic conditions and infrastructure features within each reach.



Boeckman Creek Geomorphic Survey Overview

Geomorphic Assessment of Wilsonville Creeks

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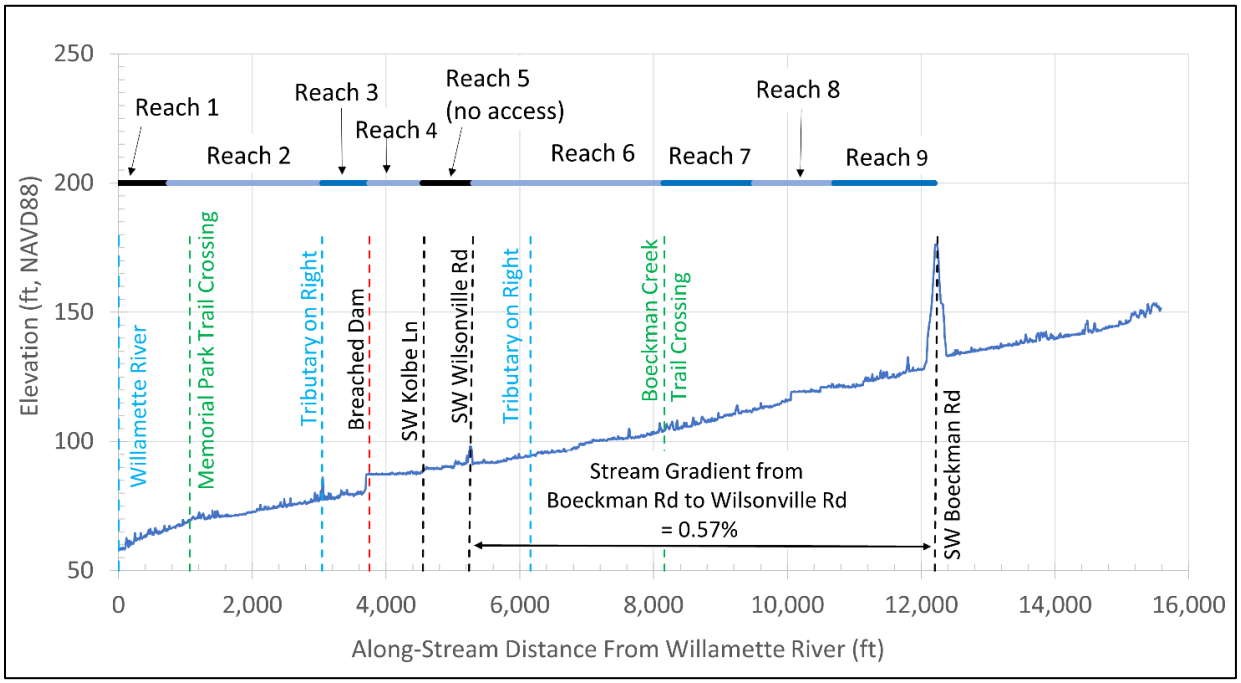
FIGURE 7

Figure 8. *Longitudinal Profile of Boeckman Creek (from 2014 LiDAR data)*



- Beaver are abundant throughout most of the assessment reaches and have a dominant impact on processes along Boeckman Creek. The most obvious impacts are from the channel-spanning dams that create a stairstep of flat water environments. Most of the grade control features shown on the field result map (**Figures 9a and 9b**) are beaver dams. The beaver dams range in height from about 1 foot to about 5 feet and pond long, continuous sections of the assessment area. The dams are actively maintained by beaver and most of them appear to be stable through typical floods in Boeckman Creek. Beaver are less prevalent or absent in the lower reaches of Boeckman Creek (Reaches 1 and 2), and are most abundant in the upper section (Reaches 6 through 9).
- The lack of stable beaver dams and seasonal variability in the backwater extent of the Willamette River along lower Boeckman Creek creates a highly dynamic condition with increased risk of erosion of the bed and banks. Dams throughout the Willamette River watershed, and the associated flow storage that those dams provide, results in a low stage in the Willamette River, relative to historic condition. Hydromodification impacts can potentially exacerbate channel instability by producing high flow events in early fall when the Willamette River is still low and the backwater influence is absent. This reach of Boeckman Creek is the most at-risk from hydrologic changes in the watershed.
- The breached former dam at Sta. 3,750 has an important reach-scale influence on the geomorphology in Boeckman Creek. Although the dam is breached, the remaining concrete and boulders are still present and provide a significant grade control feature, holding about 7 feet of grade (**Figure 8**). A wedge of fine sediment deposited upstream of the dam is covered with reed canary grass and extends as much as 800 feet upstream to the SW Kolbe Lane bridge.

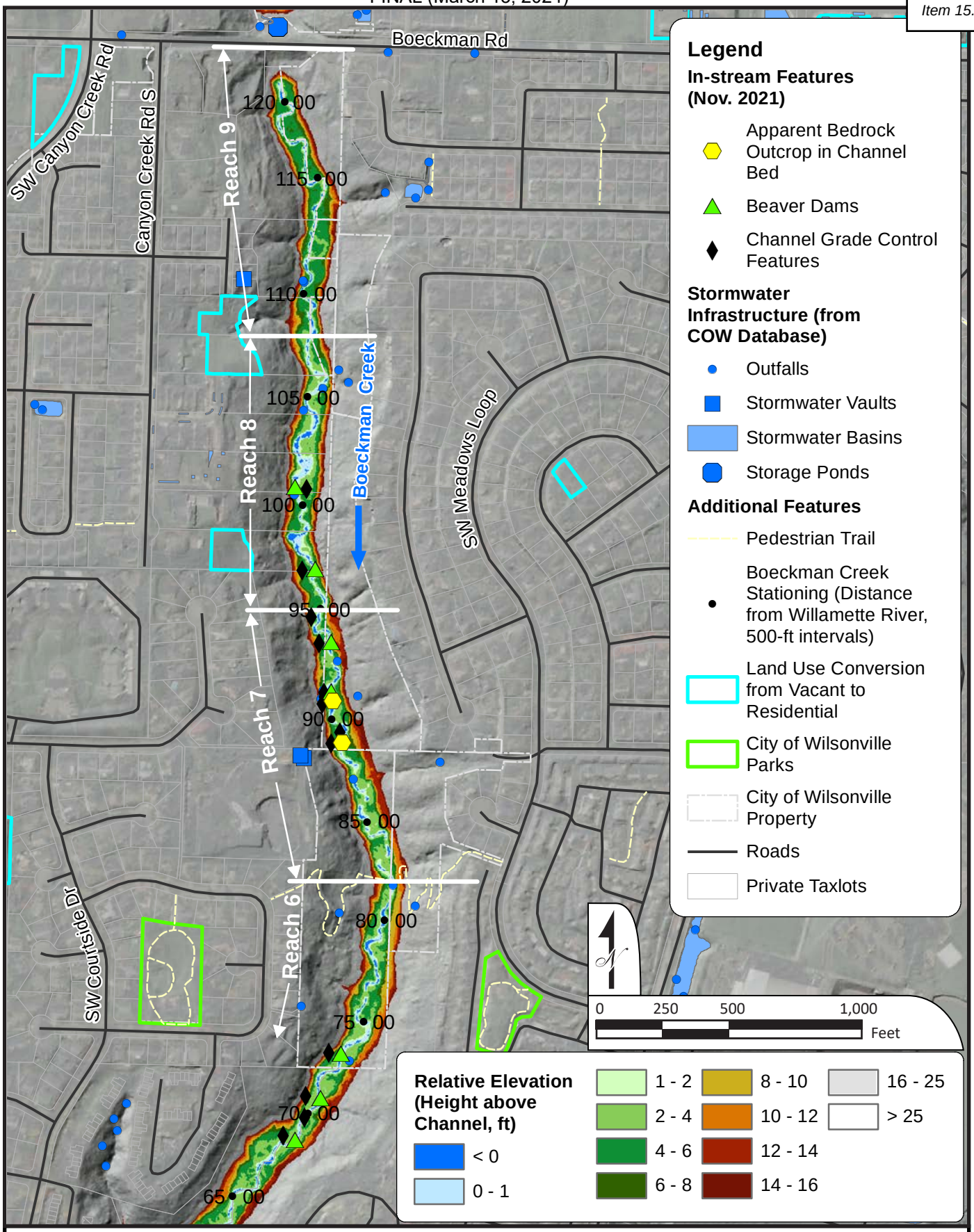
- There are at least three places where consolidated bedrock or other resistant material was observed within the channel bed in Boeckman Creek. These were noted by feel underfoot while wading. It was not possible to observe these resistant bed features due to the presence of turbid water about two to three feet deep at the time of the site visit.
- The presence of stable grade control – including resistant bed material, abundant stable beaver dams, fallen logs, boulders, and the 7-foot-high concrete and boulder grade control at the former dam – distributed throughout the project reach implies that much of Boeckman Creek cannot continue to incise. Collectively these features stabilize most of the channel bed, which is not susceptible to further incision due to hydromodification (**Figures 9a and 9b; Appendix A**).
- Waterways' geomorphologist also inspected the lower portions of two tributaries that enter Boeckman Creek from the west: one at Station 3,050 in Memorial Park, and one at Station 6,020 draining a residential area upstream of Wilsonville Road. Both tributaries appeared to be stable with no obvious infrastructure-related concerns:
    - The downstream tributary enters Boeckman Creek on river-right through a culvert under a road crossing in Memorial Park. The lower section of this tributary is deeply incised, low-gradient, gravel- and sand-bed stream in a dense blackberry thicket. Some bank erosion was observed along the steep banks but was not identified as an infrastructure concern. There is a partially clogged culvert on this tributary at a road crossing several hundred feet upstream of the confluence with Boeckman Creek. The clogged culvert backs water up to a footbridge in a grassy field in the park but does not appear to have any detrimental impacts. More descriptions are provided in **Appendix A1,** and photographs of this tributary can be found in the photo log (**Figure 10a**).
    - The upstream tributary drains the residential area along the west side of the creek north of Wilsonville Road. The tributary was only accessible at one location due to dense blackberry. At that location the channel bed was alluvial fine gravel and appeared stable.

Summary Conclusions from Boeckman Creek

- With the exception of Reach 1, the field reconnaissance did not identify any obvious concerns or infrastructure risk drivers related to geomorphology and hydromodification in the assessed portion of Boeckman Creek. No infrastructure appears at risk in the valley bottom. The stream in the assessment reach is laterally confined and vertically stable, and relatively little infrastructure is in the stream. Any increases to stormwater related to land use changes at the Frog Pond Development area are not expected to pose significant specific infrastructure risks. (*Note that the assessment area did not include the Boeckman Road crossing above the upstream extent of the assessment reach*).
- Within Reach 1, there is a risk of continued channel incision and bank erosion. Several properties have experienced bank failures and loss of land over the past several decades, and an active bank failure is impacting the backyard and deck of one of the properties. This study does not make any findings regarding the cause(s) and extent of bank failure in Reach 1. Further investigation of the bank failure should be conducted by a geotechnical engineer to determine if the source is associated with fill placed behind a now failed retaining wall, or if there is a larger slope stability issue at the site. If a further investigation to determine cause(s), extent, and possible remediation is conducted, then the investigation should consist of a slope stability analysis along with recommendations to address the instability within the context of existing site conditions. There is currently insufficient data to understand erosion rates and associated

risks. Longer-term geomorphic monitoring of this reach might be warranted, which would include establishing cross-sections that would be resurveyed every three to five years to document erosional or depositional trends over time.

- The most significant risks in the canyons may relate to instability of the valley walls, which is outside the scope of this study. In a large rainstorm or possibly during an earthquake, mass wasting (landslides) from the valley wall could potentially occur, possibly blocking the channel, potentially endangering infrastructure near the top of the canyon walls.
- It is possible that a large flood could breach one or more of the apparently stable beaver dams. If that were to happen, one or more waves of incision could move upstream through parts of the assessment reach. However, the consequences of such an event appear to be relatively low given the stable base level, lack of infrastructure in the valley bottom, and the likelihood that the beaver would reestablish impacted dam sites.
- Collapses of individual beaver dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the beaver dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy riparian corridor consisting of a mix of native riparian species in Boeckman Creek would be a beneficial long term management strategy to maintain the beaver population.
- **Figures 10a and 10b** provides some summary photographs showing conditions within the assessed portion of Boeckman Creek in November 2021 and January 2022.



Boeckman Creek Geomorphic Survey (Upstream)

Geomorphic Assessment of Wilsonville Creeks

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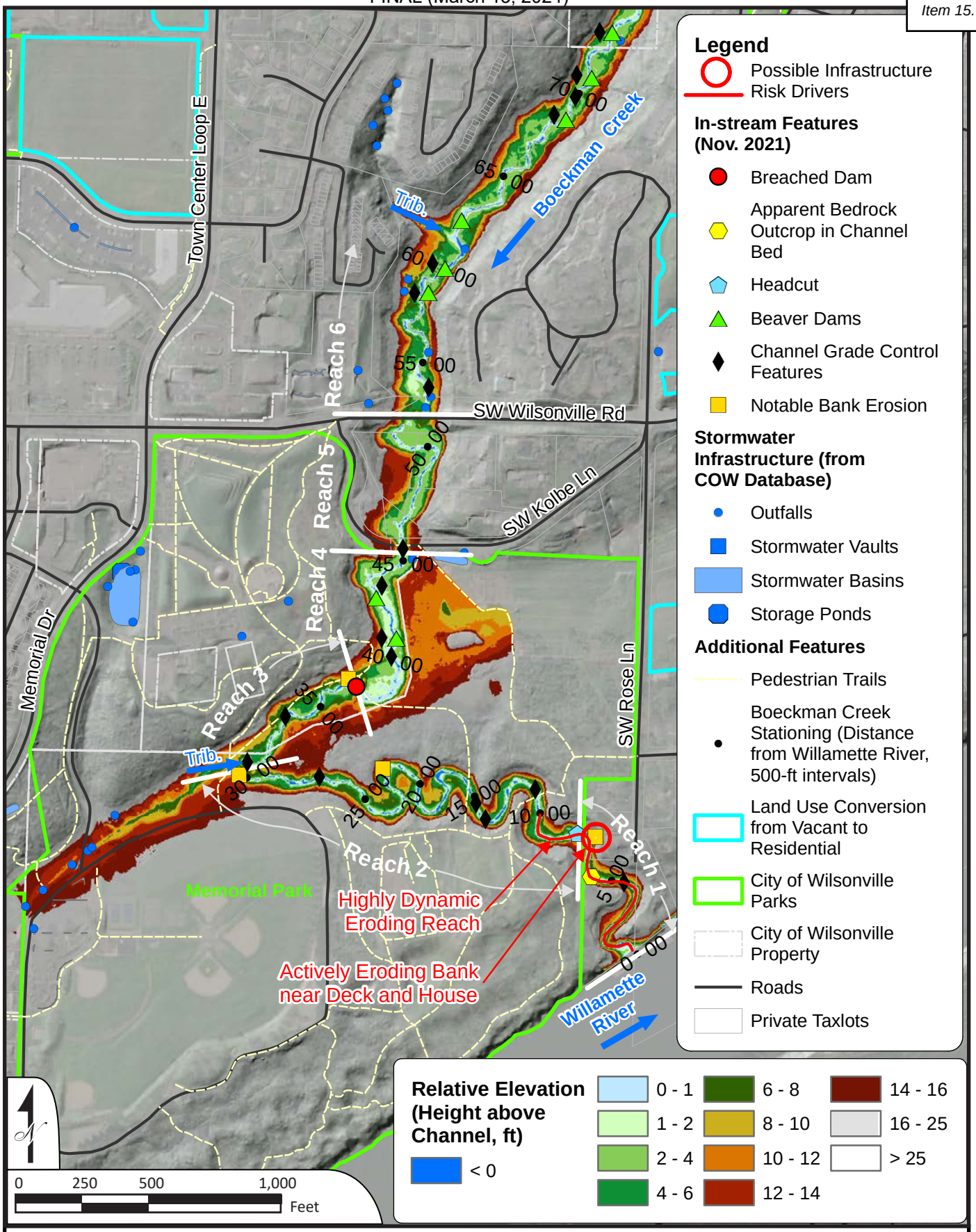
FIGURE 9A



Boeckman Creek Geomorphic Survey (Downstream)

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FIGURE 9B

Table 1. *Field Observations for Geomorphic Subreaches Within Boeckman Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	0	750	Dynamic reach with seasonal backwater from Willamette River	1.07%	Pool-Riffle	gravel / fines	Incised	Willamette River	Valley walls susceptible to mass wasting	Yes, but no dams	Incising and wideneing	4	3	5	5	Grade control and bank stabilization	Actively incising and eroding, especially upper extent of reach where active small headcuts still migrating. Lower Willamette water level combined with high intensity rainfall in fall cause incision and widening. Recommend detailed geotechnical slope stability analysis in locatoin of active bank erosion and landsliding.
2	750	3,050	Incised Meandering Reach in Willamette Floodplain	0.44%	Pool riffle	Mud, wood, boulder, cobble	Incised, Stable	Some boulder steps, downed logs, Willamette base level	High mud terraces; tree roots	Yes upstream of 2,400' ; Maybe downstream of 2,400'	Stable	2	3	2	1	Remove invasive blackberry and ivy	From property boundary at downstream end to the tributary on right in Memorial Park. Reach is within the historic Willamette River floodplain and river terrace. Single-thread, incised meanders with banks between 6 feet and 40 feet high. Generally the amount of incision increases in the downstream direction. Banks are massive mud deposits from Missoula Flood fines and/or Willamette River floodplain deposits. Bed contains mud, wood, and some gravel reaches. From about Station 1,400' downstream, Willamette River bedload deposits are visible in the banks. Little to no beaver presence below Sta 2,400'; beaver present between 2,400 and 3,040'.
3	3,050	3,700	Meander Reach below Breached Dam	0.37%	Pool riffle	Mud, wood	Incised, Stable	Beaver dams, downed logs	Valley walls, reed canary grass root mass	Yes, abundant	Stable	2	2	2	1	Remove invasives, add wood	From right bank tributary in Memorial Park to site of breached dam. Meandering channel with stable banks, beaver dams, relatively low floodplains covered in reed canary grass. Inundated areas are mostly reed canary grass, less blackberry than in other parts of the creek.
4	3,700	4,500	Low Gradient Depositional Reach above Former Dam	0.01%	Pool riffle	Mud, wood	Stable	Breached dam; beaver dam	reed canary grass in floodplain	Yes	Stable	1	2	1	1	Good reach for potential floodplain restoration	Reach from breached dam to SW Kolbe Lane in Memorial Park. Low gradient, meandering reach with relatively low, frequently inundated floodplain. Abundant beaver presence consisting of dams, canals, burrows, slides, and lot of chewed wood. Banks heavily covered with reed canary grass. Water is about 2 to 3 feet dep at this flow (moderately high flow), with mud dominated bed. A floodplain vegetation restoration project to replace reed canary grass with willow and alder could work well here.
5	4,500	5,300	Not Surveyed														Skipped this reach due to property access constraints

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
6	5,300	8,150	Stepped Beaver Pond Reach above Wilsonville Road	0.47%	Ponded by beaver dams	Mud, gravel, some bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1 (some trail erosion)	Remove invasives, add wood	Reach from Wilsonville Road to Boeckman Trail footbridge. Reach is mostly ponded by a series of beaver dams, most are small but with at least 2 large dams at Sta 6,250 and 7,300. The dams are built so that ponds are mostly continuous throughout the entire reach, with the toe of each dam close to the head of each pool of the downstream beaver pond. Reach is moderately incised but not as much as in other reaches of Boeckman Creek.
7	8,150	9,500	Mostly Free-Flowing Reach between Beaver Dammed Reaches	0.59%	Pool riffle	Gravel, mud	Stable, little to moderate incision	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	1	1 (some trail erosion)	Remove invasives, add wood	From Boeckman Trail footbridge to big beaver dam at Sta 9,500. Free flowing reach without much beaver activity. Riffle pool, gravel bed with some resistant bedrock in channel bed within the upper part of the reach. Some small beaver dams present but are not dominant.
8	9,500	10,700	Floodplain Inundated by Ponding at Several Large Beaver Dams	0.86%	Ponded by beaver dams	Mud	Stable, low banks	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1	Remove invasives, add wood	From beaver dam at Sta 9,500 to transition to more free-flowing reach. Deep ponded reach, with inundated floodplain over large areas. It is like this because either (1) dams are larger than those inreaches 6 and 9; and/or (2) the reach is less incised with lower banks. Viewed from trail on river left with some stops; unlike downstream reaches, I did not traverse the channel through this entire reach due to difficult access and need to speed up assessment. Did not visit outfall at Sta. 10,500
9	10,700	12,200	Incised Beaver Pond Reach	0.61%	Ponded, pool riffle	Mud, gravel, possible bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	3	1	Remove invasives, add wood	Similar to Reach 6, but deeper incision. Reach dominated by a series of beaver dams, not all were mapped due to difficult access. Did not visit crossing under Boeckman Road due to apparent private property

Selected Photos From Boeckman Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE
10A

Selected Photos From Boeckman Creek, January 2022

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FIGURE 10B

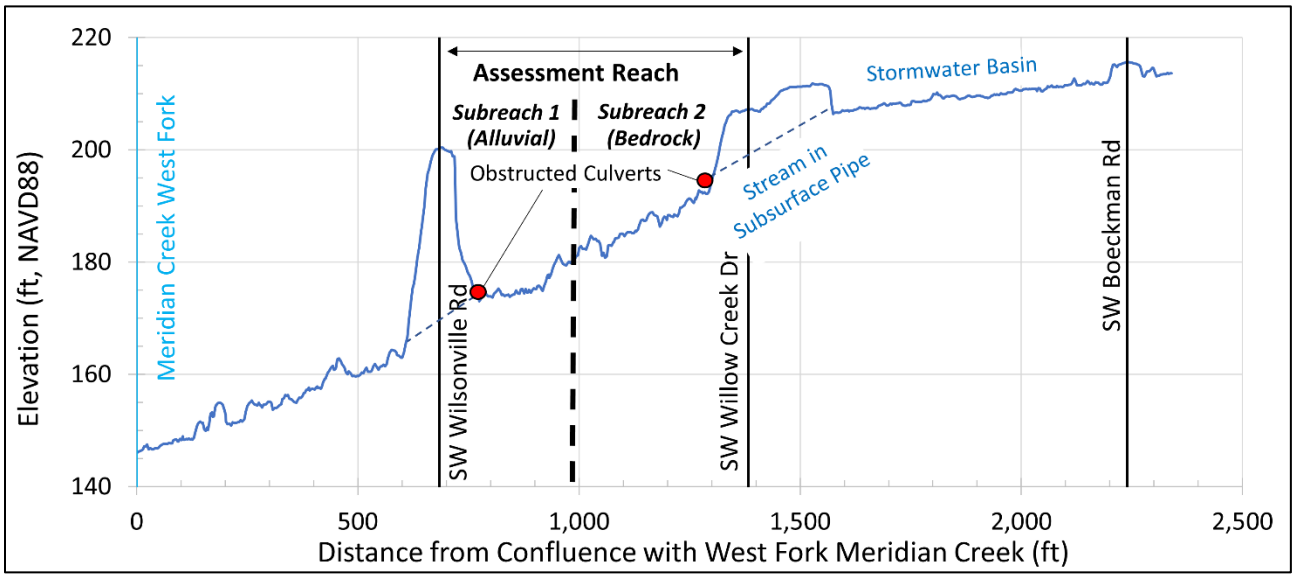
Meridian Creek in Landover Park

The field assessment for Meridian Creek occurred on November 26, 2021. The assessment included a 600-foot-long section of Meridian Creek between Wilsonville Road and SW Willow Creek Drive (**Figure 11**). This reach is immediately downstream of part of the Frog Pond Development Area. **Figure 12** is a longitudinal profile of the creek. **Table 2** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A2**. **Figure 13** contain photographs from this section of Meridian Creek.

General Observations and Interpretations

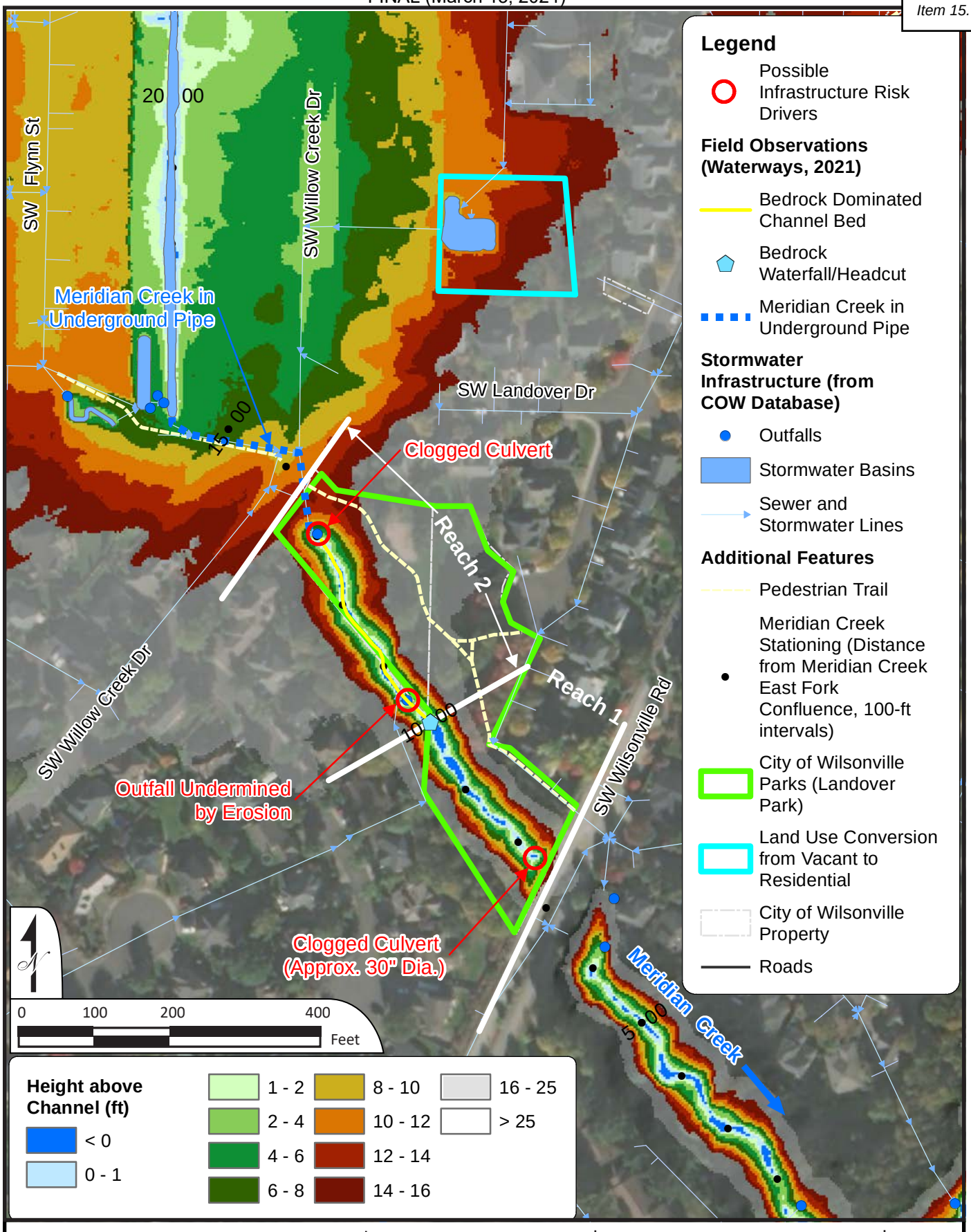
- This portion of Meridian Creek is incised in a very narrow canyon without any floodplains, whose steep slopes bound one side of the channel with a developed park on the other. The canyon is not as deep as the Boeckman Creek canyon, as can be seen in **Figure 4,** but the valley walls are steep with potentially unstable slopes underlain by fine-grained sediments and covered with dense blackberry thickets. The western valley wall is more at risk of landslides because Meridian Creek flows along the western margin of the canyon (right bank looking downstream).
- There are two distinct subreaches within the assessed area, delineated at a 4-foot-high bedrock/hardpan waterfall at Station 1,000 (**Figure 12**). The waterfall does not appear to be an active headcut advancing upstream and appears relatively stable. Downstream of the waterfall, the channel has an alluvial bed and is influenced by an obstructed culvert at Wilsonville Road. Upstream of the waterfall, a resistant layer of consolidated fine-grained sediment is exposed over most of the channel bed.
- The culvert at SW Willow Creek Drive appears to be undersized which may limit more significant hydromodification impacts from occurring downstream. Rock placed downstream of the culvert suggests that streambed erosion has been a concern in the past. This reach likely experienced significant channel incision and headcutting in the past but the active headcutting has been mostly arrested by the presence of hardpan material in the streambed. The discontinuity in the longitudinal profile across SW Willow Creek Drive (**Figure 12**) provides evidence for this field-based interpretation.

Figure 12. *Longitudinal Profile of portion of Meridian Creek (from 2014 LiDAR data)*



SUMMARY CONCLUSIONS FROM MERIDIAN CREEK

- The stream is stable in this reach due to the bedrock base level control and being confined laterally by valley walls and culverts at the upstream and downstream end.
- The main risk drivers are the culverts at the downstream and upstream ends of the reach:
  - There is a sediment-clogged culvert at the Meridian Creek crossing at Wilsonville Road (Station 775). The culvert under the high road prism is mostly obstructed and appears to cause ponding during storm runoff (**Figure 12**). It is unlikely that ponded water would overtop Wilsonville Road, but backwatering behind the road could result in significant ponding and potential for piping through the road prism, which was not likely designed to act as a dam. The risks at the crossing should be further evaluated as part of the Stormwater Master Plan. Hydraulic modeling may provide an opportunity to understand maximum inundation depths if the culvert were to plug.
  - The grate at the outlet of the culvert at the Willow Creek Drive appears to have been modified to address past channel incision and headcut migration. This location should be monitored to determine if the stabilization measures installed downstream of the culvert provide adequate, long-term grade stabilization.
- The PVC stormwater outfall on the creek at Station 1,100 is undermined and a 6-foot section has washed out and moved downstream.



Meridian Creek Geomorphic Survey

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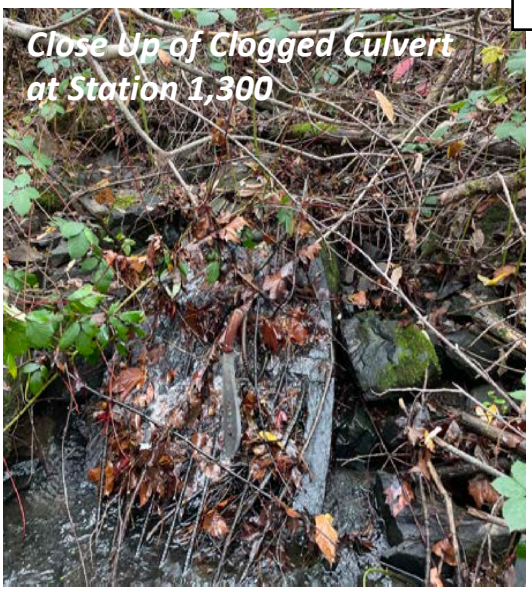
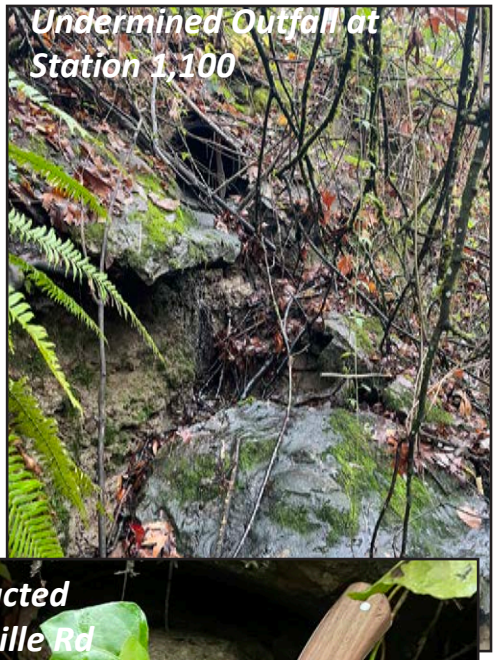
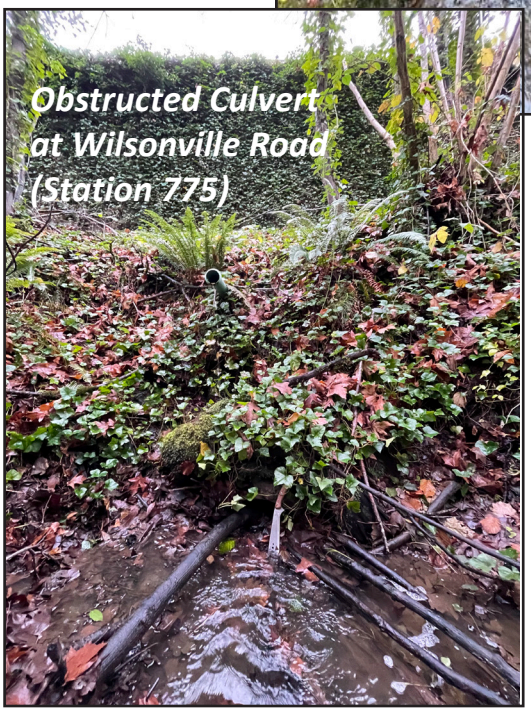
FIGURE 11

Table 2. *Field Observations for Geomorphic Subreaches Within Meridian Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	775	1,000	Gravel depositional reach behind clogged culvert	1.05%	Step Pool	Gravel, fines, wood	Incised, Stable	Culvert at Wilsonville Road	Narrow valley wall	No	Stable or aggrading	1	3	4	4	Address downstream drainage, invasives removal	Short alluvial reach behind the obstructed culvert at Wilsonville Road. Gravel bed, one or more small steps formed by fallen logs. Channel is incised to base level at the culvert, but could incise more if culvert is cleared. Small incised channel in narrow valley with unstable mud valley walls subject to landsliding. Obstructed culvert at Wilsonville road could become a problem, and should be evaluated further as to whether it is a risk that should be addressed.
2	1,000	1,300	Reach incised to bedrock above waterfall	3.74%	Plane Bed	Bedrock (consolidated mud)	Incised, Stable	Bedrock channel bed	Narrow valley wall	No	Stable	1	3	3	3	Address upstream culvert drainage, invasives removal	Bedrock reach upstream of a 4'-high waterfall. Reach incised to consolidated mud bedrock. There are at least 2 waterfalls in reach, and at least one boulder step h from probable artificially placed boulders. Dense blackberry throughout reach. The culvert at the upstream end of reach is clogged and backs up water underneath Willow Creek drive.







Selected Photos From Meridian Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 13

Arrowhead Creek

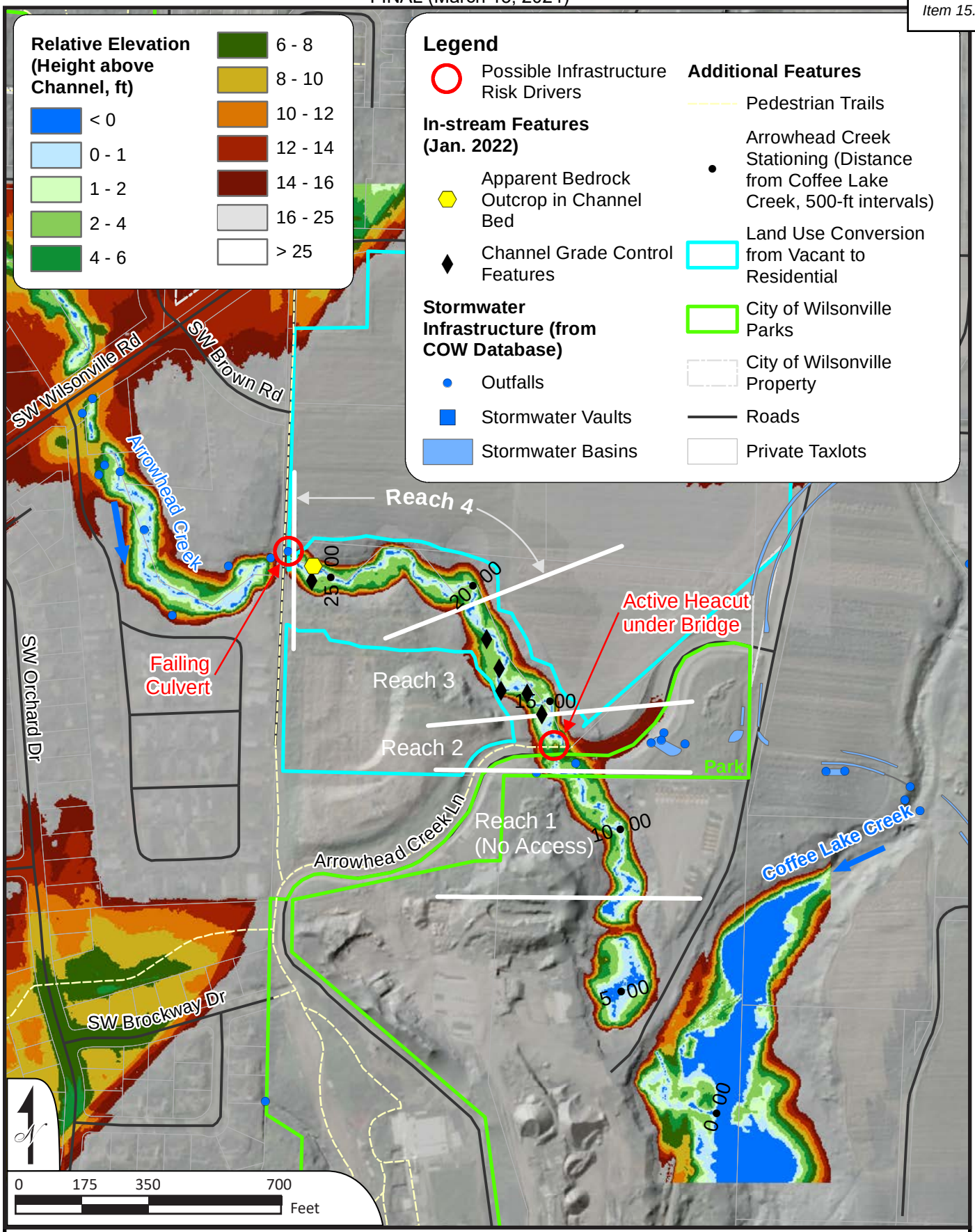
The field assessment for Arrowhead Creek occurred on January 25, 2021. The assessment included a 1,400-foot-long section of Arrowhead Creek between an asphalt pedestrian crossing and Arrowhead Creek Road (**Figure 14**). **Figure 15** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A3**. **Figure 16** contain photographs from this section of Arrowhead Creek.

General Observations and Interpretations

- The assessment area on Arrowhead Creek was divided into three subreaches based primarily on where beaver are active and have established stable dams that act as both local and regional grade control for the channel at the time of the assessment.
- Throughout the assessment area Arrowhead Creek consists of a meandering channel that is moderately incised within a broad floodplain that ranges between 40 and 80 feet. The channel and floodplain are inset 30 to 40 feet into the fine Missoula Flood deposits.
- Moderate incision of the channel limits high flow access to much of the broad floodplain except where beaver have built dams across the channel, and in some cases across the entire floodplain. In Reach 3, where the beaver dams create continuous backwater conditions along the entire reach, water engages the floodplain creating a complex mosaic of backwater and secondary channels.
- The culvert located at the pedestrian crossing at the upstream extent of the assessment area is in the process of failing and should be considered for replacement. It appeared from the downstream end that water may be piping through the fill and creating void spaces that are causing the culvert to fail. We did not evaluate the upstream end of the culvert due to lack of landowner permissions.
- English ivy dominates much of the project area and has the potential to limit the food and dam building resources for the beaver which could be detrimental to the beaver population and associated channel stability over the longer term. The ivy has already killed, or is at risk of killing, many of the alder and maple throughout the project area.

Summary Conclusions from Arrowhead Creek

- The stream is stable in this reach due to the presence of shallow hardpan and abundant beaver dams that act as local base level control and the fact that the channel is small and meanders across a broad floodplain with stable valley wall confinement.
- The main risk drivers consist of the following:
  - Failing condition of the upstream culvert. The fill prism appears to consist of relatively coarse material and therefore may be somewhat porous, limiting the potential for catastrophic failure of the prism. Further investigation by a geotechnical engineer is recommended.
  - Some instability was observed where Arrowhead Creek flows under the Arrowhead Creek Road bridge that appears to be related to construction of the channel under the crossing. Given the degree of channel stability observed upstream and downstream of the crossing the poor conditions at the crossing was determined to be relatively low risk unless there are significant changes to the active maintenance of the beaver dams.
  - Long-term, the loss of riparian trees and understory associated with dominance of English ivy does present some risk if there is a significant loss of food resources and dam building material for beaver.



Arrowhead Creek Geomorphic Survey

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FIGURE 14

Figure 15. *Longitudinal Profile of portion of Arrowhead Creek (from 2014 LiDAR data)*

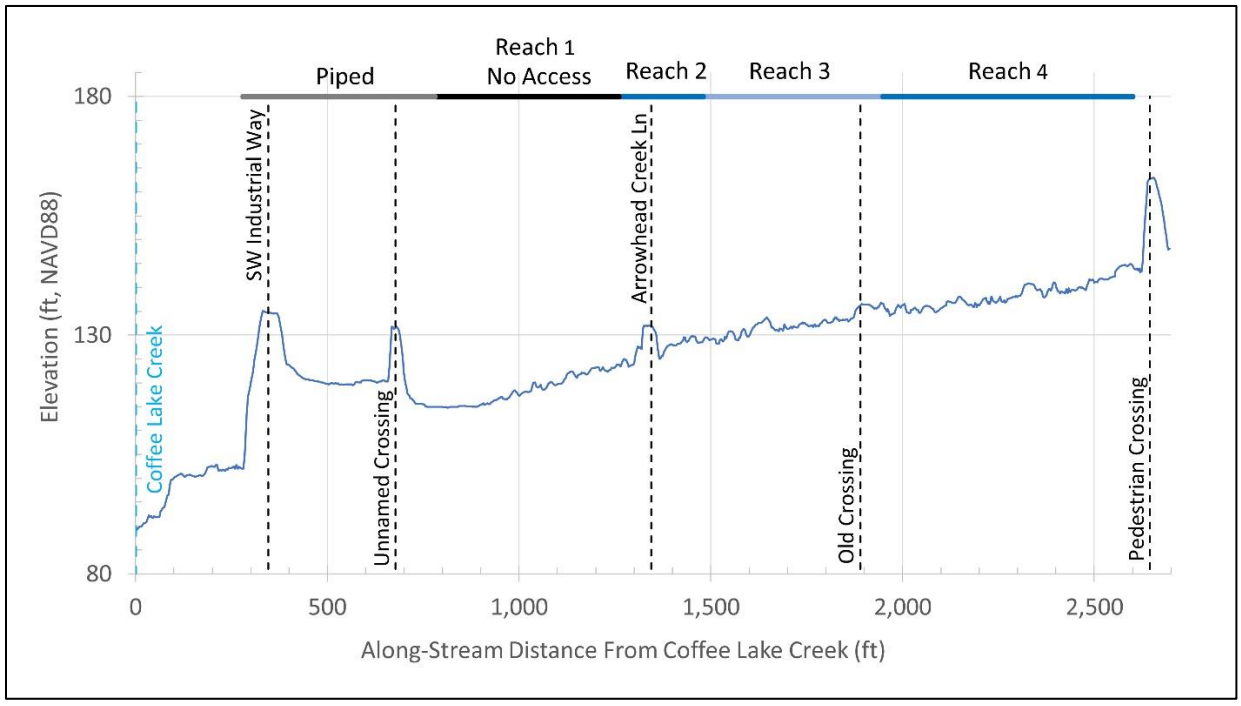

Table 3. *Field Observations for Geomorphic Subreaches Within Arrowhead Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	7+80	12+60	Not Surveyed														Did not visit this reach due to property access constraints.
2	12+60 (GPS 11)	14+80	Unstable reach associated with bridge replacement at Arrowhead Creek Road but low risk due to good stability in upstream and downstream reaches	1.95%	plane bed meandering	gravel	incised	limited. Could impact upstream reach	bridge and valley walls	Y, but limited by vegetation	incising but limited activity	3	1	3	3 - irrigation pipe at risk	remove blackberry and revegetate	Bridge reach at Arrowhead Road. Construction of crossing appears to have impacted channel with limited mitigation measures. Riparian not restored so blackberry dominates. Irrigation line crosses channel unburied.
3	14+80	19+50	Meandering channel in highly stable reach associated with actively maintained beaver dams	1.44%	plane bed meandering	hardpan bedrock gravel	incised but stable	bedrock hardpan and beaver dams	valley wall ~25'-30' with low energy	Y	stable	1	2	2	1	Ivy removal and riparian	Beaver dominated. Very similar to Reach 1, but beaver present which have built successive dams backwatering channel. Increased floodplain engagement. Poor ripariain condition long-term. Cottonwood/maple dominated.
4	19+50	26+00	Stable reach with hardpan grade control. Culvert at upstream extent of reach is in the process of failing	1.31%	plane bed meandering	hardpan bedrock gravel	incised but stable	shallow alluvium intermittent on hardpan bedrock	valley walls ~25-ft high with low energy	N	stable	1	2	2	2	Ivy removal and riparian restoration	Subreach consists of 50'-75' valley bottom confined by 25'-30' of 1:1 valley walls. Channel incised 2'-5' into valley bottom with some active inset foodplains. Creek flows on hardpan bedrock. Cottonwood/alder/fir canopy threatened by ivy which dominates groundcover.

Selected Photos From Arrowhead Creek, January 2022

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 16

Newland Creek

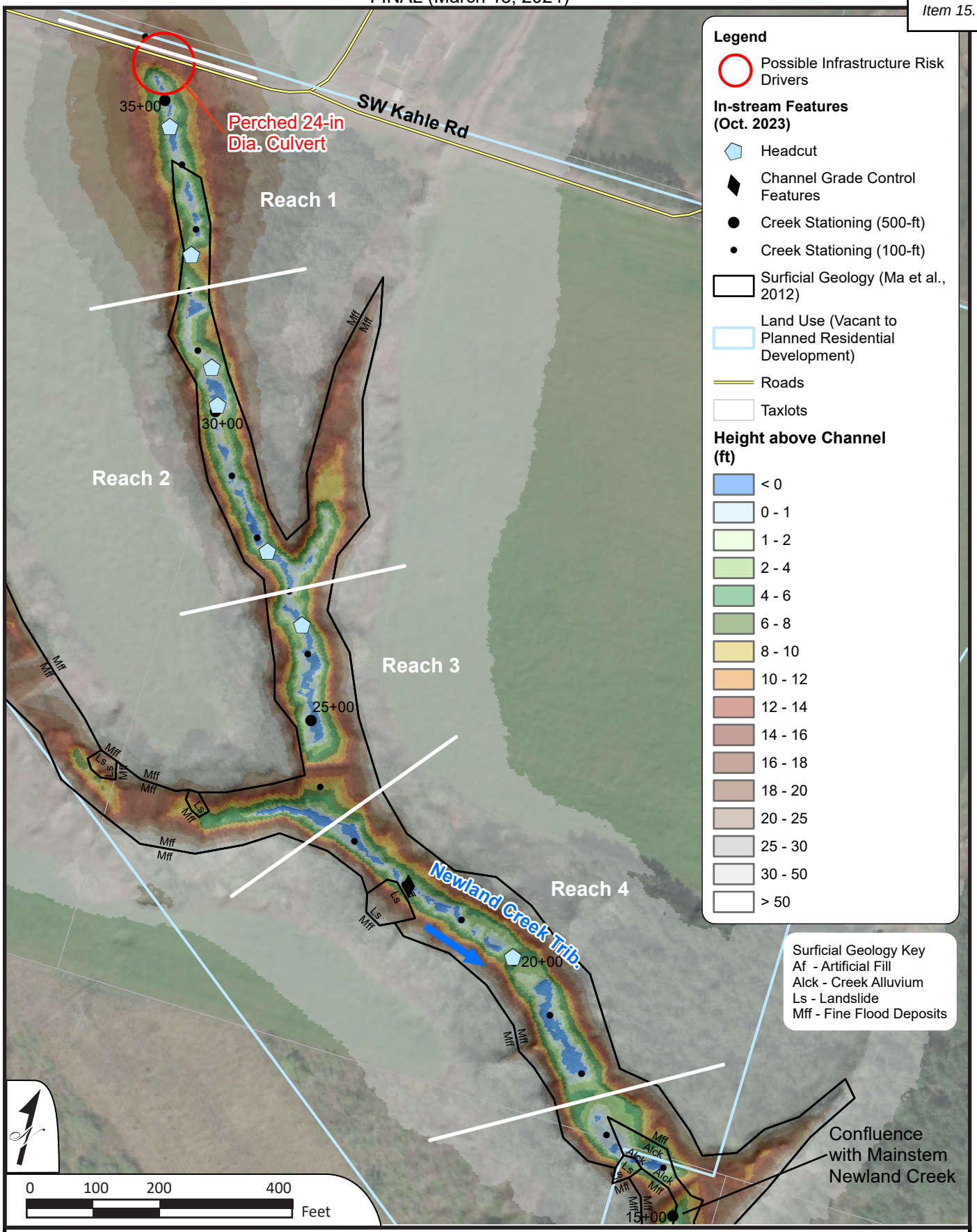
The field assessment for Newland Creek occurred on October 26, 2023. The assessment included a 1,700-foot-long section of a tributary to the mainstem of Newland Creek with the Urban Growth Boundary (UGB) with the upstream extent located at SW Kahle Road (**Figure 17**). **Figure 18** is a longitudinal profile of the creek. **Table 4** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A4**. **Figure 19** contain photographs from this section of Newland Creek.

General Observations and Interpretations

- The assessment area on Newland Creek was divided into four subreaches based primarily on the assessment boundaries and two tributaries that entered that had an influence on channel size.
- The culvert located at SW Kahle Road looked relatively new, consisting of a 24" corrugated plastic pipe. The culvert is significantly perched with about a 6-ft drop to the channel bed. Moderately sized angular rock was placed to dissipate energy. SW Kahle Road likely has prevented continued upstream movement of a large headcut by acting as a grade control.
- Upstream of SW Kahle Road the channel is small and the adjacent fields have been tiled and the tile drains closest to the road are exposed and eroding. The road probably also contributes a significant amount of stormwater.
- Reach 1 and 2 are highly incised with a least a half dozen headcuts that are eroding into erodible hardpan material. The channel is a notch in many places, characterized by a channel that is 3 to 4 feet wide and equally as deep cut into a narrow, confined valley that is 20 to 30 feet deep.
- The tributary entering from river left is also very incised.
- The gradient of Reach 4 is much flatter, after a larger tributary enters from river right. The channel is larger but still very incised and a deeper valley.
- Only one large headcut was observed in Reach 4. This reach may be in a widening phase in response to past incision as more bank instability was observed.
- More in-channel wood was observed in Reach 4 along with several debris jams that were holding grade.
- The riparian corridor is in good condition with a mix of mature coniferous and deciduous trees.
- Blackberry is the dominant understory in some areas though there are also significant stands of dogwood and vine maple.

Summary Conclusions from Newland Creek

- Reaches 1, 2, and 3 are highly unstable and likely to incise further and widen over time independent of additional upstream development.
- Reach 4 is at risk of bank instability.
- All reaches were considered to be at risk from hydromodification.
- The main risk drivers consist of the following:
  - Condition of the culvert at SW Kahle Road. Although the risk of failure of this culvert does not appear to be imminent, future development will likely increase downstream risks. As mentioned above, the culvert is likely acting as a grade control, preventing the downstream channel incision from moving upstream. Any future replacement of the crossing will need to incorporate grade control to prevent future upstream channel incision.
  - Instability in the tributaries entering Reach 2 and 3 should be considered if adjacent agricultural lands are developed. The riparian buffers on these tributaries are narrower.



Newland Creek Geomorphic Survey

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FIGURE 17

Figure 18. *Longitudinal Profile of portion of Newland Creek (from 2014 LiDAR data)*

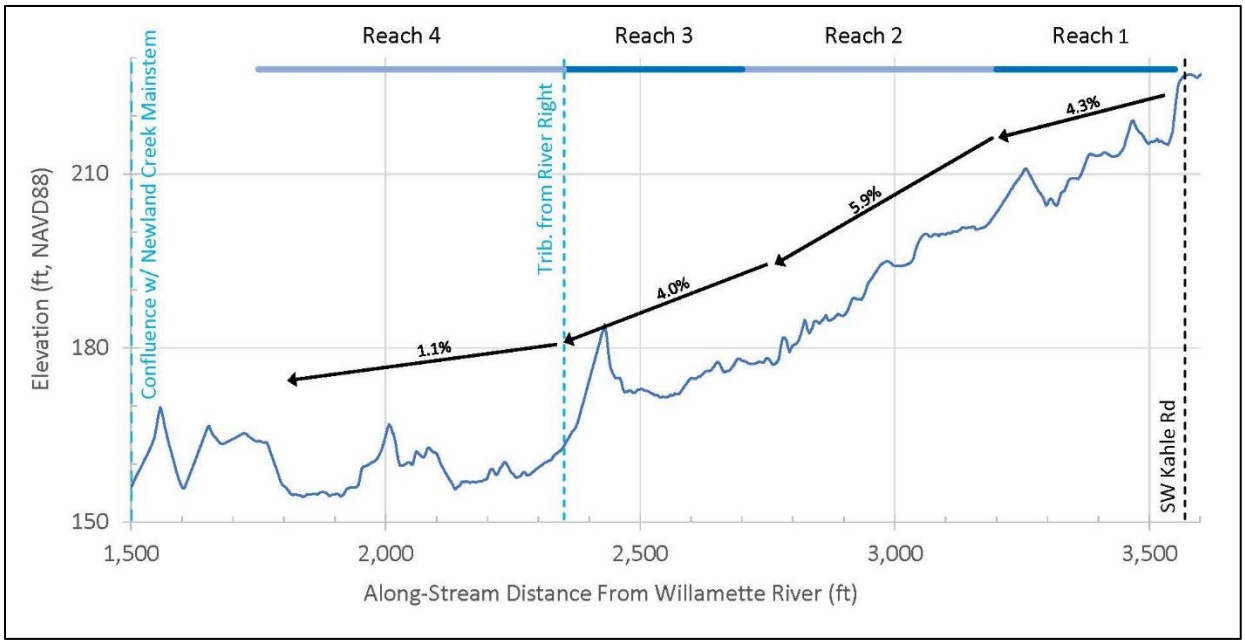

Table 4. *Field Observations for Geomorphic Subreaches Within Newland Creek Tributary*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LIDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	32+00	35+50	4.31%	bedrock/hardpan; confined	hardpan	incised	none	steep hillslopes	No	incising	5	3, but maybe not in widening phase	5	4, upstream culvert and road	Address profile instability if culvert is replaced	Steep, actively incising reach with several large to moderate headcuts. Early stage of channel evolution.
2	27+00	32+50	5.92%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	Headcuts should be monitored and addressed if results suggest rapid incision	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	23+50	27+00	4.03%	bedrock/hardpan; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Headcuts should be monitored and addressed if results suggest rapid incision	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.
4	17+50	23+50	1.12%	plane bed; confined	hardpan w/ angular cobble	incised	hardpan but only limited effectiveness	steep valley walls	No	incising	4	4, some softer bank material, maybe landslides	5	same as previous reaches	Consider adding large wood to channel to improve profile stability channel; though access is poor	Hardpan is more solid in this reach. Hillslopes not as steep though bank material is less consolidated. Maybe old landslides. Most of bed is hardpan though some coarse substrate consisting of basalt from tributary. More wood in channel.

Selected Photos From Newland Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 19

Kruse Creek

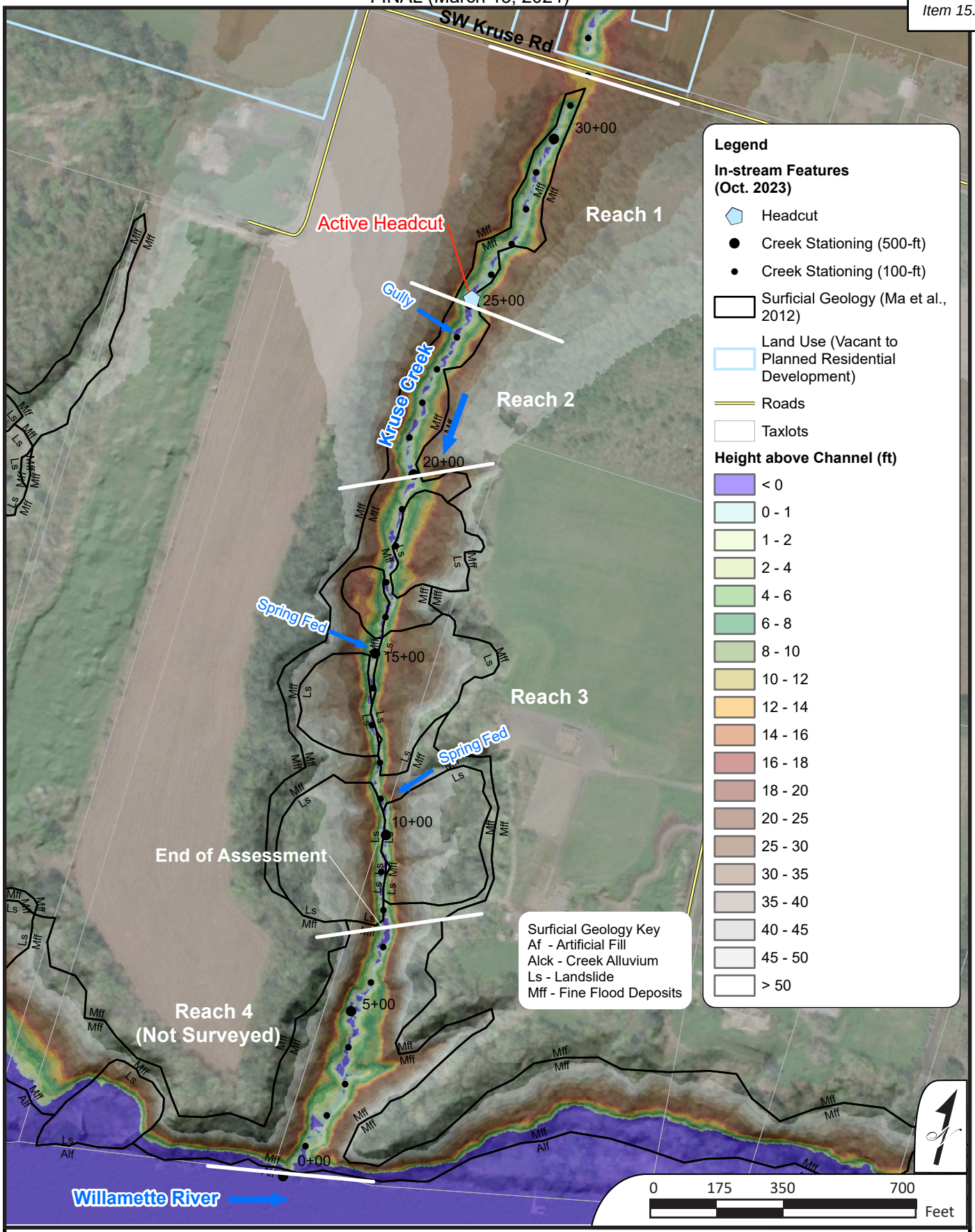
The field assessment for Kruse Creek occurred on October 26, 2023. The assessment included a 2,500-foot-long section of Kruse Creek between SW Kruse Road and the confluence with the Willamette River (**Figure 20**). **Figure 21** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A5**. **Figure 22** contains photographs from this section of Kruse Creek.

General Observations and Interpretations

- Reaches 1 and 2 are geomorphically distinct from Reach 3 and 4 due to the presence of large landslides from both the western and eastern hillslopes that extend continuously along approximately 1,400 feet of Kruse Creek.
- Although the channel is moderately incised in both Reaches 1 and 2, only one headcut was observed with the rest of the channel being relatively stable. This is likely due to the downstream landslides, which begin at the Reach 2 to 3 transition, and act as a downstream base level for these upstream reaches.
- The culvert at SW Kruse Road was difficult to access due to heavy growth of vegetation but it was perched which suggests some past channel incision that was likely arrested at the crossing.
- Reach 3 and 4 were very inaccessible due to deep channel incision and unstable banks associated with the adjacent large landslides.
- Active landslides and bank failures followed by subsequent channel incision through unconsolidated landslide debris is indicative of channel conditions through all of Reach 3 and potentially Reach 4. High ground water tables and seeps and springs through much of Reach 3 adds to the instability.
- The riparian corridor is in relatively good condition and consists of a mix of mature coniferous and deciduous trees with a good understory. Ivy is prevalent throughout the assessment reach and is climbing up many of the trees.
- On the eastern terrace in Reach 1 there is an extensive area of non-native English holly that was likely part of a former commercial holly farm.

Summary Conclusions from Kruse Creek

- Due to the presence of active landslides through Reach 3, Kruse Creek could be considered naturally unstable. This fact should be considered if the area were to develop in the future with riparian buffers adjusted to account for existing landslide activity and the potential for landward movement of the landslide scarps.
- It is unclear what the risk of hydromodification would be on this section of Kruse Creek. In Reaches 1 and 2 there would likely be additional channel incision and widening. A geotechnical engineer should be consulted to better understand the risk of increased sediment transport in Reach 3 that could cause rapid channel incision and destabilization of the toes of the existing landslides.
- Protection of the existing mature forest should be a priority in this area including management of ivy and removal of holly.
- Profile stabilization will need to be considered if the crossing at SW Kruse Road is upgraded.



Kruse Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 20

Figure 21. *Longitudinal Profile of portion of Kruse Creek (from 2014 LiDAR data)*

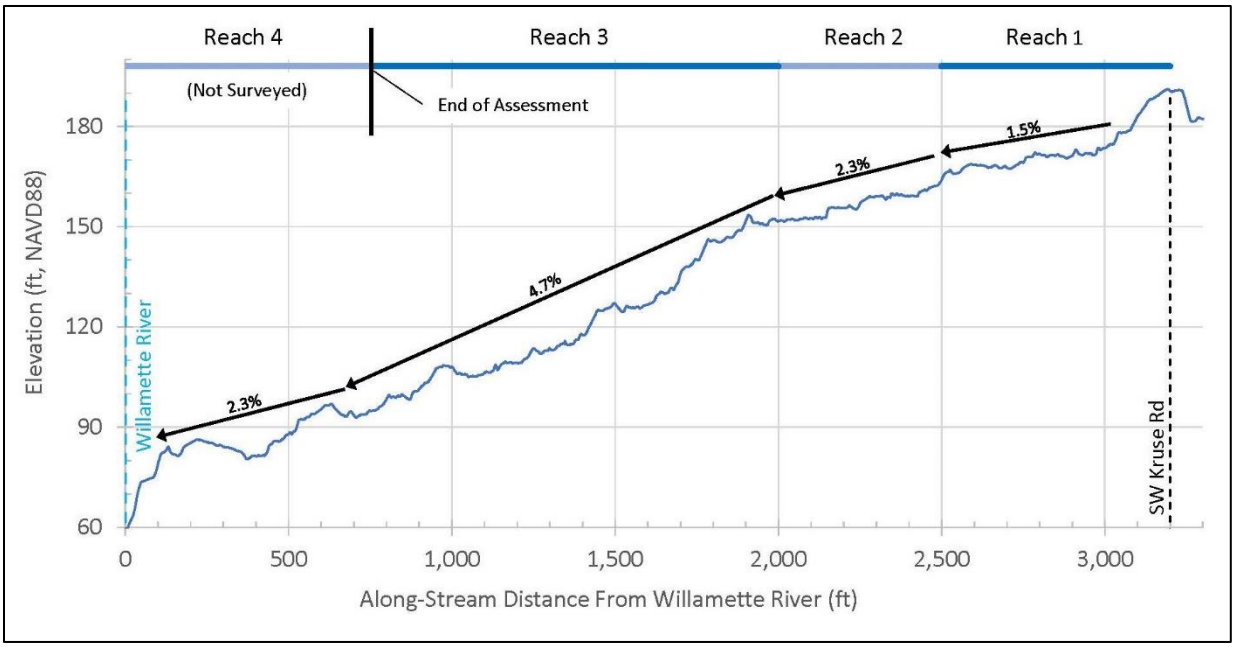

Table 5. *Field Observations for Geomorphic Subreaches Within Kruse Creek*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LiDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	25+00 (PM 3)	32+00 (at culvert)	1.51%	plane bed; confined	fines with some gravel	stable	none, some wood debris	valley slopes adjacent to small floodplain	No	stable, headcut downstream reach boundary	1, high incision potential	2, stable but rate of movement of downstream headcut could increase risk	4	No	ivy removal to save large trees	Low to moderate gradient channel. Small with adjacent low floodplain. Channel 6-ft top, 0.5-ft depth. Overall valley bottom width 20-ft. Lots of blackberry and ivy. Good canopy of douglas fir, cedar, but ivy is growing up a lot of trees. Reach break at headcut.
2	20+00 (PM 5)	25+00	2.29%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	ivy removal to save large trees	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	7+50	20+00	4.66%	colluvial; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Access is poor; Establish valley wide buffer to limit future infrastructure impacts	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.

Selected Photos From Kruse Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 22

Summary of Findings

Boeckman Creek

Boeckman Creek flows in a deep valley that appears to have formed quickly following the Missoula Floods, which ended about 15,000 years ago. The creek appears to have achieved a stable base level thousands of years ago, with a flat slope graded to the Willamette River. The assessment identified several smooth, hard surfaces in the channel bed that may be resistant bedrock or hardpan, which would prevent further downcutting and indicate that the stream has reached its limit of incision.

A major base level control in the reach is at the site of a breached concrete dam within Memorial Park (**Figure 9b**). The remnants of the dam are large concrete and boulders, creating a cascade, which should remain stable under future flood scenarios.

Upstream of the dam, and especially above Wilsonville Road, beaver are the primary controller of the morphology of the Boeckman Creek channel. Although the channel itself is moderately incised, beaver dams create a stair-stepped backwater condition that allow high flows to access the floodplain and reduce stream power and associated erosional forces. Numerous large and small dams were identified during the field investigation. The beaver dams create ponded areas and form complex environments and habitats in addition to providing base level stability in Boeckman Creek. Most of the dams appear stable, although they may be more likely to collapse as a result of larger or more frequent floods. The collapse of individual dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy beaver population in Boeckman Creek would be a beneficial long term management strategy. Riparian restoration, which would include removal of blackberry and ivy, would benefit beaver and improve the long-term resiliency of the reaches dominated by beaver.

The most at-risk area to past and future changes in the hydrology associated with hydromodification within the watershed is near the confluence with the Willamette River (**Figure 9b**). In this reach the combination of high flow conditions, an incised channel, and seasonal backwatering from the Willamette River appear to limit the long-term stability of beaver dams that provide local grade control elsewhere along Boeckman Creek. Although seasonally the Willamette River does provide base level control, hydromodification impacts, especially in fall when the Willamette River is typically low, has led to channel incision and widening in the reach downstream of Memorial Park.

Meridian Creek

Meridian Creek is incised in a small canyon between houses on the west and Landover Park on the east. Meridian Creek is incised to “bedrock,” which is a resistant layer of consolidated fine-grained sediment. The valley walls confine the channel on both sides. The valley slopes are covered with dense blackberry and are prone to landsliding, which could affect some backyards. A stormwater outfall pipe on the west side of the stream, near the Reach 1 and Reach 2 boundary, is undermined and a section has washed away (**Figure 11; Photo on Figure 13**).

The primary infrastructure issue in this reach is the crossing of Meridian Creek under Wilsonville Road (**Figure 11; Photos on Figure 13**). The culvert appears to be undersized and is nearly clogged with fine sediment. This obstruction caused a wedge of sediment to accumulate in the channel upstream. The lack of drainage appears to cause some ponding under current conditions, and complete plugging of the culvert seems like a reasonable possibility. It is unlikely that ponded water would overtop Wilsonville Road, but repeated ponding behind the road could cause geotechnical instability through other

mechanisms. The risks at this crossing should be further evaluated as part of the Stormwater Master Plan.

Secondary infrastructure issues in this reach are:

- The debris rack at the outlet of the culvert under Willow Creek Drive is clogged with leaves, debris and sediment, backing up water under Willow Creek Drive (**Figure 11; Photo on Figure 13)**. The undersized culvert at Willow Creek Drive may limit future hydromodification impacts downstream.

Arrowhead Creek

The Arrowhead Creek channel meanders across a broad floodplain that is inset approximately 30-40 feet from the upper Missoula Flood terraces. Grade control is provided through a combination of localized exposures of hardpan "bedrock" and beaver dams that are continuous and redundant along more than 60% of the project reach.

The primary infrastructure risk observed through the project reach is the condition of the culvert at the pedestrian pathway at the upstream extent of the assessment area, which is piping and failing and should be evaluated further by a structural engineer (**Figure 14; Photo on Figure 16**). An additional risk factor that was considered low to moderate and should be monitored in the future was the potential for instability and headcut migration within the vicinity of the Arrowhead Creek Lane crossing. The constructed streambed under the relatively new bridge crossing lacks adequate grade control and has the potential to incise further and threaten the series of beaver dams in the upstream, stable reach (**Figure 14).** The lack of grade control may be due to downstream mobilization of the streambed substrate that was installed during construction of the crossing. A pile of angular cobble was noted approximately 200 feet downstream of the crossing that may have been eroded from the channel at the bridge. An indirect risk factor in the assessment area relates to the condition of the riparian corridor. Much of the riparian vegetation is being impacted by the growth of English ivy, which has the potential to impact long-term beaver use of this section of creek, which could impact the primary source for grade control in this section of Arrowhead.

Newland Creek

The assessment reach included a portion of a tributary to the mainstem of Newland Creek within the existing Urban Growth Boundary. The channel is highly incised, and relatively steep, and flows within a canyon that increases in width in the downstream direction as it incises into a broader terrace surface. Past and active channel incision has resulted in a highly perched condition at the culvert at SW Kahle Road which is the upstream boundary of the assessment area. A half dozen headcuts were mapped through the project reach that ranges from 2 feet to 4 feet high with likely low to moderate rates of upstream movement as the bed of the channel flows over hardpan material.

The primary infrastructure risk identified in the project reach is the perched culvert at SW Kahle Road (**Figure 17; Photo on Figure 19**). Although this culvert isn't immediately at risk due to placement of energy dissipation rock at the outlet, upgrades to the road will need to address the profile discontinuity and also consider the likelihood of additional channel incision associated with future headcut migration. This reach lacks grade control other than exposure of hardpan material in the bed, which will slow channel incision, but not eliminate it, especially if there are significant flow increases that occur in the future associated with development. Channel incision and active headcuts along the two tributary channels entering the assessment reach should also be considered in any future development planning.

Kruse Creek

Geomorphic conditions in the assessed portion of Kruse Creek are dominated by the presence of the presence of large landslides through the lower quarter mile of the canyon. These landslides are associated with a high water table, active springs and seeps along the entire lower canyon, and sets the base level control for the upper sub reaches of the assessment area. Active slumping into and across the Kruse Creek channel, followed by reincision into landslide debris characterizes channel conditions which were difficult to directly access during the assessment.

The primary infrastructure risk observed through the project reach is the condition of the culvert at W Kruse Road (**Figure 20**). The corrugated metal pipe is perched and, although not immediately at risk of failure, would need to be addressed, along with the apparent profile discontinuity, if the crossing was replaced during upgrades to the road, which is currently a narrow, relatively undeveloped asphalt road. Although there is no direct infrastructure risk associated with the mapped landslides, any planned development might have an impact on their rate of movement. Creating large buffers along Kruse Creek that considers existing geologic and geotechnical conditions as well as how those might be exacerbated by changes to watershed hydrology will be important to limit future impacts to infrastructure. Addressing non-native species, especially the potential for English ivy to impact mature trees, would also benefit the Kruse Creek corridor.

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APPENDIX A

Field Observations in Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks

Appendix A1 *: Record of Field Observations in Boeckman Creek*

Dates: 11/19/2021, 11/24/2021 and 01/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
450	1										Steel beam, full span			3	Rock grade control in channel		Private bridge at upstream extent of Willamette backwater. Accesses 1 property. Landowner there since 1976. Creek has incised and widened when Memorial Park bridge replaced culvert. Rock grade control provides limited protection. Rocks are small and could get flanked.
580	2						X										Bedrock exposed in bed along right bank. Shale. May not be continuous across bed. Overlain by fine sediments.
700	3	L	Active, 50'x25'	5	None								Deck and House	5			Actively eroding bank. Local incision and widening of channel undermined bank. May be exacerbated by fill/retaining wall at house. Retaining wall has since failed.
780	4							18"					Old crossing				Old crossing. Some road fill still present. Upstream extent of ??? headcut migration. Possibly associated with debris log jam.
1000-800	2115-2121																Reach below bridge to private property boundary consist of a 100' section with boulders and gravel, followed downstream by a 100' section of mud and wood bed before reaching property boundary. Appears to be significant bank erosion in the downstream section underneath the private homes (see photo 2121)
1050	2109, 2111, 2127-2129										Trail footbridge						High foot bridge over creek. Low chord is about 20 feet above creek, well engineered. A few boulders and rounded gravel lag deposits in the channel under the bridge
1100	2107, 2112-2113							12" boulder drop							X		Small step with boulder rip rap just upstream of bridge
1400	2096-2100						Willamete River bed material								X		Outcrop of a contact between overlying fine-grained sediments and underlying partially cemeted gravel close to the current water level. Gravel is well rounded basalt pebbles and cobbles, looks like probably old Willamette River bed material. This suggests stream from here down is probably not susceptible to much further incision due to exposing the coarser bed material and also as approaching the base level of the Willamette River
1500	2093-2094														X		Large, recently fallen cedar tree in channel. Log jam beginning to form, accumulating wood, and will probably persist for many years
2000 - 1500	2080-2093																Deeply incised meanders in low gradient channel. Not actively moving meanders. Bank walls as high as 40' and as low as 12 feet above channel Steps are formed at several fallen logs, mostly featureless runs. Abandoned floodplain is covered with mostly ivy (not as much blackberry here)
2050	2079-2080							30" high step, log							X		step from fallen log and debris. Doesn't appear to be a beaver dam

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
2200	2069-2071	L	50' Long by 30' high	2													Bank erosion on outside of a sharp bend in incised meandering reach. 30' high near-vertical brank held up by several large fir trees composed of Missoula Flood fines. There's foot traffic at top of bank, trail may be endangered from erosion (didn't climb up to top to be sure)
2700-2200	2069-2078																Mud and wood channel bottom, 2' to 4' deep at current high flows. Channel bed about 12 feet wide, mostly runs. Ivy/blackberry floodplain, incised. Floodplain is about 6 to 12 feet above floodplain
2700	2066-2068								18"						X		Small step within mud reach, likely beaver dam but not clearly so. Could be a downed log covered with debris. Low gradient, mud reach. Lots of ivy on floodplain
3000	2026-2031	R				Tributary enters from River Right											Tributary enters from river right through a large (>36") corrugated metal culvert under a road fill. Culvert is open but backwatered by Boeckman Creek about 24" deep. Scour pool at mouth of tributary
3050 to 2700	2059-2065; 2132-2134														X		Relatively featureless reach below tributary junction; incised, heavy blackberry and ivy on terraces; mud bed; lots of wood in channel bed
3050	2058	R	75' long by 6' high	3													Bank erosion and incision on river right below fence and facility on the top of bank downstream of tributary.
3050	**TRIBUTARY DESCRIPTION**																Inspected the lower end of tributary at request from B&C. Visited lower portion of tributary up to the road crossing in Memorial Park. Low gradient, deeply incised. For the first 200 to 300 feet upstream of confluence, upstream of access road, the channel is incised in blackberry thicket with no floodplain. Channel is about 5-10' bottom width, about 20' top width. Occasional lower benches, mud in channel
3350	2016, 2024														X		100-foot-long boulder riffle with boulder bank protection on river right @ 3350. Some of the boulders transported a short distance downstream forming a stable base level control over about 50-100' distance
3450	2019-2023; 2135-2138	R															Relatively broad floodplain surface covered with blackberry
3675	2003-2004	R	50' long by 16' high	5													Big eroding bank on right bank just downstream of dam. Banks composed of Missoula Flood fine facies

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
3700	1990-1999, 2145-2147														X		Breached dam in creek. Dam made from stone and mortar, about 15' wide. Even though it is breached it is still a 4 to 5 foot drop over a distance of about 30 feet, and provides a stable base level control. Boulders on the downstream side of dam. Possible fish passage barrier at low flows (not at the current high flow). Currently an aluminum pipe ~8" crosses above channel at former dam, looks like it is no longer used.
3700 to 4000	2148-2156	R											depositional floodplain				Relatively broad, flat surface covered in reed canary grass. Appears to be a deposit in an impoundment behind former dam at 3700
4000	1983	R			2 to 3' boulders								boulder riffle		X		Boulder bank protection and boulders in streambed. It looks like the boulders were installed to protect the right bank and provide grade control. There is about a 2 foot drop over the riffle
4100	1975-1979								2 to 3'						X		2 to 3' high beaver dam. Exact height not clear due to high flows. Appears to be stable
4300	2157, 1968, 1970								18"						X		Beaver dam (?) with reed canary grass root mat. Unclear height due to high flow. Chewed sticks. RCG is providing added strength to apparent damn
4450	1965, 1966	L								30" PVC							Stormwater outfall from parking lot in park. Discharges onto slope about 4 feet above channel. Rocked around outfall, no notable erosion
4500	1960 - 1964										SW Kolbe Lane Single lane vehicle bridge				X		Single lane auto bridge at Kolbe lane. Wood single span lower chord about 12 to 15 feet above channel. Headcuts or small beaver dams under the bridge
11/24/2021 - Wilsonville Road to SW Boeckman Road																	
5250	2168, 2183	R								18"	SW Wilsonville Road Bridge						High bridge with 4 sets of 3 large concrete piers about 40-50' above the streambed. No apparent hazards related to the stream. There is a record of a past stream realignment project here but no obvious evidence of what was done here. Old concrete stormwater outfall into the channel on river right under the bridge
5350	no photo	R															Drainage off senior living community parking lot creates a ponded area on the floodplain on river right, at least during wet season.
5400	2186								2'						X		Small beaver dam a short distance upstream of bridge backs up water around 400 feet. The pond is confined within banks about 15' wide, only about 2' above water level.
5800	2199																Upstream end of beaver pond from dam at 5400' . Flow into pond comes from a beaver dam just 50' upstream of top of pool. Beaver clearly know how to build dams so that the pond ends just below the toe of next upstream dam.

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
5850	2201-2202								2'						X		2 foot high beaver dam just above ponded area from downstream dam
5900	2205	R								Surface water from outfall							Trickle of water entering from gully which begins at a stormwater outfall high up on hillslope/valley wall. The gully is protected with sandbags, minor erosion
6000	2206-2208								1.5'						X		Beaver dam around 18" high at upstream end of pond from the dam at 5850
6200	2220-2226	R				Small tributary											Small tributary from river right, incised in dense blackberry, enters just downstream of the small tributary. I was only able to reach the stream in one spot about 100' from Boeckman Creek confluence due to blackberry. Creek has pebble gravel bed and appears reasonably stable. No clear hazards noted
6250	2213-2216								**4 to 5' high**						X		Big (4 to 5' high) beaver dam inundating lot of area upstream from here. High dam spreads water onto floodplain for as much as 500' upstream
6200-6600	2217-2234																Ponded, meandering reach upstream of large beaver dam at 6250. Water spreads out onto floodplain. Lots of blackberry, slow walking through here.
6550	2233-2235																Large fallen cedar tree across channel. 3'-4' DBH within the ponded area upstream of dam at 6250. Seems certain to trap any wood traveling through this reach for many years to come.
6650	2240-2242								1'						X		Small beaver dam just upstream of the pond behind the dam at 6250
7000	2245-2246							2' high step							X		Small (2') step or beaver dam. Could be behind a collapsed block of root mats, or a fallen tree. Unclear due to accumulated debris, but it's backing up water similar to beaver dam
7100	2248								2'						X		Apparently stable 2' high step in channel as a rsult of a beaver dam reinforced by reed canary grass sod. Looks very stable and long lived
7300	2259-2267								**3-4'**						X		Big beaver dam with lots of reed canary grass covered floodplain that is flooded by this dam
7300-8000	2270-2282																Reach mostly impounded by the big dam at 7300. Impounded area continues almost up to the footbridge. Impenetrable blackberry throughout this reach
8150	2284-2286										Boeckman Creek Trail Bridge						Boeckman Creek trail footbridge crosses over creek. At this location, stream is flowing, not ponded; gravel, with riffle-pool morphology and small wood. Lots of blackberry

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
8150-8650																	Mostly gravel riffle-pool reach from bridge to 8650; low floodplain with blackberries, not ponded reach
8650	2299-2303	L															Gully and drainage from river left. It appears that a PVC culvert pipe under the trail had washed out and was moved out of the way. Former homeless encampment here.
8890															X		Resistant bedrock in channel underwater near the dam.
8900	2308								2' high dam						X		Beaver dam, around 2 feet high. Lots of blackberry
9070															X		Apparent bedrock under water
9075	2315								2' high dam						X		Another beaver dam short distance upstream of the one at 8900, also resistant bed here underwater based on feel (not visible due to turbid water). Clearly a stable base level here
9100	2317-2324									18" pipe and box							Stormwater outfall and energy dissipator on the right bank, just above the beaver dam. It appears to be sitting on basalt bedrock. It remains clear of debris. Appears to be working well, no concerns or hazards noted
9300	2329-2331								2' high dam						X		Small beaver dam ~2' high; pond backs up to toe of the next upstream dam
9500	2335-2337								**5' high**						X		Tall but narrow beaver dam. Dam is built off of one large fallen log. 5 feet high by 15 feet wide
9700	2343-2344								**3-4' high beaver dam**						X		Large beaver dam, difficult to access. Ponds water a far distance upstream.
10000	2345-2346								2' high dam						X		Beaver dam near mapped outfall. Only viewed from the trail, did not get close to it. Difficult access
10000-10500	2350-2351																Reach with mostly ponded water. Beaver pond is effectively inundating much of the valley floor throughout this reach
10500		R								plastic pipe							Large pipe down long hillside on river right valley wall. Did not visit except from trail across the valley

***Appendix A2** : Record of Field Observations in Meridian Creek*

Date: 11/26/2021

Location		Bank Features				Tribu-tary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
11/26/2021 - SW Wilsonville Road to SW Willow Creek Dr																	
775	2372-2383										Wilsonville Road				X	Fix drainage at culvert	Meridian Creek crossing at Wilsonville Road. Clogged, apparently undersized (approx 30") culvert under high road prism under Wilsonville Road. Culvert is clogged on the upstream end with about 2 feet of sediment which is backing up a wedge of sediment for about 50 feet. There is a outfall (or possibly overflow pipe inlet) above main culvert, 6" plastic pipe. This is a hydromodification risk factor that should be evaluated. Unlikely there's enough water that it could overtop the road. But could plugging the culvert and an extended period of standing water following a storm destabilize the road embankment?
850	2388-2392									18" PVC							Section of corrugated plastic culvert pipe, about 6' long, along side of the channel. It appears to have been washed down from upstream
875	2393							18" step							X		Small log jam forming a 1.5' foot high step in the channel. Gravel sediment stored in a wedge behind it. If this were to fail or collapse, sediment could easily clog the rest of the culvert at Wilsonville road
1000	2415-2417							4' high waterfall in bedrock`							X		Waterfall in consolidated fine-grained bedrock. Marks transition from alluvial bed below and a bedrock stream above the waterfall.
1050	2421-2425									18" PVC							Stormwater outfall, 18" PVC on river right, about 6' above where the channel is in bedrock.There is a concrete support under the outfall which is undermined and failing. This is where the 6' long piece of pipe at Sta. 850 came from
1200	2448-2452							2' step							X		Boulder step in consolidated mud bedrock. Boulders may have been placed here for some reason,. Perhaps they were installed as bank protection and fell into the creek.
1300	2456-2466														X		Culvert outlet at top of reach under SW Willow Creek Drive. Culvert has a metal grate at the outlet that is clogged mostly by leaves. Some water is leaking through but this is a low flow. It is probably backwatered during storm flow. Currently, there is standing water about 2' deep under Willow Creek Drive behind the clogged grate. The channel upstream of Willow Creek drive is a stormwater basin which may reduce the amount of runoff from the developed area, but this culvert should be evaluated in the context of hydromodification upstream.

Appendix A3 *: Record of Field Observations in Arrowhead Creek*

Date: 1/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
13+50	10							3 (2')			Arrowhead Road; freespan truss			3			Arrowhead Road. Freespan concrete truss. Active headcutting at creek under bridge. Mitigated somewhat by beaver activity upstream. Unknown irrigation line (6" PVC) in channcel crosses creek several times.
18+50	5-9								Series of 5 beaver dams. See notes for locations and height								Series of beaver dams. Ramps and chew suggest active site. Dams (Stationing and Height): 18+50 and 17+30 = 18" high; 16+80 = 24" high; 15+90 = 12" high; 14+80=30" high
18+80	4												old crossing	1			Old road bed/crossing. Approach fill still present and evident in LiDAR. Crossing not evident.
23+00	3												rock groin on left bank				Boulder groin on left bank at toe at apex of meander bend. Upper bank ~55' high but no evidence of active erosion. Remnant training structure.
25+50	2						hardpan										Channel flowing on hardpan. Channel 6' wide incised 2'-3' feet into floodplain. No evidence of floodplain activation. Stable channel profile.
26+00	1									Culvert at trail				3			Double concrete box cultert 5'x5' (x2). Only looked at outlet. Drop of 2'-3' to channel. Concrete base of culvert failing. Water subbing under structure. High risk to infrastructure.

Reach Name: Newland Creek Trib. - Reach 1 Date: 10/26/2023 **Appendix A4**

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
35+50	PM 1									24" Dia CPP							Culvert at Kahle Rd 24-in CPP perched 6-ft above channel bed. Stormwater from road enters uncontrolled. Concrete rubble placed at culvert outlet. Outfall relatively stable though channel downstream is highly incised compared to upstream.
34+50	PM 2							3-ft over 10-ft (4)									Channel highly incised into erodible hardpan. Steep on both banks with a narrow channel notch 4-ft wide by 4-ft deep. Headcut 3-ft distributed over 10-ft channel not even deeper and narrower downstream of headcut.
32+50	PM 3							4-ft over 6-ft (5)									Larger headcut 4-ft over 6-ft incised into erodible hardpan. Steep banks.
30+75	PM 5							3-ft (3)									Headcut 3-ft held up by maple roots.
30+00	PM 6							4-ft over 15-ft (3)									Two closely spaced headcuts. 4-ft over 115-ft. Harder bedrock exposure along right bank. Unsure if its continuous across channel.
28+00	PM 7							4-ft (5)									Headcut 4-ft tall. Risk level 5.
26+50	PM 9							3-ft (5)									Headcut 3-ft tall. Risk is 5.
22+00	PM 12								debris jam of small wood								Debris jam holds 18-in of grade. Fine sediment accumulated upstream.
20+00	PM 14							2-ft (3)									Downstream extent of assessment

Reach Name: Kruse Creek

Date: 10/26/2023

Appendix A5

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
32+00	PM 1									24" Dia CMP							Culvert 24-in CMP perched 4-ft above channel. Large scour hole and circular erosion. Undercut.
25+00	PM 3							4-ft (5)									Headcut 4-ft. Risk 5
24+00	PM 4					right gully											Small gully entering from right bank 2-ft wide, 3-ft wide. Appears to be stormwater runoff. Extends to conifers 40-ft upslope.
15+00	PM 6					right spring fed											Drainage from landslide area enters from right bank. Flow equal to or exceeds main channel flow. Flow is piping through landslide along bank.
11+00	PM 7					left spring fed											Tributary or drainage input from left bank. Might be from landslide. Steep drainage. Could be highly erosive if additional water is delivered to the drainage.

APPENDIX B

Field Maps for

Boeckman, Meridian, Arrowhead,

Newland, and Kruse Creeks

Secondary Location
Basalt Creek north of Day Rd

Priority Location
Basalt Creek South of Ridder Rd to wetlands

Secondary Location
Boeckman Creek north of Boeckman Rd

Priority Location
Boeckman Creek between Wilsonville Rd and Boeckman Rd

Secondary Location
Meridian Creek at Landover Park

Priority Location
Boeckman Creek near Memorial Park

Secondary Location
Arrowhead Creek south of Wilsonville Rd

Sheet 7
Sheet 6
Sheet 5
Sheet 4
Sheet 3
Sheet 2

Basalt Creek
W RailRoad
Coffee Creek
Villebois
Town Center
Advance Rd

006
005
004
007
003
001
002
021
37
010
011
012
10

Legend

Hydromodification-Related Capital Projects

- Erosion Prevention/Flow Bypass
- Instream Channel Improvement
- Upland Flow Control (Detention or Infiltration)
- Completed
- Field Observation Locations
- 43 E&S Problem Area ID
- COW Property
- Easements
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Stream Line
- Streets

Maxar

Accessed By: MGLASS at 08/23/2021

Path: Q:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\Modeling Workshop\Stream Assessment.aprx

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

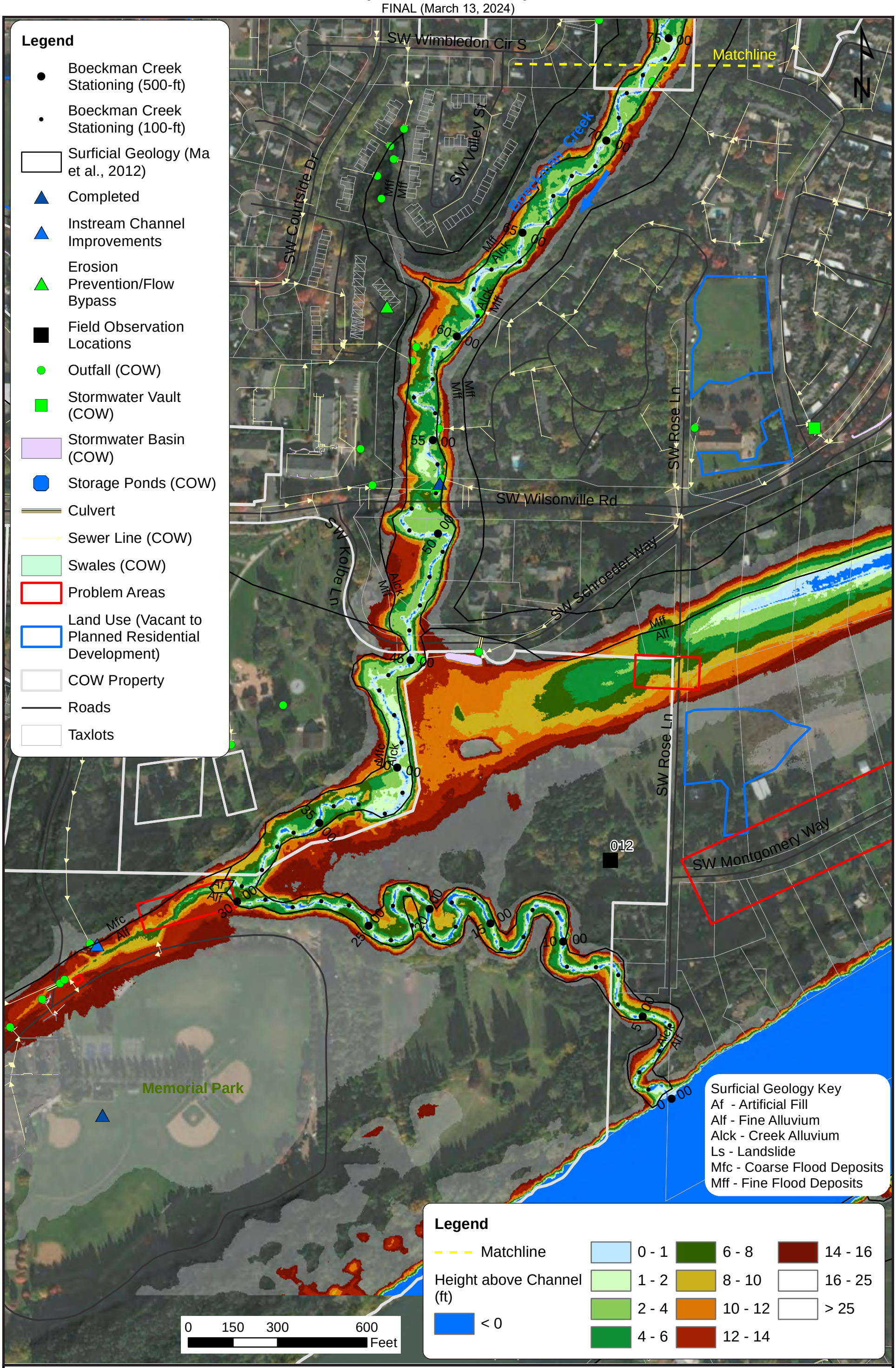
N

0 1,000 2,000 4,000
Feet

Planning Commission Meeting - February 14, 2024
Stormwater Master Plan

Date: 8/23/2021

Stream Assessment



Boeckman Creek Downstream (1 of 3) - Priority Location

Wilsonville Stormwater Master Plan

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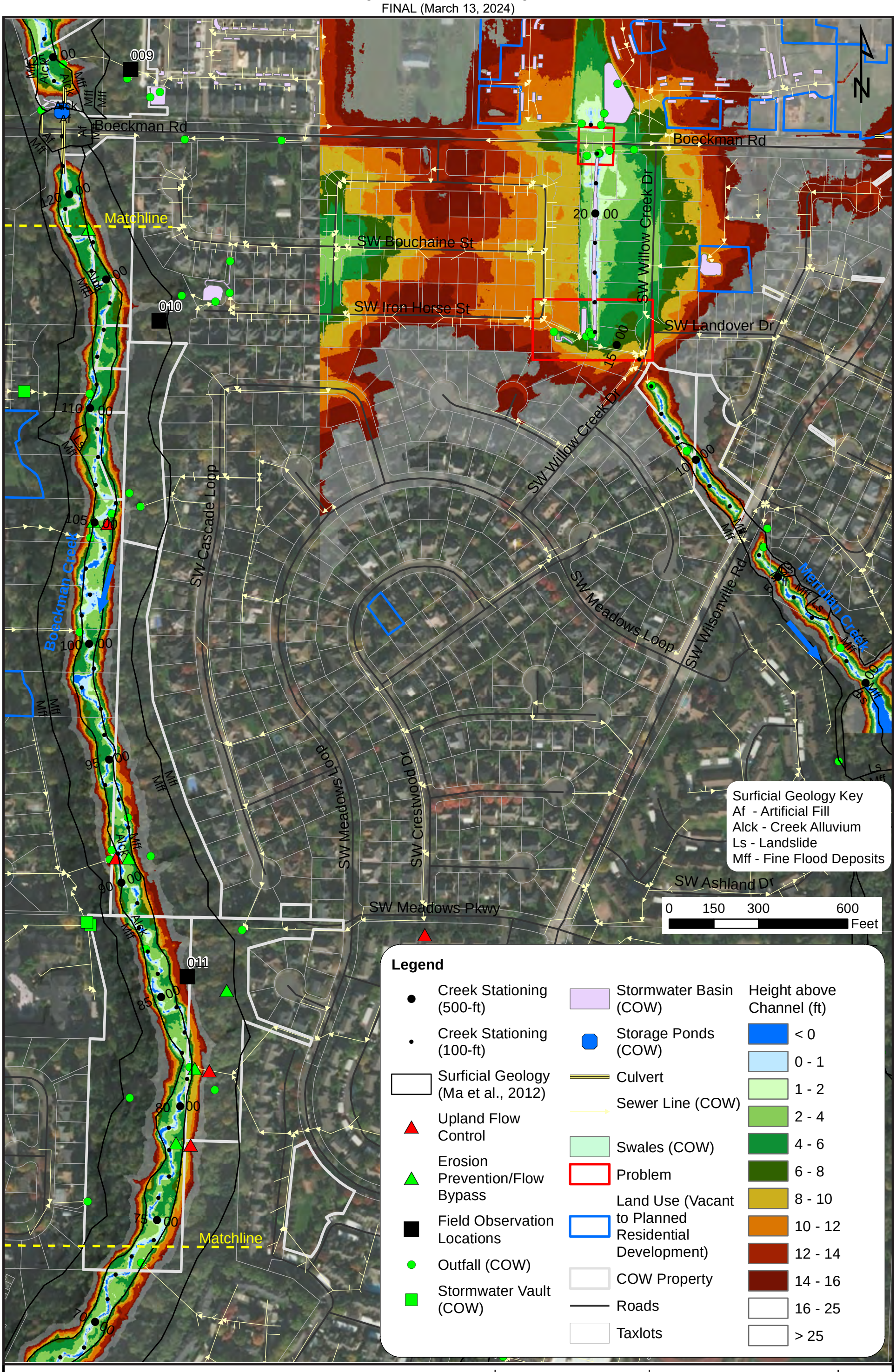
FIGURE 2



Boeckman Creek Mid (2 of 3) - Priority Location

Wilsonville Stormwater Master Plan

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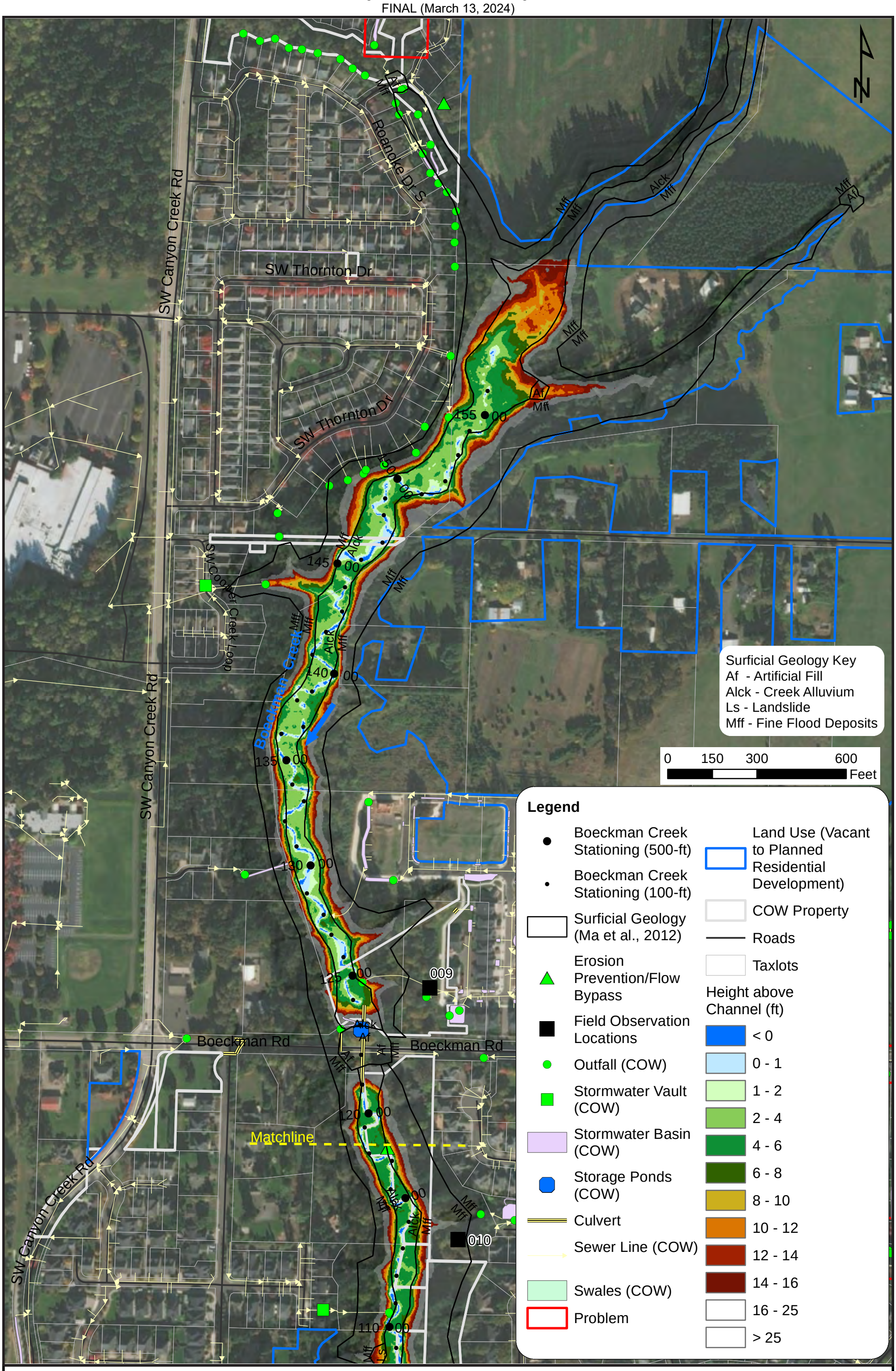
FIGURE 3



Boeckman Creek Upstream (3 of 3) - Secondary Location

Wilsonville Stormwater Master Plan

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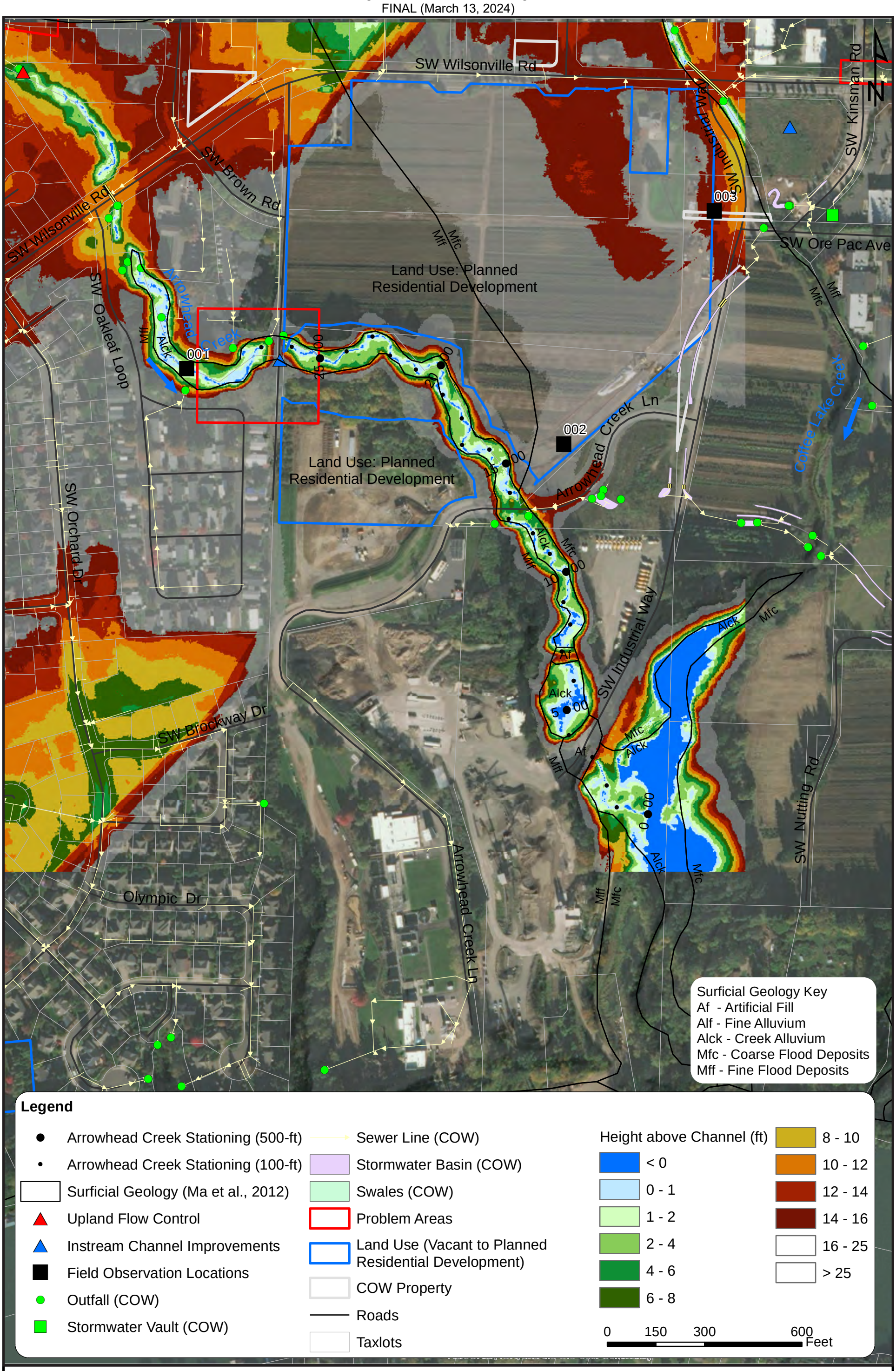
FIGURE 4



Arrowhead Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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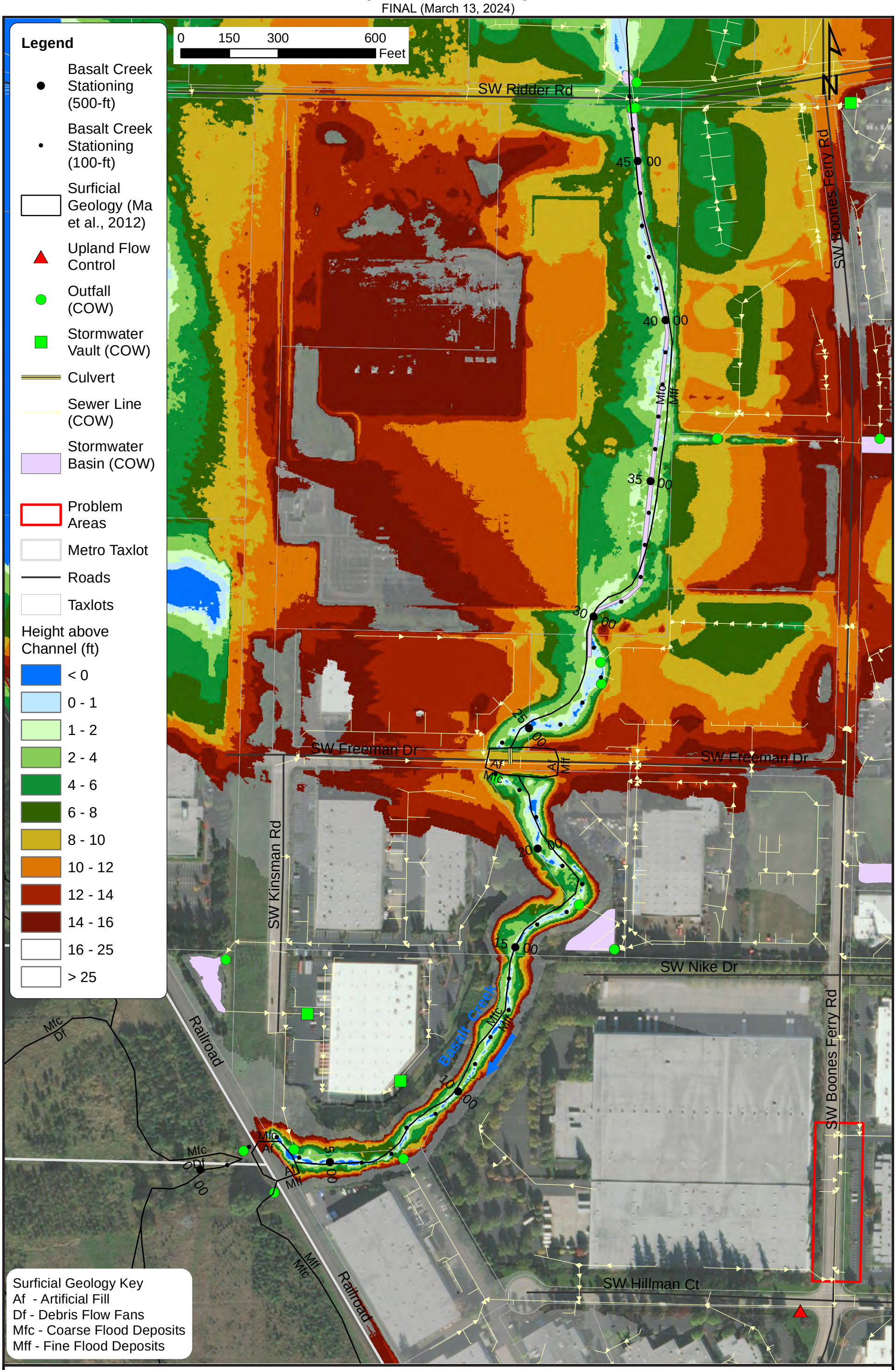
FIGURE 5



Basalt Creek Overview - Priority Location

Wilsonville Stormwater Master Plan

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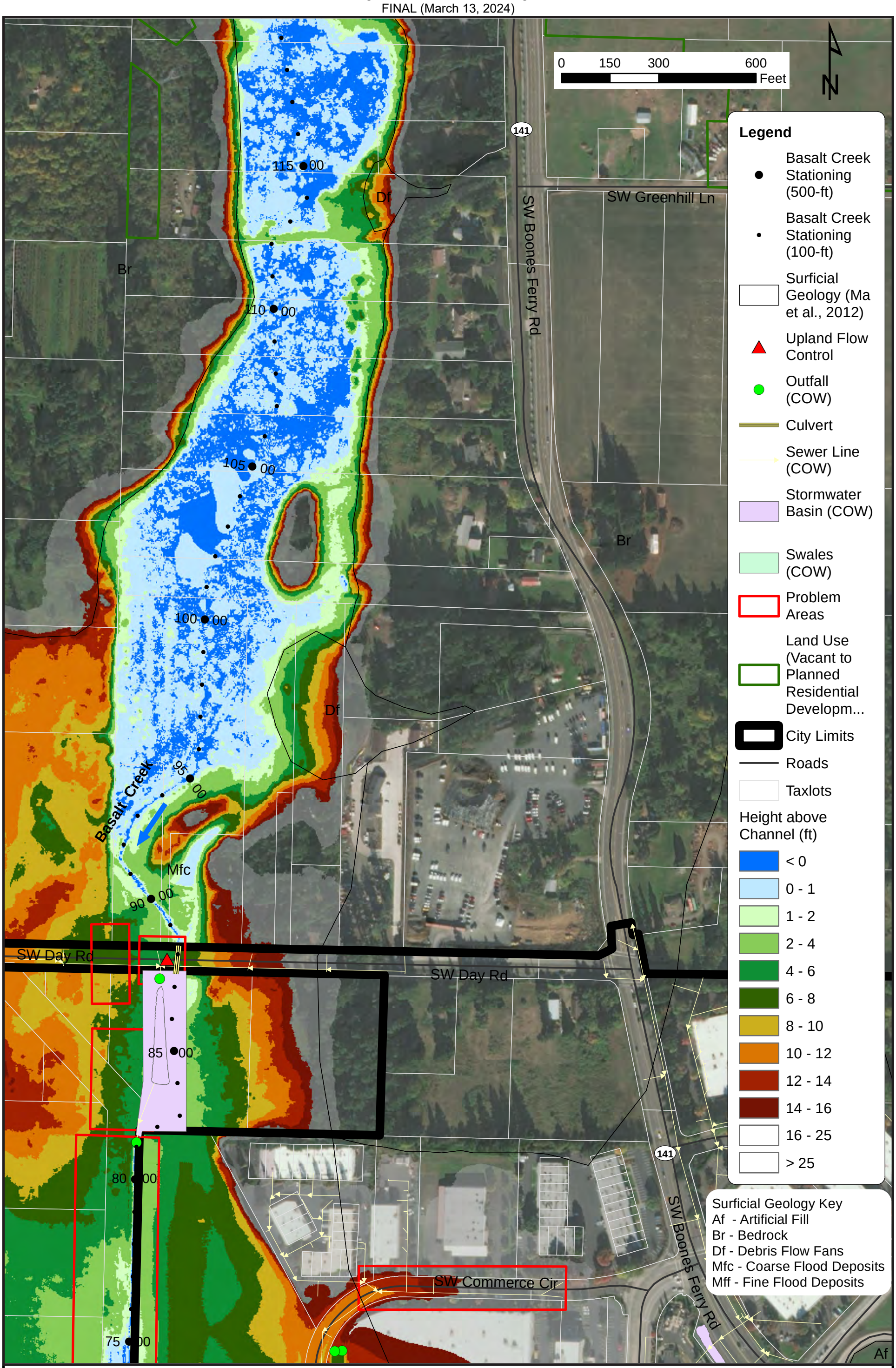
FIGURE 6



Basalt Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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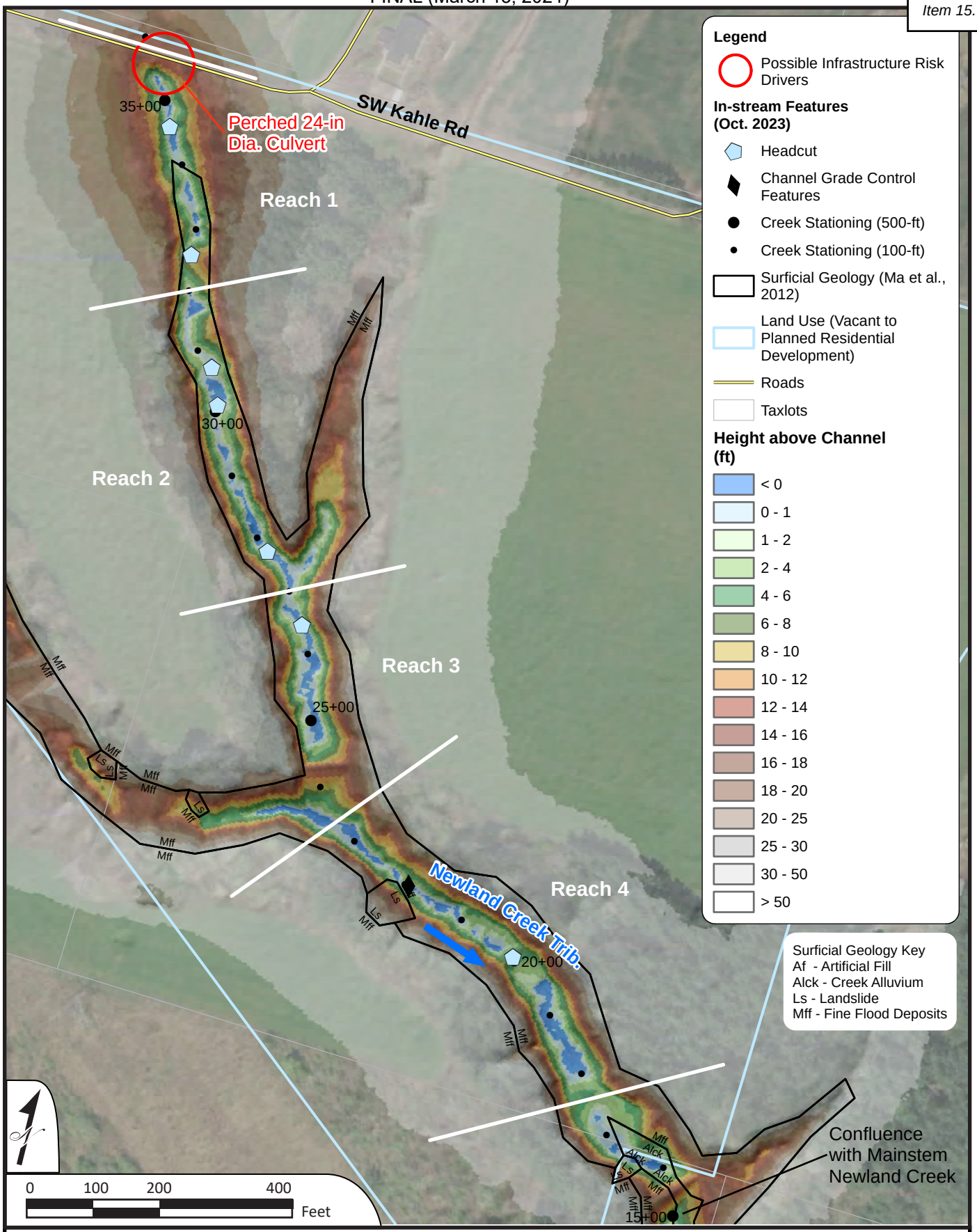
FIGURE 7



Newland Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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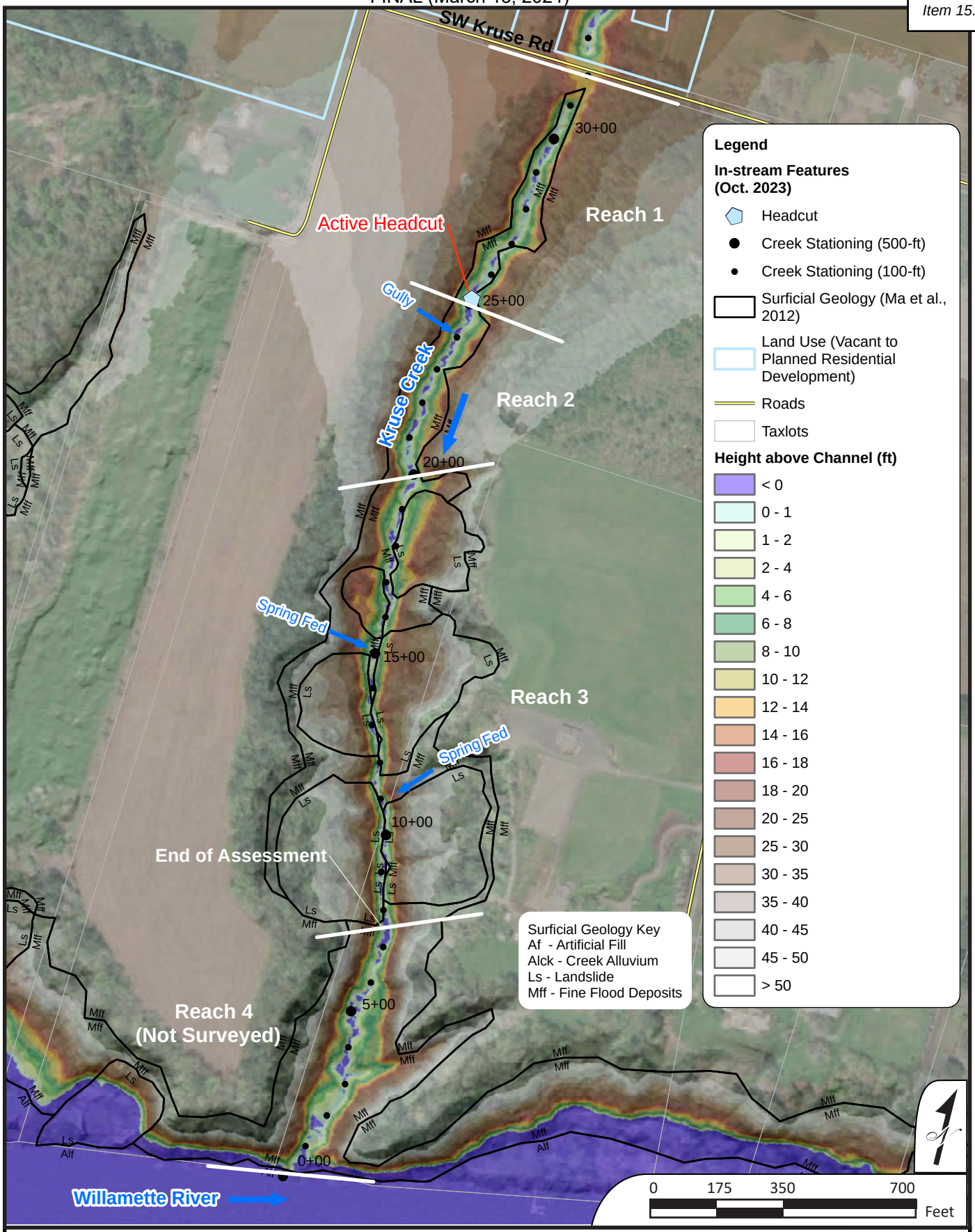
FIGURE 8



Kruse Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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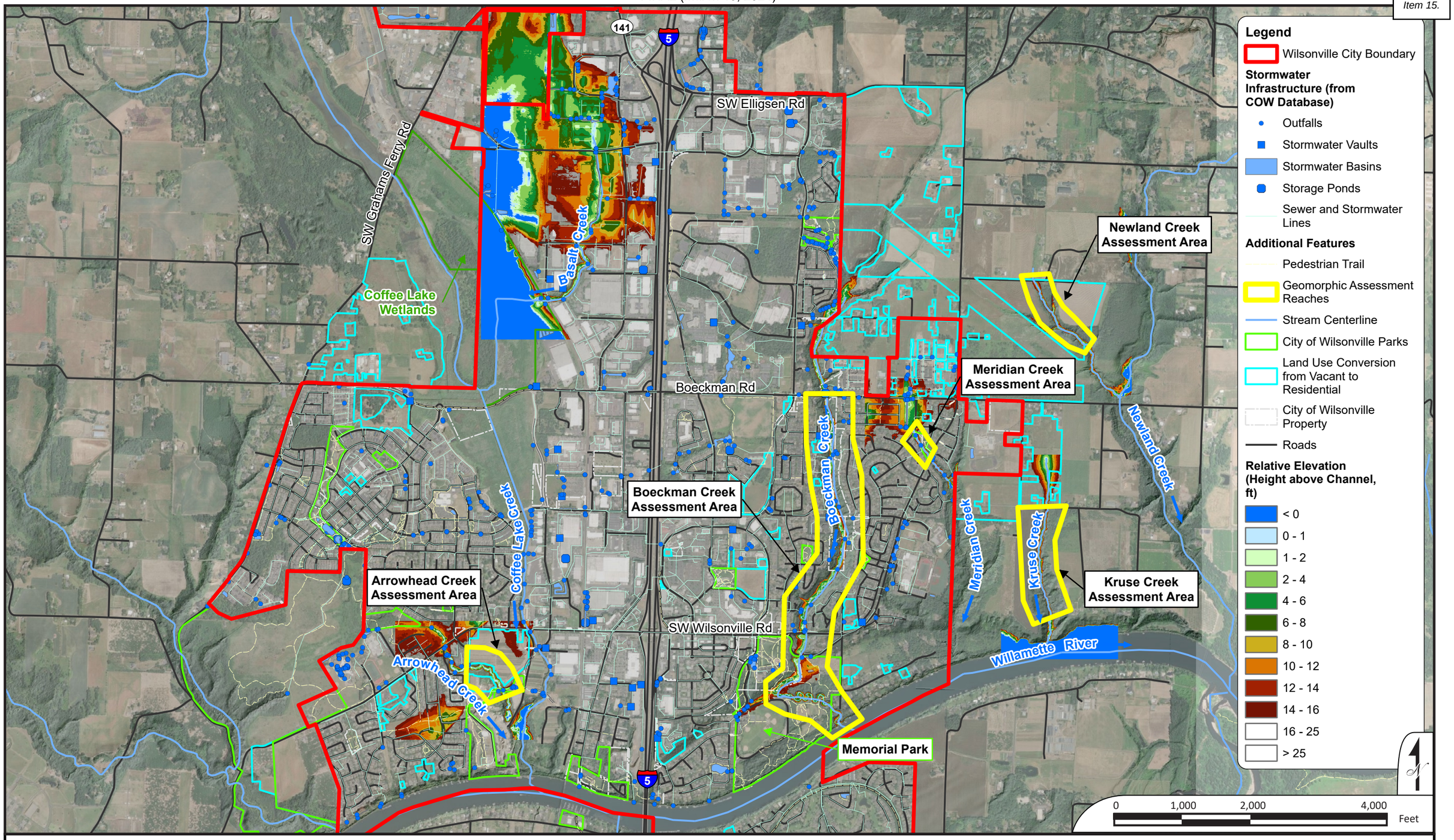
FIGURE 9

APPENDIX C

Relative Elevation Maps for Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks in Wilsonville Oregon

(Overview PDF; full data sets are provided as .tif digital files)



Relative Elevation (Height above Channel) Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE C1

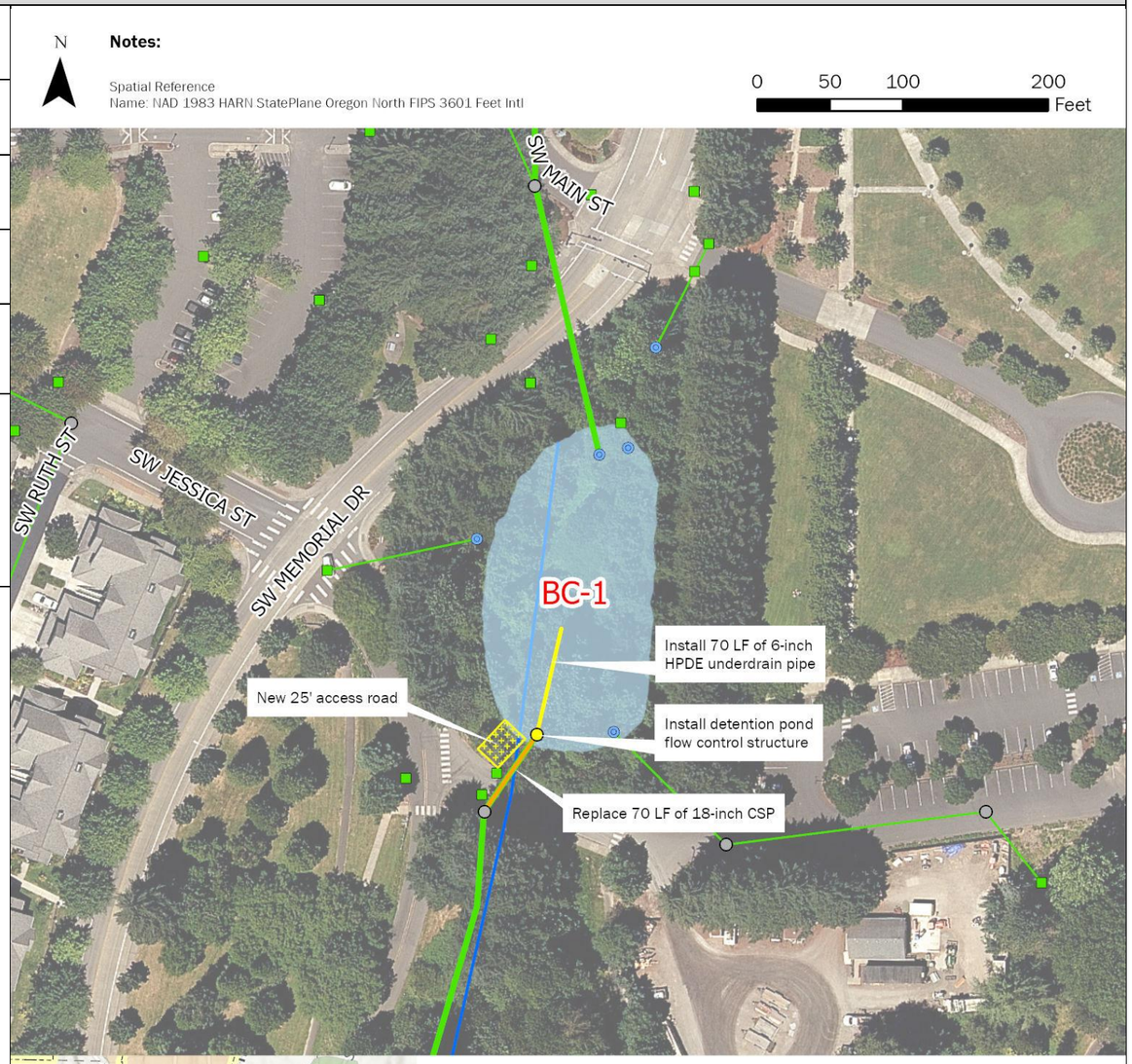
APPENDIX D (provided separately)

Digital Folders Containing Georeferenced Photographs from Boeckman and Meridian Creeks (including .kmz files with geolocated thumbnails)

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



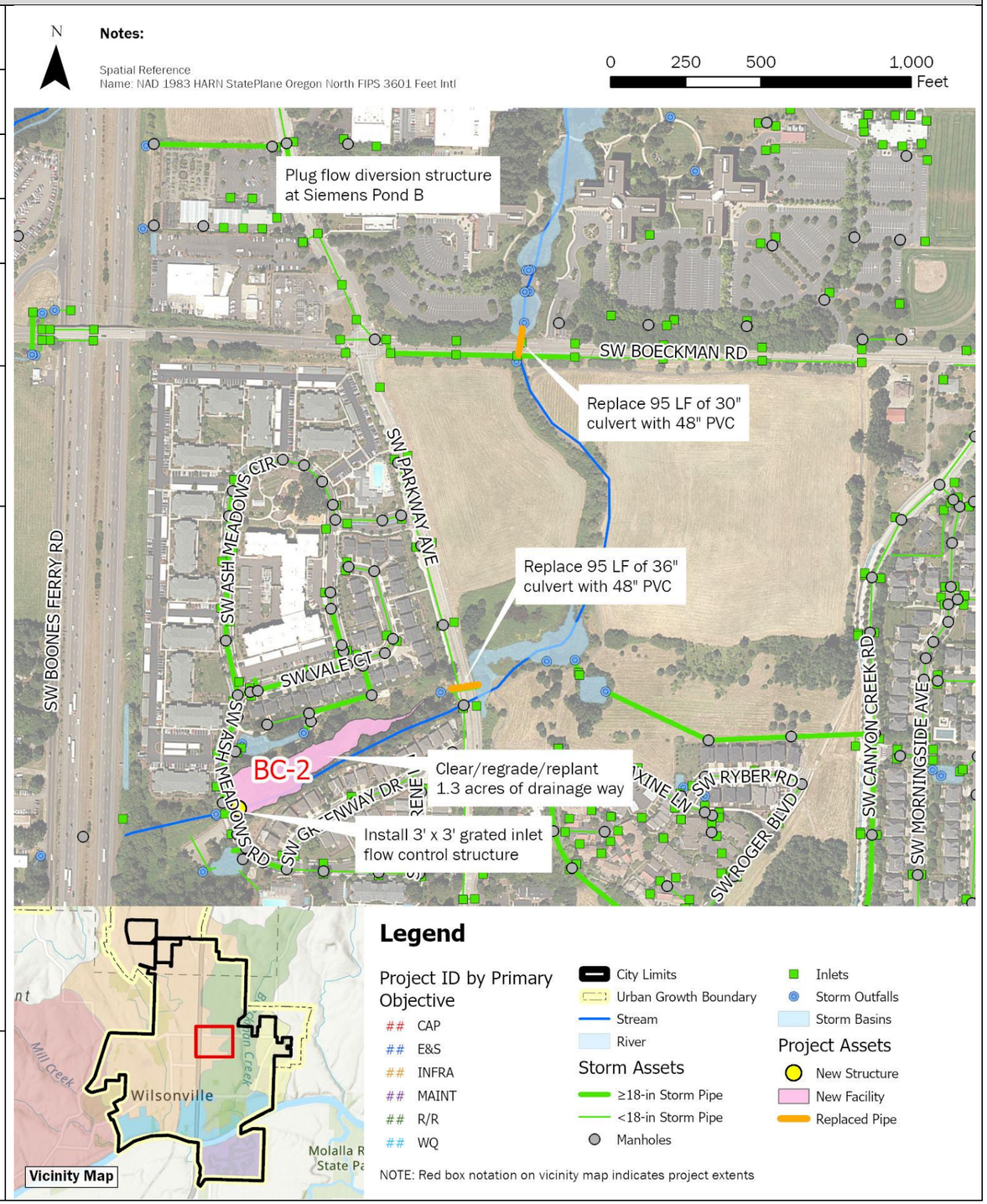
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$1,407,000
	Design / Construction Admin. (13.5%)	$190,000
	Engineering & Permitting (20%)	$281,000
	Total Cost	**$1,880,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Upsize 80 LF of 36-inch culvert at Parkway Ave (main barrel) to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Page 1 of 2

Capital Project Fact Sheet

BC-2 – Ash Meadows Flow Mitigation

BC-2 Ash Meadows Flow Mitigation

Design Considerations / Assumptions

- This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road.
- Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet.
- This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions.
- The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.

Estimated Project Cost

Capital Expense Total	$1,737,000
Design / Construction Admin. (13.5%)	$234,000
Engineering & Permitting (50%)	$869,000
Geotechnical	$100,000
Total Cost	**$2,940,000**

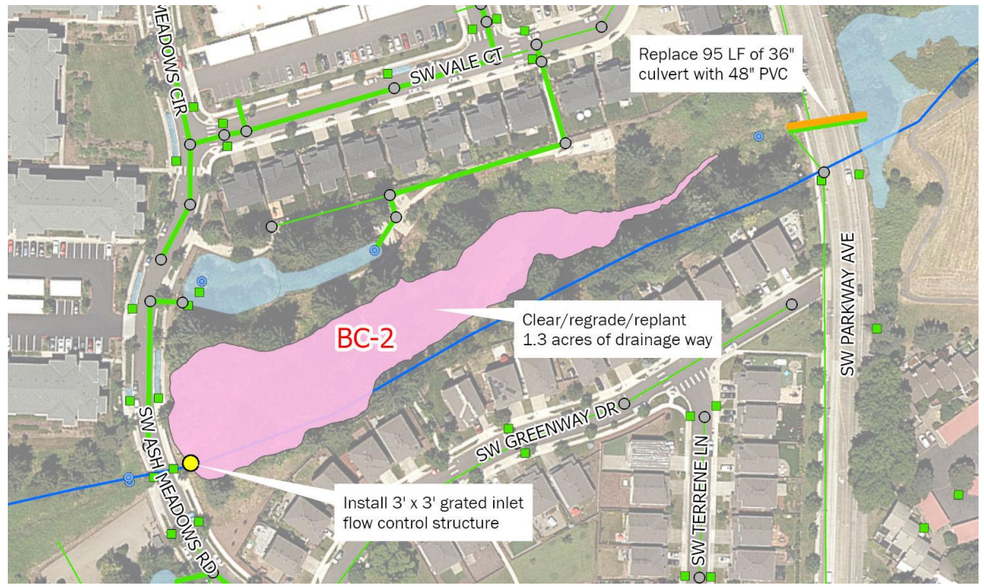
Project Cost Notes

- The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area.
- Clearing and plant restoration is necessary for entire area to 190 ft elevation.
- Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project.
- A 50% Engineering and Permitting multiplier was applied based on design cost estimate.
- A 15% Traffic Control/Utility Relocation multiplier was applied based on design cost estimate.
- A 20% Surveying multiplier was applied based on design cost estimate.
- A $100,000 lump sum cost was included for Geotechnical work based on design cost estimate.

Additional Figures

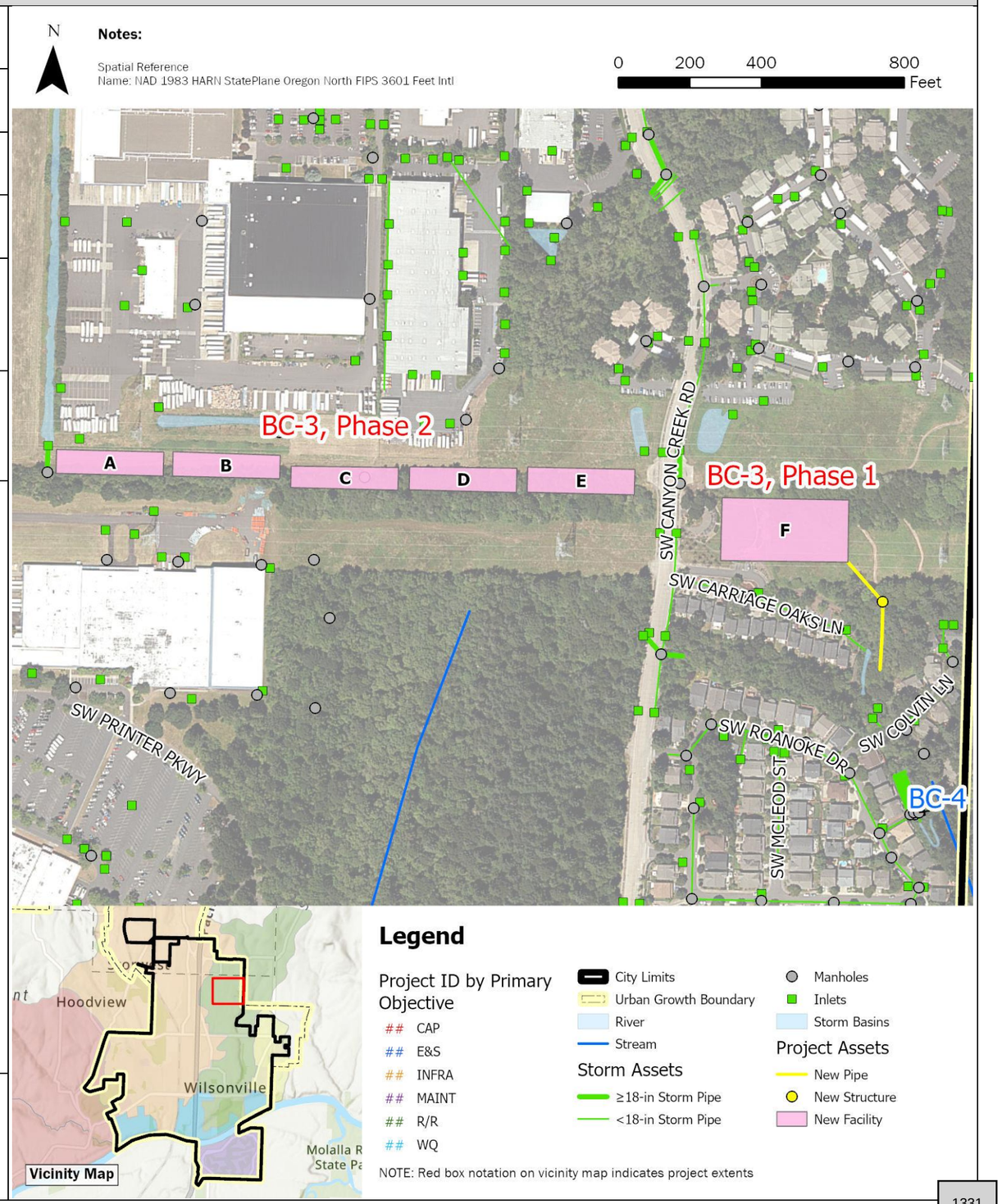
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$3,491,000	$5,253,000
Design / Construction Admin. (3.5% + $200K)	$322,000	$384,000
Engineering & Permitting (30%)	$1,047,000	$1,576,000
Total Cost	**$4,860,000**	**$7,210,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

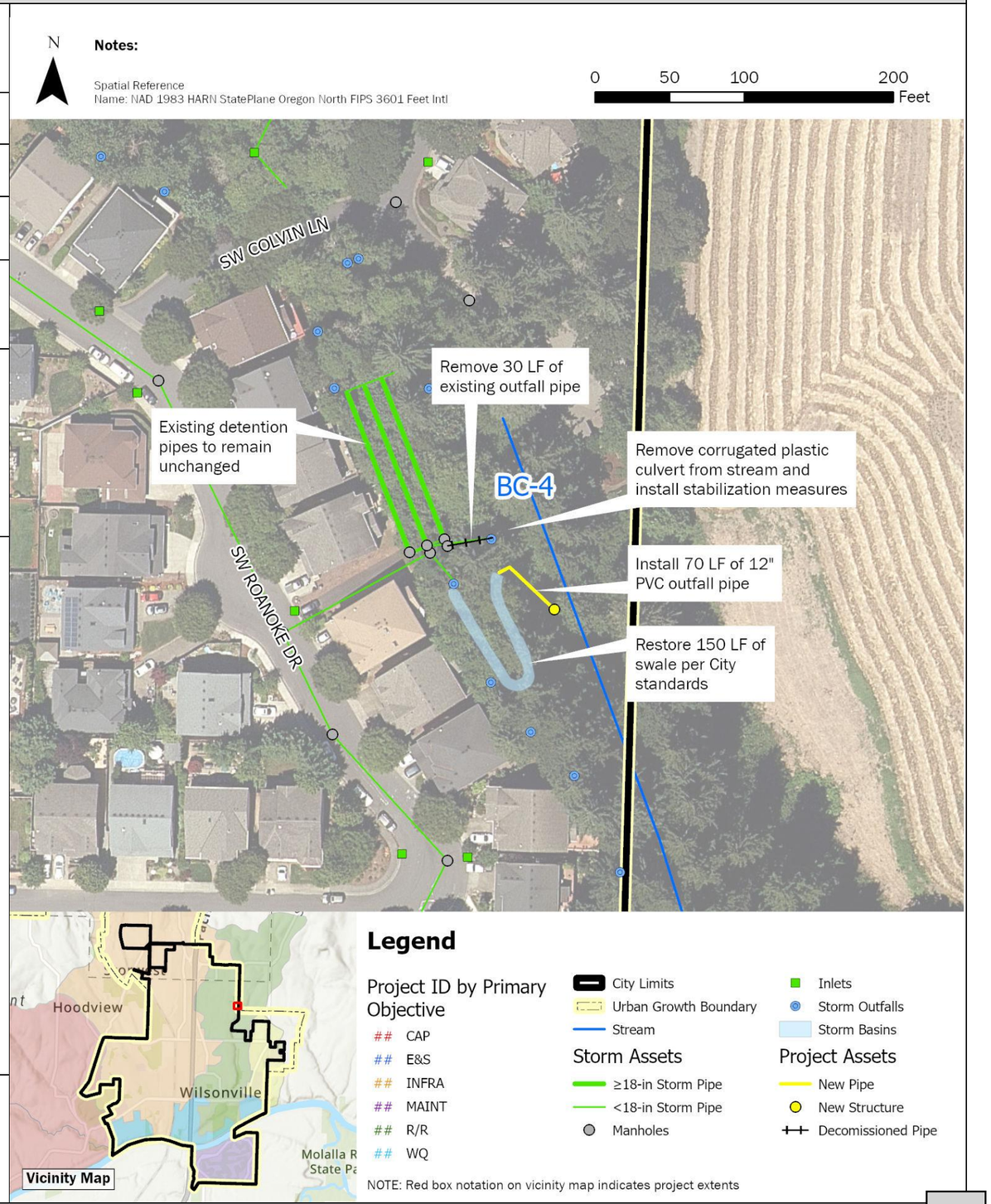
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

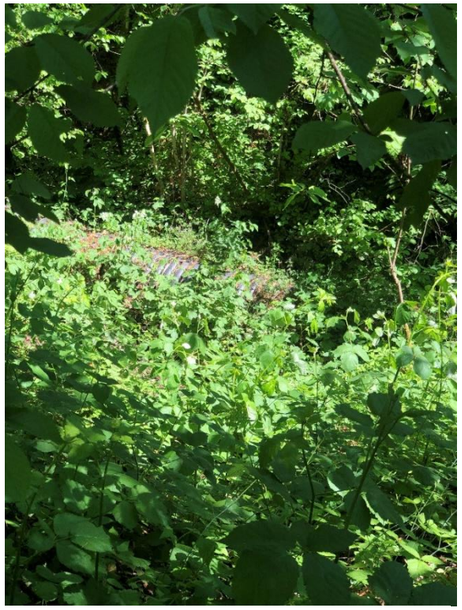
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$282,000
	Design / Construction Admin. (13.5%)	$38,000
	Engineering & Permitting (30%)	$85,000
	Total Cost	**$410,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

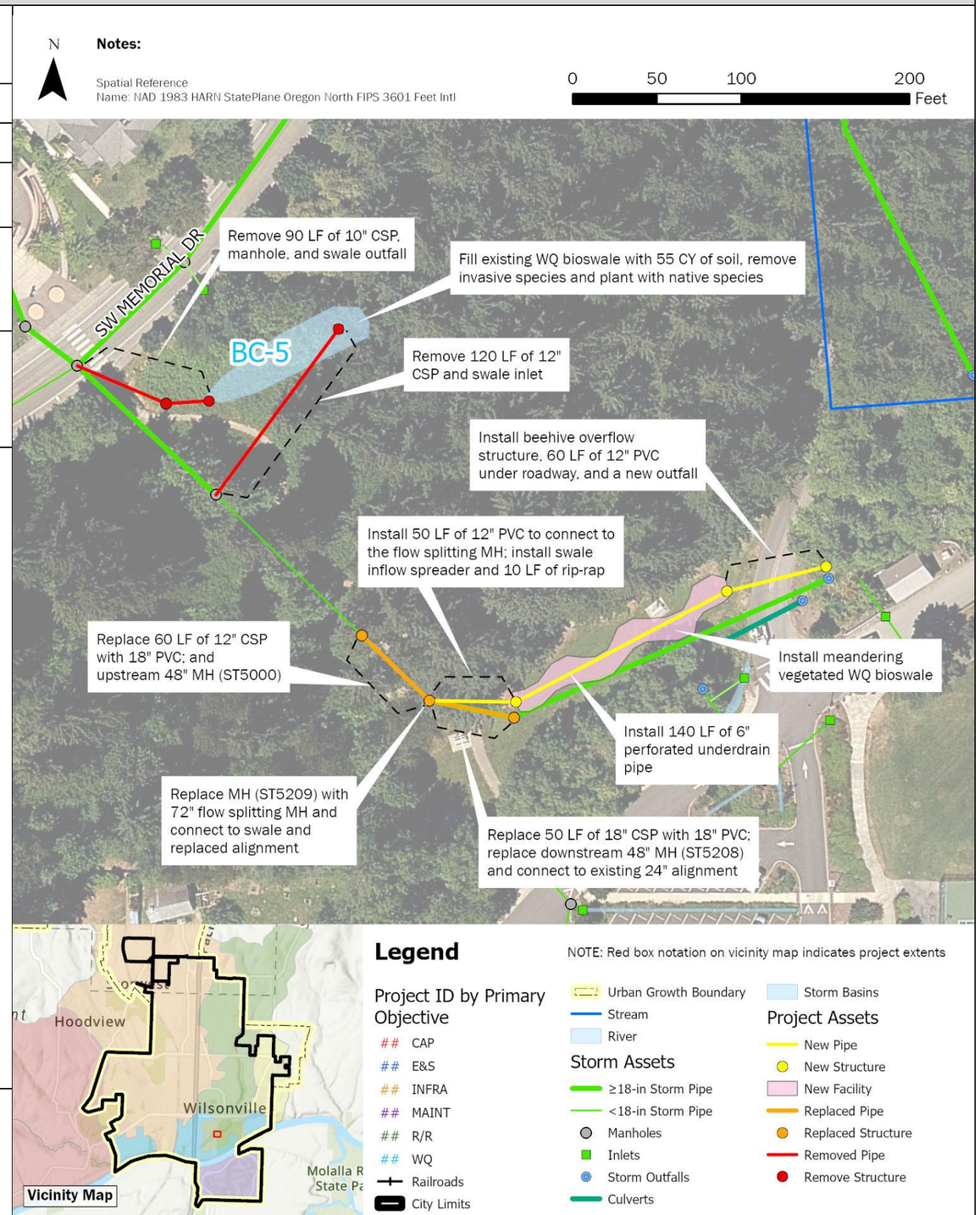


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



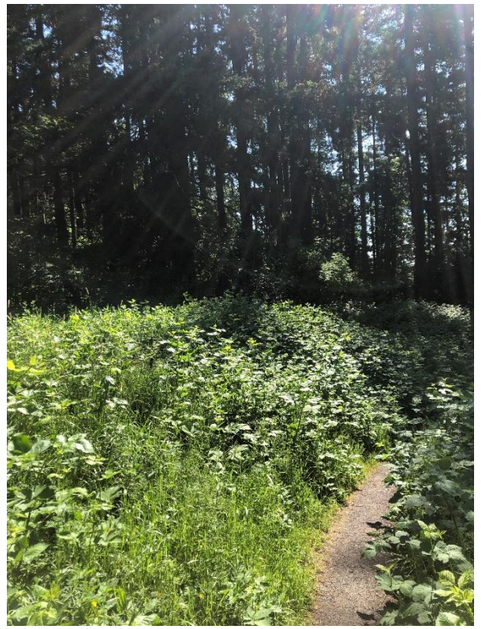
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$631,000
	Design / Construction Admin. (13.5%)	$85,000
	Engineering & Permitting (30%)	$189,000
	Total Cost	**$910,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

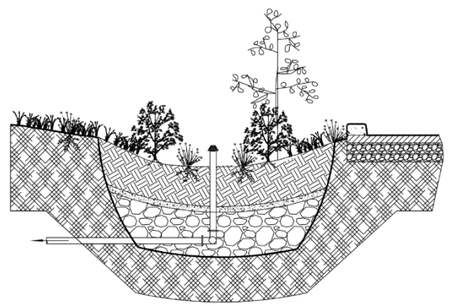
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



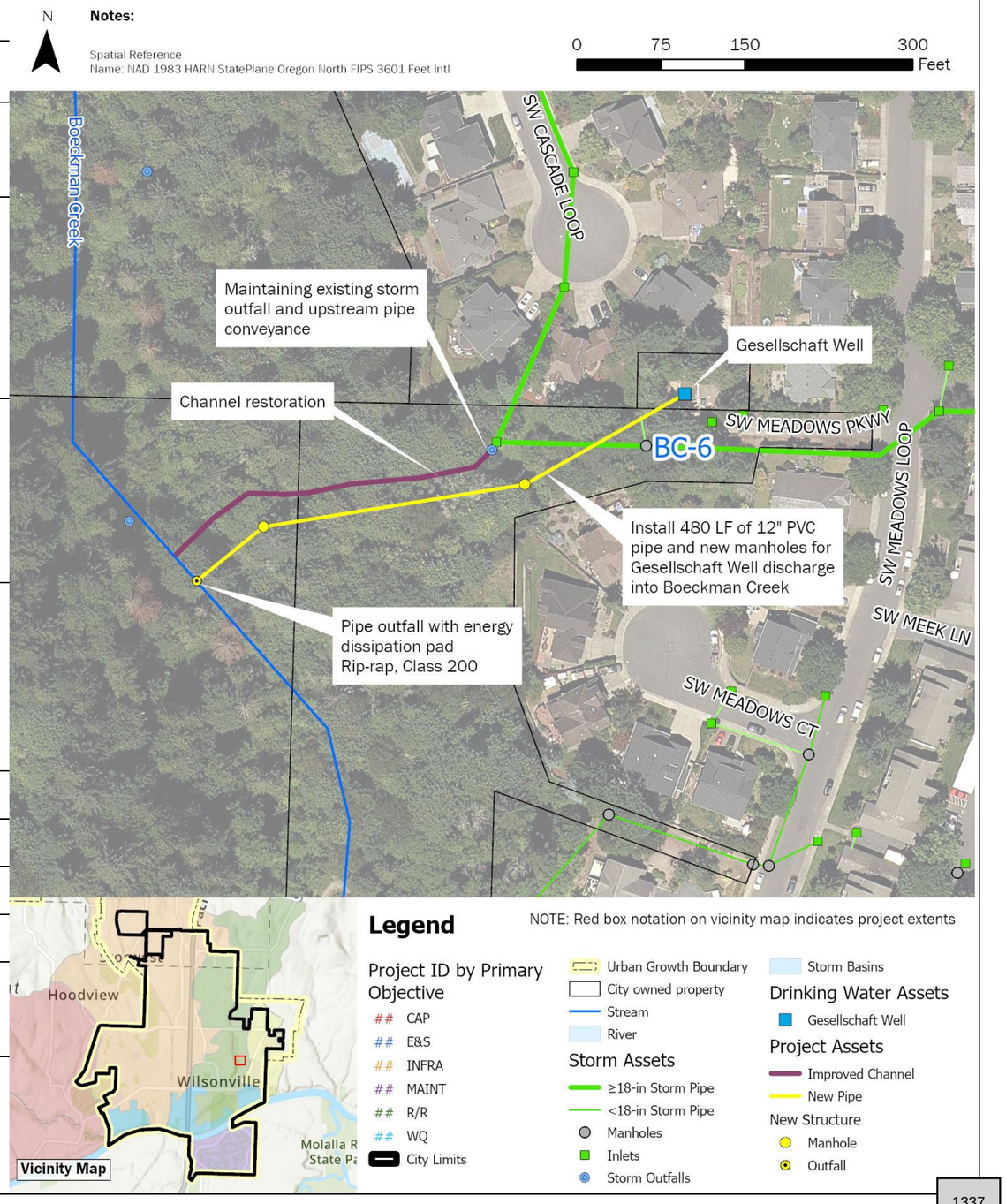
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$279,000	
	Design / Construction Admin. (13.5%)	$38,000	
	Engineering & Permitting (30%)	$84,000	
	Total Cost	**$400,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

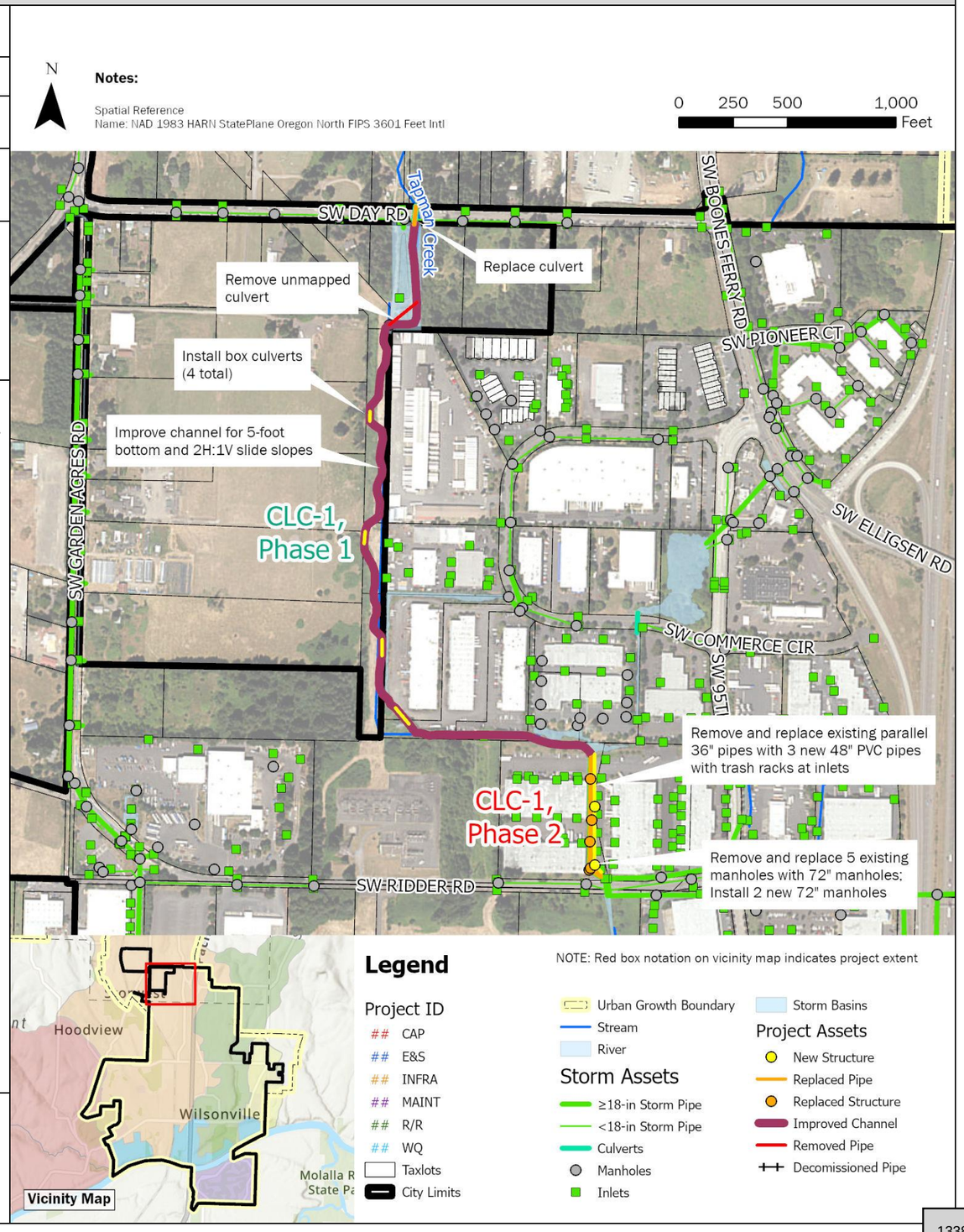
Wilsonville Stormwater Master Plan

Page 1 of 1

Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9	**Contributing Drainage Area**	944 acres
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing, approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF, 48-inch PVC parallel storm pipes. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1 Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

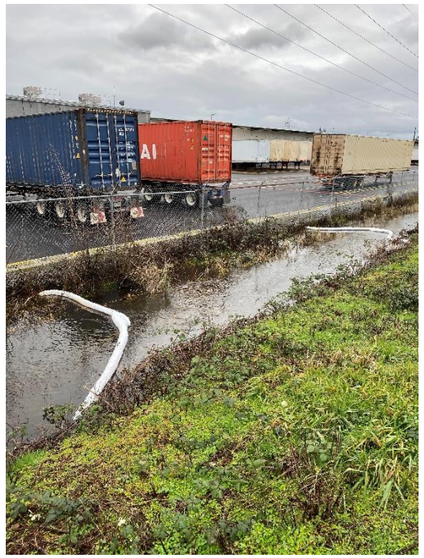
	Phase 1	*Phase 2*
Capital Expense Total	$5,860,000	$2,738,000
Design / Construction Admin. Phase 1: 3.5% + $200K Phase 2: 13.5%	$405,000	$370,000
Engineering & Permitting (30%)	$1,758,000	$821,000
Total Cost	**$8,020,000**	**$3,930,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

Additional Figures

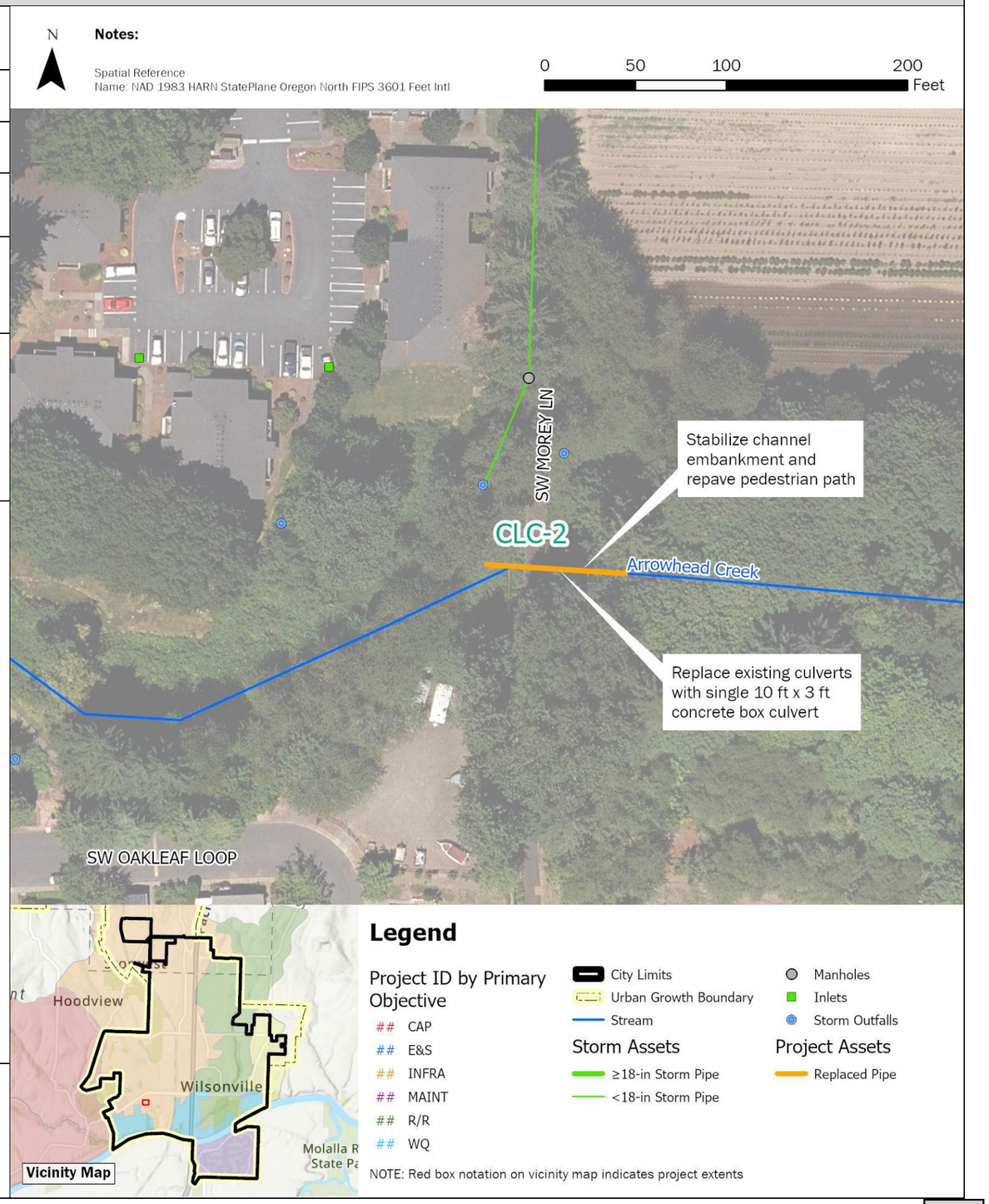
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



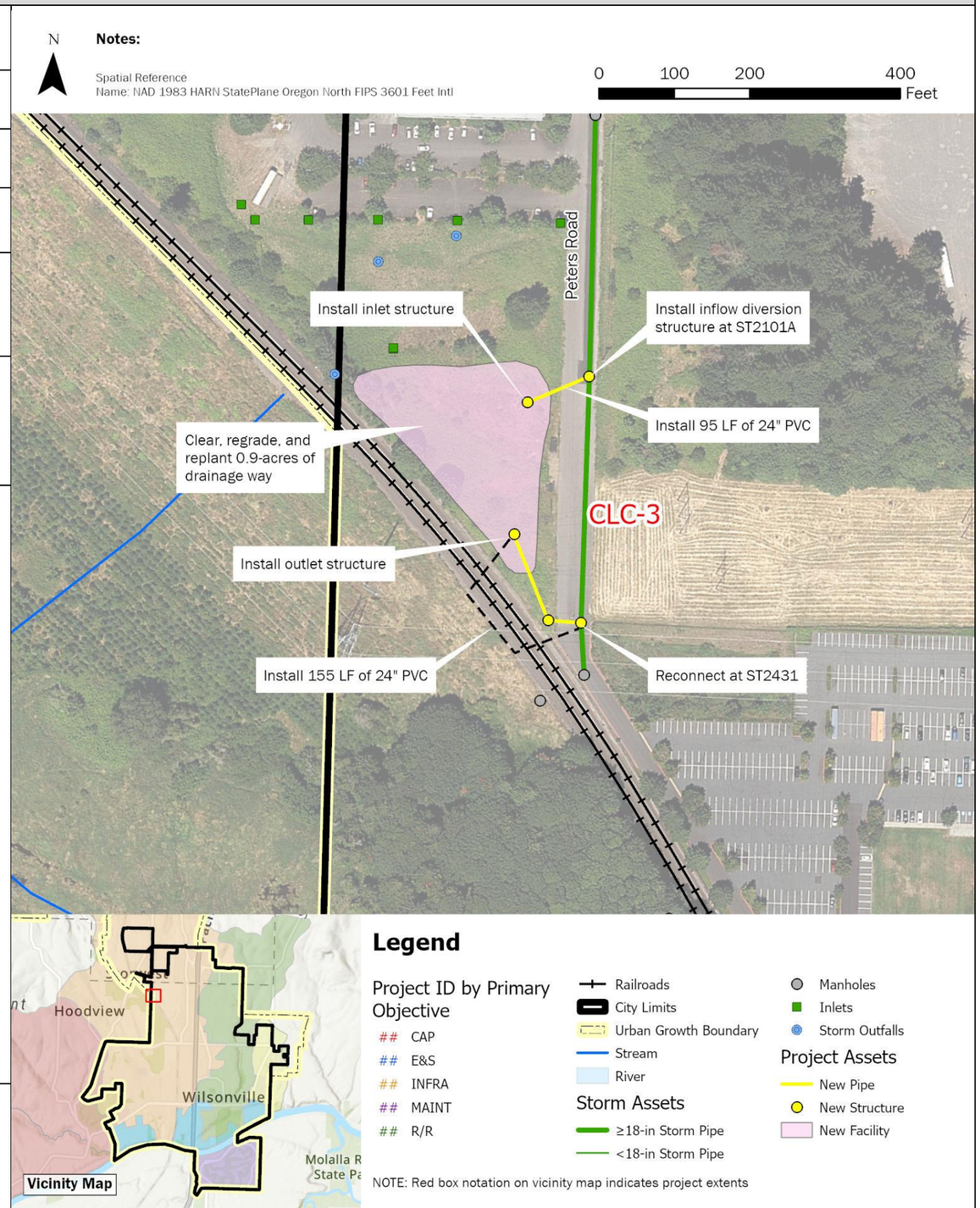
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	
Design Considerations / Assumptions	• Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts. • Culvert sizing to be confirmed with final design. • Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.	
Estimated Project Cost	Capital Expense Total	$179,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$290,000**
Project Cost Notes	• Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction. • No costs included for access - assumed access can be attained through pedestrian path. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,200 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 26,000 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install 50 LF of 6-inch HDPE underdrain pipe. • Install pond underdrain media in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.		



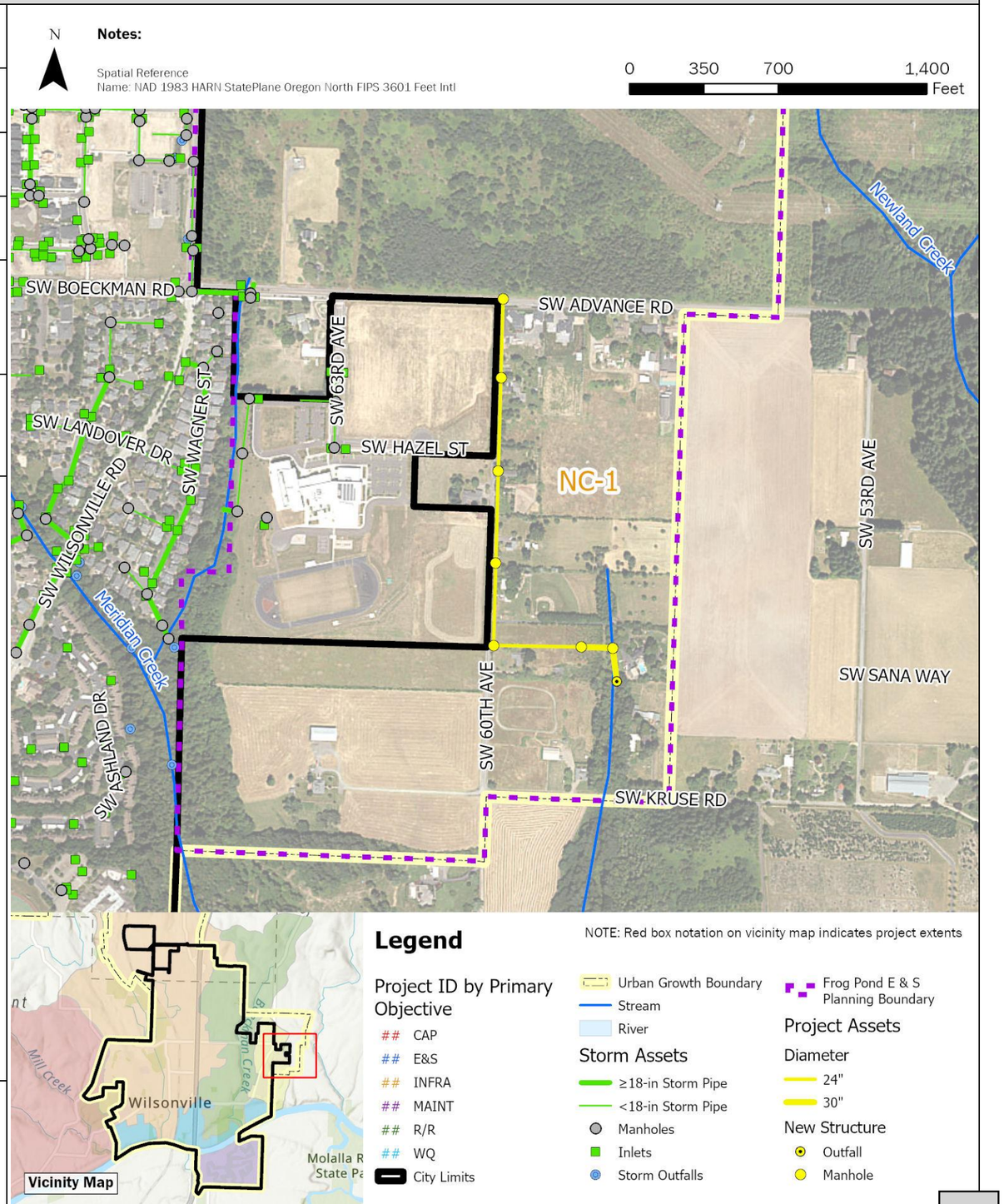
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$2,897,000
	Design / Construction Admin. (3.5% + $200K)	$301,000
	Engineering & Permitting (20%)	$579,000
	Total Cost	**$3,780,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing. • A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

Garden Acres Detention Pond (May 2023)

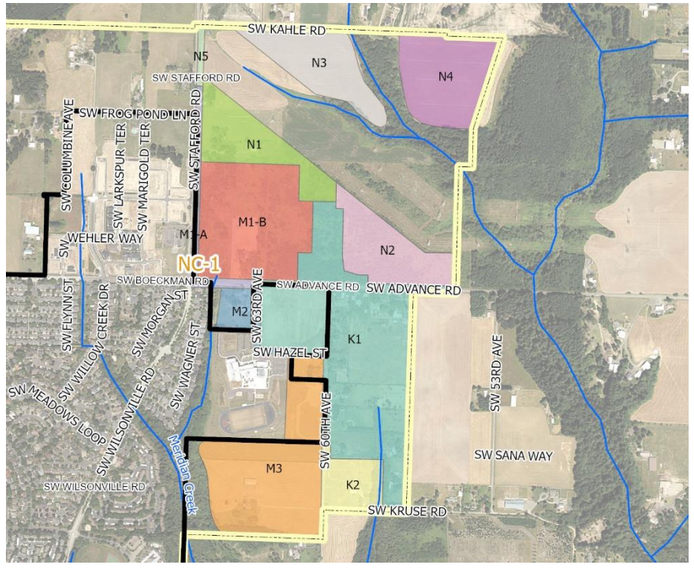
NC-1	Frog Pond East and South Conveyance Piping (Basin K1 only)		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	61 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	The full 2022 Frog Pond East and South Master Plan stormwater conveyance layout has been simplified for this CP to only include the storm main and outfall along SW 60th Ave to outfall near unnamed tributary (under SW Kruse Rd). This drainage basin is referred to in the Master Plan as K1 (encompassing approx. 61 acres). Project details are as follows: • Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.		



NC-1	Frog Pond E and S Conveyance Piping	
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure by basin is detailed below: ○ **K1**: install 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; 3- 48-inch manholes, 7-60-inch manholes and 1 outfall. ○ **K2**: install 220 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M1-A**: install 2,630 LF of 12-inch PVC pipe, 8- 48-inch manholes, and 1 outfall. ○ **M1-B**: install 1,050 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **M2**: install 400 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M3**: install 1,160 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **N1**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N2**: install 7,670 LF of 18-inch PVC pipe, 3- 48-inch manholes, and 1 outfall. ○ **N3**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N4**: install 1,150 LF of 18-inch PVC pipe, 5- 48-inch manholes, and 1 outfall. ○ **N5**: install 730 LF of 12-inch PVC pipe, 3- 48-inch, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$3,064,000
	Design / Construction Admin. (13.5%)	$414,000
	Engineering & Permitting (20%)	$613,000
	Total Cost	**$4,090,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only the main stormwater pipes along SW 60th Ave towards the outfall (24-inch and 30-inch in diameter) are included in the project estimate, per City direction. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate.	

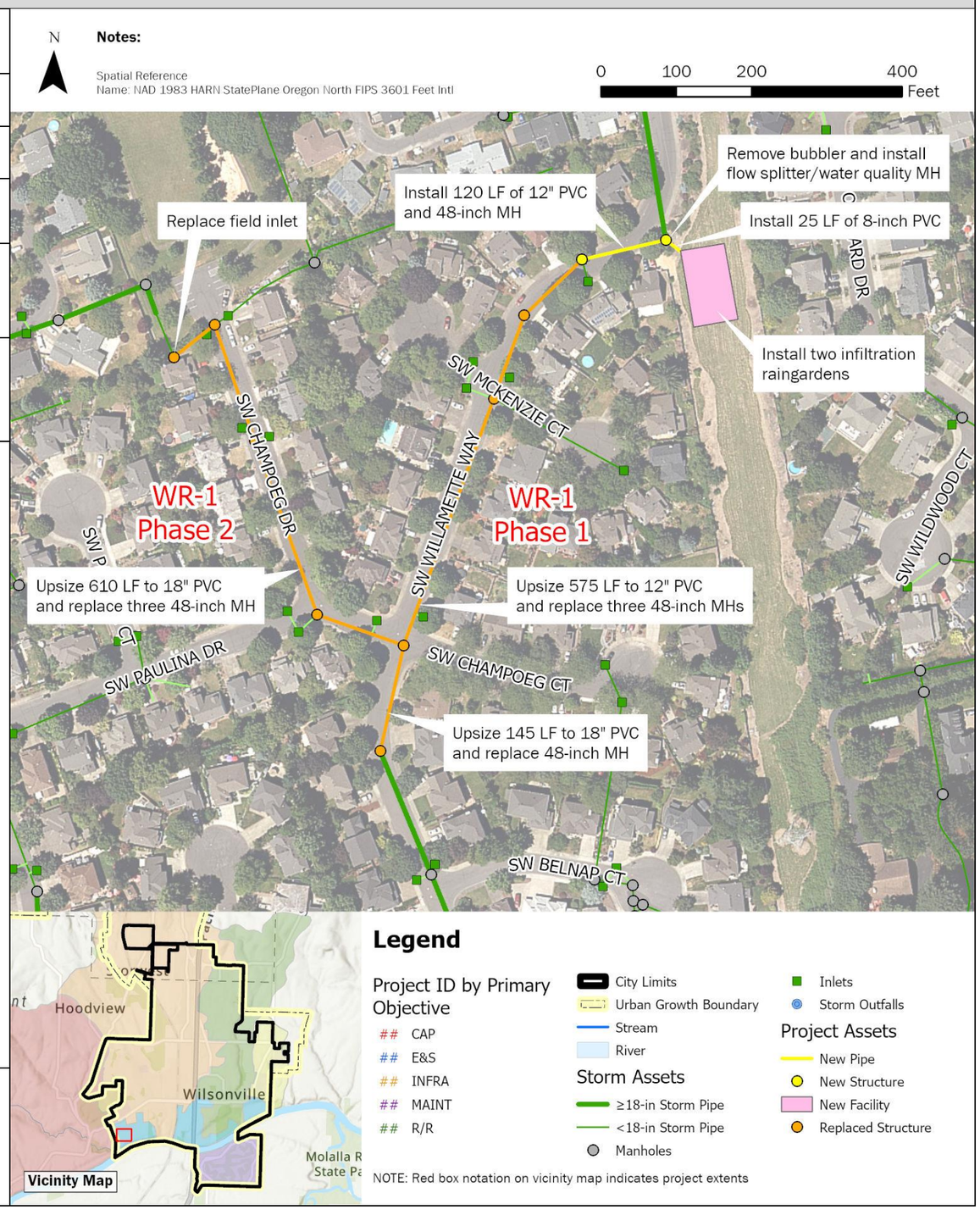
Additional Figures

Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1 SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

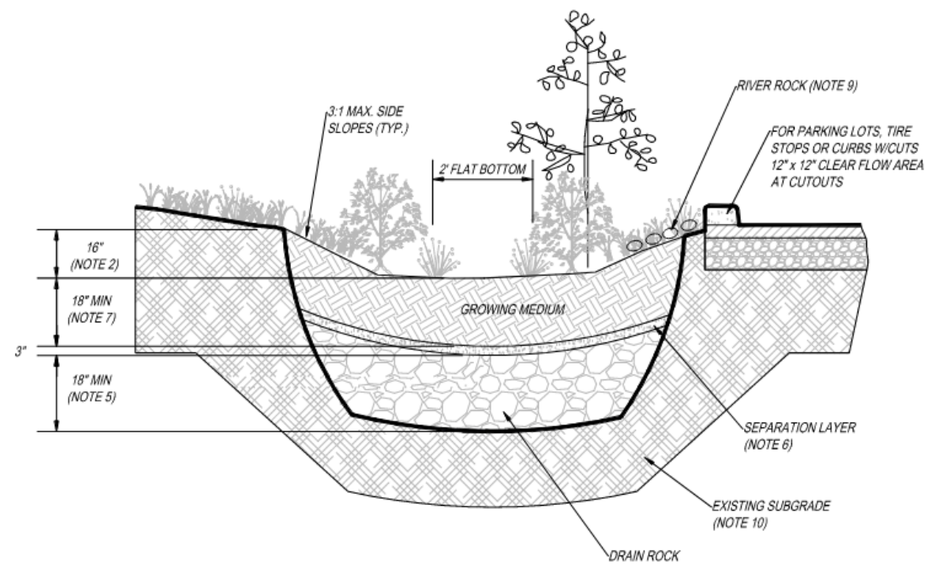
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,729,000	$811,000
Design / Construction Admin. (13.5%)	$233,000	$109,000
Engineering & Permitting (20%)	$ 346,000	$162,000
Total Cost	**$2,310,000**	**$1,080,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

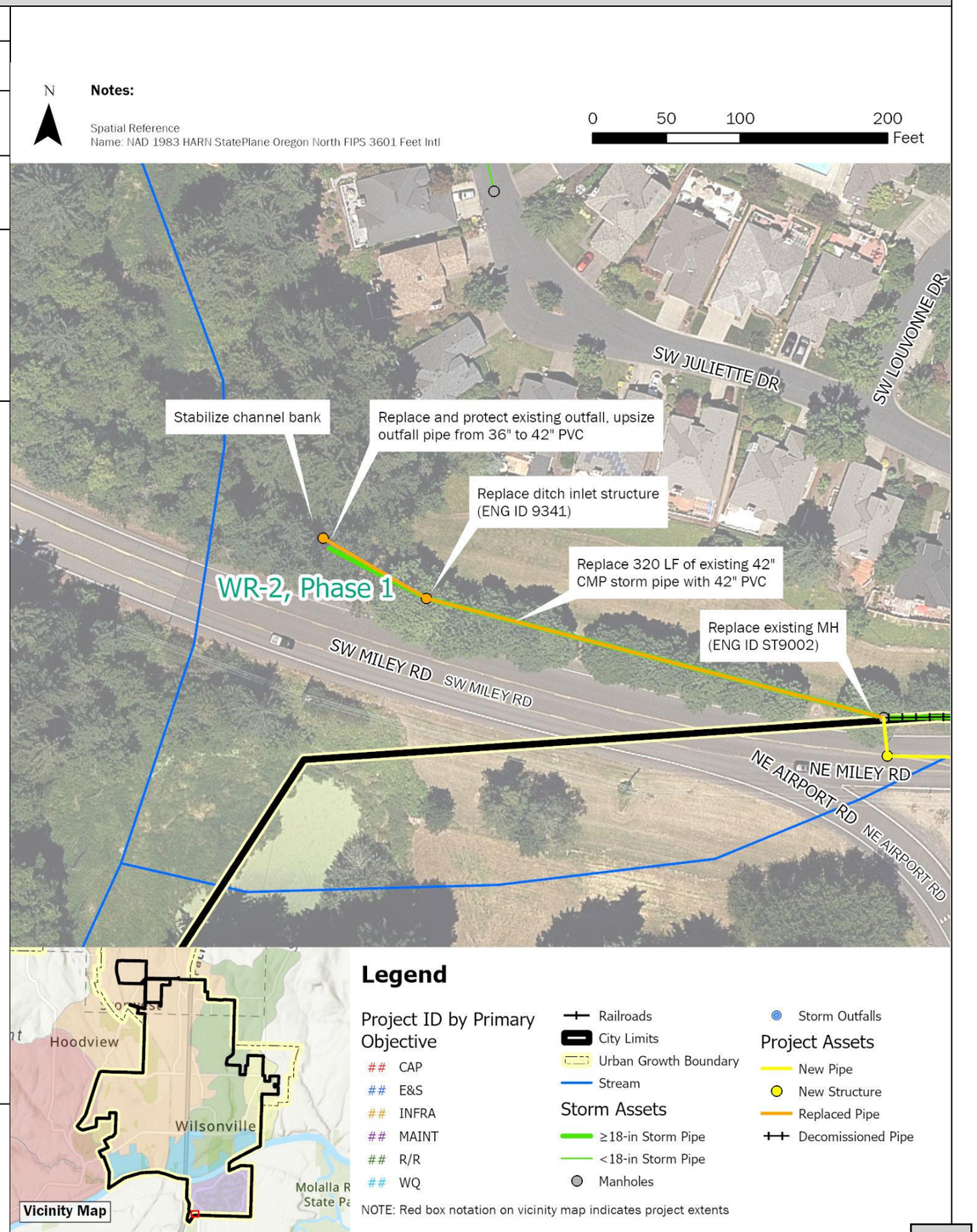
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5	**Contributing Drainage Area**	138.0 acres
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

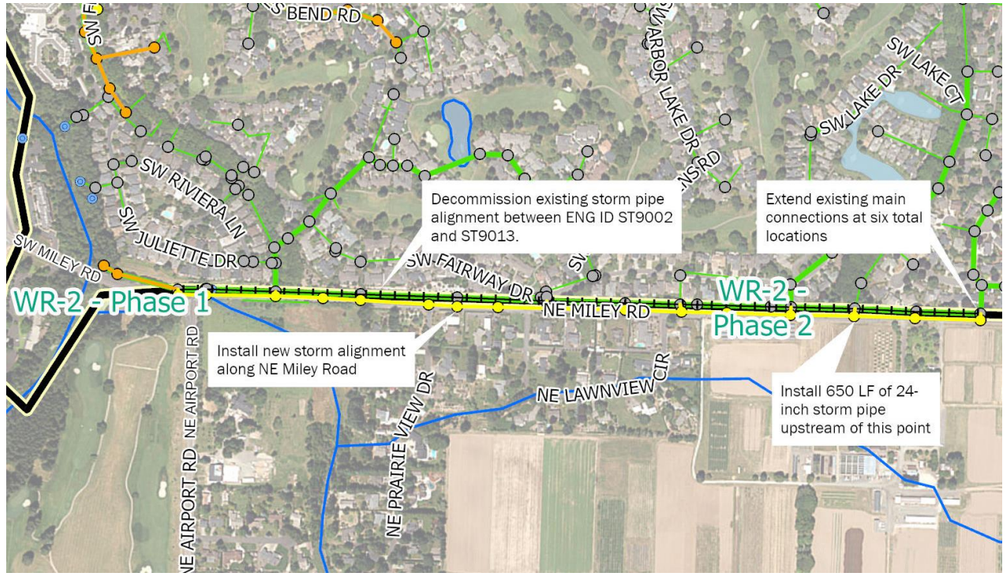
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$574,000	$7,720,000
Design / Construction Admin. Phase 1: 13.5% Phase 2: 3.5% + $200K	$77,000	$470,000
Engineering & Permitting (30%)	$172,000	$2,316,000
Total Cost	**$820,000**	**$10,510,000**

Project Cost Notes

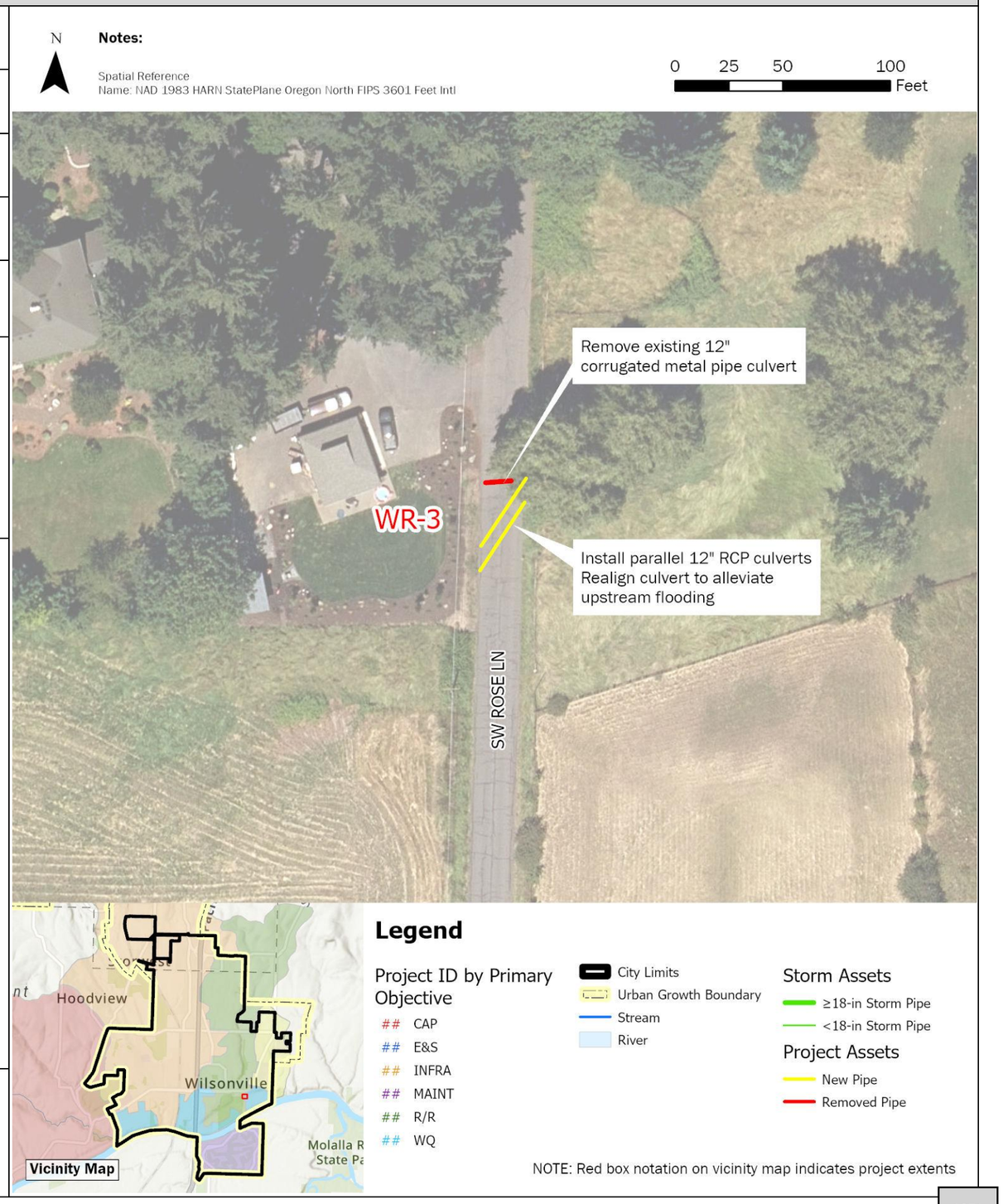
- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.



Sinkhole observed at upstream end of Miley Road alignment

Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		

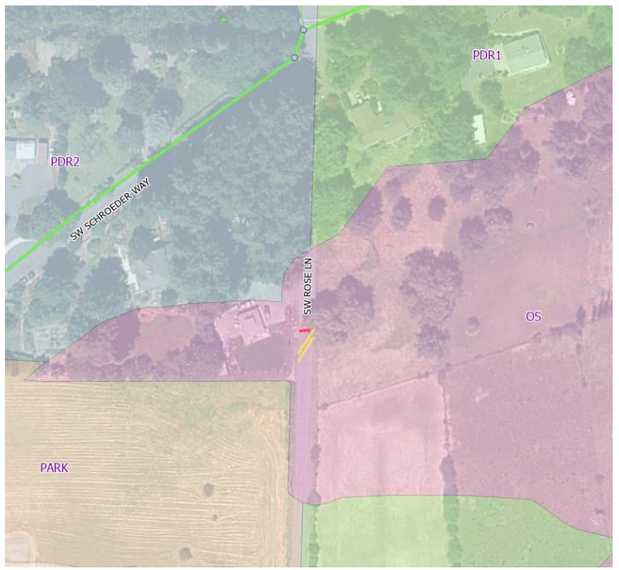


WR-3	Rose Lane Culvert Replacement	
Design Considerations / Assumptions	• Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover. • Minimum 12-inch cover on top of culvert. • Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway. • Maximum allowable depth for roadside ditches is 2-feet. • Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe. • Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP. • Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.	
Estimated Project Cost	Capital Expense Total	$86,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$200,000**
Project Cost Notes	• Modifications to the roadway beyond trenching were not developed as part of the cost estimate. • Surveying is required. • Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30	**Contributing Drainage Area**	159 acres
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		

Project Description

This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing.

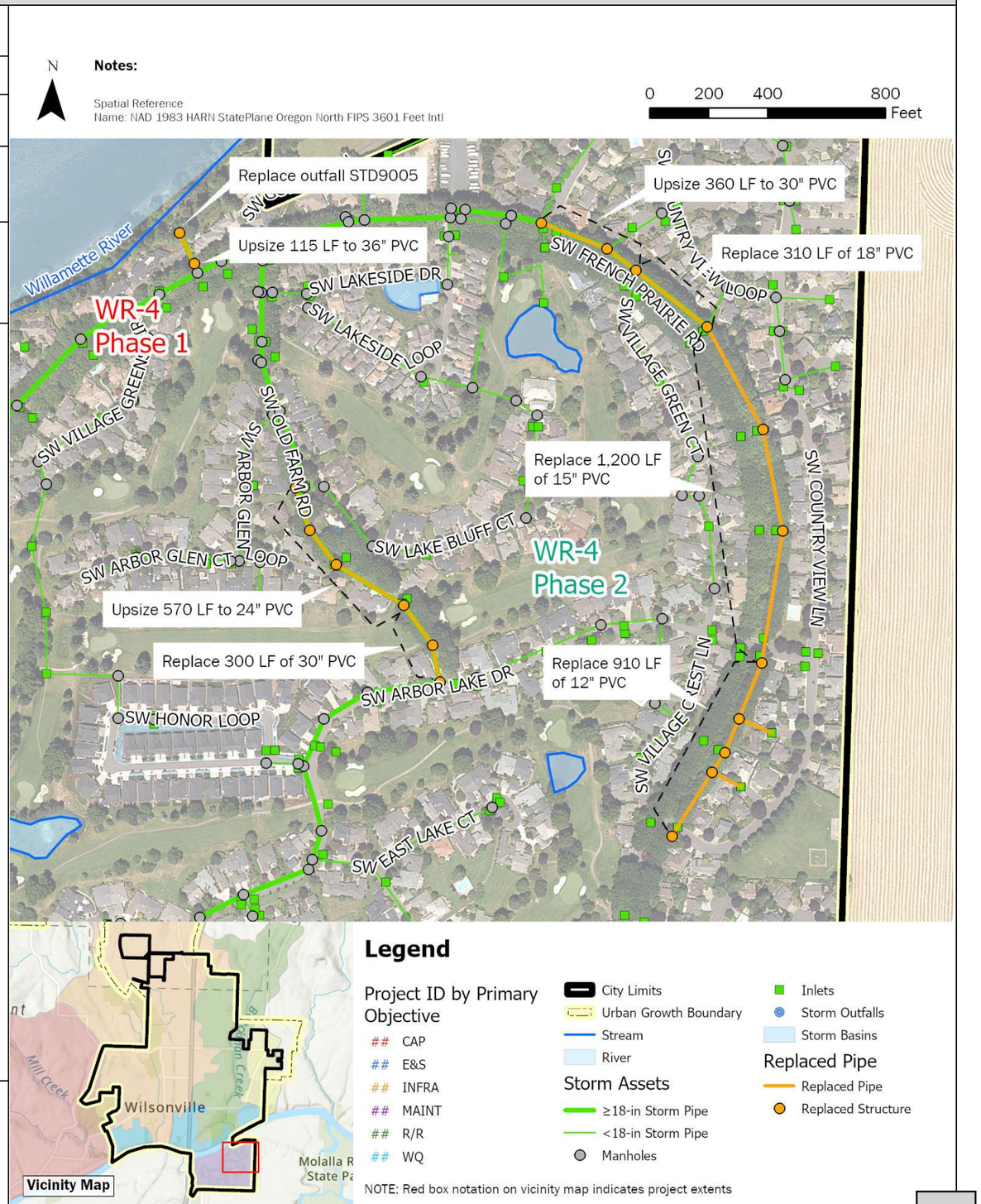
Project details by phase are as follows:

Phase 1 (Charbonneau East Outfall):

- Replace existing Charbonneau East Outfall (STD9005).
- Replace one 72-inch manhole (ST9014).
- Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014).

Phase 2 (Storm Sewer Replacement):

- Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end).
- Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242).
- Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020).
- Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019).
- Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017).
- Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027).
- Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).
- Replace eight 48-inch manholes (ST9020 to ST9242).
- Replace nine 60inch manholes (ST9017 to ST9019, and ST9027 to ST9031).



WR-4 Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

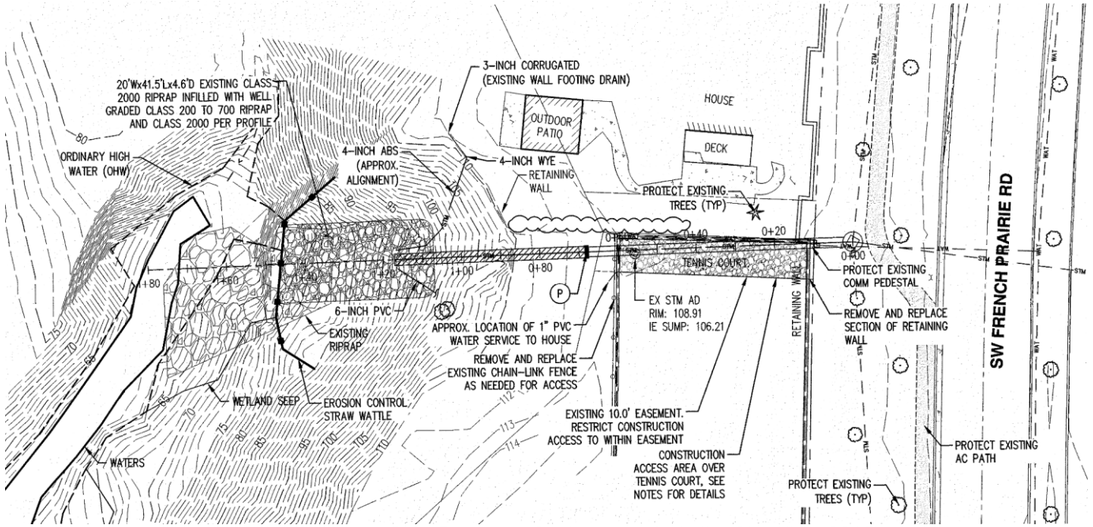
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$201,000	$3,325,000
Design / Construction Admin. Phase 1: 25% Phase 2: 13.5%	$50,000	$449,000
Engineering & Permitting Phase 1: 50% Phase 2: 20%	$101,000	$665,000
Outreach Coordination (Flat Rate - Phase 1 only)	$250,000	N/A
Total Cost	**$600,000**	**$4,400,000**

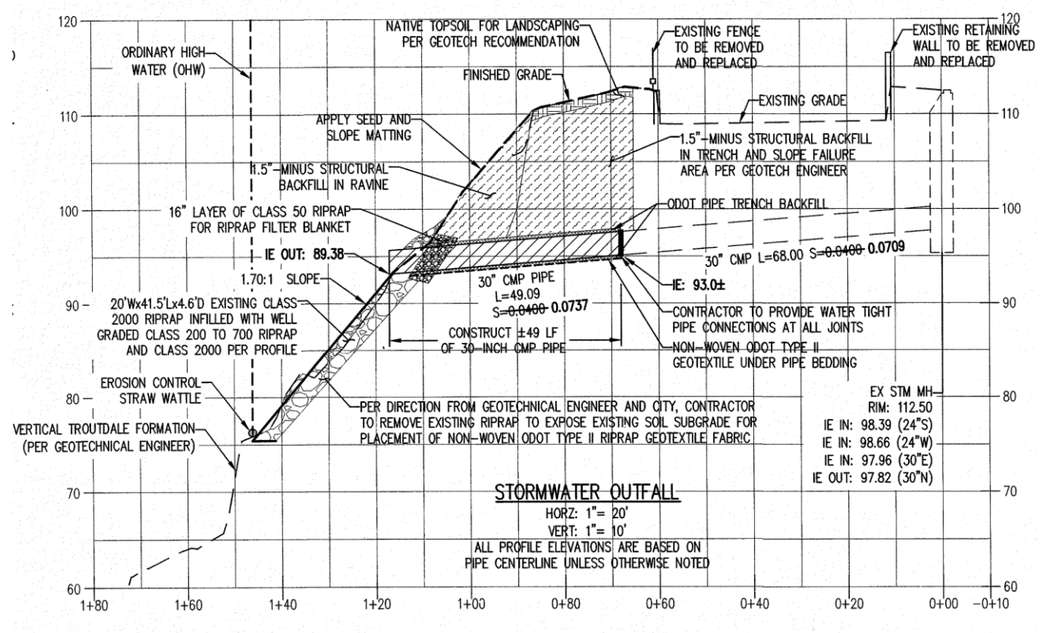
Project Cost Notes

- Due to in-water work and private property constraints, Phase 1 engineering and permitting multiplier was set to 50%. Design/Construction Administration multiplier was set to 25% per direction from the City.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures



Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		

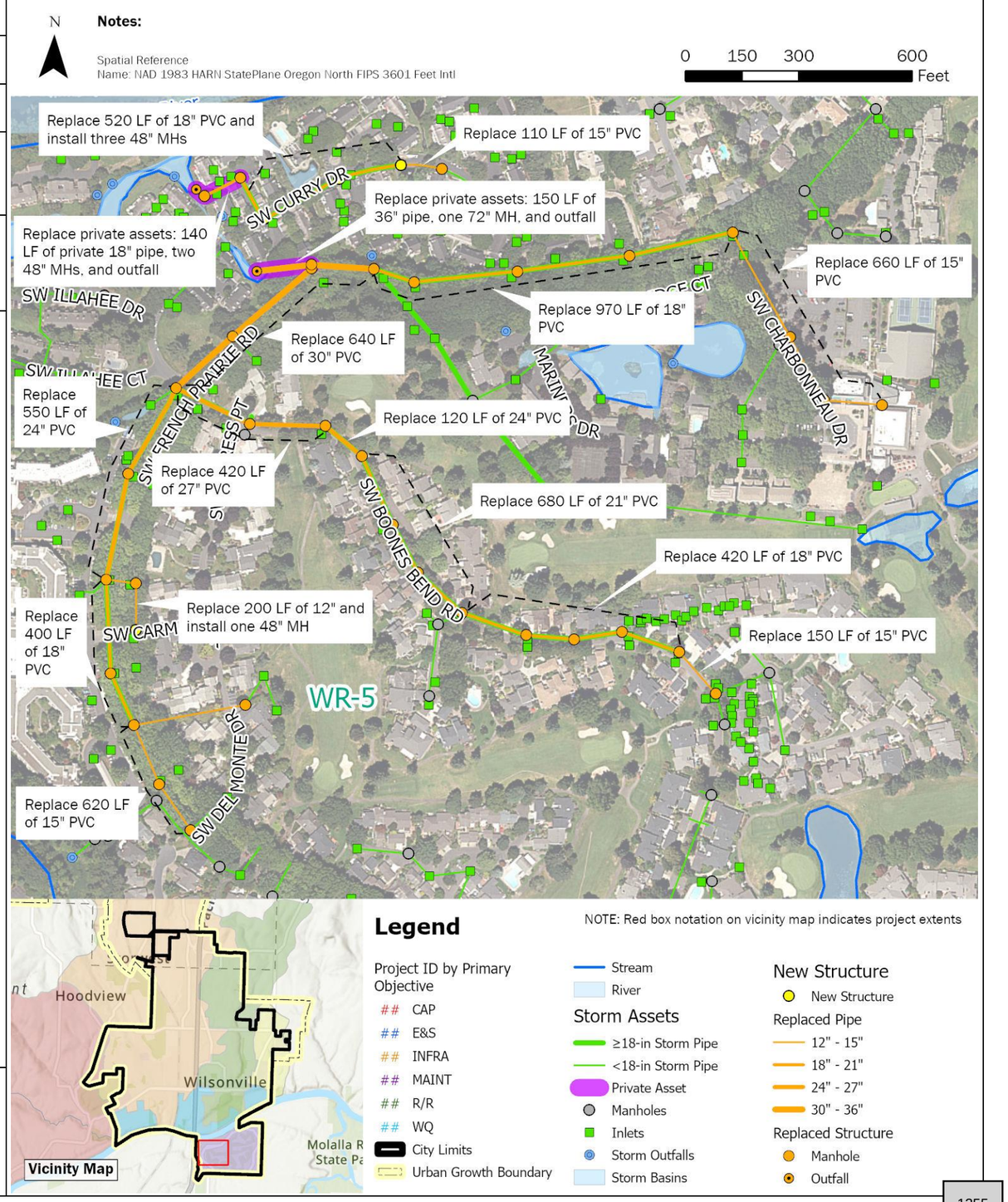
Project Description

This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping.

Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available):

- Pipe replacement along SW Curry Drive:
  - Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole).
  - Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892).
  - Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15).
  - Replace private outfall (CARTE ID: 15).
  - Replace two private 48-in manholes (CARTE ID 1892 and 1383).
  - Install three 48-inch manholes.
- Pipe replacement along SW French Prairie Road:
  - Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044)
  - Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043).
  - Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown)
  - Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040).
  - Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041).
  - Replace 20 LF of 36-in pipe with PVC (unknown to ST9067).
  - Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown).
  - Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes.

Continued on page 2.



WR-5	Charbonneau West Stormwater Improvements	
Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road: ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). ○ Replace eight 48-in manholes; and replace three 60-in manholes.	
Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated. • Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe. • Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters. • The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement: ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892). ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041. ○ Two 72-in: ST9067 and ST9041	
Estimated Project Cost	Capital Expense Total	$8,235,000
	Design / Construction Admin. (3.5% + $200K)	$488,000
	Engineering & Permitting (20%)	$1,647,000
	Total Cost	**$10,370,000**
Project Cost Notes	• A modified Design/Construction Administration multiplier was applied per direction from the City. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Appendix E: Capital Project Cost Estimates

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Earthwork			
General Earthwork/Excavation	CY	78	City of Wilsonville, provided by Zach Weigel December 2023
Excavation, to onsite stockpile	CY	20	For site grading (not structural). Source: BC Assembly using RSMeans pricing.
Fill, imported clean	CY	115	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Fill, from onsite stockpile	CY	60	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Embankment	CY	35	City of Wilsonville, provided by Zach Weigel December 2023
Structural Earth Wall	SF	50	City of Wilsonville, provided by Zach Weigel December 2023
Clear and Grub brush including stumps	AC	22,000	Source: ODOT 2022Q4, Item 0320-010000R, avg award + 10%. This item INCLUDES stump removal
Clearing and Grubbing	AC		ODOT does not have a bid item without stump removal.
Amended Soils and Mulch	CY	165	Source: ODOT 2022Q3, Item 1040-0194000K (Compost mulch), avg award + 10%
Jute Matting, Biodegradeable	SY	8	Source: ODOT 2022Avg, Item 0280-0105010,20,30,40 avg, avg award + 10%
Tree removal	EA	1,200	City of Wilsonville, provided by Zach Weigel December 2023
Geotextile	SY	7	Source: ODOT 2022Q4, Item 0350-010000J (drainage geotex Type 1), avg award + 10%
Energy dissapation pad - Rip-Rap, Class 50	CY	161	Source: ODOT 2022Avg, Item 0390-010500K, avg award + 10% - **ANDREW SAID NOT TO USE THIS ONE**
Energy dissapation pad - Rip-Rap, Class 100	CY	124	Source: ODOT 2022Avg, Item 0390-010800K, avg award + 10%
Energy dissapation pad - Rip-Rap, Class 200	CY	81	Source: ODOT 2022Avg, Item 0390-011000K, avg award + 10%
Dewatering (pipeline construction)	DAY	550	Recommend $550/day minimum for pipeline construction
Dewatering (other)	LS	5,000 - 50,000	Select as needed based on project needs (T. Suesser April 2023)
Drain Rock	CY	110	City of Wilsonville, provided by Zach Weigel December 2023
Streambed Cobble	TON	120	City of Wilsonville, provided by Zach Weigel December 2023
Water Quality Facility Installation			
Outflow Control Structure	EA	20,000	City of Wilsonville, provided by Zach Weigel December 2023
Swale Flow Spreader	EA	20,000	Unique facility (ditch inlet + outflow control) - City spec S-2225
Facility Inlet Structure	EA	10,000	Same as Outflow Control Structure
Water Quality Facility Plantings with Trees	SF	40	City of Wilsonville, provided by Zach Weigel January 2024
Rain Garden/ Swale	SF	130	City of Wilsonville, provided by Zach Weigel December 2023
Stormwater Planter	SF	180	City of Wilsonville, provided by Zach Weigel December 2023
Gravel Access Road	SF	5	2023RSMeans, for 9" thick gravel with geotextile
Beehive Overflow	EA	6,100	City of Wilsonville, provided by Zach Weigel December 2023
Structure Installation			
Field Ditch Inlet	EA	5,600	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 9-12' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	City of Wilsonville, provided by Zach Weigel December 2023
8'x8'x10' Concrete Vault	EA		
Precast Concrete Manhole (72", >12' deep)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Contech CDS (Model CDS3025, 72")	EA		
StormFilter (2-cartridge catch basin unit, 18" cartridges)	EA		
Drywell (48", 20-25' deep)	EA	14,100	Source: BC Assembly using RSMeans pricing
Curb Inlet	EA	8,300	Source: ODOT 2022Q4, Item 0470-0304000E (Concrete inlet, Type CG-1), avg award + 10%
ADA Ramp	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Catch Basin, all types	EA	8,300	Same as Curb Inlet
Concrete Fill - UIC Decomissioning	EA		
Connection to Existing Lateral	EA	6,000	City of Wilsonville, provided by Zach Weigel December 2023
Connection to Existing Structure, standard	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Abandon Existing Pipe, no excavation (12")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (15"-18")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (21"-24")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (27"-36")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, fill with grout	CF	8	Source: BC Assembly using previous bid pricing
Abandon Existing Structure	EA	3,400	Source: ODOT 2022Q4, Item 0490-0117000E (filling abandoned structures), avg award + 10%
Demo pipe	LF	30	Assumes 12" RCP pipe. Does not include excavation. Source: BC Assembly using RSMeans pricing
Remove existing pavement	SY	120	City of Wilsonville, provided by Zach Weigel January 2024
Remove structure	EA	1,700	Source: ODOT 2022Q4, Item 0310-0105000E (removal of manholes), avg award + 10%
Plug Existing Pipe, up to 18" dia, at manhole	EA	1,800	Source: BC Assembly using RSMeans pricing.
Plug Existing Pipe, up to 36" dia, at manhole	EA	2,300	Source: BC Assembly using RSMeans pricing.
Retrofit diversion structure	EA	50,000	Conservative estimate to retrofit diversion structure on seimens property. Options include raising invert elevation, plugging altogether, etc.
Check dams	EA	570	Aggregate Type 1 (Erosion Control) check dam. Source: ODOT 2022Q4, Item 0280-0106010E, avg award + 10%
Stem wall check dam	LF	600	Assume similar to retaining wall, 4' wide footing x 1' deep (buried 1' deep) with 4' tall wall x 12" th. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, larger than 48" pipe	EA	35,000	Assume approx 8' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA	25,000	Assume approx 5' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA		
Outfall Improvements	EA		
Restoration/Resurfacing			
Non-Water Quality Facility Landscaping	AC	27,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (Non-irrigated)	AC	36,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	City of Wilsonville, provided by Zach Weigel December 2023
Planting and Bioengineered Restoration	SY	60	City of Wilsonville, provided by Zach Weigel December 2023
4-foot Chain Link Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Split Rail Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Hydroseed, large quantities	AC	22,000	Source: ODOT 2022Avg, Item 1030-0110000R (Perm seeding, mix No. 2), avg award + 10%
Seeding, small quantities (< 5,000 sf)	SF	0.68	Source: ODOT 2022Q4, Item 1030-0138000J (lawn seeding), avg award + 10%
Sidewalk Installation	SF	17	Source: ODOT 2022Avg, Item 0759-0128000J (concrete walks), avg award + 10%
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	Source: ODOT 2022Avg, Item 0495-0100000J, avg award + 10%

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Permeable Paver Installation	SF	46	Source: ODOT 2022Avg, Item 0760-010000J (Unit pavers), avg award + 10%
Porous Asphalt Paving	SF	5	Source: 2023RSMeans, Item 32-12-16.13, 0600 (1" porous friction course over 3" bit course) adjusted to include hauling
Concrete Curbs	FT	74	Source: ODOT 2022Avg, Item 0759-0103000F (conc curb & gutter), avg award + 10%
Retaining wall, block	SF	119	Source: ODOT 2022Avg, Item 0596-B002000A (Retaining wall, prefab modular gravity), avg award + 10%
Retaining wall, CIP concrete	SF	250	City of Wilsonville
Retaining wall, sheet pile	SF	190	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Retaining wall, soldier pile	SF	210	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Root wad	EA	61	Source: Oregon, OH bid tab 2019 escalated
Trash rack	EA	5,600	Same as Field Ditch Inlet. City of Wilsonville, provided by Zach Weigel December 2023
Pipe Unit Cost			
Underdrain Pipe, 4"	LF	55	City of Wilsonville
Underdrain, 6" perforated HDPE	LF	60	City of Wilsonville
HDPE, 12", 10' to invert, not in road	FT	171	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, not in road	FT	179	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 10' to invert, in road	FT	470	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, in road	FT	567	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, not in road	FT	298	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, not in road	FT	310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, in road	FT	649	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, in road	FT	778	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 8", 10' to invert, not in road	FT	136	Interpolated
PVC, 12", 10' to invert, not in road	FT	206	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 10' to invert, not in road	FT	293	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 15' to invert, not in road	FT	215	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 15' to invert, not in road	FT	304	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 10' to invert, in road	FT	506	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 12", 15' to invert, in road	FT	602	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 15", 10' to invert, in road	FT	535	Interpolated from equivalants at 12" and 18" diam, MT 7/7/24
PVC, 15", 15' to invert, in road	FT	666	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 10' to invert, not in road	FT	249	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 15' to invert, not in road	FT	259	Interpolated from equivalants at 12" and 18" diam, SG 1/23/25
PVC, 18", 10' to invert, in road	FT	563	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 18", 15' to invert, in road	FT	731	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 24", 10' to invert, not in road	FT	381	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, not in road	FT	393	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 21", 10' to invert, in road	FT	647	Interpolated from equivalants at 18" and 24" diam, MT 7/7/23
PVC, 21", 15' to invert, in road	FT	796	Interpolated from equivalants at 18" and 24" diam, SG 1/23/24
PVC, 21", 15' to invert, not in road	FT	348	Interpolated from equivalants at 18" and 24" diam, SG 1/23/25
PVC, 24", 10' to invert, in road	FT	732	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, in road	FT	860	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 27", 10' to invert, in road	FT	805	Interpolated from equivalants at 24" and 30" diam, MT 7/7/23
PVC, 30", 10' to invert, not in road	FT	477	Interpolated from equivalants at 24" and 36" diam, MT 6/29/23
PVC, 30", 10' to invert, in road	FT	879	Interpolated from equivalants at 24" and 36" diam, MT 6/29/24
PVC, 36", 10' to invert, not in road	FT	573	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, not in road	FT	591	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 10' to invert, in road	FT	1,027	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, in road	FT	1,220	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 42", 10' to invert, not in road	FT	703	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 42", 10' to invert, in road	FT	1,169	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 48", 10' to invert, not in road	FT	834	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, not in road	FT	855	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 10' to invert, in road	FT	1,310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, in road	FT	1,536	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, not in road	FT	198	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, not in road	FT	207	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, in road	FT	498	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, in road	FT	594	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 15", 15' to invert, in road	FT	326	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 18", 15' to invert, in road	FT	391	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 24", 10' to invert, not in road	FT	303	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, not in road	FT	315	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 10' to invert, in road	FT	653	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, in road	FT	782	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 27", 15' to invert, in road	FT	766	Interpolated from equivalants at 24" and 36" diam, MT 7/06/23
RCP, 30", 10' to invert, in road	FT	866	Interpolated from equivalants at 24" and 36" diam, MT 6/30/23
RCP, 36", 10' to invert, not in road	FT	625	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, not in road	FT	642	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 10' to invert, in road	FT	1,079	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, in road	FT	1,272	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, not in road	FT	877	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, not in road	FT	898	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, in road	FT	1,353	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, in road	FT	1,579	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, not in road	FT	1,375	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, not in road	FT	1,401	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, in road	FT	1,861	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, in road	FT	2,151	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
Box Culvert (8' x 3')	FT	705	Source: 2023RSMeans, Item 33-42-11.60, 0200, excavation/backfill not included
Box Culvert (10' x 3')	FT	950	Source: 2023RSMeans, Item 33-42-11.60, 0300, excavation/backfill not included
Box Culvert (12' x 3')	FT	2070	Source: 2023RSMeans, Item 33-42-11.60, 0400, excavation/backfill not included
Contingencies and Multipliers			
Mobilization/Demobilization	LS	10%	
Erosion and Sediment Control	LS	3%	
Contingency	LS	40%	Updated per City of Wilsonville
Traffic Control/Utility Relocation	LS	5-10%	Dependent on work in ROW
Surveying	LS	5%	
Clackamas County Permitting	LS	8.83%	Applicable to Miley Road, added 6/22/23 per Kerry's instructions
Capital Expense Total (including contingency)			

Unit Cost Table			
Item	Unit	Proposed Unit Cost Mar 2023	Notes, Unit Cost Mar 2023
Design/Construction Administration (%)	LS	13.5%	Reflects City staff technical and administrative needs to execute the project. Per City of Wilsonville, assume minimum of $35,000.
Engineering and Permitting (%)	LS	20-30%	In-water dependent and capped on a case-by-case basis at $500,000 per City of Wilsonville. Per City of Wilsonville, minimum of $75,000.

BC-1: Library Pond

Key Project Elements

- Retrofit the existing Library Pond stormwater detention facility to meet current City PWS and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years.
- Install a pond outlet structure in compliance of current design standards.
- Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media.
- Install 15-ft wide, 25-ft long access road for maintenance access. Assume existing gate can be maintained.
- Remove and replace 70 LF of 18" CSP pipe at new design depth, approx. 15' deep.

Design Assumptions

- The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V.
- Facility sizing is based on adherence to the City's Public Works Standards (PWS), Chapter 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool.
- To size the pond in accordance with PWS design standards, approximately 48 acres require onsite treatment and flow control prior to discharge into Library Pond detention facility.
- Total pond depth includes drain rock (15"), separation layer (3"), and growing media (18"), in accordance with the 2015 PWS Section 3, Appendix A landscape and soil media requirements.
- Inlet and outlet pipe sizes are anticipated to remain unchanged. The outlet structure (standard drawing ST-6110) assumes an additional field inlet for 100-year overflow event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,350	$47,000
Fill, from onsite stockpile	CY	60	1,289	$77,340
Clear and Grub brush including stumps	AC	22,000	0.70	$15,400
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	324	$35,648
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Gravel Access Road	SF	5	375	$1,875
Water Quality Facility Plantings with Trees	SF	40	13,550	$542,000
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Demo pipe	LF	30	70	$2,100
Remove existing pavement	SY	120	210	$25,200
Remove structure	EA	1,700	1	$1,700
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	70	$4,200
PVC, 18", 15' to invert, not in road	FT	304	70	$21,252
Project Sub-Total				$863,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$86,300
Erosion and Sediment Control	LS	3%		$25,890
Contingency	LS	40%		$345,200
Traffic Control/Utility Relocation	LS	5%		$43,150
Surveying	LS	5%		$43,150
Capital Expense Total (including contingency)				$1,407,000
Design/Construction Administration (%)	LS	13.5%		$190,000
Engineering and Permitting (%)	LS	20%		$281,000
			TOTAL	$1,880,000

BC-2: Ash Meadows Flow Mitigation

Key Project Elements

- Plug flow diversion structure at Siemens Pond B.
- Upsize culvert under Boeckman Road from 30" to 48" PVC.
- Upsize culvert under SW Parkway Ave. from 36" to 48" PVC.
- Construct flow control structure at upstream end of culverts under Ash Meadows Road.
- Regrade and restore drainage way between Ash Meadows Road and Parkway Avenue.

Design Assumptions

- Excavate 18" depth for amended soils for entire 55,000 sq ft footprint area, per City Standards.
- Final design will include confirmation of flow control structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,056	$238,368
Clear and Grub brush including stumps	AC	22,000	1.3	$28,600
Amended Soils and Mulch	CY	165	1,019	$168,135
Tree removal	EA	1,200	30	$36,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	40	$3,240
Dewatering (other)	LS	50,000	1	$50,000
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Demo pipe	LF	30	175	$5,250
Retrofit diversion structure	EA	50,000	1	$50,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.3	$78,000
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, in road	FT	1,310	175	$229,268
Project Sub-Total				$924,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$92,400
Erosion and Sediment Control	LS	3%		$27,720
Contingency	LS	40%		$369,600
Traffic Control/Utility Relocation	LS	15%		$138,600
Surveying	LS	20%		$184,800
Capital Expense Total (including contingency)				$1,737,000
Design/Construction Administration (%)	LS	13.5%		$234,000
Engineering and Permitting (%)	LS	50%		$869,000
Geotechnical	LS	Flat Rate		$100,000
			TOTAL	$2,940,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1

Key Project Elements

- Construct a detention pond at Canyon Creek Park that would receive drainage from the wetland complexes described under Phase 2.

Design Assumptions

- Canyon Creek (phase 1) work includes only the installation of a vegetated facility at Canyon Creek Park and necessary conveyance.
- Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	13,900	$1,084,200
Clear and Grub brush including stumps	AC	22,000	1.6	$34,470
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.6	$94,008
4-foot Chain Link Fence	LF	60	1,130	$67,800
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$2,142,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$214,200
Erosion and Sediment Control	LS	3%		$64,260
Contingency	LS	40%		$856,800
Traffic Control/Utility Relocation	LS	5%		$107,100
Surveying	LS	5%		$107,100
Capital Expense Total (including contingency)				$3,491,000
Design/Construction Administration (%)	LS	3.5% + $200K		$322,000
Engineering and Permitting (%)	LS	30%		$1,047,000
			TOTAL	$4,860,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2

Key Project Elements

• Construct a series of linear wetland complexes to replace the existing Wiedemann ditch. Existing ditch would be enhanced to provide additional floodplain storage and mitigate flows received from Sysco ditch.

Design Assumptions

• Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
• Final design will include confirmation of weir sizing and layout.
• Final design will include confirmation of vegetated facility plantings and structure sizing.
• Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	25,600	$1,996,800
Clear and Grub brush including stumps	AC	22,000	3.6	$79,924
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Facility Inlet Structure	EA	10,000	1	$10,000
Structure Installation				
Gravel Access Road	SF	5	18,000	$90,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.6	$217,975
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$3,223,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$322,300
Erosion and Sediment Control	LS	3%		$96,690
Contingency	LS	40%		$1,289,200
Traffic Control/Utility Relocation	LS	5%		$161,150
Surveying	LS	5%		$161,150
Capital Expense Total (including contingency)				$5,253,000
Design/Construction Administration (%)	LS	3.5% + $200K		$384,000
Engineering and Permitting (%)	LS	30%		$1,576,000
			TOTAL	$7,210,000

BC-4: Boeckman Creek Stabilization at Colvin Lane

Key Project Elements

- Remove existing outfall pipe.
- Install approx. 70 LF of new outfall pipe with angle closer to parallel with creek channel.
- Install bioengineered plantings to stabilize streambank.
- Remove corrugated plastic pipe in existing channel bottom.

Design Assumptions

- Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. No cost included for access.
- Exact stabilization measures to be determined during project design.
- Assumes clearing/grubbing including stumps can include removal of existing corrugated pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	194	$15,132
Clear and Grub brush including stumps	AC	22,000	0.20	$4,400
Jute Matting, Biodegradeable	SY	8	90	$720
Embankment	CY	35	50	$1,750
Amended Soils and Mulch	CY	165	83	$13,695
Tree removal	EA	1,200	5	$6,000
Energy dissapation pad - Rip-Rap, Class 100	CY	124	10	$1,240
Drain Rock	CY	110	56	$6,160
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	1,500	$60,000
Structure Installation				
Demo pipe	LF	30	30	$900
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	360	$21,600
Pipe Unit Cost				
HDPE, 12", 15' to invert, not in road	FT	179	150	$26,895
PVC, 12", 10' to invert, not in road	FT	206	70	$14,399
Project Sub-Total				$173,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,300
Erosion and Sediment Control	LS	3%		$5,190
Contingency	LS	40%		$69,200
Traffic Control/Utility Relocation	LS	5%		$8,650
Surveying	LS	5%		$8,650
Capital Expense Total (including contingency)				$282,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$85,000
			TOTAL	$410,000

BC-5 Memorial Park Swale Retrofit

Key Project Elements

- Remove the existing WQ swale and relocate it at the bottom of the hill.
- Only designing for the WQ storm event (treatment only in the BMP Sizing Tool).
- Swale design is based on a retrofit approach. Facility sizing per PWS is not possible within available space. Design of swale with variance from design criteria (top width maximum) may allow for optimization of available space.
- Ideally keep swale outside of the 100-yr floodplain, but not a permit issue if within since it is not infiltration based.

Design Assumptions

- Remove 90 LF of 10-inch corrugated steel pipe (SD5041 and SD5042).
- Remove 120 LF of 12-inch corrugated steel pipe (SD5044).
- Remove: manhole (ST5098); inlet structure (CARTE ID 568); and outfall structure (CARTE ID 19).
- Fill existing swale and revegetate area.
- Replace 60 LF of 12" CSP with 18" PVC (SD5046); replace 2 48" MHs (ST5200 and ST5208).
- Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206).
- Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole.
- Install 50 LF of 12-inch PVC.
- Install 140 LF of 6-inch perforated HDPE underdrain pipe.
- Install inflow spreader with rip-rap pad, beehive overflow structure, and outfall to the creek.
- Install a new meandering water quality swale with 1 ft of drain rock and 1.5 ft of amended soil.
- Install split rail fence along pedestrian path north of the swale.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	55	$1,100
Fill, from onsite stockpile	CY	60	55	$3,300
General Earthwork/Excavation	CY	78	265	$20,670
Energy dissapation pad - Rip-Rap, Class 200	CY	81	2.2	$178
Drain Rock	CY	110	90	$9,900
Amended Soils and Mulch	CY	165	135	$22,275
Water Quality Facility Installation				
Beehive Overflow	EA	6,100	1	$6,100
Swale Flow Spreader	EA	20,000	1	$20,000
Facility Inlet Structure	EA	10,000	1	$10,000
Water Quality Facility Plantings with Trees	SF	40	2,400	$96,000
Structure Installation				
Demo pipe	LF	30	210	$6,300
Remove structure	EA	1,700	3	$5,100
Connection to Existing Structure, standard	EA	10,000	2	$20,000
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Outfall Improvements	EA	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Non-Water Quality Facility Landscaping	AC	27,000	0.5	$13,500
Split Rail Fence	LF	60	160	$9,600
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	140	$8,400
PVC, 12", 10' to invert, not in road	FT	206	50	$10,285
PVC, 12", 10' to invert, in road	FT	506	60	$30,360
PVC, 18", 10' to invert, not in road	FT	293	110	$32,247
Project Sub-Total				$387,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$38,700
Erosion and Sediment Control	LS	3%		$11,610
Contingency	LS	40%		$154,800
Traffic Control/Utility Relocation	LS	5%		$19,350
Surveying	LS	5%		$19,350
Capital Expense Total (including contingency)				$631,000
Design/Construction Administration (%)	LS	13.5%		$85,000
Engineering and Permitting (%)	LS	30%		$189,000
			TOTAL	$910,000

BC-6 - Gesellschaft Water Well Channel Restoration

Key Project Elements

- Existing outfall (STD3008) and upstream stormwater pipes can remain unchanged for the contributing 25 acres.
- Bypass the channel entirely by piping the weekly discharge from the well to the bottom of the slope into Boeckman Creek.
- Pipe is sized using PWS, smallest diameter (12-inch) to convey the flows.
- Weekly discharge of well volume is unknown, ODWR well logs were reviewed to verify that pipe size works with likely flows.
- Water discharge conveyance designed to comply with stormwater conveyance standards.

Design Assumptions

- Install approx. 480 LF of 12-inch PVC.
- Install 2 MHs along the new pipe alignment.
- Intall outfall and energy dissipation pad with Class 200 riprap.
- Restore the eroded discharge channel (approx. 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	214	$16,692
Energy dissapation pad - Rip-Rap, Class 200	CY	81	8	$648
Structure Installation				
Outfall Improvements	LS	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	345	$20,700
Pipe Unit Cost				
PVC, 12", 10' to invert, not in road	FT	206	480	$98,736
Project Sub-Total				$171,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,100
Erosion and Sediment Control	LS	3%		$5,130
Contingency	LS	40%		$68,400
Traffic Control/Utility Relocation	LS	5%		$8,550
Surveying	LS	5%		$8,550
Capital Expense Total (including contingency)				$279,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$84,000
			TOTAL	$400,000

CLC-1: Day Road Stormwater Improvements, Phase 1

Key Project Elements

- Replace the double-barrel 36-inch culverts that cross Day Road.
- Construct the channel improvements and culvert installations proposed by AKS in 2019 report (concept A-3).

Design/ Cost Assumptions

- The AKS concept was modeled and incorporated into BC's updated InfoSWMM model, which included updated hydrology.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers were maintained in this estimate for consistency with other capital project estimates.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	26,500	$2,067,000
Structural Earth Wall	SF	50	16,900	$845,000
Clear and Grub brush including stumps	AC	22,000	3	$66,000
Jute Matting, Biodegradeable	SY	8	4,950	$39,600
Energy dissapation pad - Rip-Rap, Class 100	CY	124	125	$15,500
Streambed Cobble	TON	120	900	$108,000
Water Quality Facility Installation				
Gravel Access Road	SF	5	15,000	$75,000
Structure Installation				
Demo pipe	LF	30	50	$1,500
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.2	$192,000
Pipe Unit Cost				
PVC, 36", 10' to invert, in road	FT	1,027	180	$184,932
Box Culvert (10' x 3')	FT	950	200	$190,000
Project Sub-Total				$3,595,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$359,500
Erosion and Sediment Control	LS	3%		$107,850
Contingency	LS	40%		$1,438,000
Traffic Control/Utility Relocation	LS	5%		$179,750
Surveying	LS	5%		$179,750
Capital Expense Total (including contingency)				$5,860,000
Design/Construction Administration (%)	LS	3.5% + $200K		$405,000
Engineering and Permitting (%)	LS	30%		$1,758,000
			TOTAL	$8,020,000

CLC-1: Day Road Stormwater Improvements, Phase 2

Key Project Elements

- Upsize the two existing parallel storm pipes located beneath the parking lot of Tax Lot 500, from 36-inch to 48-inch.
- Install a third, parallel 48-inch storm pipe.

Design/ Cost Assumptions

- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits. The establishment of similar onsite retention standards for Tualatin discharge may mitigate future flooding of this area.
- The small ponds at inlet of culverts across Ridder was not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	7	$126,000
Demo pipe	LF	30	1,200	$36,000
Restoration/Resurfacing				
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, not in road	FT	834	1,800	$1,500,840
Project Sub-Total				$1,680,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$168,000
Erosion and Sediment Control	LS	3%		$50,400
Contingency	LS	40%		$672,000
Traffic Control/Utility Relocation	LS	5%		$84,000
Surveying	LS	5%		$84,000
Capital Expense Total (including contingency)				$2,738,000
Design/Construction Administration (%)	LS	13.5%		$370,000
Engineering and Permitting (%)	LS	30%		$821,000
			TOTAL	$3,930,000

CLC-2: Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Key Project Elements

- Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert.
- Stabilize and restore embankment and channel after culvert replacement.
- Repave pedestrian path after culvert replacement.

Design Assumptions

- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	45	$3,510
Fill, imported clean	CY	115	45	$5,175
Embankment	CY	35	90	$3,150
Clear and Grub brush including stumps	AC	22,000	0.10	$2,200
Energy dissapation pad - Rip-Rap, Class 200	CY	81	10	$810
Structure Installation				
Demo pipe	LF	30	70	$2,100
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	270	$16,200
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
Box Culvert (10' x 3')	FT	950	70	$66,500
Project Sub-Total				$110,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,000
Erosion and Sediment Control	LS	3%		$3,300
Contingency	LS	40%		$44,000
Traffic Control/Utility Relocation	LS	5%		$5,500
Surveying	LS	5%		$5,500
Capital Expense Total (including contingency)				$179,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$290,000

CLC-3: Garden Acres Pond Retrofit

Key Project Elements

• Retrofit existing detention pond to increase storage capacity and water quality treatment along Peters Road and provide detention during high flow events.

Design Assumptions

• Install an inflow diversion structure at Peters Road (ST2101A).
• Install 95 LF of 24-inch PVC culvert at inlet of upsized detention pond.
• Increase existing detention pond capacity by 25,600 ft3 and lower pond invert to 196-ft elevation.
• Clear, regrade, and replant 0.9-acres of drainage way to ensure a low-flow drainage path and healthy vegetation.
• Install 155 LF of 24-inch PVC culvert at outlet of upsized detention pond.
• Install an outlet control structure at Peters Road (ST2431).
• Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,220	$251,160
Clear and Grub brush including stumps	AC	22,000	0.9	$19,800
Amended Soils and Mulch	CY	165	1,240	$204,600
Drain Rock	CY	110	1,030	$113,300
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	22,310	$892,400
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	980	$58,800
Pipe Unit Cost				
Field Ditch Inlet	EA	5,600	1	$5,600
Connection to Existing Structure, standard	EA	10,000	4	$40,000
PVC, 24", 10' to invert, not in road	FT	381	205	$78,023
PVC, 24", 10' to invert, in road	FT	732	45	$32,918
Project Sub-Total				$1,777,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$177,700
Erosion and Sediment Control	LS	3%		$53,310
Contingency	LS	40%		$710,800
Traffic Control/Utility Relocation	LS	5%		$88,850
Surveying	LS	5%		$88,850
Capital Expense Total (including contingency)				$2,897,000
Design/Construction Administration (%)	LS	3.5% + $200K		$301,000
Engineering and Permitting (%)	LS	20%		$579,000
			TOTAL	$3,780,000

NC-1: Frog Pond E and S Conveyance Pipe Installation

Key Project Elements

- Install stormwater collection system for main alignments in basin K1 identified in the Frog Pond East and South Master Plan.

Design Assumptions

- Pipe sizes and alignment was taken directly from the Frog Pond E and S Master Plan. This area was not included in the InfoSWMM modeling effort for this SMP.
- Install 2,050 LF of 24-inch PVC pipe.
- Install 310 LF of 30-inch PVC pipe.
- Install seven 60-inch manholes.
- Install 1 outfall.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Outfall Improvements	EA	10,000	1	$10,000
Pipe Unit Cost				
PVC, 24", 10' to invert, in road	FT	732	2,050	$1,499,575
PVC, 30", 10' to invert, in road	FT	879	310	$272,630
Project Sub-Total				$1,880,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$188,000
Erosion and Sediment Control	LS	3%		$56,400
Contingency	LS	40%		$752,000
Traffic Control/Utility Relocation	LS	5%		$94,000
Surveying	LS	5%		$94,000
Capital Expense Total (including contingency)				$3,064,000
Design/Construction Administration (%)	LS	13.5%		$414,000
Engineering and Permitting (%)	LS	20%		$613,000
			TOTAL	$4,090,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 1

Key Project Elements

- Remove existing Morey's Landing Bubbler (STD6604).
- Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement.
- Install a flow control diversion structure and low flow pipe at Willamette Way E to route water quality events to new raingardens and high flow events to the stormwater collection system along SW Willamette Way.
- Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall.
- Install 120 LF of 12-inch PVC on SW Willamette Way for flow exceeding the water quality event.
- Upsize 575 LF of 10-inch CPS to 12-inch PVC on SW Willamette Way (SD6629, SD6630, SD6632).
- Upsize 145 LF of 10-inch CSP to 18-inch PVC on Willamette Way (SD6638).
- Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).

Design Assumptions

- The raingardens (Phase 1) were sized as a filtration facility using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP will be constructed as an infiltration facility, pending infiltration testing. It is to be designed per the City's standard details for the selected BMP structure and used to treat the 1" water quality event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,055	$41,100
Fill, from onsite stockpile	CY	60	1,289	$77,340
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	376	$41,360
Water Quality Facility Installation				
Rain Garden/ Swale	SF	130	120	$15,600
Geotextile	SY	7	2.5	$18
Energy dissapation pad - Rip-Rap, Class 100	CY	124	1	$124
Water Quality Facility Plantings with Trees	SF	40	5,782	$231,280
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	305	$18,300
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Structure Installation				
Remove structure	EA	1,700	6	$10,200
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	5	$60,000
Pipe Unit Cost				
PVC, 8", 10' to invert, not in road	FT	136	25	$3,394
PVC, 12", 15' to invert, not in road	FT	215	120	$25,740
PVC, 12", 10' to invert, in road	FT	506	575	$290,950
PVC, 18", 10' to invert, in road	FT	563	145	$81,635
Connection to Existing Structure, standard	EA	10,000	4	$40,000
Project Sub-Total				$1,029,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$102,900
Erosion and Sediment Control	LS	3%		$30,870
Contingency	LS	40%		$411,600
Traffic Control/Utility Relocation	LS	10%		$102,900
Surveying	LS	5%		$51,450
Capital Expense Total (including contingency)				$1,729,000
Design/Construction Administration (%)	LS	13.5%		$233,000
Engineering and Permitting (%)	LS	20%		$346,000
			TOTAL	$2,310,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 2

Key Project Elements

- Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637).
- Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).

Design Assumptions

- Flows over the water quality event will be routed to the Belknap Court outfall (part of Phase 2 network).
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Demo pipe	LF	30	610	$18,300
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	3	$36,000
Pipe Unit Cost				
PVC, 18", 10' to invert, in road	FT	563	610	$343,430
Connection to Existing Structure, standard	EA	10,000	8	$80,000
Project Sub-Total				$483,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$48,300
Erosion and Sediment Control	LS	3%		$14,490
Contingency	LS	40%		$193,200
Traffic Control/Utility Relocation	LS	10%		$48,300
Surveying	LS	5%		$24,150
Capital Expense Total (including contingency)				$811,000
Design/Construction Administration (%)	LS	13.5%		$109,000
Engineering and Permitting (%)	LS	20%		$162,000
			TOTAL	$1,080,000

WR-2: Miley Road Stormwater Improvements - Phase 1

Key Project Elements

- Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall.
- Restore approx. 30 ft of channel bank on either side of new outfall.
- Replace area drain (ENG ID 9341).
- Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002).
- Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH.

Design Assumptions

- Access to outfall for removal and replacement is assumed feasible - costs have not been included for access requirements

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	100	$7,800
Embankment	CY	35	100	$3,500
Clear and Grub brush including stumps	AC	22,000	0.1	$2,200
Jute Matting, Biodegradeable	SY	8	100	$800
Energy dissapation pad - Rip-Rap, Class 200	CY	81	50	$4,050
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Demo pipe	LF	30	400	$12,000
Outfall Improvements	EA	10,000	1	$10,000
Remove structure	EA	1,700	2	$3,400
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	55	$3,300
Pipe Unit Cost				
PVC, 42", 10' to invert, not in road	FT	703	400	$281,380
Project Sub-Total				$352,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$35,200
Erosion and Sediment Control	LS	3%		$10,560
Contingency	LS	40%		$140,800
Traffic Control/Utility Relocation	LS	5%		$17,600
Surveying	LS	5%		$17,600
Capital Expense Total (including contingency)				$574,000
Design/Construction Administration (%)	LS	13.5%		$77,000
Engineering and Permitting (%)	LS	30%		$172,000
			TOTAL	$820,000

WR-2: Miley Road Stormwater Improvements - Phase 2

Key Project Elements

- Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road.
- Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road.
- Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011.
- Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral.
- Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall.
- Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.

Design Assumptions

- Costs for connections to existing system under brick wall have been assumed for connections and pipe length only. Constructability to be verified during detailed design.
- Costs assume that existing pipe alingment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	10	$140,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	3	$54,000
Connection to Existing Lateral	EA	6,000	19	$114,000
Abandon Existing Pipe, fill with grout	CF	8	3705	$29,640
Pipe Unit Cost				
PVC, 12", 15' to invert, in road	FT	602	80	$48,136
PVC, 18", 15' to invert, in road	FT	731	80	$58,476
PVC, 24", 10' to invert, in road	FT	732	650	$475,475
PVC, 24", 15' to invert, in road	FT	860	40	$34,408
PVC, 36", 10' to invert, in road	FT	1,027	3055	$3,138,707
PVC, 42", 10' to invert, in road	FT	1,169	530	$619,438
Project Sub-Total				$4,736,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$473,600
Erosion and Sediment Control	LS	3%		$142,080
Contingency	LS	40%		$1,894,400
Traffic Control/Utility Relocation	LS	5%		$236,800
Surveying	LS	5%		$236,800
Clackamas County Permitting	LS	8.83%		$418,189
Capital Expense Total (including contingency)				$7,720,000
Design/Construction Administration (%)	LS	3.5% + $200K		$470,000
Engineering and Permitting (%)	LS	30%		$2,316,000
			TOTAL	$10,510,000

WR 3 - Rose Lane Culvert Replacement

Key Project Elements

- Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available).
- Install approximately 40 LF of parallel 12-inch RCP culverts.
- Reconfiguring culvert diagonally across roadway to move it away from the residental building (garage) and remove hard bends.
- Maintain 12-inch pipe cover in roadway (minimum amount).

Design Assumptions

- Assuming recommended culvert sizing is sufficent to convey H/H flows. Unable to easily model due to lack of stream information (seasonal stream in wetland).
- Survey required.
- Roadwork beyond trenching not evaluated.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Clear and Grub brush including stumps	AC	22,000	0.05	$1,100
Structure Installation				
Demo pipe	LF	30	25	$750
Field Ditch Inlet	EA	5,600	2	$11,200
Pipe Unit Cost				
RCP, 12", 10' to invert, in road	FT	498	80	$39,864
Project Sub-Total				$53,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$5,300
Erosion and Sediment Control	LS	3%		$1,590
Contingency	LS	40%		$21,200
Traffic Control/Utility Relocation	LS	5%		$2,650
Surveying	LS	5%		$2,650
Capital Expense Total (including contingency)				$86,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$200,000

WR-4: Charbonneau East Stormwater Improvements, Phase 1

Key Project Elements

- Upsize and replace the existing stormwater outfall (serving Charbonneau development) along the Willamette River.

Design Assumptions

- Remove and replace existing Charbonneau East Outfall.
- Upsize 115 LF of 30-inch pipe discharging to Willamette River to 36-inch diameter PVC.
- Replace 72-inch manhole (ST9014).

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Connection to Existing Structure, standard	EA	10,000	1	$10,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	145	$11,745
Restoration/Resurfacing				
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	115	$65,907
Project Sub-Total				$116,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,600
Erosion and Sediment Control	LS	3%		$3,480
Contingency	LS	50%		$58,000
Traffic Control/Utility Relocation	LS	5%		$5,800
Surveying	LS	5%		$5,800
Capital Expense Total (including contingency)				$201,000
Design/Construction Administration (%)	LS	25.0%		$50,000
Engineering and Permitting (%)	LS	50%		$101,000
Outreach Coordination	LS	Flat Rate		$250,000
			TOTAL	$600,000

WR-4: Charbonneau East Stormwater Improvements, Phase 2

Key Project Elements

- Upsize and replace stormwater network along SW French Prairie Rd or SW Old Farm Rd.

Design Assumptions

- Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end).
- Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242).
- Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020).
- Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019).
- Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017).
- Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027).
- Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).
- Replace eight 48-inch manholes.
- Replace nine 60-inch manholes.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	4	$48,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	4	$60,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	5	$70,000
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	4	$88,000
Connection to Existing Structure, standard	EA	10,000	12	$120,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	910	$460,460
PVC, 15", 10' to invert, in road	FT	535	1,200	$641,400
PVC, 18", 10' to invert, in road	FT	563	310	$174,530
PVC, 30", 10' to invert, in road	FT	879	360	$316,602
PVC, 24", 10' to invert, in road	FT	732	570	$416,955
PVC, 30", 10' to invert, in road	FT	879	300	$263,835
Project Sub-Total				$1,979,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$197,900
Erosion and Sediment Control	LS	3%		$59,370
Contingency	LS	40%		$791,600
Traffic Control/Utility Relocation	LS	10%		$197,900
Surveying	LS	5%		$98,950
Capital Expense Total (including contingency)				$3,325,000
Design/Construction Administration (%)	LS	13.5%		$449,000
Engineering and Permitting (%)	LS	20%		$665,000
			TOTAL	$4,440,000

WR-4: Charbonneau West Stormwater Improvements

Key Project Elements

- Replace stormwater network along SW French Prairie Road, SW Curry Drive, SW Boones Bend Road

Design Assumptions

- Replace 200 LF of 12-inch pipe along SW French Prairie Road with PVC (ENG ID: ST9048 to ST9281)
- Replace a total of 1,540 LF of 15-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace a total of 2,450 LF of 18-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace 680 LF of 21-inch pipe along SW Boones Bend Road with PVC.
- Replace 670 LF of 24-inch pipe along SW French Prairie Road and SW Boones Bend Road with PVC.
- Replace 420 LF of 27-inch pipe along SW Boones Bend Road with PVC.
- Replace 640 LF of 30-inch pipe along SW Boones Bend Road with PVC.
- Replace 170 LF of 36-inch pipe along SW Boones Bend Road with PVC.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	29	$348,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	2	$36,000
Connection to Existing Lateral	EA	6,000	15	$90,000
Outfall Improvements	EA	10,000	2	$20,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	200	$101,200
PVC, 15", 10' to invert, in road	FT	535	1,540	$823,130
PVC, 18", 10' to invert, in road	FT	563	2,450	$1,379,350
PVC, 21", 10' to invert, in road	FT	647	680	$440,130
PVC, 24", 10' to invert, in road	FT	732	670	$490,105
PVC, 27", 10' to invert, in road	FT	805	420	$338,300
PVC, 30", 10' to invert, in road	FT	879	640	$562,848
PVC, 36", 10' to invert, in road	FT	1,027	170	$174,658
Project Sub-Total				$4,902,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$490,200
Erosion and Sediment Control	LS	3%		$147,060
Contingency	LS	40%		$1,960,800
Traffic Control/Utility Relocation	LS	10%		$490,200
Surveying	LS	5%		$245,100
Capital Expense Total (including contingency)				$8,235,000
Design/Construction Administration (%)	LS	3.5% + $200K		$488,000
Engineering and Permitting (%)	LS	20%		$1,647,000
			TOTAL	$10,370,000

Charbonneau R&R Program

Key Project Elements

- Replace pipe in Charbonneau District that isn't being replaced by another CIP or hasn't been recently replaced. Recently replaced pipe was designated by the City as anything replaced between 2015-2022.
- Assume minimum pipe size of 12-inch. Assume all other pipe is replace-in-place.
- Assume replacements of all manholes (except those excluded from above mentioned projects).

Design Assumptions

- Replace 19,460 LF of 12-inch diameter PVC pipe.
- Replace 4,590 LF of 15-inch diameter PVC pipe.
- Replace 3,620 LF of 18-inch diameter PVC pipe.
- Replace 1,210 LF of 21-inch diameter PVC pipe.
- Replace 750 LF of 24-inch diameter PVC pipe.
- Replace 180 LF of 27-inch diameter PVC pipe.
- Replace 340 LF of 30-inch diameter PVC pipe.
- Replace 470 LF of 36-inch diameter PVC pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	120	$1,440,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	13	$195,000
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	3	$54,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	15	$210,000
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	2	$46,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	13,470	$6,815,820
PVC, 12", 15' to invert, in road	FT	602	2,500	$1,504,250
PVC, 12", 10' to invert, not in road	FT	206	3,210	$660,297
PVC, 12", 15' to invert, not in road	FT	215	280	$60,060
PVC, 15", 10' to invert, in road	FT	535	2,220	$1,186,590
PVC, 15", 15' to invert, in road	FT	666	570	$379,805
PVC, 15", 10' to invert, not in road	FT	249	1,680	$419,034
PVC, 15", 15' to invert, not in road	FT	259	120	$31,086
PVC, 18", 10' to invert, in road	FT	563	1,870	$1,052,810
PVC, 18", 15' to invert, in road	FT	731	880	$643,236
PVC, 18", 10' to invert, not in road	FT	293	630	$184,685
PVC, 18", 15' to invert, not in road	FT	304	240	$72,864
PVC, 21", 10' to invert, in road	FT	647	670	$433,658
PVC, 21", 15' to invert, in road	FT	796	520	$413,699
PVC, 21", 15' to invert, not in road	FT	348	20	$6,963
PVC, 24", 10' to invert, in road	FT	732	410	$299,915
PVC, 24", 10' to invert, not in road	FT	381	340	$129,404
PVC, 27", 10' to invert, in road	FT	805	180	$144,986
PVC, 30", 10' to invert, in road	FT	879	340	$299,013
PVC, 36", 10' to invert, not in road	FT	573	240	$137,544
PVC, 36", 15' to invert, in road	FT	1,220	230	$280,577
Project Sub-Total				$17,101,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$1,710,100
Erosion and Sediment Control	LS	3%		$513,030
Contingency	LS	40%		$6,840,400
Traffic Control/Utility Relocation	LS	10%		$1,710,100
Surveying	LS	5%		$855,050
Capital Expense Total (including contingency)				$28,730,000
Design/Construction Administration (%)	LS	13.5%		$3,879,000
Engineering and Permitting (%)	LS	20%		$5,746,000
			TOTAL	$38,360,000

Appendix F: Library Pond Analysis

Technical Memorandum

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T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan Update

Project No.: 156157

Technical Memorandum

Subject: Library Pond Evaluation

Date: June 14, 2023

To: Kerry Rappold, City of Wilsonville

From: Brown and Caldwell

Prepared by: Shelby Gilmartin, E.I.T

Reviewed by: Angela Wieland, P.E.

Limitations:

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Library Pond Evaluation

Executive Summary

This Technical Memorandum (TM) describes a sizing evaluation conducted on the Library Pond stormwater detention facility (also referred to as the Memorial Park Pond). This evaluation was conducted as part of the City's 2023 Stormwater Master Plan (SMP) Update to determine capital project needs (specific to retrofit of the Library Pond), as well as policy recommendations (to be documented in the SMP) related to redevelopment of the Wilsonville Town Center, which contributes stormwater to the Library Pond.

This evaluation utilized the City of Wilsonville's BMP Sizing Tool, which is intended for use in conjunction with the *2015 Stormwater & Surface Water Design & Construction Standards,* as well as historic as-built drawings, results from the InfoSWMM model, Geographic Information System (GIS) data, and the *2019 Wilsonville Town Center Plan* to analyze pond sizing and ability to effectively mitigate stormwater flows under three development scenarios. The development scenarios reflect unique land cover and impervious conditions specific to pre-development (Oak Savanna) land use conditions, existing (current) land use conditions, and future (Town Center build-out) land use conditions.

Section 1: Background

The Library Pond Stormwater Detention Facility (Library Pond) was originally constructed in the 1980s. Modifications were made to the pond in 1992 as part of the Memorial Park site improvements. These improvements include enlarging the pond, installing new stormwater piping, an outfall, and inlet, as well as enclosing the pond with a chain-link fence.

The Library Pond receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, east of Interstate 5 and adjacent to Wilsonville Road. The Library Pond discharges to a piped collection system, which outfalls to an unnamed tributary to Boeckman Creek approximately 750 feet downstream of the Library Pond. Boeckman Creek is a tributary to the Willamette River. Water quality monitoring has been conducted at the Library Pond since the late 1990's in accordance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit. Although operating as a regional stormwater facility, there are several notable characteristics of the pond that may contribute to observed capacity and water quality issues:

- There is no flow control/orifice structure or emergency overflow type structure, thus providing limited detention benefit.
- Vegetation is overgrown with invasive species and sediment has accumulated along the pond bottom, limiting pond capacity and water quality function.
- As shown in the as-builts and verified on-site, the facility has very steep side slopes (estimated to be 2H:1V), limiting facility access and maintenance.
- City staff have experienced ongoing challenges with debris removal at existing ditch inlet, which serves as the outlet from the pond so impounded trash can quickly result in a flooding issue.

Hydraulic analysis of the Library Pond conducted for the SMP in 2022 indicates that flooding occurs during the 25-year future development condition. This finding is confirmed by City staff who have observed flooding of the Wilsonville Public Library parking lot and Memorial Drive near the entrance to Memorial Park. The contributing drainage area to the Library Pond is subject to redevelopment in both the near term and long term as part of the Wilsonville Town Center Plan (adopted May 6, 2019).

The three phases of the Willamette Town Center Plan include:

- Phase I - infill and redevelopment of vacant and/or underutilized land over the next 10 years (approx. 2019-2029). This will focus on areas where landowners can develop new buildings on vacant or underused parking without impacting existing businesses. The mostly likely type of redevelopment occurring will be existing retail and commercial buildings, multifamily residential, and some mixed-use development.
- Phase 2 - redevelopment, multiuse, and parking garage integration in the next 10-20 years (approx. 2029-2039). This phase includes office and mixed-use development with attached structured parking leading to the redevelopment of surface lots, redesign of the street grid because of development, and streetscape management.
- Phase 3 – the full build out will include high-density, mixed-use buildings, completion of pedestrian networks and vehicle roadways, and reallocation of parking facilities behind or integrated into buildings. This phase is anticipated to occur in the next 20+ years (approx. 2039-TBD).

The City anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with private redevelopment and public improvements in the Town Center Plan area. Design and construction of the Library Pond retrofit may be funded exclusively through system development charges (SDCs) applied to Town Center redevelopment, allowing the City to charge Town Center development a fee-in-lieu.

Section 2: City of Wilsonville Stormwater Design Standards

Over the past decade, stormwater management practices in Oregon have evolved to require consideration of hydromodification as well as more traditional water quality and peak flow (detention) requirements. Hydromodification is the change in runoff patterns caused by land use and impervious area changes that result in the degradation of stream channels and water quality (i.e., stream erosion from the extended duration of peak flows). Traditional stormwater treatment and detention design practices typically analyze pre- and post-development peak flows associated with a standard (i.e., 24-hour) synthetic design storm. A hydromodification standard requires continuous simulation flow modeling to evaluate both peak flow but also the duration of flows exceeding a specific recurrence interval. Adherence to a hydromodification standard assumes that peak flow and flow duration for the post-development condition does not exceed the pre-developed condition for a range of geomorphically significant flows—those capable of moving sediment and eroding streambanks. For the City of Wilsonville, the range of geomorphically significant flows is established as 42 percent of the 2-year flow to the 10-year flow.

Given the complexity of evaluating stormwater controls to adhere to a hydromodification standard, municipalities that have adopted a hydromodification standard have also developed tools to aid developers with design.

2.1 Design Standards

The City's Public Works Design Standards (PWS) (i.e., *City of Wilsonville's 2015 Stormwater & Surface Water Design & Construction Standards, Section 3*) were updated in December 2015 to emphasize low-impact development (LID) facilities that incorporate infiltration to address both pollutant reduction and flow control as well as develop facility sizing to address hydromodification impacts.

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2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater facilities for hydromodification-based standards. The BMP Sizing Tool (last updated in 2017) is used in conjunction with the City's PWS and by developers and engineers to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate the following BMP types:

- Rain Garden - Filtration and Infiltration
- Stormwater Planter - Filtration and Infiltration
- Vegetated Swale - Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The tool was developed based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration is based on the facility soil subgroup. Groups A1 – B3 include infiltration rates greater than 0.50 in/hr and are considered acceptable for use with infiltration facilities. Groups C1 – D1 reflect infiltration rates from 0.02 – 0.49 in/hr and are considered acceptable for use with filtration facilities. Infiltration facilities use only infiltration to manage runoff. Filtration facilities include piped underdrain systems and orifice controls.

The following table is an excerpt from the *User's Guide for the BMP Sizing Tool* which shows the BMP sizing dimension for each facility type. The focus for this analysis will be on the capabilities of the Detention Pond for treatment and flow control settings in the tool.

Table 4. BMP Dimensions Required for the Sizing Tool to Apply

Facility	Drain Rock, min. in.	Separation Layer, in.	Growing Media, min. in.	Ponding Depth, in.	Freeboard, min. in.	Side Slope, ratio	Bottom Width, min. in.	Liner
Stormwater Planter - Filtration	12	3	18	12	4	0	18	If required
Stormwater Planter - Infiltration	28	3	18	12	4	0	30	No
Rain Garden - Filtration	18	3	18	12	4	3:1 max	24	If required
Rain Garden - Infiltration	18	3	18	16	N/A	3:1 max	24	No
Vegetated Swale - Filtration	12	3	18	12	4	3:1 max	24	If required
Vegetated Swale - Infiltration	18	3	18	12	N/A	3:1 max	24n	No
Detention Pond	15	3	18	Per sizing model (12 in. min.)	12[a]	3:1 max	N/A	If required

a. The surface area of the detention pond, the filtration rain garden and the filtration swale sized by the tool does not take freeboard into account. In addition, see Note 12 on the Detention Pond detail regarding an emergency spillway.

Although the table states a side slope ratio of 3H:1V max for detention ponds, the 2015 PWS section 301.4.09 states a General Facility Design Requirement that stormwater management facilities shall not exceed 4H:1V up to the maximum design water elevation. The initial analyses used 4H:1V sizing requirements. After review by the City, the scenarios were refined to optimize pond sizing and incorporated a 3H:1V side slope to maximize potential storage at Library Pond.

For detention ponds, the tool can be used to either calculate a simple geometry or a custom geometry. A simple geometry uses a known surface area or depth and entered slope to calculate the bottom area and depth or surface area (whichever was initially an unknown variable). While the custom geometry relies on known depth, area, and flow values. For each configuration option, the BMP Sizing Tool routes the post-development flow through the pond, performs statistical analyses for flow duration and peak flow criteria, and reports if the pond is sized adequately.

For ponds sized using simple geometry, the required outlet dimensions for the pond will be calculated. This includes inverts and dimensions of lower orifice, upper orifice, and overflow weir which correspond to the provided facility schematic (see Figure 1). Figure 1 depicts the main features of the outlet structure with the locations of their inverts. The overflow weir is at 1 foot below the 10-year pond water surface elevation. It is assumed that the pond will need to include additional freeboard (typically 1 foot) above the 10-year water surface elevation.

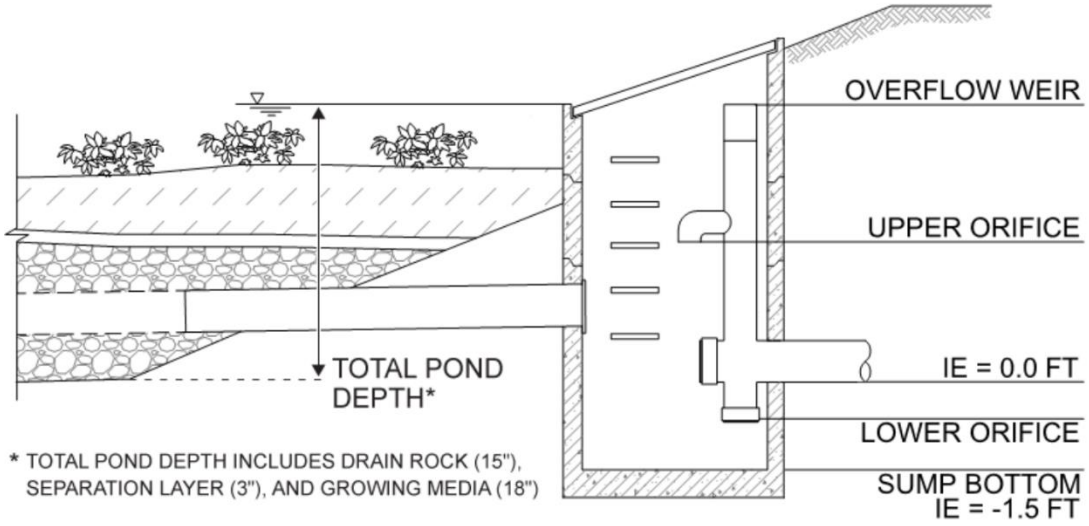

Figure 1. Detention pond facility schematic

The BMP Sizing Tool also calculates flow duration and peak flow frequency curves to compare pre-development to post-project flows. The curves represent the flow and duration over the range of geomorphically significant flows (i.e., lower threshold of 42 percent of the 2-yr storm and an upper threshold of the 10-yr storm). When a pond is adequately sized the mitigated post-development curve (blue per the BMP Sizing Tool output) falls below the pre-development curve (red per the BMP Sizing Tool output). It will also be sized to ensure treatment of 80 percent of the average annual runoff.

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Section 3: Evaluation and Methodology

With the 2015 updates to the PWS, the Library Pond as it exists today does not meet the City's current stormwater design and construction specifications. This TM documents the evaluation of the existing pond location and footprint against several pre- and post- development scenarios. The process used for this evaluation of the facility includes:

1. Utilize facility as-builts, the InfoSWMM model, and the Town Center Plan to determine the current pond facility size, contributing drainage area and land use, and the pond's stage storage curve;
2. Determine if the current pond storage volume and outlet structure address current flows reflective of existing development conditions and pre-development flows reflective of historic land use conditions, as required in the 2015 PWS;
3. Use the BMP Sizing Tool to compare pond sizing and outlet adjustments, assuming existing development conditions and historic land use conditions, to meet the minimum criteria in the City's design standards;
4. Locate potential impervious areas within the Town Center redevelopment for upstream, low impact development (LID) planter facilities to meet the City's water quality treatment and flow control requirements associated with the City's established hydromodification standard;
5. Use the BMP Sizing Tool to iterate and optimize pond sizing and outlet configurations in conjunction with LID sizing/placement to meet the City's design standards in conjunction with future development of the Town Center and associated site constraints, and
6. Document LID placement needs associated with future development to determine fee-in-lieu policy implications.

To evaluate Library Pond sizing in conjunction with the above-mentioned process, the 11 subbasins (delineated as part of the SMP) that drain into the Library Pond were subdivided based on various land cover and impervious conditions reflective of pre-development, existing, and future development conditions. Under future development conditions, the Town Center development plans include demolition of existing stormwater infrastructure and installation of new pipes to convey stormwater drainage in conjunction with the proposed roadway configuration.

Because the existing footprint of the pond, approximately 0.7 acres, is constrained by limitations (roadways, trees, etc.), simple pond sizing was employed by holding the pond surface area constant and allowing the BMP Sizing Tool to calculate a required pond depth and bottom surface area.

3.1 Discharge Management Areas

The BMP Sizing Tool requires users to first delineate Discharge Management Areas (DMAs), also referred to as subcatchments, which are used to define a contributing drainage area to each planned BMP facility on a site. The BMP Sizing Tool has limitations on the size of individual DMAs to individual LID facilities. In addition, to facilitate iteration of scenarios related to BMP sizing, flexibility had to be incorporated into the DMAs. Therefore, the contributing drainage area to the Library Pond had to be categorized and subdivided.

The DMAs were initially developed by subdividing each of the 11 subbasins (totaling 179.8 acres) into their respective Hydrologic Soil Groups (HSGs) - either B, C, or D (note: soils that fell into a dual-HSG category are reflected by the less infiltrating soil. For example, a soil in group C/D was calculated as HSG D). The total area of analysis was found to be 35% HSG B, 42% HSG C, and 23% HSG D, with the actual site of Library Pond in HSG B soils.

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The areas were then further subdivided by land cover to separate existing roadways/Right-of-ways (ROWs) from private property. Existing ROW areas were confirmed against the future Town Center Plan to ensure the area would remain roadways in the future development condition. Similarly, building (rooftop) area and pavement areas were also designated and digitized to inform the delineation of DMAs. An example of how this hierarchy was implemented is shown in Figure 2.

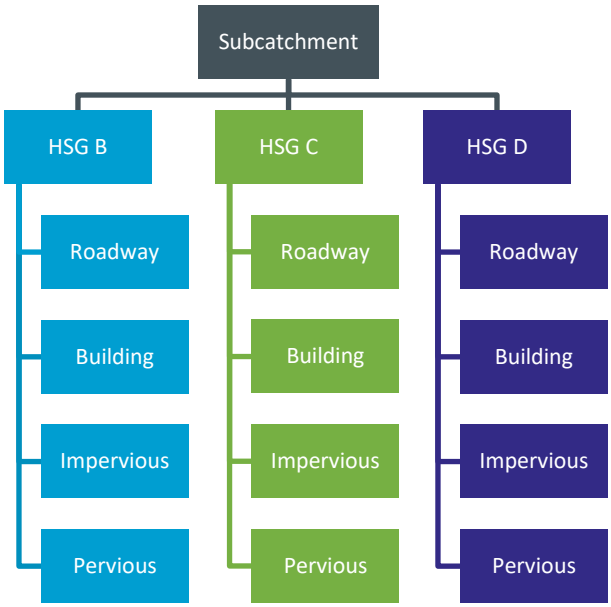

Figure 2. Example hierarchy of how the subcatchments were divided into DMAs

The DMAs were set-up to meet each of the three (3) initial scenarios for evaluation:

1. Pre-development (Oak Savanna) to existing conditions (today)
2. Pre-development (Oak Savanna) to future conditions (Town Center build out)
3. Existing conditions (today) to future conditions (Town Center build out)

To accommodate each of these scenarios, a total of 98 individual DMAs were established to represent the soil characteristics and development types over the 11 subcatchments. Each of the DMAs has a unique pre-development and post-development surface types associated with a specific soil type.

A database and specific naming convention was used to track DMAs and associated information. DMAs were named by subcatchment number, HSG letter, the existing development type, and the future development type. For example, a DMA from scenario 3 may read as 3414_D_Ex_Perv_Fu_Imp with an area of 3,995 square feet. This naming convention indicates that this DMA is currently a pervious surface (noted as Grass in the tool) but is anticipated to become an impervious surface (Conventional Concrete or Asphalt) under the full Town Center development.

3.2 Best Management Practices

Although the BMP Sizing Tool has eight (8) available facility types to develop sizing, this analysis focused on the Detention Pond with treatment and flow control to represent the Library Pond. Since the Library Pond is located in HGL B soils, the more conservative group B value (called B3 in the tool) with an infiltration rate of 0.50-0.99 in/hr was used to represent these soils. This range was verified against data from the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) soil survey database which identified the soil in this area to be primarily Willamette silt loam with a saturated hydraulic conductivity (Ksat) between 0.57-1.98 in/hr.

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The pond was modeled using both custom and simple geometry in the tool in order to compare existing pond sizing as well as determine sizing and outlet control adjustments. The custom geometry was used in the BMP Sizing Tool to represent the existing facility under current and future conditions to confirm if it meets design standards. For the custom sizing, the geometry data was extracted from the InfoSWMM model (based on the 1992 as-built data) to determine the depth in feet (ft), area in square feet (sq ft), and flow in cubic feet per second (cfs) based on modeled stage storage for the 10-year storm event. The stage storage information extracted from InfoSWMM is listed in Table 1.

Table 1. Library Pond Stage Storage

Depth (ft)	Area (sq ft)	Flow (cfs)
0	0	0
1	10,018	9.4
2	17,859	14.3
5	23,522	19.7
9	32,670	Not reached in 10-year storm
10	34,848	Not reached in 10-year storm

It is assumed that usable storage within the pond must remain below the elevation of the chain link fence at its lowest position (near the outlet structure where it passes under the road). This elevation contour of 147 ft is considered the upper limit of the pond with a calculated surface area of 30,130 sq ft. The lowest full elevation contour of the pond was calculated to be 137 ft with a surface area of 17,800 sq ft. It was assumed that the existing footprint of the pond is a hard constraint, and the surface area of the pond could not be expanded.

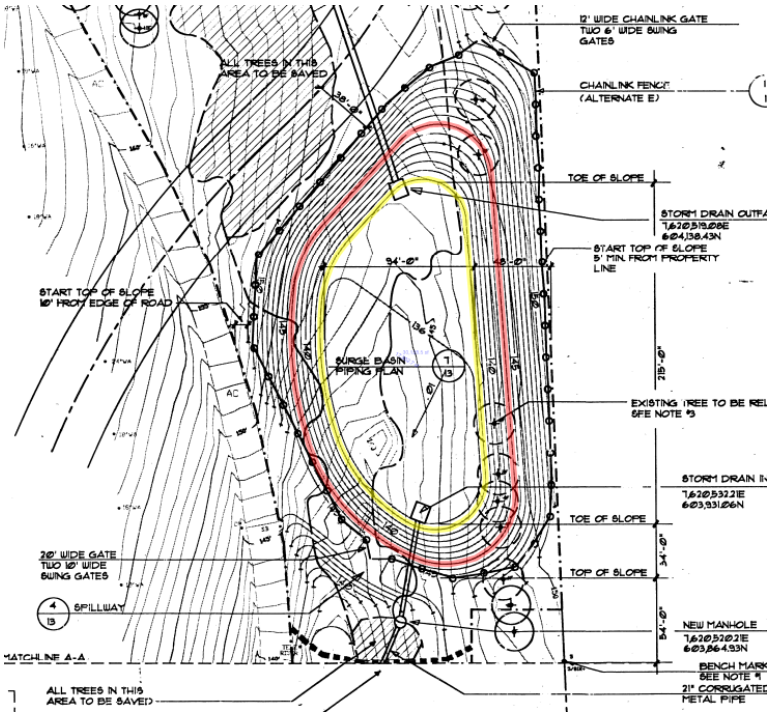

Figure 3. Library Pond 1992 as-builts, upper 147 ft contour (red) and lower 137 ft contour (yellow)

Alternatively, the simple geometry calculation was used to confirm modifications needed to retrofit the pond to current PWS design standards, based on each of the scenarios. The simple geometry could be run with either a known pond surface area, a known depth, or both. If one variable is unknown the tool calculates it based on the provided information for the surface area and/or depth and slope (H:V), as well as calculated the bottom area of the pond. Values for the surface area and slope were rounded to the nearest whole number for calculations.

Since the detention pond is being evaluated to meet both the water quality and flow control criteria, the BMP Sizing Tool was used to evaluate and size the pond facility to address peak flow duration matching for flows ranging from 42 percent of the 2-year peak flow to the 10-year peak flow as well as ensure treatment of 80 percent of the average annual runoff.

Section 4: Scenarios

The following three (3) scenarios were established to compare past, present, and future conditions of the Town Center Development area and associated sizing of the Library Pond. Each scenario was input into the BMP Sizing Tool to see how the system (pond) would respond under the varying development assumptions, with accompanying scenarios evaluated to confirm what level of retrofit or policy change regulating upstream LID installations are needed to meet the City's design standards.

4.1 Scenario 1: Pre-development to Existing Conditions

This scenario simulated pre-development conditions, referred to as Oak Savanna in the 2015 PWS, and existing development conditions to confirm whether the existing Library Pond sizing is adequate to meet design standards. The contributing drainage area under existing conditions is 47 percent impervious. In comparison, Oak Savanna is considered 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type.

Simply comparing the aerial photography from 1992 (which is not representative of Oak Savanna but represents the oldest web accessible archived image) to aerial imagery from 2022, it is evident that this area has experienced a large amount of development over the past 30 years.

Figure 4. Aerial images of site and surrounding area

Left: after retrofit in June 1994

Right: July 2022, representative of existing condition.

4.1.1 Pond Sizing Evaluation

Simulation of the Library Pond configuration in the BMP Sizing Tool indicates that the existing pond does not meet the current stormwater design standards per the 2015 PWS. The existing pond geometry was entered into the tool using stage storage information from the 1992 as-builts and SMP InfoSWMM model. As seen in Figure 5, the blue line represents the discharge occurring from the pond and it is consistently higher than the red, pre-development (Oak Savannah) flow frequency and flow duration curves. Library Pond in its current configuration does not adequately match the pre-development curves and additional pond storage is needed.

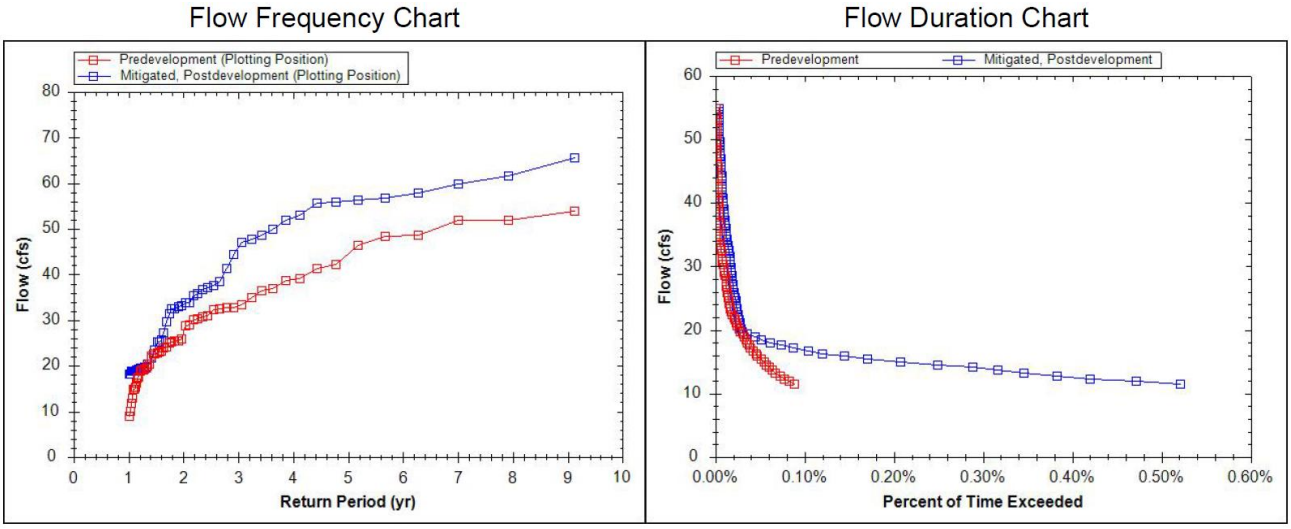

Figure 5. Curves based on existing stage storage information from as-builts

Pre-development shown in red. Mitigated, Post-Development shown in blue.

4.1.2 Pond Retrofit Evaluation

The BMP Sizing Tool was used to simulate additional scenarios associated with the pond configuration and size, as outlined in Table 2, to calculate pond retrofits required to meet current design standards. The BMP Sizing Tool calculations show that significant design modifications are required to ensure the pond is adequately sized; specifically the pond would need to be retrofit to have 1H:1V side slopes with a depth of nearly 24 feet (Figure 6) to adhere to the City's hydromodification standard (see Attachment A, Scenario 1A). This design fails to meet the design criteria for detention ponds having 3H:1V slopes and results in an excessively deep detention facility. Retrofit of the pond to meet City design standards based on existing development conditions is considered infeasible.

Table 2. Scenario 1 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information per as-builts				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, geometry doesn't work
	1:1	Auto calculate depth	23.98	15,780	Yes, sized adequately

Note: there is some variation between calculated depths with the same slope based on the tool and the outset structure sizing/configuration.

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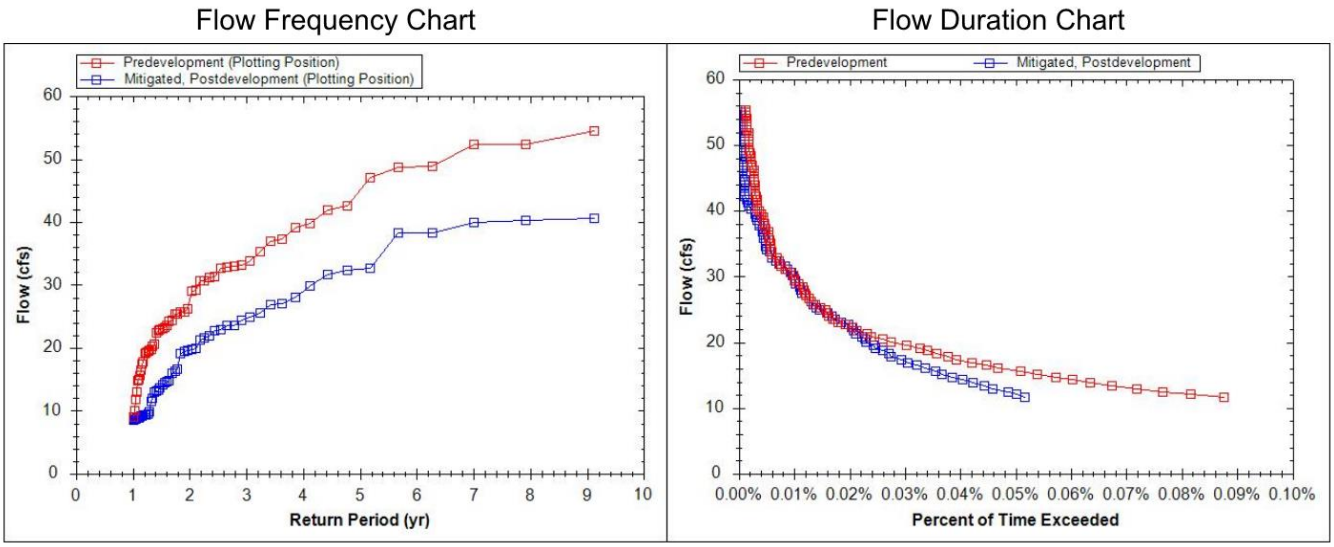

Figure 6. Flow frequency and duration curves if retrofit is to have 1H:1V side slopes and a depth of nearly 24 feet

Pre-development (red) to Existing condition (blue)

4.1.3 Onsite Flow Mitigation Evaluation

An additional, theoretical investigation was conducted to see how much of the current contributing drainage area to Library Pond would need to be managed onsite (i.e., routed to onsite LID) for the pond to meet current design standards.

To evaluate, the BMP Sizing Tool was used to automatically size the detention pond, maintaining the existing pond surface area of 30,130 sq. ft., and adjusting the side slopes to meet the PWS of 3H:1V. The automatic sizing mode to calculate the depth and bottom area of the pond. DMAs were then selectively removed from contributing area to the detention pond with the assumption that removed DMAs would require onsite stormwater management (retention) and use of LID such as planters or raingardens.

By removing approximately 20 percent of the existing total drainage area (roughly 36 acres of impervious surface or 43% of the contributing impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. This reduces the total drainage area to the Library Pond to 143.3 acres. The resulting pond sizing requires deepening the Library Pond to 15.08 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,906 sq. ft. See Attachment A, Scenario 1B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.08 feet and 3H:1V side slopes is as follows in Figures Figure 7 and Figure 8.

Structure	Size
Lower Orifice Diameter	9.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	25.2 in
Upper Orifice Invert	9.8 ft
Weir Length	6.3 ft
Weir Invert	13.6 ft

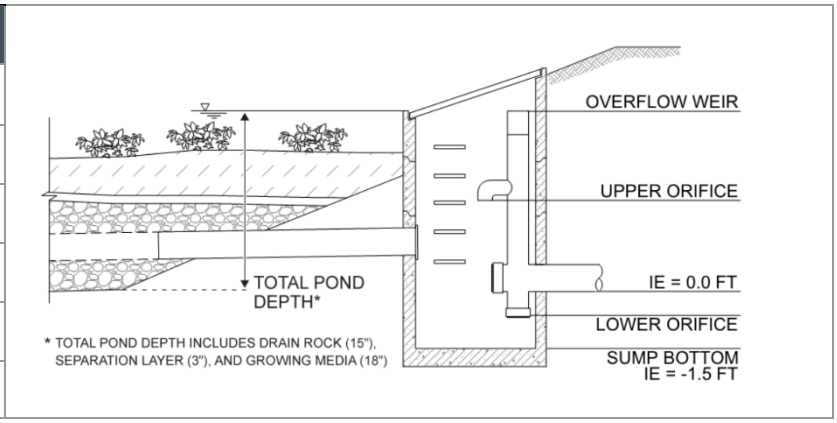

Figure 7. Scenario 1 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

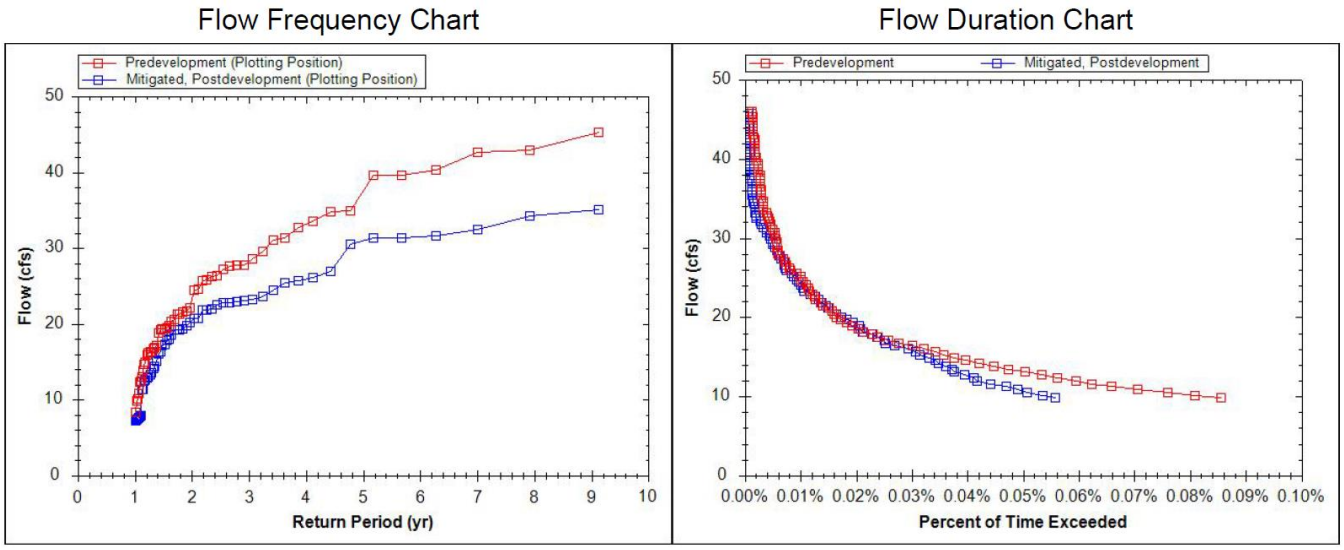

Figure 8. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to existing condition (blue)

4.2 Scenario 2: Pre-development to Future Conditions

The second scenario was simulated in the BMP Sizing Tool, comparing pre-development conditions, referred to as "Oak Savanna" in the 2015 PWS, to the future development conditions outlined in the Town Center Plan at full build out (20+ year planning horizon) to confirm sizing needs for the Library Pond. The contributing drainage area under future conditions is 53 percent impervious. In comparison, Oak Savanna is 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type. Like Scenario 1, expansion of the existing footprint of the pond, approximately 0.7 acres, is not possible due to constraining site limitations (roadways, trees, etc.).

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4.2.1 Pond Sizing and Retrofit Evaluation

Based on Scenario 1 findings, it is assumed that the existing pond sizing would not meet the City's design standards as is in conjunction with future redevelopment of the Town Center area (Figure 9). Since the existing pond configuration does not meet the City's design standards for existing development conditions, it was not expected that the pond is adequately sized for future development conditions either.

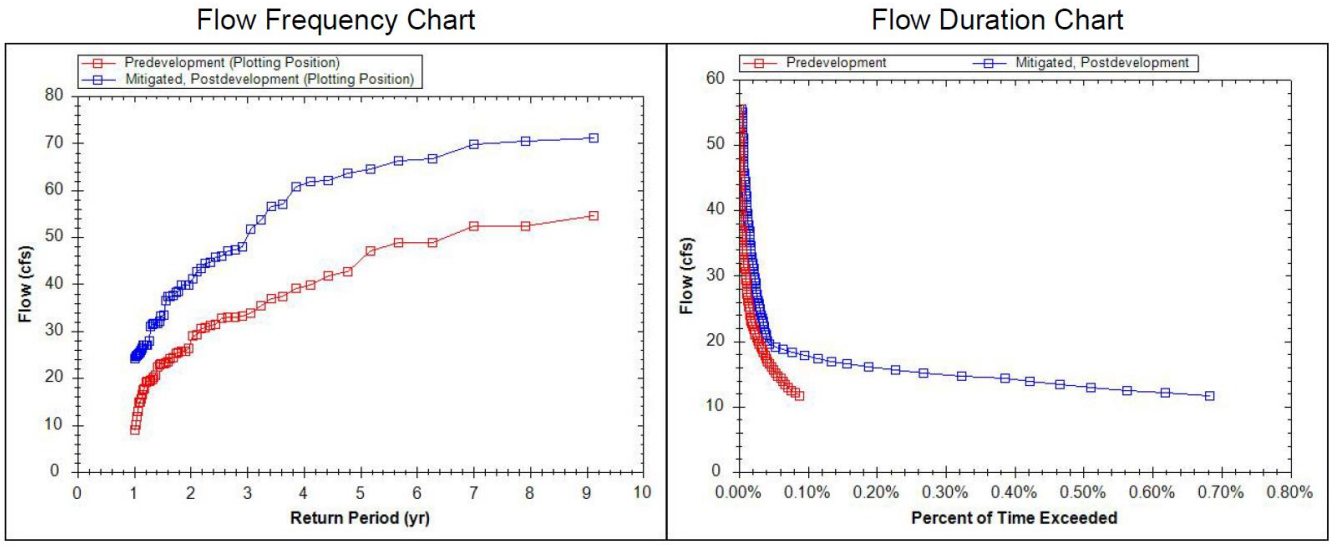

Figure 9. Flow frequency and duration curves based on existing stage storage information from as-builts

Pre-development shown in red and future development conditions shown in blue.

The BMP Sizing Tool was simulated for the additional scenarios outlined in Table 3 to calculate the required pond sizing and retrofit needs. As shown in Table 3 and Figure 10, like with the previous scenario, the BMP Sizing Tool calculated that the pond would have to be retrofit to have 1H:1V side slopes with a depth of approximately 30.4 feet and a bottom geometry of over just over 12,700 sq. ft to meet current design standards (see Attachment A, Scenario 2A). However, these detention pond design criteria do not meet the 2015 PWS requirements.

Table 3. Scenario 2 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, not large enough
	1:1	Auto calculate depth	30.40	12,719	Yes, sized adequately

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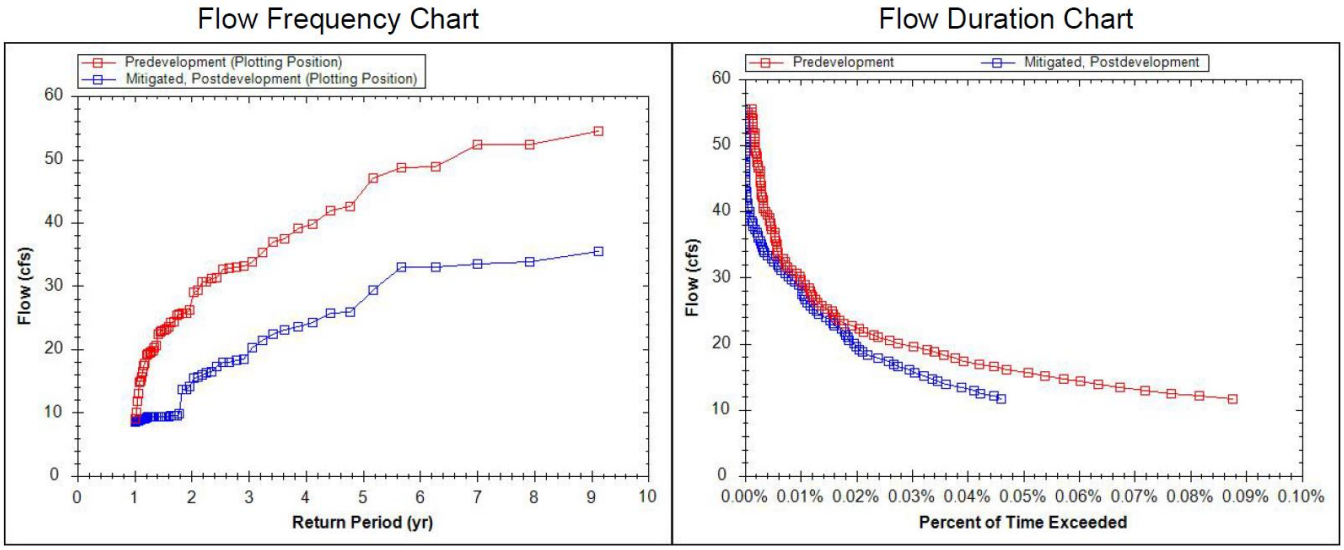

Figure 10. Flow and durations curves if retrofit was to have 1H:1V side slopes with a depth of over 30 feet.

Pre-development (red) to future development conditions (blue).

4.2.2 Onsite Flow Mitigation Evaluation

Based on these findings, a secondary analysis for Scenario 2 was developed. Similar to Scenario 1, this analysis removed select DMAs from contributing to the pond, assuming that these areas could be treated by additional LID facilities, to determine how much of Town Center property would require onsite stormwater management in order for Library Pond to meet City design standards.

Again, to evaluate the reduction in DMAs, the BMP Sizing Tool maintained the existing surface area of 30,130 sq. ft., set the slope to meet the City directed use of the PWS maximum of 3H:1V, and used the automatic sizing mode to calculate the depth and bottom area of the pond.

By removing approximately 27 percent of the total contributing drainage area (approximately 48 acres impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. All 48 acres of removed DMAs were impervious surfaces and represents all roadways (approximately 27 acres) plus an additional 21 acres of impervious area. **The removed impervious surfaces to be redirected constitutes 50 percent of the total new or redeveloped impervious surfaces contributing to the pond.** This removed area was assumed rerouted to infiltration planters onsite and modeled in the BMP Sizing Tool through a series of Stormwater Water Planter BMPs that connect to Library Pond as upstream LIDs. Although site-specific infiltration testing would be needed to confirm whether an infiltration or filtration-based LID is needed, for integration into the BMP Sizing Tool an infiltration planter that provides treatment and flow control was selected. Since the facility infiltration rate at Library Pond is associated with HSG B3 (0.50-0.99 in/hr), for purposes of this initial analysis the same infiltration rate was assumed as a representative of the soils for the LID facilities. With a portion of contributing drainage area removed, the total drainage area to Library Pond to 131.8 acres. The resulting pond sizing requires deepening the Library Pond to 15.04 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,946 sq. ft. See Attachment A, Scenario 2B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.04 feet and 3H:1V side slopes is as follows in Figure 11 and Figure 12.

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Structure	Size
Lower Orifice Diameter	10.6 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	27.4 in
Upper Orifice Invert	10.1 ft
Weir Length	6.3 ft
Weir Invert	14.0 ft

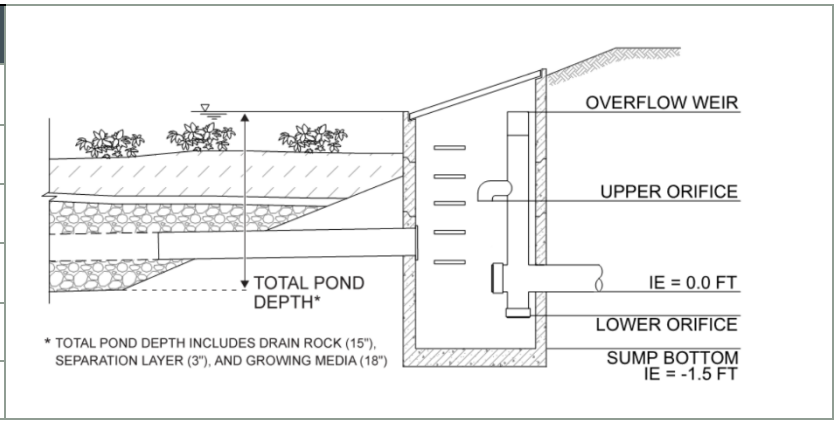

Figure 11. Scenario 2 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

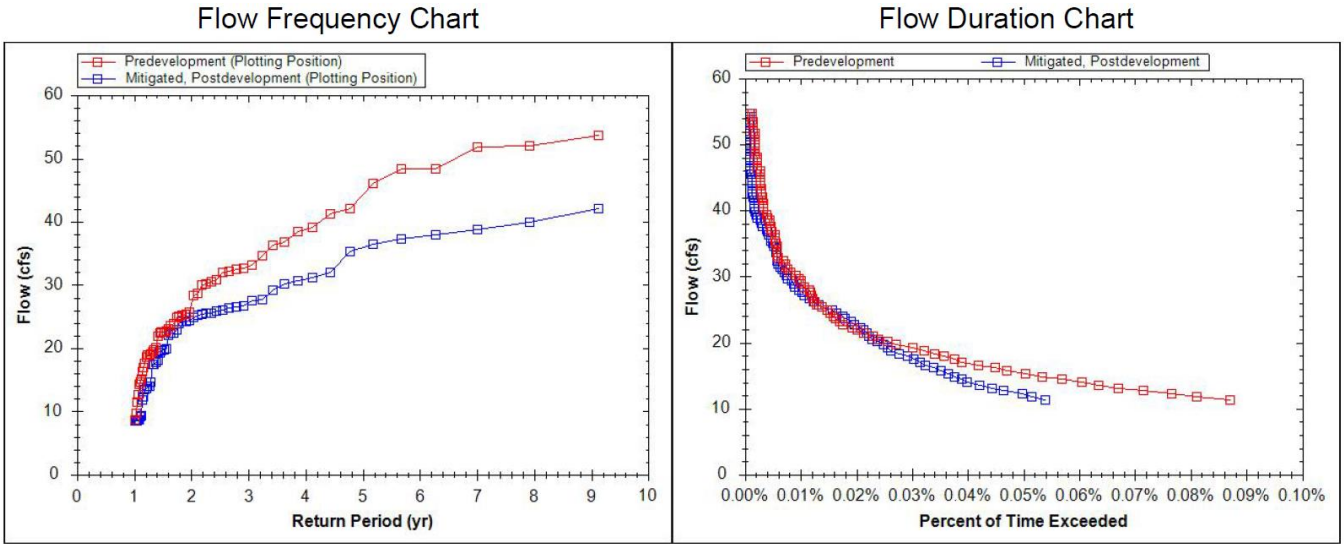

Figure 12. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to future development condition (blue).

4.3 Scenario 3: Existing to Future Conditions

The last scenario assumes that adherence to the City's design standards could be accomplished by allowing redevelopment of Town Center to adhere to predevelopment flows reflecting existing land use conditions as opposed to historic (Oak Savannah) land cover conditions. The contributing drainage area under existing conditions is 47 percent impervious and under future conditions increases to 53 percent impervious through both redevelopment and the addition of approximately 10 acres of impervious surface. As seen in Figure 13, the Town Center development plans anticipate redevelopment of many currently developed and impervious areas, which is why the amount of impervious area only increases by about 7 percent. However, all redevelopment area is subject to the City's design standards including utilization of Green Infrastructure and Low Impact Development (GI/LID) strategies to mitigate stormwater.

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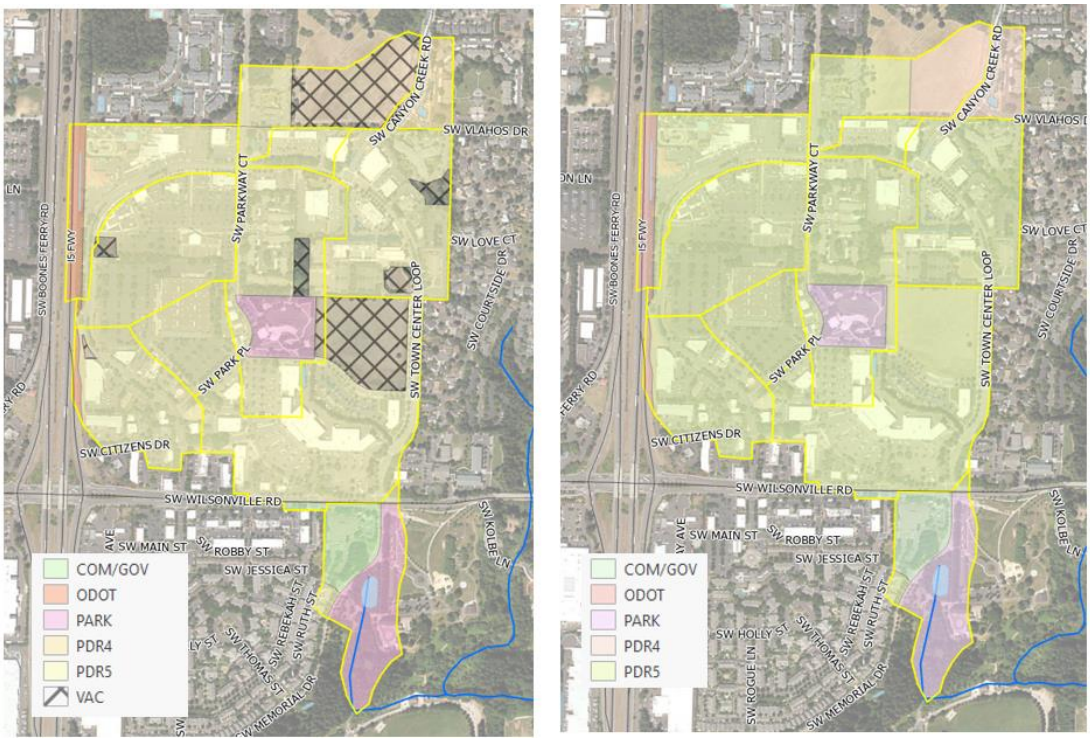

Figure 13. Existing land use at 47% impervious (left); future land use at 53% impervious (right)

The BMP Sizing Tool was run through the following scenarios outlined in Table 4 to calculate how the existing pond may handle future flows as well as design modifications that would be required.

Assuming pre-development conditions reflect existing land use, the pond as-is does not adequately meet City design standards for sizing. Some modifications to Library Pond are required, specifically the pond needs to be deepened to approximately 7.1 feet, which includes 3 feet of media at the bottom of the facility and adjustment of side slopes to 4:1 is required. Utilizing this comparison methodology, this approach requires a policy change since for the City since it redefines “pre-development” from historic (Oak Savanna) land coverage to current land use conditions.

Table 4. Scenario 3 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	7.09	13,656	Yes, sized adequately
	3:1	Auto calculate depth	6.24	18,534	Yes, sized adequately

Note: Additional analysis of slopes 2H:1V and 1H:1V were not recorded as the 4H:1V and 3H:1V slope design standard slope meets sizing requirements.

The pond schematic and structure sizing reflect a depth of 7.09 feet and 4H:1V side slopes is as follows in Figure 14 and Figure 15.

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Structure	Size
Lower Orifice Diameter	16.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	40.9 in
Upper Orifice Invert	4.8 ft
Weir Length	6.3 ft
Weir Invert	6.1 ft

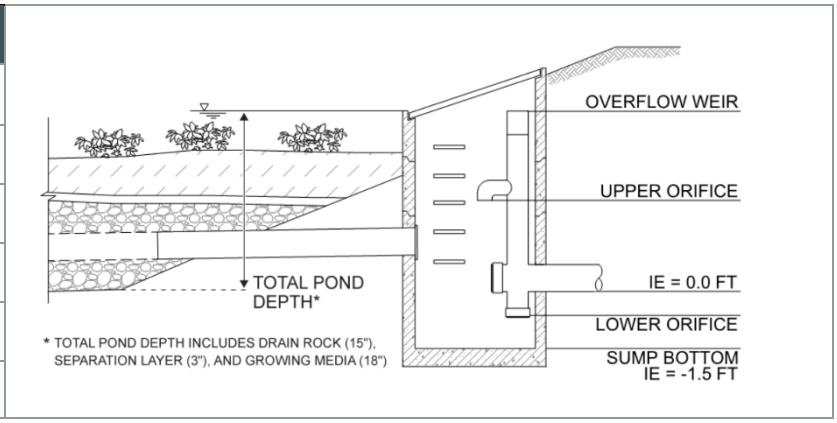

Figure 14. Scenario 3 outfall structure sizing and schematic for reduced contributing drainage area and 4H:1V sides slopes

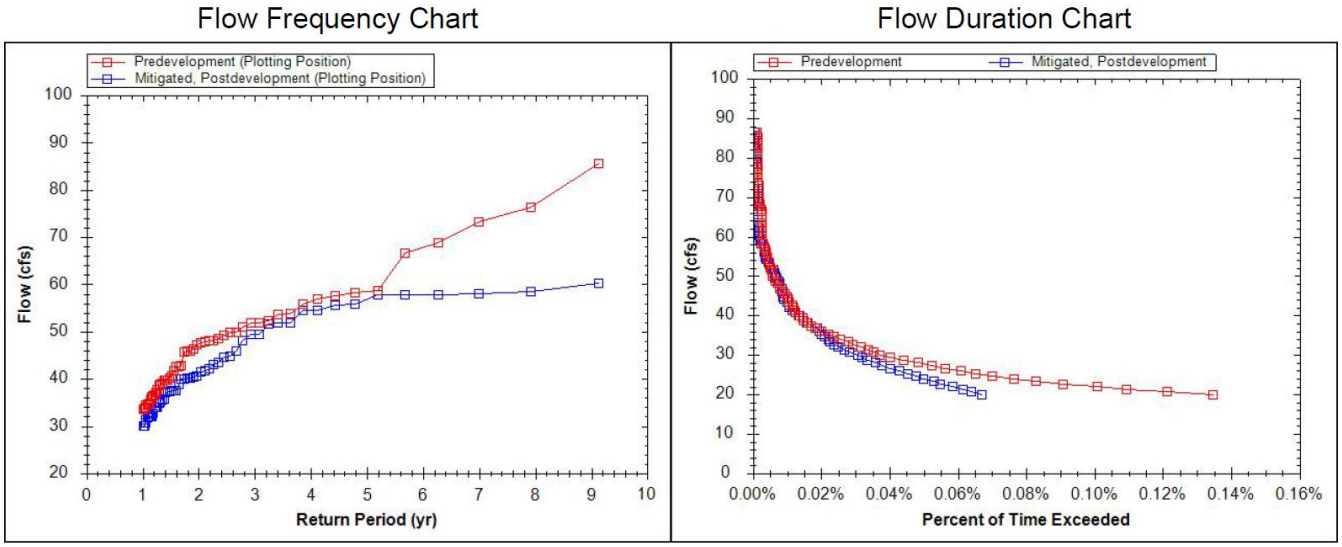

Figure 15. Flow and durations curves show adequate sizing for 4H:1V side slopes at 7.09 feet deep

Existing development conditions (red) to future development conditions (blue).

Section 5: Conclusions

Scenarios simulated using the BMP Sizing Tool for Library Pond indicate there are limited options to retrofit the pond to meet the existing stormwater design standards. Table 5 summarizes the scenarios iterated and the resulting design adjustments (retrofit) required for Library Pond based on assumptions discussed in Section 4.

Table 5. Scenario Summary							
Scenario No.	Scenario Description and Land Cover Conditions	Total Contributing Area (acres)	Meets Hydraulic Requirements?	Pond Retrofit Requirements		Meets Pond Design Criteria?	Notes
				Slope (H:V)	Depth (feet)		
1.A	Pre-Development Land Cover to Existing Land Cover	179.8	Yes	1:1	21.33	No	Pond sides are too steep and pond is too deep
1.B	Pre-Development Land Cover to Existing Land Cover	143.3	Yes	3:1	15.08	Yes	Requires onsite mitigation (retention) for 36 acres of existing impervious area
2.A	Pre-Development Land Cover to Future Land Cover	179.8	Yes	1:1	32.01	No	Pond sides are too steep, and pond is too deep
2.B	Pre-Development Land Cover to Future Land Cover	131.8	Yes	3:1	15.04	Yes	Requires onsite mitigation (retention) for 48 acres of existing impervious area
3	Existing Land Cover to Future Land Cover	179.8	Yes	4:1	7.09	Yes	Requires an established policy adjusting the definition of pre-developed land cover for Town Center redevelopment.

As seen in Table 5, Scenarios 1A and 2A are unable to meet the 2015 PWS stormwater design standards for ponds, specific to side slope (both are 1H:1V and the standard is 3H:1V) and depth. Only if onsite retention occurs for a portion of the upstream contributing drainage area will pond retrofit be able to meet the City's design standards. Only Scenario 3 allows for the entire upstream contributing drainage area to be managed by Library Pond and the pond adhere to design criteria outlined in the PWS. This pond retrofit can be designed with a more gradual 4H:1V slope, and results in a reasonable pond depth of 7.09 feet deep, which is shallower than the existing Library Pond with the 3 feet of required media in the bottom.

However, Scenario 3 mandates a policy change to adjust pre-development land cover from historic Oak Savanna to current land use conditions. This consideration will need to be evaluated by the City.

If a policy change related to the pre-development condition associated with Town Center is not possible, Scenarios 1B and 2B reflect the percentage and acreage of impervious area that would need to be retained or managed onsite using GI/LID BMP facilities and no longer routed to Library Pond. The following assumptions were made to estimate the amount of onsite infiltration planters required to offset 48 acres of impervious surfaces in the future condition (or 50% of the total new or redeveloped impervious area to Library Pond).

- Pre-development conditions are grass cover per PWS Oak Savanna designation with soil conditions reflective of the associated HSG;
- Soil and infiltration characteristics for the LID facilities are similar to that of the Library Pond, characterized as B3 (0.5-0.99 in/hr infiltration), which prompts use of an infiltration facility;
- Per Appendix B of the BMP Sizing Tool User Manual, onsite LID sizing would equate to a sizing factor of approximately 7.4, based on an area weighted average of sizing factors and soil characteristics for area removed from the Library Pond drainage area.

Using the above assumptions, onsite retention of 48 acres of impervious surface is possible using approximately 154,725 sq. ft. (3.6 acres) of infiltration planters located throughout the Town Center development. It should be noted that site-specific infiltration testing may result in adjustment of the LID sizing and/or need for a filtration-based facility to be used instead.

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Retrofit of the Library Pond would require regrading and structural improvements, resulting in a 3:1 side slope and depth of 15.04 feet. This is a conservative design approach and conservative design assumptions based on onsite management of approximately 48 acres of the contributing drainage area to Library Pond onsite. Pond sizing may vary depending on the use and characteristics of upstream LID.

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References

Stormwater & Surface Water Design & Construction Standards, Section 3, "Public Works Standards," City of Wilsonville, 2015, pp.1-104.

User's Guide for the BMP Sizing Tool, City of Wilsonville and City of Oregon City, 2017, pp. 1-23.

Wilsonville Town Center Plan, City of Wilsonville, 2019, pp. 1-104.

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Attachment A: BMP Sizing Tool Scenario Reports

1. Scenario 1 – Stage Storage Report
2. Scenario 1A – Automatically Calculated Depth Report
3. Scenario 1B – Automatically Calculated Depth Report – Reduced Area
4. Scenario 2 – Stage Storage Report
5. Scenario 2A – Automatically Calculated Depth Report
6. Scenario 2B – Automatically Calculated Depth Report – Reduced Area
7. Scenario 3 – Stage Storage Report
8. Scenario 3A – Automatically Calculated Depth Report

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WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Existing

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	5.00	30,130.0	0	150,650.0	96,416.0	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

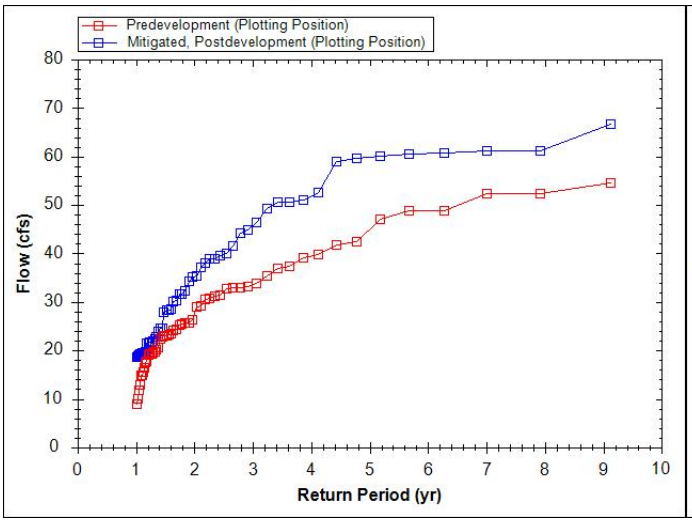
Custom Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

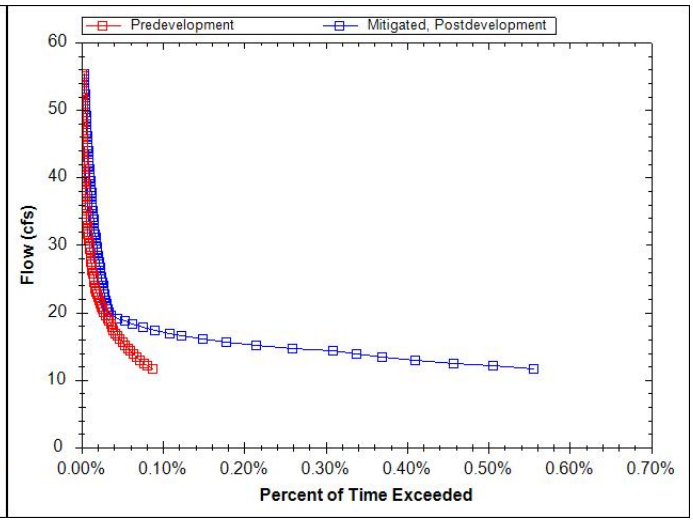
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

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3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
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5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
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5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Existing

LID Facility Sizing Details

Pond Sizing Details

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Library Pond_Existing	FCWQT	B3	23.98	30,130.0	1	541,267.4	511,485.0	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

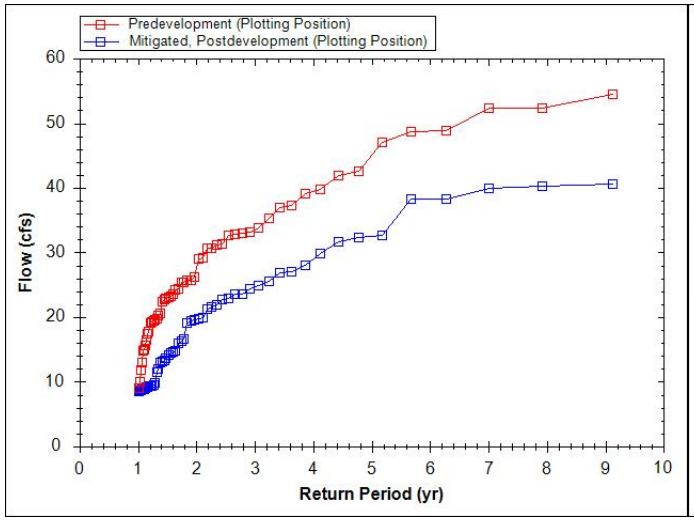
Shape Curve

Depth (ft)	Area (sq ft)
24.0	30,130.0

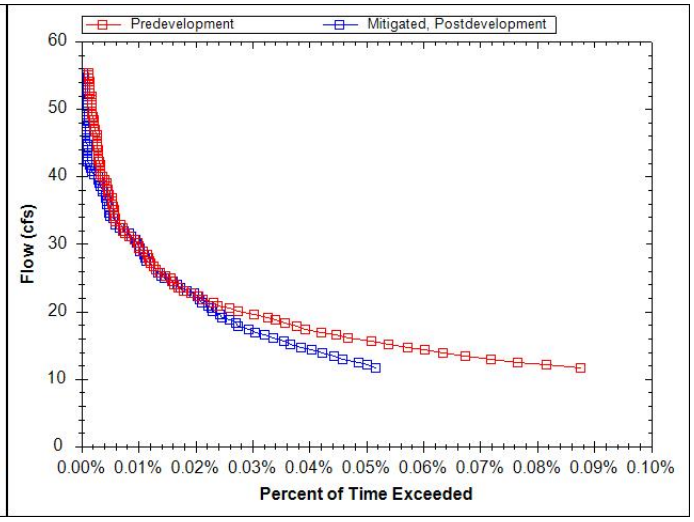
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.5
Upper Orifice Invert(ft)	16.1
Upper Orifice Dia (in)	24.5
Overflow Weir Invert(ft)	23.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	NA
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	NA
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	NA
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	NA
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	NA

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	NA
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	NA
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	NA
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	NA
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	NA
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	NA
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	NA
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	NA
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	NA
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	NA
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	NA
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	NA
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	NA

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	NA
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	NA
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	NA

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	15.08	30,130.0	3	258,676.8	243,359.2	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

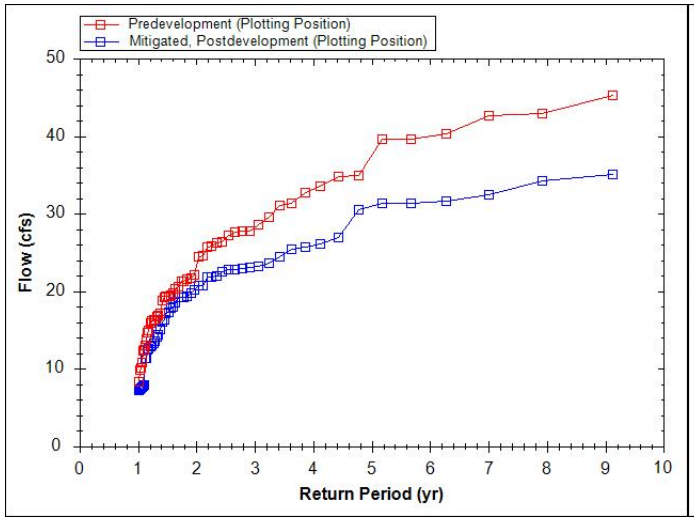
Shape Curve

Depth (ft)	Area (sq ft)
15.1	30,130.0

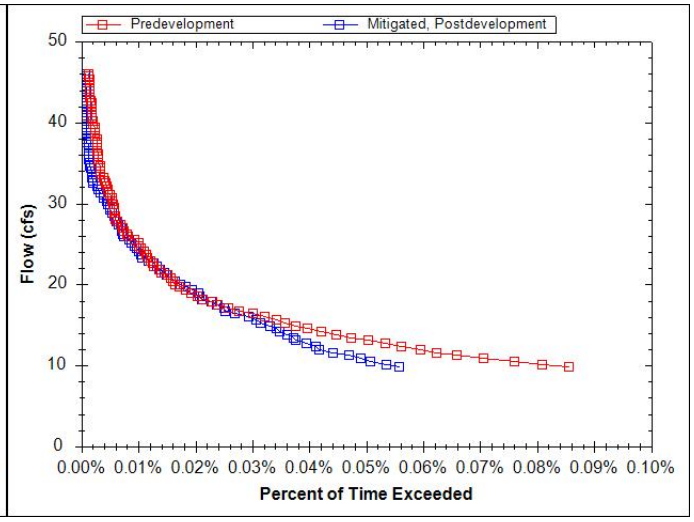
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.9
Upper Orifice Invert(ft)	9.8
Upper Orifice Dia (in)	25.2
Overflow Weir Invert(ft)	13.6
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

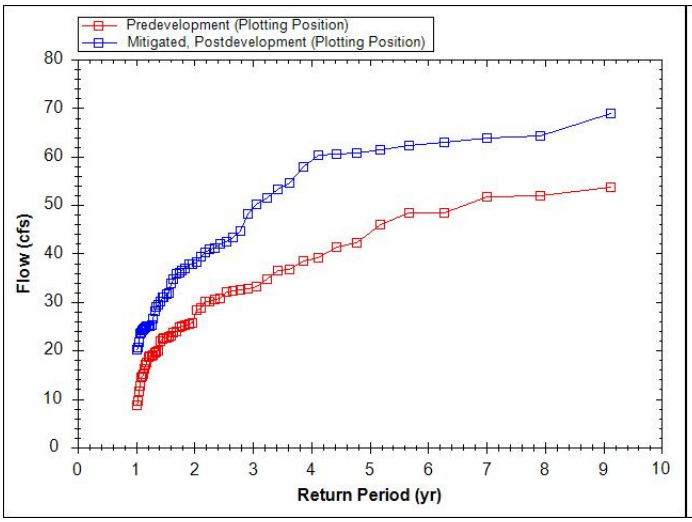
Custom Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

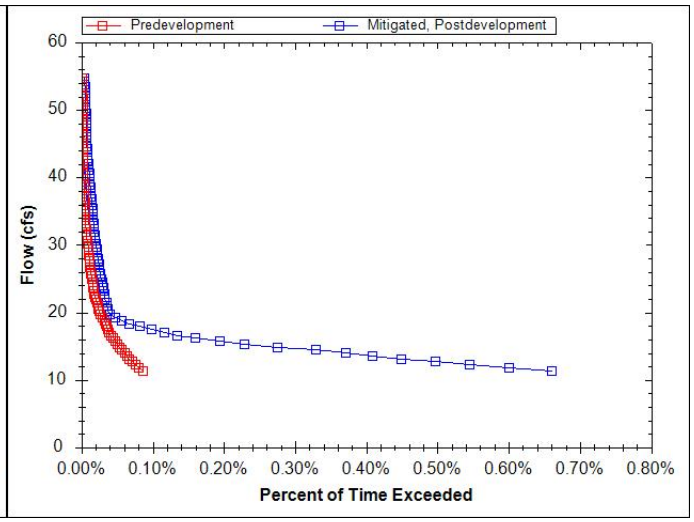
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

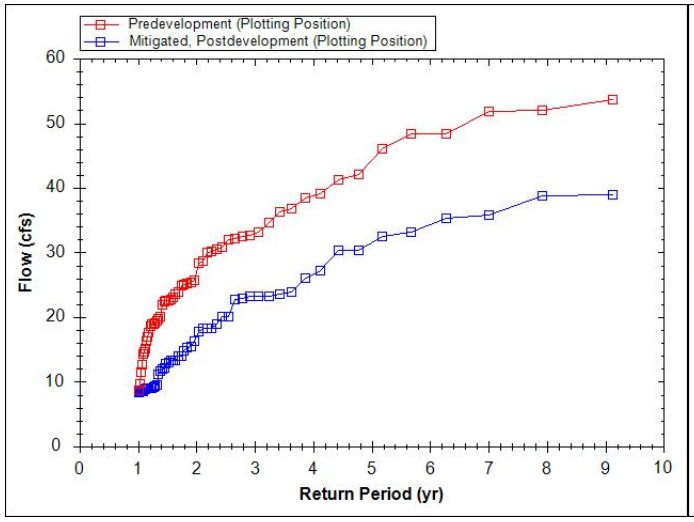
Shape Curve

Depth (ft)	Area (sq ft)
30.4	30,130.0

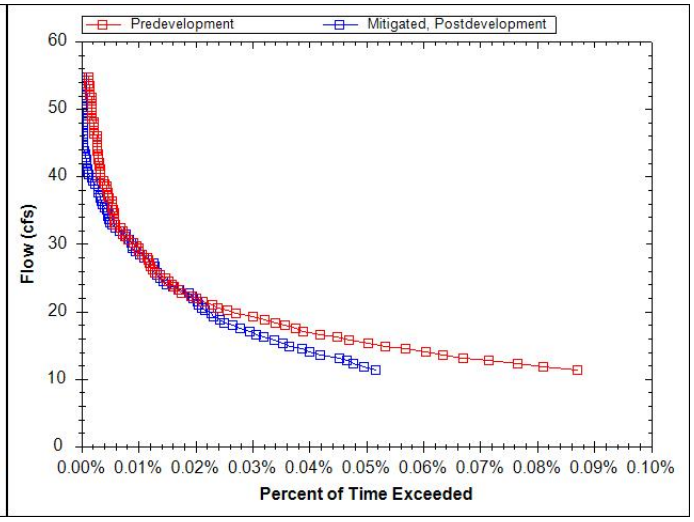
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	7.5
Upper Orifice Invert(ft)	38.8
Upper Orifice Dia (in)	19.5
Overflow Weir Invert(ft)	56.9
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Planter 2
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Planter 2
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Planter 3
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Planter 2

			ncrete		
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Planter 4
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Planter 3
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Planter 1
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Planter 3
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Planter 3
3420_B_Bdg	13,450	Grass	Roofs	B	Planter 6
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Planter 4
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Planter 3

3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Planter 2
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Planter 3
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Planter 2
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Planter 3
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Planter 3
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Planter 2
3402_C_Bdg	250,938	Grass	Roofs	C	Planter 6
3402_B_Perv	385,991	Grass	Grass	B	Library

					Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Planter 1
3402_B_Bdg	330,195	Grass	Roofs	B	Planter 5
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Planter 1
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Planter 4

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Planter 1	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	31,696.4	31,697.0	0.0
Planter 2	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	43,376.2	43,377.0	0.0
Planter 3	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	23,933.0	23,933.0	0.0
Planter 4	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	14,129.5	14,357.0	0.0
Planter 5	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	49,529.3	54,273.0	0.0
Planter 6	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	12,055.0	12,247.0	0.0

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	15.04	30,130.0	3	258,400.3	243,002.9	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

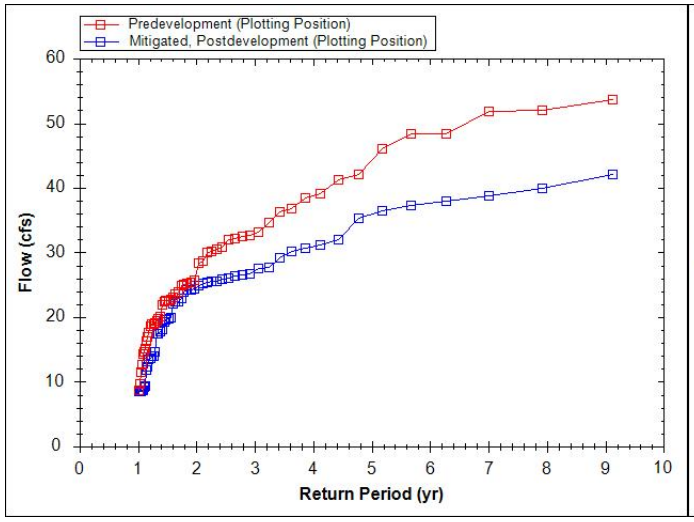
Shape Curve

Depth (ft)	Area (sq ft)
15.0	30,130.0

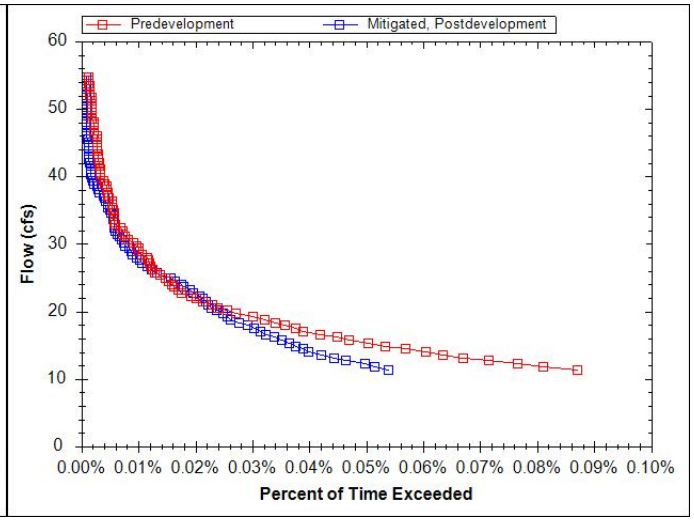
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	10.6
Upper Orifice Invert(ft)	10.1
Upper Orifice Dia (in)	27.4
Overflow Weir Invert(ft)	14.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

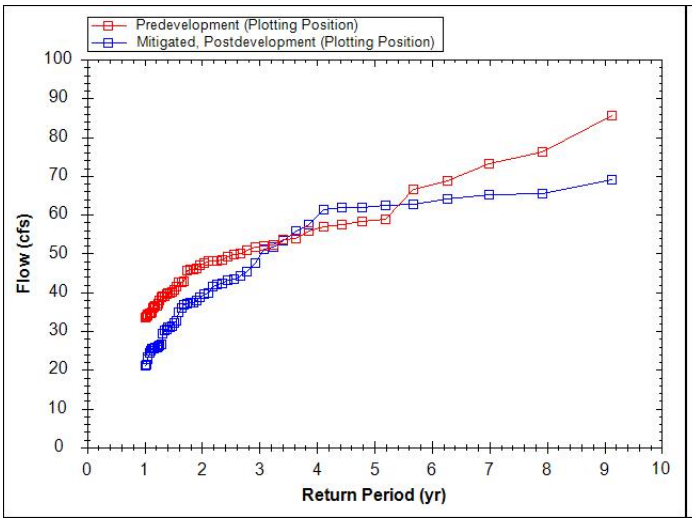
Custom Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

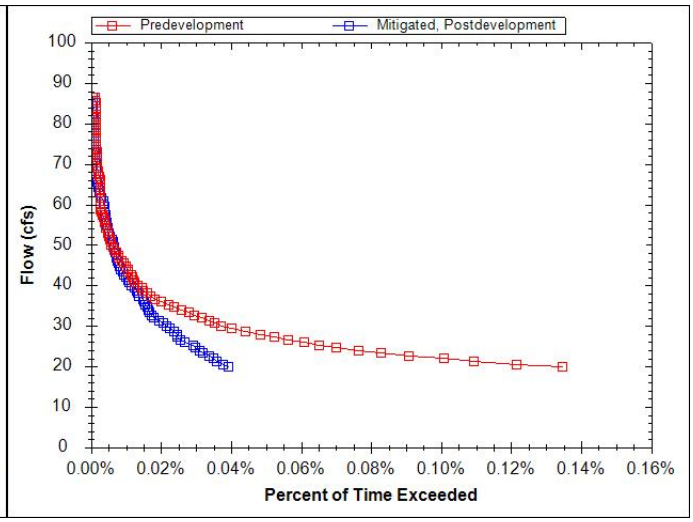
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

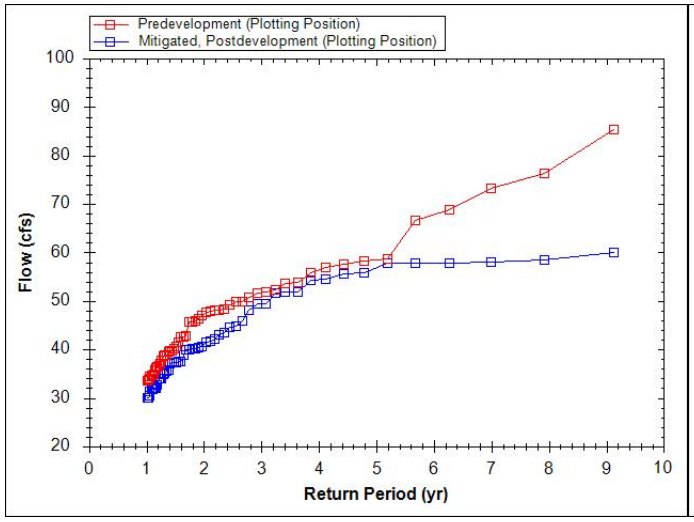
Shape Curve

Depth (ft)	Area (sq ft)
7.1	30,130.0

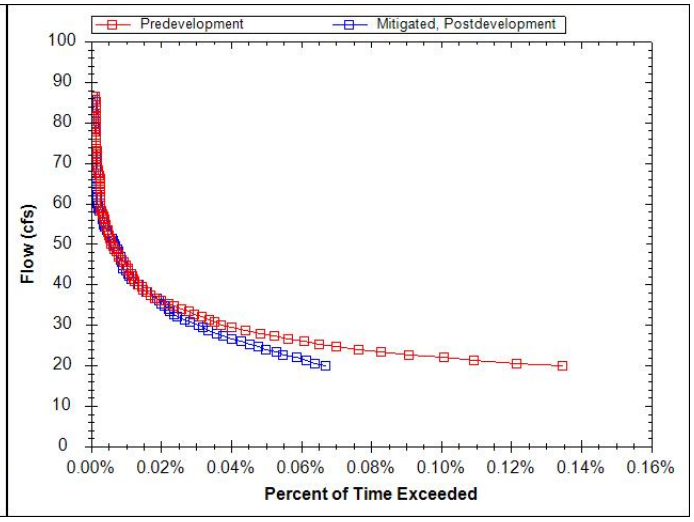
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	16.9
Upper Orifice Invert(ft)	4.8
Upper Orifice Dia (in)	40.9
Overflow Weir Invert(ft)	6.1
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



Appendix G: Staffing Evaluation

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T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan

Project No.: 156157.002.001

Staff Analysis Tables

Subject: Stormwater Staffing Analysis

Date: January 24, 2024

To: Kerry Rappold, City of Wilsonville

From: Angela Wieland, Brown and Caldwell

Prepared by: Shelby Gilmartin, EIT

Reviewed by: Angela Wieland, PE

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List of Abbreviations

BMP	Best Management Practice
CCTV	Closed-circuit Television
City	City of Wilsonville
CP	Capital Project
CREST	Center for Research in Environmental Sciences & Technologies
DEI	Diversity, Equity, and Inclusion
EC	Construction Site Runoff Control
Ft	Feet
FTE	Full-Time Employee
FY	Fiscal Year
Hr	Hour
HPSE	High Pollutant Source Facilities
ILL	Illicit Discharge Detection and Elimination
IND	Industrial and Commercial Facilities
IPM	Integrated Pest Management
LF	Linear Feet
NPDES	National Pollution Discharge Elimination System
OM	Pollution Prevention and Good Housekeeping for Municipal Operations
OSHA	Occupational Safety and Health Administration
PC	Post-Construction Site Runoff for New Development and Redevelopment
PEO	Public Education and Outreach
PI	Public Involvement
SF	Square Feet
SMP	Stormwater Master Plan
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TBD	To Be Determined
TM	Technical Memorandum (Tech Memo)
WERK	Wilsonville Environmental Resource Keepers

Assumptions

A. This staffing analysis assumes that existing City staff is able to implement the current stormwater program (pre-2022 conditions). Additional activities not previously conducted by the City under current staffing were used to create the estimates of additional staff resource needs. Additional activities include those associated with the reissued NPDES MS4 permit (2021) and implementation of the proposed Capital Projects (CP) in the Stormwater Master Plan (2023).

B. One (1) FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year.

C. Assume that 100 percent of Engineering and Permitting Costs are for use of a consultant, and 100 percent of Design/Construction Administration Costs are required for internal City staff.

D. The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021 – Sept. 30, 2026) – reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.

E. Stormwater Master Plan (SMP) implementation is projected on an annual basis and assumes a 20-year CP implementation schedule from 2024-2043, with higher project projects occurring sooner:

- High Priority (2024-2028); Medium Priority (2029-2033); and Low Priority (2034-2043).
- Capital Projects costs are averaged over the 20-year implementation period and shown as a standard annual value. While in practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.

Where applicable the following asset assumptions are divided between 1) those needed to maintain existing assets and commitments under the Stormwater Management Program (SWMP) BMPs and meet the requirements of the NPDES MS4 permit and 2) those for future assets constructed as part of the SMP Capital Projects. If not distinguished, the assumption applies to newly constructed assets.

F. **Piped Conveyance System**

- *For SWMP BMPs*: CCTV and cleaning activities were evaluated as part of the maintenance evaluation in SMP TM#1 and this program requires an additional 0.5 FTE to meet current maintenance needs.
- *For SMP CPs*: 250 ft of pipe cleaning can be accomplished per hour, and 200 ft of closed-circuit television inspections (CCTV) can be accomplished per hour. Inspection and maintenance to occur on at least 15 percent of City pipes annually (assuming cleaning/inspection will occur four times over 20-year CP cycle).
    - Perforated pipe does not require regular cleaning and inspection and is anticipated to only occur if needed.
    - Pipe connections/laterals are not included in the annual maintenance estimate.
    - Pipe inspection and maintenance activities require a 2-person crew.

G. **Manholes**

- *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
- For *SMP CPs:* 0.5 hr/facility/year is needed for maintenance of a standard manhole. 1.0 hr/facility/year is needed for inspection and maintenance of a water quality manhole.
    - Manhole inspection and maintenance activities require a 2-person crew.

H. **Catch Basins**
   - *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
   - *For SMP CPs:* 0.5 hr/facility/year is needed for maintenance.
     - Catch basin maintenance requires a 2-person crew.

I. **Vegetated Systems (swales, rain gardens, planters, etc.):**
   - *For SWMP BMPs:* Maintenance activities associated with vegetated system were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 1.25 FTE to meet maintenance needs.
   - *For SMP CPs:* 8 hr/facility/year for inspection and maintenance for public systems.
     - Vegetated system inspections and maintenance requires a 2-person crew.

J. **Ditches**: 20 ft of ditch maintenance can be accomplished per hour.
   - Maintenance is required once every 5 years.
   - Ditch maintenance requires a 2-person crew.

K. **Outfalls**: 0.5 hr/facility/year is needed for inspection and maintenance of outfalls.
   - Outfall inspection and maintenance requires a 2-person crew.

L. **Inlets/Outlets**: 0.5 hr/facility/year is needed for inspection and maintenance of inlets/outlets.
   - Inlet/outlet inspection and maintenance requires a 2-person crew.

M. **Detention Pond**: 16 hrs/facility/year is needed for inspection and maintenance of detention ponds.
   - Detention pond inspection and maintenance requires a 2-person crew.

N. **Culverts:** 2 hr/facility/year is needed for culvert cleaning and inspection.
   - Culvert inspection and cleaning requires a 2-person crew.

O. **Private Water Quality Facilities:** 4 hr/facility/year is required for inspections.
   - The City holds *Stormwater Maintenance and Access Easement Agreements* with private water quality facilities owners to actively maintain facilities in conformance with City of Wilsonville's Public Work Standards and annually inspect and report on the facility.
   - Private water quality facility inspections require a 1-person crew.

P. **Restoration/Stabilization:** Planting and bioengineered restoration/stabilization is a single installation and does not require annual maintenance.

Q. **Replacement or Removal:** Replacement or removal of assets does not require continued maintenance and is not accounted for as additional annual maintenance activity.

R. **Driveways/Pathways:** Addition of, or modifications to driveways, accessways, or paths does not require annual maintenance. These facilities will be maintained only when identified as needed.

S. **Street Sweeping:** 165 hr/year is needed for street sweeping of all curbed areas. This work is completed by a contractor.

T. **Training:** Assume general training includes 3 staff and industrial/commercial training includes 1 staff.

NOTE: Recommended Programs developed for the SMP (P-1 to P-3, and P-5 to P-6) are outlined in the SMP Table 7-1 as an annual cost only and not staff hours which is why it was removed from the Public Works/Maintenance Staffing and Community Development/Engineering Staffing sections. Program P-4 is included in *SMP Implementation - Community Development/Engineering Staffing Assessment* analysis.

NPDES MS4 Permit Driven Activities (per 2022 SWMP)

Public Works/Maintenance Staffing Assessment

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr).	3	2 hrs/yr 6 hrs/permit term	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/ equipment costs	• Organizing public outreach programs such as Adopt-a-Road and WERK Day. • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	N	No Change.			N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.						
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	N	No Change.			N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment

Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
OM-2	Routine Road Maintenance	Conduct street sweeping, maintenance, and winter weather protocols.	N	No Change.			N	• Sweep all curbed City streets monthly. • Schedule and conduct street maintenance activities during dry weather conditions. • Continue to sponsor the Adopt-a-Road program, Bulky Waste Day, and Fall Leaf Collection Day.						
			Y	Implement Winter Weather Response Plan (2021) – including snow removal, sanding, chemical application, and proper management of materials. Staff time is winter conditions dependent, assume additional 40-hrs for additional tracking of materials and activities per year.	1	40 hrs/yr	N	N/A – New requirement.	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)
OM-3	Pest Management	Follow the IPM Plan (2018) principles for public landscape maintenance.	N	No Change.			N	• Track the amount of pesticides and fertilizers applied to public property and general areas of application. • Estimate number and area of sites where the planting of native vegetation was incorporated into the maintenance activities.						
			Y	Publish annual IPM activity on City website (assume 1-hr/year).	1	1 hr/yr	N	N/A – New requirement.	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)
OM-4	Conveyance System Cleaning	Maintain and repair public stormwater conveyance system components including the storm sewer pipes,	Y	• Conduct CCTV inspection of approximately 15% of the public stormwater conveyance system (>6-inch pipe) annually. • Inspect other public conveyance systems as required.	Analysis in SMP TM#1		N	• Inspect public conveyance system annually for maintenance needs. • Maintain and repair public conveyance system as needed based on inspections.	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		manholes, outfalls, culverts, and swales.	Y	Refine the internal inspection guidelines annually to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hr/permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-5	Catch Basin Cleaning	Inspect, maintain, and repair public stormwater catch basins annually during dry season.	N	No Change.	Analysis in SMP TM#1		N	• Clean all high-priority public catch basins annually and remaining public catch basins over a 4-year period. • Inspect catch basins for maintenance and repair needs during catch basin cleaning activities. Schedule repair activities as needed, based on inspections.	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)
			Y	Refine the internal inspection guidelines to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hrs/ permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
			Y	Update tracking database during each maintenance cycle (assume 10-hr/year).	1	10 hrs/yr	N	N/A	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.	Analysis in SMP TM#1		N	• Inspect public structural controls annually; maintain and repair as needed. • Maintain GIS “atlas” for both public and private.	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)
			Y	In conjunction with post-construction standards updates, by Dec. 1, 2024, update the City’s internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) used in the City (assume 40-hr for refinement, review and periodic update).	1	40 hrs by Dec. 2024	N	N/A	20 hrs (0.012 FTE)	20 hrs (0.012 FTE)	--	--	--	8 hrs (0.005 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) annually over the permit term.	1	6 hrs/permit term	N	N/A	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)
NPDES MS4 Driven Activities Subtotal of Public Works/Maintenance Staff Cost								Annual Staff Time (Hours)	3,395.4	3,395.4	3,375.4	3,375.4	3,375.4	3,383.4
								Annual Staff Time (FTE)	2.06	2.06	2.05	2.05	2.05	2.05
								Staffing contingency (FTE) (estimated at 20% to account for unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
								NPDES MS4 Public Works/Maintenance Activities Sub-Total staff cost (FTE)	2.47	2.47	2.46	2.46	2.46	2.46

Community Development/Engineering Staffing Assessment

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-1	Public Education Participation	• Promote public awareness through City newsletters, doorhangers, social media, and website. • Annually publish 2 articles/year in the Wilsonville Business Newsletter and 3 articles/year educating the public on stormwater issues.	N	No change.			Y – printing	During the 2021-22 reporting year, 5 educational/informational articles were published in the City newsletter and 4 were posted to the City's social media pages.						
		Engage the City's DEI Committee to identify additional language translations needs of the public, if necessary.	Y	Twice over permit term engage with the DEI Committee to verify that materials are translated into representative languages for the public. Assume two 1-hour meetings.	1	2 hrs/ permit term	N	N/A – Committee was formed in 2021.	--	1 hr (0.001 FTE)	--	1 hr (0.001 FTE)	--	0.4 hrs (0.001 FTE)
		Support regional public education campaigns and programs.	N	No change (varies by year).			Y - financial support	• Financially support regional public education campaigns and programs. • During the 2021-22 reporting year, the City contributed $15,000 to Friends of Trees.						
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr). Assume 40-hr/yr to develop trainings.	2	40 hrs/yr	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment

Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Staff attend Clackamas County co-permittee meetings to engage in collective efforts related to education, monitoring, and NPDES requirements.	N	No change.			Y – Cost sharing (as applicable).	Coordinate with other Clackamas County co-permittees regarding regional water quality efforts through scheduled co-permittee meetings.						
PI-1	Public Involvement and Participation	Provide opportunity for public participation in the development, implementation, and modification of the City's stormwater management program.	Y	• Maintain a publicly accessible website with the SWMP, Monitoring Plan, annual reports, program contact information, educational/reference materials, and reporting requirements for illicit discharges. • Provide a 30-day public comment period, and consider comments received for updates to the Monitoring Plan, the SWMP, and other strategy documents as required. • Maintain MS4 Document Library on website. Assume 8 hr/year for website management.	1	8 hrs/yr	N	N/A – new requirement.	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/equipment costs	• Organizing public outreach programs (e.g., Adopt-a-Road and WERK Day). • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
		Review and update the City's IDDE SOP to clarify enforcement procedures and response timeframes in conjunction with the NPDES MS4 permit.	Y	Review and update IDDE SOP by Dec. 1, 2023. Assume 8-hrs to review and update annually. Consult will support 2023 update.	1	8 hr/yr	N	Implement existing IDDE SOP (2012).	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
								and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-3	MS4 Mapping	Continually maintain the online GIS mapping and digital inventory.	Y	• Continually maintain the online GIS mapping for public viewing. • Add municipal structural stormwater controls within 1 year of receiving the as-builts. • As necessary, create a tracking system for repeat illicit discharges. Assume 24-hr/year for updates.	1	24 hr/yr	N	N/A – new requirement.	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	Y	By Dec. 1, 2023, review and update high priority locations and criteria, as necessary, based on outcomes from inspections and other public reporting. Update locations on mapping and in the IDDE SOP (assume 10 hours for review).	1	10 hrs by Dec. 2023	N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.	10 hrs (0.006 FTE)	--	--	--	--	2 hrs (0.001 FTE)
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	Y	Report any updates or modifications to the 2020 Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (assume 20 hrs for review).	1	20 hrs by Dec. 2024	N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	--	--	--	4 hrs (0.002 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment

Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need: Number of City Staff	Implementation Need: Total Staff Time	Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
		Update enforcement response procedures and escalating enforcement language.	Y	By Dec. 1, 2023, review and, if necessary, update enforcement response procedures and escalating enforcement specific to erosion and sediment control in City Code and Public Works Standards (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
PC-1	Stormwater Planning and Development Review	The City provides land use and planning review to meet goals related to the management of natural resources, transportation, housing, public facilities and services, and open spaces and parks.	N	Continue to require all new and redevelopment projects that add or replace 5,000 SF or more of impervious surface to implement the City's Stormwater and Surface Water Design and Construction Standards Review plans for compliance with stormwater requirements.			N	• Track number of development applications reviewed for compliance with the City's stormwater requirements. • Track new and redeveloped impervious surface in conjunction with annual reporting requirements.						
			Y	By Dec. 1, 2023, as necessary, review and document updates to the City's LID Guidebook and Public Works Standards to refine preferred LID/GI approaches and strategies for development within the ROW (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
			Y	By Dec. 1, 2024, as necessary, update Section 3 of the Public Works Standards to include reference to either the Numeric Stormwater Retention Requirement (NSSR) or Alternative Site Performance Standards (assume 100-hrs for review). Consultant will support update.	2	100 hrs by Dec. 2024	N	N/A	50 hrs (0.03 FTE)	50 hrs (0.03 FTE)	--	--	--	20 hrs (0.012 FTE)
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
			Y	Ensure litter control language is included in new event contracts and facility rental agreements (assume 8-hr for language draft and inclusion).	1	8 hrs (immediate update)	N	N/A – New requirement.	8 hrs (0.005 FTE)	--	--	--	--	1.6 hrs (0.001 FTE)
			Y	By Dec. 1, 2024, review and update the SWPPP for consistency with current use, practices, and new facility installations (assume 40-hr for review and 8-hr per year for updates). Consultant will support update.	1	40 hrs by Dec. 2024 + 8 hrs/yr	N	N/A	28 hrs (0.017 FTE)	28 hrs (0.017 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	16 hrs (0.010 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.			N	• Inspect public structural controls annually and maintain and repair as needed. • Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.						
			Y	In conjunction with updates to post-construction standards, by Dec. 1, 2024, update the City's internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) being used in the City (assume 120-hr for review).	1	120 hrs by Dec. 2024	N	N/A	60 hrs (0.036 FTE)	60 hrs (0.036 FTE)	--	--	--	24 hrs (0.015 FTE)
OM-7	Private Structural Facility Operation and Maintenance	The City requires maintenance of private structural stormwater controls through implementation of the Stormwater Maintenance and Access Easement agreements and submittal of a Stormwater Operations and Maintenance Plan.	N	No Change.			N	• Track agreements on file for private structural control facilities. • Track number of private annual inspection and maintenance reports received annually. • Maintain GIS database for private structural facilities.						
			N	No change, but as additional development and new facilities are added, additional time will be needed for tracking and inspection documentation (assume 8-hr/year for additional facility tracking).	1	8 hrs/yr	N	• Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS "atlas" for both public and private.	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-8	Develop Planning Documents in Support of Water Quality	The City assesses flood control, transportation, and other infrastructure projects during planning stages to identify and mitigate potential negative impacts and/or enhance benefits for the water quality of receiving water bodies.	Y	• By Dec. 1, 2023, complete public outreach related to the updated 2023 Stormwater Master Plan (assume 30-hr for outreach).	1	30 hrs by Dec. 2023	N	N/A	30 hrs (0.018 FTE)	--	--	--	--	6 hrs (0.004 FTE)
			Y	• Implement water quality, flood control, and natural resource CIPs in accordance with the effective Stormwater Master Plan. • Track the status of the City's Stormwater Master Planning efforts. • Track the number of CIP/retrofit projects implemented each year and discuss the added benefit (water quality,	1	40 hrs/yr	N	N/A	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
				• hydromodification, habitat restoration, etc.) of each. • Map the location and drainage area of water quality CIPs/retrofits as they are constructed. Assume 40-hrs/year for CIP implementation and tracking.										
			Y	By Dec. 1, 2023, document and submit a summary of outcomes the City's 2015 Retrofit Strategy and 2015 Hydromodification Assessment, in accordance with the 2023 Stormwater Master Plan (assume 20-hrs for review).	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) over permit term. • Assume 6-hrs annually for engineer.	1	6 hrs/yr	N	N/A	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)
NPDES MS4 Permit Driven Activities Subtotal of Community Development/Engineering Staff Cost								Annual Staff Time (Hours*)	430	322	182	182	182	260
								Annual Staff Time (FTE)	0.26	0.19	0.11	0.11	0.11	0.16

**Summary values rounded to nearest whole hour.*

Note: No staffing contingency includes for Community Development/Engineering NPDES MS4 Permit Driven Activities .

NPDES MS4 Permit Driven Activities (per 2022 SWMP) Summary

NPDES MS4 Permit Driven Activities – Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Annual NPDES MS4 Activities Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	Public Works/Maintenance Annual Staff Time	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for Public Works/Maintenance (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	Community Development/Engineering	0.26	0.19	0.11	0.11	0.11	0.16
	Total Staff Time (NPDES MS4 Activities)	2.73	2.66	2.57	2.57	2.57	2.62

Stormwater Master Plan Implementation

Master Plan implementation staffing timing varies based on CP implementation schedule and prioritization. Staffing assessment tables averages projects over 20-year planning period.

Public Works/Maintenance Staffing Assessment

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
BC-1	Library Pond Retrofit	Clear, regrade, and replant 0.7-acre detention pond.	Y	M	16 .0	2	32.0	Y	33.0	0.02
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 70 LF of new perforated pipe.	N	F						
		Replace 70 LF of pipe.		Q						
		Install driveway for maintenance access.		R						
BC-2	Ash Meadows Flow Mitigation	Clear, regrade, and replant 1.3-acres of drainageway.	Y	M	16.0	2	32.0	Y	33.0	0.02
		Install 1 inlet.		L	0.5	2	1.0			
		Replace 175 LF of pipe.		Q						
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	Clear, regrade, and replant 1.6-acres of storage facility (detention pond).	Y	M	16.0	2	32.0	Y	115.3	0.07
		Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes).		I	40.0	2	80.0			
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 350 LF of pipe.		F	0.6	2	1.3			
		Install 1 new manhole.		G	0.5	2	1.0			
BC-4	Boeckman Creek Stabilization at Colvin Lane	Install 70 LF of new pipe.	Y	F	0.1	2	0.2	Y	16.2	0.01
		Reconstruct 150 LF of vegetated swale.		I	8.0	2	16.0			
		Install planting and bioengineered restoration of 600 LF of stream corridor.	N	P						
		Remove 30 LF of existing outfall pipe.		Q						
BC-5	Memorial Park Swale Retrofit	Install 2,400 SF vegetated water quality swale.	Y	I	8.0	2	16.0	Y	21.2	0.013
		Install 50 LF of new pipe.		F	0.1	2	0.2			
		Install 1 swale inflow spreader.		L	0.5	2	1.0			
		Install 1 overflow structure.		L	0.5	2	1.0			
		Install 1 new outfall.		K	0.5	2	1.0			
		Replace 1 manhole with a flow splitting/WQ manhole.		G	1.0	2	2.0			
		Replace 110 LF of pipe.	N	Q						
		Install 140 LF of perforated pipe.		F						
		Replace 2 manholes.		Q						
		Fill existing 1,500 SF swale and revegetate area.		P						

SMP Implementation - Public Works/Maintenance Staffing Assessment

Stormwater program implementation (post-2022)

CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Remove 210 LF of existing pipe.		Q						
		Remove 1 manhole.		Q						
		Remove 1 swale inlet structure.		Q						
		Remove 1 outlet structure.		Q						
BC-6	Gesellschaft Water Well Channel Restoration	Install 480 LF of new pipe.	Y	F	0.9	2	1.7	Y	4.7	0.003
		Install 2 new manholes.		G	1.0	2	2.0			
		Install 1 outfall.		K	0.5	2	1.0			
		Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	N	P						
CLC-1	Day Road Stormwater Improvements	Install 200 LF of open-bottom or box culverts (4 total).	Y	N	8.0	2	16.0	Y	27.1	0.016
		Install 180 LF of culverts (1 total).		N	2.0	2	4.0			
		Install 600 LF of pipe.		F	1.1	2	2.2			
		Install 2 manholes.		G	0.5	2	2.0			
		Install 3 trash racks at pipe inlets.		L	0.5	2	3.0			
		Regrade and reconstruct approx. 4,500 feet of open channel.	N	P						
		Replace 1,800 LF of pipe with 600 LF of pipe.		Q						
		Replace 7 manholes.		Q						
		Remove 50 LF of existing culvert.		Q						
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	Replace 70 LF of box culvert.	N	N				Y	0.0	0.0
		Install 70 LF of planting and bioengineered restoration/stabilization measures along path.		P						
		Repave 600 SF of pedestrian path.		R						
CLC-3	Garden Acres Pond Retrofit	Install 1 flow diversion structure.	Y	L	0.5	2	1.0	Y	35.0	0.021
		Install 250 LF of new pipe.		F	0.5	2	1.0			
		Install 1 outlet control structure.		L	0.5	2	1.0			
		Clear, regrade, and replant 0.9-acres of pond.		M	16.0	2	32.0			
		Remove 25,600 CY of fill from existing pond.	N	Q						
		Install 50 LF of perforated pipe.		F						
NC-1	Frog Pond East and South Conveyance Pipe Installation	Install 2,360 LF of new pipe.	Y	F	4.2	2	8.5	Y	10.5	0.006
		Install 1 outfall.		K	0.5	2	1.0			
		Install 7 manholes.		G	0.5	2	1.0			
WR-1	SW Willamette Way/ Morey's Landing Stormwater Improvements	Clear, grade, and replant 0.12-acres of raingarden.	Y	I	8.0	2	16.0	Y	18.4	0.011
		Install 1 flow control diversion structure.		L	0.5	2	1.0			
		Install 120 LF of new pipe.		F	0.2	2	0.4			

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Install 1 manhole.		G	0.5	2	1.0			
		Replace 1,330 LF of pipe.	N	Q						
		Remove existing bubbler.		Q						
		Replace 7 manholes.		Q						
		Replace field inlet.		Q						
WR-2	Miley Road Stormwater Improvements	Install 4,195 of new pipe.	Y	F	7.6	2	15.1	Y	30.1	0.018
		Install 15 manholes.		G	7.5	2	15.0			
		Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert.	N	P						
		Replace 400 LF of pipe.		Q						
		Replace 1 manhole.		Q						
		Replace 1 area drain.		Q						
		Extend 240 LF of existing main connections to the new pipe alignment.		F						
		Reconnect 13 existing curb inlets.		F						
WR-3	Rose Lane Culvert Replacement	Install 80 LF of new pipe.	Y	F	0.1	2	0.2	Y	2.2	0.001
		Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch.		J	1.0	2	2.0			
		Remove 25 LF of pipe.	N	Q						
WR-4	Charbonneau East Stormwater Improvements	Replace 3,765 LF of pipe.	N	Q				Y	0.0	0.0
		Replace 18 manholes.		Q						
		Replace 1 outfall.		Q						
WR-5	Charbonneau West Stormwater Improvements	Install 4 manholes.	Y	G	2.0	2	4.0	Y	4.0	0.002
		Replace 34 manholes.	N	Q						
		Replace 6,770 LF of pipe.		Q						
		Replace 2 outfalls.		Q						
City-1	Flow Monitoring and Rain Gauge Installation Hydromodification Assessment and Stream Survey	Install 1 rain gauge.	Y	Consultant Support				Y	Consultant Support	
		Install 3+ flow meters.								
City-2	Porous Pavement Pilot Study	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	Consultant Support				Y	Consultant Support	
City-3	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
City-4	Flow Monitoring and Rain Gauge Installation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
						SMP Implementation Subtotal of Public Works/Maintenance Staff Cost	Average Annual Staff Time (hours)		350.7	
							Average Annual Staff Time (FTE)		0.21	

Community Development/Engineering Staffing Assessment

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
BC-1	Library Pond Retrofit	• Clear, regrade, and replant 0.7-acre detention pond. • Install 1 new outlet structure. • Install 70 LF of new perforated pipe. • Replace 70 LF of pipe. • Install driveway for maintenance access.	Y	$1,880,000	$190,000	0.95	0.048	1,567.5	78.4
BC-2	Ash Meadows Flow Mitigation	• Clear, regrade, and replant 1.3-acres of drainageway. • Install 1 inlet. • Replace175 LF of pipe.	Y	$2,940,000	$234,000	1.17	0.059	1,930.5	96.5
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	• Clear, regrade, and replant 1.6-acres of storage facility (detention pond). • Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes). • Install 1 new outlet structure. • Install 350 LF of pipe. • Install 1 new manhole.	Y	Ph 1: $4,860,000	Ph 1: $322,000	1.61	0.081	2,656.5	132.8
				Ph 2: $7,210,000	Ph 2: $384,000	1.92	0.096	3,168.0	158.4
BC-4	Boeckman Creek Stabilization at Colvin Lane	• Install 70 LF of new pipe. • Reconstruct 150 LF of vegetated swale. • Install planting and bioengineered restoration of 600 LF of stream corridor. • Remove 30 LF of existing outfall pipe.	Y	$410,000	$38,000	0.19	0.010	313.5	15.7
BC-5	Memorial Park Swale Retrofit	• Install 2,400 SF vegetated water quality swale. • Install 50 LF of new pipe. • Install 1 swale inflow spreader, 1 overflow structure and 1 new outfall. • Replace 1 manhole with a flow splitting/WQ manhole. • Replace 110 LF of pipe. • Install 140 LF of perforated pipe. • Replace 2 manholes. • Fill existing 1,500 SF swale and revegetate area. • Remove 210 LF of existing pipe. • Remove 1 manhole, 1 swale inlet structure, and 1 outlet structure.	Y	$910,000	$85,000	0.43	0.021	701.3	35.1
BC-6	Gesellschaft Water Well Channel Restoration	• Install 480 LF of new pipe. • Install 2 new manholes. • Install 1 outfall. • Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	Y	$400,000	$38,000	0.19	0.010	313.5	15.7

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
CLC-1	Day Road Stormwater Improvements	• Install 200 LF of open-bottom or box culverts (4 total). • Install 180 LF of culverts (1 total). • Install 600 LF of pipe. • Install 2 manholes. • Install 3 trash racks at pipe inlets. • Regrade and reconstruct approx. 4,500 feet of open channel. • Replace 1,800 LF of pipe with 600 LF of pipe. • Replace 7 manholes. • Remove 50 LF of existing culvert.	Y	Ph 1: $8,020,000	Ph 1: $405,000	2.03	0.101	3,341.3	167.1
				Ph 2: $3,930,000	Ph 2: $370,000	1.85	0.093	3,052.5	152.6
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• Replace 70 LF of box culvert. • Install 70 LF of planting and bioengineered restoration/stabilization measures along path. • Repave 600 SF of pedestrian path.	Y	$290,000	$35,000	0.18	0.009	288.8	14.4
CLC-3	Garden Acres Pond Retrofit	• Install 1 flow diversion structure. • Install 250 LF of new pipe. • Install 1 outlet control structure. • Install 50 LF of perforated pipe. • Clear, regrade, and replant 0.9-acres of pond. • Remove 26,500 CY of fill from existing pond.	Y	$3,780,000	$302,000	1.51	0.076	2,491.5	124.6
NC-1	Frog Pond East and South Conveyance Pipe Installation	• Install 2,360 LF of new pipe. • Install 1 outfalls. • Install 7 manholes.	Y	$4,090,000	$414,000	2.07	0.104	3,415.5	170.8
WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements	• Clear, grade, and replant 0.12-acres of raingarden. • Install 1 flow control diversion structure. • Install 120 LF of new pipe. • Install 1 manhole. • Replace 1,330 LF of pipe. • Remove existing bubbler. • Replace 7 manholes. • Replace field inlet.	Y	Ph 1: $2,310,000	Ph 1: $233,000	1.17	0.058	1,922.3	96.1
				Ph 2: $1,080,000	Ph 2: $109,000	0.55	0.027	899.3	45.0

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
WR-2	Miley Road Stormwater Improvements	• Install 4,195 of new pipe. • Install 15 manholes. • Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert. • Replace 400 LF of pipe. • Replace 1 manhole. • Replace 1 area drain. • Extend 240 LF of existing main connections to the new pipe alignment. • Reconnect 13 existing curb inlets.	Y	Ph 1: $820,000	Ph 1: $77,000	0.39	0.019	635.3	31.8
				Ph 2: $10,510,000	Ph 2: $470,000	2.35	0.118	3,877.5	193.9
WR-3	Rose Lane Culvert Replacement	• Install 80 LF of new pipe. • Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch. • Remove 25 LF of pipe.	Y	$200,000	$35,000	0.18	0.009	288.8	14.4
WR-4	Charbonneau East Stormwater Improvements	• Replace 3,765 LF of pipe. • Replace 18 manholes. • Replace 1 outfall.	Y	Ph1: $600,000	Ph 1: $50,000	0.25	0.013	412.5	20.6
				Ph 2: $4,440,000	Ph 2: $449,000	2.25	0.112	3,704.3	185.2
WR-5	Charbonneau West Stormwater Improvements	• Install 4 manholes. • Replace 34 manholes. • Replace 6,770 LF of pipe. • Replace 2 outfalls.	Y	$10,370,000	$488,000	2.44	0.122	4,026.0	201.3
P-4[E]	Charbonneau Repair/ Replacement Program	• Replace 30,620 LF of pipe. • Replace 153 manholes.	Y	$38,360,000	$3,879,000	19.40	0.970	32,001.8	1,600.1
City-1	Flow Monitoring and Rain Gauge Installation	• Install 1 rain gauge. • Install 3+ flow meters.	Y	TBD, project will vary		Consultant Support			
City-2	Hydromodification Assessment and Stream Survey	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	TBD, project will vary		Consultant Support			
City-3	Porous Pavement Pilot Study	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
City-4	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
SMP Implementation Subtotal of Community Development/Engineering Staff Cost				Total Staff Time		43.04 FTE / (71,008 hrs)			
				Annual Average Staff Time [B]		2.15 FTE / (3,550 hrs)			
				City Engineering Staff already designated for Capital Project work [C]		*1.0 FTE*			
				Additional Annual Average Community Development/Engineering Staff Time Needed [D]		**1.15 FTE**			

[A] *Most projects use a 13.5% multiplier for Design/Construction Administration, but a select group of projects were designated by the City to use a 3.5% + $200K value instead to better represent anticipated conditions.*

The projects with the adjusted multiplier include BC-3 Phases 1 & 2, CLC-1 Phase 1, CLC-3, WR-2 Phase 2, and WR-5.

WR-4 Phase 1 was designated by the City to use a 25% multiplier for Design/Construction Administration.

[B] *Summary values rounded to nearest whole hour.*

[C] *The City already has 1.0 FTE designated to work on Capital Projects, this amount was subtracted from the total calculated staff time.*

[D] *This value represents the additional annual average Community Development/Engineering staffing need of the City to complete the Capital Projects.*

[E] *Proposed program efforts are generally anticipated to be conducted using existing staffing resources or within allocated annual budgets. The Charbonneau R/R Program (P-4) will require dedicated City Engineering resources to schedule and manage specific contracts to adhere to the anticipated 20-year program duration. As such, Design/ Construction Administration costs were specifically calculated for this program and used to inform the required staffing needs.*

Stormwater Master Plan Staffing Summary

SMP Implementation - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary						
	Annual SMP Implementation Staff Cost Schedule (FTE)					
	2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	0.21	0.21	0.21	0.21	0.21	0.21
Community Development/Engineering	1.15	1.15	1.15	1.15	1.15	1.15
Total Staff Time	1.36	1.36	1.36	1.36	1.36	1.36

Combined Staffing Assessment Summary

Combined - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Combined Annual Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for NPDES MS4 Driven Activities (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	SMP Implementation	0.21	0.21	0.21	0.21	0.21	0.21
	Public Works/Maintenance Staffing Summary (FTE)	2.68	2.68	2.67	2.67	2.67	2.67
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.26	0.19	0.11	0.11	0.11	0.16
	SMP Implementation	1.15	1.15	1.15	1.15	1.15	1.15
	Community Development/Engineering Staffing Summary (FTE)	1.41	1.34	1.26	1.26	1.26	1.31

Appendix H: Comprehensive Plan Review

Brown AND Caldwell

Comment Log

6500 SW Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville
Project Title: Stormwater Master Plan
Project No.: 156157
Subject: Review of Wilsonville Comprehensive Plan
Date: December 16, 2021

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
1	K. Reininga	C-8	Storm Drainage Plan Paragraph 2, Line 2	Add other parameters here [currently includes temperature and turbidity] like metals, toxics, nutrients…
2	K. Reininga	C-8	Storm Drainage Plan Paragraph 3, Line 2	Remove word 'detention.'
3	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 2	Include mention of water quality.
4	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 3	Add "Prepared in X and updated in X" after Stormwater Master Plan.
5	K. Reininga	C-8	Policy 3.1.7	The need to prioritize green infrastructure and infiltration should be reflected in the policy statement. It may be preferred to keep language general and say compliance with the City's standards is required and then those priorities reside there. Or, an implementation measure could be added to address the new permit requirements for LID and retention. Numbering appears to be incorrect, as this should be Policy 3.1.9.
6	K. Reininga	C-8	Policy 3.1.7 Paragraph 1, Line 6	Add "peak rate" after "volume".
7	K. Reininga	C-9	Implementation Measure 3.1.7.b, Line 3	Add Municipal Separate Storm Sewer System (MS4) before the word permit as there are other types of NPDES permits.
8	K. Reininga	C-9	Implementation Measure 3.1.7.c, Line 9	Remove word 'detention.'
9	K. Reininga	C-9	Implementation Measure 3.1.7.e	City to confirm this implementation measure is still applicable.
10	K. Reininga	C-9	Implementation Measure 3.1.7.f, Line 3	Clarification need. It is not clear what Option A is referring to.
11	K. Reininga	C-10	Implementation Measure 3.1.7.h, Line 3	"Development Review Board" - Is this still the appropriate reference?

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
12	K. Reininga	C-10	Implementation Measure 3.1.7.k, Line 5	Has this now been done? Reference: "For that area along Coffee Lake Creek, a hydrology study to establish the 100-year flood elevation will be required prior to development approval."
13	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 1	Insert word "peak" in single-storm drainage runoff.
14	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 5	Revise to say stormwater management facilities here instead of detention or retention facilities.
15	K. Reininga	C-11	Implementation Measure 3.1.7.n, Line 7	Has this been done? "The appropriate criteria will be established and implemented through the City's Public Works Standards."
16	K. Reininga	C-11	Implementation Measure 3.1.7.r, Line 3	Replace "detention/retention basin" with the term stormwater management facility.

Stormwater Master Plan Update

Planning Commission Work Session

February 14, 2023

Zach Weigel
City Engineer

Angela Wieland
Brown & Caldwell

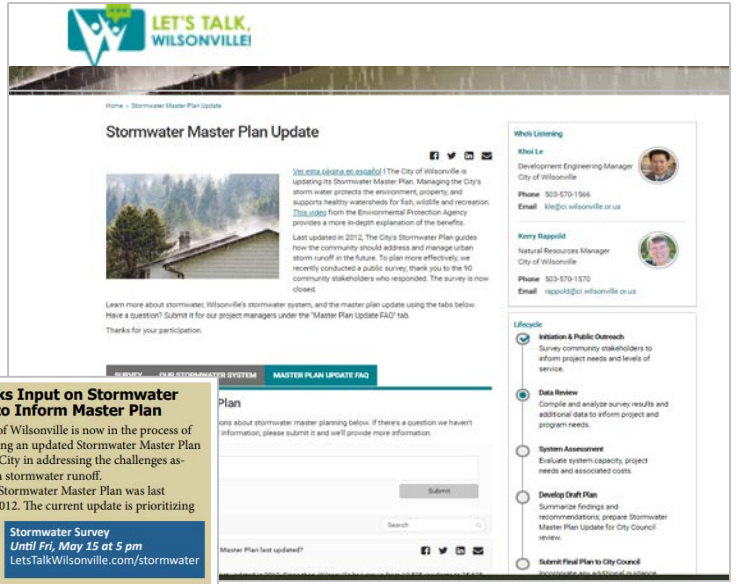
WILSONVILLE
OREGON

Discussion Topics

- Stormwater Management in Wilsonville
- Master Plan Development Process
- Regulatory Drivers and Overlap
- Technical Evaluations
- Capital Project and Program Overview
- Next Steps

Stormwater Management in Wilsonville

- Outreach moved online to educate community and gather feedback
  - Web page with traditional open house materials – hosted on *letstalkwilsonville*
  - English and Spanish versions
  - Boones Ferry Messenger article
  - Social media
- External Stormwater Survey
  - April 1 – May 15, 2021
  - English and Spanish versions
  - 90+ participants
  - 97% favorable impression of Wilsonville's stormwater services
  - Provided areas of concern



City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

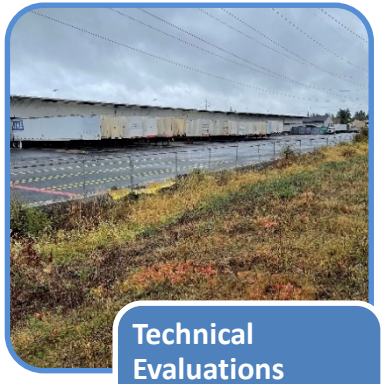
The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-1566 or kle@ci.wilsonville.or.us.

Master Plan Development Process

Project Needs Assessment

- Data Collection
- Public Survey
- Staff Interviews
- Site Visits
- Problem Area Identification



Technical Evaluations

H/H Modeling

Stream Assessment

Water Quality Retrofits

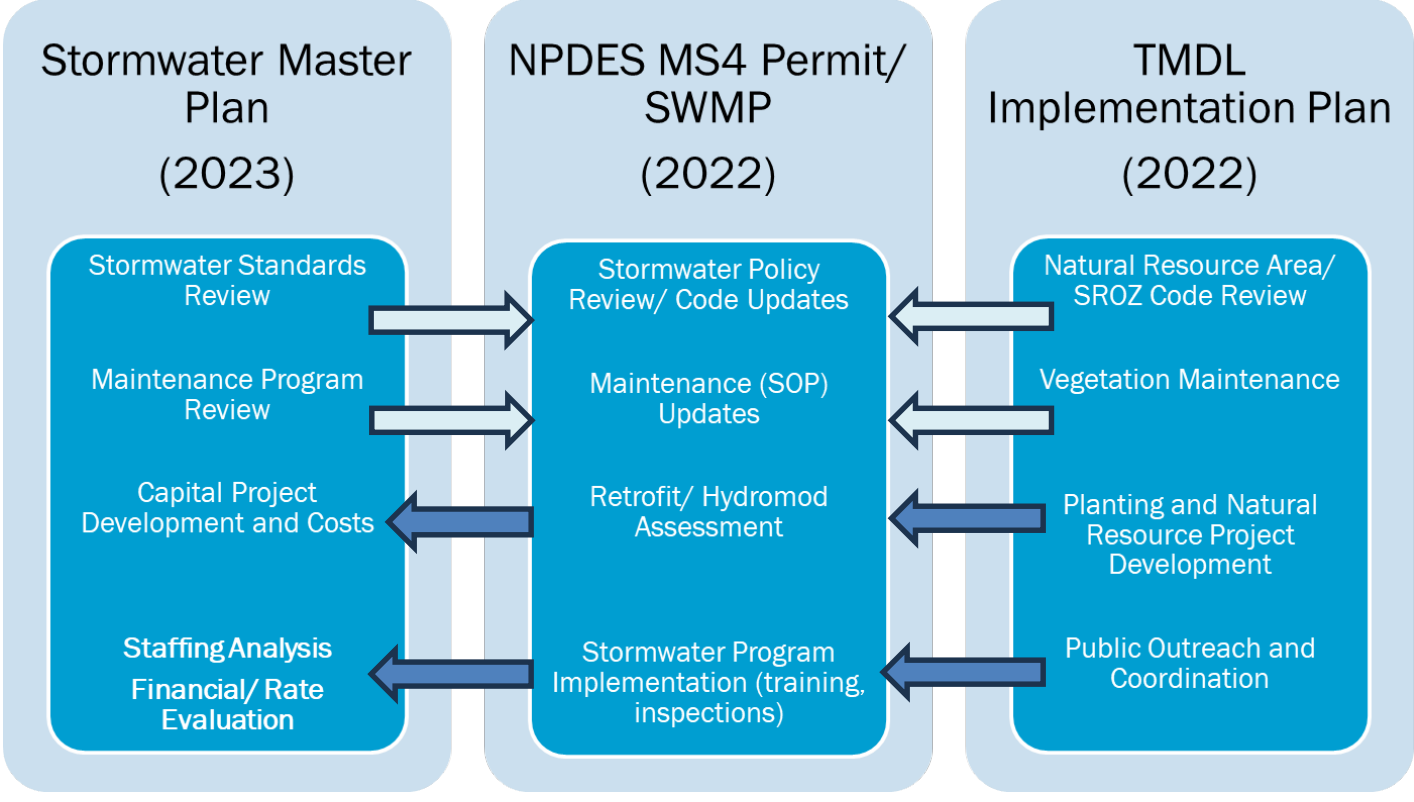
Capital Program Development

- Projects (Capital and Planning)
- City-wide Programs
- Policies
- Cost Estimation

Capital Program Implementation

- Staffing
- Project Prioritization
- Documentation
- Stakeholder Outreach

Regulatory Drivers and Overlap



Project Needs Identification

Problem Area Identification

- Surveys (Internal and External)
- Field Visits
- 33 Locations

Technical Analysis

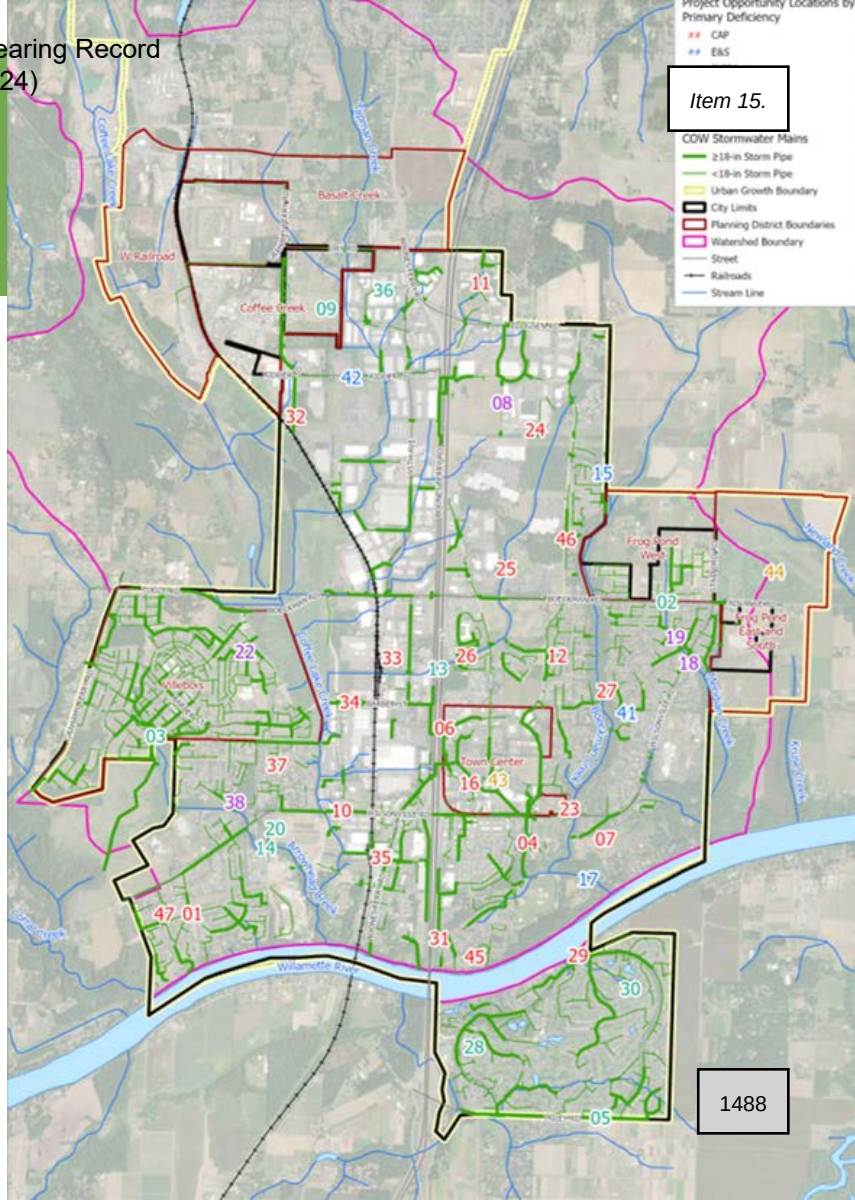
- Modeling
- Stream Assessment
- Water Quality Retrofits
- Maintenance Evaluations

Project Opportunities

- 47 Project Opportunity Locations
- CIP Workshops

Capital Program Development

- Project Objectives
  - Capacity
  - Maintenance
  - Repair/ Replacement (System Condition)
  - Infrastructure Need (growth areas)
  - Water Quality
  - Erosion and Sediment Control/ Instream
- Project Categorization
  - Funded Project
  - Program Need
  - Policy Need
  - Future/ Unfunded Project



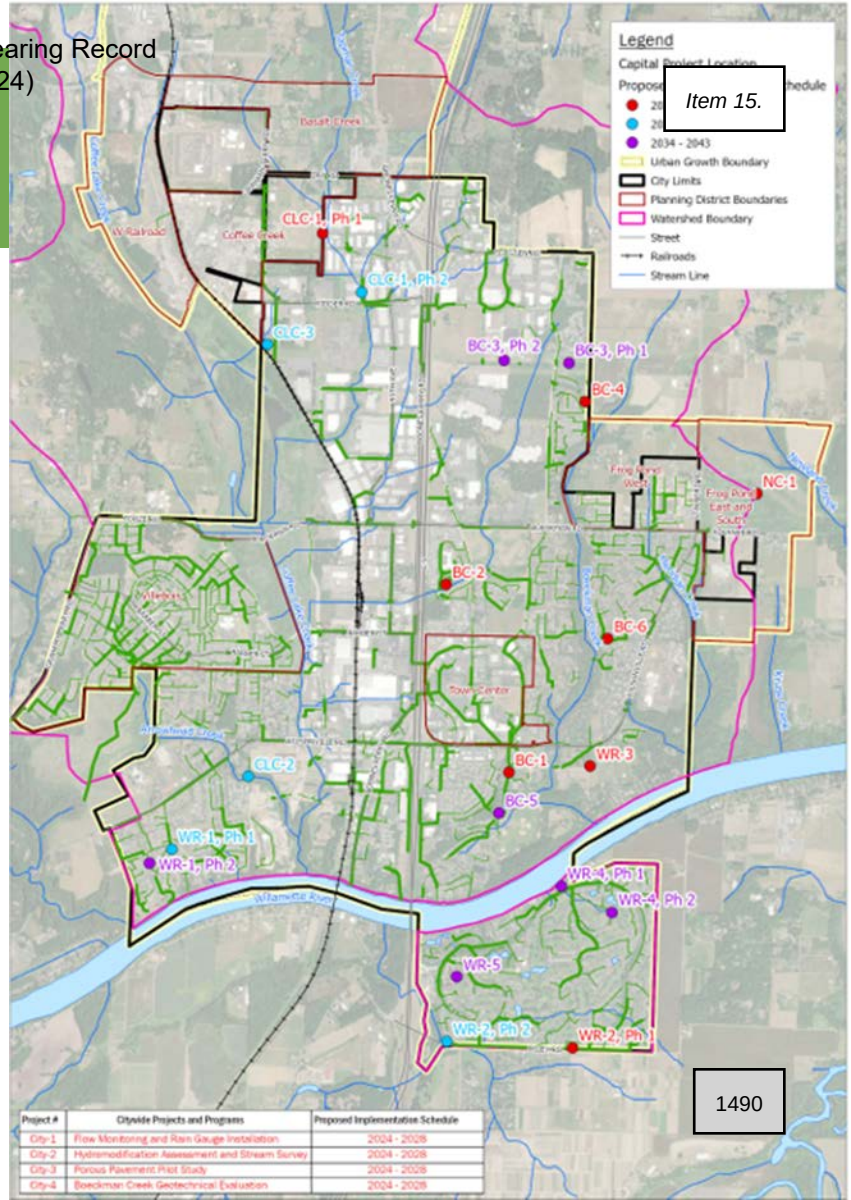
Capital Projects (Funded)

- One-time cost
- 15 Capital Projects
  - Fact sheets
  - Detailed Cost Estimates
- Four Planning Projects
- Project Scheduling
  - Near Term (2024-2028)
  - Mid Term (2029-2033)
  - Long Term (2034-2043)

	Near Term	Mid Term	Long Term
Capital Project Cost	18.86M	20.82M	29.47M
Planning Project Cost	$280,000	$30,000	$60,000
TOTAL	19.14M	20.85M	29.53M

Near-Term Projects

- Capital Projects (select)
  - CLC-1 Day Road Stormwater (Phase 1)
  - WR-2 Miley Road Stormwater (Phase 1)
  - BC-2 Ash Meadows Flow Mitigation
  - BC-4 Boeckman Creek Stabilization at Colvin Lane
- Planning Projects



Program Needs (Annual)

	Name	Annual Cost
P-1	Localized Drainage Improvements Program	$100,000
P-2	Water Quality Retrofit Program	$200,000
P-3	Repair and Replacement (R/R), citywide	$275,000
P-4	Charbonneau R/R	1.92M
P-5	Riparian Vegetation Management Program	$25,000
P-6	Stormwater Facility Enhanced Maintenance Program	$25,000
TOTAL		2.54M

Staffing Analysis

- Public Works (Roads and Stormwater Sections)
  - More immediate need
    - Deferred Maintenance
    - Maintenance of new assets
- Community Development/ Engineering
  - Extended need
    - Capital Project Implementation
    - NPDES/ TMDL Regulatory

	Activity	Staffing Increase (FTE)
Public Works/ Stormwater	Regulatory	2.5
	Capital	0.2
	TOTAL:	2.7
Community Development/ Engineering	Regulatory	0.2
	Capital	1.2
	TOTAL:	1.4

Implementation

	Annual	Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-2043)
Capital Project Cost	---	18.86M	20.82M	29.47M
Planning Project Cost	---	$280,000	$30,000	$60,000
Program Cost	2.54M			
Staffing (Public Works)		2.5 FTE		0.2 FTE
Staffing (Engineering)		0.2 FTE	1.2FTE	
TOTAL	2.54M	19.14M + 2.7 FTE	20.85M + 1.2 FTE	29.53M + 0.2

Next Steps

Public Meetings/ Review

Virtual Open House

Plan Adoption and Rate Study

CITY COUNCIL

MONDAY, NOVEMBER 6, 2023

WORK SESSION

Stormwater Master Plan (Rappold)

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: November 6, 2023	**Subject:** Stormwater Master Plan Update – Executive Summary and CIP **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☐ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☒ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Review and provide comment on the Executive Summary and Capital Improvement Program (CIP) for the Stormwater Master Plan update.	
Recommended Language for Motion: N/A	
Project / Issue Relates To:	

☐Council Goals/Priorities:	☒Adopted Master Plan(s): Stormwater Master Plan	☐Not Applicable

ISSUE BEFORE COUNCIL:
In advance of the draft Stormwater Master Plan (SMP) update, staff and the consultant will present the Executive Summary and Capital Improvement Program (CIP) for the SMP.

EXECUTIVE SUMMARY:

In 2012, the City adopted the Stomwater Master Plan, which provided an update to the previous Master Plan adopted in June 2001. There have been changes in land use (e.g., Urban Growth Boundary (UGB) expansion areas) and new stormwater management requirements (i.e., National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit) that need to be addressed as part of the update. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a virtual open house and survey were conducted to gather feedback from the community about the proposed SMP. Ninety (90) respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

Since 2021, the consultant team has been working on extensive data collection, problem area identification, assessment, and modeling of the stormwater system, retrofit analysis, CIP projects, and developing the policies and that will guide the implementation of the SMP. The executive summary provides an overview of the SMP and includes the following new elements that will be incorporated into the draft SMP:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality) and Total Maximum Daily Loads (TMDL) Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon Department of Environmental Quality (DEQ)) to determine the appropriate management and project objectives in the SMP.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The Capital Improvement Program addresses the variety of issues and problems associated with the City's public stormwater system and represent a critical piece in the overall management of the system. Projects have been developed, and will be prioritized, to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as a porous pavement and green street pilot program, were identified to address regulatory drivers and support proactive system maintenance.

On October 11, 2023, staff presented the Executive Summary and the CIP at a Planning Commission work session. The Commissioners were supportive of the proposed concepts, programs, and projects in the SMP.

EXPECTED RESULTS:
The SMP will include goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Program, fee in lieu of construction program, and draft and final versions of the Plan. The recommended capital improvements will provide the basis for an analysis of storm rates and system development charges (SDCs) that are necessary to fund the projects needed to meet permit requirements and the City's storm water management needs.

TIMELINE:
The project team will incorporate feedback received by both the Planning Commission (October 11, 2023 work session) and the City Council (November 6, 2023 work session) into the Plan. Final SMP adoption is anticipated for the first quarter of 2024.

CURRENT YEAR BUDGET IMPACTS:
The amended fiscal year 2023-2024 Budget for CIP#7064 includes $77,425 in storm operations and system development charge funds. The budget is sufficient to complete the remaining work to update and adopt the SMP.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the SMP. The Public Engagement Plan incorporated the City's existing public engagement tools, including Let's Talk Wilsonville and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities. The forthcoming Storm System Rate Study and SDC Update will also include a pubic engagement process with outreach to utility customers and the development community.

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
The SMP will benefit the community by providing goals and policies and an updated Capital Improvement Program to serve a growing population and meet environmental regulations.

ALTERNATIVES:
The project team considered and evaluated numerous alternatives to provide the needed storm drainage improvements necessary to meet the City's system management needs and permit requirements. The recommended capital improvement program implements the needed improvements in a way that is efficient and cost effective.

CITY MANAGER COMMENT:
N/A

ATTACHMENTS:
1. Stormwater Master Plan Executive Summary
2. Capital Improvement Program

ATTACHMENT 1

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include completion and reprioritization of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), changing regulatory drivers and programs, new and redevelopment activities, and observed system deficiencies warranting additional study and proposed solutions.

This 2023 SMP identifies projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth.

The SMP development process included:

- Incorporation of project need and system improvements information as identified by City staff.
- Identification and validation of storm drainage problems and flooding using hydrologic and hydraulic (H/H) models, which help to assess flooding frequency and severity.
- Assessment of stormwater retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risk to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. This effort included distributing surveys to City staff and the public, conducting a literature-based and Geographic Information System (GIS) data review, and site visits. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of the project needs identification effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvement, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, continued applicability of non-constructed water quality projects per the 2012 SMP, and the ability to integrate water quality into other project needs, 10 CP locations and two ongoing programs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks to inform locations where stream morphology may be or is currently impacted from changes to upstream land use and in response to changes in flow,

infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) modeling developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities. CPs installed since 2012 were incorporated in the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing levels and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into additional staffing recommendations for both Public Works and Community Development/Engineering.

Project Prioritization. Project needs were prioritized based on various criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater utility rate evaluations.

General Recommendations

Project, program, and policy recommendations in this SMP are proposed to improve and enhance the performance of the storm drainage infrastructure throughout the city, as summarized by the following recommended actions:

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion and sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related programs to address recurring, maintenance-related system improvements in an expedited manner and proactively and opportunistically address water quality.
- Use ongoing inspection results to evaluate and proactively address system condition needs, supporting asset management principles.
- Update policies and procedures to support public and private partnerships with new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu in conjunction with the Town Center redevelopment.
- Continue implementation of City's Public Works Design Standards to ensure the City's stormwater standards address regulatory drivers, support private development activities, and protect stream health.
- Add staff necessary to ensure compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit needs as well as implementation of recommendations outlined in this SMP.

Capital Project Summary

A total of 16 CPs, representing 21 separately costed (by phase) projects, two (2) citywide planning projects, and five (5) programs have been developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified capital projects, costs, and respective priority (to be finalized with draft SMP). Figure ES 1-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
BC-1	Library Pond Retrofit	**Capacity** Water Quality Infrastructure Need	$778,000				
BC-2	Ash Meadows Flow Mitigation	**Capacity** Water Quality	$1,403,000				
BC-3 – Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	**Capacity** Water Quality	$3,618,000				
BC-3 – Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	**Capacity** Water Quality	$5,148,000				
BC-4	Boeckman Creek Stabilization at Colvin Lane	**Erosion/ Sediment Control** Repair/Replacement Maintenance	$235,000				
BC-5	Memorial Park Swale Retrofit	**Water Quality** Erosion/ Sediment Control Maintenance	$540,000				
BC-6	Gesellschaft Water Well Channel Restoration	**Erosion/ Sediment Control** Maintenance	$309,000				
BC-7	Town Center Conveyance Pipe Installation	**Infrastructure Need**	$10,805,000				
CLC-1 – Phase 1	Day Road Stormwater Improvements, Phase 1	**Repair/ Replacement** Capacity	$4,645,000				

Table ES-1. Capital Project Costs and Schedule

Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
CLC-1 – Phase 2	Day Road Stormwater Improvements, Phase 2	**Capacity**	$2,964,000				
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	**Repair/ Replacement** Maintenance	$227,000				
CLC-3	Garden Acres Pond Retrofit	**Capacity** Water Quality	$1,058,000				
NC-1	Frog Pond East and South Conveyance Pipe Installation	**Infrastructure Need**	$19,731,000				
WR-1 – Phase 1	SW Willamette Way/ Morey's Landing Stormwater Improvements, Phase 1	**Capacity** Water Quality	$1,476,000				
WR-1 – Phase 2	SW Willamette Way/ Morey's Landing Stormwater Improvements, Phase 2	**Capacity**	$811,000				
WR-2 – Phase 1	Miley Road Stormwater Improvements, Phase 1	**Repair/ Replacement** Erosion/Sediment Control Maintenance	$661,000				
WR-2 – Phase 2	Miley Road Stormwater Improvements, Phase 2	**Repair/Replacement** Maintenance	$7,425,000				
WR-3	Rose Lane Culvert Replacement	**Capacity** Maintenance	$94,000				
WR-4 – Phase 1	Charbonneau East Stormwater Improvements, Phase 1	**Capacity** Repair/ Replacement	$231,000				
WR-4 – Phase 2	Charbonneau East Stormwater Improvements, Phase 2	**Repair/Replacement** Maintenance	$2,551,000				
WR-5	Charbonneau West Stormwater Improvements	**Repair/Replacement** Maintenance	$8,049,000				
City-1	Flow Monitoring and Rain Gauge Installation	**Capacity**	$100,000				
City-2	Hydromodification Assessment and Stream Survey	**Erosion/Sediment Control**	TBD				
P-1	Local Drainage Improvements Program	**Infrastructure Need** Capacity	$100,000/yr				X
P-2	Porous Pavement/Green Street Retrofit Program	**Water Quality**	$50,000/yr				X
P-3	Repair/Replacement Program	**Repair/Replacement** Maintenance	TBD				X
P-4	Inlet Replacement Program	**Infrastructure Need**	$50,000/yr				X

Table ES-1. Capital Project Costs and Schedule							
Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
P-5	Vegetative Facility Maintenance Program	**Water Quality**	$10,000/yr				X
			TOTAL $	$	$	$	$

*Note: Primary objectives are identified in **BOLD**.*

Programmatic Summary

In addition to the identified CPs, the following stormwater program needs were identified to address regulatory drivers and support proactive system maintenance:

Local Drainage Improvements Program (P-1). Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).

Porous Pavement/Green Street Pilot Program (P-2). Establishes an annual funding mechanism to integrate porous pavement overlays, low impact development (LID) or green infrastructure (GI) in conjunction with street improvement and other utility projects.

Repair/Replacement Program (P-3). Allocates funds to conduct prescriptive replacement of public pipe and outfalls in conjunction with inspection and asset management efforts.

Inlet Replacement Program (P-4). Allocates funds to relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues.

Vegetation Maintenance Program (P-5). Allocates funds to 1) conduct riparian and/or in channel vegetation maintenance including removal of invasive species and/or 2) conduct restorative maintenance on select private stormwater facilities in the City where maintenance agreements are not in place or have not been executed.

Implementation

Capital projects, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP).

To ensure effective implementation of the Wilsonville 2023 CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP to inform recommendations for additional Public Works Operations and Engineering staff. Additional staff in Public Works Operations and Community Development/ Engineering are recommended to accommodate new projects and programs defined in this SMP as well as deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the schedule and respective funding needs of capital investments. A financial plan is required to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, will reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

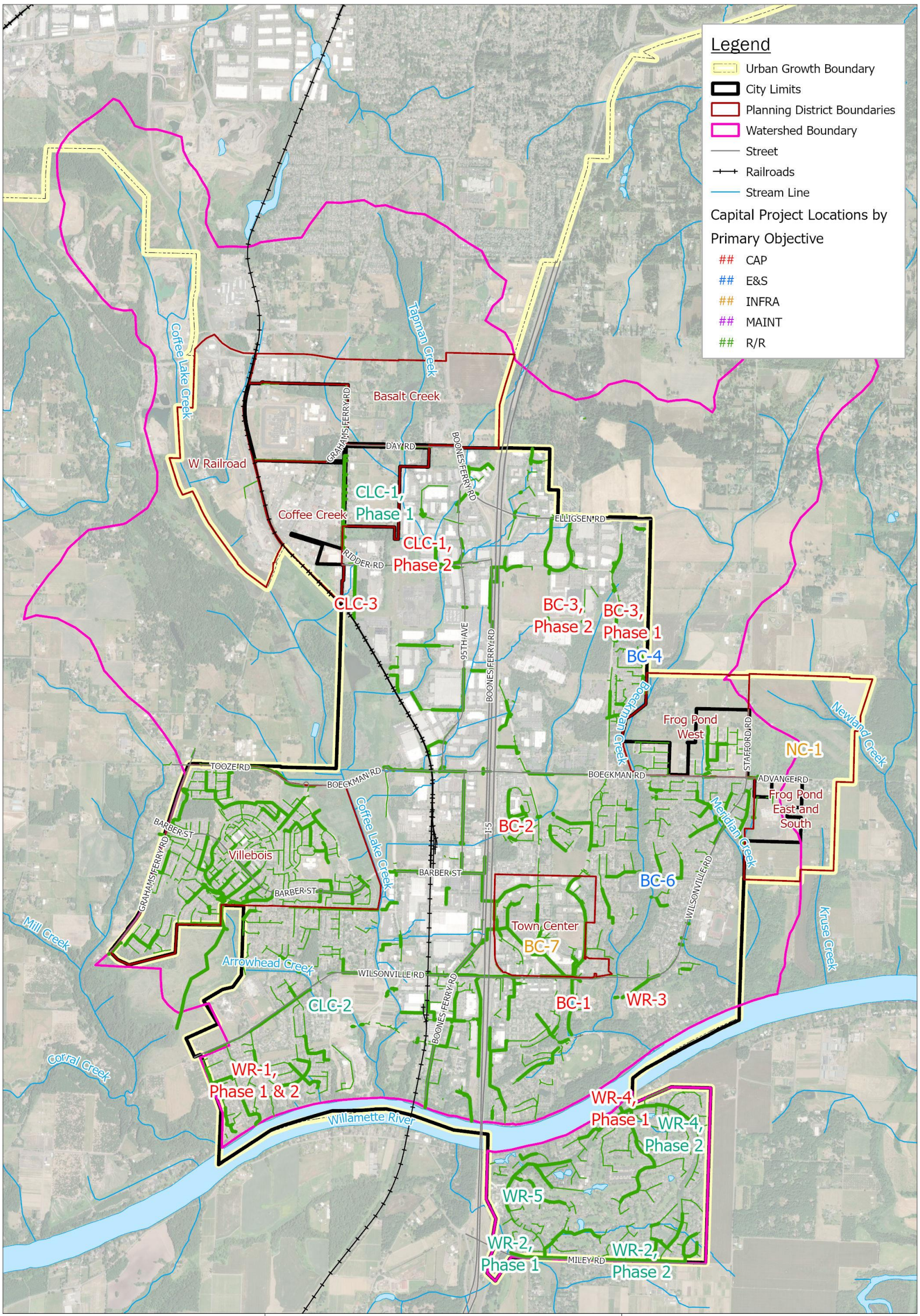
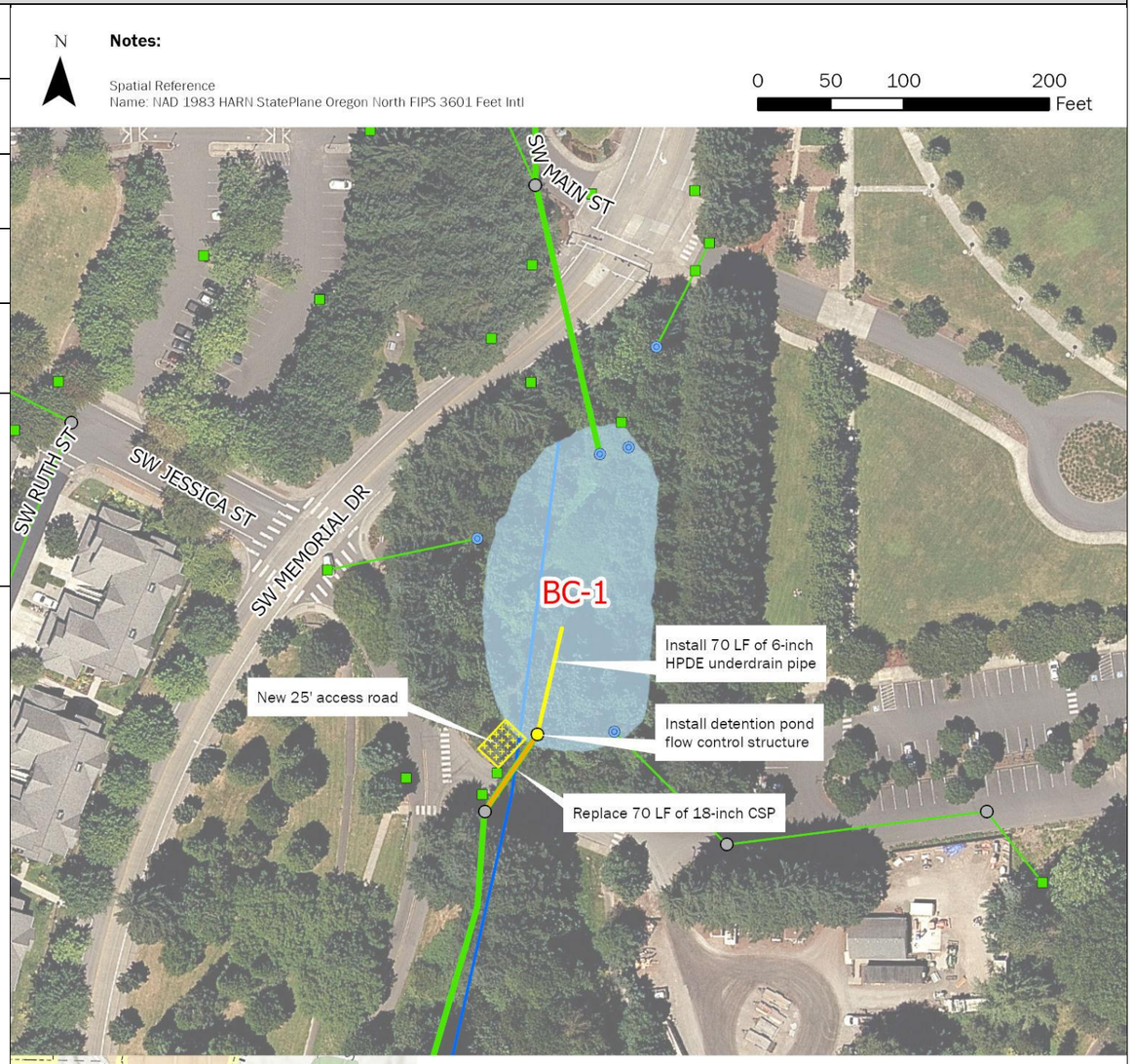


Figure ES-1. Capital Projects by Primary Objective

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



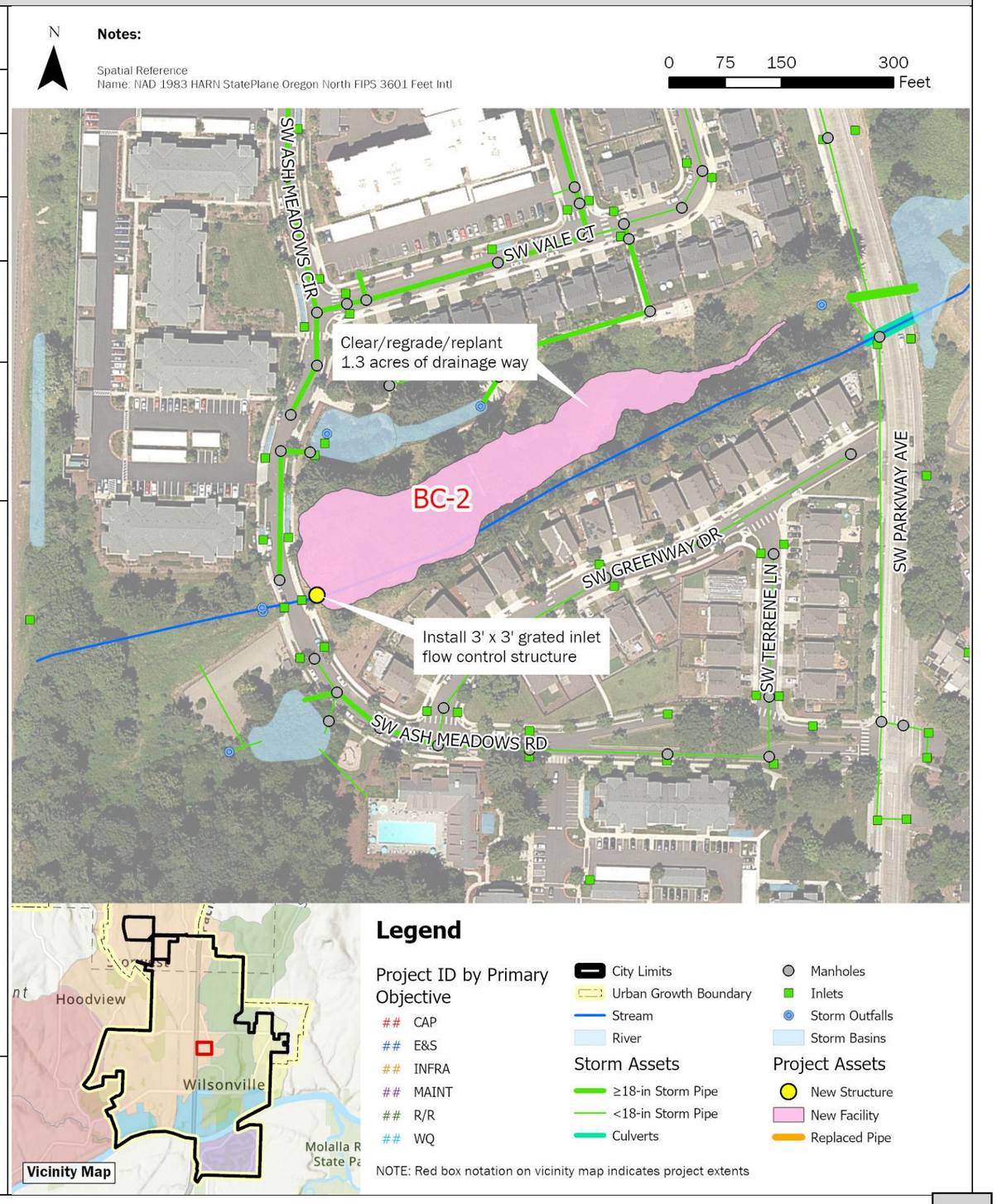
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$594,000
	Design / Construction Admin. (11%)	$65,000
	Engineering & Permitting (20%)	$119,000
	Total Cost	**$778,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		

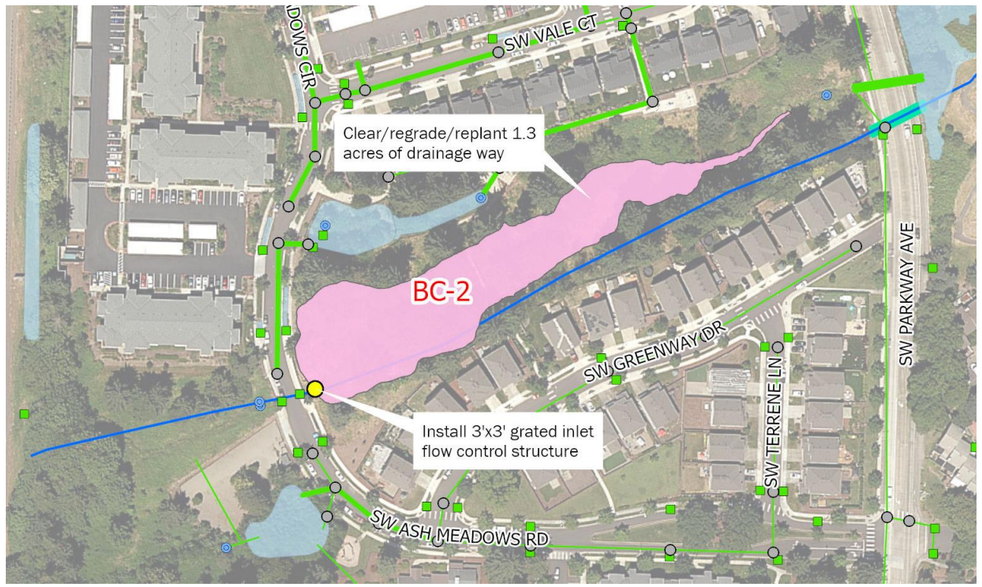


BC-2	Ash Meadows Flow Mitigation	
Design Considerations / Assumptions	• This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions. • This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road. • Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet. • This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions. • The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.	
Estimated Project Cost	Capital Expense Total	$995,000
	Design / Construction Admin. (11%)	$109,000
	Engineering & Permitting (30%)	$299,000
	Total Cost	**$1,403,000**
Project Cost Notes	• The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area. • Clearing and plant restoration is necessary for entire area to 190 ft elevation. • A 30% engineering and permitting multiplier was applied due to in-water work. • Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project.	

Additional Figures

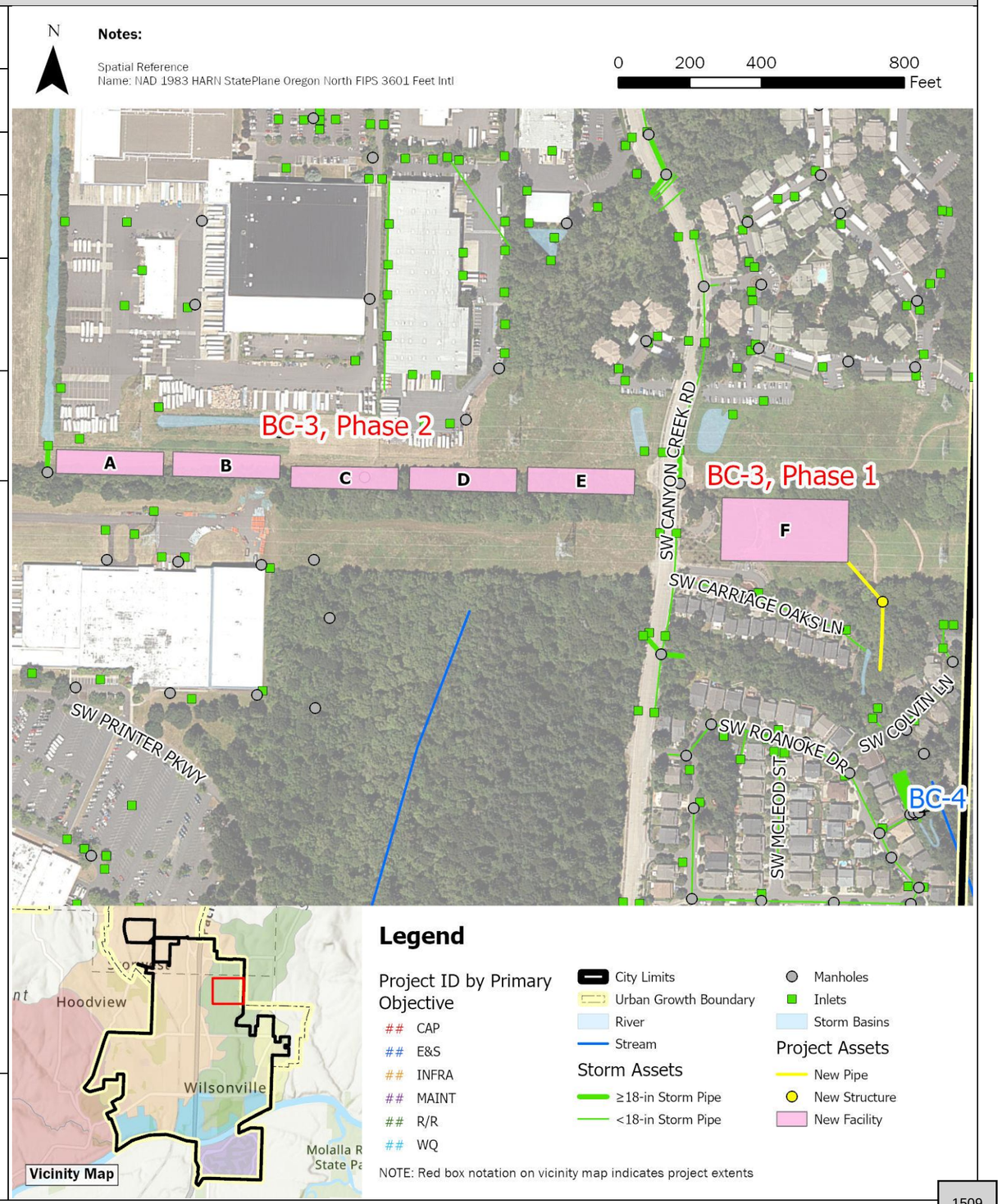
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$2,809,000	$4,187,000
Design / Construction Admin. (11%)	$309,000	$461,000
Engineering & Permitting (Capped)	$500,000	$500,000
Total Cost	**$3,618,000**	**$5,148,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A cap on engineering and permitting was applied.

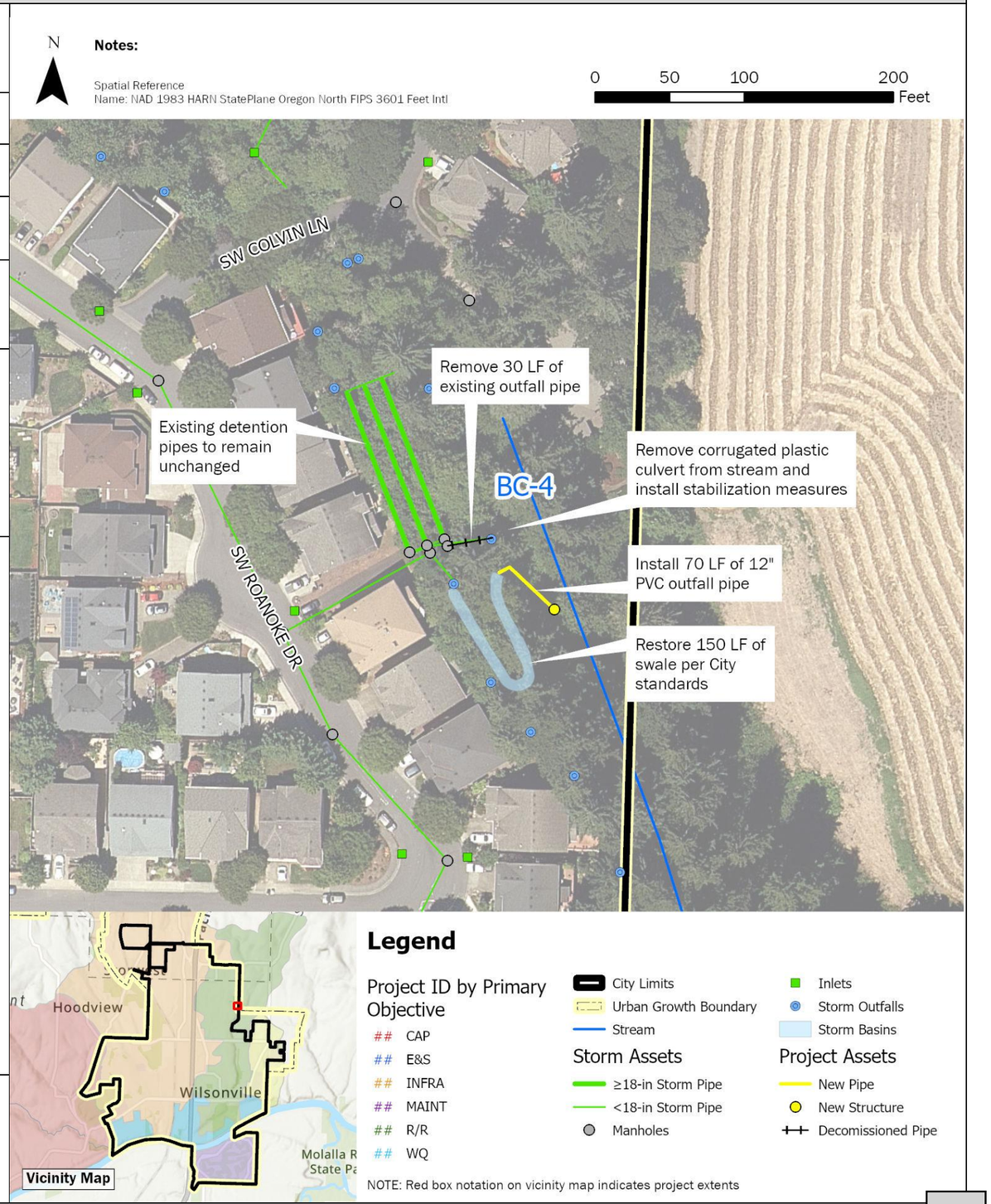
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

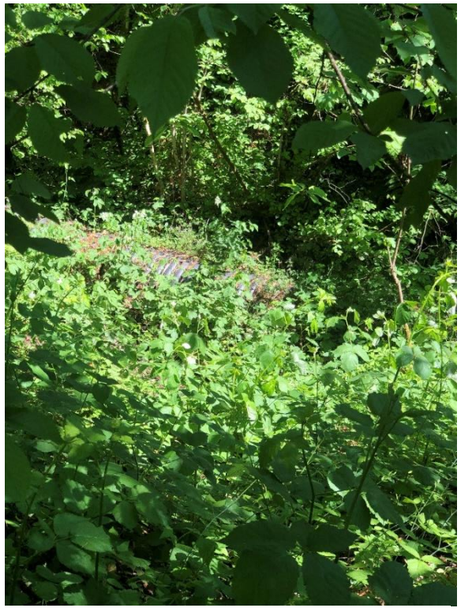
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$167,000
	Design / Construction Admin. (11%)	$18,000
	Engineering & Permitting (30%)	$50,000
	Total Cost	**$235,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

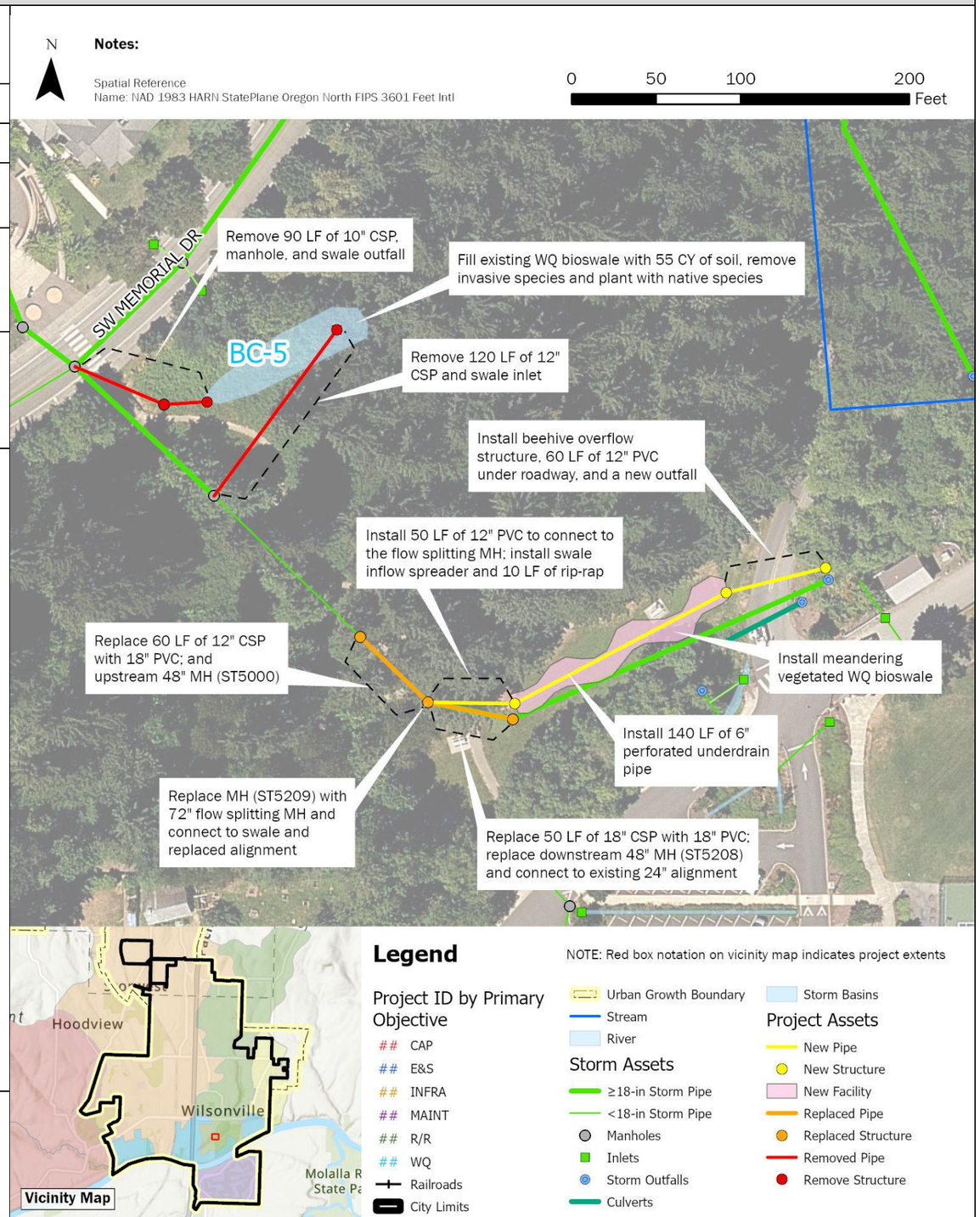


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



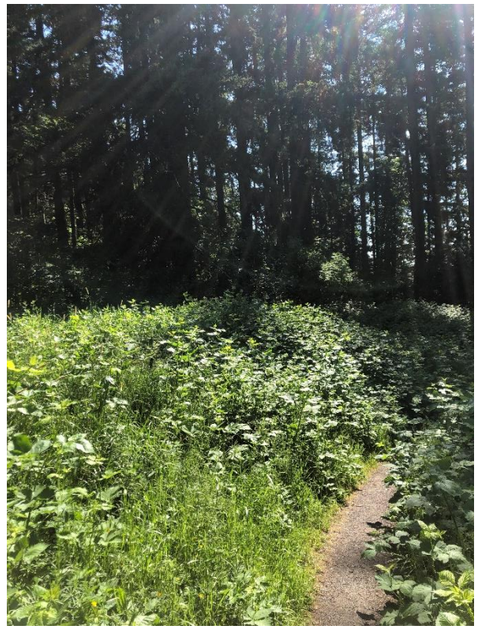
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$383,000
	Design / Construction Admin. (11%)	$42,000
	Engineering & Permitting (30%)	$115,000
	Total Cost	**$540,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

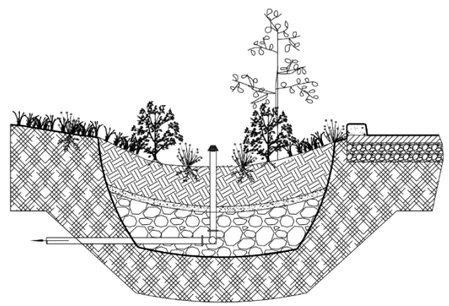
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



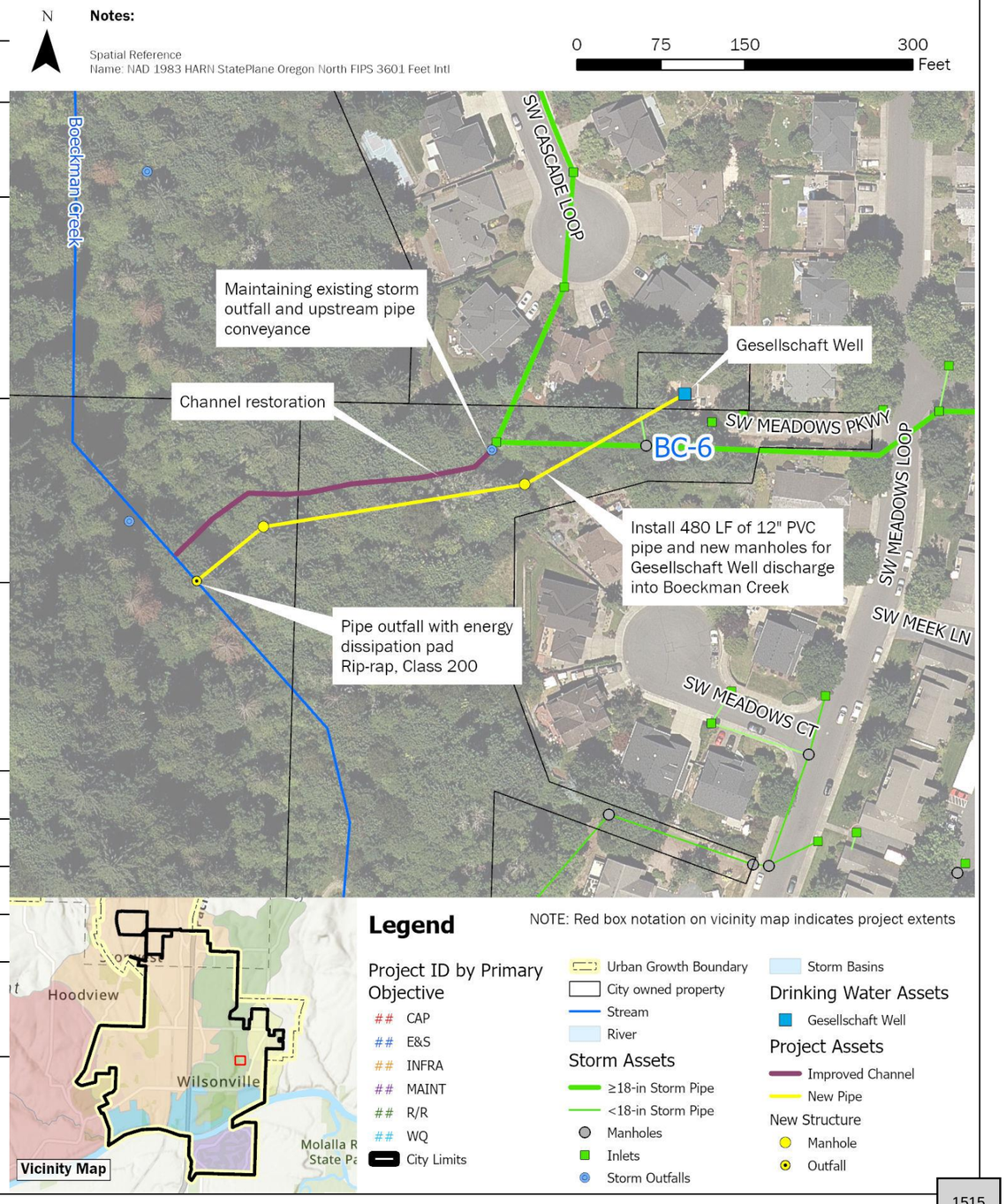
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$219,000	
	Design / Construction Admin. (11%)	$24,000	
	Engineering & Permitting (30%)	$66,000	
	Total Cost	**$309,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



Brown AND Caldwell

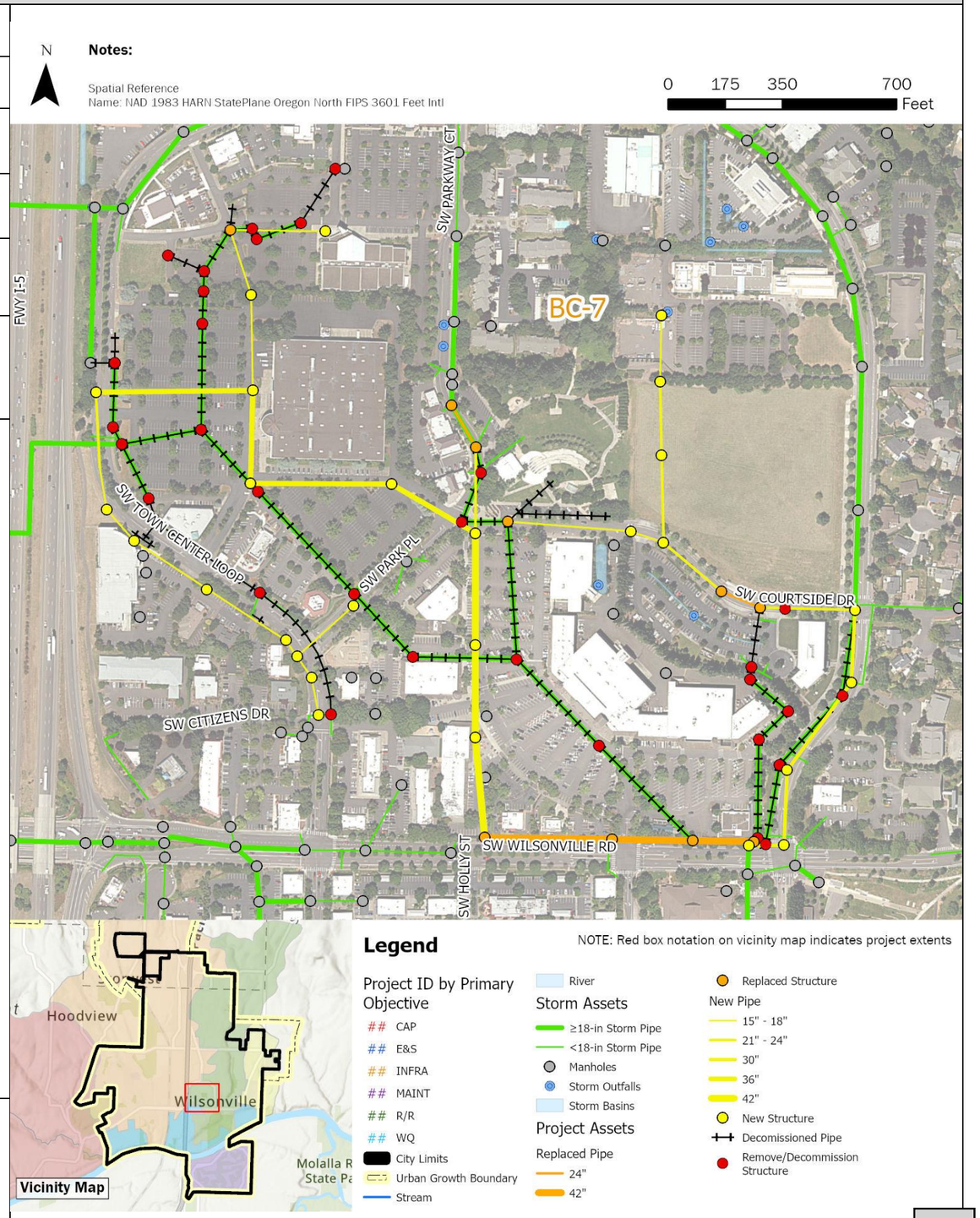
City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

BC-7	Town Center Conveyance Pipe Installation		
Project Objective(s)	Infrastructure Need (New development)		
Project Opportunity ID	43		
Contributing Drainage Area	141 acres		
Estimated Existing Impervious Area (%)	43.6%	**Estimated Future Impervious Area (%)**	51.2%
Project Location	The project site is located in the Town Center Planning District of the City, bounded by Interstate-5 to the west, SW Town Center Loop to the north and east, and SW Wilsonville Road to the south.		
Statement of Need	The City adopted the City of Wilsonville Town Center Plan in 2019, which includes a conceptual public stormwater collection system layout. This project includes proposed stormwater pipe (trunk lines >15" diameter), manholes, and existing stormwater pipe and manhole decommissioning associated with this development plan.		
Project Description	This project reflects pipe and manhole installation and decommissioning/abandonment provided by the City from the 2019 Town Center Development Plan. Project details are as follows: • Decommission approx. 7,670 LF (1.45 miles) of existing pipe between 12-42 inches: ○ 150 LF of 12-inch; 690 LF of 15-inch; 20 LF of 18-inch; 670 LF of 21-inch; 1,020 LF of 24-inch; 2,060 LF of 30-inch; 2,600 LF of 36-inch; and 460 LF of 42-inch. ○ Decommission 33 manholes associated with decommissioned pipe. • Replace approx. 1,130 LF (0.21 miles) of existing pipe (ENG IDs provided in parenthesis when applicable): ○ Replace 150 LF of 24-inch DI with PVC (ST3410 to ST3409). ○ Upsize 130 LF of 15-inch PVC with 24-inch PVC (ST3485 to ST3484). ○ Upsize 390 LF of 18-inch RCP with 42-inch PVC (PST3407 to ST3493). ○ Upsize 250 LF of 24-inch RPC with 42-inch PVC (ST3493 to ST3402). ○ Replace 210 LF of 42-inch RCP with PVC. (ST3402 to ST3400). ○ Replace 10 manholes with: two 48" MHs (ST3453 and ST3406), four 60" MHs (ST3410, ST3409, ST3485, and ST3484), and four 72" MHs (ST3401, PST3407, ST3493, and ST3402). • Install approx. 7,625 LF (1.45 miles) of new 15- to 42-inch PVC pipe: ○ Install 1,150 LF of 15-inch PVC. ○ Install 1,640 LF of 18-inch PVC. ○ Install 230 LF of 21-inch PVC. ○ Install 1,280 LF of 24-inch PVC. ○ Install 890 LF of 30-inch PVC. ○ Install 1,500 LF of 36-inch PVC. ○ Install 935 LF of 42-inch PVC. ○ Install 27 manholes with twelve 48" MHs, eight 60" MHs, and seven 72" MHs.		

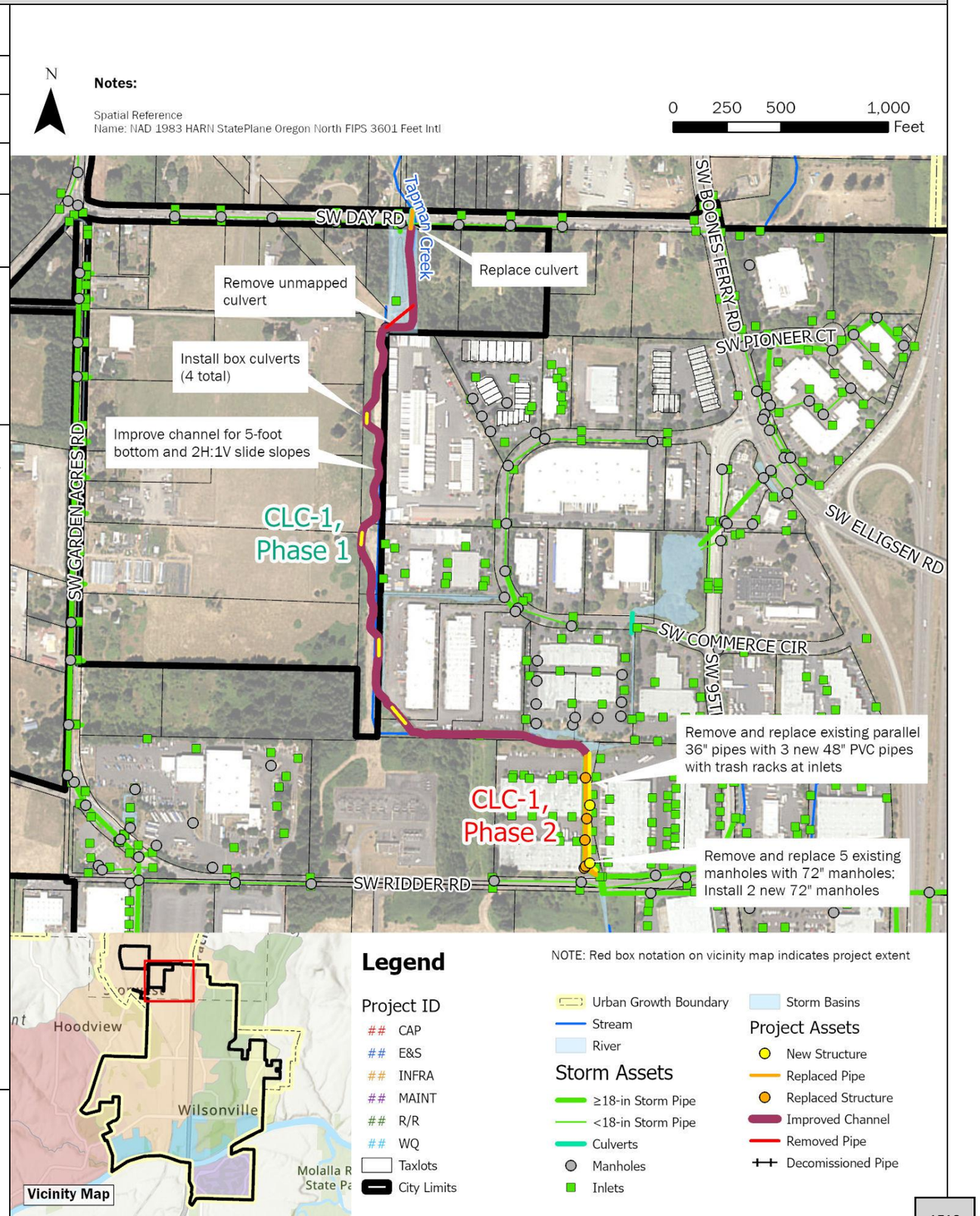


BC-7	Town Center Conveyance Pipe Installation	
Design Considerations / Assumptions	• Installation is assumed to be phased in conjunction with development activities. • Decommissioned pipe and structures will be abandoned in place to continue use as the phased development is built-out. • When feasible, pipes and manholes were designated for replacement instead of removal and new installation. • Pipe estimates only include pipe 15-inches and greater in diameter. • Conveyance system sizing was provided by the City and was not modeled in InfoSWMM. • If GIS attribute information was missing per the Town Center Development Plan, the pipe diameter from the nearest connected pipe was used to estimate pipe diameters and lengths.	
Estimated Project Cost	Capital Expense Total	$9,284,000
	Design / Construction Admin. (11%)	$1,021,000
	Engineering & Permitting (Cap)	$500,000
	Total Cost	**$10,805,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new and replacement pipe materials. • Project cost assume pipe installations will all occur in roadways, and pavement restoration and trenching are assumed in the pipe unit costs. • All decommissioned/abandoned assets are to remain in place and be filled with grout. • No earthwork beyond trenchwork is included. • A cap on engineering and permitting and surveying was applied.	

Additional Figures

Town Center Plan – Phase 3, Full Buildout (2019)

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9		
Contributing Drainage Area	944 acres		
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF of 48-inch PVC storm pipe. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1 Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

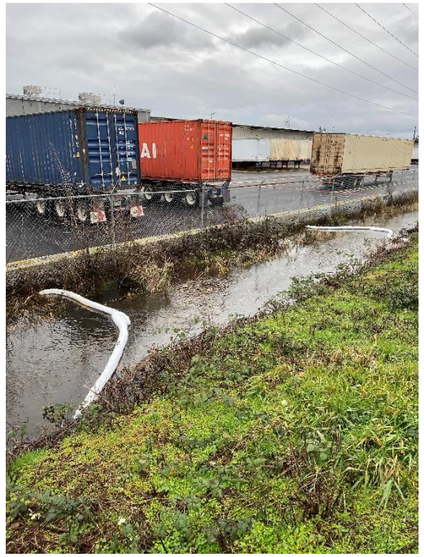
	Phase 1	*Phase 2*
Capital Expense Total	$3,734,000	$2,220,000
Design / Construction Admin. (11%)	$411,000	$244,000
Engineering & Permitting (Cap)	$500,000	$500,000
Total Cost	**$4,645,000**	**$2,964,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates.
- Project concept and cost estimates were initially developed by AKS (30% design drawings are complete). A cap on engineering and permitting was applied.

Additional Figures

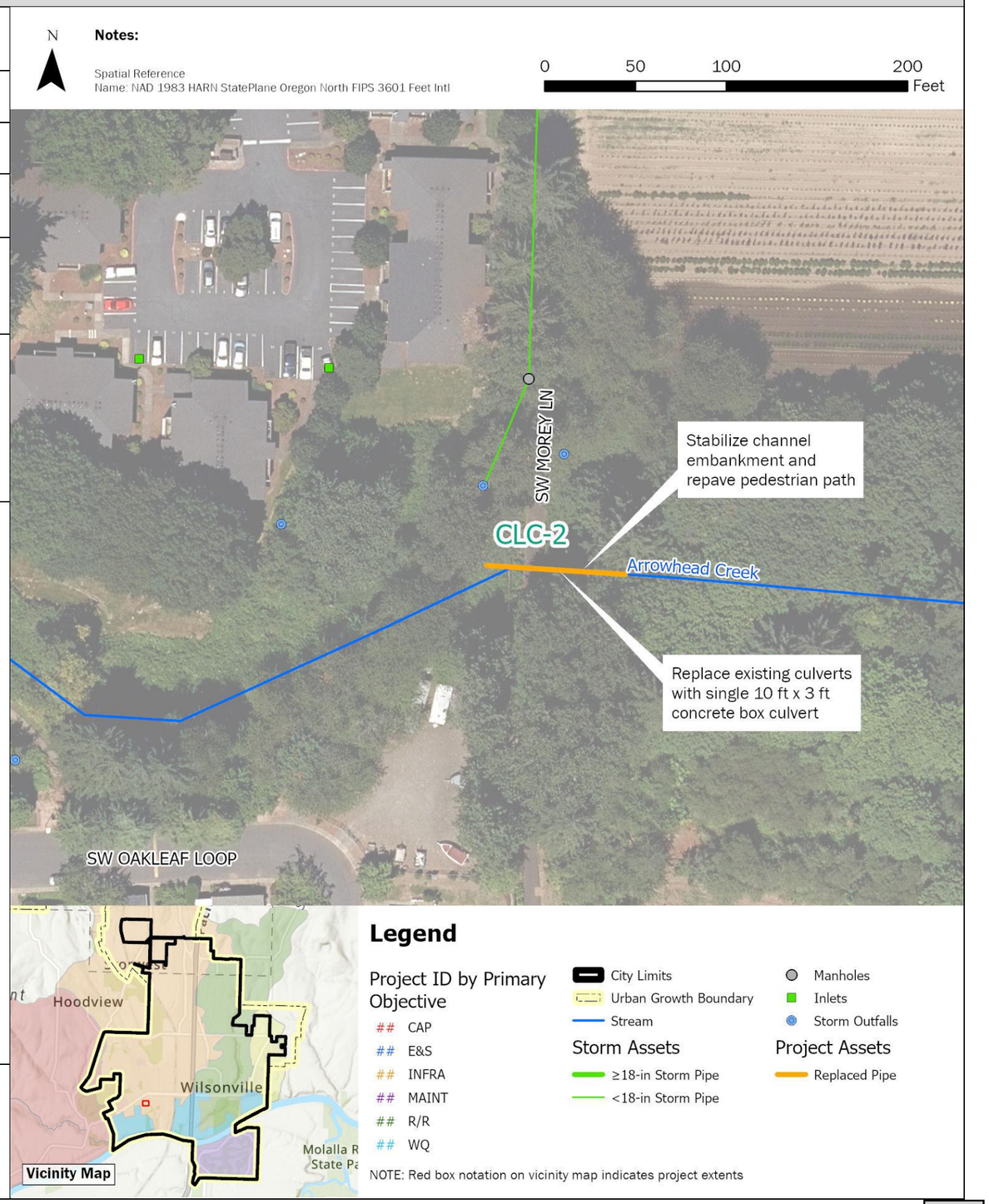
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



CLC-2 Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Design Considerations / Assumptions

- Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts.
- Culvert sizing to be confirmed with final design.
- Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane.
- Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary.
- Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.

Estimated Project Cost

Capital Expense Total	$161,000
Design / Construction Admin. (11%)	$18,000
Engineering & Permitting (30%)	$48,000
Total Cost	**$227,000**

Project Cost Notes

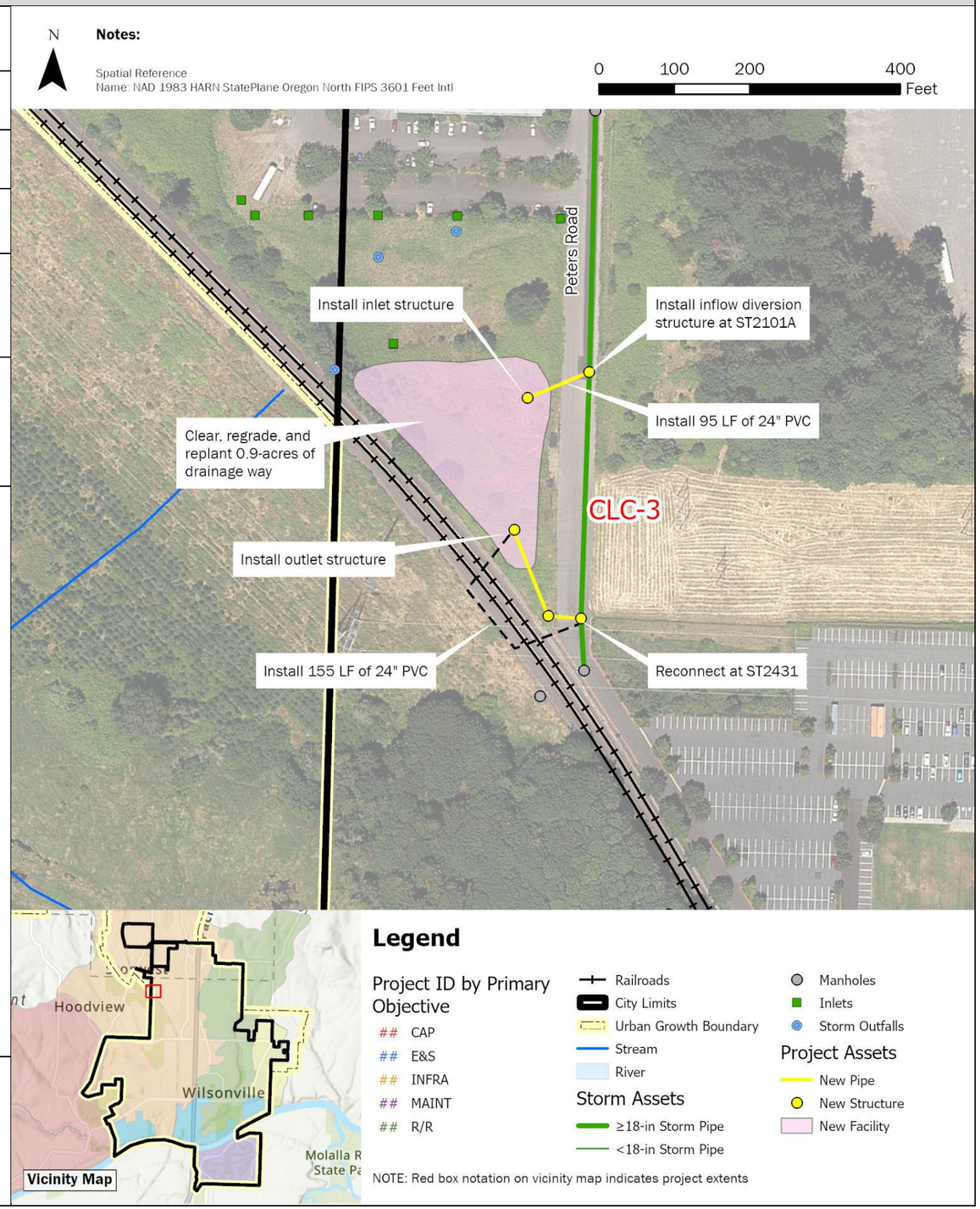
- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,000 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431).		



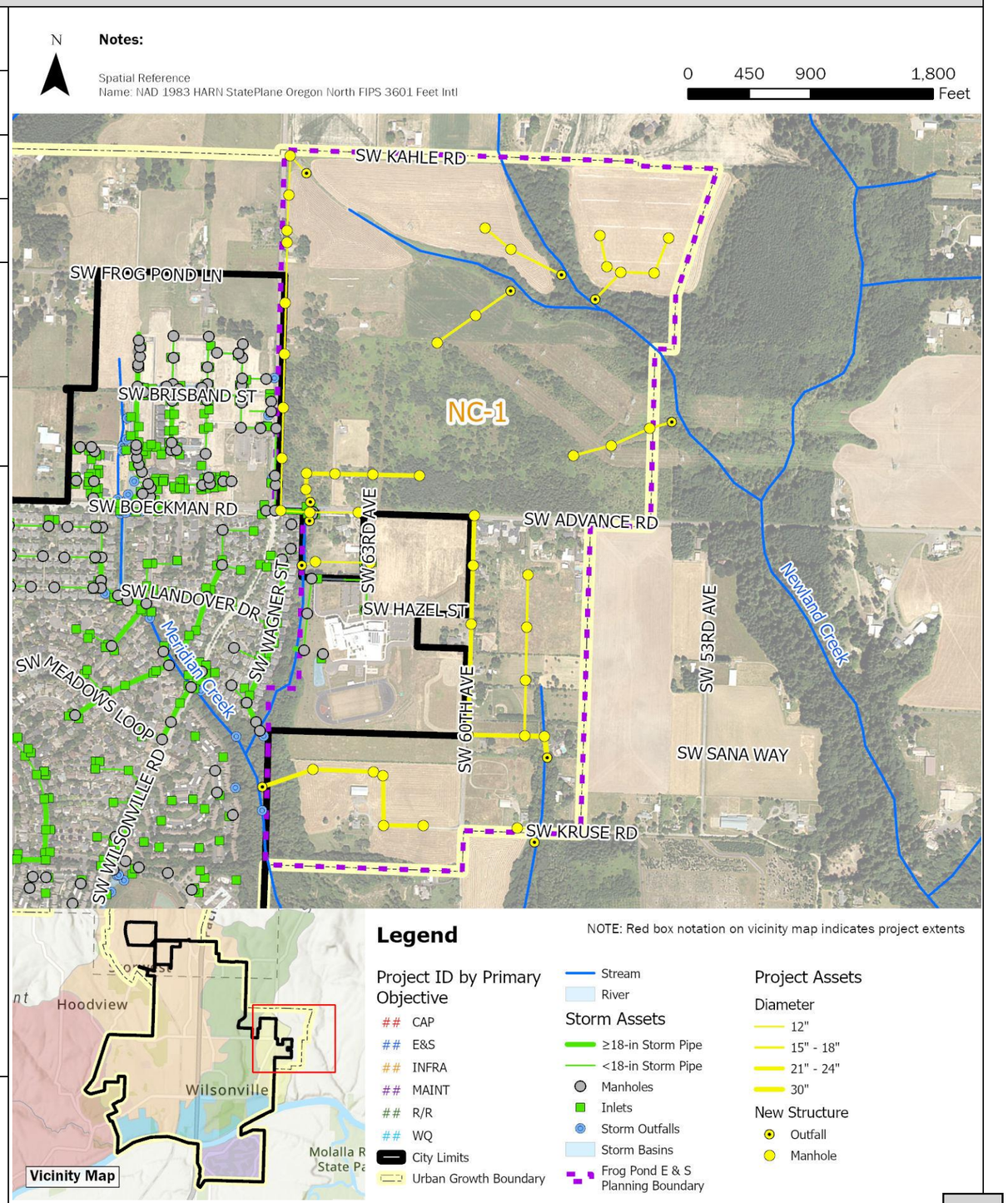
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$808,000
	Design / Construction Admin. (11%)	$89,000
	Engineering & Permitting (20%)	$161,000
	Total Cost	**$1,058,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

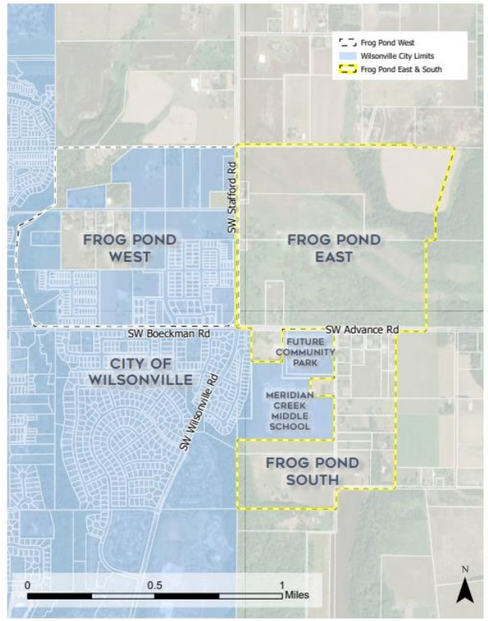
Garden Acres Detention Pond (May 2023)

NC-1	Frog Pond East and South Conveyance Piping		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	305 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	This project reflects pipe and manhole installation associated with main lines identified in the Frog Pond East and South Master Plan (2022). Project details are as follows: • Install 3,980 LF of 12-inch PVC pipe. • Install 11,360 LF of 18-inch PVC pipe. • Install 4,260 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install 11 outfalls. • Install 29 48-inch manholes. • Install 10 60-inch manholes.		

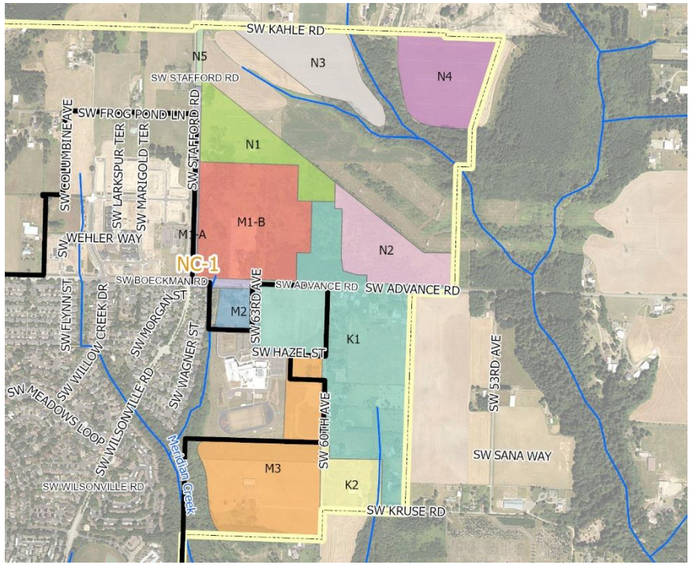


NC-1	Frog Pond E and S Conveyance Piping	
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure to install by basin is detailed below: ○ **K1**: 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; two 48-inch manholes, and 1 outfall. ○ **K2**: 220 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M1-A**: 2,630 LF of 12-inch PVC pipe, eight 48-inch manholes, and 1 outfall. ○ **M1-B**: 1,050 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **M2**: 400 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M3**: 1,160 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **N1**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N2**: 7,670 LF of 18-inch PVC pipe, three 48-inch manholes, and 1 outfall. ○ **N3**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N4**: 1,150 LF of 18-inch PVC pipe, five 48-inch manholes, and 1 outfall. ○ **N5**: 730 LF of 12-inch PVC pipe, three 48-inch manholes, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$17,325,000
	Design / Construction Admin. (11%)	$1,906,000
	Engineering & Permitting (Cap)	$500,000
	Total Cost	**$19,731,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only stormwater pipes greater than 12-in in diameter are included in the project estimate. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate. • A cap on engineering and permitting and survey was applied.	

Additional Figures

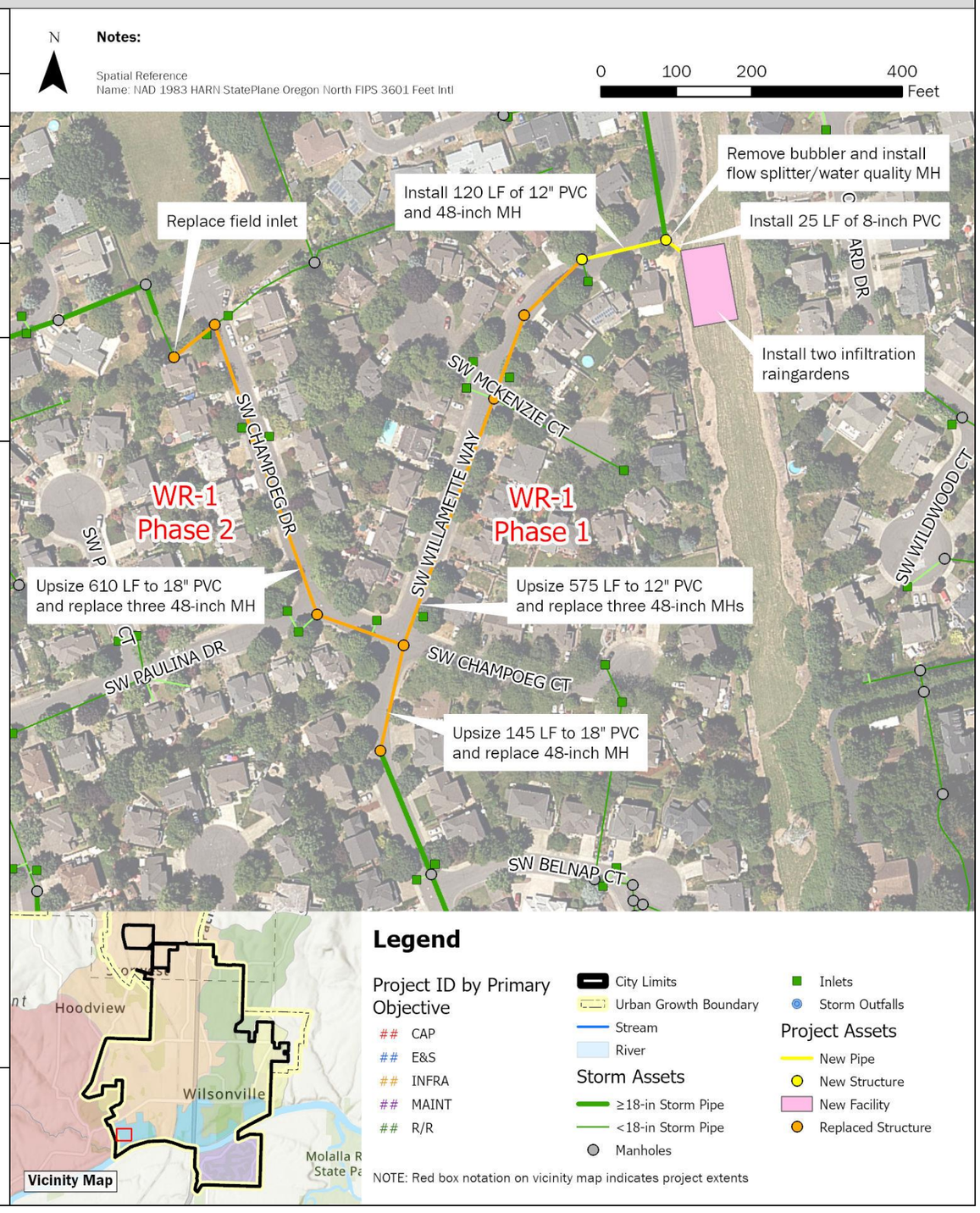


Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

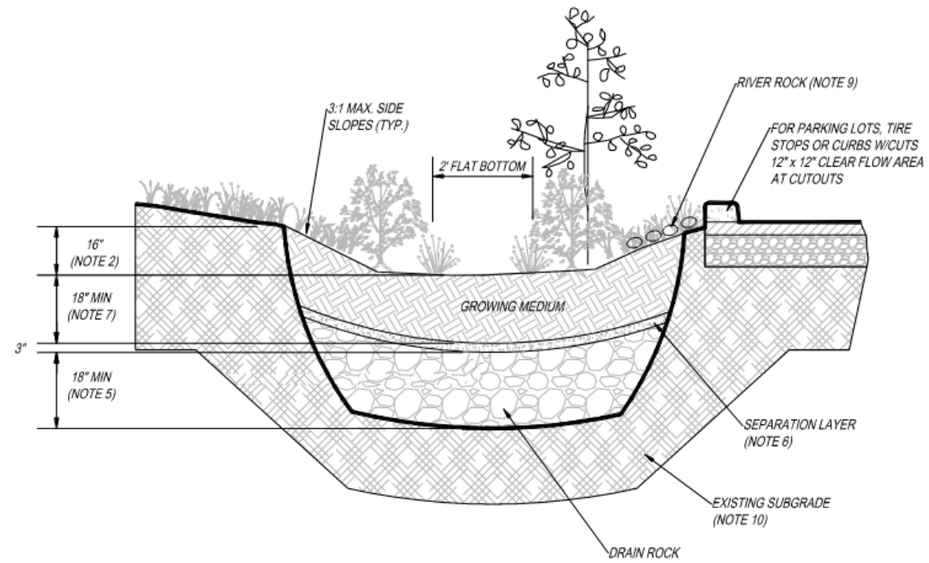
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,127,000	$619,000
Design / Construction Admin. (11%)	$124,000	$68,000
Engineering & Permitting (20%)	$ 225,000	$124,000
Total Cost	**$1,476,000**	**$811,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

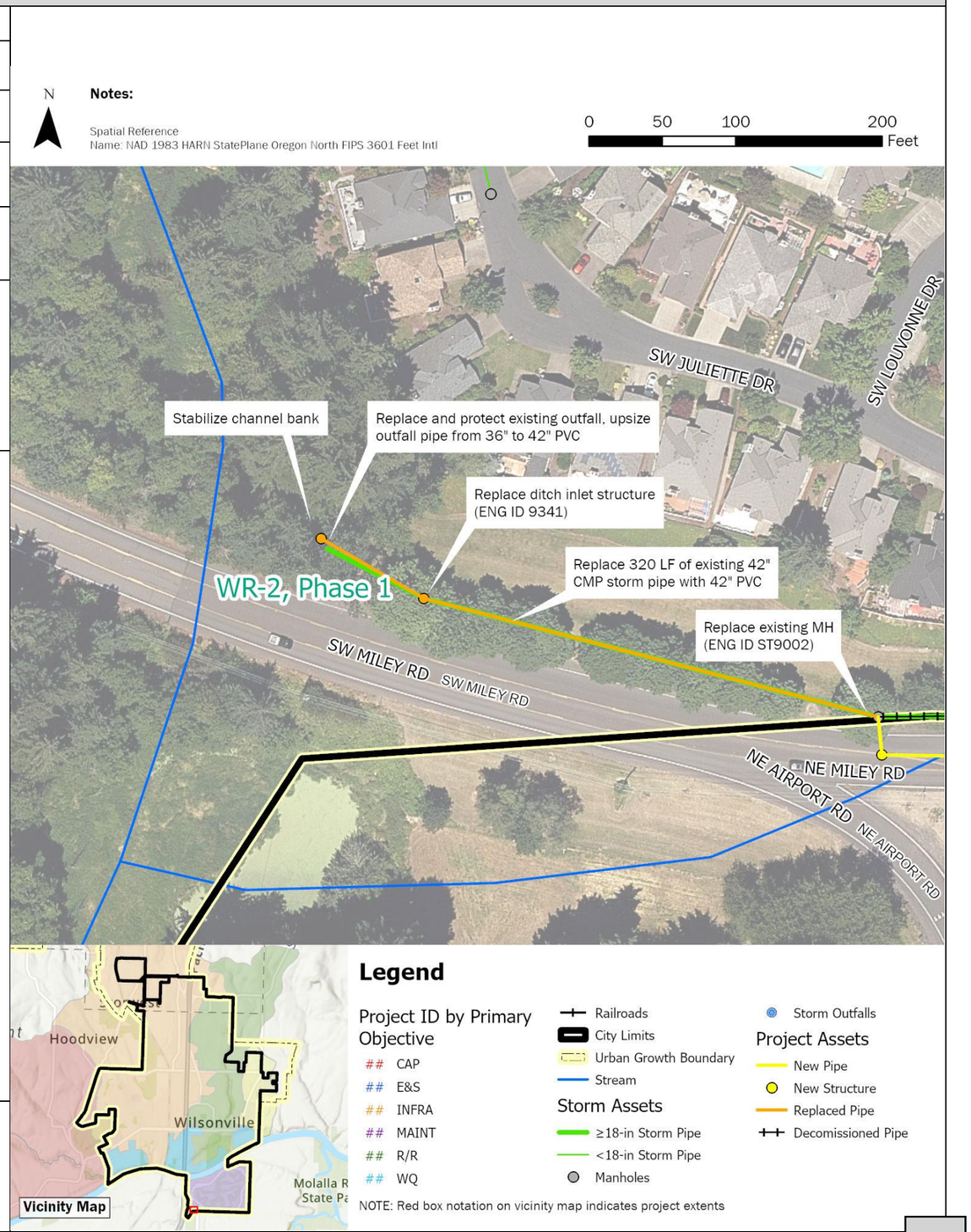
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5		
Contributing Drainage Area	138.0 acres		
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

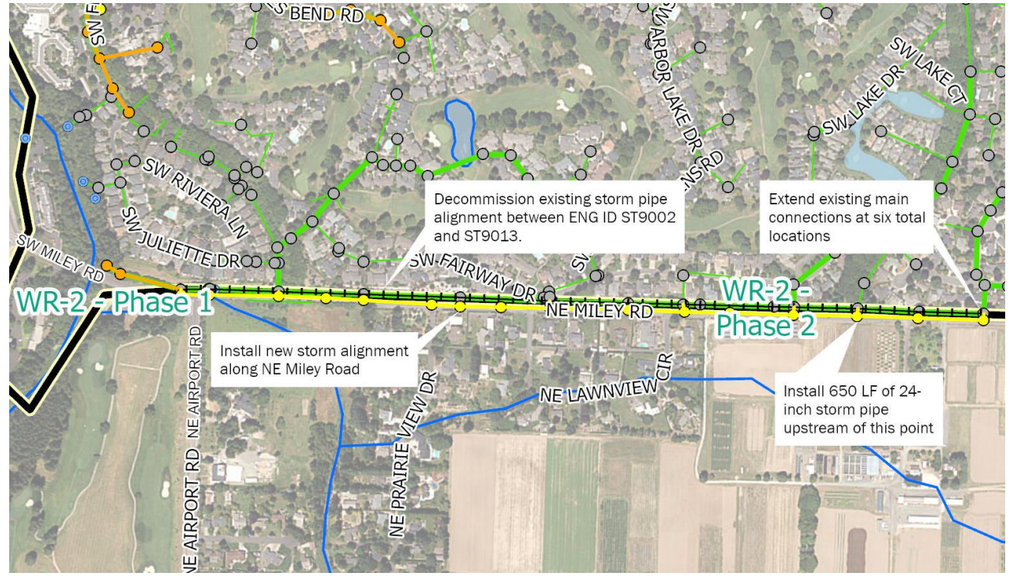
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

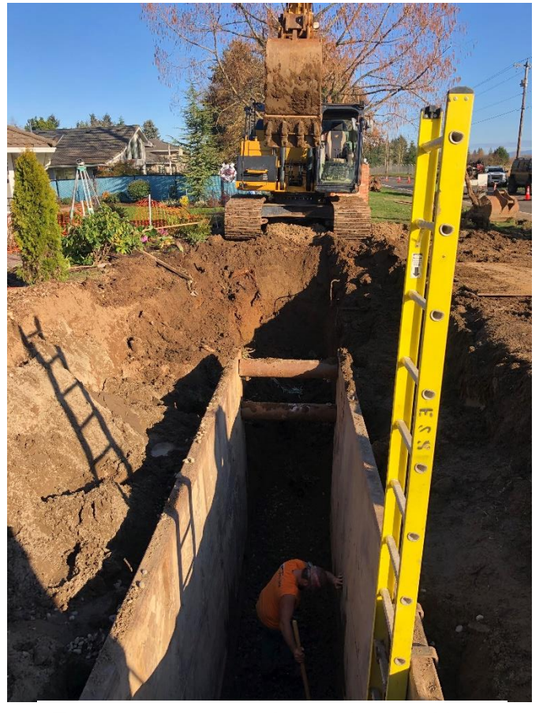
	Phase 1	*Phase 2*
Capital Expense Total	$469,000	$6,239,000
Design / Construction Admin. (11%)	$51,000	$686,000
Engineering & Permitting (30% or Cap.)	$141,000	$500,000
Total Cost	**$661,000**	**$7,425,000**

Project Cost Notes

- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- Engineering and Permitting costs for Phase 2 have been capped at $500,000.

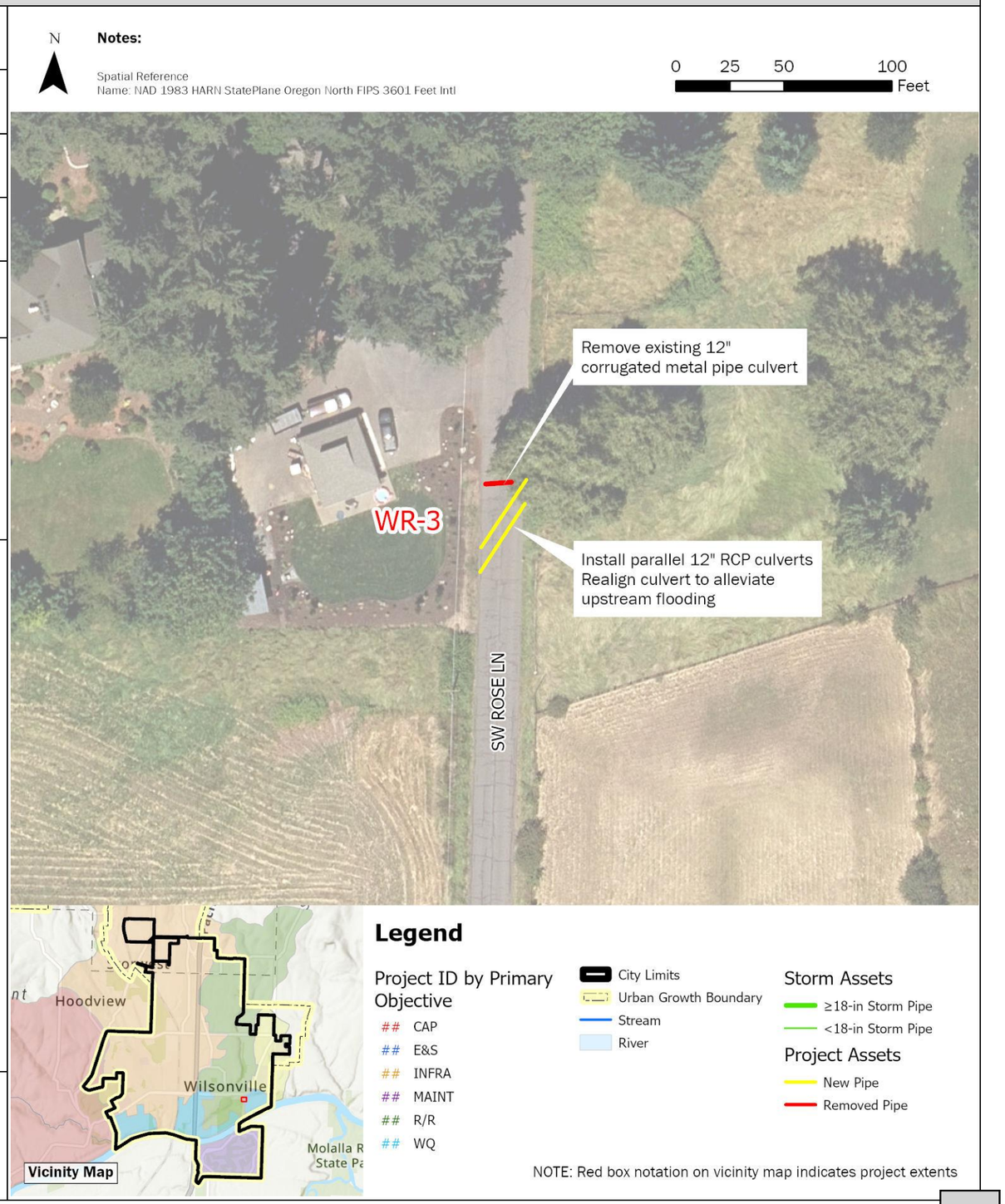


Sinkhole observed at upstream end of Miley Road alignment



Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		



WR-3	Rose Lane Culvert Replacement	

Design Considerations / Assumptions

- Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover.
- Minimum 12-inch cover on top of culvert.
- Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway.
- Maximum allowable depth for roadside ditches is 2-feet.
- Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP.
- Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.

Estimated Project Cost

Capital Expense Total	$72,000
Design / Construction Admin. (11%)	$8,000
Engineering & Permitting (20%)	$14,000
Total Cost	**$94,000**

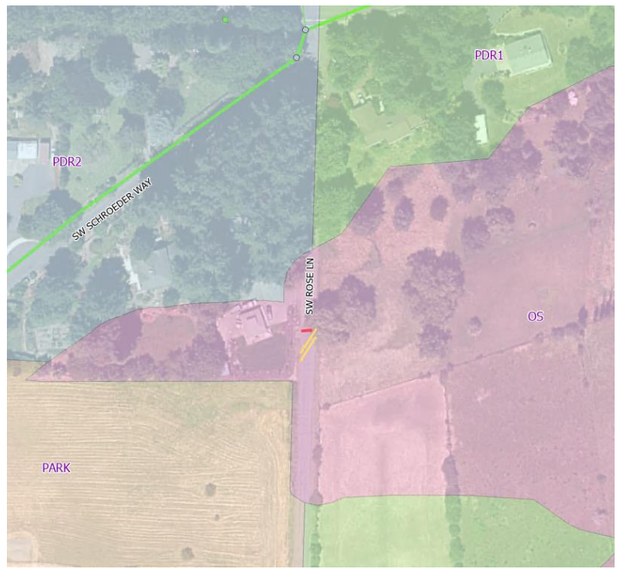
Project Cost Notes

- Modifications to the roadway beyond trenching were not developed as part of the cost estimate.
- Surveying is required.
- Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included.

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

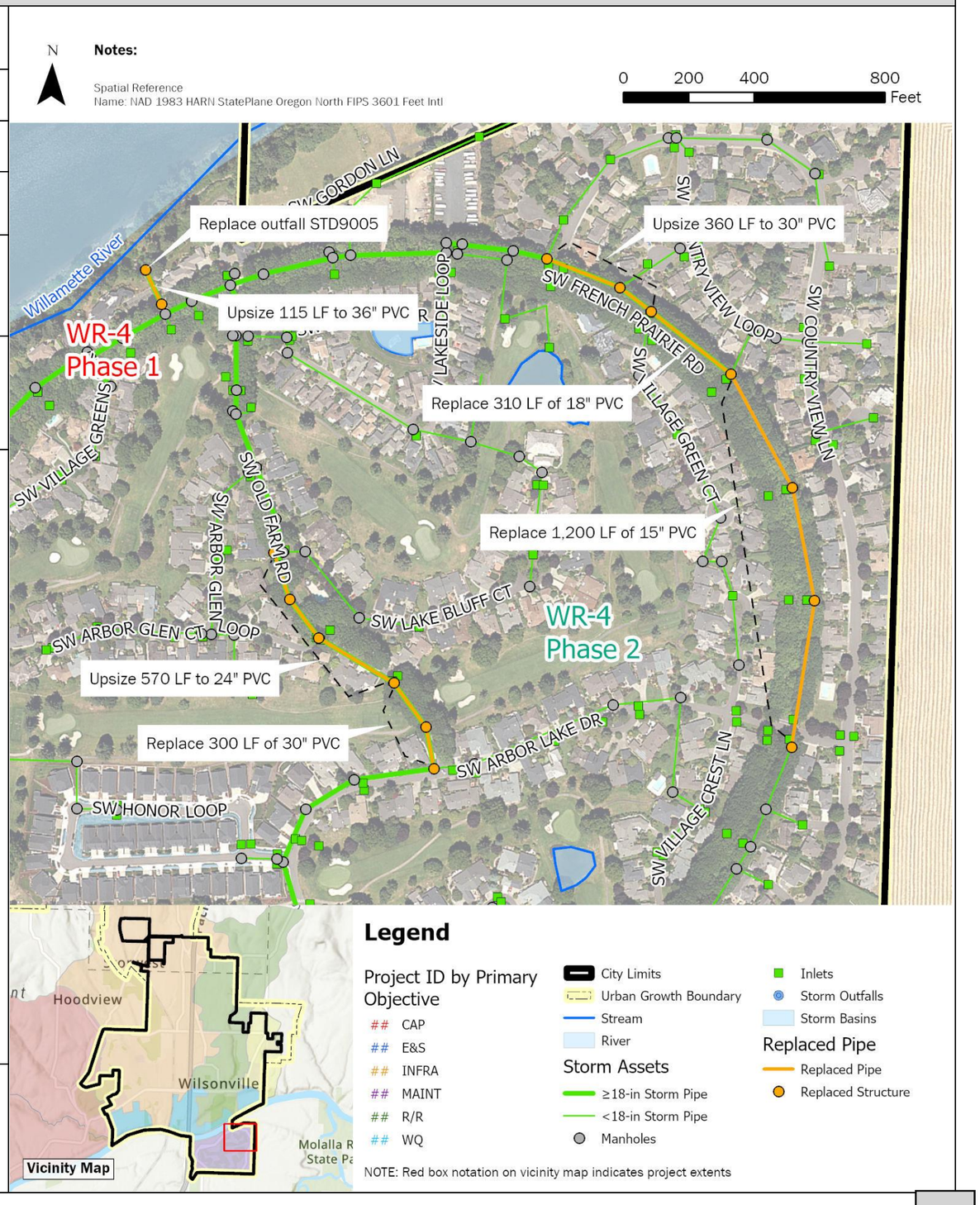
Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30		
Contributing Drainage Area	159 acres		
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Remove and replace existing Charbonneau East Outfall (STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).		



WR-4	Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

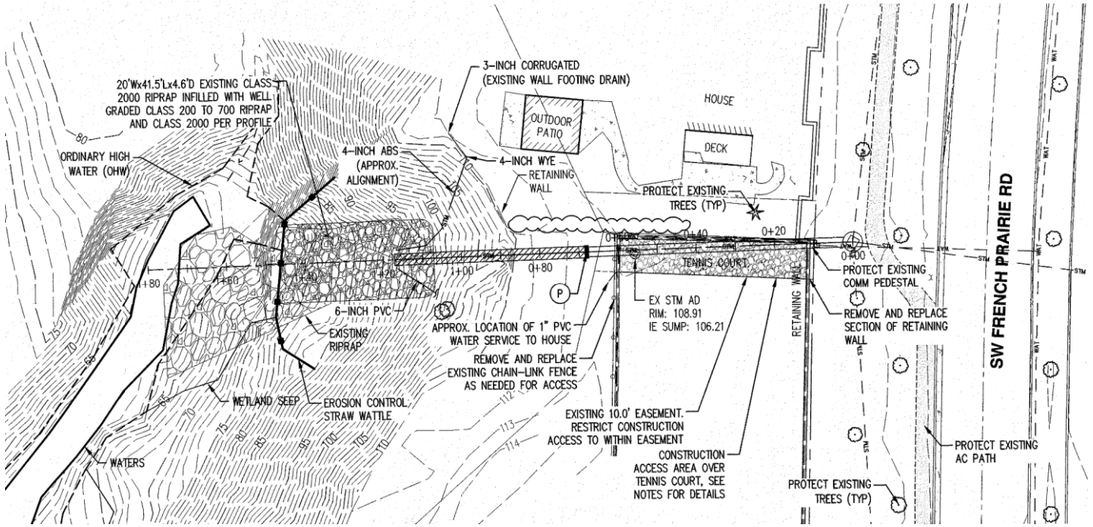
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 164,000	$ 1,947,000
Design / Construction Admin. (11%)	$ 18,000	$ 214,000
Engineering & Permitting (30% for Phase 1; 20% for Phase 2)	$ 49,000	$ 390,000
Total Cost	**$ 231,000**	**$2,551,000**

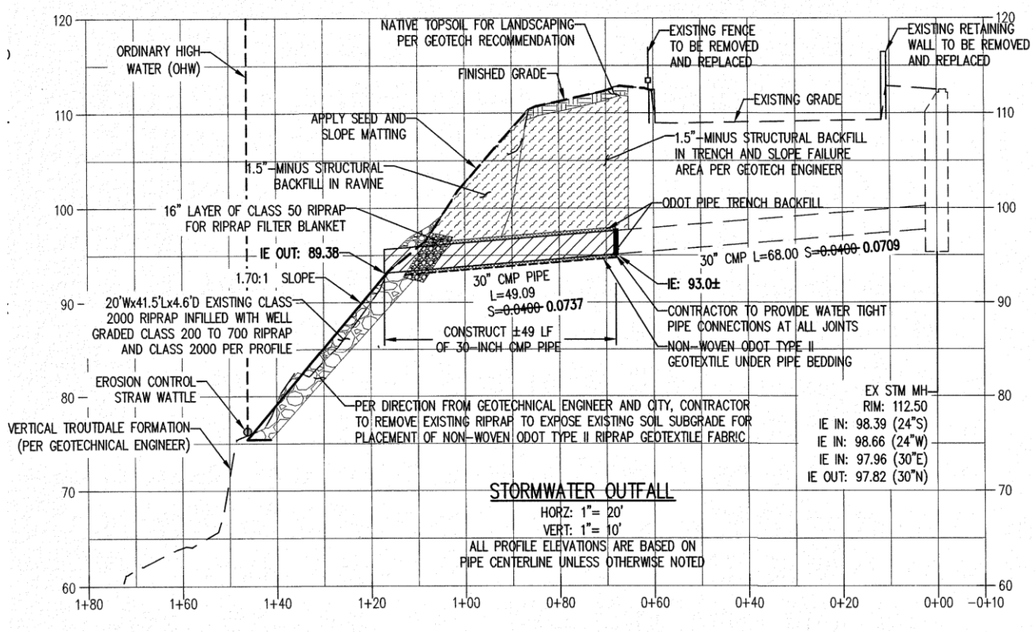
Project Cost Notes

- Due to in-water work, Phase 1 engineering and permitting multiplier was set to 30% versus 20%.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures

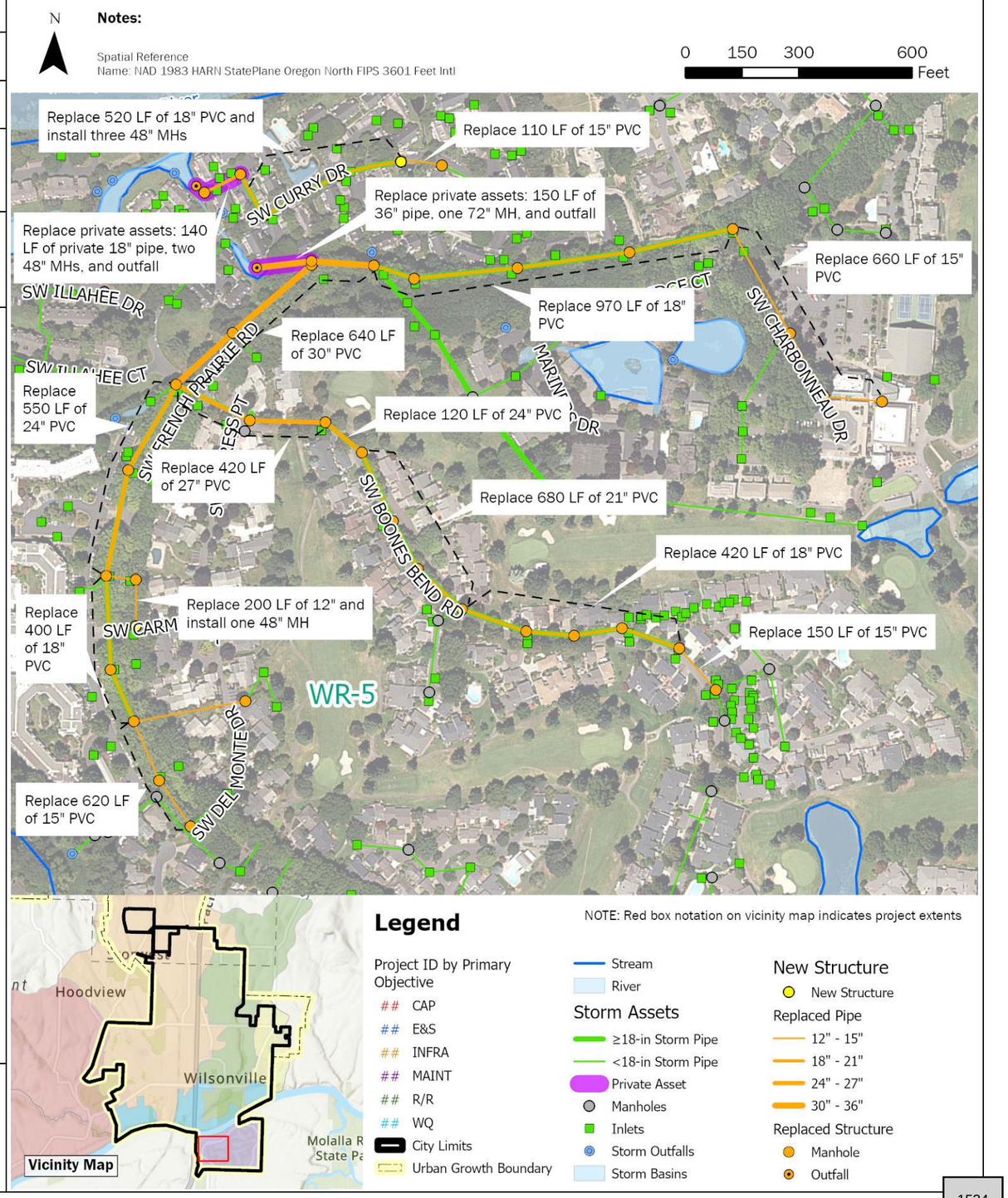


Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping. Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): • Pipe replacement along SW Curry Drive: ○ Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). ○ Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892). ○ Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). ○ Replace private outfall (CARTE ID: 15). ○ Replace two private 48-in manholes (CARTE ID 1892 and 1383). ○ Install three 48-inch manholes. • Pipe replacement along SW French Prairie Road: ○ Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) ○ Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). ○ Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown) ○ Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). ○ Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). ○ Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). ○ Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown). ○ Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. *Continued on page 2.*		



WR-5	Charbonneau West Stormwater Improvements	

Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road:
	  ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058).
	  ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055).
	  ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051).
	  ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050).
	  ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040).
	  ○ Replace eight 48-in manholes; and replace three 60-in manholes.	

Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated.
	• Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe.
	• Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters.
	• The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement:
	  ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892).
	  ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041.
	  ○ Two 72-in: ST9067 and ST9041	

Estimated Project Cost	Capital Expense Total	$ 6,801,000
	Design / Construction Admin. (11%)	$ 748,000
	Engineering & Permitting (Cap)	$ 500,000
	Total Cost	**$ 8,049,000**
Project Cost Notes	• A cap on engineering and permitting was applied. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Stormwater Master Plan Update

City Council Work Session

November 6, 2023

Kerry Rappold
Natural Resources Manager

Angela Wieland
Brown & Caldwell

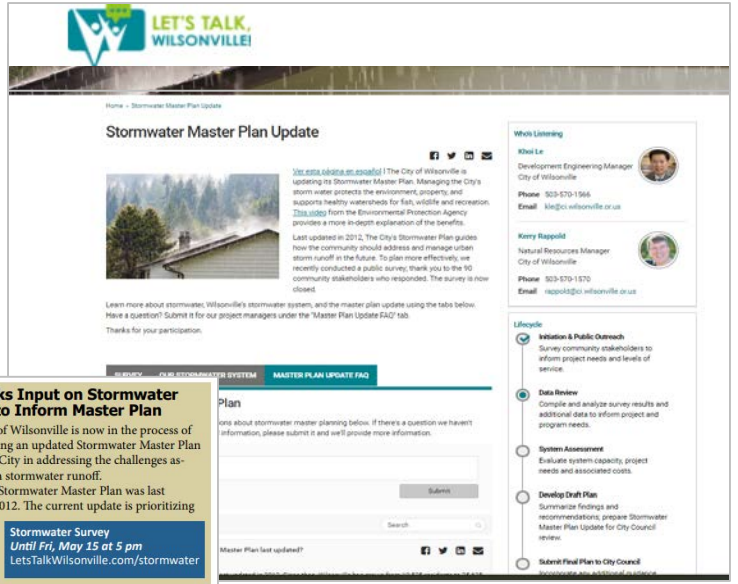
WILSONVILLE
OREGON

Discussion Topics

- Stormwater Management in Wilsonville
- Master Plan Development Process
- Regulatory Drivers and Overlap
- Technical Evaluations
- Capital Project and Program Overview
- Next Steps

Stormwater Management in Wilsonville

- Outreach moved online to educate community and gather feedback
  - Web page with traditional open house materials – hosted on *letstalkwilsonville*
  - English and Spanish versions
  - Boones Ferry Messenger article
  - Social media
- External Stormwater Survey
  - April 1 – May 15, 2021
  - English and Spanish versions
  - 90+ participants



City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

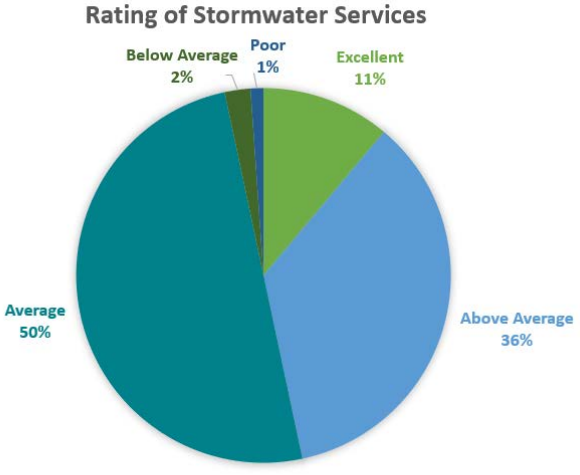
The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-1566 or kle@ci.wilsonville.or.us.

Stormwater Management in Wilsonville

External Public Outreach

1. Perception that stormwater is well-managed overall
2. Residents and businesses have similar priorities
   - ✓ Protection of streams, fish and wildlife
   - ✓ Water quality
   - ✓ Flood management
   - ✓ Stormwater infrastructure maintenance
3. The city could benefit from innovation and thinking “outside of the box”
4. Natural solutions appeal to participants
5. Residents could benefit from more education about stormwater

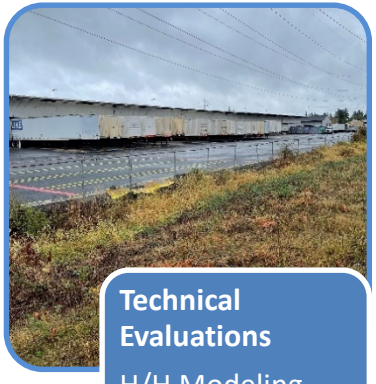


✓ 97% have a positive impression of Wilsonville Stormwater Services

Master Plan Development Process

Project Needs Assessment

- Data Collection
- Public Survey
- Staff Interviews
- Site Visits
- Problem Area Identification



Technical Evaluations

H/H Modeling

Stream Assessment

Water Quality Retrofits

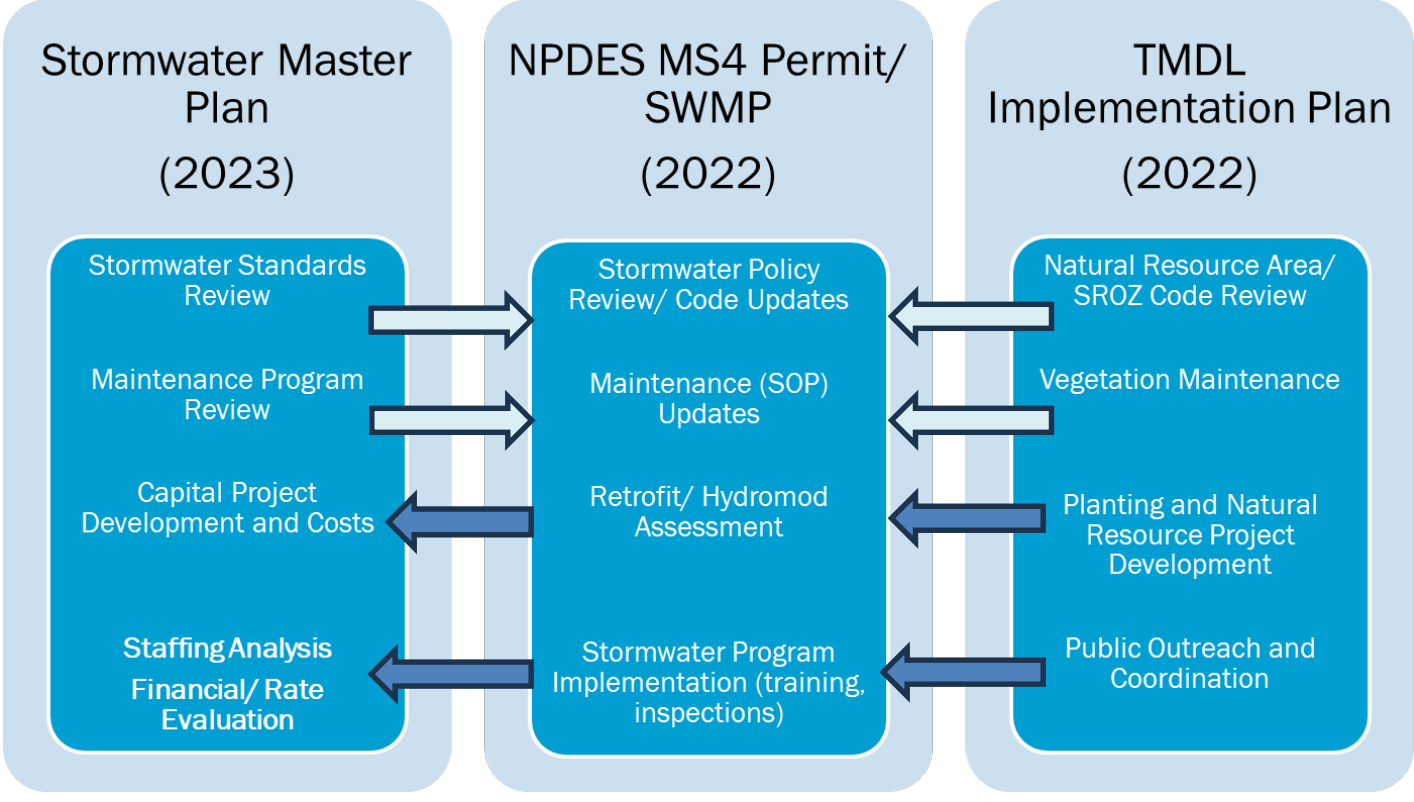
Capital Program Development

- Project Recommendations
- City-wide Programs
- Policies
- Cost Estimation

Capital Program Implementation

- Staffing
- Project Prioritization
- Documentation
- Stakeholder Outreach

Regulatory Drivers and Overlap



Technical Evaluations

- 33 Problem Areas Identified
- Technical Evaluations:
  - Hydrologic/ Hydraulic Modeling
  - Stream Assessment
  - Water Quality Retrofits
  - Maintenance Needs Evaluation

Capital Program Development

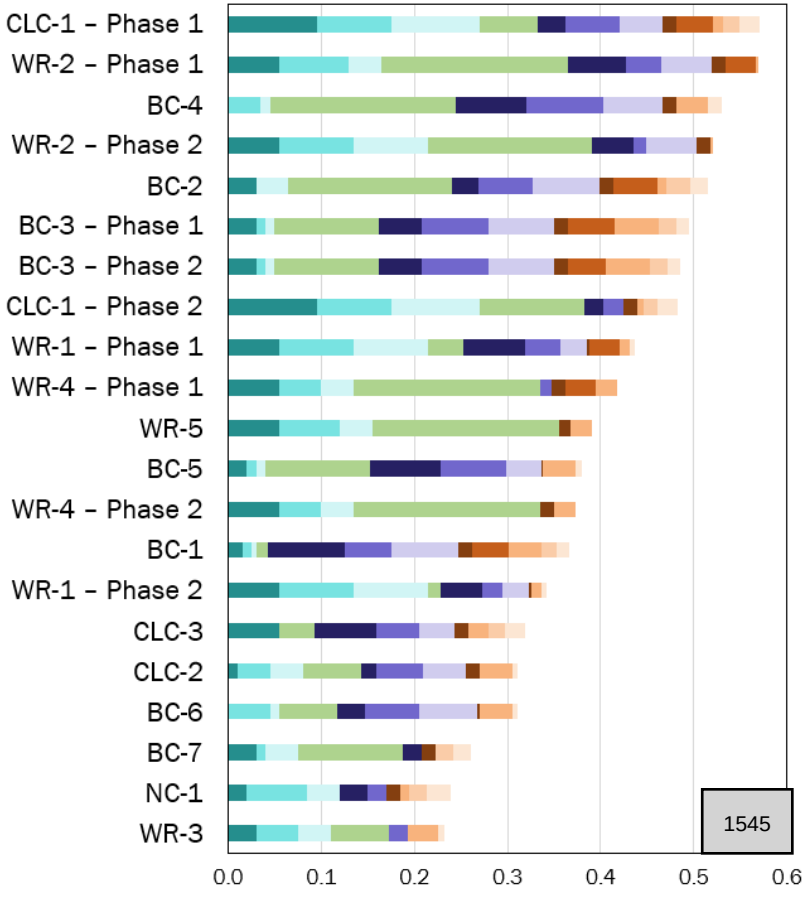
- 47 Project Opportunities Identified
- Project Objectives
  - Capacity
  - Maintenance
  - Repair/ Replacement (System Condition)
  - Infrastructure Need (growth areas)
  - Water Quality
  - Erosion and Sediment Control/ Instream
- City staff review (CIP Workshops)
- Fact Sheet Development/ Cost Estimates

Program Overview

- P-1: Localized Drainage Improvements Program
- P-2: Porous Pavement/ Green Street Retrofit Program
- P-3: Repair and Replacement Program
- P-4: Inlet Replacement Program
- P-5: Vegetation Maintenance Program

Capital Program Implementation

- Staffing Analysis
  - Public Works/ Stormwater
    - Deferred Maintenance
    - Maintenance of new assets
    - More immediate need
  - Community Development/ Engineering
    - Capital Project Implementation
    - NPDES/ TMDL Program Needs
    - Longer-term Need
- Project Prioritization



Next Steps

Project and Program Cost and Prioritization

- Short Term Schedule
- Mid Term Schedule
- Long Term Schedule

Virtual Open House

Draft SMP for Public Review

City Council Meeting Action Minutes
November 6, 2023

COUNCILORS PRESENT
Mayor Fitzgerald
Council President Akervall – Arrived 7:00 p.m.
Councilor Linville
Councilor Berry
Councilor Dunwell – Arrived 5:07 p.m.

STAFF PRESENT
Bryan Cosgrove, City Manager
Amanda Guile-Hinman, City Attorney
Dan Pauly, Planning Manager
Delora Kerber, Public Works Director
Dustin Schull, Parks Supervisor
Erika Valentine, Arts & Culture Program Coordinator
Jeanna Troha, Assistant City Manager
Kerry Rappold, Natural Resources Manager
Kimberly Veliz, City Recorder
Kris Ammerman, Parks and Recreation Director
Mark Ottenad, Public/Government Affairs Director
Mike Nacrelli, Civil Engineer
Stephanie Davidson, Assistant City Attorney
Zach Weigel, City Engineer
Zack Morse, Parks Maintenance Specialist
Zoe Mombert, Assistant to the City Manager

AGENDA ITEM	ACTIONS
WORK SESSION	**START:** 5:06 p.m.
A. Wastewater Treatment Plant Master Plan Update	Staff shared analysis that informs an updated draft of the Wastewater Treatment Plant Master Plan.
B. Stormwater Master Plan Update – Executive Summary and Capital Improvement Project	Staff presented an executive summary of the draft Stormwater Master Plan, a 20-year plan detailing the City's work plan and identifying capital needs to effectively maintain, restore and enhance local watersheds and to meet engineering, environmental and land use needs.
C. Frog Pond East and South Development Code	Staff sought the Council's feedback to inform development code amendments drafted for the Frog Pond East and South Master Plan.
D. Boones Ferry Park Projects Update	Staff provided a combined presentation on Resolution Nos. 3088 and 3089, both of which provide upgrades to Boones Ferry Park.
REGULAR MEETING	
<u>Mayor's Business</u> A. Upcoming Meetings	Upcoming meetings were announced by the Mayor as well as the regional meetings she attended on behalf of the City.

B. Proclamation	The Mayor read a proclamation declaring November 2023 as National American Indian Heritage month.
Communications A. None.	
Consent Agenda A. **Resolution No. 3088** A Resolution Of The City Of Wilsonville Approving A Construction Contract With Romtec, Inc. For The Boones Ferry Restroom Construction Project. B. **Resolution No. 3089** A Resolution Of The City Of Wilsonville Approving A Construction Contract With Buell Recreation LLC For The Boones Ferry Playground Project. C. **Resolution No. 3090** A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Master Services Agreement With OpenGov, Inc. For Asset Management Software Services. D. **Resolution No. 3092** A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Professional Services Agreement With Century West Engineering For Engineering Consulting Services For The 2024 Street Maintenance Project (Capital Improvement Project No. 4014, 4118, 4725). E. **Resolution No. 3093** A Resolution Of The City Of Wilsonville Accepting The Jurisdictional Surrender For A Portion Of SW Stafford Road And SW Frog Pond Lane By Clackamas County Pursuant To Oregon Revised Statute 373.270. F. Minutes of the October 16, 2023 City Council Meeting.	The Consent Agenda was adopted 5-0.
New Business A. **Resolution No. 3081** A Resolution Of The City Of Wilsonville Approving The City Of Wilsonville Public Art Policy And Guidelines.	Resolution No. 3081 was adopted 5-0.

B. **Resolution No. 3083** A Resolution Of The City Of Wilsonville Adopting The Arts, Culture, And Heritage Commission (ACHC) FY 2023/24 Five-Year Action Plan And Annual One-Year Implementation Plan.	Resolution No. 3083 was adopted 5-0.
C. **Resolution No. 3091** A Resolution Of The City Of Wilsonville Adopting The Findings And Recommendations Of The "Solid Waste Collection Rate Report, October 2023" And Modifying The Current Republic Services Rate Schedule For Collection And Disposal Of Solid Waste, Recyclables, Organic Materials And Other Materials, Effective January 1, 2024.	Resolution No. 3091 was tabled until the December 4, 2023 City Council meeting.
Continuing Business A. None.	
Public Hearing A. **Ordinance No. 883** An Ordinance Of The City Of Wilsonville Adopting A Franchise Agreement For Solid Waste Management And Collection Within The City And Repealing Ordinance No. 814.	After a public hearing was conducted, Ordinance No. 883 was adopted on first and second reading by a vote of 5-0.
City Manager's Business	The City Manager shared staff would arrange a training for Council to prepare them for their trip to Kitakata, Japan.
Legal Business	The City Attorney, who is also a running coach at the Coffee Creek Correctional Facility, shared some feedback from adults in custody who participate in the running program.
ADJOURN	10:10 p.m.

PLANNING COMMISSION

WEDNESDAY, OCTOBER 11, 2023

WORK SESSION

3. Stormwater System Master Plan (Rappold) (45 minutes)

PLANNING COMMISSION MEETING
STAFF REPORT

Meeting Date: October 11, 2023	**Subject:** Stormwater Master Plan Update – Executive Summary and CIP **Staff Member:** Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☐ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☒ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Review and provide comment on the executive summary and Capital Improvement Program (CIP) for the Stormwater Master Plan Update.	
Recommended Language for Motion: N/A	
Project / Issue Relates To:	

☒Council Goals/Priorities: Expand and Maintain High Quality Infrastructure	☒Adopted Master Plan(s): 2012 Stormwater Master Plan	☐Not Applicable

ISSUE BEFORE COMMISSION:
In advance of the draft Stormwater Master Plan Update (SMP), staff and the consultant will present the executive summary and CIP for the SMP.

EXECUTIVE SUMMARY:

In 2012, the City adopted the Stormwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., UGB expansion areas) and new stormwater management requirements (i.e., NPDES MS4 Stormwater Permit) that need to be addressed as part of the update. The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

In 2021, a survey was conducted to gather feedback from the community about the proposed SMP. Ninety respondents provided input on existing conditions (e.g., water quality of streams and flooding issues) related to the stormwater system and how they rate the level of service (e.g., maintenance of system and public education). Overall, the respondents felt the City was doing a good job in regards to managing the public stormwater system.

Since 2021, the consultant team has been working on extensive data collection, problem area identification, assessment and modeling of the stormwater system, retrofit analysis, CIP projects, and developing the policies that will guide the implementation of the SMP. The executive summary provides an overview of the SMP and includes the following new elements that will be incorporated into the draft SMP:

1. An analysis of the City's NPDES MS4 permit (i.e., stormwater permit issued by the Oregon Department of Environmental Quality) and TMDL Implementation Plan (i.e., a plan to address bacteria, mercury and temperature as required by Oregon DEQ) to determine the appropriate management and project objectives in the SMP.
2. Stream surveys (segments of Boeckman Creek, Meridian Creek, Arrowhead Creek, and streams in the Frog Pond Planning Area) to assess the geomorphic condition (e.g., bank erosion, and grade control, such as beaver dams) of stream channels due to hydromodification (i.e., the impact of urban stormwater runoff).
3. A staffing analysis to determine the current and future needs related to operating and maintaining the public stormwater system, including the implementation of future programmatic responsibilities and CIP projects.

The Capital Improvement Program addresses the variety of issues and problems associated with the City's public stormwater system and represents a critical piece in the overall management of the system. Projects have been developed, and will be prioritized, to address the capacity, condition, and maintenance of the system, and improvements associated with water quality and hydromodification. In addition to the identified CIP projects, stormwater programs, such as a porous pavement and green street pilot program, were identified to address regulatory drivers and support proactive system maintenance.

EXPECTED RESULTS:
The SMP will include goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Program, fee in lieu of construction program, and draft and final versions of the Plan.

TIMELINE:
The project is scheduled to be completed by the spring of 2024.

CURRENT YEAR BUDGET IMPACTS:
The adopted budget for FY20/21 included $450,000 in Stormwater Operating and Stormwater System Development Charges (SDC) for CIP #7064. In the budget, $396,476 had been allocated for the development of the Master Plan, and $53,525 for overhead. The project funds have been rolled over into the current fiscal year.

COMMUNITY INVOLVEMENT PROCESS:
The consultant team prepared a public engagement plan for outreach to interested members of the community and businesses potentially affected by the updated plan. The Public Engagement Plan incorporated the City's existing public engagement tools, including Let's Talk, Wilsonville! and the Boones Ferry Messenger. A survey was conducted to provide information and solicit feedback from the public related to the project scope and activities.

POTENTIAL IMPACTS or BENEFIT TO THE COMMUNITY:
The project will benefit the community by providing goals and policies and an updated capital improvement plan to serve a growing population and meet environmental regulations.

ALTERNATIVES:
Not proceeding with the project will hinder the City's ability to plan for anticipated growth and development and to address regulatory requirements.

ATTACHMENTS:

1. Stormwater Master Plan Executive Summary (draft October 2023)
2. Stormwater Capital Improvement Program (draft October 2023)

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include completion and reprioritization of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), changing regulatory drivers and programs, new and redevelopment activities, and observed system deficiencies warranting additional study and proposed solutions.

This 2023 SMP identifies projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth.

The SMP development process included:

- Incorporation of project need and system improvements information as identified by City staff.
- Identification and validation of storm drainage problems and flooding using hydrologic and hydraulic (H/H) models, which help to assess flooding frequency and severity.
- Assessment of stormwater retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risk to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. This effort included distributing surveys to City staff and the public, conducting a literature-based and Geographic Information System (GIS) data review, and site visits. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of the project needs identification effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvement, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, continued applicability of non-constructed water quality projects per the 2012 SMP, and the ability to integrate water quality into other project needs, 10 CP locations and two ongoing programs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks to inform locations where stream morphology may be or is currently impacted from changes to upstream land use and in response to changes in flow,

infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) modeling developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities. CPs installed since 2012 were incorporated in the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing levels and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into additional staffing recommendations for both Public Works and Community Development/Engineering.

Project Prioritization. Project needs were prioritized based on various criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater utility rate evaluations.

General Recommendations

Project, program, and policy recommendations in this SMP are proposed to improve and enhance the performance of the storm drainage infrastructure throughout the city, as summarized by the following recommended actions:

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion and sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related programs to address recurring, maintenance-related system improvements in an expedited manner and proactively and opportunistically address water quality.
- Use ongoing inspection results to evaluate and proactively address system condition needs, supporting asset management principles.
- Update policies and procedures to support public and private partnerships with new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu in conjunction with the Town Center redevelopment.
- Continue implementation of City's Public Works Design Standards to ensure the City's stormwater standards address regulatory drivers, support private development activities, and protect stream health.
- Add staff necessary to ensure compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit needs as well as implementation of recommendations outlined in this SMP.

Capital Project Summary

A total of 16 CPs, representing 21 separately costed (by phase) projects, two (2) citywide planning projects, and five (5) programs have been developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified capital projects, costs, and respective priority (to be finalized with draft SMP). Figure ES 1-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
BC-1	Library Pond Retrofit	**Capacity** Water Quality Infrastructure Need	$778,000				
BC-2	Ash Meadows Flow Mitigation	**Capacity** Water Quality	$1,403,000				
BC-3 – Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	**Capacity** Water Quality	$3,618,000				
BC-3 – Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	**Capacity** Water Quality	$5,148,000				
BC-4	Boeckman Creek Stabilization at Colvin Lane	**Erosion/ Sediment Control** Repair/Replacement Maintenance	$235,000				
BC-5	Memorial Park Swale Retrofit	**Water Quality** Erosion/ Sediment Control Maintenance	$540,000				
BC-6	Gesellschaft Water Well Channel Restoration	**Erosion/ Sediment Control** Maintenance	$309,000				
BC-7	Town Center Conveyance Pipe Installation	**Infrastructure Need**	$10,805,000				
CLC-1 – Phase 1	Day Road Stormwater Improvements, Phase 1	**Repair/ Replacement** Capacity	$4,645,000				

Table ES-1. Capital Project Costs and Schedule

Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
CLC-1 – Phase 2	Day Road Stormwater Improvements, Phase 2	**Capacity**	$2,964,000				
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	**Repair/ Replacement** Maintenance	$227,000				
CLC-3	Garden Acres Pond Retrofit	**Capacity** Water Quality	$1,058,000				
NC-1	Frog Pond East and South Conveyance Pipe Installation	**Infrastructure Need**	$19,731,000				
WR-1 – Phase 1	SW Willamette Way/ Morey's Landing Stormwater Improvements, Phase 1	**Capacity** Water Quality	$1,476,000				
WR-1 – Phase 2	SW Willamette Way/ Morey's Landing Stormwater Improvements, Phase 2	**Capacity**	$811,000				
WR-2 – Phase 1	Miley Road Stormwater Improvements, Phase 1	**Repair/ Replacement** Erosion/Sediment Control Maintenance	$661,000				
WR-2 – Phase 2	Miley Road Stormwater Improvements, Phase 2	**Repair/Replacement** Maintenance	$7,425,000				
WR-3	Rose Lane Culvert Replacement	**Capacity** Maintenance	$94,000				
WR-4 – Phase 1	Charbonneau East Stormwater Improvements, Phase 1	**Capacity** Repair/ Replacement	$231,000				
WR-4 – Phase 2	Charbonneau East Stormwater Improvements, Phase 2	**Repair/Replacement** Maintenance	$2,551,000				
WR-5	Charbonneau West Stormwater Improvements	**Repair/Replacement** Maintenance	$8,049,000				
City-1	Flow Monitoring and Rain Gauge Installation	**Capacity**	$100,000				
City-2	Hydromodification Assessment and Stream Survey	**Erosion/Sediment Control**	TBD				
P-1	Local Drainage Improvements Program	**Infrastructure Need** Capacity	$100,000/yr				X
P-2	Porous Pavement/Green Street Retrofit Program	**Water Quality**	$50,000/yr				X
P-3	Repair/Replacement Program	**Repair/Replacement** Maintenance	TBD				X
P-4	Inlet Replacement Program	**Infrastructure Need**	$50,000/yr				X

Table ES-1. Capital Project Costs and Schedule							
Project Number	Project Name	Objectives	Estimated Cost	Implementation Schedule			
				Near Term (2024-28)	Mid Term (2029-33)	Long Term (2034-43)	Annual
P-5	Vegetative Facility Maintenance Program	**Water Quality**	$10,000/yr				X
			TOTAL $	$	$	$	$

*Note: Primary objectives are identified in **BOLD**.*

Programmatic Summary

In addition to the identified CPs, the following stormwater program needs were identified to address regulatory drivers and support proactive system maintenance:

Local Drainage Improvements Program (P-1). Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).

Porous Pavement/Green Street Pilot Program (P-2). Establishes an annual funding mechanism to integrate porous pavement overlays, low impact development (LID) or green infrastructure (GI) in conjunction with street improvement and other utility projects.

Repair/Replacement Program (P-3). Allocates funds to conduct prescriptive replacement of public pipe and outfalls in conjunction with inspection and asset management efforts.

Inlet Replacement Program (P-4). Allocates funds to relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues.

Vegetation Maintenance Program (P-5). Allocates funds to 1) conduct riparian and/or in channel vegetation maintenance including removal of invasive species and/or 2) conduct restorative maintenance on select private stormwater facilities in the City where maintenance agreements are not in place or have not been executed.

Implementation

Capital projects, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP).

To ensure effective implementation of the Wilsonville 2023 CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP to inform recommendations for additional Public Works Operations and Engineering staff. Additional staff in Public Works Operations and Community Development/ Engineering are recommended to accommodate new projects and programs defined in this SMP as well as deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the schedule and respective funding needs of capital investments. A financial plan is required to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, will reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

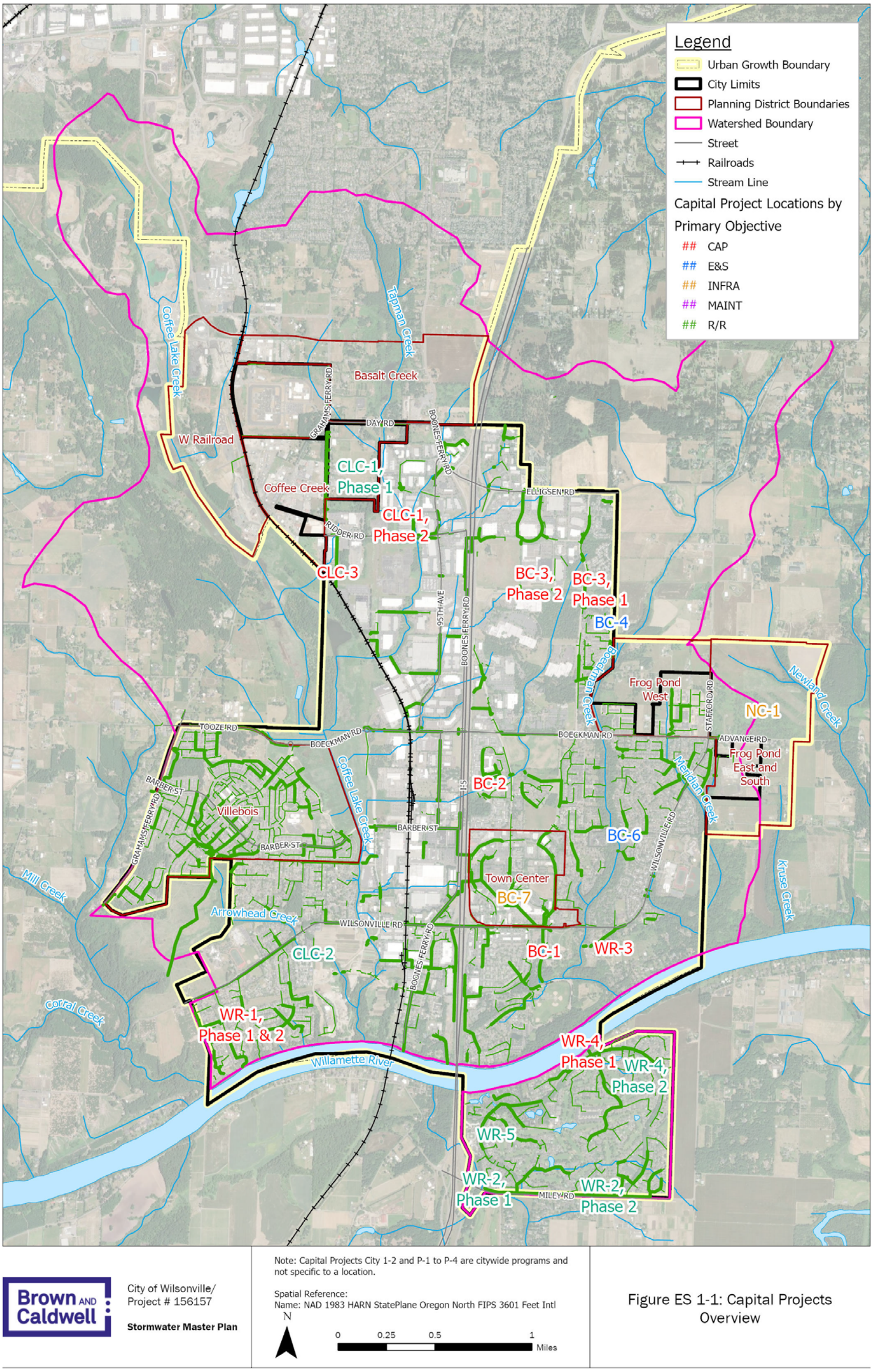
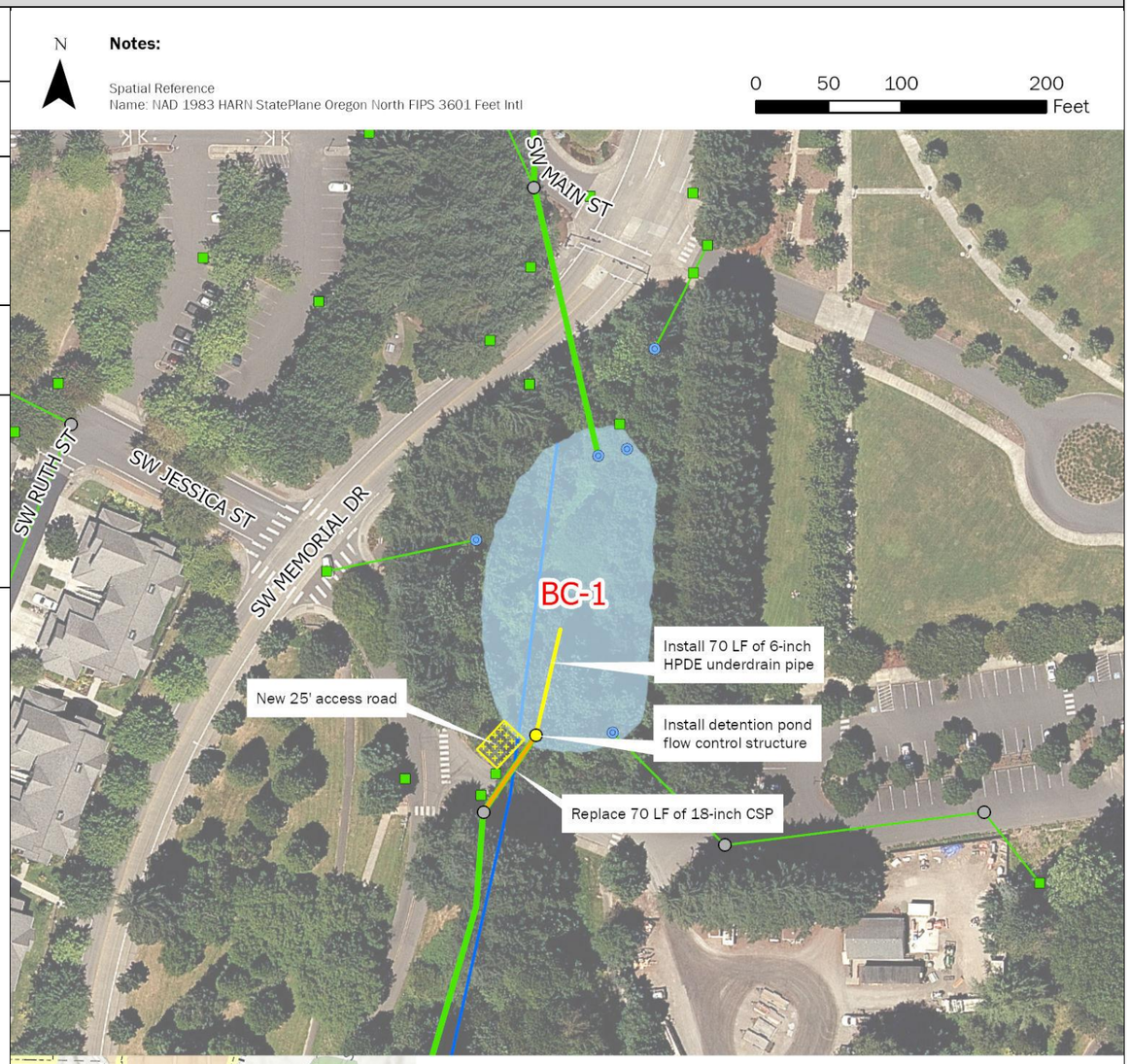


Figure ES-1. Capital Projects by Primary Objective

Attachment 2

Stormwater Capital Improvement Program (draft October 2023)

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



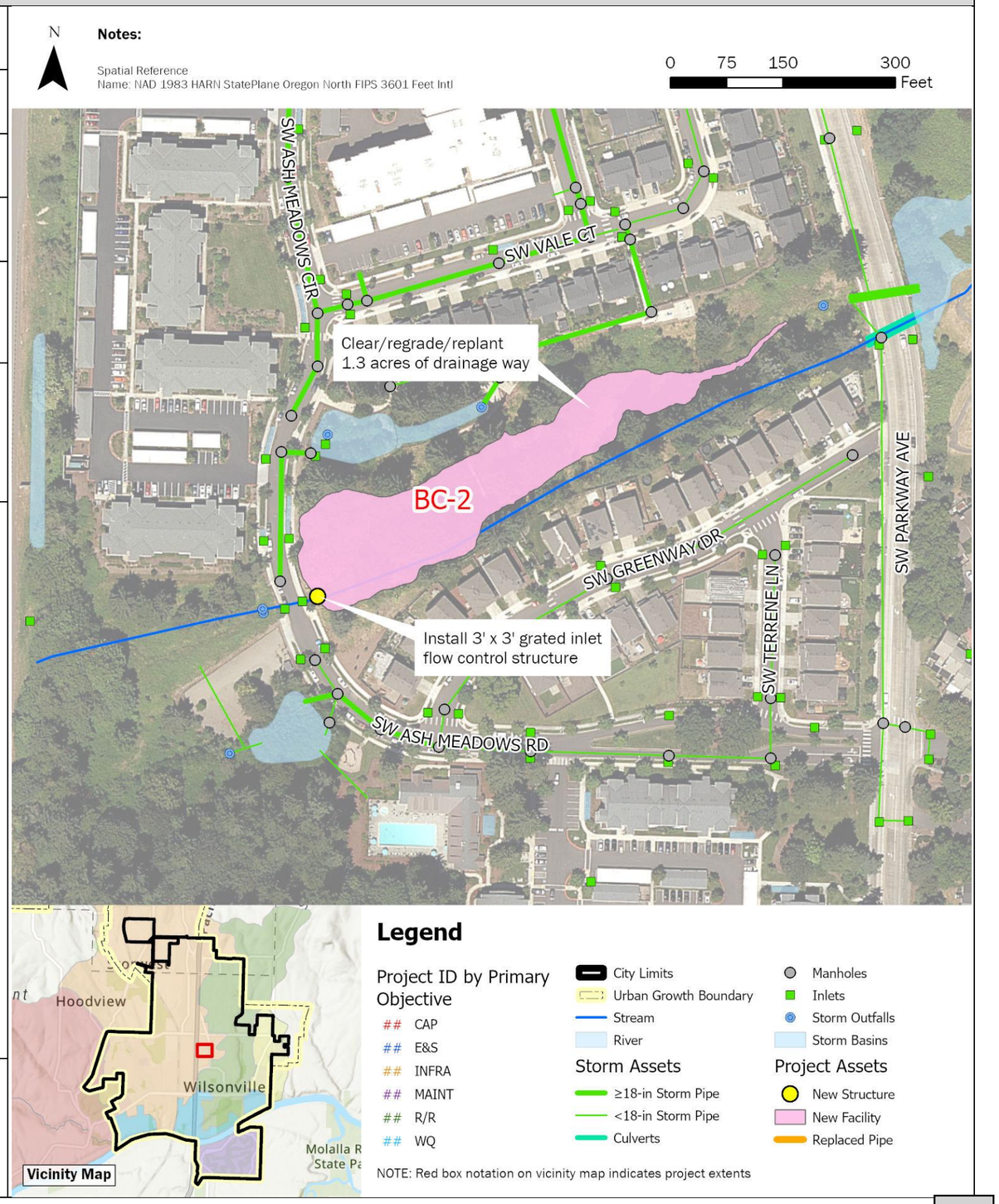
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$594,000
	Design / Construction Admin. (11%)	$65,000
	Engineering & Permitting (20%)	$119,000
	Total Cost	**$778,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		

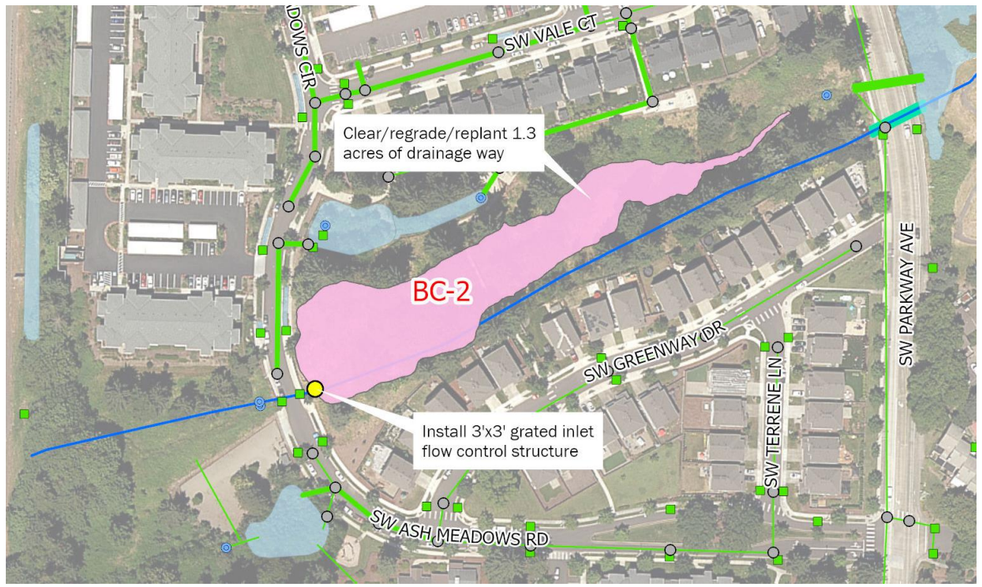


BC-2	Ash Meadows Flow Mitigation	
Design Considerations / Assumptions	• This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions. • This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road. • Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet. • This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions. • The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.	
Estimated Project Cost	Capital Expense Total	$995,000
	Design / Construction Admin. (11%)	$109,000
	Engineering & Permitting (30%)	$299,000
	Total Cost	**$1,403,000**
Project Cost Notes	• The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area. • Clearing and plant restoration is necessary for entire area to 190 ft elevation. • A 30% engineering and permitting multiplier was applied due to in-water work. • Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project.	

Additional Figures

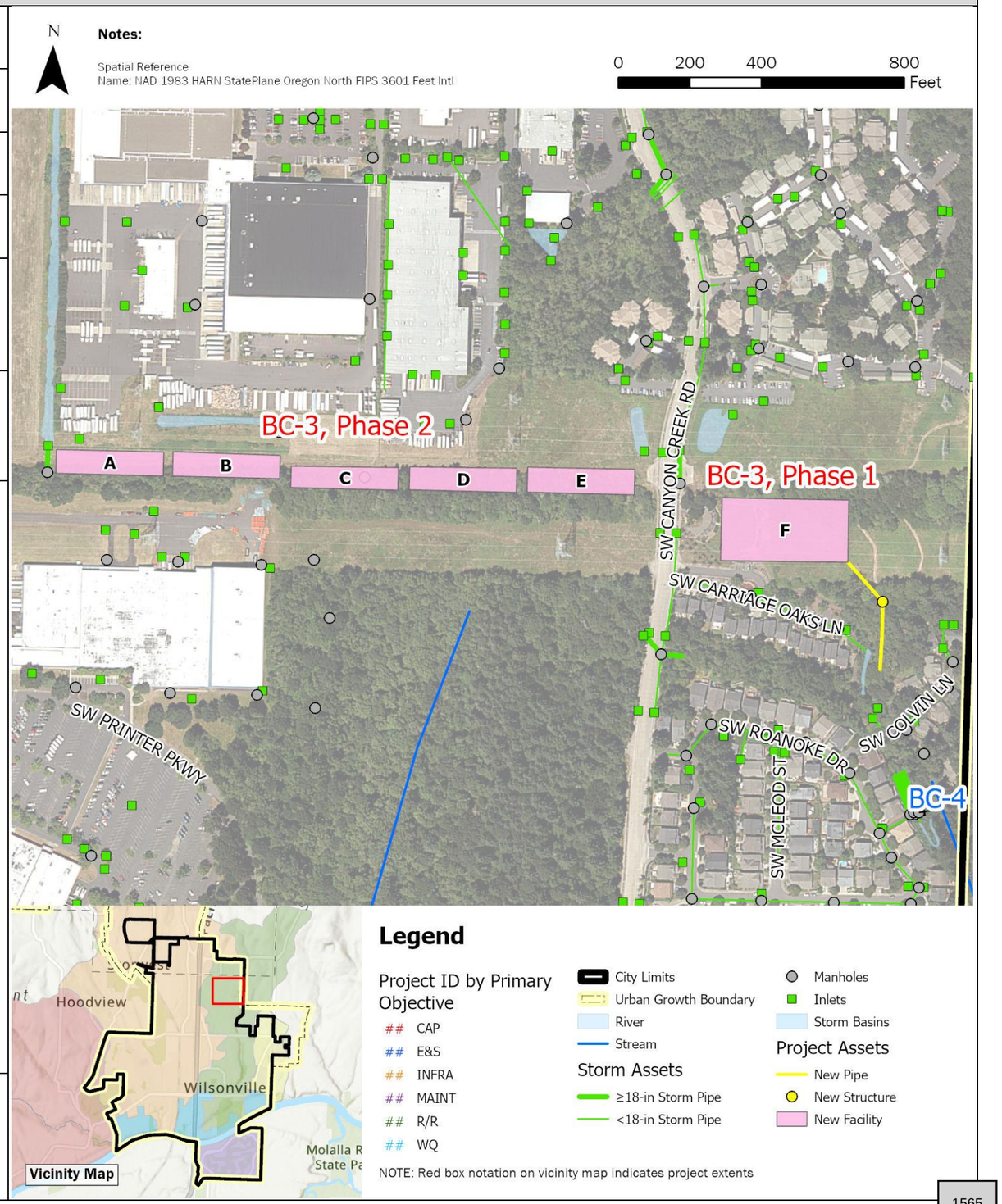
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3 Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$2,809,000	$4,187,000
Design / Construction Admin. (11%)	$309,000	$461,000
Engineering & Permitting (Capped)	$500,000	$500,000
Total Cost	**$3,618,000**	**$5,148,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A cap on engineering and permitting was applied.

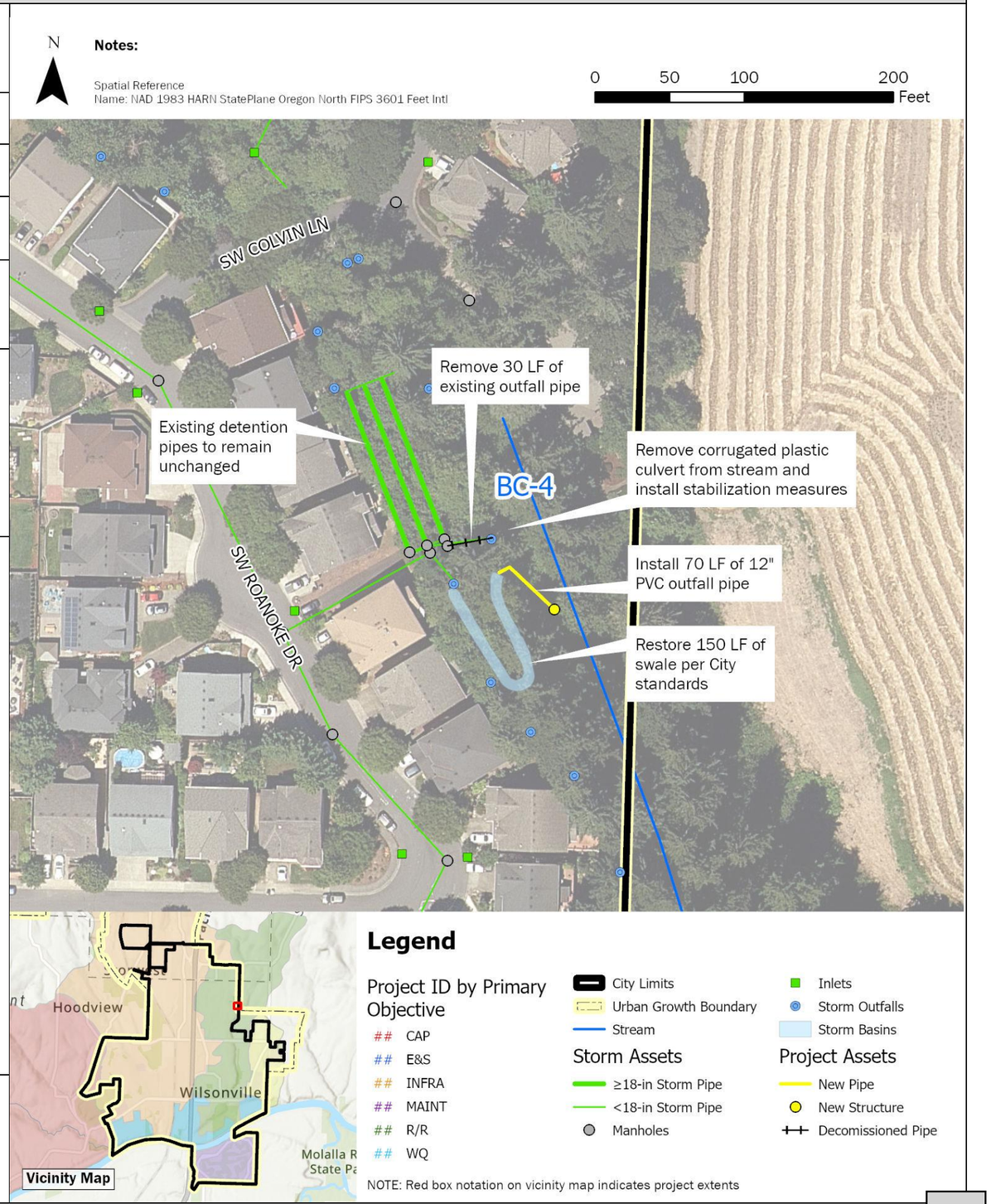
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

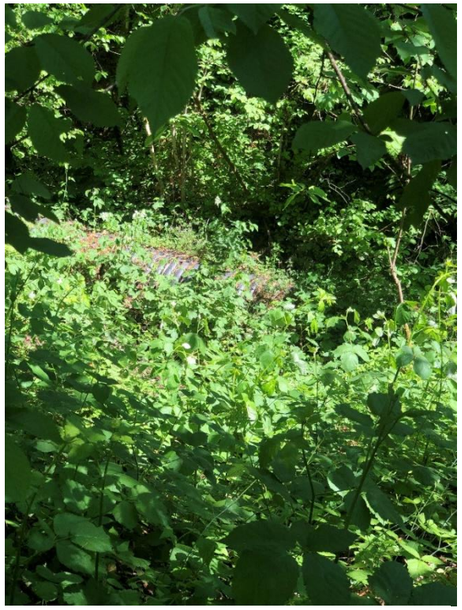
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$167,000
	Design / Construction Admin. (11%)	$18,000
	Engineering & Permitting (30%)	$50,000
	Total Cost	**$235,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures

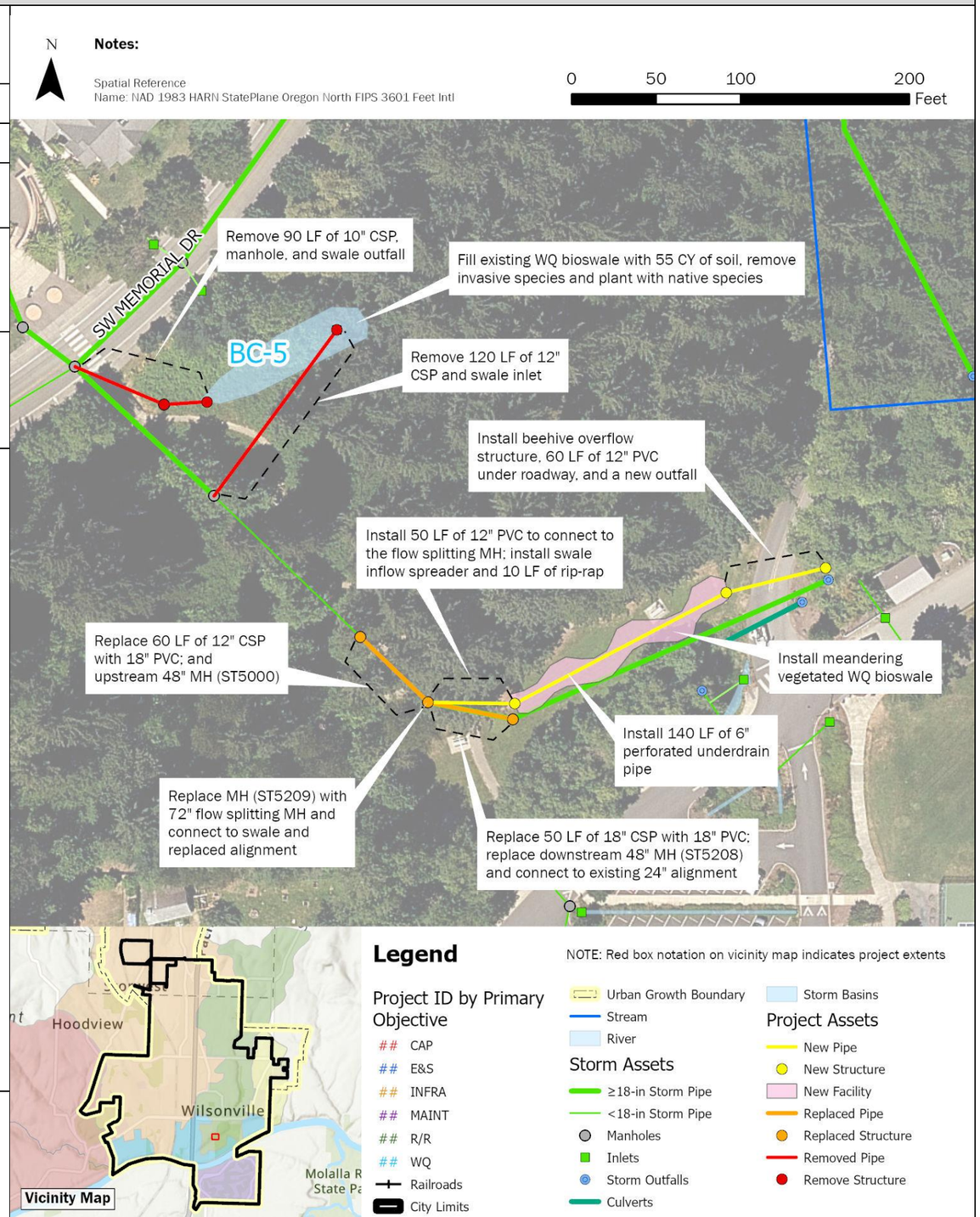


Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		
Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot. Project details are as follows: • Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available): ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042). ○ Remove 120 LF of 12-inch CSP (SD5044). ○ Remove manhole (ST5098). ○ Remove swale inlet structure (CARTE ID 568). ○ Remove swale outfall structure (CARTE ID 19). ○ Fill existing swale and revegetate area. • Replace two 48-inch manholes (ST5000 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Install a new meandering water quality swale near the Memorial Park parking lot: ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole. ○ Install 50 LF of 12-inch PVC pipe. ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe. ○ Install swale inflow spreader. ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader. ○ Install beehive overflow structure. ○ Install new outfall into the creek. ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Summary

BC-5 - Memorial Park Swale Retrofit

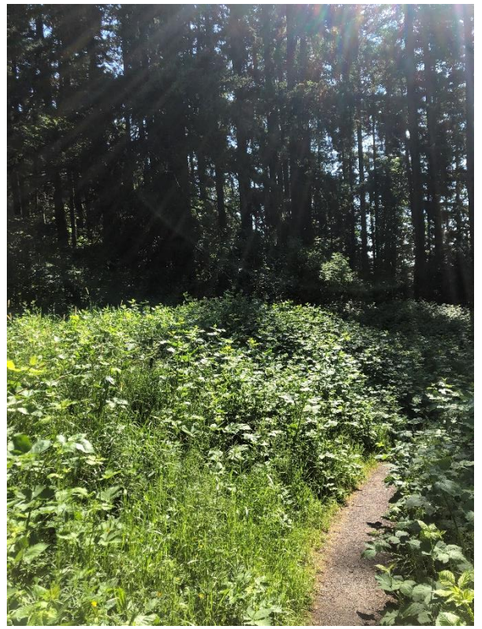
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$383,000
	Design / Construction Admin. (11%)	$42,000
	Engineering & Permitting (30%)	$115,000
	Total Cost	**$540,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

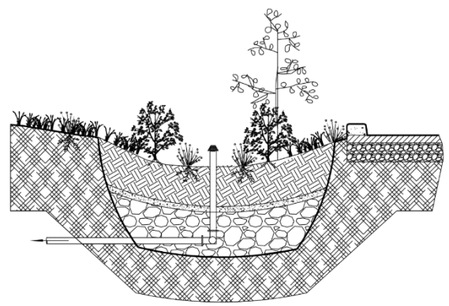
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



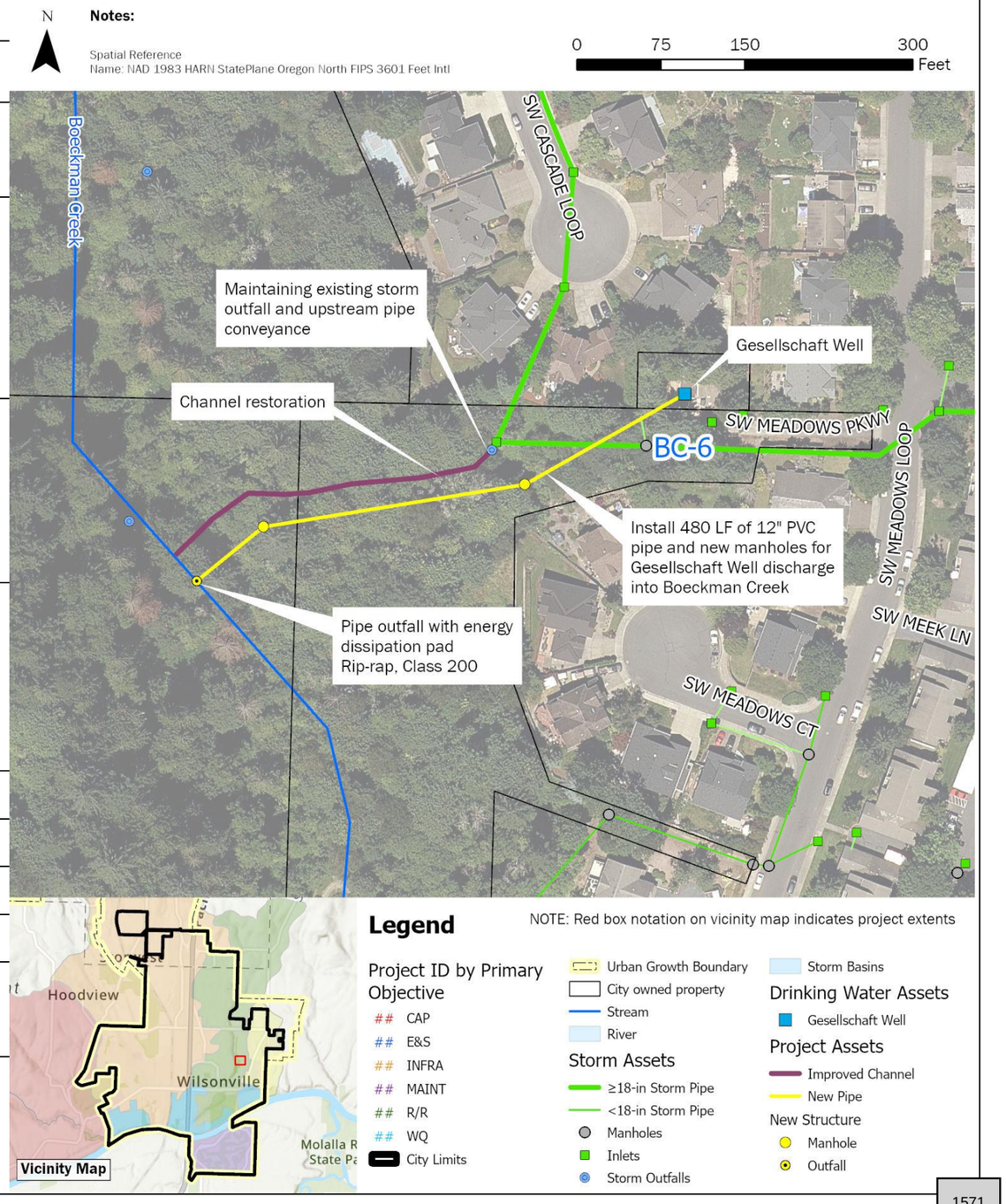
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)



Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$219,000	
	Design / Construction Admin. (11%)	$24,000	
	Engineering & Permitting (30%)	$66,000	
	Total Cost	**$309,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



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City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

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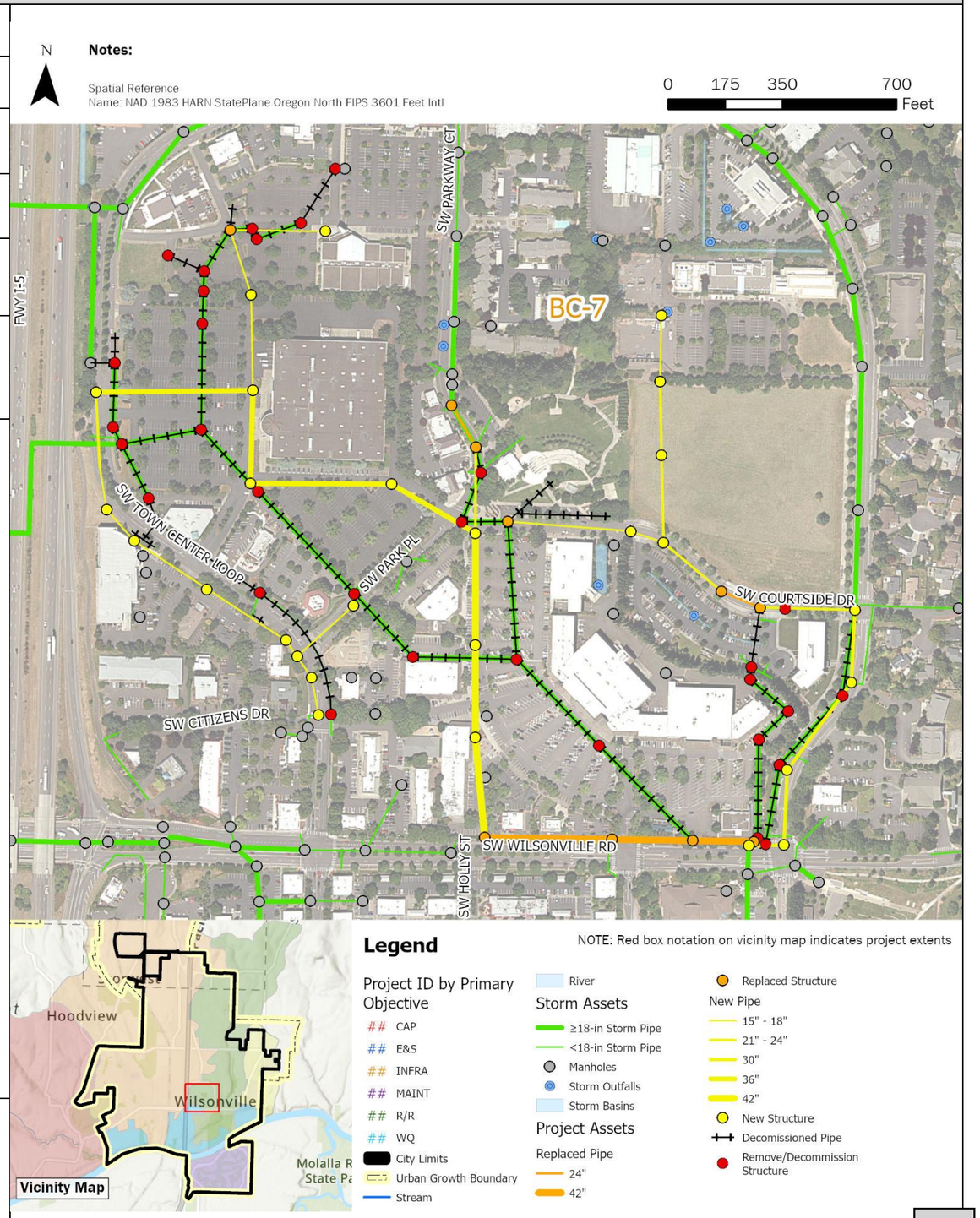
Capital Project Summary

BC-6 - Gesellschaft Water Well Channel Restoration

BC-7	Town Center Conveyance Pipe Installation		
Project Objective(s)	Infrastructure Need (New development)		
Project Opportunity ID	43		
Contributing Drainage Area	141 acres		
Estimated Existing Impervious Area (%)	43.6%	**Estimated Future Impervious Area (%)**	51.2%
Project Location	The project site is located in the Town Center Planning District of the City, bounded by Interstate-5 to the west, SW Town Center Loop to the north and east, and SW Wilsonville Road to the south.		
Statement of Need	The City adopted the City of Wilsonville Town Center Plan in 2019, which includes a conceptual public stormwater collection system layout. This project includes proposed stormwater pipe (trunk lines >15" diameter), manholes, and existing stormwater pipe and manhole decommissioning associated with this development plan.		
Project Description	This project reflects pipe and manhole installation and decommissioning/abandonment provided by the City from the 2019 Town Center Development Plan. Project details are as follows: • Decommission approx. 7,670 LF (1.45 miles) of existing pipe between 12-42 inches: ○ 150 LF of 12-inch; 690 LF of 15-inch; 20 LF of 18-inch; 670 LF of 21-inch; 1,020 LF of 24-inch; 2,060 LF of 30-inch; 2,600 LF of 36-inch; and 460 LF of 42-inch. ○ Decommission 33 manholes associated with decommissioned pipe. • Replace approx. 1,130 LF (0.21 miles) of existing pipe (ENG IDs provided in parenthesis when applicable): ○ Replace 150 LF of 24-inch DI with PVC (ST3410 to ST3409). ○ Upsize 130 LF of 15-inch PVC with 24-inch PVC (ST3485 to ST3484). ○ Upsize 390 LF of 18-inch RCP with 42-inch PVC (PST3407 to ST3493). ○ Upsize 250 LF of 24-inch RPC with 42-inch PVC (ST3493 to ST3402). ○ Replace 210 LF of 42-inch RCP with PVC. (ST3402 to ST3400). ○ Replace 10 manholes with: two 48" MHs (ST3453 and ST3406), four 60" MHs (ST3410, ST3409, ST3485, and ST3484), and four 72" MHs (ST3401, PST3407, ST3493, and ST3402). • Install approx. 7,625 LF (1.45 miles) of new 15- to 42-inch PVC pipe: ○ Install 1,150 LF of 15-inch PVC. ○ Install 1,640 LF of 18-inch PVC. ○ Install 230 LF of 21-inch PVC. ○ Install 1,280 LF of 24-inch PVC. ○ Install 890 LF of 30-inch PVC. ○ Install 1,500 LF of 36-inch PVC. ○ Install 935 LF of 42-inch PVC. ○ Install 27 manholes with twelve 48" MHs, eight 60" MHs, and seven 72" MHs.		

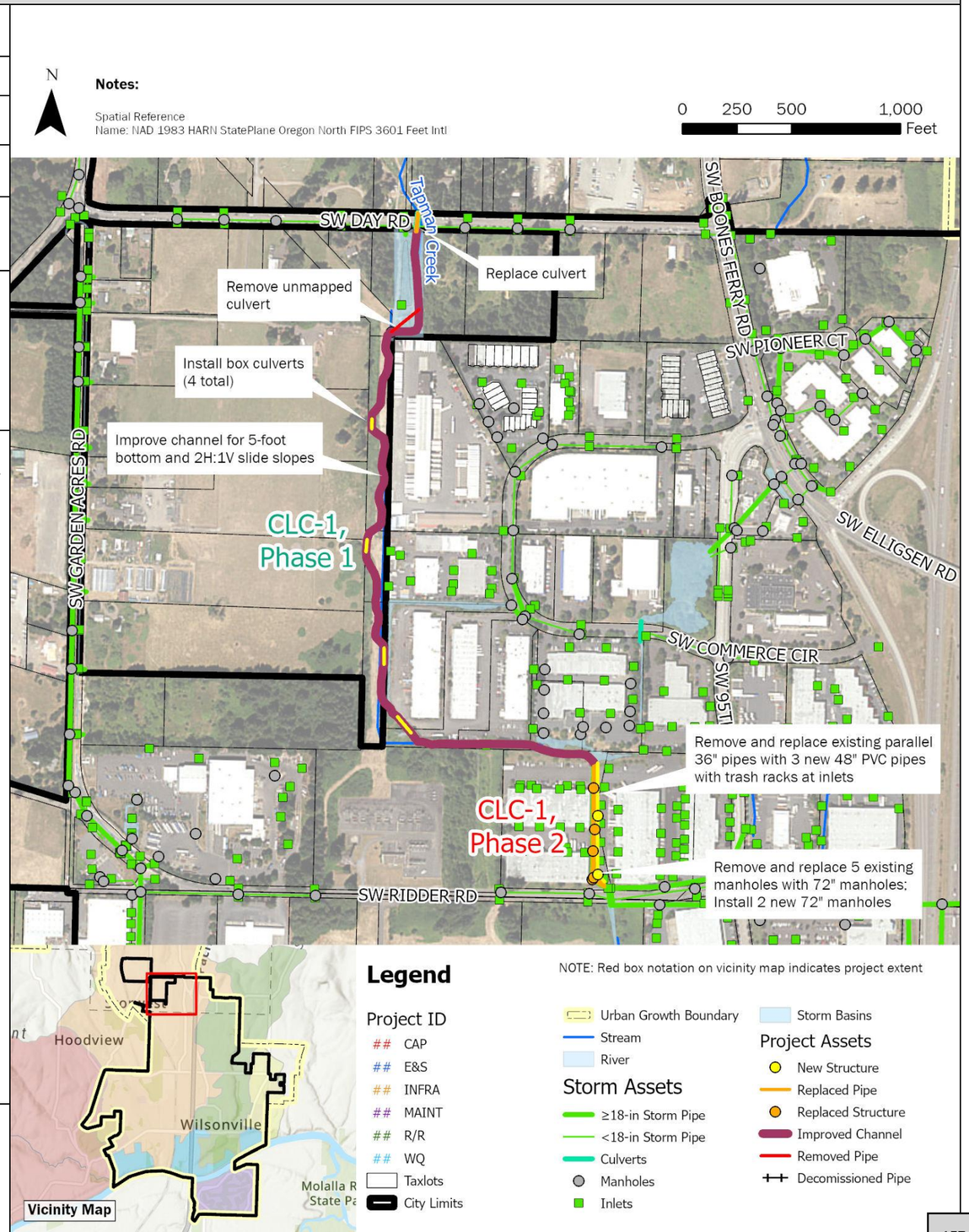


BC-7	Town Center Conveyance Pipe Installation	
Design Considerations / Assumptions	• Installation is assumed to be phased in conjunction with development activities. • Decommissioned pipe and structures will be abandoned in place to continue use as the phased development is built-out. • When feasible, pipes and manholes were designated for replacement instead of removal and new installation. • Pipe estimates only include pipe 15-inches and greater in diameter. • Conveyance system sizing was provided by the City and was not modeled in InfoSWMM. • If GIS attribute information was missing per the Town Center Development Plan, the pipe diameter from the nearest connected pipe was used to estimate pipe diameters and lengths.	
Estimated Project Cost	Capital Expense Total	$9,284,000
	Design / Construction Admin. (11%)	$1,021,000
	Engineering & Permitting (Cap)	$500,000
	Total Cost	**$10,805,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new and replacement pipe materials. • Project cost assume pipe installations will all occur in roadways, and pavement restoration and trenching are assumed in the pipe unit costs. • All decommissioned/abandoned assets are to remain in place and be filled with grout. • No earthwork beyond trenchwork is included. • A cap on engineering and permitting and surveying was applied.	

Additional Figures

Town Center Plan – Phase 3, Full Buildout (2019)

CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9		
Contributing Drainage Area	944 acres		
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF of 48-inch PVC storm pipe. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1 — Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

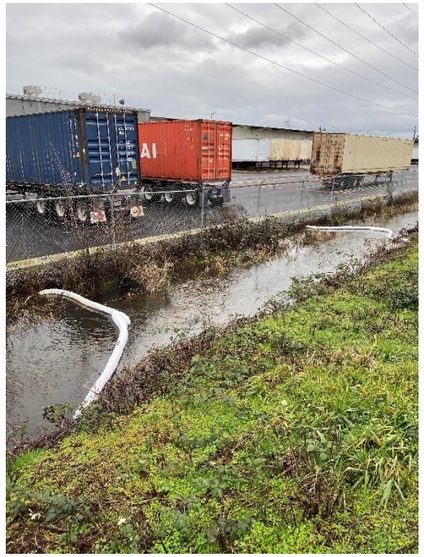
	Phase 1	*Phase 2*
Capital Expense Total	$3,734,000	$2,220,000
Design / Construction Admin. (11%)	$411,000	$244,000
Engineering & Permitting (Cap)	$500,000	$500,000
Total Cost	**$4,645,000**	**$2,964,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates.
- Project concept and cost estimates were initially developed by AKS (30% design drawings are complete). A cap on engineering and permitting was applied.

Additional Figures

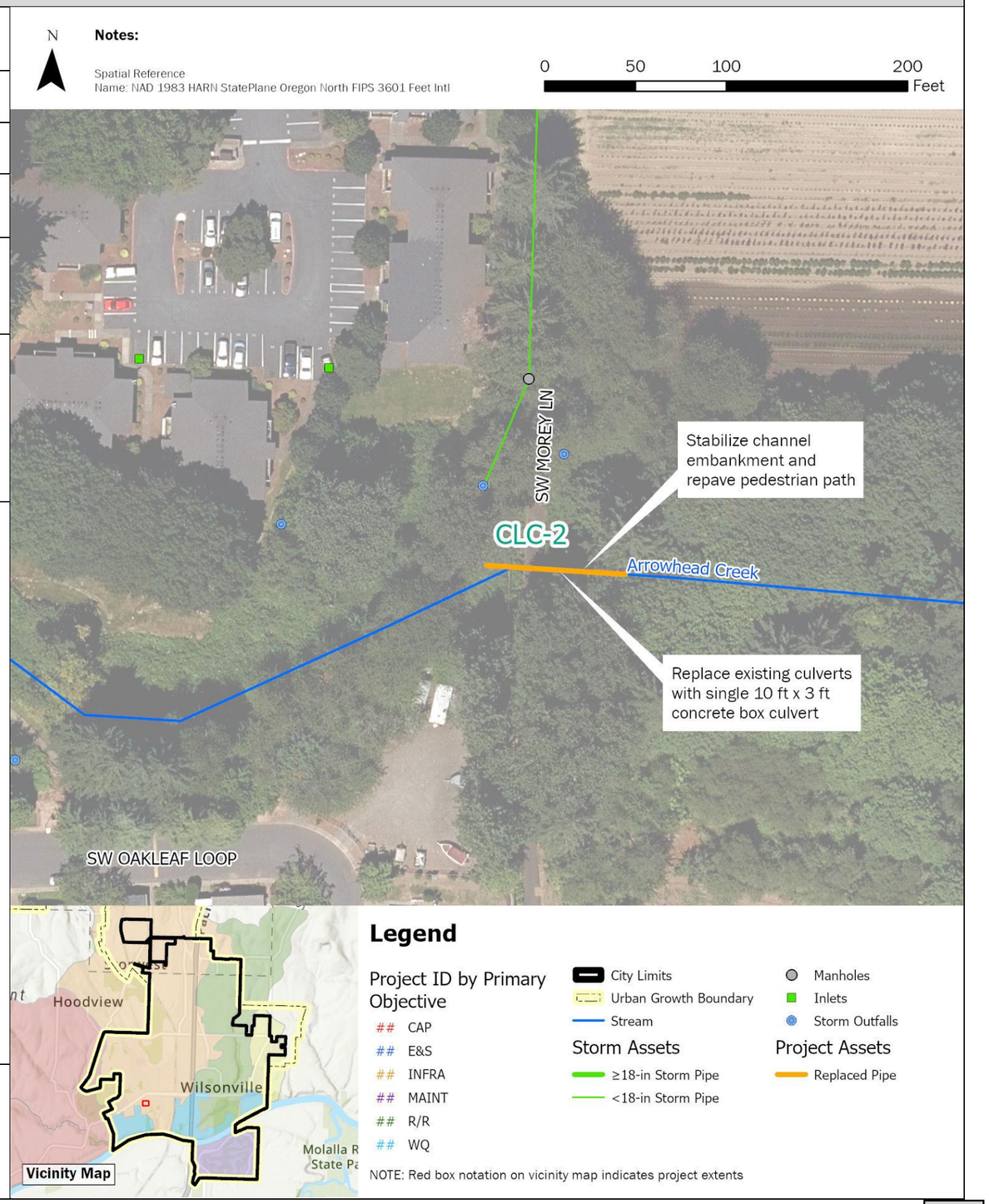
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



CLC-2 Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Design Considerations / Assumptions

- Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts.
- Culvert sizing to be confirmed with final design.
- Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane.
- Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary.
- Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.

Estimated Project Cost

Capital Expense Total	$161,000
Design / Construction Admin. (11%)	$18,000
Engineering & Permitting (30%)	$48,000
Total Cost	**$227,000**

Project Cost Notes

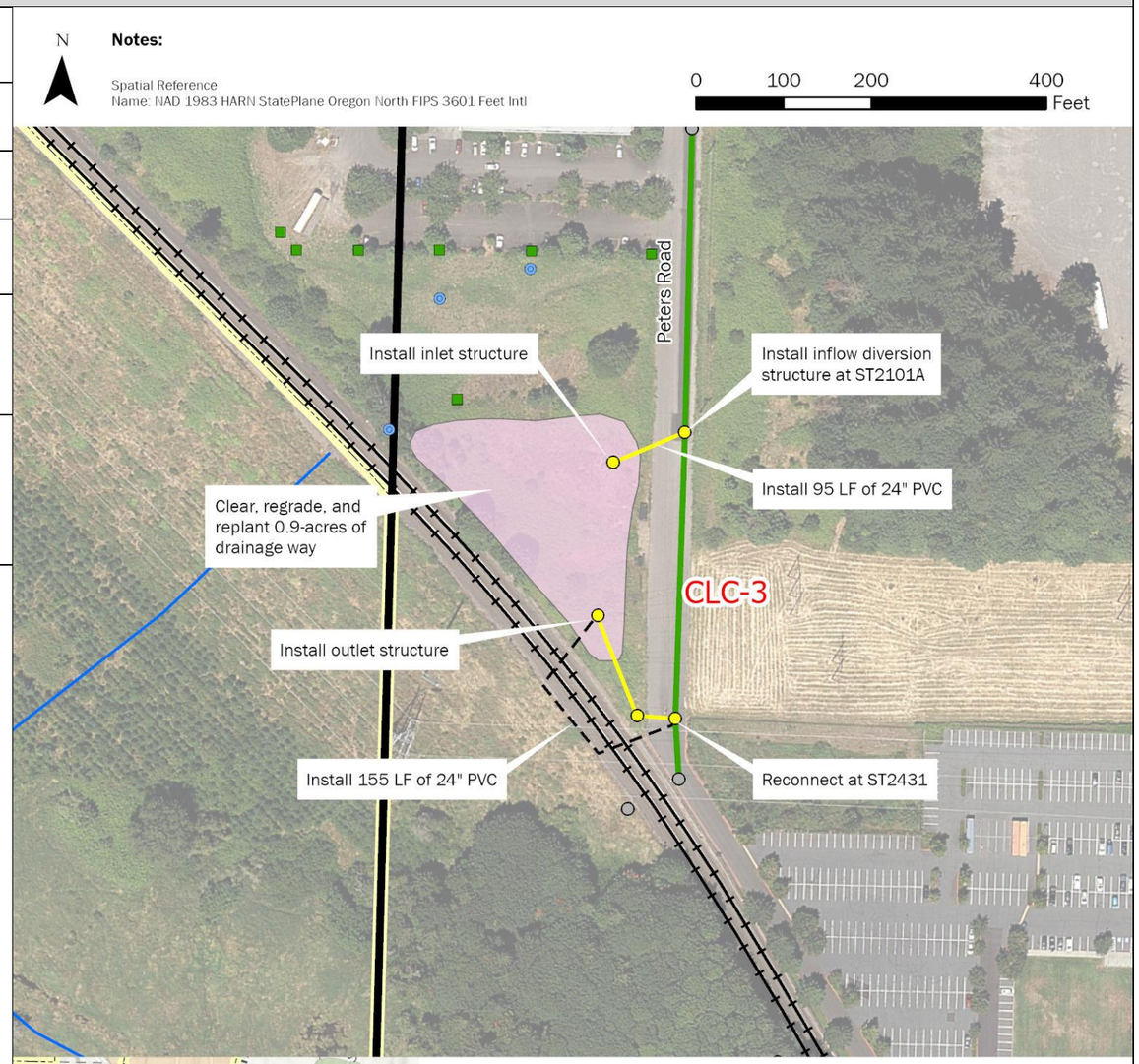
- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,000 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431).		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Page 1 of 2

Capital Project Summary

CLC-3 – Garden Acres Pond Retrofit

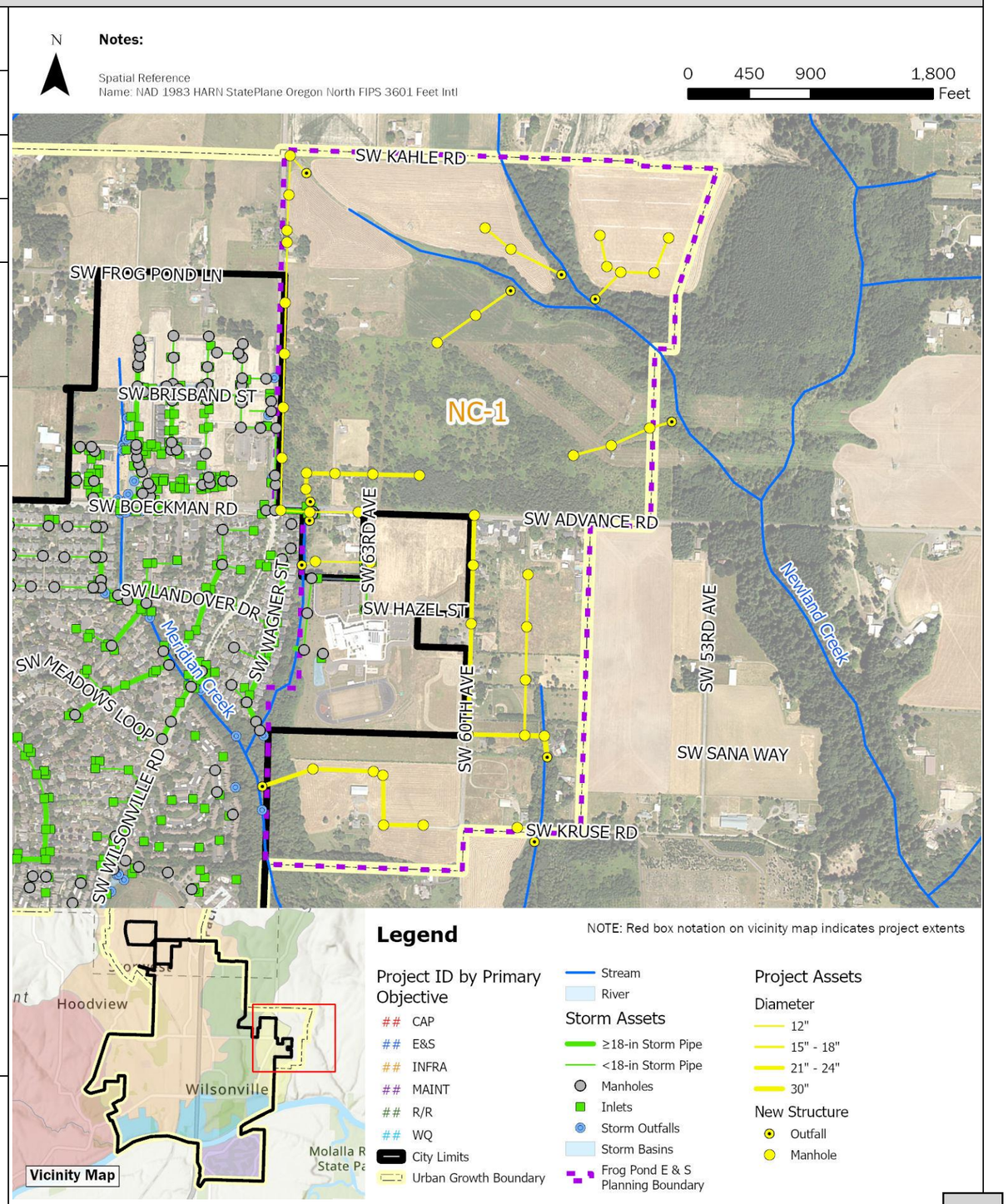
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$808,000
	Design / Construction Admin. (11%)	$89,000
	Engineering & Permitting (20%)	$161,000
	Total Cost	**$1,058,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

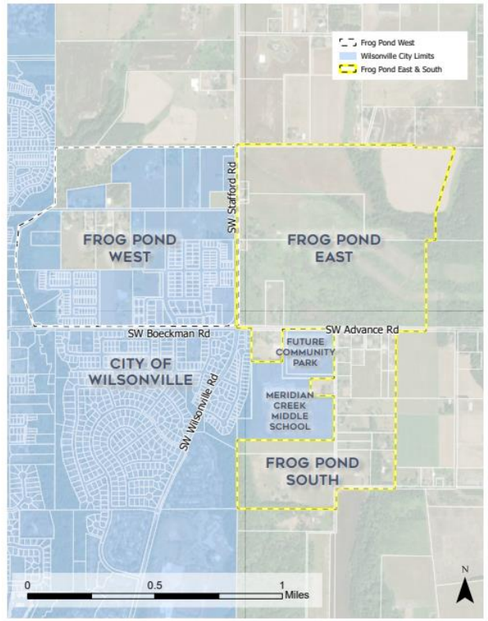
Garden Acres Detention Pond (May 2023)

NC-1	Frog Pond East and South Conveyance Piping		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	305 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	This project reflects pipe and manhole installation associated with main lines identified in the Frog Pond East and South Master Plan (2022). Project details are as follows: • Install 3,980 LF of 12-inch PVC pipe. • Install 11,360 LF of 18-inch PVC pipe. • Install 4,260 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install 11 outfalls. • Install 29 48-inch manholes. • Install 10 60-inch manholes.		

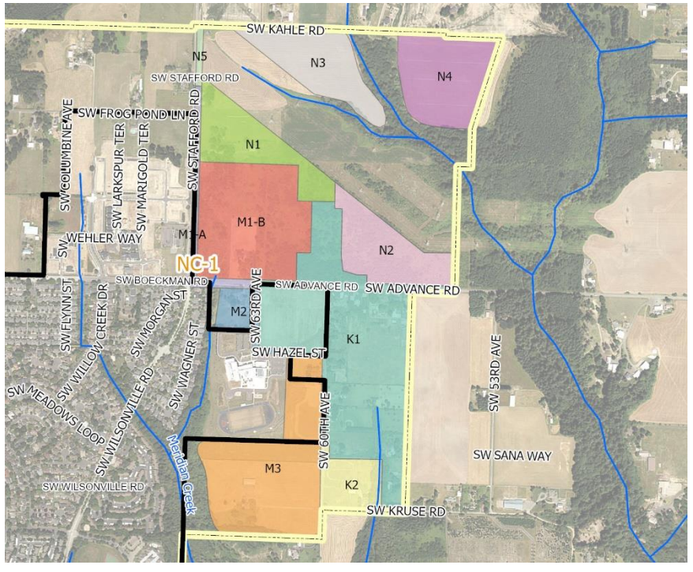


NC-1	Frog Pond E and S Conveyance Piping		
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure to install by basin is detailed below: ○ **K1**: 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; two 48-inch manholes, and 1 outfall. ○ **K2**: 220 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M1-A**: 2,630 LF of 12-inch PVC pipe, eight 48-inch manholes, and 1 outfall. ○ **M1-B**: 1,050 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **M2**: 400 LF of 12-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **M3**: 1,160 LF of 24-inch PVC pipe, five 60-inch manholes, and 1 outfall. ○ **N1**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N2**: 7,670 LF of 18-inch PVC pipe, three 48-inch manholes, and 1 outfall. ○ **N3**: 670 LF of 18-inch PVC pipe, two 48-inch manholes, and 1 outfall. ○ **N4**: 1,150 LF of 18-inch PVC pipe, five 48-inch manholes, and 1 outfall. ○ **N5**: 730 LF of 12-inch PVC pipe, three 48-inch manholes, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$17,325,000	
	Design / Construction Admin. (11%)	$1,906,000	
	Engineering & Permitting (Cap)	$500,000	
	Total Cost	**$19,731,000**	
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only stormwater pipes greater than 12-in in diameter are included in the project estimate. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate. • A cap on engineering and permitting and survey was applied.		

Additional Figures

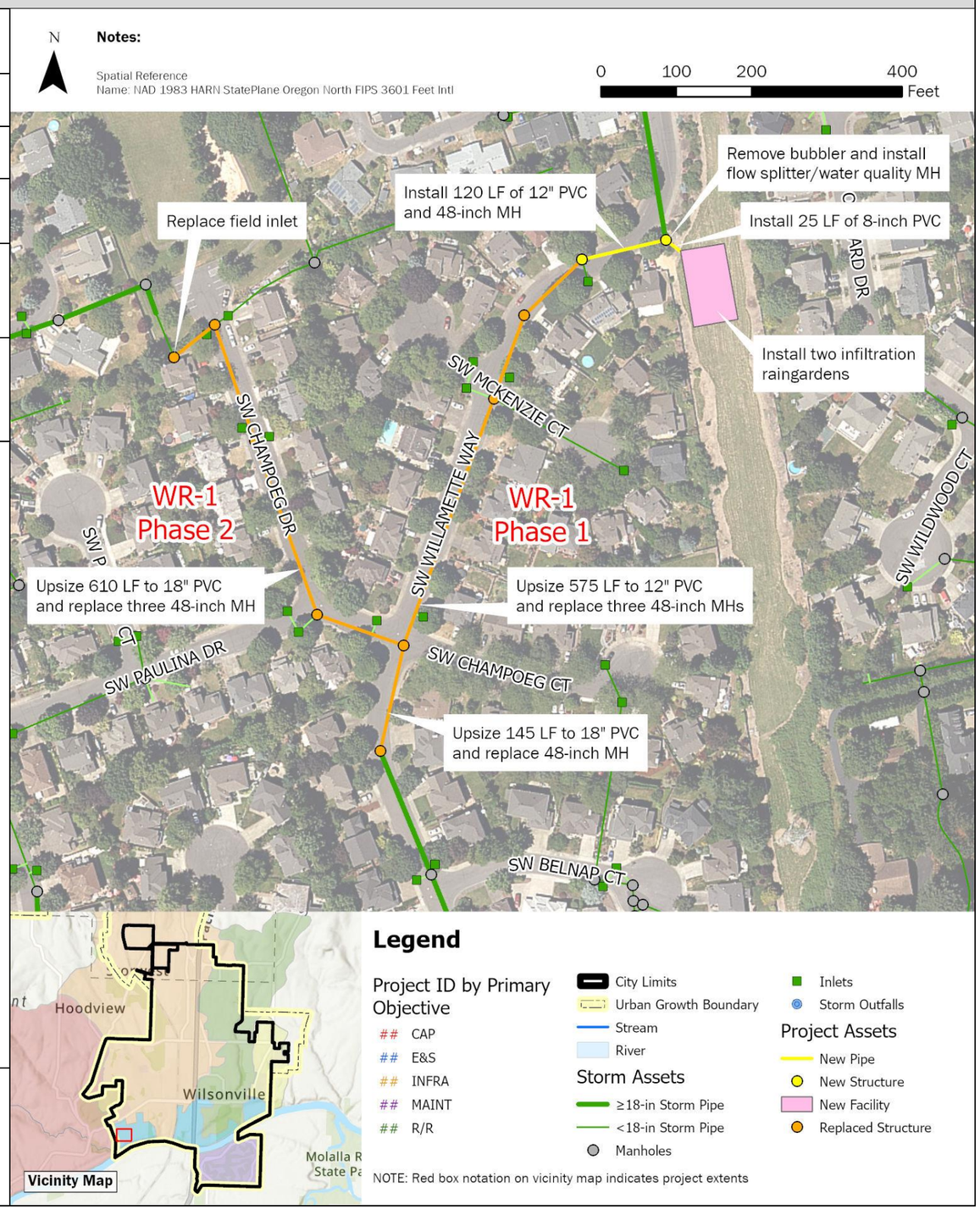


Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1 SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

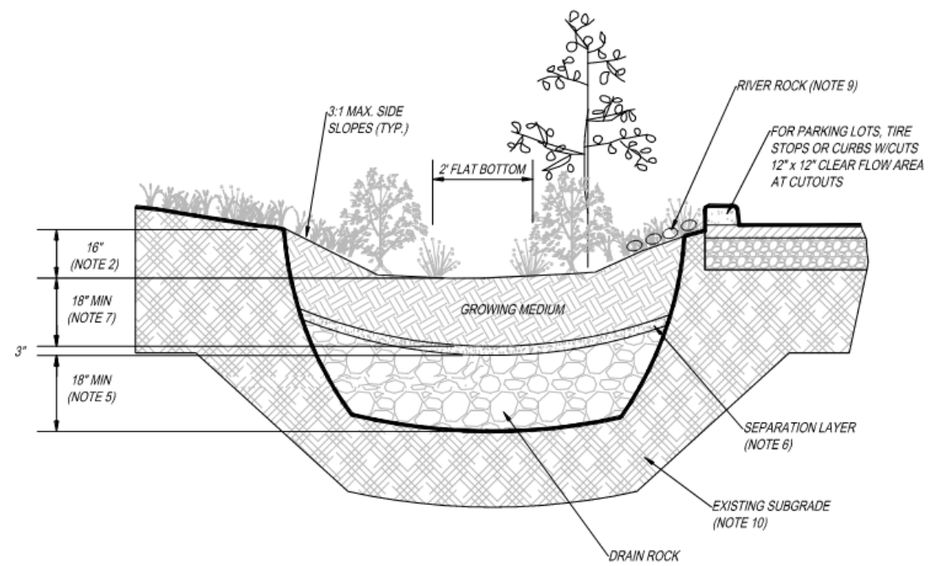
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,127,000	$619,000
Design / Construction Admin. (11%)	$124,000	$68,000
Engineering & Permitting (20%)	$ 225,000	$124,000
Total Cost	**$1,476,000**	**$811,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

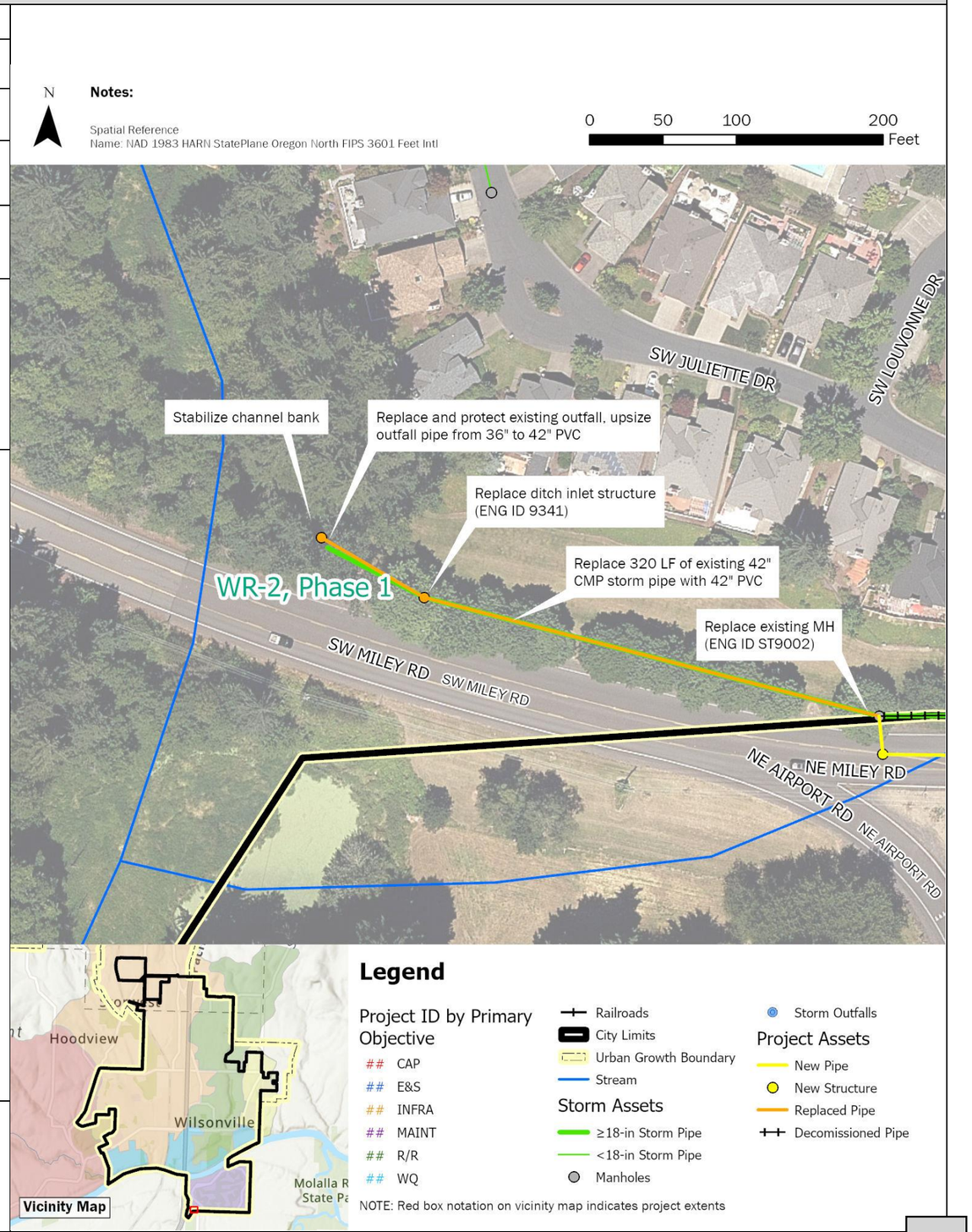
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5		
Contributing Drainage Area	138.0 acres		
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

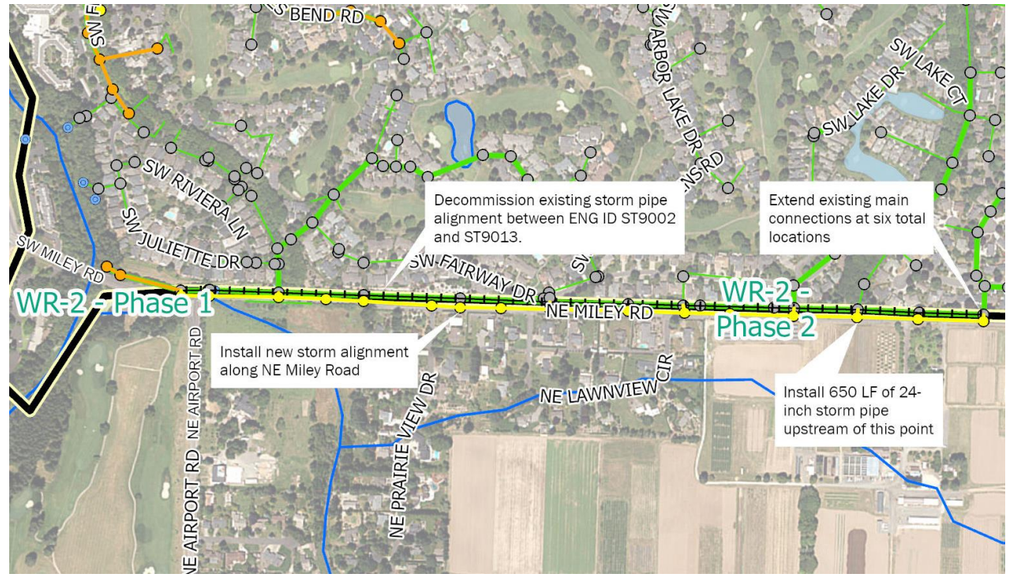
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

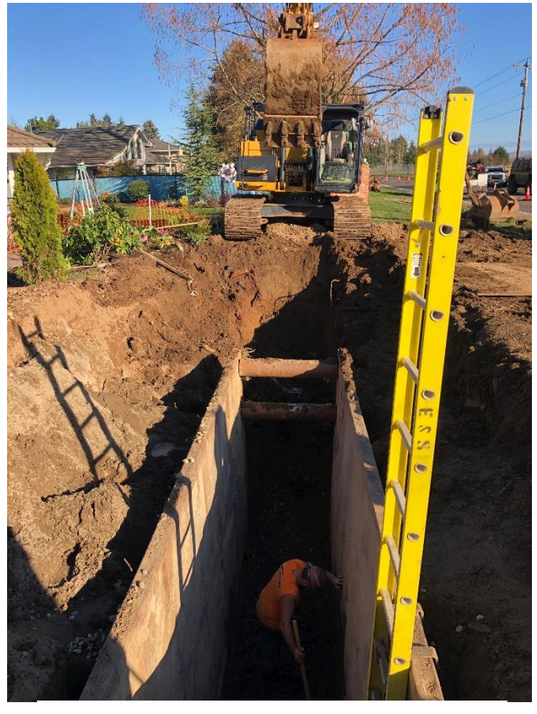
	Phase 1	*Phase 2*
Capital Expense Total	$469,000	$6,239,000
Design / Construction Admin. (11%)	$51,000	$686,000
Engineering & Permitting (30% or Cap.)	$141,000	$500,000
Total Cost	**$661,000**	**$7,425,000**

Project Cost Notes

- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- Engineering and Permitting costs for Phase 2 have been capped at $500,000.

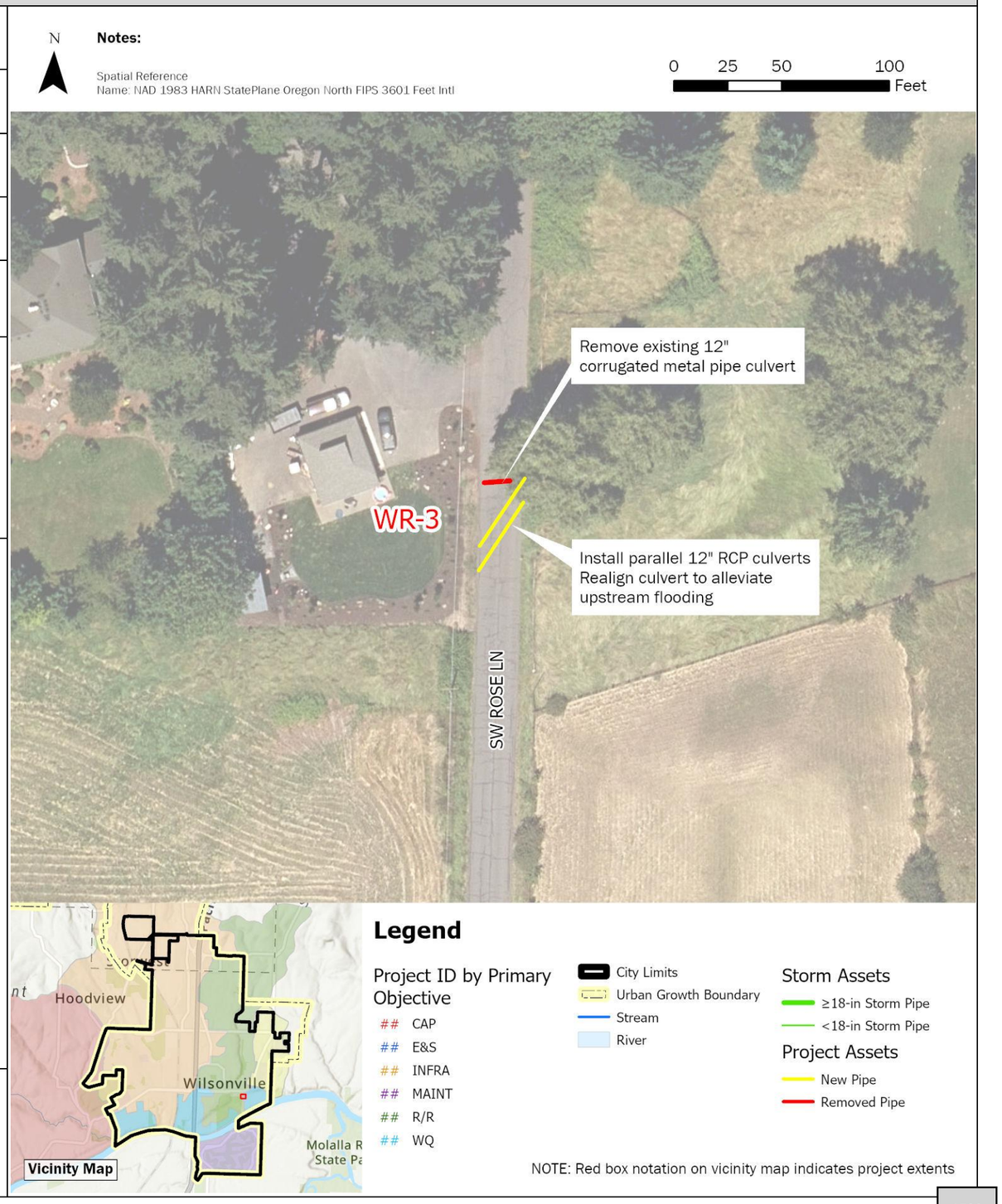


Sinkhole observed at upstream end of Miley Road alignment



Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		



WR-3	Rose Lane Culvert Replacement	

Design Considerations / Assumptions

- Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover.
- Minimum 12-inch cover on top of culvert.
- Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway.
- Maximum allowable depth for roadside ditches is 2-feet.
- Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP.
- Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.

Estimated Project Cost

Capital Expense Total	$72,000
Design / Construction Admin. (11%)	$8,000
Engineering & Permitting (20%)	$14,000
Total Cost	**$94,000**

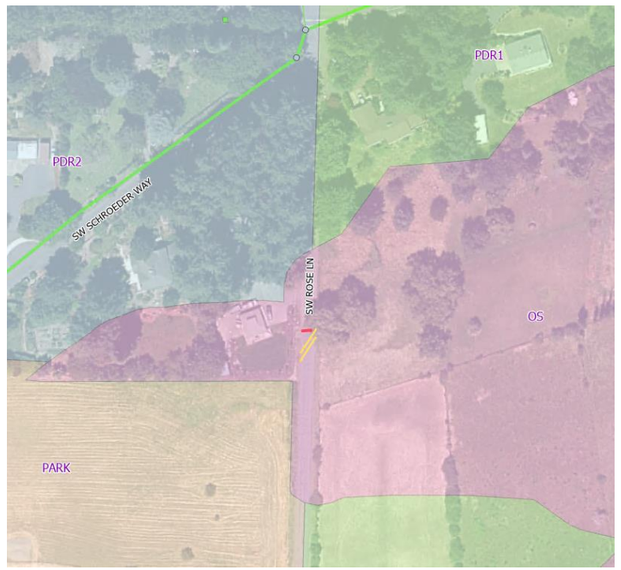
Project Cost Notes

- Modifications to the roadway beyond trenching were not developed as part of the cost estimate.
- Surveying is required.
- Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included.

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

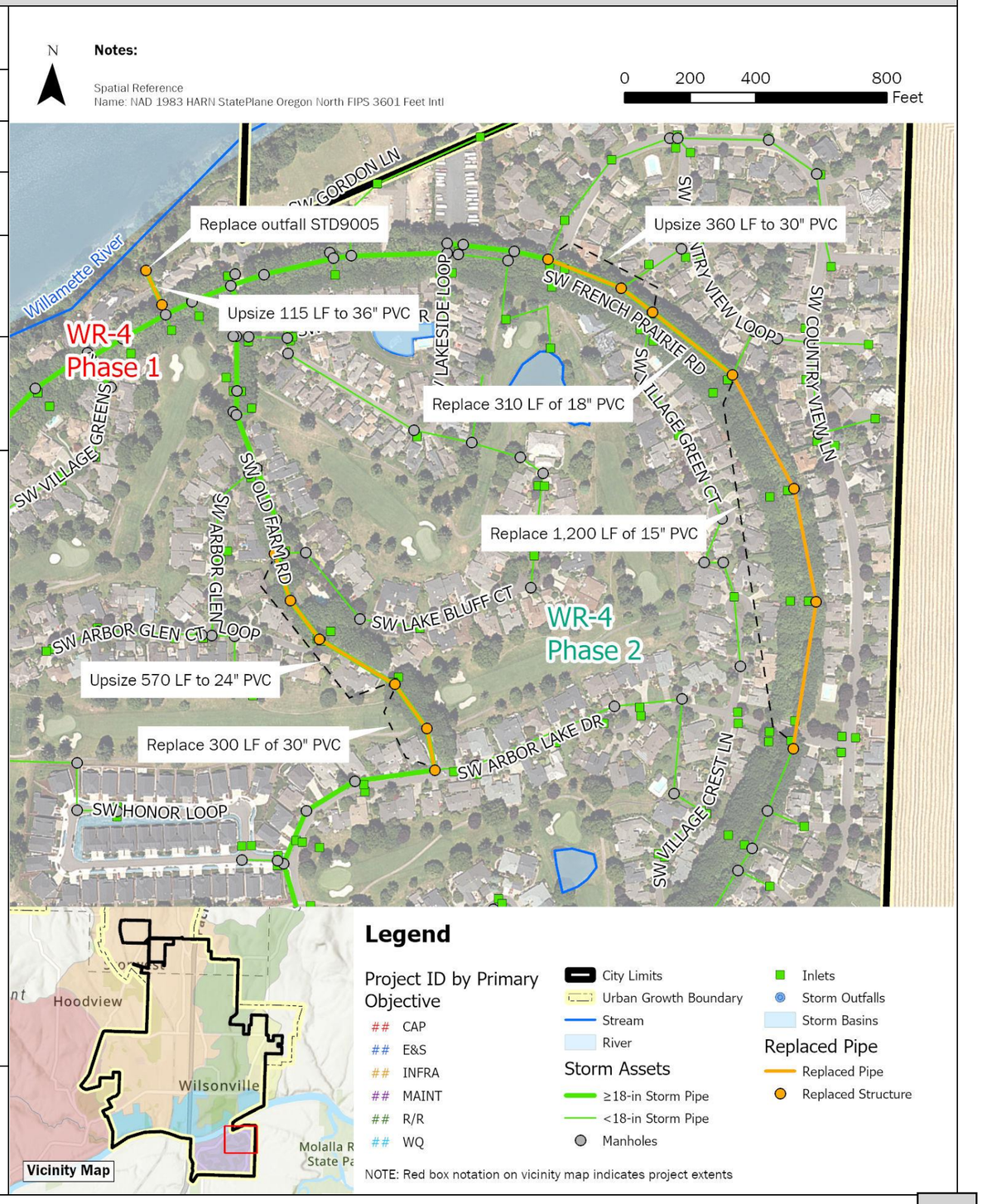
Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30		
Contributing Drainage Area	159 acres		
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Remove and replace existing Charbonneau East Outfall (STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).		



WR-4 Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

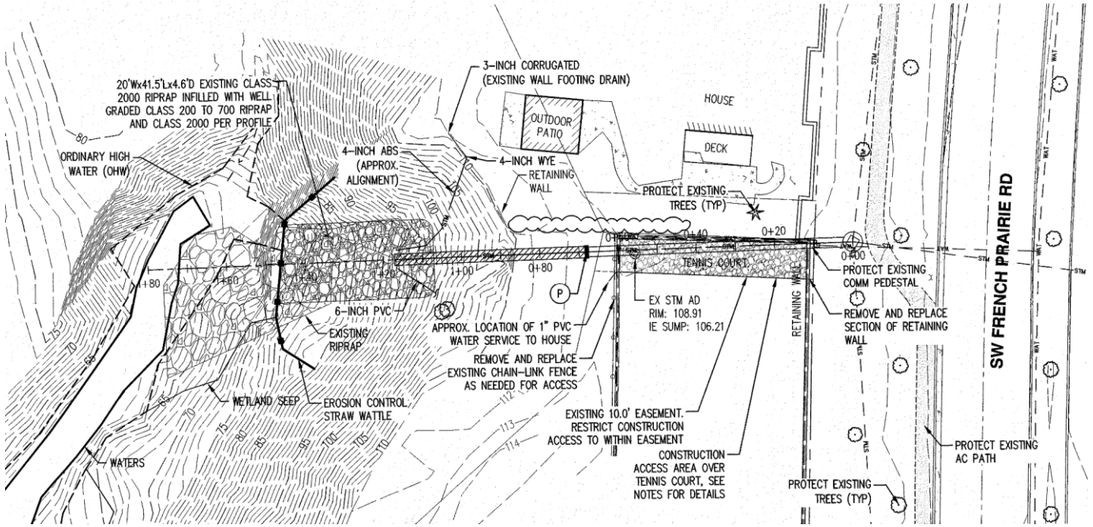
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 164,000	$ 1,947,000
Design / Construction Admin. (11%)	$ 18,000	$ 214,000
Engineering & Permitting (30% for Phase 1; 20% for Phase 2)	$ 49,000	$ 390,000
Total Cost	**$ 231,000**	**$2,551,000**

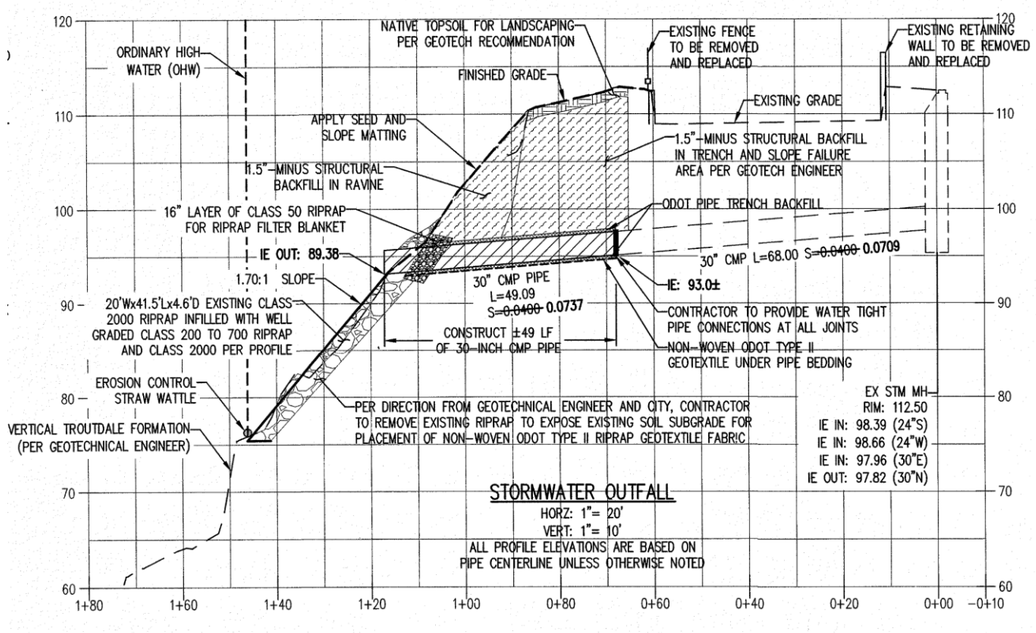
Project Cost Notes

- Due to in-water work, Phase 1 engineering and permitting multiplier was set to 30% versus 20%.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures



Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		

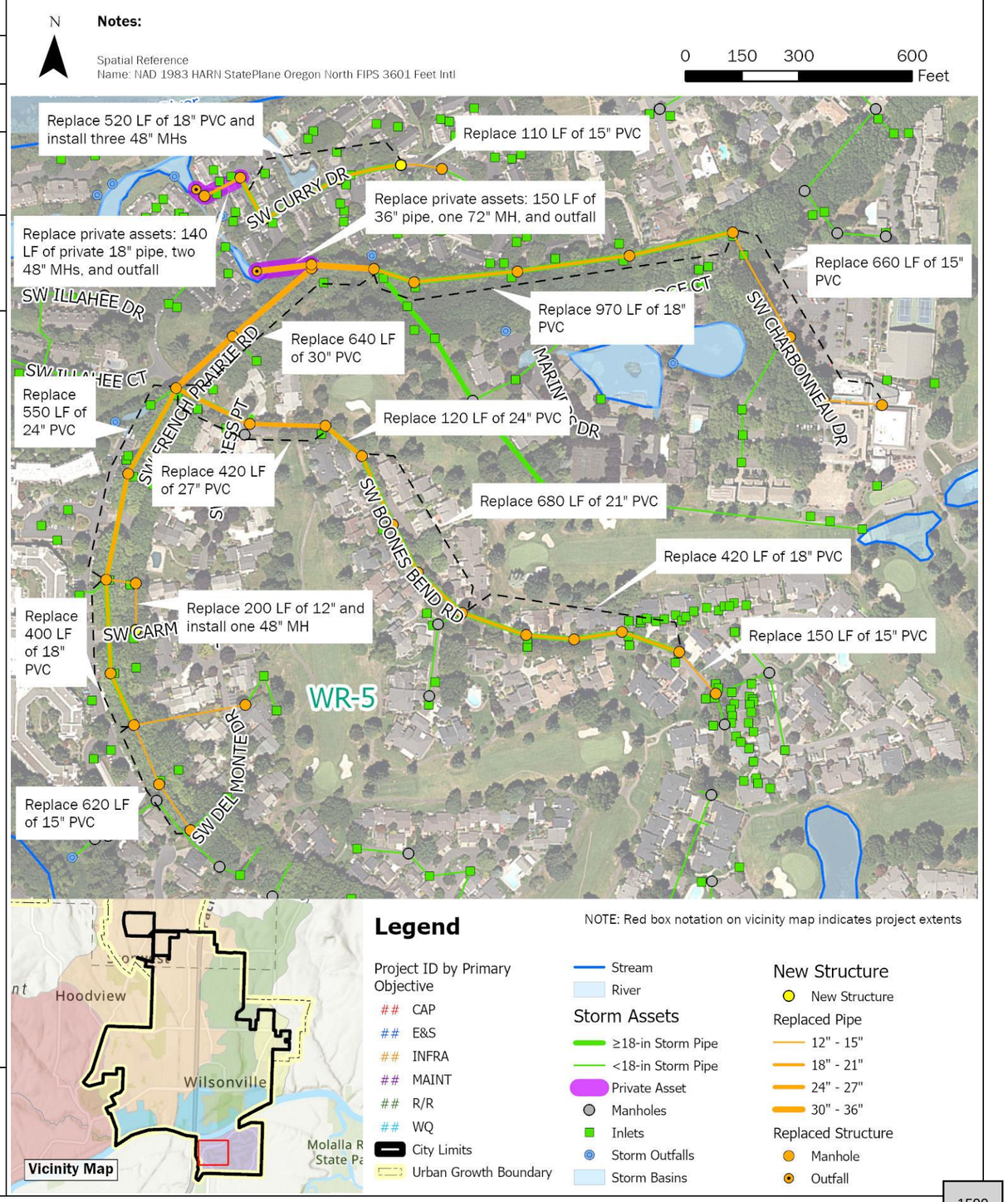
Project Description

This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping.

Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available):

- Pipe replacement along SW Curry Drive:
  - Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole).
  - Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892).
  - Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15).
  - Replace private outfall (CARTE ID: 15).
  - Replace two private 48-in manholes (CARTE ID 1892 and 1383).
  - Install three 48-inch manholes.
- Pipe replacement along SW French Prairie Road:
  - Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044)
  - Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043).
  - Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown)
  - Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040).
  - Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041).
  - Replace 20 LF of 36-in pipe with PVC (unknown to ST9067).
  - Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown).
  - Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes.

Continued on page 2.



WR-5	Charbonneau West Stormwater Improvements	

Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road:
	  ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058).
	  ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055).
	  ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051).
	  ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050).
	  ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040).
	  ○ Replace eight 48-in manholes; and replace three 60-in manholes.	

Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated.
	• Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe.
	• Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters.
	• The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement:
	  ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892).
	  ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041.
	  ○ Two 72-in: ST9067 and ST9041	

Estimated Project Cost	Capital Expense Total	$ 6,801,000
	Design / Construction Admin. (11%)	$ 748,000
	Engineering & Permitting (Cap)	$ 500,000
	Total Cost	**$ 8,049,000**
Project Cost Notes	• A cap on engineering and permitting was applied. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Stormwater Master Plan Update

Planning Commission Work Session

October 11, 2023

Kerry Rappold
Natural Resources Manager

Angela Wieland
Brown & Caldwell

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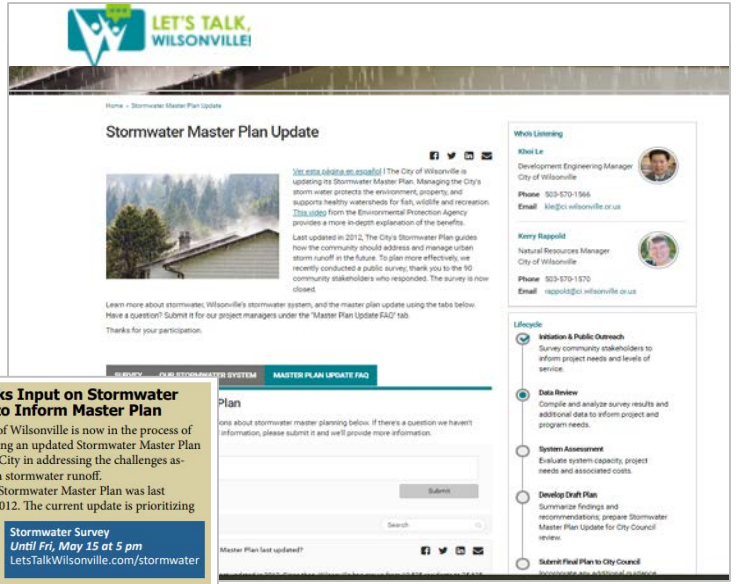
Discussion Topics

- Stormwater Management in Wilsonville
- Master Plan Development Process
- Regulatory Drivers and Overlap
- Technical Evaluations
- Capital Project and Program Overview
- Next Steps

Stormwater Management in Wilsonville

- Outreach moved online to educate community and gather feedback
  - Web page with traditional open house materials – hosted on *letstalkwilsonville*
  - English and Spanish versions
  - Boones Ferry Messenger article
  - Social media
- External Stormwater Survey
  - April 1 – May 15, 2021
  - English and Spanish versions
  - 90+ participants



City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

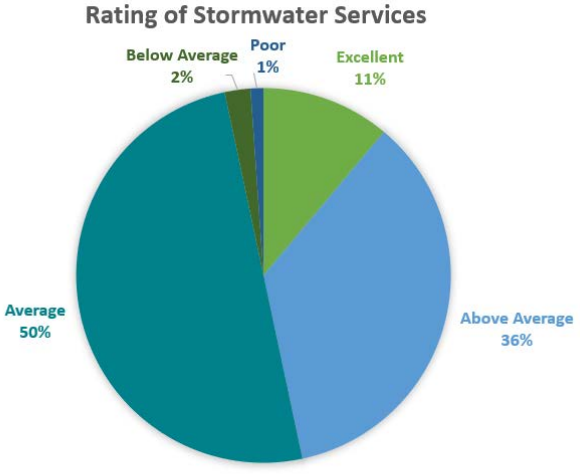
The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-1566 or kle@ci.wilsonville.or.us.

Stormwater Management in Wilsonville

External Public Outreach

1. Perception that stormwater is well-managed overall
2. Residents and businesses have similar priorities
   - ✓ Protection of streams, fish and wildlife
   - ✓ Water quality
   - ✓ Flood management
   - ✓ Stormwater infrastructure maintenance
3. The city could benefit from innovation and thinking “outside of the box”
4. Natural solutions appeal to participants
5. Residents could benefit from more education about stormwater

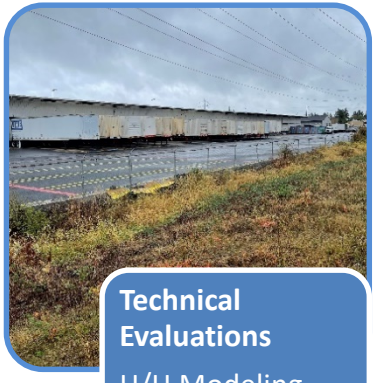


✓ 97% have a positive impression of Wilsonville Stormwater Services

Master Plan Development Process

Project Needs Assessment

- Data Collection
- Public Survey
- Staff Interviews
- Site Visits
- Problem Area Identification



Technical Evaluations

H/H Modeling

Stream Assessment

Water Quality Retrofits

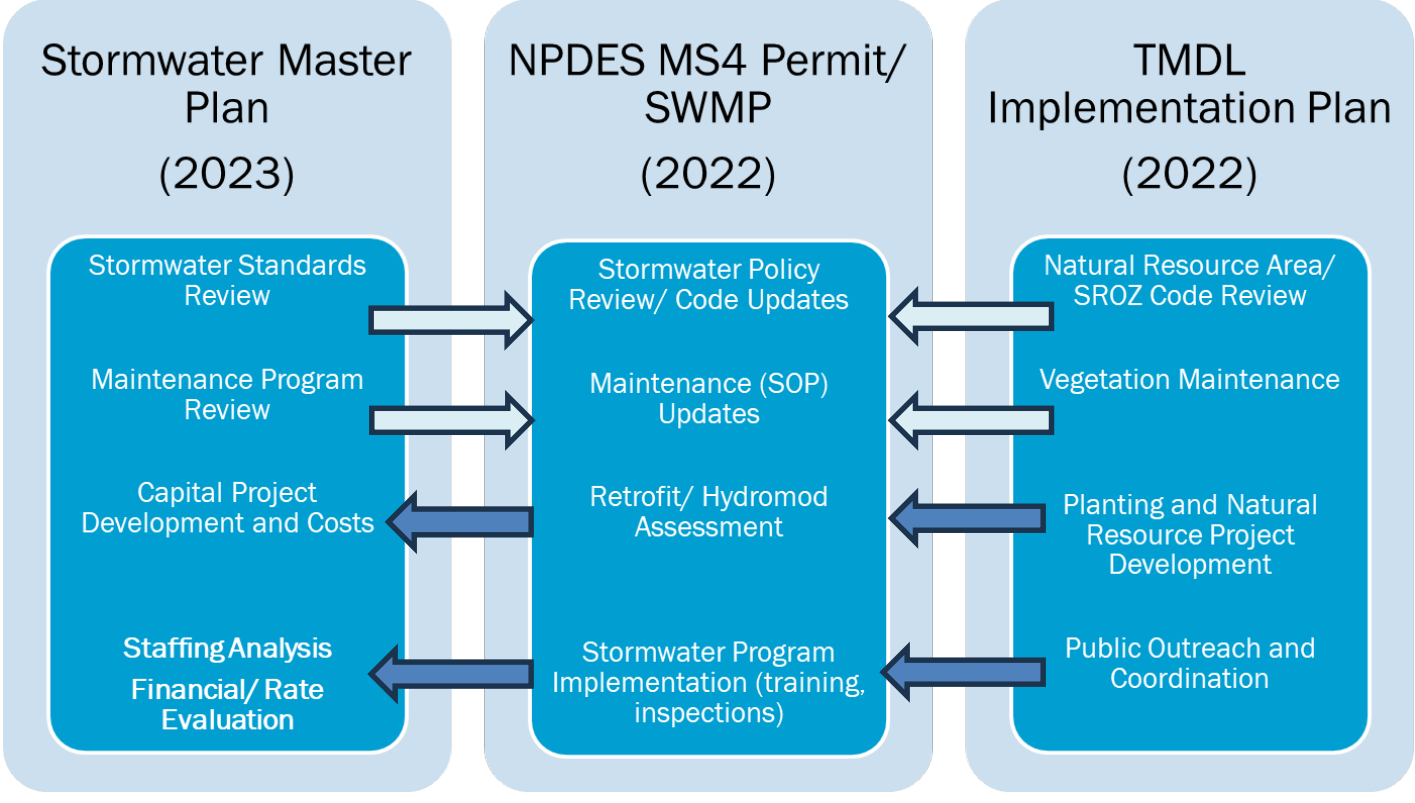
Capital Program Development

- Project Recommendations
- City-wide Programs
- Policies
- Cost Estimation

Capital Program Implementation

- Staffing
- Project Prioritization
- Documentation
- Stakeholder Outreach

Regulatory Drivers and Overlap



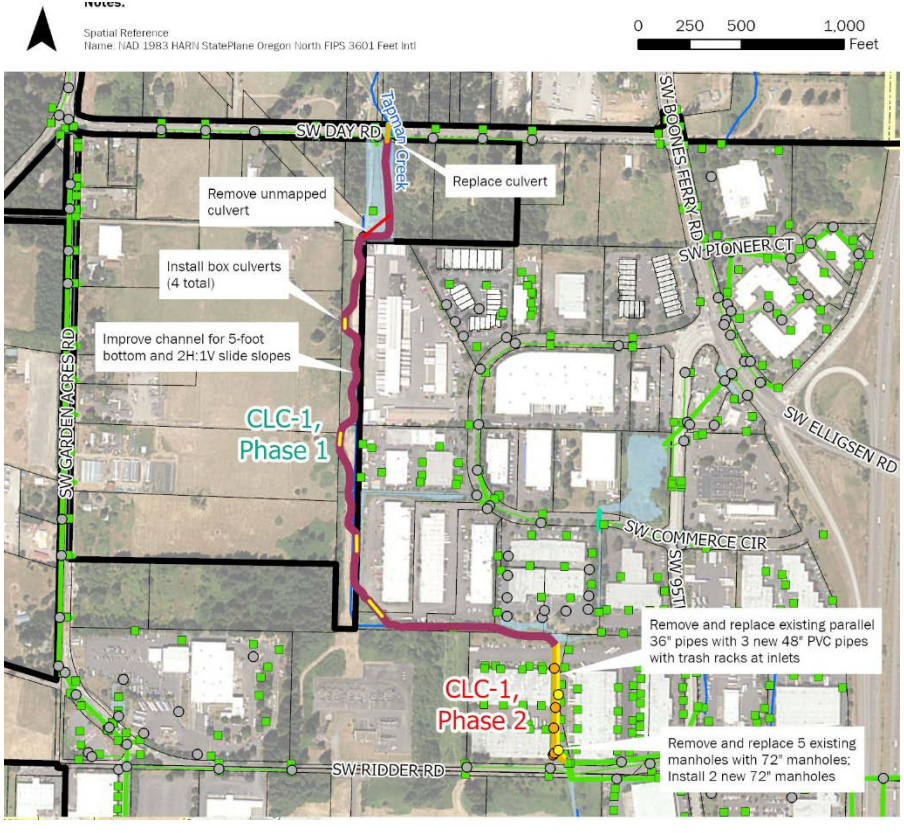
Technical Evaluations

- 33 Problem Areas Identified
- Technical Evaluations:
  - Hydrologic/ Hydraulic Modeling
  - Stream Assessment
  - Water Quality Retrofits
  - Maintenance Needs Evaluation

Capital Program Development

- 47 Project Opportunities Identified
- Project Objectives
  - Capacity
  - Maintenance
  - Repair/ Replacement (System Condition)
  - Infrastructure Need (growth areas)
  - Water Quality
  - Erosion and Sediment Control/ Instream
- City staff review (CIP Workshops)
- Fact Sheet Development/ Cost Estimates

Capital Project – Day Road



- Objective: Capacity, R/R
- Flooding identified in the 2012 SMP
- Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.).
- Culvert under Day Road needs replacement.
- Pending future development may exacerbate flooding.
- Phased project approach proposed.

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Capital Project – Morey's Landing

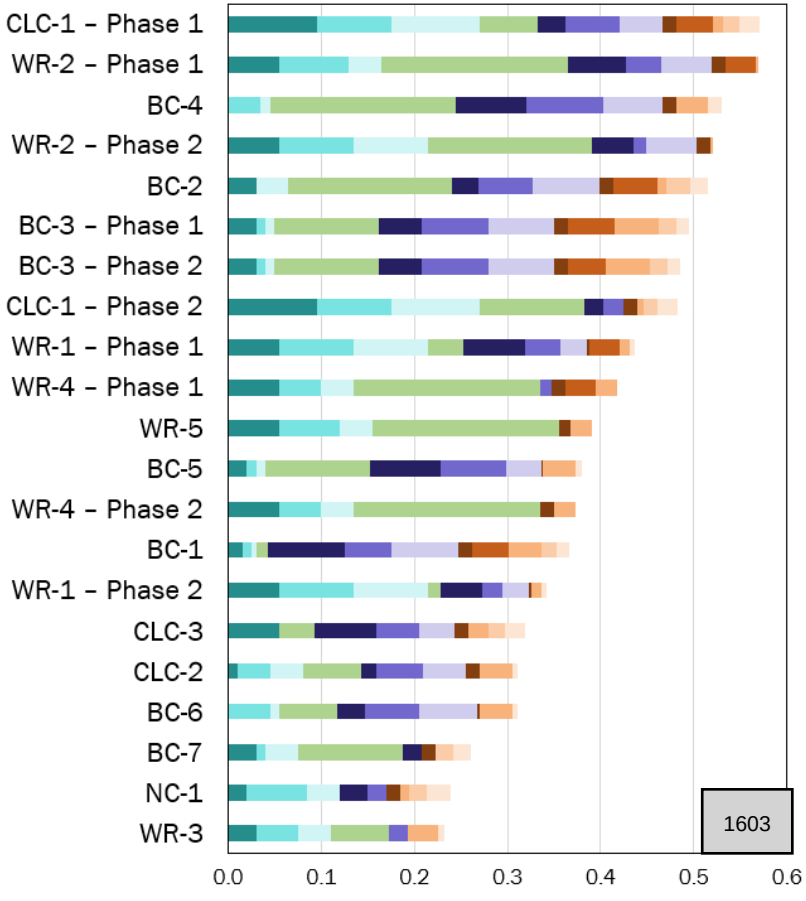
- Objective: Capacity, Maintenance, Water Quality
- Reported localized flooding (bubbler) and capacity deficiencies
- Opportunity for water quality retrofit in conjunction with BPA easement.
- Downstream conveyance pipe and Belknap Ct outfall recently replaced.
- Phased project approach proposed with Phase II based on flow monitoring.

Program Overview

- P-1: Localized Drainage Improvements Program
- P-2: Porous Pavement/ Green Street Retrofit Program
- P-3: Repair and Replacement Program
- P-4: Inlet Replacement Program
- P-5: Vegetation Maintenance Program

Capital Program Implementation

- Staffing Analysis
  - Public Works/ Stormwater
    - Deferred Maintenance
    - Maintenance of new assets
    - More immediate need
  - Community Development/ Engineering
    - Capital Project Implementation
    - NPDES/ TMDL Program Needs
    - Longer-term Need
- Project Prioritization



Next Steps

Project and Program Cost and Prioritization

- Short Term Schedule
- Mid Term Schedule
- Long Term Schedule

Virtual Open House

Draft SMP for Public Review

Amanda Guile-Hinman, City Attorney, noted there was value in having some leniency in the typical rules for discussions during the work session items, but the important thing for the Planning Commission to remember was when West Hills provides comment, they are talking only about the area they have under the contract, and the standards would address a much larger area.

Commissioner Willard stated it would be great to see a site plan and what the average cost per unit would be compared to one that meets the block variability, stormwater distribution and housing variety to see what adhering to some of the policies did to the bottom line.

Chair Heberlein agreed that was a great idea.

3. Stormwater System Master Plan (Rappold)

Kerry Rappold, Natural Resources Manager, stated in 2021, the City started this project to update the 2012 master plan and tonight's presentation was intended to give the Commission a quick preview of important information in the draft Stormwater System Master Plan, which Staff hoped to finalize by the end of November. He noted master plan updates were typically done every ten years and that the Executive Summary and Capital Improvement Plan were in the packet.

Mr. Rappold and Angela Weiland, Brown & Caldwell, presented the Stormwater Master Plan Update via PowerPoint, reviewing the public outreach received in 2021 regarding stormwater management in Wilsonville; the Master Plan development process, which involved evaluating problem areas, identifying solutions, and getting Staff input; regulatory drivers and the overlap between the Master Plan, NPDES MS4 Permit/SWMP and the TMDL Implementation Plan; technical evaluations; and the development and an overview of the Capital Program. Two of the proposed capital projects at Day Road and Morey's Landing were described, as well as the implementation of the Capital Program and the next steps to finalize the draft, which included hosting a virtual open house in December and a rate study.

Comments from the Commission and responses to Commissioner questions were as follows:

- Ms. Wieland noted the outcome from the surveys showed Wilsonville citizens were very well educated and informed about stormwater, its implications, and what assets and infrastructure were related to making sure stormwater was not a detriment to receiving water health. Some feedback was related to problem areas and was directly incorporated into the problem area list. Some reported issues stemmed from areas that would be redeveloped in the near term and did not necessarily translate to a project but were documented in the Master Plan to be recognized.
    - Morey's Landing was an example of incorporating innovative solutions into the Master Plan, where the pipes could have been upsized to alleviate the bubbler, but the project team wanted to recognize that water quality in a developed area had inherent aesthetics and livability benefits to the city, not just to comply with permits.
    - The elevations and patterns of the BPA easement corridor were considered, and the team tried to incorporate the use of the City's stormwater design standards and the sizing of that area and really honed in a bit more on what those kind of multi-objective solutions look like.
    - A primary area of focus was Memorial Park and Library Pond, which has been a stormwater feature and where the City did a lot of stormwater monitoring. The project team wanted to look more specifically at the sizing and ability of that facility to accommodate redevelopment

and growth, so one project was a retrofit of that facility to make it more functional from a maintenance perspective, allow better access, and allow it to be redesigned in a way that coincides with the City's design standards and brings it a bit more up to the present.

- Mr. Rappold explained that the responsibility to replace and maintain LID media depended on the reason the facility was installed. Case in point were the facilities along Garden Acres Rd which were part of a capital project, so that was the City's responsibility. In Frog Pond West, however, the facilities were part of the actual development of that area, and even though the facilities were placed in the right-of-way, they were still privately owned and maintained because the part of the development.
  - The City was still in a process of trying to catch up and retrofit areas from a number of perspectives. There were still a lot of area within the city that had no active stormwater management, such as outfalls along the Willamette River, where significant areas did not even have for detention facilities.
- What was the rationale for the P1 through P5 funding levels, which seemed low; like it would be one project a year for each of the items or maybe two on P1?
  - Mr. Rappold replied some of it was related to Staff's discussions and the capacity available to deal with the project items. Staff wanted to create funding pots of money to avoid pushing the rates too far out the line.
  - Ms. Wieland added the P1-P5 projects were intended to be annualized, going into a pot of money that eventually grows over time. Over the course of a few years, then maybe that opportunistic transportation project would present itself where an overlay could be put on the road and obtain different benefits and monitor it as a pilot study. It was hard to define such opportunities up front or know how many there would be, but they wanted to aside some level of funding to recognize it as a goal, while also allowing for accrual and accumulation over time.
    - Public Works Maintenance was asked how often and how much it cost to go out an fix local drainage improvements, whether independently or through an on-call situation, and the $100,000 amount was in alignment with the level of effort involved.
- It would be interesting to see the rate study as the draft progresses. Understanding the level of stormwater capital projects the City has funded over the last 10 years, how does the millions of dollars in this capital project list align with historical efforts and would there be a ramp up in rates or other funding mechanisms over the next 20 years to get them funded?
  - Mr. Rappold responded that would have to be discussed with City Council to get their input on what levels could be set in terms of how the list was considered, from a 5-year, 10-year, 20-year perspective, but those were always adjusting. Sometimes, the City was just in a response mode, unfortunately, such as the many times having to deal with the outfalls on the Willamette River. Some of it, Staff could gauge, but some was more immediate in terms of how they had to deal with the situation.
- Mr. Rappold explained that in general, all water quality facilities would provide treatment for the usual pollutants associated with sediment and bacteria, and now there were new requirements regarding mercury. Most of the mercury in stormwater runoff came from the atmosphere, so not a lot could be done to prevent it, but the City could work to treat it.
    - The facilities would essentially treat the same pollutants no matter their location, but it was important to prioritize areas where there were very few stormwater facilities, like in Morey's Landing and the entire area south of Wilsonville Rd on the west side of the city.

- Ms. Weiland added that LID and vegetated stormwater facilities provided truly good pollutant removal in accordance with effectiveness information that was well documented. Different processes were used, and vegetation enhances uptake. Through these facilities, retention and infiltration of stormwater was encouraged, which was another means to remove pollutants before they discharged via overland flow or pipe flow into receiving water, so the types of facilities proposed were intentionally in alignment with the City's design standards and MS4 permit requirements.

4. Wastewater Treatment Plant Master Plan (Nacrelli)

Mike Nacrelli, Senior Civil Engineer, and Dave Price, Senior Civil Engineer, Carollo Engineers, presented on the update Wastewater Treatment Plant Master Plan via PowerPoint, reviewing key components of the Master Plan which would accommodate expected demand for build out by 2045. Highlights included details regarding the completed facility capacity assessment, costs and a schedule for the updated Capital Improvements Program (CIP), an alternatives evaluation and a breakdown of costs by project, estimated cash flow, and the next steps for advancing the Master Plan for adoption.

and the additional changes since the last work session with the Commission.

Discussion and feedback from the Planning Commission was as follows with responses by Staff to Commissioner questions as noted:

- In September 2022, the estimate was $75 million which moved to $120 million in the span of a year with the increased industrial discharges.
  - Mr. Nacrelli noted an oversight in the presentation, stating the $75 million had not included the engineering portion, it was only construction. The actual cost should have been in the $90,000s.
- If the project were not space constrained, what would the project cost and overall plan look like? Would clarifiers be added instead of adding a membrane bioreactor (MBR)? Considering the huge sum of money involved, maybe it would be cheaper overall to acquire some additional land south of the existing facility to add more equipment, rather than this huge increase for the MBR. The river was south of the facility, but there were a lot of trees that could be cut down.
  - Mr. Nacrelli responded Staff could cost out what a conventional expansion would take and how much land would be required; however, the direction provided was that there was no room to grow.
  - Ms. Guile-Hinman understand the facility was all surrounded by Boones Ferry Park, and there were deed restrictions that did not allow the City to use it for anything other than a recreational use.
  - Mr. Nacrelli clarified the land on the east side had a large grade adjacent to where the new aeration basin would go in the northeast corner.
  - Mr. Price added a significant retaining wall would have to be built there in order to put in the additional aeration basin, so the area was already tight due to the slopes.
- At a high level, it would be good to double check that there is no physical space to put in a conventional facility, because this was a huge sum of money, especially with the $60 million outlay in 2030. It would be good to make sure the City was looking at all the options out there.

CITY COUNCIL

MONDAY, JANUARY 4, 2021

WORK SESSION

Stormwater Master Plan (Rappold)

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: January 4, 2021	**Subject: Resolution No. 2848** Authorizing the City Manager to Execute a Professional Services Agreement with Brown and Caldwell to Provide Engineering Consulting Services for the Stormwater Master Plan Update (CIP #7064) **Staff Member:** Khoi Le, PE, Development Engineering Manager and Kerry Rappold, Natural Resources Manager **Department:** Community Development
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☒ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☒ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☒ Not Applicable **Comments:** N/A
Staff Recommendation: Staff recommends Council adopt the Consent Agenda.	
Recommended Language for Motion: I move to approve the Consent Agenda.	
Project / Issue Relates To:	

☒Council Goals/Priorities: Expand and Maintain High Quality Infrastructure	☐Adopted Master Plan(s):	☐Not Applicable

ISSUE BEFORE COUNCIL:

A City of Wilsonville Resolution approving a Professional Services Agreement (PSA) with Brown and Caldwell in the amount of $393,946 for engineering consulting services for the Stormwater Master Plan Update (CIP #7064) project (Project).

EXECUTIVE SUMMARY:

In 2012, the City adopted the Stormwater Master Plan, which provided an update to the previous master plan adopted in June 2001. There have been changes in land use (e.g., UGB expansion areas) and new stormwater management requirements (i.e., National Pollution Discharge Elimination System, MS4 Stormwater Permit) that need to be addressed as part of the update.

The City ultimately seeks an integrated approach to stormwater and watershed management that will result in the development of management solutions and policies that maintain, restore and enhance local watersheds and meet engineering, environmental and land use needs.

Staff issued a Request for Proposals (RFP) in July 2020 for professional engineering services for the Stormwater Master Plan Update project. Three proposals were received by the August 27, 2020 due date. Staff evaluated the submitted proposals and determined that Brown and Caldwell was the most qualified to perform engineering consulting services for the Project.

EXPECTED RESULTS:

The Stormwater Master Plan Update will include goals and policies, data gathering, surveying, system condition assessment, hydraulic modeling, area specific studies, retrofit analysis, Capital Improvement Plan, fee in lieu of construction program, outreach, public engagement, and draft and final versions of the Plan.

TIMELINE:

The project is scheduled to be completed by June 30, 2022.

CURRENT YEAR BUDGET IMPACTS:

The adopted budget for FY20/21 includes $450,000 in Stormwater Operating and Stormwater System Development Charges (SDC) for CIP #7064. In the budget, $396,476 has been allocated for the development of the Master Plan, and $53,525 for overhead. The contract amount with Brown and Caldwell is $393,946.

FINANCIAL REVIEW / COMMENT:

Reviewed by: CAR Date: 12/21/2020

LEGAL REVIEW / COMMENT:

Reviewed by: JRA Date: 12/30/2020

COMMUNITY INVOLVEMENT PROCESS:

The consultant team will prepare a public engagement plan for outreach to interested members of the community and businesses potentially affected by the updated plan. The Public Engagement Plan will incorporate the City's existing public engagement tools, including *Let's Talk Wilsonville* and the Boones Ferry Messenger. Two virtual open houses will be held to present project information and solicit feedback from the public related to the project scope and activities.

POTENTIAL IMPACTS or BENEFIT TO THE COMMUNITY:

The project will benefit the community by providing goals and policies and an updated capital improvement plan to serve a growing population and meet environmental regulations.

ALTERNATIVES:

Not proceeding with the project will hinder the City's ability to plan for anticipated growth and development and to address regulatory requirements.

CITY MANAGER COMMENT:

N/A

ATTACHMENTS:

1. Resolution No. 2848
    A. Stormwater Master Plan Update Professional Services Agreement

RESOLUTION NO. 2848

A RESOLUTION OF THE CITY OF WILSONVILLE AUTHORIZING THE CITY MANAGER TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT WITH BROWN AND CALDWELL TO PROVIDE ENGINEERING CONSULTING SERVICES FOR THE STORMWATER MASTER PLAN UPDATE PROJECT (CAPITAL IMPROVEMENT PROJECT #7064).

WHEREAS, the City has planned and budgeted for engineering consulting services for Capital Improvement Project #7064, known as the Stormwater Master Plan Update project (the Project); and

WHEREAS, the City solicited proposals from qualified consulting firms for the Project that duly followed State of Oregon Public Contracting Rules and the City of Wilsonville Municipal Code; and

WHEREAS, Brown and Caldwell submitted a proposal on August 27, 2020 and was subsequently evaluated and determined to be the most qualified consultant to perform the work; and

WHEREAS, following the qualifications based selection process and under the direction of the City, a detailed scope of work was prepared, and the fee for the scope was negotiated and found to be acceptable and appropriate for the services to be provided.

NOW, THEREFORE, THE CITY OF WILSONVILLE RESOLVES AS FOLLOWS:

1. The procurement process for the Project duly followed Oregon Public Contracting Rules, and Brown and Caldwell has provided a responsive and responsible proposal for engineering consulting services.
2. The City Council, acting as the Local Contract Review Board, authorizes the City Manager to enter into and execute, on behalf of the City of Wilsonville, a Professional Services Agreement with Brown and Caldwell for a not-to-exceed amount of $393,946, which is substantially similar to **Exhibit A** attached hereto.
3. This resolution becomes effective upon adoption.

ADOPTED by the Wilsonville City Council at a regular meeting thereof this 4th day of January, 2021, and filed with the Wilsonville City Recorder this date.

_____
Julie Fitzgerald, Mayor

ATTEST:

_____
Kimberly Veliz, City Recorder,

SUMMARY OF VOTES:
Mayor Fitzgerald
Council President Akervall
Councilor Lehan
Councilor West
Councilor Linville

EXHIBIT:

A. Stormwater Master Plan Update Professional Services Agreement

Contract No. 21010
CIP #7064

CITY OF WILSONVILLE
PROFESSIONAL SERVICES AGREEMENT

This Professional Services Agreement ("Agreement") for the Stormwater Master Plan Update Project ("Project") is made and entered into on this _____ day of _____ 2020 ("Effective Date") by and between the **City of Wilsonville**, a municipal corporation of the State of Oregon (hereinafter referred to as the "City"), and **Brown and Caldwell, Inc.**, a California corporation (hereinafter referred to as "Consultant").

RECITALS

WHEREAS, the City requires services which Consultant is capable of providing, under terms and conditions hereinafter described; and

WHEREAS, Consultant represents that Consultant is qualified to perform the services described herein on the basis of specialized experience and technical expertise; and

WHEREAS, Consultant is prepared to provide such services as the City does hereinafter require.

NOW, THEREFORE, in consideration of these mutual promises and the terms and conditions set forth herein, the parties agree as follows:

AGREEMENT

Section 1. Scope of Work

Consultant shall diligently develop a Stormwater Master Plan Update according to the requirements and deliverable dates identified in the Scope of Work for the Project, attached hereto as **Exhibit A** and incorporated by reference herein (the "Services").

Section 2. Term

The term of this Agreement shall be from the Effective Date until all Services required to be performed hereunder are completed and accepted, or no later than June 30, 2022, whichever occurs first, unless earlier terminated in accordance herewith or an extension of time is agreed to, in writing, by the City.

Section 3. Consultant's Services

3.1. All written documents prepared by Consultant in conjunction with the Services shall bear the signature, name, or logo of, or otherwise be identified as coming from, Consultant's authorized Project Manager.

3.2. Consultant will not be deemed to be in default by reason of delays in performance due to circumstances beyond Consultant's reasonable control, including but not limited to strikes,

lockouts, severe acts of nature, or other unavoidable delays or acts of third parties not under Consultant's direction and control ("Force Majeure"). In the case of the happening of any Force Majeure event, the time for completion of the Services will be extended accordingly and proportionately by the City, in writing. Lack of labor, supplies, materials, or the cost of any of the foregoing shall not be deemed a Force Majeure event.

3.3. The existence of this Agreement between the City and Consultant shall not be construed as the City's promise or assurance that Consultant will be retained for future services beyond the Scope of Work described herein.

3.4. Consultant shall maintain the confidentiality of any confidential information that is exempt from disclosure under state or federal law to which Consultant may have access by reason of this Agreement. Consultant warrants that Consultant's employees assigned to the Services provided in this Agreement shall be clearly instructed to maintain this confidentiality. All agreements with respect to confidentiality shall survive the termination or expiration of this Agreement. Notwithstanding the foregoing, Consultant shall have no confidentiality obligation with respect to information that:

3.4.1 becomes generally available to the public other than as a result of disclosure by Consultant or its agents or employees;

3.4.2 was available to Consultant on a non-confidential basis prior to its disclosure by City;

3.4.3 becomes available to Consultant from a third party who is not, to the knowledge of Consultant, bound to retain such information in confidence.

In the event Consultant is compelled by subpoena, court order, or administrative order to disclose any confidential information, Consultant shall promptly notify City and shall cooperate with City prior to disclosure so that City may take necessary actions to protect such confidential information from disclosure.

Section 4. Compensation

4.1. Except as otherwise set forth in this **Section 4**, the City agrees to pay Consultant a not-to-exceed amount of THREE HUNDRED NINETY-THREE THOUSAND NINE HUNDRED FORTY-SIX DOLLARS ($393,946.00) for performance of the Services ("Compensation Amount"). Any compensation in excess of the Compensation Amount will require an express written Addendum to be executed between the City and Consultant.

4.2. During the course of Consultant's performance, if the City, through its Project Manager, specifically requests Consultant to provide additional services that are beyond the Scope of Work described on **Exhibit A**, Consultant shall provide such additional services and bill the City at the hourly rates outlined on Consultant's Rate Schedule, as set forth in **Exhibit B**. Any Additional work beyond the Scope of Work, or any compensation above the amount shown in **Subsection 4.1**, requires a written Addendum executed in compliance with the provisions of **Section 18**.

4.3. Except for amounts withheld by the City pursuant to this Agreement, Consultant will be paid for Services for which an itemized invoice is received by the City within thirty (30) days of receipt, unless the City disputes such invoice. In that instance, the undisputed portion of the invoice will be paid by the City within the above timeframe. The City will set forth its reasons for the disputed claim amount and make good faith efforts to resolve the invoice dispute with Consultant as promptly as is reasonably possible.

4.4. The City will be responsible for the direct payment of required fees payable to governmental agencies, including but not limited to plan checking, land use, zoning, and all other similar fees resulting from this Project, that are not specifically covered by **Exhibit A**.

4.5. Consultant's Compensation Amount and Rate Schedule are all inclusive and include, but are not limited to, all work-related costs, expenses, salaries or wages, plus fringe benefits and contributions, including payroll taxes, workers compensation insurance, liability insurance, profit, pension benefits and similar contributions and benefits, technology and/or software charges, licensing, trademark, and/or copyright costs, office expenses, travel expenses, mileage, and all other indirect and overhead charges.

Section 5. Prevailing Wages

This is a contract for a Public Works Project subject to ORS 279C.800 to 279C.870. Therefore, not less than the current applicable state prevailing wage must be paid on this Project. Wage rates for this Project are those published by the Bureau of Labor and Industries (BOLI), effective July 1, 2020, and all subsequent amendments. The BOLI prevailing wage rate for public works contracts can be found at the following website: http://www.oregon.gov/boli/WHD/PWR/Pages/pwr_state.aspx. Because this is a public works contract subject to payment of prevailing wages, each worker in each trade or occupation employed in the performance of the Services, either by Consultant, a subcontractor, or other person doing or contracting to do, or contracting for the whole or any part of the Services, must be paid not less than the applicable state prevailing wage for an hour's work in the same trade or occupation in the locality where such labor is performed, in accordance with ORS 279C.838 and 279C.840, if applicable. Consultant must comply with all public contracting wages required by law. Consultant and any subcontractor, or their sureties, shall file a certificate of rate of wage as required by ORS 279C.845. If the City determines at any time that the prevailing rate of wages has not been or is not being paid as required herein, it may retain from the moneys due to Consultant an amount sufficient to make up the difference between the wages actually paid and the prevailing rate of wages, and may also cancel the contract for breach. Consultant shall be liable to the workers affected for failure to pay the required rate of wage, including all fringe benefits under ORS 279C.840(5). Consultant shall include a contract provision in compliance with this paragraph in every subcontract and shall require each subcontractor to include it in subcontract(s).

Section 6. City's Rights and Responsibilities

6.1. The City will designate a Project Manager to facilitate day-to-day communication between Consultant and the City, including timely receipt and processing of invoices, requests for information, and general coordination of City staff to support the Project.

6.2. Award of this contract is subject to budget appropriation. Funds are approved for Fiscal Year 2019-20. If not completed within this fiscal year, funds may not be appropriated for the next fiscal year. The City also reserves the right to terminate this contract early, as described in **Section 16**.

Section 7. City's Project Manager

The City's Project Manager is Khoi Le. The City shall give Consultant prompt written notice of any re-designation of its Project Manager.

Section 8. Consultant's Project Manager

Consultant's Project Manager is Angela Wieland. In the event that Consultant's designated Project Manager is changed, Consultant shall give the City prompt written notification of such re-designation. Recognizing the need for consistency and knowledge in the administration of the Project, Consultant's Project Manager will not be changed without the written consent of the City, which consent shall not be unreasonably withheld. In the event the City receives any communication from Consultant that is not from Consultant's designated Project Manager, the City may request verification by Consultant's Project Manager, which verification must be promptly furnished.

Section 9. Project Information

Except for confidential information designated by the City as information not to be shared, Consultant agrees to share Project information with, and to fully cooperate with, those corporations, firms, contractors, public utilities, governmental entities, and persons involved in or associated with the Project. No information, news, or press releases related to the Project, whether made to representatives of newspapers, magazines, or television and radio stations, shall be made without the written authorization of the City's Project Manager. The foregoing shall not apply to project descriptions used for marketing or similar purposes.

Section 10. Duty to Inform

If at any time during the performance of this Agreement or any future phase of this Agreement for which Consultant has been retained, Consultant becomes aware of actual or potential problems, faults, or defects in the Project or Scope of Work, or any portion thereof; or of any nonconformance with federal, state, or local laws, rules, or regulations; or if Consultant has any objection to any decision or order made by the City with respect to such laws, rules, or regulations, Consultant shall give prompt written notice thereof to the City's Project Manager. Any delay or failure on the part of the City to provide a written response to Consultant shall neither constitute agreement with nor acquiescence to Consultant's statement or claim, nor constitute a waiver of any of the City's rights.

Section 11. Subcontractors and Assignments

11.1. Unless expressly authorized in **Exhibit A** or **Section 12** of this Agreement, Consultant shall not subcontract with others for any of the Services prescribed herein. Consultant shall not assign any of Consultant's rights acquired hereunder without obtaining prior written approval from the City, which approval may be granted or denied in the City's sole discretion. Some Services may be performed by persons other than Consultant, provided Consultant advises the City of the names of such subcontractors and the work which they intend to perform, and the City specifically agrees in writing to such subcontracting. Consultant acknowledges such work will be provided to the City pursuant to a subcontract(s) between Consultant and subcontractor(s) and no privity of contract exists between the City and the subcontractor(s). Unless otherwise specifically provided by this Agreement, the City incurs no liability to third persons for payment of any compensation provided herein to Consultant. Any attempted assignment of this Agreement without the written consent of the City shall be void. Except as otherwise specifically agreed, all costs for work performed by others on behalf of Consultant shall not be subject to additional reimbursement by the City.

11.2. The City shall have the right to enter into other agreements for the Project, to be coordinated with this Agreement. Consultant shall cooperate with the City and other firms, engineers or subcontractors on the Project so that all portions of the Project may be completed in the least possible time and within normal working hours. Consultant shall furnish other engineers, subcontractors and affected public utilities, whose designs are fitted into Consultant's design, detail drawings giving full information so that conflicts can be avoided.

11.3. Consultant shall include this Agreement by reference in any subcontract and require subcontractors to perform in strict compliance with this Agreement.

Section 12. Consultant Is Independent Contractor

12.1. Consultant is an independent contractor for all purposes and shall be entitled to no compensation other than the Compensation Amount provided for under **Section 4** of this Agreement. Consultant will be solely responsible for determining the manner and means of accomplishing the end result of Consultant's Services. The City does not have the right to control or interfere with the manner or method of accomplishing said Services. The City, however, will have the right to specify and control the results of Consultant's Services so such Services meet the requirements of the Project.

12.2. Consultant may request that some consulting services be performed on the Project by persons or firms other than Consultant, through a subcontract with Consultant. Consultant acknowledges that if such services are provided to the City pursuant to a subcontract(s) between Consultant and those who provide such services, Consultant may not utilize any subcontractor(s), or in any way assign its responsibility under this Agreement, without first obtaining the express written consent of the City, which consent may be given or denied in the City's sole discretion. For all Services performed under subcontract to Consultant, as approved by the City, Consultant shall only charge the compensation rates shown on the approved Rate Schedule (**Exhibit B**). Rate schedules for named or unnamed subcontractors, and Consultant markups of subcontractor billings,

will only be recognized by the City as set forth in Consultant's Rate Schedule, unless documented and approved, in writing, by the City pursuant to a modification to Consultant's Rate Schedule, per **Section 18** of this Agreement. In all cases, processing and payment of billings from subcontractors is solely the responsibility of Consultant.

12.3. Consultant shall be responsible for, and defend, indemnify, and hold the City harmless against, any liability, cost, or damage arising out of Consultant's use of such subcontractor(s) and subcontractor's negligent acts, errors, or omissions. Unless otherwise agreed to, in writing, by the City, Consultant shall require that all of Consultant's subcontractors also comply with, and be subject to, the provisions of this **Section 12** and meet the same insurance requirements of Consultant under this Agreement.

Section 13. Consultant Responsibilities

13.1. Consultant must make prompt payment for any claims for labor, materials, or services furnished to Consultant by any person in connection with this Agreement as such claims become due. Consultant shall not permit any liens or claims to be filed or prosecuted against the City on account of any labor or material furnished to or on behalf of Consultant. If Consultant fails, neglects, or refuses to make prompt payment of any such claim, the City may, but shall not be obligated to, pay such claim to the person furnishing the labor, materials, or services and offset the amount of the payment against funds due or to become due to Consultant under this Agreement. The City may also recover any such amounts directly from Consultant.

13.2. Consultant must comply with all applicable Oregon and federal wage and hour laws, including BOLI wage requirements, if applicable. Consultant shall make all required workers compensation and medical care payments on time. Consultant shall be fully responsible for payment of all employee withholdings required by law, including but not limited to taxes, including payroll, income, Social Security (FICA), and Medicaid. Consultant shall also be fully responsible for payment of salaries, benefits, taxes, Industrial Accident Fund contributions, and all other charges on account of any employees. Consultant shall pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167. All costs incident to the hiring of assistants or employees shall be Consultant's responsibility. Consultant shall defend, indemnify, and hold the City harmless from claims for payment of all such expenses.

13.3. No person shall be discriminated against by Consultant or any subcontractor in the performance of this Agreement on the basis of sex, gender, race, color, creed, religion, marital status, age, disability, sexual orientation, gender identity, or national origin. Any violation of this provision shall be grounds for cancellation, termination, or suspension of the Agreement, in whole or in part, by the City. References to "subcontractor" mean a subcontractor at any tier.

13.4. COVID-19 Safety Measures. Consultant must have a written policy in place to comply with all applicable local, state, and federal laws, regulations, and executive orders related to the COVID-19 coronavirus outbreak to ensure the protection of Consultant's employees and/or subconsultants, City employees, and the public. Consultant must provide its written policy to the City Project Manager at the commencement of the Project. In the event that Consultant is required

to stop or delay work due to a COVID-19 related event, Consultant shall not be entitled to any additional payment, remobilization costs, or delay damages.

Section 14. Indemnity

14.1. Indemnification. Consultant acknowledges responsibility for liability arising out of the performance of this Agreement, and shall defend, indemnify, and hold the City harmless from any and all liability, settlements, loss, costs, and expenses in connection with any action, suit, or claim resulting or allegedly resulting from Consultant's negligent acts, omissions, errors, or willful or reckless misconduct pursuant to this Agreement, or from Consultant's failure to perform its responsibilities as set forth in this Agreement. The review, approval, or acceptance by the City, its Project Manager, or any City employee of documents or other work performed, prepared, or submitted by Consultant shall not be considered a negligent act, error, omission, or willful misconduct on the part of the City, and none of the foregoing shall relieve Consultant of its responsibility to perform in full conformity with the City's requirements, as set forth in this Agreement, and to indemnify the City as provided above and to reimburse the City for any and all costs and damages suffered by the City as a result of Consultant's negligent performance of this Agreement, failure of performance hereunder, violation of state or federal laws, or failure to adhere to the standards of performance and care described in **Subsection 14.2**. Consultant shall defend the City (using legal counsel reasonably acceptable to the City) against any claim that alleges negligent acts, omissions, errors, or willful or reckless misconduct by Consultant. As used herein, the term "Consultant" applies to Consultant and its own agents, employees, and suppliers [, and to all of Consultant's subcontractors, including their agents, employees, and suppliers].

14.2. Standard of Care. In the performance of the Services, Consultant agrees to use at least that degree of care and skill exercised under similar circumstances by reputable members of Consultant's profession practicing in the Portland metropolitan area. Consultant will re-perform any Services not meeting this standard without additional compensation. Consultant's re-performance of any Services, even if done at the City's request, shall not be considered as a limitation or waiver by the City of any other remedies or claims it may have arising out of Consultant's failure to perform in accordance with the applicable standard of care of this Agreement and within the prescribed timeframe.

Section 15. Insurance

15.1. Insurance Requirements. Consultant shall maintain insurance coverage acceptable to the City in full force and effect throughout the term of this Agreement. Such insurance shall cover all risks arising directly or indirectly out of Consultant's activities or work hereunder. Any and all agents, contractors, or subcontractors with which Consultant contracts to work on the Services must have insurance that conforms to the insurance requirements in this Agreement. Additionally, if a subcontractor is an engineer, architect, or other professional, Consultant must require the subcontractor to carry Professional Errors and Omissions insurance and must provide to the City proof of such coverage. The amount of insurance carried is in no way a limitation on Consultant's liability hereunder. The policy or policies maintained by Consultant shall provide at least the following minimum limits and coverages at all times during performance under this Agreement:

15.1.1. Commercial General Liability Insurance. Consultant and all subcontractors shall obtain, at each of their own expense, and keep in effect during the term of this Agreement, comprehensive Commercial General Liability Insurance covering Bodily Injury and Property Damage, written on an "occurrence" form policy. This coverage shall include broad form Contractual Liability insurance for the indemnities provided under this Agreement and shall be for the following minimum insurance coverage amounts: The coverage shall be in the amount of **$2,000,000** for each occurrence and **$3,000,000** general aggregate and shall include Products-Completed Operations Aggregate in the minimum amount of **$2,000,000** per occurrence, Fire Damage (any one fire) in the minimum amount of **$50,000**, and Medical Expense (any one person) in the minimum amount of **$10,000**. All of the foregoing coverages must be carried and maintained at all times during this Agreement.

15.1.2. Professional Errors and Omissions Coverage. Consultant agrees to carry Professional Errors and Omissions Liability insurance on a policy form appropriate to the professionals providing the Services hereunder with a limit of no less than **$2,000,000** per claim. Consultant shall maintain this insurance for damages alleged to be as a result of errors, omissions, or negligent acts of Consultant. Such policy shall have a retroactive date effective before the commencement of any work by Consultant on the Services covered by this Agreement, and coverage will remain in force for a period of at least three (3) years after termination of this Agreement.

15.1.3. Business Automobile Liability Insurance. If Consultant or any subcontractors will be using a motor vehicle in the performance of the Services herein, Consultant shall provide the City a certificate indicating that Consultant and its subcontractors have business automobile liability coverage for all owned, hired, and non-owned vehicles. The Combined Single Limit per occurrence shall not be less than **$2,000,000**.

15.1.4. Workers Compensation Insurance. Consultant, its subcontractors, and all employers providing work, labor, or materials under this Agreement that are subject employers under the Oregon Workers Compensation Law shall comply with ORS 656.017, which requires them to provide workers compensation coverage that satisfies Oregon law for all their subject workers under ORS 656.126. Out-of-state employers must provide Oregon workers compensation coverage for their workers who work at a single location within Oregon for more than thirty (30) days in a calendar year. Consultants who perform work without the assistance or labor of any employee need not obtain such coverage. This shall include Employer's Liability Insurance with coverage limits of not less than **$500,000** each accident.

15.1.5. Insurance Carrier Rating. Coverages provided by Consultant and its subcontractors must be underwritten by an insurance company deemed acceptable by the City, with an AM Best Rating of A or better. The City reserves the right to reject all or any insurance carrier(s) with a financial rating that is unacceptable to the City.

15.1.6. Additional Insured and Termination Endorsements. The City will be named as an additional insured with respect to Consultant's liabilities hereunder in insurance coverages. Additional Insured coverage under Consultant's Commercial General Liability, Automobile Liability, and Excess Liability Policies, as applicable, will be provided by endorsement. Additional insured coverage shall be for both ongoing operations via ISO Form CG 2010 or its equivalent, and products and completed operations via ISO Form CG 2037 or its equivalent. Coverage shall be Primary and Non-Contributory. Waiver of Subrogation endorsement via ISO Form CG 2404 or its equivalent shall be provided. The following is included as additional insured: "The City of Wilsonville, its elected and appointed officials, officers, agents, employees, and volunteers." An endorsement shall also be provided requiring the insurance carrier to give the City at least thirty (30) days' written notification of any termination or major modification of the insurance policies required hereunder. Consultant must be an additional insured on the insurance policies obtained by its subcontractors performing work on the Services contemplated under this Agreement.

15.1.7. Certificates of Insurance. As evidence of the insurance coverage required by this Agreement, Consultant shall furnish a Certificate of Insurance to the City. This Agreement shall not be effective until the required certificates and the Additional Insured Endorsements have been received and approved by the City. Consultant agrees that it will not terminate or change its coverage during the term of this Agreement without giving the City at least thirty (30) days' prior advance notice and Consultant will obtain an endorsement from its insurance carrier, in favor of the City, requiring the carrier to notify the City of any termination or change in insurance coverage, as provided above.

15.2. Primary Coverage. The coverage provided by these policies shall be primary, and any other insurance carried by the City is excess. Consultant shall be responsible for any deductible amounts payable under all policies of insurance. If insurance policies are "Claims Made" policies, Consultant will be required to maintain such policies in full force and effect throughout any warranty period.

Section 16. Early Termination; Default

16.1. This Agreement may be terminated prior to the expiration of the agreed upon terms:

16.1.1. By mutual written consent of the parties;

16.1.2. By the City, for any reason, and within its sole discretion, effective upon delivery of written notice to Consultant by mail or in person; or

16.1.3. By Consultant, effective upon seven (7) days' prior written notice in the event of substantial failure by the City to perform in accordance with the terms through no fault of Consultant, where such default is not cured within the seven (7) day period by the City. Withholding of disputed payment is not a default by the City.

16.2. If the City terminates this Agreement, in whole or in part, due to default or failure of Consultant to perform Services in accordance with the Agreement, the City may procure, upon reasonable terms and in a reasonable manner, services similar to those so terminated. In addition to any other remedies the City may have, both at law and in equity, for breach of contract, Consultant shall be liable for all costs and damages incurred by the City as a result of the default by Consultant, including, but not limited to all costs incurred by the City in procuring services from others as needed to complete this Agreement. This Agreement shall be in full force to the extent not terminated by written notice from the City to Consultant. In the event of a default, the City will provide Consultant with written notice of the default and a period of ten (10) days to cure the default. If Consultant notifies the City that it wishes to cure the default but cannot, in good faith, do so within the ten (10) day cure period provided, then the City may elect, in its sole discretion, to extend the cure period to an agreed upon time period, or the City may elect to terminate this Agreement and seek remedies for the default, as provided above.

16.3. If the City terminates this Agreement for its own convenience not due to any default by Consultant, payment of Consultant shall be prorated to, and include the day of, termination and shall be in full satisfaction of all claims by Consultant against the City under this Agreement.

16.4. Termination under any provision of this Section shall not affect any right, obligation, or liability of Consultant or the City that accrued prior to such termination. Consultant shall surrender to the City items of work or portions thereof, referred to in **Section 20**, for which Consultant has received payment or the City has made payment.

Section 17. Suspension of Services

The City may suspend, delay, or interrupt all or any part of the Services for such time as the City deems appropriate for its own convenience by giving written notice thereof to Consultant. An adjustment in the time of performance or method of compensation shall be allowed as a result of such delay or suspension unless the reason for the delay is within Consultant's control. The City shall not be responsible for Services performed by any subcontractors after notice of suspension is given by the City to Consultant. Should the City suspend, delay, or interrupt the Services and the suspension is not within Consultant's control, then the City shall extend the time of completion by the length of the delay.

Section 18. Modification/Addendum

Any modification of the provisions of this Agreement shall not be enforceable unless reduced to writing and signed by both the City and Consultant. A modification is a written document, contemporaneously executed by the City and Consultant, which increases or decreases the cost to the City over the agreed Compensation Amount in **Section 4** of this Agreement, or changes or modifies the Scope of Work or the time for performance. No modification shall be binding or effective until executed, in writing, by both Consultant and the City. In the event Consultant receives any communication of whatsoever nature from the City, which communication Consultant contends gives rise to any modification of this Agreement, Consultant shall, within five (5) business days after receipt, make a written request for modification to the City's Project Manager in the form of an Addendum. Consultant's failure to submit such written request for modification in the form

of an Addendum shall be the basis for refusal by the City to treat said communication as a basis for modification or to allow such modification. In connection with any modification to this Agreement affecting any change in price, Consultant shall submit a complete breakdown of labor, material, equipment, and other costs. If Consultant incurs additional costs or devotes additional time on Project tasks, the City shall be responsible for payment of only those additional costs for which it has agreed to pay under a signed Addendum. To be enforceable, the Addendum must describe with particularity the nature of the change, any delay in time the Addendum will cause, or any increase or decrease in the Compensation Amount. The Addendum must be signed and dated by both Consultant and the City before the Addendum may be implemented.

Section 19. Access to Records

The City shall have access, upon request, to such books, documents, receipts, papers, and records of Consultant as are directly pertinent to this Agreement for the purpose of making audit, examination, excerpts, and transcripts during the term of this Agreement and for a period of four (4) years after termination of the Agreement, unless the City specifically requests an extension. This clause shall survive the expiration, completion, or termination of this Agreement.

Section 20. Property of the City

20.1. All documents, reports, and research gathered or prepared by Consultant under this Agreement, including but not limited to spreadsheets, charts, graphs, drawings, modeling, maps, data generation, papers, diaries, and inspection reports, shall be the exclusive property of the City and shall be delivered to the City prior to final payment. Any statutory or common law rights to such property held by Consultant as creator of such work shall be conveyed to the City upon request without additional compensation.

20.2. Consultant shall not be held liable for any damage, loss, increased expenses, or otherwise, caused by or attributed to the reuse by the City or its designees of all work performed by Consultant pursuant to this Agreement without the express written permission of Consultant.

Section 21. Notices

Any notice required or permitted under this Agreement shall be in writing and shall be given when actually delivered in person or forty-eight (48) hours after having been deposited in the United States mail as certified or registered mail, addressed to the addresses set forth below, or to such other address as one party may indicate by written notice to the other party.

To City: City of Wilsonville
Attn: Khoi Le, Development Engineering Manager
29799 SW Town Center Loop East
Wilsonville, OR 97070

To Consultant: Brown and Caldwell, Inc.
Attn: Angela Wieland
6500 SW Macadam Avenue, .Suite 200
Portland, OR 97239

Section 22. Miscellaneous Provisions

22.1. Integration. This Agreement, including all exhibits attached hereto, contains the entire and integrated agreement between the parties and supersedes all prior written or oral discussions, representations, or agreements. In case of conflict among these documents, the provisions of this Agreement shall control.

22.2. Legal Effect and Assignment. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective heirs, personal representatives, successors, and assigns. This Agreement may be enforced by an action at law or in equity.

22.3. No Assignment. Consultant may not assign this Agreement, nor delegate the performance of any obligations hereunder, unless agreed to in advance and in writing by the City.

22.4. Adherence to Law. In the performance of this Agreement, Consultant shall adhere to all applicable federal, state, and local laws (including the Wilsonville Code and Public Works Standards), including but not limited to laws, rules, regulations, and policies concerning employer and employee relationships, workers compensation, and minimum and prevailing wage requirements. Any certificates, licenses, or permits that Consultant is required by law to obtain or maintain in order to perform the Services described on **Exhibit A**, shall be obtained and maintained throughout the term of this Agreement.

22.5. Governing Law. This Agreement shall be construed in accordance with and governed by the laws of the State of Oregon, regardless of any conflicts of laws. All contractual provisions required by ORS Chapters 279A, 279B, 279C, and related Oregon Administrative Rules to be included in public agreements are hereby incorporated by reference and shall become a part of this Agreement as if fully set forth herein.

22.6. Jurisdiction. Venue for any dispute will be in Clackamas County Circuit Court.

22.7. Legal Action/Attorney Fees. If a suit, action, or other proceeding of any nature whatsoever (including any proceeding under the U.S. Bankruptcy Code) is instituted in connection with any controversy arising out of this Agreement or to interpret or enforce any rights or obligations hereunder, the prevailing party shall be entitled to recover reasonable attorney, paralegal, accountant, and other expert fees and all other fees, costs, and expenses actually incurred and reasonably necessary in connection therewith, as determined by the court or body at trial or on any appeal or review, in addition to all other amounts provided by law. If the City is required to seek legal assistance to enforce any term of this Agreement, such fees shall include all of the above fees, whether or not a proceeding is initiated. Payment of all such fees shall also apply to any administrative proceeding, trial, and/or any appeal or petition for review.

22.8. Nonwaiver. Failure by either party at any time to require performance by the other party of any of the provisions of this Agreement shall in no way affect the party's rights hereunder to enforce the same, nor shall any waiver by the party of the breach hereof be held to be a waiver of any succeeding breach or a waiver of this nonwaiver clause.

22.9. Severability. If any provision of this Agreement is found to be void or unenforceable to any extent, it is the intent of the parties that the rest of the Agreement shall remain in full force and effect, to the greatest extent allowed by law.

22.10. Modification. This Agreement may not be modified except by written instrument executed by Consultant and the City.

22.11. Time of the Essence. Time is expressly made of the essence in the performance of this Agreement.

22.12. Calculation of Time. Except where the reference is to business days, all periods of time referred to herein shall include Saturdays, Sundays, and legal holidays in the State of Oregon, except that if the last day of any period falls on any Saturday, Sunday, or legal holiday observed by the City, the period shall be extended to include the next day which is not a Saturday, Sunday, or legal holiday. Where the reference is to business days, periods of time referred to herein shall exclude Saturdays, Sundays, and legal holidays observed by the City. Whenever a time period is set forth in days in this Agreement, the first day from which the designated period of time begins to run shall not be included.

22.13. Headings. Any titles of the sections of this Agreement are inserted for convenience of reference only and shall be disregarded in construing or interpreting any of its provisions.

22.14. Number, Gender and Captions. In construing this Agreement, it is understood that, if the context so requires, the singular pronoun shall be taken to mean and include the plural, the masculine, the feminine and the neuter, and that, generally, all grammatical changes shall be made, assumed, and implied to individuals and/or corporations and partnerships. All captions and paragraph headings used herein are intended solely for convenience of reference and shall in no way limit any of the provisions of this Agreement.

22.15. Good Faith and Reasonableness. The parties intend that the obligations of good faith and fair dealing apply to this Agreement generally and that no negative inferences be drawn by the absence of an explicit obligation to be reasonable in any portion of this Agreement. The obligation to be reasonable shall only be negated if arbitrariness is clearly and explicitly permitted as to the specific item in question, such as in the case of where this Agreement gives the City "sole discretion" or the City is allowed to make a decision in its "sole judgment."

22.16. Other Necessary Acts. Each party shall execute and deliver to the other all such further instruments and documents as may be reasonably necessary to carry out this Agreement in order to provide and secure to the other parties the full and complete enjoyment of rights and privileges hereunder.

22.17. Interpretation. As a further condition of this Agreement, the City and Consultant acknowledge that this Agreement shall be deemed and construed to have been prepared mutually by each party and it shall be expressly agreed that any uncertainty or ambiguity existing therein shall not be construed against any party. In the event that any party shall take an action, whether judicial or otherwise, to enforce or interpret any of the terms of the Agreement, the prevailing party shall be entitled to recover from the other party all expenses which it may reasonably incur in taking such action, including attorney fees and costs, whether incurred in a court of law or otherwise.

22.18. Entire Agreement. This Agreement and all documents attached to this Agreement represent the entire agreement between the parties.

22.19. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall constitute an original Agreement but all of which together shall constitute one and the same instrument.

22.20. Authority. Each party signing on behalf of Consultant and the City hereby warrants actual authority to bind their respective party.

The Consultant and the City hereby agree to all provisions of this Agreement.

CONSULTANT:

BROWN AND CALDWELL, INC.

By:_____

Print Name:_____

As Its:_____

Employer I.D. No._____

CITY:

CITY OF WILSONVILLE

By:_____

Print Name:_____

As Its:_____

APPROVED AS TO FORM:

_____
Ryan Adams, Assistant City Attorney
City of Wilsonville, Oregon

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Exhibit A

Scope of Services

City of Wilsonville City-wide Stormwater Master Plan

The City of Wilsonville (City) is developing a Stormwater Master Plan (SMP) update to evaluate system deficiencies and support the prioritization of stormwater capital projects. Key objectives for the SMP include the development/refinement of drainage basins, an evaluation of hydrology and stormwater flows, the identification of system deficiencies and new infrastructure needs, and the development and prioritization of capital improvement projects. Presentation of the SMP will be clear, concise, and implementable.

For purposes of this scope and contract, Brown and Caldwell (BC) is the prime contractor and overseeing contract management and the SMP development. Barney and Worth (B&W), Waterways Consulting (Waterways), and Weddle are subcontractors providing services on Phases 3 and 7. The collective project team is referred to as the Team.

Phase 1 Project Management

Objective To provide overall contract management and ensure project objectives are met per the scope, schedule, and budget. To maintain regular communications with the City. To provide quality assurance and quality control (QA/QC) throughout the project.

Task 1-1 Project Administration

Activities BC will provide overall contract management. The Team will coordinate to ensure the project receives the staff support necessary to meet the schedule and maintain project quality. Activities budgeted under Task 1-1 include:

- **Overall schedule management.** An initial project schedule will be developed using Excel. It will identify anticipated task duration, start/stop dates, and scheduled QA/QC reviews. Up to three schedule updates (in digital form) will be provided to the City throughout the project duration.
- **Overall budget management**. Budget tracking will occur via WorkSmart, BC's internal tool for tracking weekly project costs by project phase and task. Internal month end reporting will be conducted by BC to estimate effort to complete and will be used to identify budget challenges in advance. While not anticipated, budget challenges will be communicated directly to the City during monthly coordination meetings. Any subsequent resolution/scope adjustments/amendments will be documented in emailed meeting summaries.
- **Development of a Project Administration Plan (PAP).** BC shall prepare a PAP and decision log to outline communication paths, technical review requirements, and project roles, responsibilities, and QA/QC protocols.
- **Subcontractor coordination and oversight**. BC will work with the Subcontractors to review subcontractor budgets, coordinate deliverables schedules, and identify data gaps and other project issues throughout the project.

- **Monthly invoicing with project progress reports**. BC will prepare invoices to reflect budget spent and work completed at the phase level.
- **Document control and delivery**. Final deliverables including mapping, models, technical memoranda (TMs), and reports will be provided digitally to the City at the end of the project.

Task 1-2 Project Coordination Meetings

Activities

Monthly project check-ins will be conducted by a telephone/ virtual meeting platform throughout the project to discuss project progress and coordinate deliverables. Key Team staff will participate in the calls as needed. BC will provide a brief email following each call to summarize key decisions, action items for the Team and City staff, issue resolution, and any scope/budget adjustments.

Task 1-3 Project Kickoff Workshop

Activities

City staff and BC will initiate a project kick-off workshop to confirm project goals, objectives and priorities, and outline the anticipated schedule for the project.

Prior to this meeting, BC will prepare a meeting agenda, preliminary project schedule, comprehensive data needs list, and a draft Public Education Plan (PEP) outline (see Phase 10). General outreach and communication strategy elements will be discussed for inclusion in the PEP.

BC will prepare a draft internal stormwater survey to document areas of known stormwater system deficiencies. and external (public) survey questions to help identify community level of service goals. The draft surveys will be reviewed during the kick off meeting and distributed to City staff following the meeting.

The comprehensive data request list, draft PEP and draft stormwater surveys will be reviewed in detail during the project kick-off meeting.

Phase 1 Deliverables

The following deliverables are included under Phase 1:

- Project schedule
- Monthly progress reports with invoices
- Project coordination meeting scheduling, including an email agenda of discussion topics
- Emailed summaries of project coordination meetings, including a list of key decisions and action items
- Project kick-off meeting agenda. The comprehensive data request list and internal stormwater survey are deliverables listed and budgeted under Phase 3.

Phase 1 Assumptions

The following assumptions are made for Phase 1:

- The project duration is estimated at 24 months for budgeting purposes.
- The budget for specific QA/QC review of deliverables is reflected under the individual technical phases.
- Monthly coordination meetings will be conducted via telephone and attended by key staff, as required. A total of 24 meetings are assumed. The BC PM will individually participate in all 24 meetings; an additional BC staff person will participate in 12 meetings. An email outlining agenda topics will be sent prior to each meeting. An email briefly summarizing action items and next steps will be sent following each meeting.

- Coordination meetings may be cancelled or rescheduled based on scheduling of project workshops, need or pending deliverables,
- Progress reports will summarize major activities completed during the invoicing period.
- The City's project manager will invite appropriate engineering, planning, and maintenance staff to participate in the project kick-off workshop and distribute meeting materials prior to the meeting.
- If available, a preliminary review of available GIS data will be conducted and incorporated into the comprehensive review of data needs in order to identify data gaps early in the process.
- Survey development is reflected under Task 3-3. The City's project manager will distribute the final stormwater surveys to City staff. City staff are responsible for the publication of the external (public) survey online and for the distribution, compilation, and receipt of internal surveys to provide to BC within the timeline established during the project kick-off meeting.
- Three BC staff will attend a 2-hour project kick-off workshop (Task 1-3). The kick-off meeting will be facilitated by BC and attended virtually.
- Additional project meetings are included under the individual technical tasks.

Phase 2 Stormwater Code and Policy Review

Objective To review regulatory (NPDES MS4 and TMDL) requirements, current City policies, and stormwater-related code and standards to inform future policy needs and applicable stormwater design criteria for the SMP.

Activities BC will review the City's Municipal Code and Public Works Standards (stormwater) to verify design criteria and assumptions for the evaluation of the City's stormwater system and capital project needs.

Requirements of the City's reissued NPDES MS4 permit and 2020 TMDL Implementation Plan will be summarized and compared to activities anticipated as part of this SMP update. Potential connections/ integration between these compliance and planning documents will be highlighted. Compliance elements that can be addressed through the SMP update process will be identified to inform additional policy recommendations and future revisions to standards.

BC will review the applicable City Council Goals and Policies and stormwater-related Comprehensive Plan elements to identify needed modifications and updates to these documents in accordance with the City's (draft or final) NPDES MS4 Permit and/or results from the staff interviews and surveys (Phase 3).

Recommended policy and /or Comprehensive Plan language adjustments will be provided in a track changes, word version of the documents.

Phase 2 Deliverables

The following deliverables are included under Phase 2:

- Tabular summary relating NPDES MS4 permit requirements, TMDL Implementation Plan Requirements, and SMP update elements.
- Track changes edits to City Council Goals and Policies and stormwater-related comprehensive plan sections.

Phase 2 Assumptions

The following assumptions are made for Phase 2:

- The timeline for issuance of the City's NPDES MS4 permit is unknown. A public review draft of the NPDES MS4 permit was issued October 23, 2020 and will be used as the basis for regulatory requirements.
- A gap analysis documenting requirements of the City's reissued NPDES MS4 permit requirements compared to City Code, Public Works Standards, and the City's Stormwater Management Plan (SWMP) will be conducted independent from this scope and budget. Depending on timing, results of this analysis may be incorporated into the SMP.
- Design criteria and the tabular summary of NPDES MS4 permit requirements, TMDL requirements and SMP activities will be documented under TM#1: Project Planning (see Task 4-3).
- Policy recommendations, programmatic adjustments, and/or Comprehensive Plan updates will be based on activities conducted throughout the duration of the project and documented in the SMP at the conclusion of the project.
- Discussion of the stormwater code and policy review will be incorporated into a scheduled monthly coordination call agenda.

Phase 3 Data Compilation and Characterization

Objective To compile, examine, and evaluate existing GIS data, staff information, and reports to inform planning methods and assumptions.

Task 3-1 GIS Data Compilation, Model Review and Mapping

Activities BC will prepare a comprehensive data needs list (GIS files, documents, reports, etc.), to be provided to City staff prior to the kick off meeting (Task 1-3).

BC will inventory and review available City-wide GIS and LiDAR data, as well as the City's existing InfoSWMM model to confirm hydrologic and hydraulic input parameters and compare the extents and configuration against current City GIS.

. Stormwater system GIS data will be reviewed to identify potential locations for model updates (i.e., per new infrastructure added prior to the previous modeling effort). Storm system GIS data will also be reviewed for completeness in terms of open channel and pipe information including inverts, rim elevations, and pipe diameters. BC will conduct a desktop analysis to compare available light detecting and ranging (LIDAR) data with documented rim elevations to confirm that data are recorded on a consistent datum, and can be used for future system-wide modeling.

Base maps will be prepared to document information collected as part of Task 3-1. Maps will reflect current city limits, land use/ zoning coverage, areas of future development and growth, areas of pending redevelopment, soils and topography, basin and subbasin delineation, stormwater collection system and facilities, and existing stormwater system data gaps (inverts, rims, etc.).

GIS data gaps or deficiencies that may impact project objectives and schedule will be identified and documented in a matrix format for discussion with the City during a scheduled coordination phone call.

Task 3-2 Documentation Review and Problem Area Identification

Activities

BC will review the City's 2012 SMP related to modeling methods, identified capacity deficiencies, and CIP needs. Unconstructed and/or unfunded stormwater CIPs per the 2012 SMP will be identified for discussion with City staff under Task 4-1 and documented in a Problem Area Matrix.

BC will also review the following concept planning and background documentation to inform the Problem Area Matrix and identify the proposed stormwater management concepts:

- Hydromodification Assessment (2015)
- Retrofit Assessment (2015)
- Wilsonville Town Center Concept Plan,
- Coffee Creek Industrial Area Concept Plan,
- Coffee Creek Regional Stormwater Facility,
- Basalt Creek Concept Plan.
- Frog Pond Planning Area
- Transportation Systems Plan (2013)

Per the above listed concept plans, available GIS related to zoning, proposed transportation corridors, preliminary infrastructure layouts, and in-progress development applications will be requested on the data needs matrix and incorporated into the GIS data review under Task 3-1.

Available Public Works documentation related to the condition of stormwater system assets will be reviewed to qualitatively identify infrastructure for inclusion on the Problem Area Matrix due to more immediate repair and replacement needs.

Task 3-3 Maintenance Activities Review

Activities

Stormwater-related operations and maintenance activities prescribed in the City's Stormwater Management Plan (SWMP) will be summarized to inform maintenance cost/ staff time assumptions for capital project development. Standard operating procedures informing maintenance activities and schedules will be reviewed. Existing stormwater-related programmatic activities that are currently incorporated into the City's annual budget will also be identified for discussion under Task 3-4.

Task 3-4 Surveys and Staff Interviews

Activities

BC will prepare a draft internal survey and external survey questions for review with the City during the kick off meeting (Task 1-3). External survey questions will be published on the City's website and used to inform stakeholder/ public level of service goals for consideration as part of the SMP update. Internal surveys will be distributed to City staff and used to inform locations of known stormwater deficiencies and flooding, lack of infrastructure, maintenance challenges, and water quality and natural resource project opportunities. Survey results will be incorporated into the Problem Area Matrix and mapped for review with the City.

BC will conduct spend up to 8 hours conducting virtual interviews with select City personnel and documenting responses, in order to collect additional information related to system operation, roles and responsibilities, current maintenance processes, and reported system deficiencies.

Information collected via surveys and interviews will be incorporated into the Problem Area Matrix as necessary.

Task 3-5 Site Visits

Activities

BC will conduct up to 3 days (24 hours) of field investigations to verify identified stormwater problem areas and refine GIS/ modeling assumptions in accordance with Phases 2 through 7. Additional objectives of field investigations may include:

- Verification and refinement of subbasin delineations (if needed). See Task 6-1.
- Verification of areas with future development potential.
- Initial observation and documentation of areas of the city with known capacity deficiencies, as identified in the completed surveys and identified on the stormwater problem area matrix
- Observation, qualification, and documentation of known high pollutant source areas of the city with the potential to install stormwater treatment.
- Observation and documentation of existing stormwater treatment and detention facility installations and retrofit opportunities.
- Observation and documentation of open-channel or natural-channel locations that may benefit from channel bank enhancement, improved riparian vegetation, or other in-stream channel improvements

Prior to the site visit, BC and City staff will coordinate locations to visit during a scheduled project coordination meeting. An agenda of targeted locations will be developed including locations where private property may require access agreements. Photo logs will be generated documenting observations and findings.

Task 3-6 Land Use and Impervious Assumptions

Activities

BC will provide up to 10 hours of technical support to City staff to assess and develop an updated existing land use coverage, based on review of the City's current zoning and vacant/ developable lands coverage and 2020 development conditions. Additional zoning/ land use categories may be added to the land use coverage assumptions from the City's 2012 SMP to reflect current development patterns and zoning specific to Concept Planning Areas. Updated impervious percentage assumptions specific to each identified land use category will be developed and provided to BC.

BC will facilitate discussions via a scheduled coordination call with the City Planning Department related to assumptions for future infrastructure needs and anticipated density increases associated with HB 2001. It is anticipated that areas impacted by this bill will be specific to the City's redevelopment and concept planning areas.

Phase 3 Deliverables

The following deliverables are included under Phase 3:

- Comprehensive data request list.
- Draft and final internal stormwater survey and external survey questions.
- Updated data request list, documenting GIS data received from the City, identified data gaps, and proposed data gap resolution.
- Preliminary mapping (by basin), including locations of identified problem areas per surveys.
- Draft Problem Area Matrix for use in Task 4-1.

Phase 3 Assumptions

The following assumptions are made for Phase 3:

- The City will provide BC with data in response to the data request lists within a mutually agreed upon timeline.
- System condition assessment efforts do not include CCTV video review, development of rating criteria or risk-based scoring framework.
- Maintenance activities and records will solely be reviewed to inform priority locations for repair and replacement needs. Assessment and inspection of stormwater infrastructure to evaluate system condition will not be conducted as part of this study.
- Available GIS data includes the basin/ subbasin delineation per the 2012 SMP, City concept planning area boundaries and proposed infrastructure layout, and locations of public detention/ regional facilities.
- The City will provide a existing land use coverage and associated impervious area assumptions to BC at the conclusion of Task 3-6 in GIS and tabular format. BC will provide up to 10 hours of technical support related to the land use categorization and impervious percentage analysis.
- City staff will be responsible for providing GIS mapping or specific locations (coordinates) of problem areas per the internal survey results.
- Internal and external survey review and refinement (per the kick-off meeting feedback), as well as the summarization of survey results is reflected under Task 10-1. Such activities will be conducted by B&W.
- Two BC staff are budgeted for 8 hours each to conduct interviews and documentation under Task 3-4.
- Two BC staff are budgeted for 8 hours per day for 3 days (including travel) under Task 3-5.
- The outcomes from Phase 3 will be documented under TM#1: Project Planning (see Task 4-3).

Phase 4 Project Planning

Objective To establish modeling extents, capital project needs, and water quality objectives to support project identification and future financial analysis efforts.

Task 4-1 Workshop 1: System Status and Modeling Extents

Activities BC will prepare an agenda, meeting materials, and facilitate a 3-hour workshop with City staff to discuss the status and results of Phase 3. The Problem Area Matrix developed under Phase 3 to describe reported problem areas and documented system condition deficiencies will be used to inform Workshop 1.

BC will prepare maps of the stormwater system, identifying locations of reported impairment/project needs and preliminary hydraulic modeling extents. Anticipated discussion topics and activities include:

- City staff input regarding currently known capacity problems, hydromodification problems, water quality needs and opportunities, aging/failing infrastructure, and proposed and constructed CIPs.
- Future development and stormwater management approach for growth areas.
- Available planning documentation (zoning, transportation corridors, preliminary infrastructure layouts, in-progress development applications)
- Identify the extent of stream survey needs (see Task 5-2).
- Data availability to support model update and development. How should data gaps be resolved? Is additional field survey work required?
- Public detention facilities modeling needs. Facilities constructed since 2008 will be identified per Task 3-1 and reviewed with City staff to inform incorporation into the hydraulic model extents and consideration for retrofit potential.

Task 4-2 Documentation

Activities

Based on the results from Task 4-1, workshop outcomes including qualified problem areas, preliminary project concepts, and modeling needs will be documented in an updated Problem Area and Project Opportunity Matrix. When possible, overlapping problem areas will be combined into single projects that serve multiple objectives. Project concepts may include pipe replacement, facility maintenance, infrastructure needs, detention/retention facility installation or modification, natural resource improvements, and water quality facility installations (e.g., rain gardens, planters).

A map of proposed hydrologic and hydraulic model extents will be developed.

BC will prepare a TM (TM#1: Project Planning) summarizing project planning efforts conducted under Phases 2, 3 and 4.

Phase 4 Deliverables

The following deliverables are included under Phase 4:

- Problem area matrix and GIS shapefile documenting reported problem area locations and system condition deficiencies, for use during Workshop 1.
- Workshop 1 meeting agenda and meeting materials, including base maps
- Problem Area and Project Opportunity Matrix per identified project needs discussed during Workshop 1.
- Draft TM#1: Project Planning

Phase 4 Assumptions

The following assumptions are made for Phase 4:

- The City will provide BC with one consolidated set of comments on draft TM#1.
- Finalization of TM#1 will occur prior to inclusion in the SMP and reflect inclusion of Phase 7 outcome.
- Three BC staff will attend the 3-hour workshop with City staff.
- The City's project manager will invite appropriate engineering, planning, and maintenance staff to participate in Workshop 1 and distribute meeting materials prior to the workshop.
- Early Action Project needs may be identified from the Problem Area and Project Opportunity Matrix and can be prioritized for cost estimation and capital project development purposes.
- Discussion during the Workshop will also be used to inform stream survey and data collection efforts (Phase 5).
- The Problem Area and Project Opportunity Matrix will serve as the meeting minutes from the workshop.

Phase 5 Stream Survey and Data Collection

Objective

To assess the geomorphic condition of stream channels in the City and obtain system data for use in hydrology and hydraulic (H/H) model development and capital project development.

Task 5-1 Stream Survey

Activities

Based on the results of Phase 4, BC will summarize the stream survey needs and preliminary open channel data collection needs for consideration under Task 5-2. These locations may include open channel segments where tree cover/ LIDAR coverage does not allow for the automated development of transects and other locations that may warrant additional investigation and/or data collection efforts.

Waterways Consulting will conduct a field-based geomorphic assessment of selected open channel areas within and adjacent to the city to characterize condition, identify impacts associated with hydromodification, assess and map potential risks to property and infrastructure, and provide recommendations on how to address the observed risks or impacts.

The following activities will be conducted to characterize ongoing erosion concerns and hydromodification risk in specified stream locations:

- Review of available data, reports, and maps to support the geomorphic analysis.
- John Dvorsky, Waterways' Principal Geomorphologist, will conduct up to 3-days of a geomorphic field assessment to characterize ongoing erosion concerns, hydromodification risk, and baseline conditions to inform stream impacts associated with upstream development activities.
  - The field-based assessment will consist of a stream walk along accessible stream reaches in the City, targeting those with reported or documented hydromodification risk.
  - Locations and descriptions of relevant instream features such as eroding banks, bed features (e.g. exposed bedrock, headcuts, beaver dams), and at-risk infrastructure (e.g. road crossings, pipes, etc.) will be documented.
  - Qualitative description of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure will be included at the reach scale.
  - Areas where the assessed stream topography varies significantly from the existing topographic data will be GPS located and flagged in the field.
- Waterways will prepare a TM (TM#2: Geomorphic Analysis) documenting results of the field analysis and historic, current and expected channel conditions.

Task 5-2 Open Channel Data Collection (Optional)

Activities

Based on activities conducted under Task 5-1, a map will be prepared by Waterways Consulting following the stream walk to prioritize where additional cross-section or localized stream channel profiles may need to be surveyed.

Waterways Consulting will conduct up to three days of additional topographic data collection efforts. Open channel survey data will be collected either using an RTK or Total Station, depending on field conditions in each location.

Task 5-3 Pipe System Data Collection (Optional)

Activities

BC will identify survey needs (based on gaps in GIS data) for the piped stormwater system required to support development of the stream survey and hydraulic modeling efforts.

The BC Team includes Weddle to provide surveying services as needed. Structure elevations, measure downs, and any additional open channel cross sections will be surveyed to rectify data discrepancies and support hydraulic model refinements.

Phase 5 Deliverables

The following deliverables are included under Phase 5:

- Mapping reflecting stream survey and open channel data collection extents.
- Draft and final TM#2: Geomorphic Analysis

Phase 5 Assumptions

The following assumptions are made for Phase 5:

- Tasks 5-2 and 5-3 are optional and would be initiated by City staff based on proposed model extents, required open channel and pipe system survey needs, and GIS data gaps.
- City staff will be available to provide basic field support during the stream survey and data collection efforts.
- Rights of entry permission will be obtained by the City from private property owners to support Tasks 5-1, 5-2 and 5-3.
- LIDAR will be used to develop cross-sections for ditches or open channel portions of the conveyance system to support hydraulic modeling efforts. Additional data collection efforts (Task 5-2 or 5-3) may be required for associated structures (weirs, culverts, etc.) or areas where LIDAR is not accurate. Field verification to confirm geometry can be collected during the stream survey.
- Ground, manhole rim elevations, and open-channel system geometry to develop and refine the hydraulic models will initially be based on existing information in the City's system inventory, InfoSWMM model or interpolated from available LIDAR to the extent possible.
- The stream survey (Task 5-1) will identify locations and descriptions of relevant instream features such as eroding banks, bed features (e.g. exposed bedrock, headcuts, beaver dams), and at-risk infrastructure (e.g. road crossings, pipes, etc.). In addition, qualitative description of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure will be included at the reach scale.
- City authorization is required prior to Tasks 5-2 or 5-3. BC and city staff will review the open channel survey locations noted by Waterways under Task 5-1 and other areas of data gaps and identify supplemental data collection needs. Initiation of Tasks 5-2 and 5-3 is subject to project amendment.
- Any collected survey data (open channel and piped system) will be added by the City into their existing GIS database for continued use on this project.

Phase 6 System Assessment

Objective To develop a hydrologic model of the city's drainage basins for existing and future flows. To refine the current hydraulic model of the public stormwater system to evaluate problem areas and future infrastructure needs in growth areas of the city.

Task 6-1 Subbasin Delineation

Activities BC will use available GIS data of the City's current basin and subbasin delineations, developed for the 2012 SMP, and refine and delineate subbasins based on proposed model extents.

Subbasin size may vary per the extent of the mapped public stormwater system and anticipated hydraulic modeling needs. Subbasins may extend outside of the city limits to account for contributing areas, but detailed delineation in areas outside of the city limits and/or UGB is not anticipated.

Task 6-2 Hydrologic Model Development

Activities BC will develop an updated hydrology model based on the updated land use and impervious coverage information identified in Task 3-6. Updated system hydrology will include review and refinement of flow length and slope values, catchment widths, soils, and infiltration assumptions based on refined subbasin delineations, GIS, aerial imagery, and land use coverage.

For areas outside of the current City limits where growth and/or future annexation is anticipated, system hydrology (flow projections) will be developed to support future financial evaluations and system development charge (SDC) calculations.

Task 6-3 Hydraulic Model Updates

Activities

In accordance with modeling extents and methods developed under Phase 4, InfoSWMM hydraulic model updates will be conducted in conjunction with current GIS and LIDAR and may include revised invert and rim elevations, the addition of public improvements, and the incorporation of channel cross-sections and any new field survey information.

For areas outside of the current City limits where growth and/or future annexation is pending (i.e., Concept Planning Areas), system hydraulic updates will be incorporated based on available GIS of proposed system improvements, survey (as needed) and additional feedback from the City during Workshop 1, consistent with the established modeling approach per Phase 4.

QA/QC of the model will be conducted.

Task 6-4 Model Validation

Activities

Existing-conditions models developed under Tasks 6-2 and 6-3 will be used to simulate flows from up to two real-time storm events for model validation. Model validation efforts to compare model results against anecdotal data provided by the city will be conducted as information is available.

Best professional judgement will be used to adjust model input parameters to best match observed flow conditions. Hydrologic model adjustments will be limited to ranges identified in the modeling methods and assumptions document (TM#2). Results of the validation process will be discussed with City staff during a conference call to confirm acceptance of model adjustments.

Adjustments to input parameters will be applied city wide such that hydrologic input utilize the same means and methods across the city.

Task 6-5 System Evaluation and Documentation

Activities

BC will simulate flows associated with the Water Quality, 2-, 10-, and 25-year, 24-hour design storms with the validated model developed under Task 6-4.

Based on performance criteria established under Phase 2, BC will use the hydraulic model to analyze the functionality of the existing stormwater system to convey both current and future predicted flows. Capacity limited areas will be identified on the Problem Area and Project Opportunity Matrix for potential capital project development under Phase 8.

Capacity deficiencies will be presented to city staff during a scheduled project coordination call. Basin maps will be developed to summarize results of the modeling analysis for discussion with the City.

BC will prepare a TM (TM#3) at the beginning of Phase 6, outlining modeling methods including the modeling platform, hydrologic modeling assumptions and proposed revisions (per the City's 2012 InfoSWMM model, as applicable), hydraulic design criteria, and approach to model validation. TM#3 will be updated to include model results, including tabulated hydrologic and hydraulic model results to facilitate QA/QC of modeling results.

Task 6-6 Hydraulic Model Conversion and 2-D Model Evaluation (Optional)

Activities

The City's existing InfoSWMM hydraulic model will be converted to the XPSWMM model platform to support 1-D and 2-D model evaluations for targeted areas of the stormwater system.

BC will evaluate select areas of the City using 2-D modeling capabilities. The evaluation will include establishment of flooding extents, determination of water surface depths across the inundated areas, identify the source location of flooding, and confirm velocity fields across the 2-D modeled area and flow paths of inundated areas.

Phase 6 Deliverables

The following deliverables will be provided under Phase 6:

- GIS shapefiles documenting the updated subbasin delineations.
- Basin maps indicating projected capacity deficiencies, including locations that may be considered for project development efforts.
- Draft and final TM#3, documenting modeling methods and results of Phase 6 efforts including tabular documentation of existing and future flows.
- A working Problem Area and Project Opportunity Matrix summarizing capital project needs for development under Phase 8.

Phase 6 Assumptions

The following assumptions are made for Phase 6:

- Where survey data are not available, BC will incorporate assumed data from LIDAR, rough field measurements, engineering judgement (as appropriate) or other sources and document the modeling assumptions.
- The hydraulic model updates will be focused on pipes that are 18 inches in diameter and greater and will not include smaller pipes and laterals. Validated (as information is available) hydrologic and hydraulic (H/H) models will be provided at the conclusion of the project as a deliverable.
- 40 hours total are allotted in the budget for Task 6-1 for updating and expanding the subbasin delineations. This effort assumes boundaries from the previous plan are currently available in GIS.
- 92 hours total are allotted in the budget for Task 6-2 for hydrologic model development and QAQC, which assumes consistent hydrologic and infiltration methodology per the 2012 SMP is used.
- 116 hours total are allotted for hydraulic model updates and QAQC. The inclusion of any additional public detention facilities and the subsequent review of drainage reports/ as-builts to support inclusion into the hydraulic model is budgeted under this task.
- Detention pond additions/ retrofit needs will be included in the Problem Area Matrix developed under Task 4-1 and verified under Phase 7.
- As-built information as well as stage-storage-discharge information will be provided by the City for public detention facilities added to the hydraulic model.
- Validation efforts under Task 6-4 will be limited to comparing existing-conditions model results for up to two rainfall events. Anecdotal information, photos, flow measurements and rainfall data will be provided by the City, as available, for use in model validation. A total of 36 hours has been allocated to the model validation effort.

- BC will present initial model results to City staff during a scheduled coordination call. As applicable, BC will work with the City to identify whether additional 2-D modeling might be desirable for capital project development.
- Modeling methods will maintain consistency with the 2012 SMP. Any deviations from methods outlined in the 2012 SMP will be identified and discussed with the City during a monthly coordination call.
- TM#3 will include both a summary of modeling methods per the 2012 SMP, any modeling method deviations, and modeling results and be provided to the City for review and comment. City comments not affecting technical or project related assumptions will be addressed when the TM is incorporated into the master plan.
- The City will provide BC with one consolidated set of comments on the draft TM#3.
- Hydraulic model updates will maintain consistent nomenclature per the existing InfoSWMM model and 2012 SMP. Model nomenclature refers City's GIS IDs.
- The budget for Task 6-6 reflects hydraulic model conversion to XPSWMM and up to 40 hours of staff time developing 2-D hydraulic models for targeted areas of the City. Task 6-6 will be initiated at the request of the City prior to work beginning under Phase 6, and based on outcomes from Phase 4 and 5.

Phase 7 Retrofit Analysis

Objective To evaluate stormwater retrofit opportunities to address water quality and/or flow control needs within existing development and future growth areas.

Activities BC will assess the City's storm system layout to identify public retrofit project opportunities to supplement the City's 2015 Retrofit Assessment and address areas of growth and redevelopment. This analysis will consider the configuration of the public conveyance system to evaluate constraints and opportunity areas. Activities include the following:

- Review recent TMDL benchmark, wasteload allocation attainment and retrofit assessment results to confirm high pollutant loading areas and water quality planning needs.
- Identify opportunities to integrate water quality in conjunction with results of the problem area identification (Phase 3) and system assessment (Phase 5) efforts.
- Evaluate the Memorial Park/ Library Detention Pond to confirm existing drainage area and additional capacity and expansion potential.
- Review existing public detention and water quality facility locations to confirm expansion potential to serve as a regional facility and support development of a fee-in-lieu program.
- Assess utility and transportation conceptual layouts in planning areas to assess collection system and potential regional facility placement opportunities in conjunction with Phase 8.
- Evaluate programmatic opportunities to incorporate water quality facility installation or maintenance on an annual basis.

The assessment methods and identified project and programmatic opportunities, and recommended prioritization considerations will be documented in TM#3: Retrofit Analysis.

Phase 7 Deliverables

The following deliverables will be provided under Phase 7:

- Map identifying retrofit opportunities for existing development and future growth areas.
- Updated TM#1, documenting results of Phase 7 efforts.

Phase 7 Assumptions

The following assumptions are made for Phase 7:

- Water quality and flow control facility sizing will utilize the City's BMP sizing tool or InfoSWMM/ XPSWMM hydraulic model, depending on the size of the contributing drainage area.
- Modeling analysis to support conceptual design of retrofits will be evaluated under Phase 8.
- Calculation of SDC/ fee in lieu eligibility will be conducted only for capital projects with cost estimates as developed in Phase 8.

Phase 8 Capital Project Development

Objective To define the highest priority capital project needs for conceptual project development, cost estimation, and fact sheet development as part of the SMP.

Task 8-1 Project Opportunities Matrix

The Problem Area and Project Opportunity Matrix developed under Phase 4 will be updated to comprehensively summarize project and programmatic needs stemming from the stream survey (Task 5-1), system evaluation (Phase 6), and retrofit analysis (Phase 7). Potential project strategies will be documented, which may include pipe replacement, enhanced maintenance, water quality treatment, detention/retention facility installation or modification, flow routing modifications, stream enhancement and infrastructure installation.

Task 8-2 Workshop 2: CIP Opportunities

Activities BC will facilitate a 3-hour CIP Workshop with the City to review the Project Opportunities Matrix and discuss the City's goals and expectations for capital project and programmatic needs. Preliminary project alternatives and concepts will be discussed and reviewed.

BC will discuss options (project versus programmatic activity) to address areas of more frequent maintenance needs, continued repair and replacement needs, or where a one-time project or structural solution may not be relevant. Programmatic needs may also reflect locations where routine or ongoing monitoring is required. Confirmed programmatic activities will be reflected on the Matrix.

During the Workshop, emphasis will be placed on the prioritization of areas for capital project development. Preliminary project prioritization criteria will be presented to assist staff in defining whether an area or deficiency requires immediate resolution (highest priority/ 0-5 year timeframe), whether it is a lesser priority but still should be documented (medium priority/ 6-10 year timeframe), longer term need (lower priority/ 11-20 year timeframe), or whether it is no longer an issue or need as part of a capital improvement program. This initial project prioritization will be reflected in a matrix. The highest priority project locations/concepts will be selected for detailed cost estimation under Task 8-4.

Following the workshop, BC will prepare an updated Project Opportunities Matrix to summarize key results and decisions from the Workshop and reflect priority project locations for development of detailed costs and mapping.

Task 8-3 Capital Project Model Development

Activities Using future condition flows estimated under Phase 6, BC will hydraulically evaluate capital project needs and sizing for select areas of existing system capacity deficiencies, detention/ retrofit needs, and concept planning areas requiring new infrastructure. Alternatives will be identified and discussed with City staff to inform preferred capital project options.

Analysis may use InfoSWMM or XPSWMM (as applicable), the BMP Sizing Tool, or other hydraulic modeling platform. Strategies may include retrofit of existing water quality or detention ponds, installation of storage facilities, pipe upsizing and/ or reconfiguration, open channel enhancements, and new pipe sizing.

Task 8-4 Capital Project Cost Estimation and Documentation

Activities

Using recent bid tab information, RS Means, and City-specific cost information, BC will prepare planning level unit cost tables for applicable capital project design components and features for City review and feedback. Planning-level cost estimates will include construction, engineering, administration, and contingencies.

Annualized maintenance costs will be identified in terms of staffing resources, based on information collected in Phase 3. Current system maintenance activities and asset inventory will also be used to refine programmatic recommendations and annual costs.

In conjunction with the planning level cost estimates, BC will prepare an estimate of the percent of the total project cost that could potentially be attributed to future development impacts to support SDC evaluations.

The capital project design concepts (to approximately a 10 percent level of design) and the planning-level cost estimates will be incorporated into a Stormwater Capital Improvement Summary matrix (CIP Outlay), providing design information for up to 15 individual project needs. Comprehensive map(s) will be developed to show capital project locations and design features.

Task 8-5 Project Prioritization

Activities

BC will work with the City to refine the preliminary prioritization criteria and scoring metrics presented in Task 8-2, in order to develop an automated and adjustable prioritization tool to support City scheduling of capital project implementation over a 20-year planning period. Activities include the following:

- Development of a simple spreadsheet project prioritization tool, criteria, and scoring mechanism to evaluate and rank projects.
- Presentation (during a regular coordination call) of the prioritization process and tool and to obtain feedback.
- Address City comments on the prioritization matrix and tool and document the prioritization of projects for inclusion in the master plan.
- Assist in developing a CIP implementation schedule based on project prioritization and costs.

Capital projects will be scheduled as either high priority, medium priority, or low priority in conjunction with schedule. Project prioritization and schedule will be incorporated in the Stormwater Capital Improvement Summary matrix.

Phase 8 Deliverables

The following deliverables are included under Phase 8:

- Updated Project Opportunities matrix, reflecting outcomes from Phase 5, 6 and 7, including selection of priority project locations for capital project development under Task 8-3 and 8-4.
- Agenda and workshop meeting materials for Workshop 2.
- Attendance and facilitation by three BC staff at a 3-hour workshop with the City.
- Draft and final unit cost table

- A Stormwater Capital Improvement Summary Matrix reflecting planning-level cost estimates.
- Schedule for capital project implementation in accordance with Task 8-5.
- Up to five map(s) identifying capital project locations and design features.

Phase 8 Assumptions

The following assumptions are made for Phase 8:

- Due to the unknown scope and scale of this work, 84 hours of staff engineer time and 60 hours of senior engineer time for modeling support and QA/QC has been budgeted to model project alternatives and establish system sizing under Task 8-3.
- BC will prepare an agenda and workshop meeting materials for City review prior to Workshop 2. City staff will coordinate logistics for the workshop, including securing a meeting location, establishing a meeting date and time, and inviting appropriate City staff.
- Approximately 15 capital project planning-level cost estimates will be developed under Task 8-4. Lesser priority capital project needs may be maintained on the Stormwater Capital Improvement Summary matrix at the City's request.
- The City will provide one consolidated set of comments on the Project Opportunities Matrix at the conclusion of Task 8-2, including confirmation of priority project locations for development under Task 8-3 and 8-4.
- If programmatic activities (i.e., ongoing or annual city-wide maintenance programs, pilot programs, etc.) are selected to address system deficiencies, these programs will solely be referenced in the Stormwater Capital Improvement Summary Matrix (not as a fact sheet) and as a separate section of the SMP. Annual cost estimates will be provided.
- The City will provide one consolidated set of comments on the planning level cost estimates.
- Unit costs will be based on RS Means, recent master planning level costs compiled by BC and any City-provided bid tabs.

Phase 9 Stormwater Master Plan (SMP) Preparation

Objective Develop an approved City-wide stormwater master plan to guide capital project development during the next 20 years.

Task 9-1 Draft SMP Development

Activities BC will prepare a draft SMP, compiling the highlights of information and documentation (TMs) prepared under Phases 2 through 8. General system maps and narrative reflecting the City's stormwater conveyance system, identified system capacity deficiencies, water quality project needs (as appropriate) and capital project locations will be summarized.

Detailed technical information, such as tabular modeling data, TMs, and cost estimates, will be included as technical appendices, as appropriate.

A graphical executive summary with mapping, call-outs, schedule, etc. will be prepared for ready distribution to the public, summarizing goals and objectives and technical outcomes.

BC will conduct an internal QA/QC of the draft Stormwater Master Plan.

A draft digital copy will be provided to the City for review and comment.

Task 9-2 Draft Final and Final SMP Development

Activities

City comments provided under Task 8-1 will be incorporated to create a draft-final SMP for City Council review and comment. An Executive Summary will highlight the major findings and recommendations from the Draft Stormwater Master Plan. A draft-final SMP in digital format will be provided to the City for review and comment by City Council.

City comments on the draft-final SMP will be incorporated to create a final SMP. Three hard copies of the final SMP, including appendices, will be provided. A print and Web-ready, searchable electronic version of the final SMP will also be provided to the City.

Phase 9 Deliverables

The following deliverables are included under Phase 9:

- Draft SMP (in .doc format) for City review and comment
- Draft-Final SMP (in .pdf format) for Council review and comment
- Final SMP (in .pdf format) and three full hard copies
- Electronic copies of project GIS data, models and the SMP. Editable .doc versions will be provided for unstamped documentation.

Phase 9 Assumptions

The following assumptions are made for Phase 9:

- One consolidated set of City and stakeholder review comments on the draft SMP will be provided to BC.
- One consolidated set of City comments on the draft-final SMP will be provided to BC.
- The City will be responsible for additional stakeholder coordination efforts, aside from the scoped public meetings and open houses (see Phase 10).
- The client is responsible for hosting and maintaining all GIS or non-GIS contents (e.g. documents, pictures, videos) on a web server and providing valid URLs.

Phase 10 Public Outreach and Stakeholder Participation

Objective

Implement public engagement and outreach activities in accordance with tools and forums identified in the documented Public Engagement Plan (PEP). Prepare for and participate in two Virtual Open Houses and up to seven public meetings (Planning Commission, City Council)

Task 10-1 Public Engagement Plan (PEP) Implementation

Activities

Barney and Worth (B&W) will provide public engagement efforts for the Stormwater Master Plan, in conjunction with strategies outlined the PEP. Activities will include:

- Development of a one-page public engagement plan (PEP) to identify key stakeholders and outline communication needs in conjunction with the project schedule. Draft presentation of the PEP will occur at the project kickoff meeting; the final PEP will reflect messaging and talking points confirmed with City staff during a coordination call.
- Collaboration on City Council and Planning Committee meeting materials throughout the project duration.
- Support for development of external survey questions and follow up analysis and reporting (in accordance with Task 3-4).
- Provide Spanish language translation for survey questions and Virtual Open House content.

Task 10-2 Virtual Open House

Activities

BC and B&W will coordinate with City staff and prepare materials to support two, static virtual open houses in order to present project status information, FAQs, and solicit information from the public related to the project scope and activities. Technical content to be outlined in the PEP. Tentative open house objectives are as follows:

- Open House #1 – Purpose is to educate and learn about the community's values related to stormwater management. These values will help inform messaging for the stormwater master plan. Introduce external survey to assess desired levels of service.
- Open House #2– Purpose is to provide a status update on the project to the public and solicit community feedback related to capital project development efforts.

Task 10-3 Public Meeting Preparation and Attendance

Activities

BC will prepare up to three presentations for use during public meetings, using graphics and narrative developed under Phases 4 through 8. Presentations will outline the SMP goals, objectives, planning process, and capital project/ program recommendations.

One BC staff will attend and present at up to two planning commission meetings, accompanied by City staff. Two BC staff will attend and present at up to three City Council meetings, accompanied by City staff.

Phase 10 Deliverables

The following deliverables are included under Phase 10:

- Draft and final Public Engagement Plan, reflecting messaging and talking points discussed and vetted with BC and City staff.
- Web content development, attendance and facilitation at up to two Virtual Open Houses. Web content to include Spanish translation (up to $1,500).
- Presentation materials (up to two) for City Council and Planning Commission Meetings (PowerPoints, graphics, messaging)
- BC attendance and presentation at up to five public meetings

Phase 10 Assumptions

The following assumptions are made for Phase 10:

- City staff will support efforts to promote the Virtual Open Houses including development of promotional materials and posting on the City social media sites, providing access to interested parties email lists, etc.
- City staff to develop articles for the Boones Ferry Messenger based on content developed for the Virtual Open Houses.
- Virtual Open Houses will be hosted on https://www.letstalkwilsonville.com/ and City staff will be the technical lead to launch and manage Virtual Open Houses.
- Consultant team will have access to external survey results from Virtual Open Houses (Letstalkwilsonville/Bangthetable).
- B&W will facilitate the Virtual Open Houses; no live presentation
- One BC staff will be in attendance and present at up to two Planning Commission meetings; two BC staff will be in attendance and present at up to three City Council meetings.
- Presentation content will be repeated between the Virtual Open Houses, Planning Commission Meetings, and City Council Meetings. Up to two presentation documents will be developed in PowerPoint and Prezzi format and provided to the City in advance of the work session or meeting.

Brown and Caldwell

Budget

November 20, 2020

Wilsonville, City of (OR) -- Wilsonville Stormwater Master Plan

Phase	Phase Description	Wieland, Angela M	Eldon, Miranda	Retzlaff, Ryan C	Glass, Michael R	Bell, Janice	Suesser, Thomas	Christofferson, Jessica L	Reininga, Krista	Richardson, Angela M	Kansakar, Pratistha	Persson, Douglas R	Rowe, Jessica A	Weaver, Anton M	Molseed, Arthur C	Wilson, Joanna B	Pare, Wendy M	Total Labor Hours	Total Labor Effort	Expenses	Waterways Cost	Barney and Worth Cost	Weddle Cost	Total Sub Cost	Total Expense	Total Effort
		PM	PA																							
		$234	$98	$198	$128	$171	$112	$198	$270	$171	$147	$171	$171	$128	$270	$98	$128									
001	**Project Management**	124	44	22	12	0	4	0	0	0	0	0	0	0	2	24	0	**232**	**42,560**	0	0	0	0	**0**	**0**	**42,560**
001	Project Administration	70	44	0	4	0	4	0	0	0	0	0	0	0	2	24	0	**148**	24,544	**0**	**0**	**0**	**0**	**0**	**0**	**24,544**
002	Project Coordination Meetings	48	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	**64**	14,400	**0**	**0**	**0**	**0**	**0**	**0**	**14,400**
003	Project Kickoff Workshop	6	0	6	8	0	0	0	0	0	0	0	0	0	0	0	0	**20**	3,616	**0**	**0**	**0**	**0**	**0**	**0**	**3,616**
002	**Stormwater Code and Policy Review**	24	0	0	6	0	0	0	4	0	0	0	0	0	0	0	3	**37**	**7,848**	0	0	0	0	**0**	**0**	**7,848**
001	Stormwater Code and Policy Review	24	0	0	6	0	0	0	4	0	0	0	0	0	0	0	3	**37**	7,848	0	**0**	**0**	**0**	**0**	**0**	**7,848**
003	**Data Compilation, Characterization**	54	4	60	150	13	16	0	0	8	0	0	0	0	0	0	2	**307**	**49,747**	300	0	1,440	0	**1,440**	**1,812**	**51,559**
001	GIS Data Comp, Model Rvw, Mapping	10	0	10	76	5	0	0	0	0	0	0	0	0	0	0	0	**101**	14,903	0	**0**	**0**	**0**	**0**	**0**	**14,903**
002	Documentation, Problem Area ID	10	0	12	34	6	8	0	0	8	0	0	0	0	0	0	0	**78**	12,358	0	**0**	**0**	**0**	**0**	**0**	**12,358**
003	Maintenance Activities Review	4	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	**12**	1,832	0	**0**	**0**	**0**	**0**	**0**	**1,832**
004	Surveys and Staff Interviews	20	0	12	4	2	0	0	0	0	0	0	0	0	0	0	2	**40**	8,166	0	**0**	**1,440**	**0**	**1,440**	**1,512**	**9,678**
005	Site Visits	2	4	26	28	0	0	0	0	0	0	0	0	0	0	0	0	**60**	9,592	300	**0**	**0**	**0**	**0**	**300**	**9,892**
006	Land Use Impervious Assumptions	8	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	**16**	2,896	**0**	**0**	**0**	**0**	**0**	**0**	**2,896**
004	**Project Planning**	22	0	18	50	10	0	0	4	2	0	0	0	0	0	0	6	**112**	**19,012**	**0**	0	0	0	**0**	**0**	**19,012**
001	Workshop 1	12	0	8	12	0	0	0	0	0	0	0	0	0	0	0	2	**34**	6,184	**0**	**0**	**0**	**0**	**0**	**0**	**6,184**
002	Documentation	10	0	10	38	10	0	0	4	2	0	0	0	0	0	0	4	**78**	12,828	**0**	**0**	**0**	**0**	**0**	**0**	**12,828**
005	**Stream Survey and Data Collection**	6	0	0	4	8	0	0	0	0	0	0	0	0	0	0	2	**20**	**3,540**	**0**	20,300	0	0	**20,300**	**21,315**	**24,855**
001	Stream Survey	6	0	0	4	8	0	0	0	0	0	0	0	0	0	0	2	**20**	3,540	**0**	**20,300**	**0**	**0**	**20,300**	**21,315**	**24,855**
006	**System Assessment**	44	0	74	278	42	46	0	4	0	20	0	0	0	0	0	8	**516**	**77,910**	**0**	0	0	0	**0**	**0**	**77,910**
001	Subbasin Delineation	2	0	6	2	2	30	0	0	0	0	0	0	0	0	0	0	**42**	5,614	**0**	**0**	**0**	**0**	**0**	**0**	**5,614**
002	Hydrologic Model Development	4	0	16	40	8	16	0	0	0	8	0	0	0	0	0	0	**92**	13,560	0	**0**	**0**	**0**	**0**	**0**	**13,560**
003	Hydraulic Model Updates	4	0	8	88	8	0	0	0	0	8	0	0	0	0	0	0	**116**	16,328	0	**0**	**0**	**0**	**0**	**0**	**16,328**
004	Model Validation	4	0	8	24	0	0	0	0	0	4	0	0	0	0	0	0	**40**	6,180	0	**0**	**0**	**0**	**0**	**0**	**6,180**
005	System Evaluation and Documentation	30	0	36	124	24	0	0	4	0	0	0	0	0	0	0	8	**226**	36,228	**0**	**0**	**0**	**0**	**0**	**0**	**36,228**
007	**Retrofit Analysis, Fee-in-Lieu**	16	0	14	28	0	0	36	2	0	0	0	0	0	0	0	2	**98**	**18,024**	**0**	0	0	0	**0**	**0**	**18,024**
001	Retrofit Analysis, Fee-in-Lieu	16	0	14	28	0	0	36	2	0	0	0	0	0	0	0	2	**98**	18,024	**0**	**0**	**0**	**0**	**0**	**0**	**18,024**
008	**Capital Project Development**	82	0	80	256	28	0	0	8	0	8	0	0	0	0	0	10	**472**	**77,200**	**0**	2,920	0	0	**2,920**	**3,066**	**80,266**
001	Project Opportunities Matrix	4	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	**20**	3,544	**0**	**0**	**0**	**0**	**0**	**0**	**3,544**
002	Workshop 2: CIP Opportunities	12	0	12	16	0	0	0	0	0	0	0	0	0	0	0	0	**40**	7,232	**0**	**0**	**0**	**0**	**0**	**0**	**7,232**
003	Capital Project Model Development	16	0	32	84	20	0	0	0	0	8	0	0	0	0	0	0	**160**	25,428	**0**	**2,920**	**0**	**0**	**2,920**	**3,066**	**28,494**
004	CIP Cost Estimate, Documentation	34	0	28	148	8	0	0	0	0	0	0	0	0	0	0	10	**228**	35,092	**0**	**0**	**0**	**0**	**0**	**0**	**35,092**
005	Project Prioritization	16	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	**24**	5,904	**0**	**0**	**0**	**0**	**0**	**0**	**5,904**
009	**Stormwater Master Plan Devel**	40	0	8	88	8	24	0	8	0	0	0	28	12	0	0	26	**242**	**38,076**	0	0	0	0	**0**	**100**	**38,176**
001	Draft SMP Development	24	0	8	60	8	24	0	8	0	0	0	28	12	0	0	12	**184**	28,956	0	**0**	**0**	**0**	**0**	**0**	**28,956**
002	Draft Final and Final SMP Devel	16	0	0	28	0	0	0	0	0	0	0	0	0	0	0	14	**58**	9,120	100	**0**	**0**	**0**	**0**	**100**	**9,220**
010	**Public Outreach**	46	0	24	12	0	0	0	0	0	0	0	0	0	0	0	6	**88**	**17,820**	**150**	0	15,015	0	**15,015**	**15,916**	**33,736**
001	Public Engagement Plan Implement	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**	1,404	**0**	**0**	**15,015**	**0**	**15,015**	**15,766**	**17,170**
002	Virtual Open House	8	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	**20**	3,408	**0**	**0**	**0**	**0**	**0**	**0**	**3,408**
003	Public Meetings	32	0	24	0	0	0	0	0	0	0	0	0	0	0	0	6	**62**	13,008	**150**	**0**	**0**	**0**	**0**	**150**	**13,158**
	CORE TOTAL	**458**	**48**	**300**	**884**	**109**	**90**	**36**	**30**	**10**	**28**	**0**	**28**	**12**	**2**	**24**	**65**	**2,124**	**351,737**	**450**	**23,220**	**16,455**	**0**	**39,675**	**42,209**	**393,946**
	OPTIONAL TASKS																									
005	**Stream Survey and Data Collection**	0	0	4	16	4	0	0	0	0	0	0	0	0	0	0	0	**24**	**3,524**	**0**	10,720	0	10,000	**20,720**	**21,756**	**25,280**
002	Open Channel Data Collection	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	**8**	1,196	**0**	**10,720**	**0**	**0**	**10,720**	**11,256**	**12,452**
003	Pipe System Data Collection (Opt)	0	0	4	12	0	0	0	0	0	0	0	0	0	0	0	0	**16**	2,328	**0**	**0**	**0**	**10,000**	**10,000**	**10,500**	**12,828**
006	**System Assessment**	0	0	40	0	0	0	0	0	0	8	40	0	0	0	0	0	**88**	**15,936**	**0**	0	0	0	**0**	**0**	**15,936**
006	2D Model Evaluation (Opt)	0	0	40	0	0	0	0	0	0	8	40	0	0	0	0	0	**88**	15,936	**0**	**0**	**0**	**0**	**0**	**0**	**15,936**
	OPTIONAL TOTAL	**0**	**0**	**44**	**16**	**4**	**0**	**0**	**0**	**0**	**8**	**40**	**0**	**0**	**0**	**0**	**0**	**112**	**19,460**	**0**	**10,720**	**0**	**10,000**	**20,720**	**21,756**	**41,216**
	PROJECT TOTAL	**458**	**48**	**344**	**900**	**113**	**90**	**36**	**30**	**10**	**36**	**40**	**28**	**12**	**2**	**24**	**65**	**2,236**	**371,197**	**450**	**33,940**	**16,455**	**10,000**	**60,395**	**63,965**	**435,162**

Hours and Dollars are rounded to nearest whole number.
Subconsultants subject to a 5% markup.

STORMWATER MASTER PLAN UPDATE CONSULTANT SELECTION AND CONTRACT AWARD

City Council Work Session
January 4, 2021

Khoi Le – Development Engineering Manager
Kerry Rappold – Natural Resources Manager

STORMWATER MASTER PLAN UPDATE
CONSULTANT SELECTION AND CONTRACT AWARD

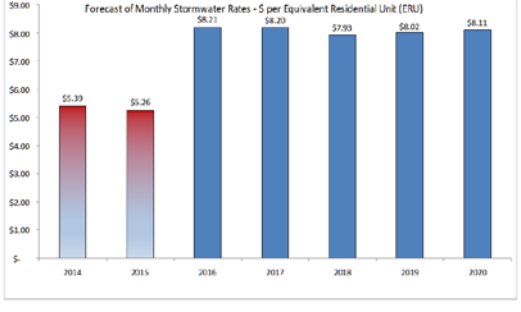
- **Last Update:**
  - ✓ March 2012

- **Purposes:**
  - ✓ Address new EPA/DEQ requirements
  - ✓ Include new annexed areas
  - ✓ Develop new and prioritize Capital Improvement Projects
  - ✓ Prepare for new rate study

DEQ
State of Oregon
Department of
Environmental
Quality

Preliminary Rate Forecast – Case 1.A

Issue Revenue Bond & Interfund Loan for CIP (years 1-5)



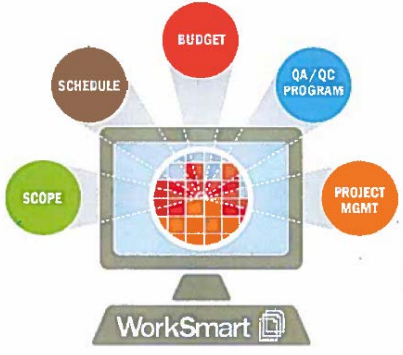
WILSONVILLE
OREGON

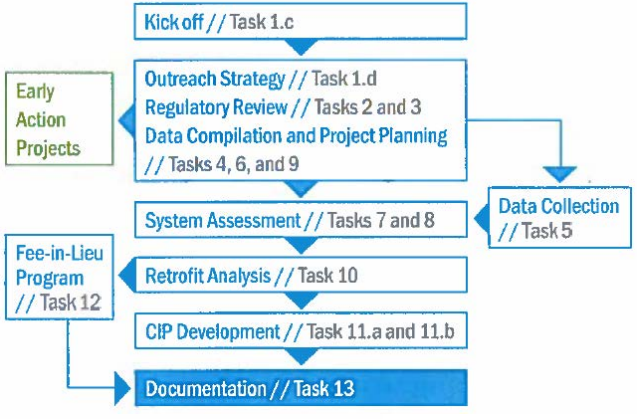
STORMWATER MASTER PLAN UPDATE
CONSULTANT SELECTION AND CONTRACT AWARD

- **Consultant Selected:**
  - ✓ Brown & Caldwell

- **Knowledge and Experience:**
  - ✓ Have worked on 15 Stormwater Plans since 2012
  - ✓ Wilsonville experience and knowledge: working on Wilsonville MS4 Permit
  - ✓ Innovative proposal
  - ✓ Met Wilsonville's approved budget and anticipated timeline

- **Contract Award:**
  - ✓ $393,946





QUESTIONS?

City Council Meeting Action Minutes
January 4, 2021

City Council members present included:
Mayor Fitzgerald
Council President Akervall
Councilor Lehan
Councilor West
Councilor Linville

Staff present included:
Bryan Cosgrove, City Manager
Barbara Jacobson, City Attorney
Kimberly Veliz, City Recorder
Jeanna Troha, Assistant City Manager
Beth Wolf, Senior Systems Analyst
Andy Stone, IT Director
Khoi Le, Development Engineering Manager
Kerry Rappold, Natural Resources Manager
Mark Ottenad, Public/Government Affairs Director
Fred Weinhouse, Municipal Court Judge

AGENDA ITEM	ACTIONS
WORK SESSION	**START:** 5:06 p.m.
A. Emergency Declaration Update	Council was briefed on Resolution No. 2870, which further extends the local state of emergency.
B. Stormwater Master Plan Contract Award	Staff informed Council of Resolution No. 2848. The resolution authorizes the City Manager to execute a professional services agreement with Brown and Caldwell to provide engineering consulting services for the Stormwater Master Plan update.
C. City Council Representation to Regional and State Intergovernmental Boards and Committee Representation Assignments-Introduction.	Council made initial determinations as to who would serve as primary and alternative representatives on the State and regional boards for which the City is represented.
REGULAR MEETING	
Swearing In Ceremony	The honorable Judge Weinhouse swore in Mayor Fitzgerald along with Councilors Akervall and Linville.
Mayor's Business A. Elect City Council President	Council re-elected Councilor Akervall to the position of Council President. Passed 4-0-1.
B. Upcoming Meetings	Because of the Martin Luther King Jr. Holiday, the next Council meeting is scheduled to be held on Thursday, January 21, 2021.
Communications A. None.	

Consent Agenda A. **Resolution No. 2848** A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Professional Services Agreement With Brown And Caldwell To Provide Engineering Consulting Services For The Stormwater Master Plan Update Project (Capital Improvement Project #7064). B. **Resolution No. 2862** A Resolution Of The City Of Wilsonville Authorizing The City Manager To Execute A Professional Services Agreement With Keller Associates, Inc. To Provide Engineering Consulting Services For The Elligsen Well Facility Rehab And Upgrades Project (Capital Improvement Project #1083). C. **Resolution No. 2870** A Resolution And Order Amending Resolution No. 2864 To Further Extend The Local State Of Emergency And Emergency Measures, As Authorized By Resolution No. 2803. D. Minutes of the December 7, 2020 City Council Meeting.	The Consent Agenda was approved 5-0.
New Business A. None.	
Continuing Business A. Boards & Commission Appointment	**Development Review Board (Staff to Assign Panel)** Appointment of Jami Arbon to the Development Review Board for a term beginning 1/5/2021 to 12/ 31/2022. Passed 4-1.
Public Hearing A. None.	
City Manager's Business	Wished Council a happy New Year. Encouraged all to get a COVID vaccination. Reminded Council that they are scheduled to present at the next Citizens Academy.
Legal Business A. **Resolution No. 2869** A Resolution Relating To Stipends And Compensation For The Mayor And City Councilors, And Repealing Resolution No. 2360.	Informed the Council that Resolution No. 2869, which was voted on at the December 21, 2020 Council meeting, passed 2-1-2.
ADJOURN	8:07 p.m.

Survey

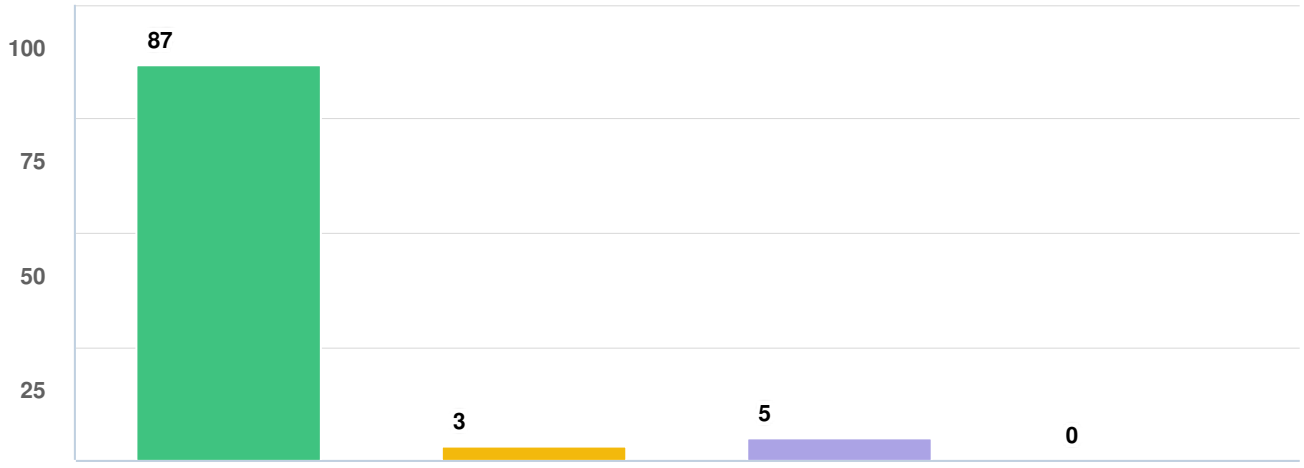
SURVEY RESPONSE REPORT

19 July 2019 - 17 May 2021

PROJECT NAME:
Stormwater Master Plan Update

SURVEY QUESTIONS

Q1 Which describes you (check all that apply):

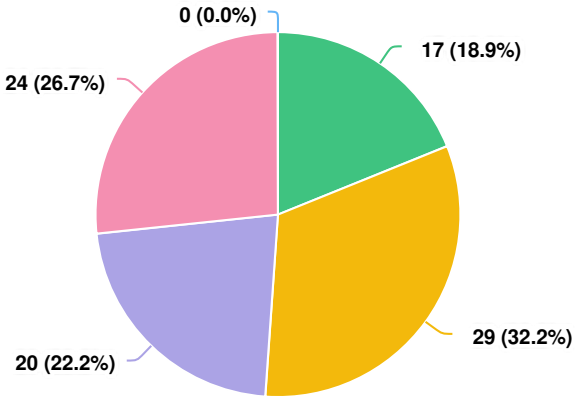


Question options

Residential customer | Business customer | I live in Wilsonville, but do not directly pay a bill | I don't live in Wilsonville

Mandatory Question (90 response(s))
Question type: Checkbox Question

Q2 How long have you lived or worked in Wilsonville?

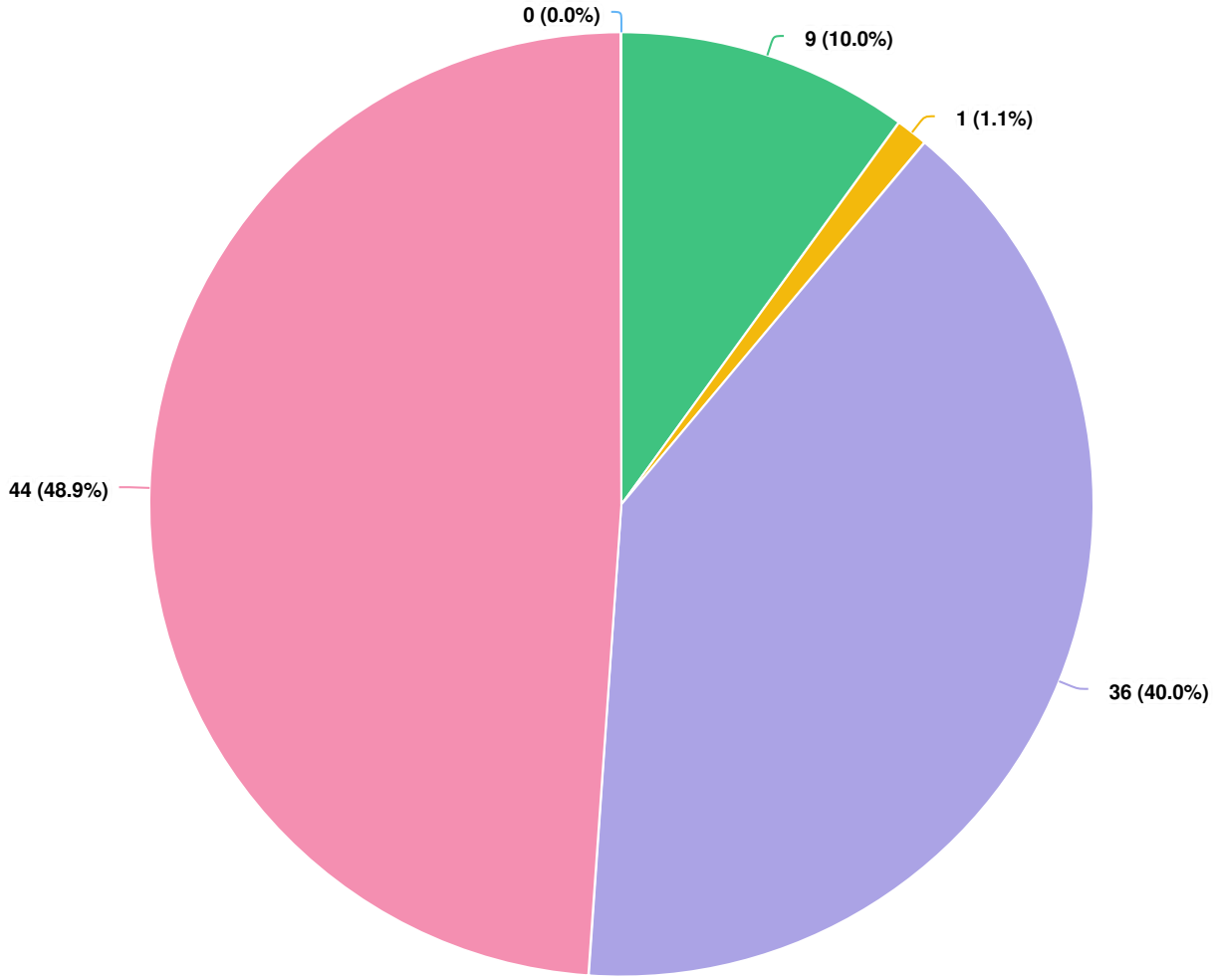


Question options

1-3 years | 3-10 years | 10-20 years | More than 20 years | I don't work or live in Wilsonville

Mandatory Question (90 response(s))
Question type: Radio Button Question

Q3 In which area do you reside or conduct business?

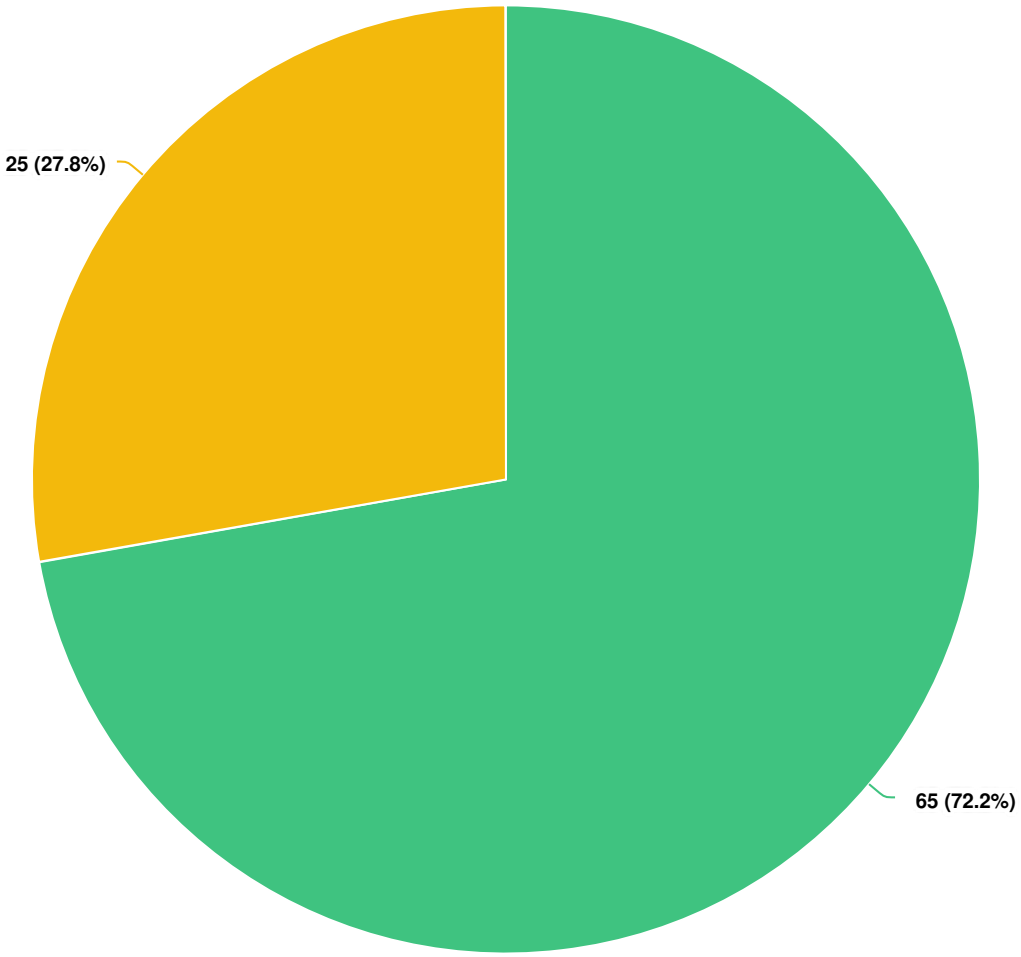


Question options

Charbonneau Riverfront East of I-5 (not riverfront) West of I-5 (not riverfront) Other (please specify)

Mandatory Question (90 response(s))
Question type: Radio Button Question

Q4 Do you live near a wetland, stream, or river?

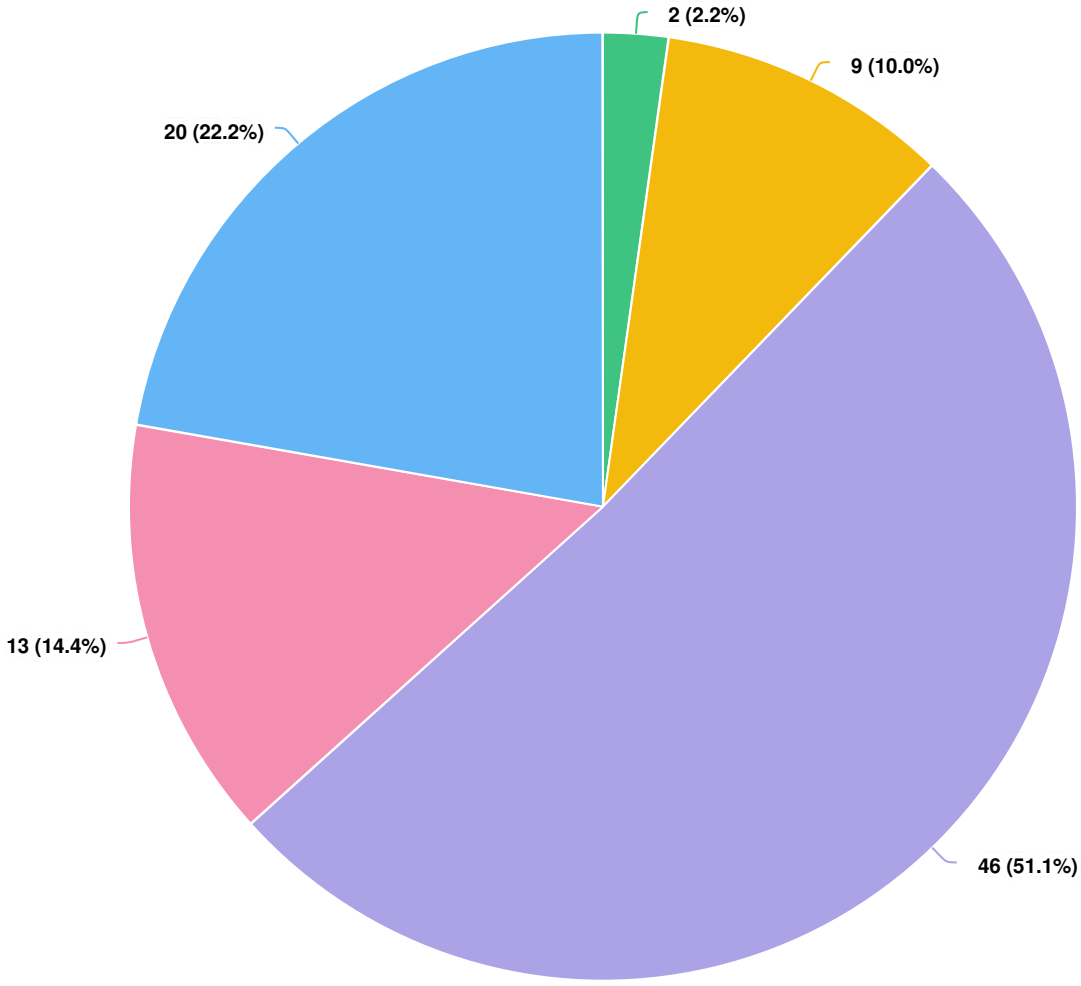


Question options

Yes No

Mandatory Question (90 response(s))
Question type: Radio Button Question

Q5 **To the best of your knowledge, overall water quality of wetlands, streams, and rivers where you reside or conduct business is:**

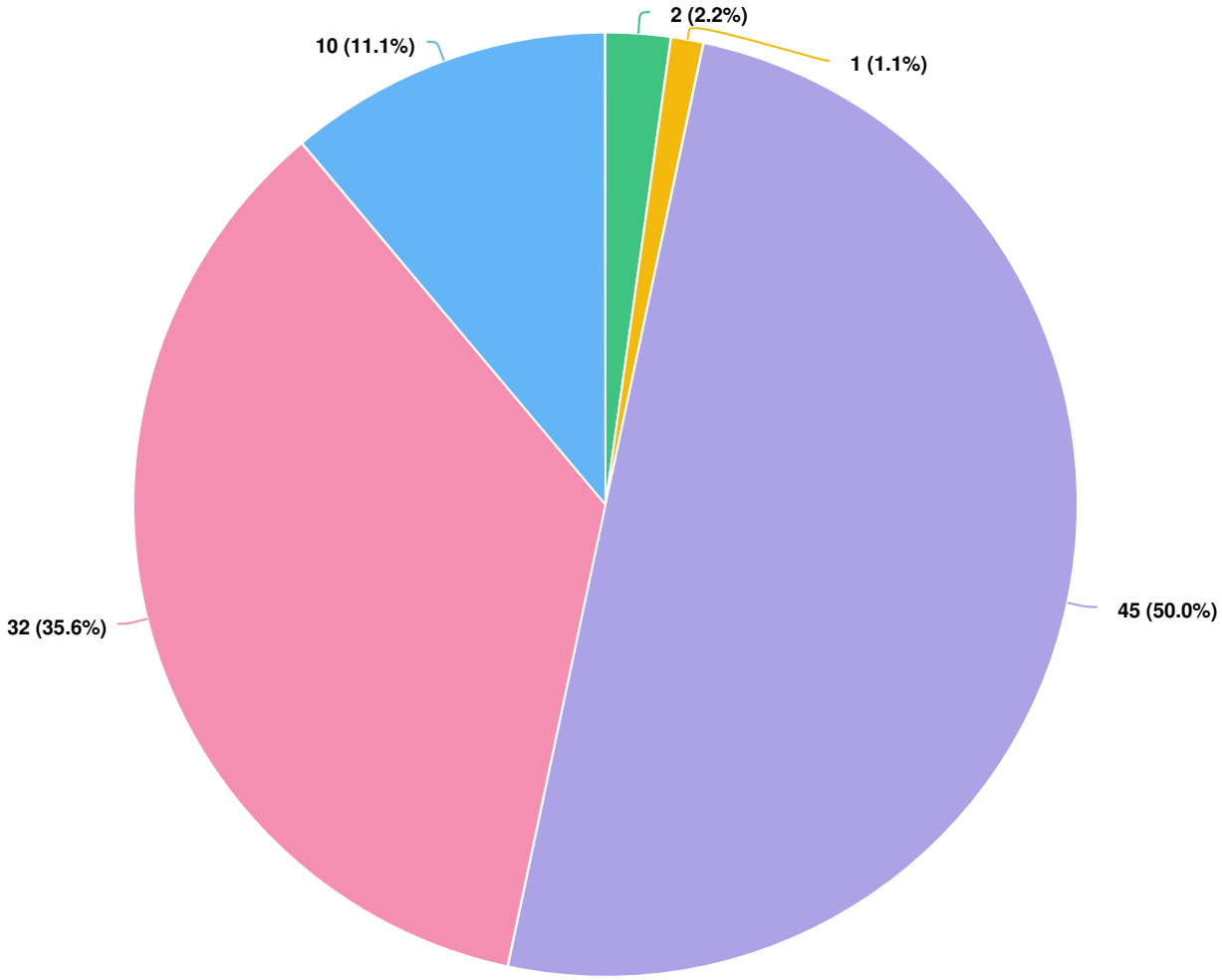


Question options

Poor Fair Good Excellent Unsure

Mandatory Question (90 response(s))
Question type: Radio Button Question

Q6 **How would you rate the stormwater services you receive from Wilsonville, on a scale of one (poor) to 5 (excellent).**



Question options

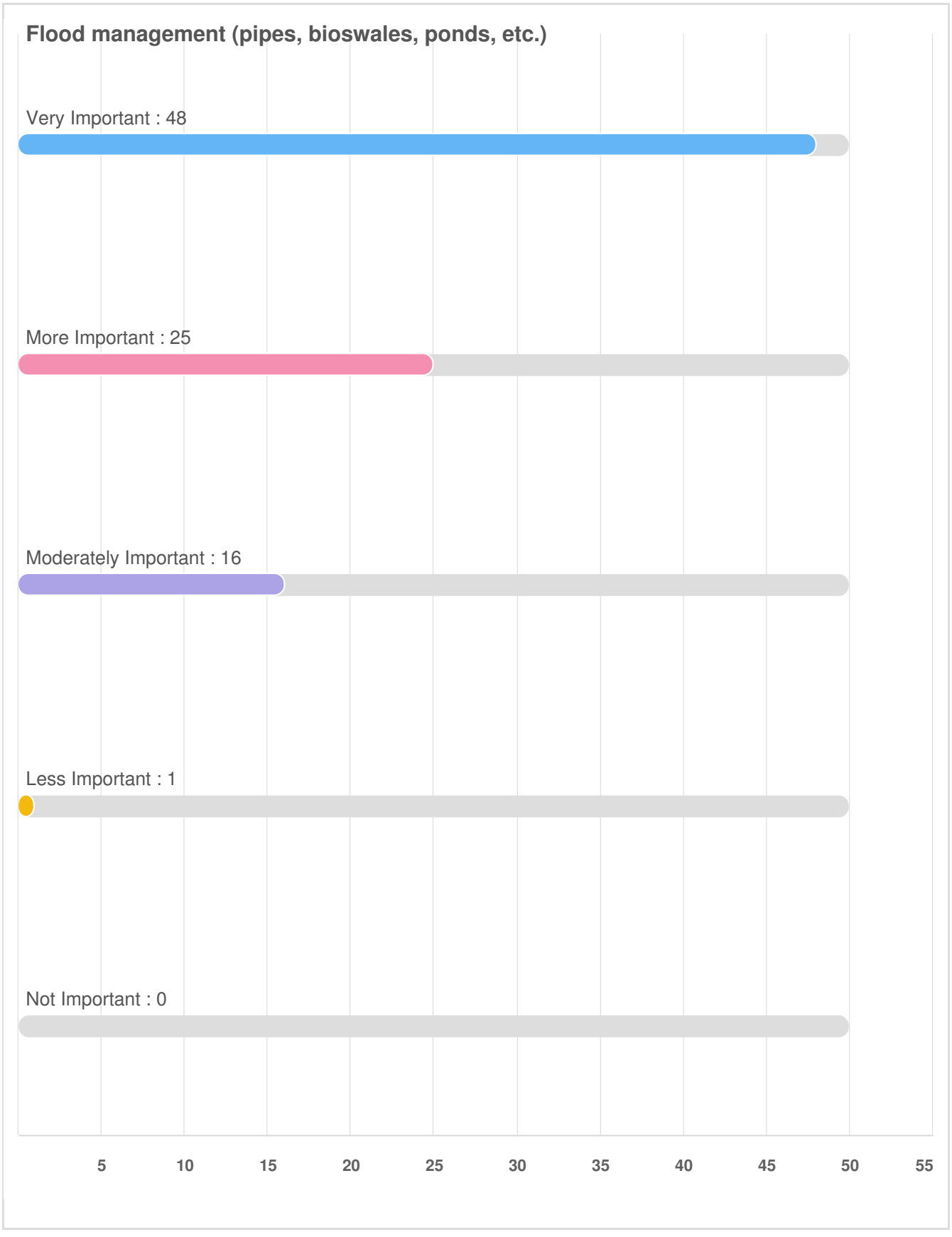
1 Poor 2 Below Average 3 Average 4 Above Average 5 Excellent

Mandatory Question (90 response(s))
Question type: Dropdown Question

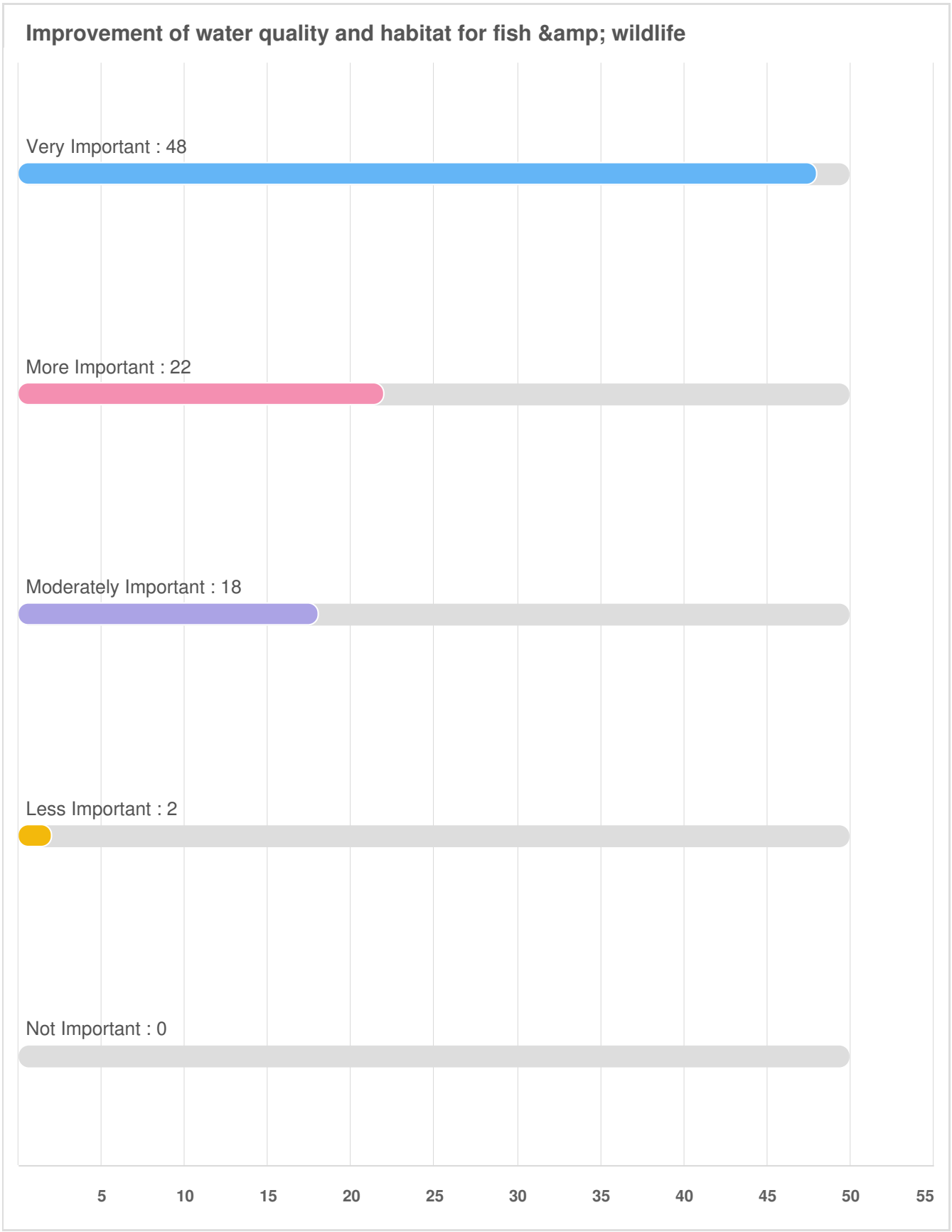
Q7 Residential customers: how do you value these stormwater services?

Optional question (90 response(s), 0 skipped)
Question type: Likert Question

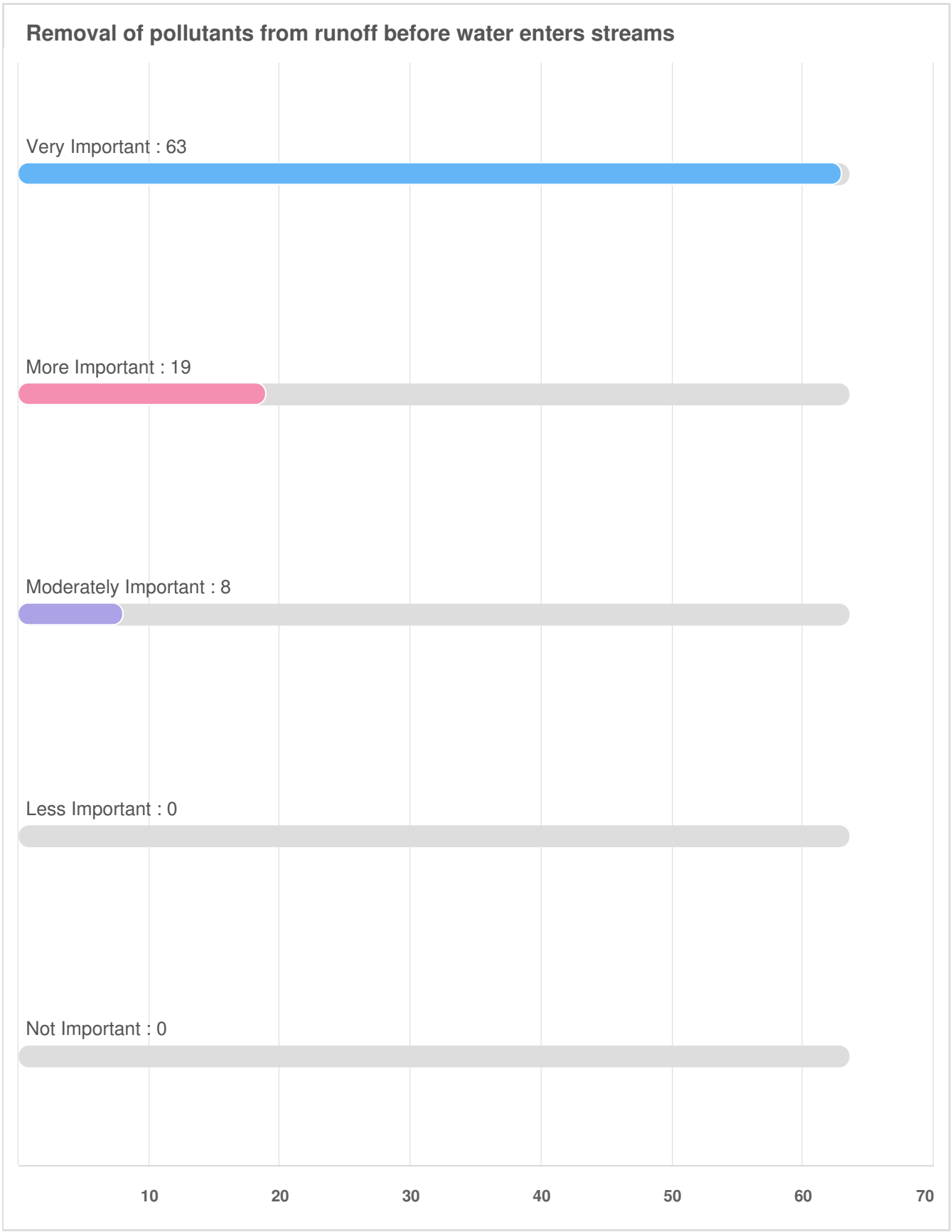
Q7 Residential customers: how do you value these stormwater services?

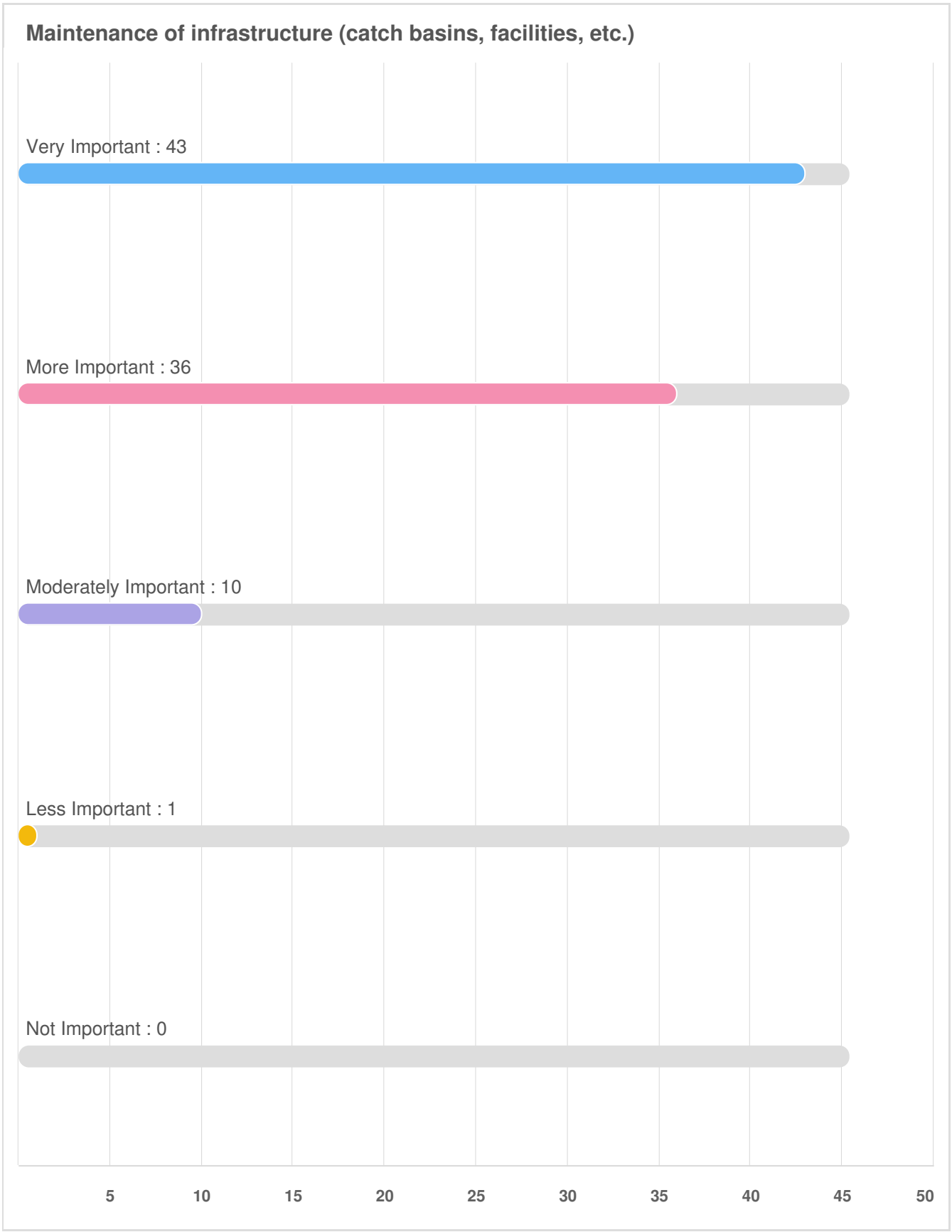


Survey : Survey Report for **19 July 2019** to **17 May 2021**

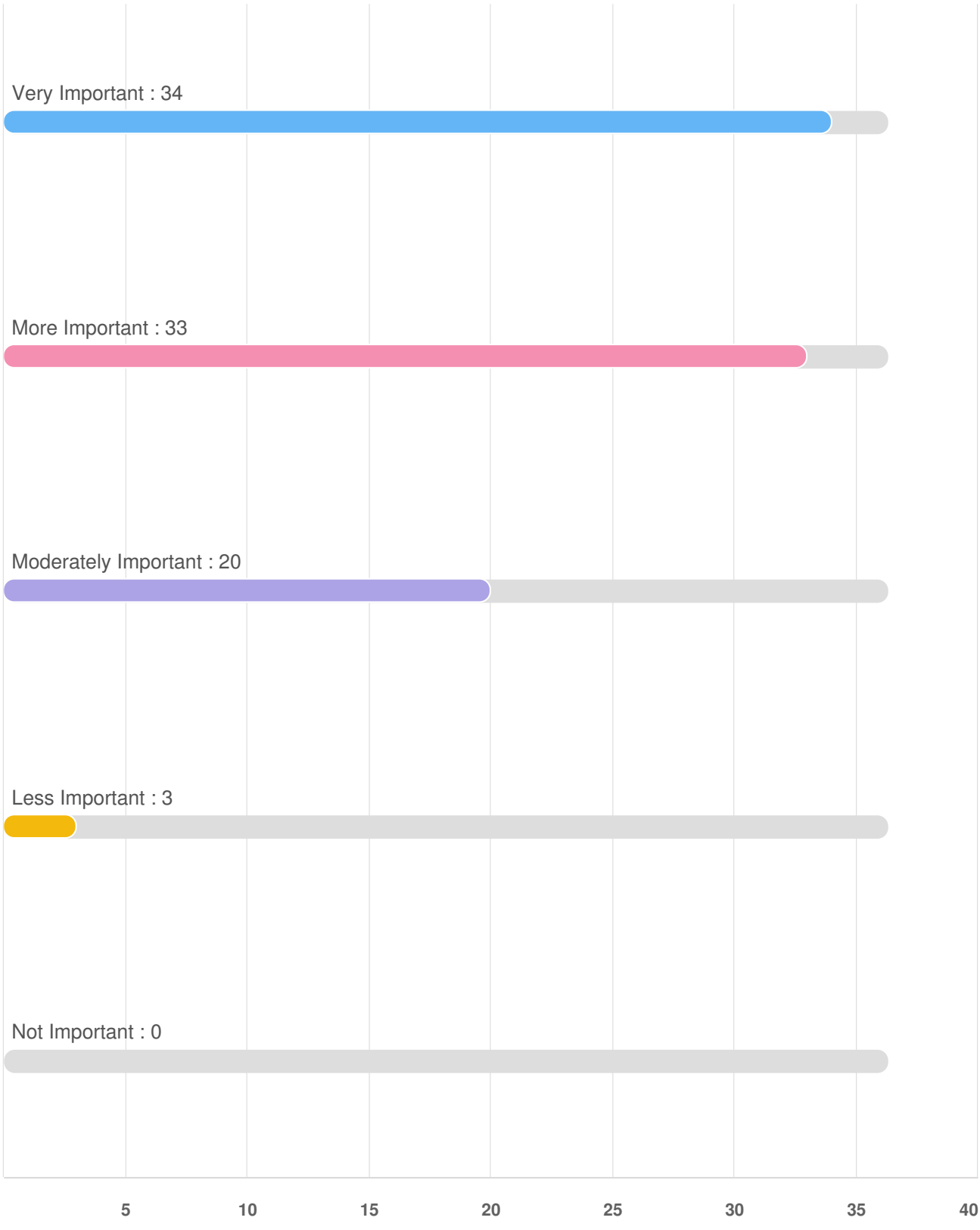


Survey : Survey Report for **19 July 2019** to **17 May 2021**

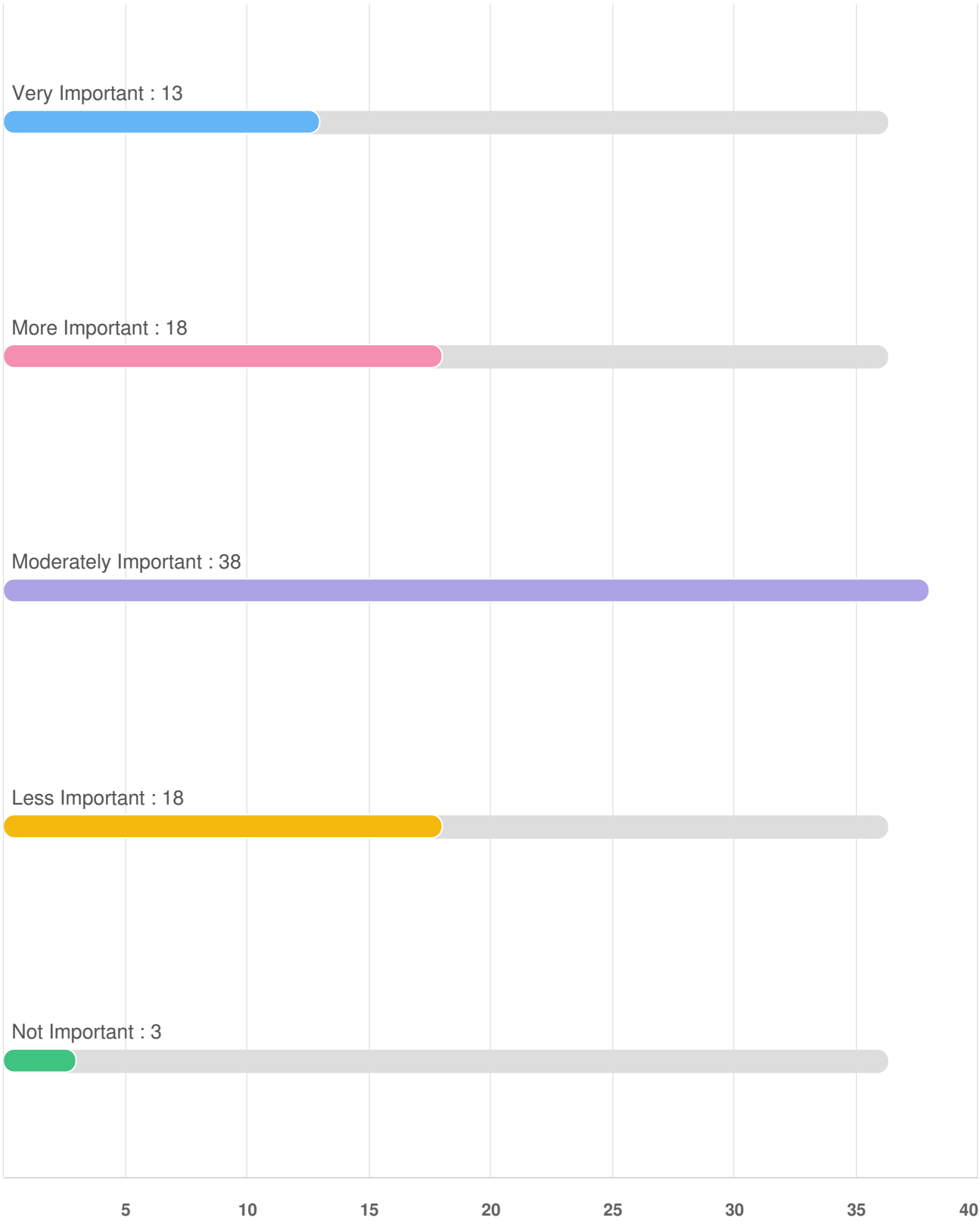



Maintenance of infrastructure (catch basins, facilities, etc.)
Very Important : 43
More Important : 36
Moderately Important : 10
Less Important : 1
Not Important : 0
5
10
15
20
25
30
35
40
45
50

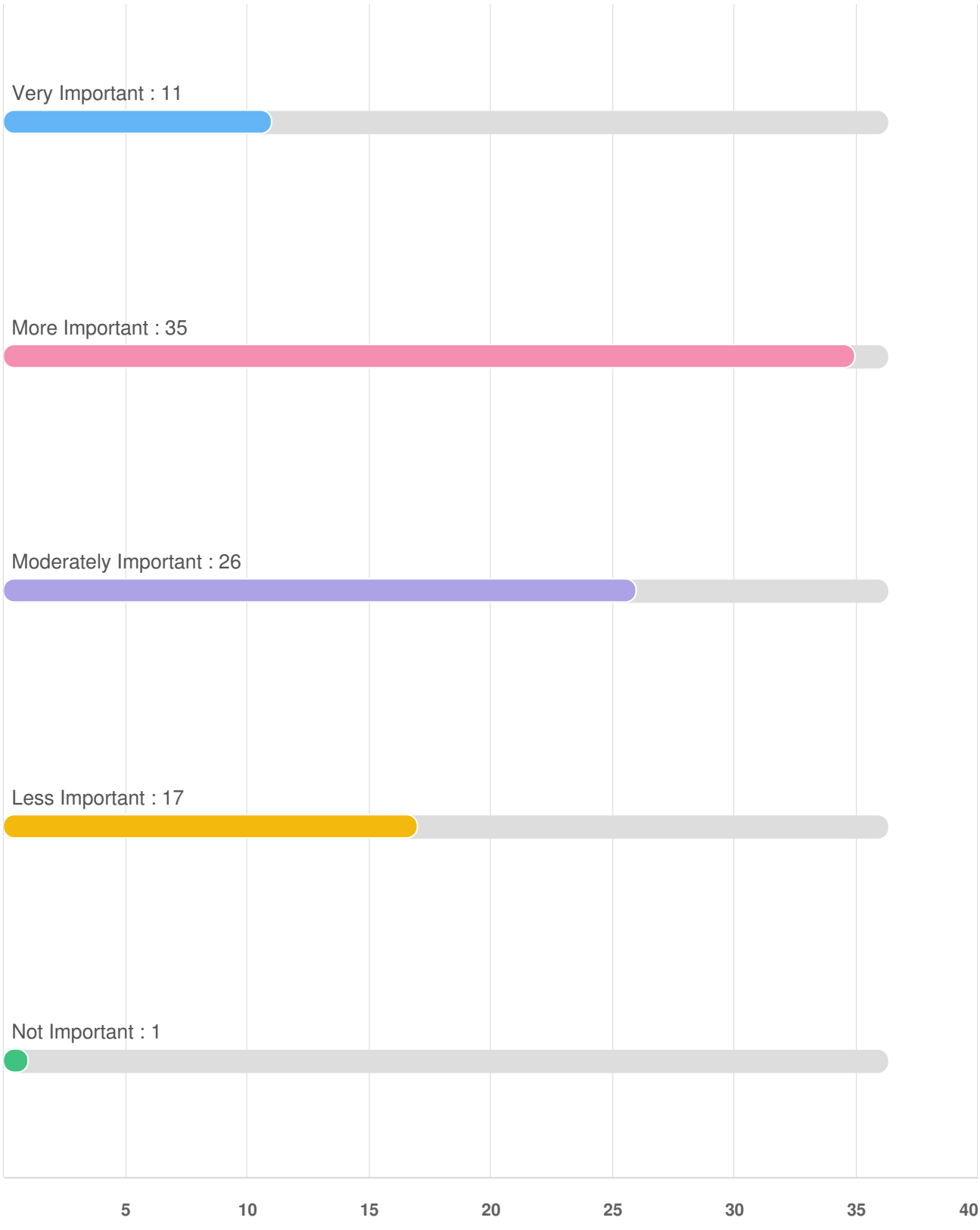
Responsiveness in addressing complaints, fixing problem areas



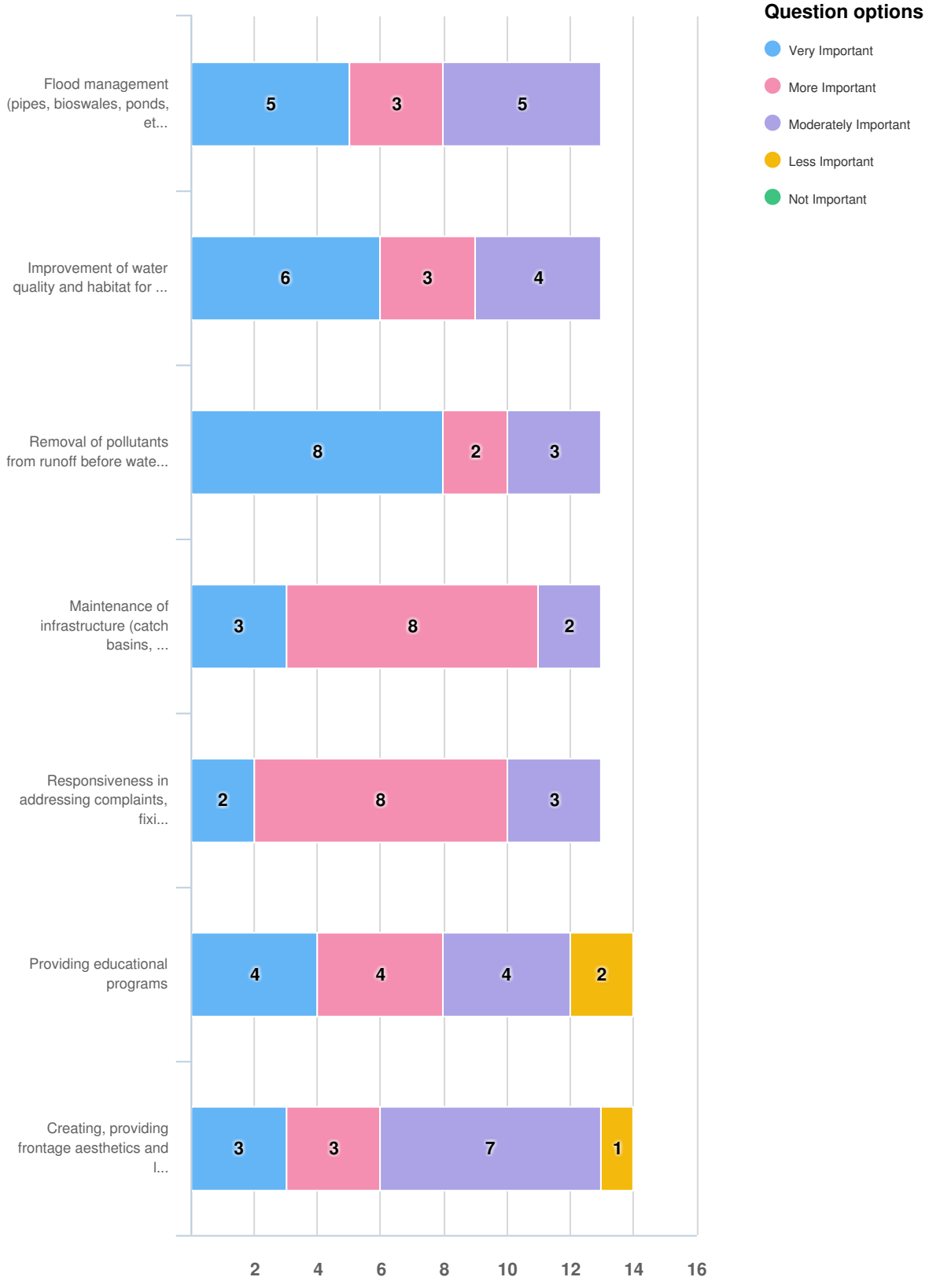
Providing educational programs



Creating, providing frontage aesthetics and landscaping

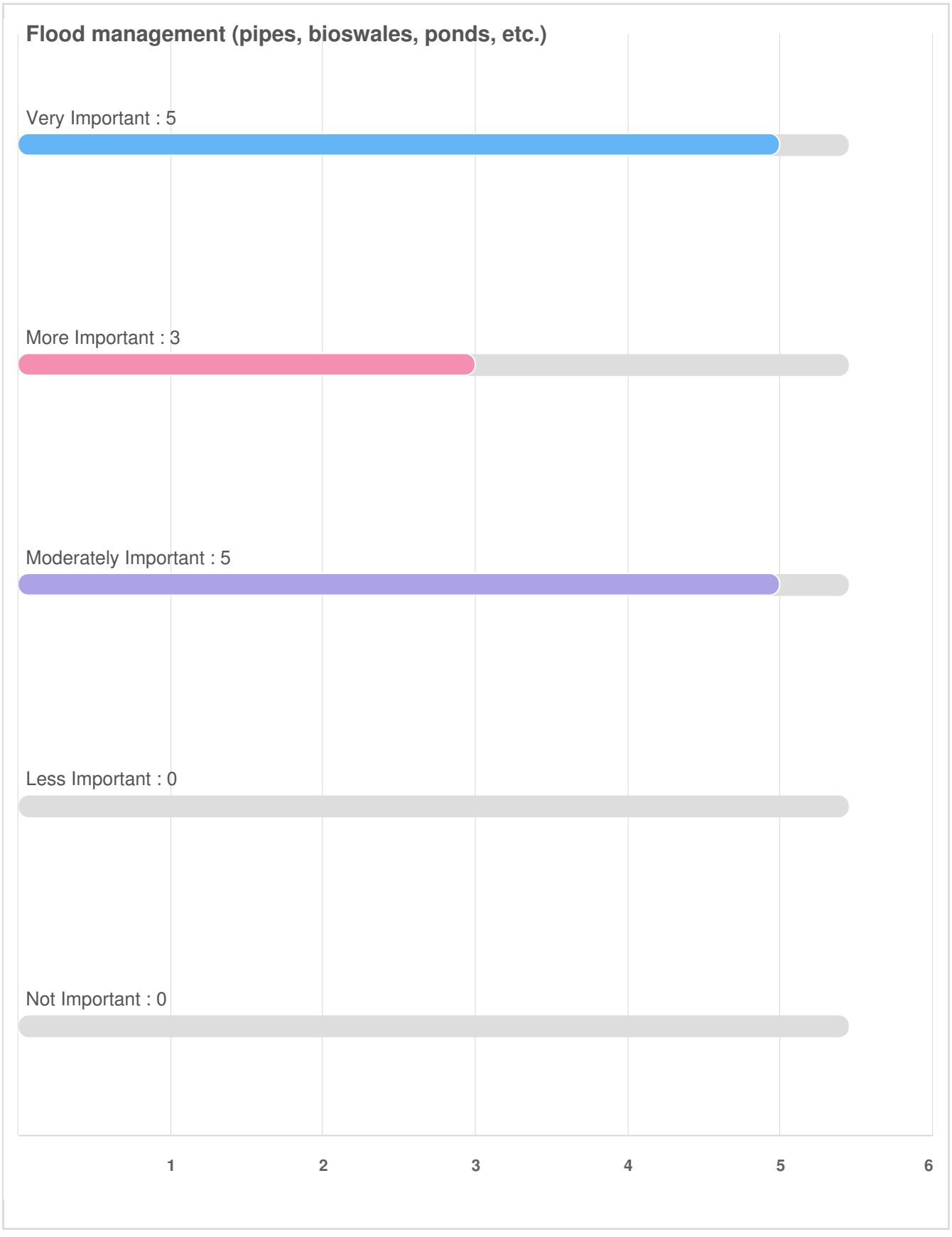


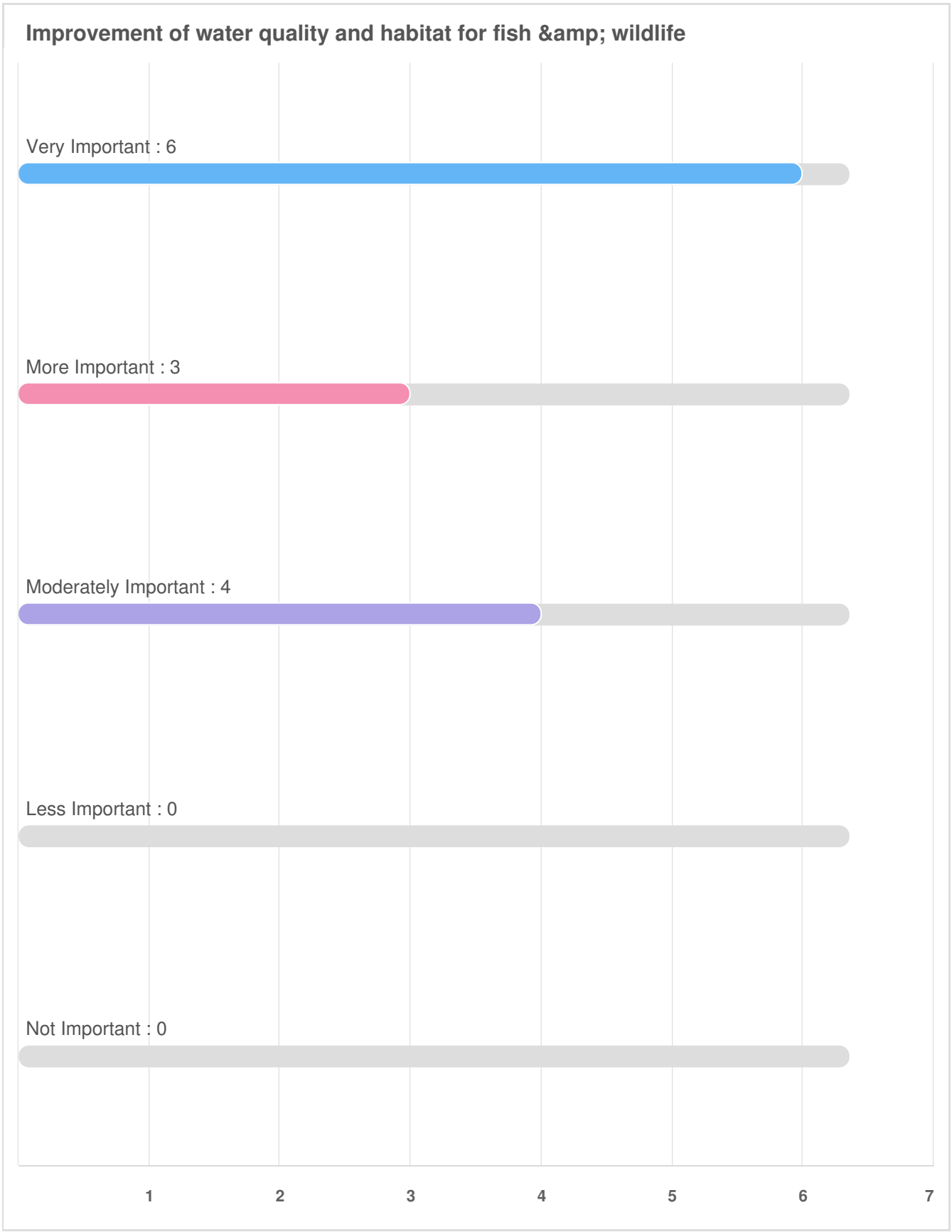
Q8 Business customers: how do you value these stormwater services?



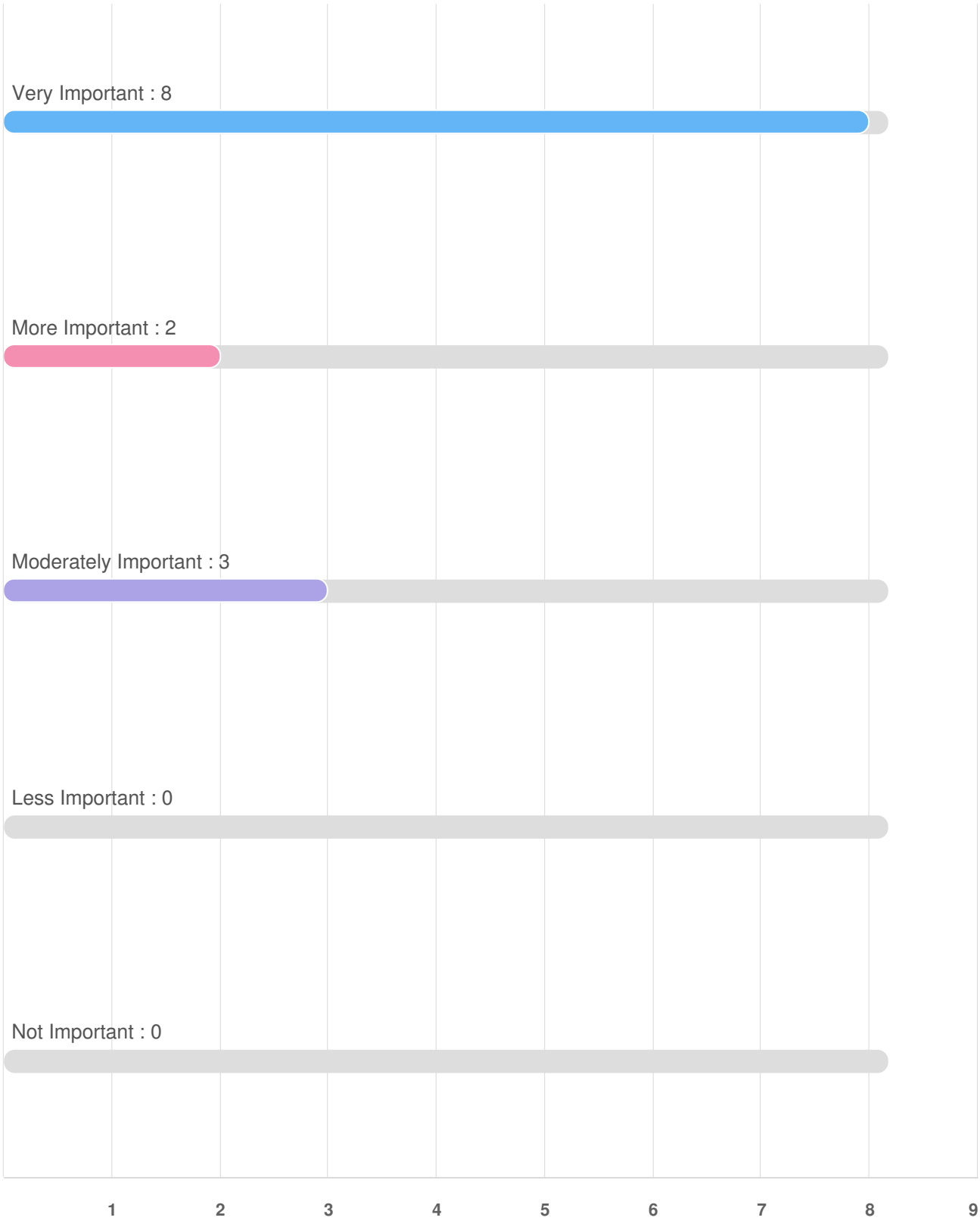
Optional question (14 response(s), 76 skipped)
Question type: Likert Question

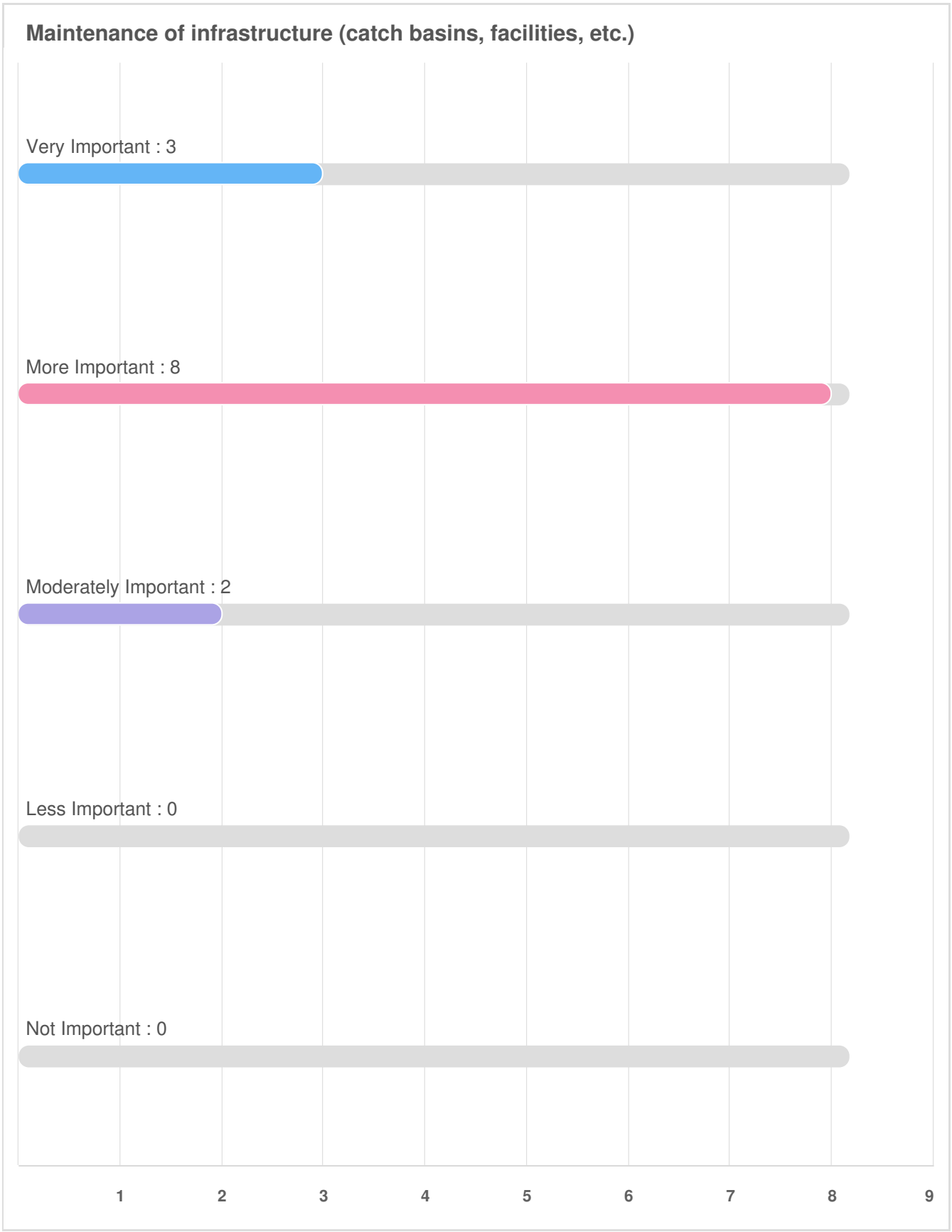
Q8 Business customers: how do you value these stormwater services?



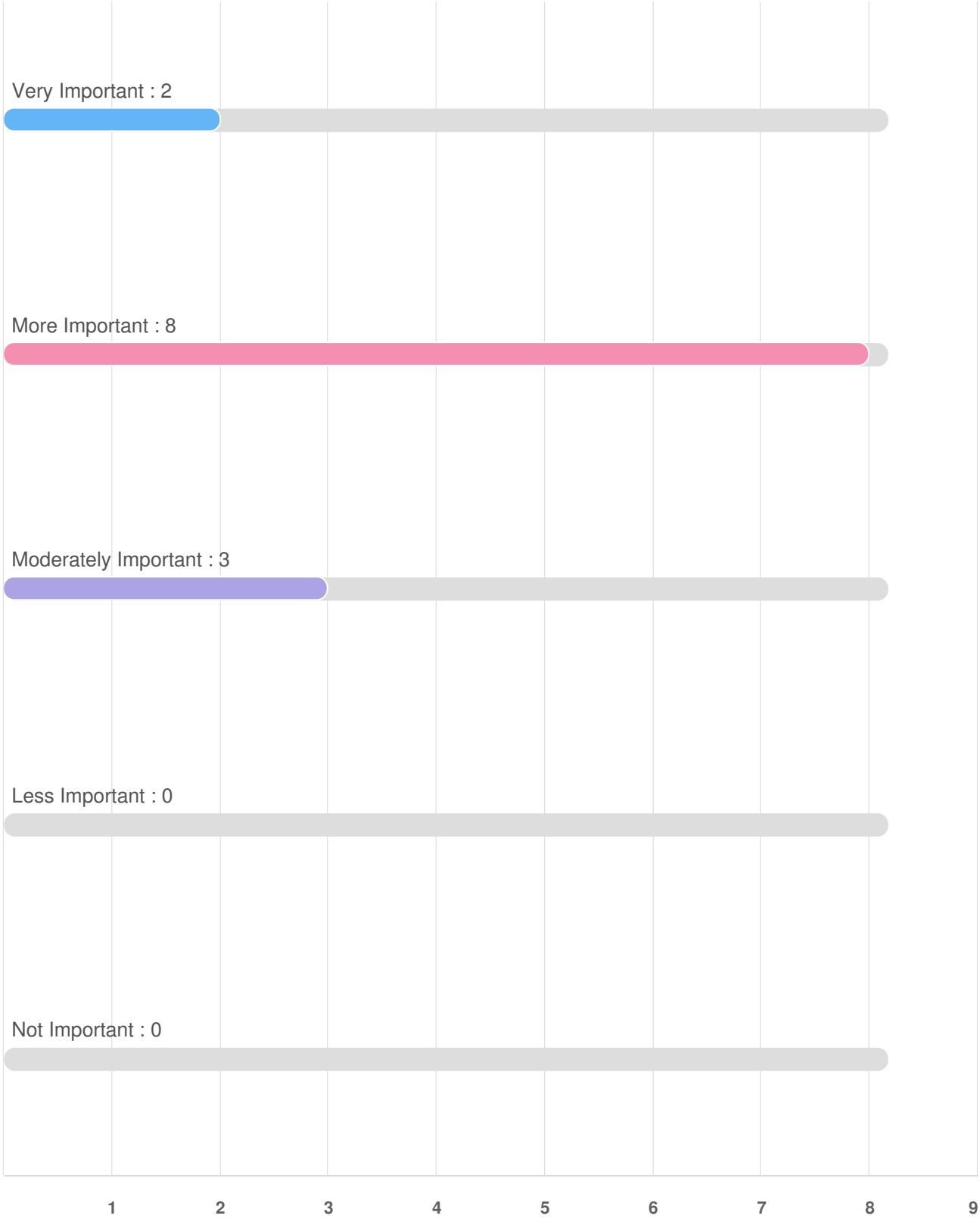

Improvement of water quality and habitat for fish & wildlife
Very Important : 6
More Important : 3
Moderately Important : 4
Less Important : 0
Not Important : 0
1
2
3
4
5
6
7

Removal of pollutants from runoff before water enters streams

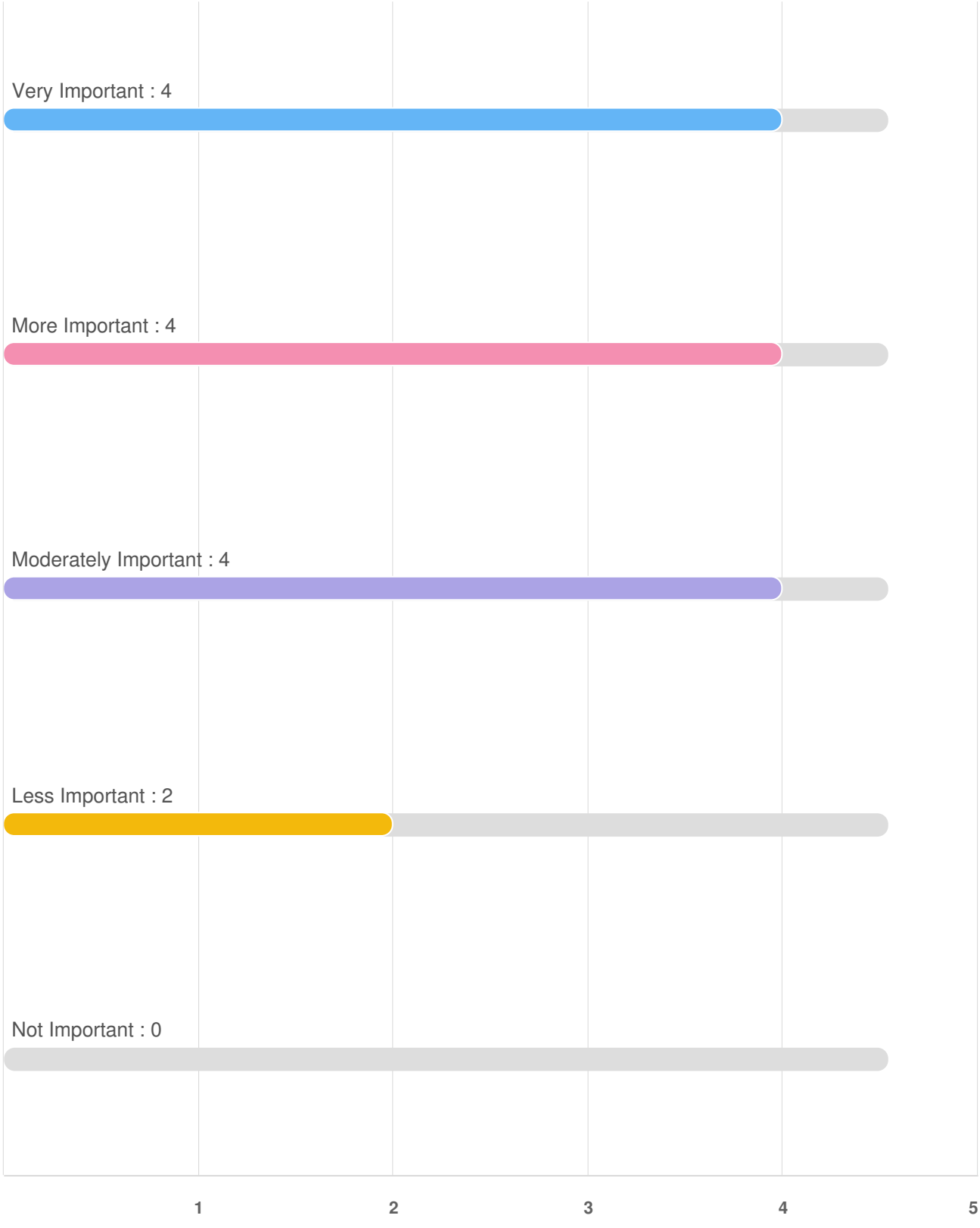



Maintenance of infrastructure (catch basins, facilities, etc.)
Very Important : 3
More Important : 8
Moderately Important : 2
Less Important : 0
Not Important : 0
1
2
3
4
5
6
7
8
9

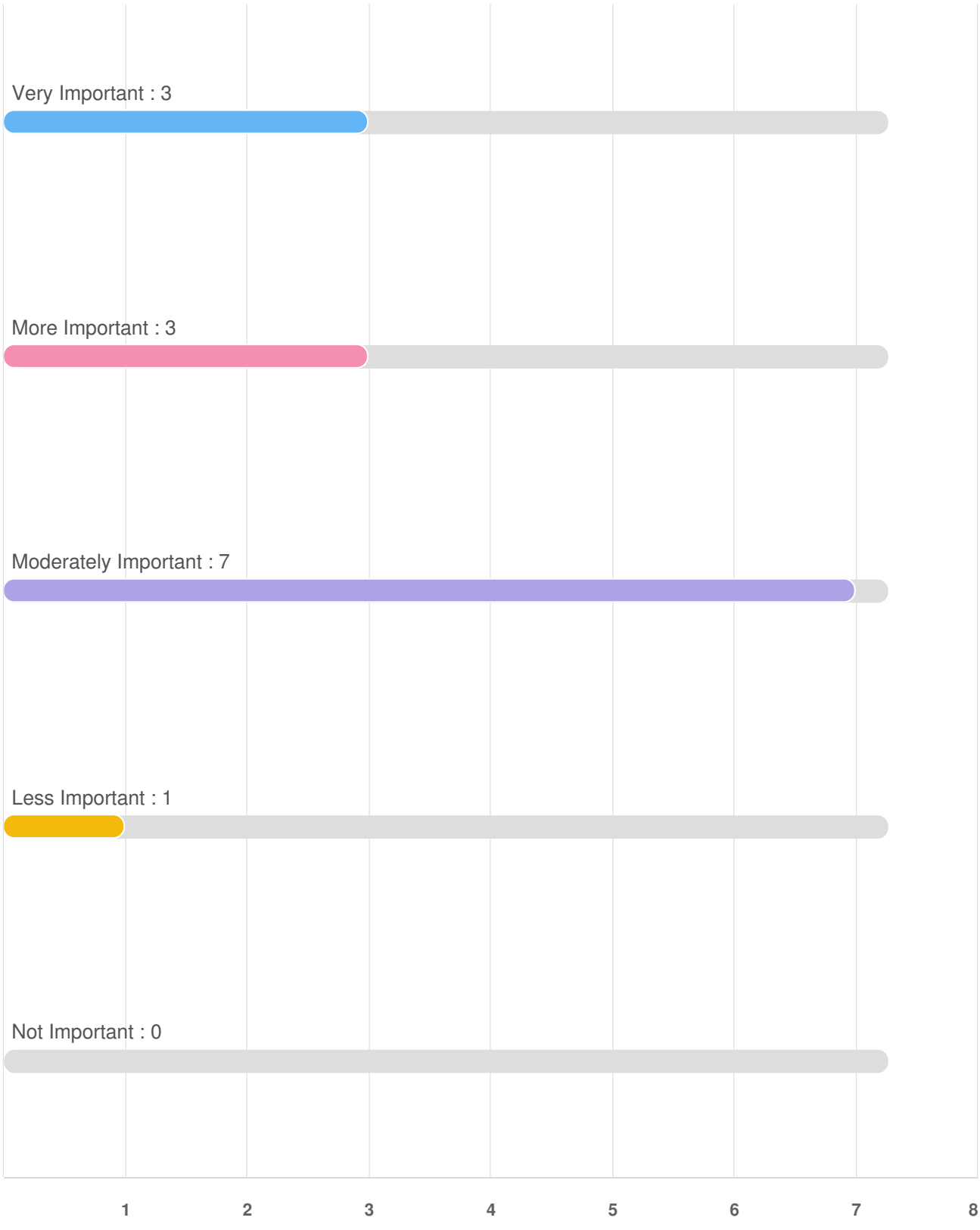
Responsiveness in addressing complaints, fixing problem areas



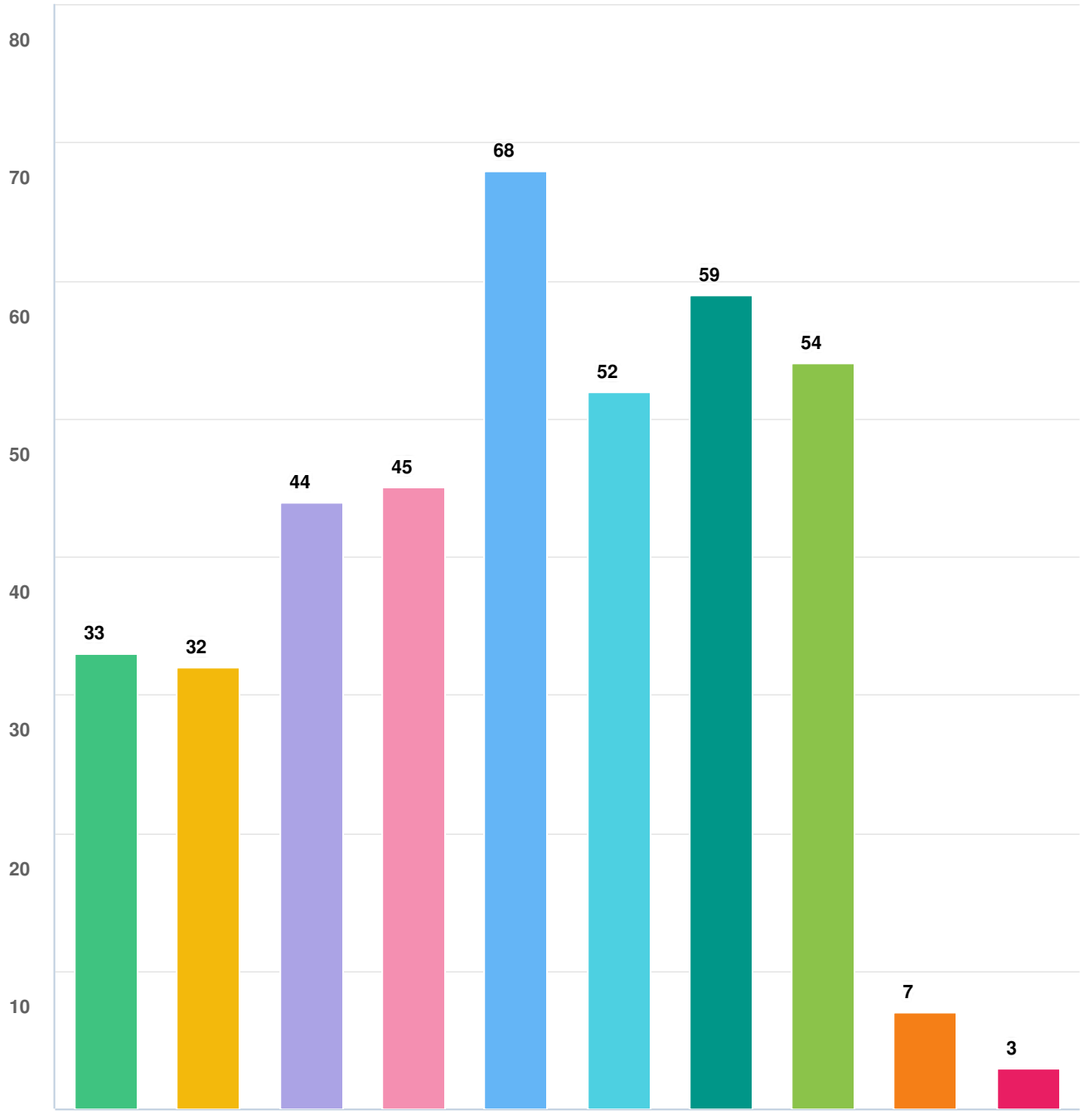
Providing educational programs



Creating, providing frontage aesthetics and landscaping



Q9 Which of these issues is of concern to you? (check all that apply)



Question options

Other (please specify) · Not sure / no significant concerns · Sewage overflow into streams · Pollution from industrial/other sources · Rainfall runoff from driveways, parking lots and streets with pollutants · Runoff with fertilizers, pesticides, pet waste and other pollutants entering streams · Increased runoff from new development · Streambank erosion · Construction site erosion · Flooding of property

Mandatory Question (90 response(s))
Question type: Checkbox Question

Q10 Please provide any additional comments about stormwater management:

4/01/2021 07:36 PM	There is too much concrete/pavement being used in Wilsonville. It is one of the major causes of runoff and flooding of streets. The ground can not absorb the rain anymore. Many trees have concrete sidewalks cutting off the trees roots from water which they absorb to live. Our soil in Wilsonville is very absorbent which is why the settlers chose this area to farm in the first place. Our planner need to throw out the Urban Planning box and study the options that are outside of the box. Many cities in Oregon are looking a better ways to solve urban planning. They are reducing the use of concrete and paving. That's how I would like to see my portion of city taxes used. Thank you.
4/02/2021 02:35 AM	Drainage issues every year — Shari’s parking lot, Starbucks parking lot on Citizens Drive, Elligsen by 76 station
4/02/2021 03:49 PM	I would prefer the City's recent trend of leniency in code enforcement to not extend to our storm water facilities.
4/08/2021 10:29 AM	I live next to Coffee Lake Creek, so flooding and erosion are key concerns for me. At the moment, storm water seems to be well-managed by that creek, but I see a lot of trash collected at various points along the creek (especially at choke points)
4/08/2021 10:50 AM	Stormwater management needs to include more than strictly utilitarian approaches to managing water and mitigating negative externalities. It rains a significant portion of the year

	and we should be creating stormwater amenities that create interesting spaces to be during the rainy months, especially near parks, local businesses, and dense residential areas.
4/08/2021 11:33 AM	This probably falls under "only notice when there's a problem"; I fully appreciate the importance of stormwater services and have seen the results when they are overwhelmed, but I haven't had direct problems as a resident.
4/08/2021 01:21 PM	(1) require ALL users--both residential and business--to use shut-off nozzles on hoses... have witnessed people washing vehicles and letting the water run off (2) if the water habitat is good for birds, etc., then it will also be good for humans
4/08/2021 01:28 PM	When I think about all the herbicides, and pesticide that is used, that go into streams, and the ocean, it is very worrisome.
4/08/2021 02:55 PM	I have not paid much attention to stormwater runoff but do know that the City is very good at keeping autumn leaves cleaned up so the drains do not get clogged. This was a task neighbors did in Portland when I lived there 25 years ago.
4/10/2021 06:34 PM	I would consider the preservation and protection of wetlands, streams, and rivers the highest priority, and would support all measures designed to keep the water quality the cleanest as possible in these areas.
4/11/2021 08:43 AM	**********@gmail.com
4/12/2021 03:45 PM	At this time we are happy with the city response.
5/07/2021 11:31 AM	I have lived at two locations in

	Wilsonville and frequently take walks through the city and its parks of two to five miles and have not experienced a problem with stormwater management
5/07/2021 11:50 AM	PLEASE REPLACE THE storm drain street grate with a street grate and curb inlet in front of 29851/29840 SW Camelot St. The street grate clogs with debris and Camelot St. Floods in front of our home.
5/08/2021 03:35 PM	Residents and businesses should be encouraged to upgrade their storm gutters to handle more water.
5/11/2021 12:40 AM	Having a waste container at the bus stops on either side of the boechman creek bridge on Wilsonville road would help keep more trash from being thrown on the ground & over the bridge. Trash has increased in recent yrs. I walk the area often.
5/16/2021 12:47 PM	I'm very interested in storm water management and clean water but I don't think the city provides any education to the residents. I would like to see more opportunities to be educated about storm water management in our city.

Optional question (17 response(s), 73 skipped)
Question type: Essay Question

City Seeks Input on Stormwater System to Inform Master Plan

The City of Wilsonville is now in the process of developing an updated Stormwater Master Plan to guide the City in addressing the challenges associated with stormwater runoff.

The City's Stormwater Master Plan was last updated in 2012. The current update is prioritizing stormwater capital projects and programs, evaluating deficiencies within the current system and providing guidance on how to best invest City resources to meet current and future demands on the storm water system.

Stormwater Survey
Until Fri, May 15 at 5 pm
LetsTalkWilsonville.com/stormwater

"The plan's intent is to provides an integrated approach to managing stormwater runoff, reducing water pollution, and protecting aquatic habitats and watersheds," said Natural Resources Manager Kerry Rappold.

To effectively proceed with a stormwater plan that serves the community's best interest, the City is now inviting public feedback. Residents are invited to take a brief stormwater before May 15 online, at LetsTalkWilsonville.com/stormwater

The "Let's Talk, Wilsonville!" website also provides a more comprehensive look at how the City manages the stormwater system and also provides in-depth information about the Master Plan Update and the benefits this program provides to the community.

For more information, contact Khoi Le, Development Engineering Manager, at 503-570-[illegible] or kle@ci.wilsonville.or.us.

Mandi Simmons

From: Kerry Rappold
Sent: Thursday, February 29, 2024 10:10 AM
To: Mandi Simmons
Subject: Fw: Wilsonville Stormwater Standards In-person 2nd Follow up Meeting
Attachments: Pages from Draft SWMP.pdf

FYI

From: Vu Nguyen <VuN@aks-eng.com>
Sent: Monday, February 26, 2024 12:53 PM
To: Daniel Pauly <pauly@ci.wilsonville.or.us>
Cc: Janelle Guiao <guiaoj@aks-eng.com>; Monty Hurley <monty@aks-eng.com>; Nathan Ahrend <ahrendn@aks-eng.com>; Kerry Rappold <rappold@ci.wilsonville.or.us>; Amy Pepper <apepper@ci.wilsonville.or.us>; Dan Grimberg <dan@westhillsdevelopment.com>; Miranda Bateschell <bateschell@ci.wilsonville.or.us>; Mimi Doukas <MimiD@aks-eng.com>; Zach Weigel <weigel@ci.wilsonville.or.us>
Subject: RE: Wilsonville Stormwater Standards In-person 2nd Follow up Meeting

[This email originated outside of the City of Wilsonville]

Hi Dan,

Please see below for our comments on the Stormwater Master Plan.

- Construction of the southern part of the proposed Frog Pond East and South (NC-1) stormwater conveyance piping will need a public stormwater easement granted by private property owners for the proposed stormwater conveyance alignment, as shown on the attached pdf, and may not be the best viable option.
- We would like to see flexibility of the alignment addressed within the description of the project number NC-1.

Thanks,

Vu Nguyen, PE
AKS ENGINEERING & FORESTRY, LLC
12965 SW Herman Road, Suite 100 | Tualatin, OR 97062
P: 503.563.6151 Ext. 240 | F: 503.563.6152 | www.aks-eng.com | Vun@aks-eng.com
Offices in: Bend, OR | Keizer, OR | Tualatin, OR | Vancouver, WA

From: Daniel Pauly <pauly@ci.wilsonville.or.us>
Sent: Tuesday, February 6, 2024 10:42 AM
To: Janelle Guiao <guiaoj@aks-eng.com>; Monty Hurley <monty@aks-eng.com>; Nathan Ahrend <ahrendn@aks-eng.com>; Vu Nguyen <VuN@aks-eng.com>; Kerry Rappold <rappold@ci.wilsonville.or.us>; Amy Pepper <apepper@ci.wilsonville.or.us>; Zach Weigel <weigel@ci.wilsonville.or.us>; Dan Grimberg <dan@westhillsdevelopment.com>; Miranda Bateschell <bateschell@ci.wilsonville.or.us>
Subject: RE: Wilsonville Stormwater Standards In-person 2nd Follow up Meeting

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Dear AKS/West Hills Team

We continue to experience a delay in the analysis of the stormwater sizing tool due to a continuing family matter consultant. It is unfortunate that the delay will again leave us unprepared for the planned discussion on Thursday the 8th. Due to the consultant's timeline for returning to work and key City staff having upcoming long-planned time off, the earliest we are currently able to reschedule is the week of the 26th. We recognize this has been delayed and that answers are being looked for by your team as well as ours, and we are committed to getting answers as soon as practicable. We look forward to the discussion at the end of the month and will share information in advance as applicable.

In the meantime, we do have the City's Stormwater Master Plan available for your review and comment, which was one of your three outstanding concerns as articulated at our last meeting. Comments are welcomed as soon as you are able, but to allow staff response prior to a Planning Commission hearing scheduled on March 13, please have written comments to us no later than February 26. This will also allow us time to discuss any key concerns at your meeting with you that week. I will send a link as soon as the large files are uploaded to the City's website within the next day.

Dan Pauly, AICP *(he/him)*
Planning Manager
City of Wilsonville
503.570.1536

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

-----Original Appointment-----
From: Janelle Guiao <guiaoj@aks-eng.com>
Sent: Tuesday, January 9, 2024 2:34 PM
To: Janelle Guiao; Monty Hurley; Nathan Ahrend; Vu Nguyen; Daniel Pauly; Kerry Rappold; Amy Pepper; Zach Weigel; Dan Grimberg; Miranda Bateschell
Subject: Wilsonville Stormwater Standards In-person 2nd Follow up Meeting
When: Thursday, February 8, 2024 2:00 PM-3:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Willamette River 2 Conference Room, 29799 Town Center Loop E, Wilsonville, OR 97070

[This email originated outside of the City of Wilsonville]

Meeting Location:
29799 Town Center Loop E
Wilsonville, OR 97070

NC-1	Frog Pond East and South Conveyance Piping (Basin K1 only)		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	61 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	The full 2022 Frog Pond East and South Master Plan stormwater conveyance layout has been simplified for this CP to only include the storm main and outfall along SW 60th Ave to outfall near unnamed tributary (under SW Kruse Rd). This drainage basin is referred to in the Master Plan as K1 (encompassing approx. 61 acres). Project details are as follows: • Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.		

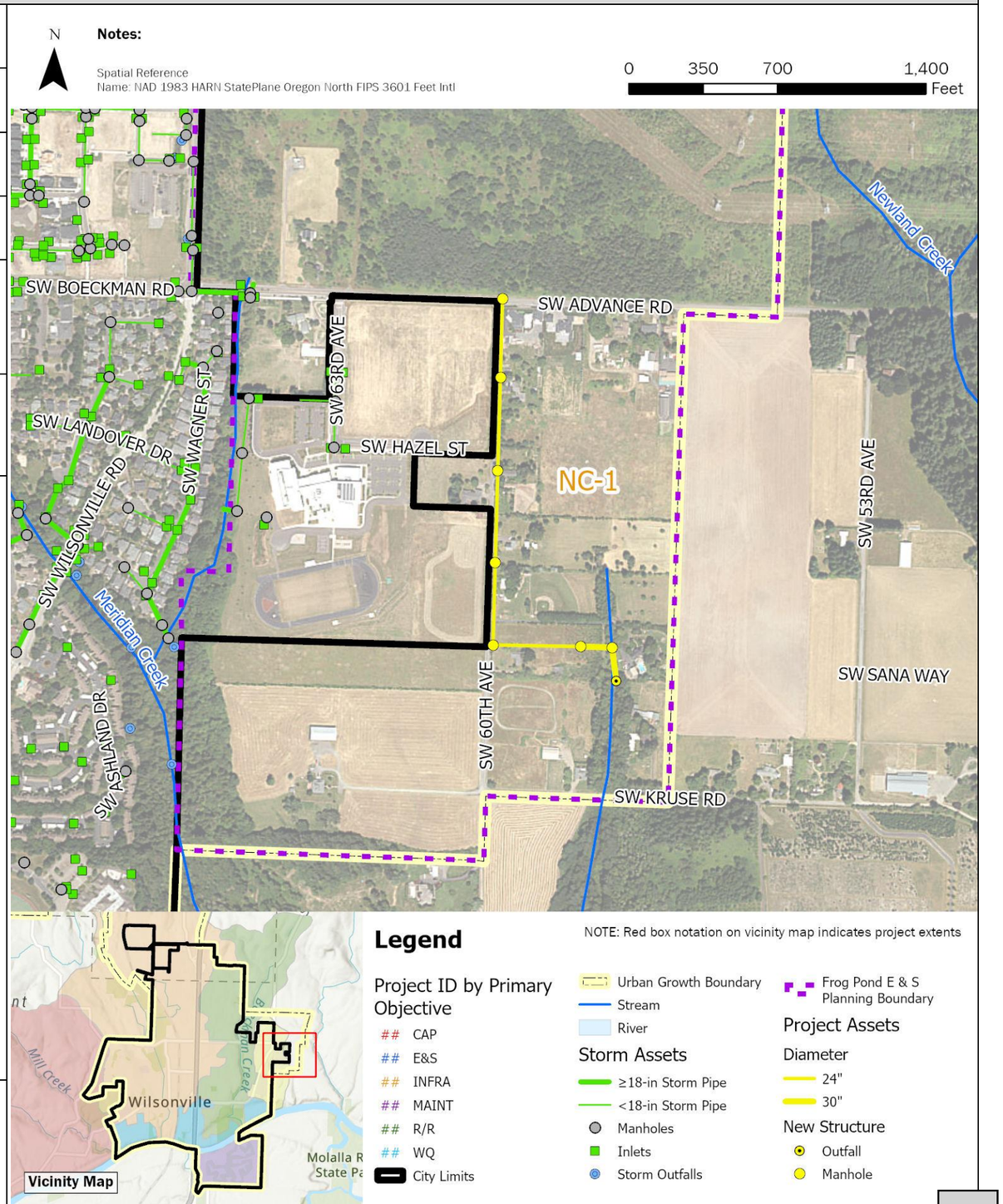

EXHIBIT B

Brown AND Caldwell

Stormwater Master Plan

March 2024 // **FINAL**

WILSONVILLE
OREGON

Stormwater Master Plan

Prepared for
City of Wilsonville, Oregon
March 2024

Brown AND Caldwell

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552
T: 503.244.7005

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List of Abbreviations

AACE	Association for the Advancement of Cost Engineering
ac	acre
BC	Brown and Caldwell
BMP	best management practice
CB	catch basin
CCTV	closed-circuit television
cfs	cubic feet per second
COM/GOV	Commercial/Government
CIP	capital improvement program
City	City of Wilsonville
CPs	capital projects
CPP	corrugated polyethylene pipe
CWA	Clean Water Act
DEQ	Oregon Department of Environmental Quality
DIP	ductile iron pipe
DS	downstream
EPA	U.S. Environmental Protection Agency
E&S	Erosion and Sediment
fps	feet per second
ft	feet/foot
GIS	geographic information system
H	horizontal
H/H	hydrologic and hydraulic
HSG	Hydrologic Soil Group
IGA	Intergovernmental Agreements
in.	inch/inches
IND	Industrial
INST	Institutional
I-5	Interstate 5
LA	Load Allocation
LF	linear foot/feet
LID	low impact development
MEP	maximum extent practicable
MH(s)	manhole(s)
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
NRCS	National Resources Conservation Service
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
Plan	Stormwater Master Plan
PVC	polyvinyl chloride
PWS	Wilsonville Public Works Standards
RA	Rural Agricultural
RCP	reinforced concrete pipe
ROW	right-of-way
R/R	repair/replacement
SDC	System Development Charge
SF	square feet
SMP	Stormwater Master Plan
SOPs	standard operating procedures
SROZ	Significant Resource Overlay Zone
SSURGO	Soil Survey Geographic Database
TM	technical memorandum
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UGB	Urban Growth Boundary
US	upstream
USCS	Unified Classification System
V	vertical
VAC	Vacant
WDC	Wilsonville Development Code
WLA	Waste Load Allocation
WQ	water quality

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Acknowledgements

The Brown and Caldwell Team, including Waterways Consulting, Inc. and Consor (formerly Barney and Worth) would like to extend thanks to the following staff and stakeholders for assistance in completing this Stormwater Master Plan:

- Kerry Rappold, Natural Resources Manager and City Project Manager
- Andy Sheehan, Asset Management Coordinator
- Sean Shortes, Engineering Tech II

Wilsonville Internal Stakeholders

- Zach Weigel, City Engineer
- Andrew Barrett, Capital Projects Manager
- Amy Pepper, Development Engineering Manager
- Dan Pauly, Planning Manager
- Jim Cartan, Environmental Specialist
- Delora Kerber, Public Works Director
- Martin Montalvo, Operations Manager
- Brad Painter, Roads and Stormwater Supervisor
- Bill Evans, Communications and Marketing Manager

City Council

- Mayor Julie Fitzgerald
- Kristin Akervall, Council President
- Dr. Joann Linville, Councilor
- Caroline Berry, Councilor
- Katie Dunwell, Councilor

City Planning Commission

- Ronald Heberlein, Chair
- Jennifer Willard, Vice-Chair
- Nicole Hendrix
- Andrew Karr
- Kamran Mesbah
- Kathryn Neil

Executive Summary

In 2021, the City of Wilsonville (City) initiated development of a Stormwater Master Plan (SMP or Plan) to guide capital project and program needs over the next 20-year planning period. Drivers for this SMP include the need to: 1) address changing regulatory requirements; 2) reassess the storm system based on completion of capital projects (CPs) identified in Wilsonville's previous SMP (dated March 2012), 3) accommodate new and redevelopment activities, and 4) address observed system deficiencies warranting additional study.

This 2024 SMP identifies and prioritizes projects and programs to increase system capacity, address infrastructure and maintenance needs, add or enhance water quality treatment, address natural system deficiencies, and proactively plan for future growth. The SMP development process includes the:

- Evaluation of project needs and system improvements as identified by City staff.
- Development of validated hydrologic and hydraulic (H/H) model to confirm capacity issues and to assess anticipated flooding frequency and severity.
- Assessment of stormwater system retrofit opportunities for water quality treatment and/or flow control.
- Assessment of the natural (stream) system to identify risks to infrastructure and stream stability.
- Identification of programmatic opportunities to address recurring maintenance needs and water quality issues at a citywide scale.
- Development of a comprehensive, prioritized CP list and associated costs.
- Analysis of staffing levels to meet deferred and future maintenance and regulatory requirements.

Master Plan Technical Analyses

The following technical analyses were conducted to evaluate stormwater system deficiencies and define project and program needs in support of SMP development.

Project Needs Identification. Project needs were initially identified through the distribution of surveys to City staff and the public, a literature-based and Geographic Information System (GIS) data review, and site visits and staff interviews. Information collected helped to create a robust inventory of the stormwater collection system features and problem areas related to capacity, maintenance, system condition, and infrastructure needs. Locations warranting additional analyses via hydraulic modeling and/or stream assessment were defined based on results of this effort.

Stormwater Retrofit Analysis. A stormwater retrofit analysis was completed to inform potential locations for water quality improvements, erosion prevention/natural resource enhancement, and/or flow mitigation in the city. Based on the site characteristics, the continued applicability of water quality projects not implemented from the 2012 SMP, and the ability to integrate water quality into other project needs, CP and program needs were identified to expand and enhance stormwater treatment throughout the city.

Stream Assessment. A stream assessment was conducted on select reaches of Boeckman, Meridian, Arrowhead, Newland, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby referred to as Kruse Creek for this SMP) to inform locations where stream morphology may

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be or is currently impacted by changes to upstream land use, and in response to changes in flow, infrastructure, and sediment supply. The assessment included a desktop GIS analysis and stream walk (field observations) to inform capital project and ongoing monitoring needs.

Stormwater System Capacity Evaluation. The stormwater hydrologic and hydraulic (H/H) model developed for the 2012 SMP was updated to reflect changes in land use and impervious coverage and additional City-owned (public) storm pipe, culverts, and detention facilities constructed since 2012. CPs installed since 2012 were also incorporated into the H/H model, and the model was used to simulate rainfall and runoff characteristics and identify capacity limitations under both current and projected future development conditions.

Maintenance and Staffing Evaluation. Operational activities were assessed to identify staffing level needs and constraints. Information on current maintenance activities, regulatory needs, and anticipated engineering activities associated with implementation of this SMP, as well as compensation rates, were incorporated into staffing recommendations for both Public Works and Community Development/Engineering.

Project/Program Development and Prioritization. Project opportunities from the various technical evaluations were consolidated and developed into CPs and programs. CP development included conceptual design, facility sizing, and cost estimation. CPs were prioritized based on multiple criteria including system operations (capacity, recurring maintenance, safety); system condition; regulatory compliance (water quality, natural system condition, instream erosion); and other needs including project concurrence/scheduling, development drivers, and contributing drainage area. Project scoring and ranking helped designate high, medium, and lower priority projects for use in project scheduling and future stormwater funding evaluations.

General Recommendations

The following project, program, and policy actions are recommended to improve and enhance the performance of the storm drainage infrastructure throughout the city:

1. Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
2. Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
3. Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
4. Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
5. Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.
6. Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
7. Clearly document CP and program costs and schedule to inform future funding and rate analyses.

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Capital Project Summary

Individual and city-wide CPs, as well as stormwater programs, were developed to address the following objectives:

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table ES-1 summarizes the identified 15 CPs (representing 20 individually costed project phases) and 4 city-wide planning projects, including conceptual cost estimates and respective priorities. Figure ES-1 shows CP locations by primary objective.

Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
Capital Projects							
BC-1	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	$1,880,000	11%	X		
BC-2	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	$2,940,000	27%	X		
BC-3-Phase 1	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	$4,860,000	19%			X
BC-3-Phase 2	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	$7,210,000	19%			X
BC-4	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	$410,000	19%	X		
BC-5	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	$910,000	2%			X
BC-6	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	$400,000	1%	X		
CLC-1-Phase 1	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	$8,020,000	38%	X		
CLC-1-Phase 2	Day Road Stormwater Improvements, Phase 2	• **Capacity**	$3,930,000	38%		X	

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Table ES-1. Capital Project Costs and Schedule

Project Number [a]	Project Name	Objectives Addressed [b]	Estimated Cost	% Related to Growth [c]	Implementation Schedule		
					Near-term (2024-28)	Mid-term (2029-33)	Long-term (2034-43)
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	$290,000	6%		X	
CLC-3	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	$3,780,000	35%		X	
NC-1	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	$4,090,000	79%	X		
WR-1-Phase 1	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **Capacity** • Water Quality	$2,310,000	2%		X	
WR-1-Phase 2	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **Capacity**	$1,080,000	2%			X
WR-2-Phase 1	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	$820,000	--		X	
WR-2-Phase 2	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$10,510,000	--			X
WR-3	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	$200,000	10%	X		
WR-4-Phase 1	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	$600,000	--			X
WR-4-Phase 2	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	$4,440,000	--			X
WR-5	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	$10,370,000	--			X
City-wide Planning Projects							
City-1	Flow Monitoring and Rain Gauge Installation	• **Capacity**	$100,000	N/A	X		
City-2	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	$30,000/ event	N/A	X	X	X
City-3	Porous Pavement Pilot Study	• **Water Quality**	$100,000	N/A	X		
City-4	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	$150,000	N/A	X		
				TOTAL:	**$19.14M**	**$20.85M**	**$29.53M**

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. City-wide planning projects are designated as "City".

*b. Primary objectives addressed are identified in **BOLD**. Objectives addressed relate to project needs in the contributing watershed to resolve known and predicted system/ facility deficiencies.*

c. % Related to Growth refers to SDC-eligible projects and the proportional cost attributable to growth.

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Program Summary

In addition to the identified CPs, the following programs were identified to address regulatory drivers and support proactive stormwater system maintenance. These programs, objectives, and estimated annual cost are listed in Table ES-2 and described below:

- **Local Drainage Improvements Program (P-1).** Allocate funds to install small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow).
- **Water Quality Retrofit Program (P-2).** Establish an annual funding mechanism to integrate low impact development (LID) and/or green infrastructure (GI) in conjunction with street improvements, public improvements, and other utility projects. This program supports the City's retrofit strategy and regulatory objectives by adding water quality treatment in areas that do not currently have treatment.
- **City-wide Repair/Replacement Program (P-3).** Allocate funds to conduct replacement of public pipe and outfalls (outside of the Charbonneau development area) in conjunction with inspection results and asset management efforts.
- **Charbonneau Repair/Replacement Program (P-4).** Allocate funds to conduct replacement of public pipe and structures within the Charbonneau development area in accordance with the Charbonneau Consolidated Improvement Plan (2014). Excludes portions of the system identified by CPs WR-4 and WR-5.
- **Riparian Vegetation Management Program (P-5).** Allocate funds to conduct riparian and/or in-channel vegetation restoration and maintenance including removal of invasive plant species.
- **Vegetative Facility Maintenance Program (P-6).** Allocate funds to conduct restorative maintenance for select stormwater facilities (public and private) in the City where larger-scale maintenance is needed and/or maintenance agreements are not in place or executed.

Table ES-2. Program Costs

Project Number	Project Name	Objective(s) Addressed	Estimated Annual Cost
City-Wide Programs			
P-1	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	$100,000/yr
P-2	Water Quality Retrofit Program	• **Water Quality** • Capacity	$200,000/yr
P-3	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$275,000/yr
P-4	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	$1,920,000/yr
P-5	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	$25,000/yr
P-6	Vegetative Facility Maintenance Program	• **Water Quality** • Maintenance	$25,000/yr
		Annual Total	$2,545,000/yr

*Note: Primary objectives addressed are identified in **BOLD**. Objectives relate to identified or ongoing city-wide needs to address known system/ facility deficiencies.*

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Implementation

CPs, program needs, and policy recommendations collectively inform the City's updated Stormwater Capital Improvement Program (CIP) as described in this SMP.

To ensure effective implementation of the CIP over the 20-year planning period, City staffing levels were analyzed against project and programs developed as part of this SMP. The purpose of this analysis was to inform recommendations as needed for additional Public Works Operations and Community Development engineering staff.

An additional 2.7 FTE in Public Works Operations and 1.4 FTE in Community Development/Engineering are recommended to accommodate new projects and programs defined in this SMP as well as to address deferred maintenance activities and new regulatory requirements.

CPs are prioritized to inform the implementation schedule and respective funding needs of capital investments. The City will need to develop a financial plan to ensure funding of the scheduled capital costs, program costs, and staffing needs. Future financial planning, including level of service goals, a stormwater utility rate evaluation, and a system development charge (SDC) update, should reflect rates necessary to implement the Stormwater CIP while meeting other financial obligations.

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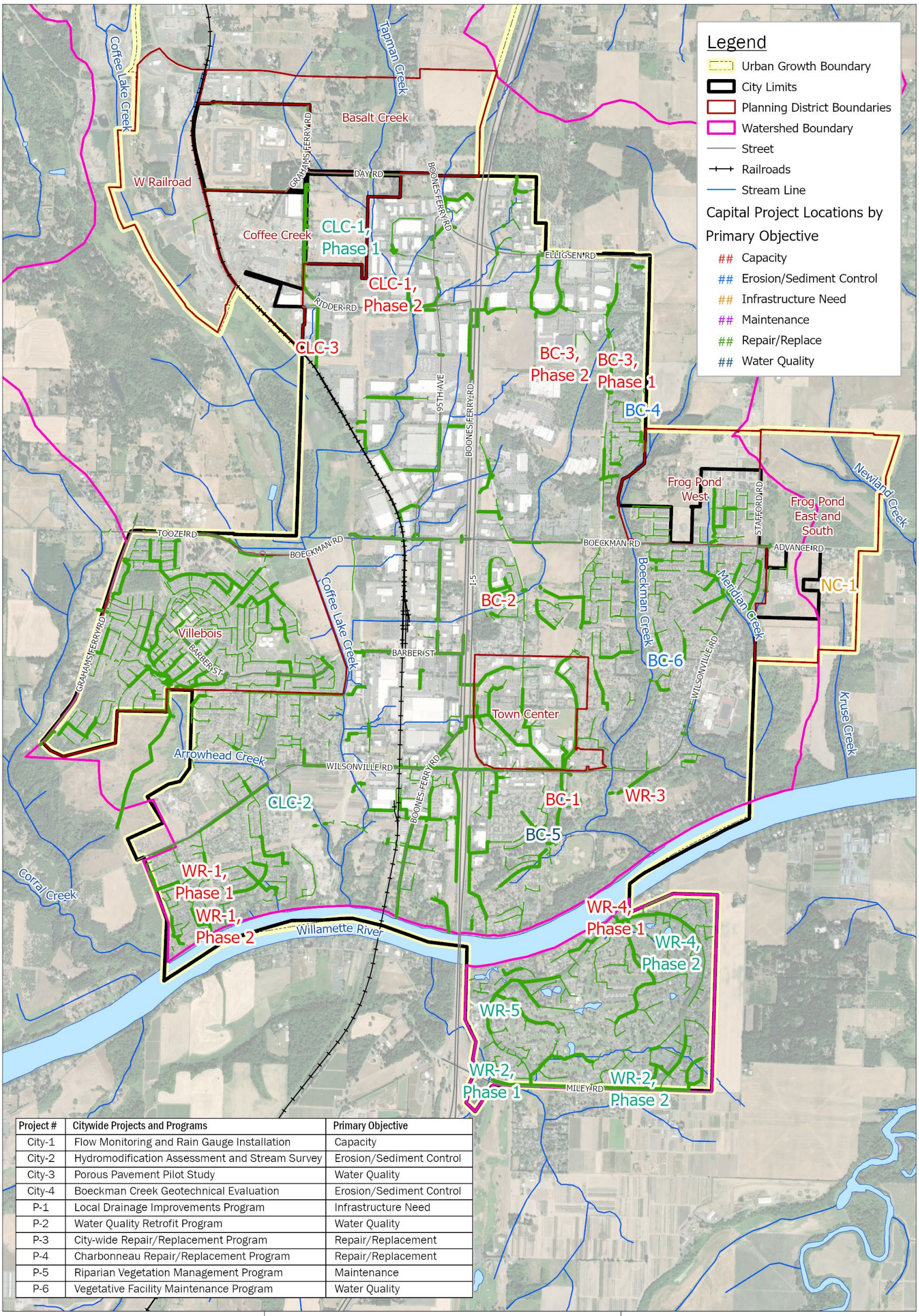

Project #	Citywide Projects and Programs	Primary Objective
City-1	Flow Monitoring and Rain Gauge Installation	Capacity
City-2	Hydromodification Assessment and Stream Survey	Erosion/Sediment Control
City-3	Porous Pavement Pilot Study	Water Quality
City-4	Boeckman Creek Geotechnical Evaluation	Erosion/Sediment Control
P-1	Local Drainage Improvements Program	Infrastructure Need
P-2	Water Quality Retrofit Program	Water Quality
P-3	City-wide Repair/Replacement Program	Repair/Replacement
P-4	Charbonneau Repair/Replacement Program	Repair/Replacement
P-5	Riparian Vegetation Management Program	Maintenance
P-6	Vegetative Facility Maintenance Program	Water Quality

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Note: Capital Projects City-1 to City-4 and Programs P-1 to P-6 are citywide and not specific to a single location.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure ES-1: City of Wilsonville Capital Improvement Program Overview

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Section 1

Introduction

The City of Wilsonville (City) developed this Stormwater Master Plan (SMP or Plan) to guide stormwater and drainage-related capital project (CP), program, and policy decisions over a 20-year planning period.

The City's overall storm drainage system includes approximately 87 miles of piped and open channel (e.g., ditch, stream) conveyance, in addition to stormwater treatment and detention facilities for stormwater management. Most of the City's stormwater is collected and conveyed from north to south, discharging to the Willamette River via major stream corridors including Boeckman Creek (eastern portion of the City) and Coffee Lake Creek (western portion of the City). This SMP collectively considers both piped and open channel conveyances as part of the overall storm drainage system.

This Plan documents the processes and methods used to evaluate the City's storm drainage infrastructure, City stormwater programs, and maintenance activities. Results of the evaluation provide the City with projects, programs, and policies for implementation over the next 20 years and support future funding evaluations and stormwater utility rate and system development charge (SDC) calculations.

1.1 Need for a Master Plan

The City's previous SMP was completed in 2012, setting the course for stormwater management policies and CPs for the last decade. CPs and programs were proposed, prioritized, and scheduled (short term, midterm, long term, and unfunded) in the 2012 SMP, and some of the higher priority projects have been initiated or constructed. However, for some unconstructed and unfunded projects, the project needs have changed, and warrant reconsideration based on development drivers and regulatory needs.

In 2012, project prioritization focused more on project complexity and cost versus other objectives that are of increased importance (e.g., safety, recurring maintenance, water quality, erosion, and stream protection). New regulatory drivers, including the City's reissued 2021 Phase I National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit and the Oregon Department of Environmental Quality's (DEQ's) 2021 finalization of the 2019 Revised Willamette Basin total maximum daily load (TMDL) for mercury prompted increased consideration of water quality objectives as part of the capital project and program development effort.

Since 2012, new and re-development activities are rapidly occurring within the City's urban growth boundary (UGB). New infrastructure is continually being added, and ongoing maintenance of new infrastructure can strain City resources. The City also needs a proactive plan to address existing capacity deficiencies and aging and failing infrastructure, while considering resource limitations and development trends.

This SMP addresses water quantity, quality, and natural resource management for constructed drainage systems and stream corridors under the City's management.

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1.2 Master Plan Objectives

The City's overarching goal for this SMP is to guide storm drainage infrastructure improvements over a 20-year implementation period. Improvements must address maintenance/system condition issues, capacity issues, and water quality needs into the future. Specific objectives of the City's SMP include the following:

- Establish a process for evaluating and prioritizing stormwater needs in Wilsonville.
- Solicit information from staff to inform the identification of project needs and improvements.
- Identify known areas of flooding and other storm drainage problems, and provide project solutions related to collection, conveyance, treatment, and natural resource protection.
  - Update the City's existing hydrologic and hydraulic (H/H) model to evaluate system capacity based on current system information and updated land use and development conditions as obtained from the City's Planning Division.
  - Integrate findings and project needs stemming from stormwater planning documents completed since 2012 (i.e., 2015 Retrofit Plan, 2015 Hydromodification Assessment, development-specific master plans, etc.).
- Identify programmatic and planning opportunities to address areas of frequent maintenance needs, system condition deficiencies, and water quality concerns on a City-wide scale.
- Support long-term staffing and funding of the City's stormwater utility.
- Support current, pending, and future regulatory requirements and drivers through CPs, programs and policy recommendations.

This Plan is intended to support regulatory directives under the City's NPDES MS4 Permit and total maximum daily load (TMDL) obligations.

1.3 Approach

The City developed this SMP using an initial, collaborative planning approach with Community Development (Engineering and Planning divisions) and Public Works to assess known storm drainage problem areas and identify areas where the addition, replacement, or retrofit of infrastructure is needed to address an issue.

Targeted system evaluations were conducted to investigate water quality or natural resource opportunities and confirm capacity limitations. Following system evaluation efforts, Project Opportunity Areas were defined and vetted with the project team to inform the development of capital project and program concepts and costs.

This overall process allowed the City to develop multi-benefit projects that target areas of the City likely to be prioritized and funded in a capital improvement program.

Figure 1-1 outlines the approach used to develop this Plan. Detail related to specific evaluation efforts can be found in the following technical memorandums:

- Technical Memorandum #1 (TM1)- Stormwater Basis of Planning (February 2022), not included directly in this SMP document, but much of the content and figures have been integrated into this SMP document.
- Technical Memorandum #2 (TM2)-Geomorphic Reconnaissance of Boeckman, Meridian, and Arrowhead Creeks (May 2022), included in this SMP as Appendix C.
- Technical Memorandum #3 (TM3)-Hydrologic and Hydraulic Modeling Methods and Results, included in this SMP as Appendix B.

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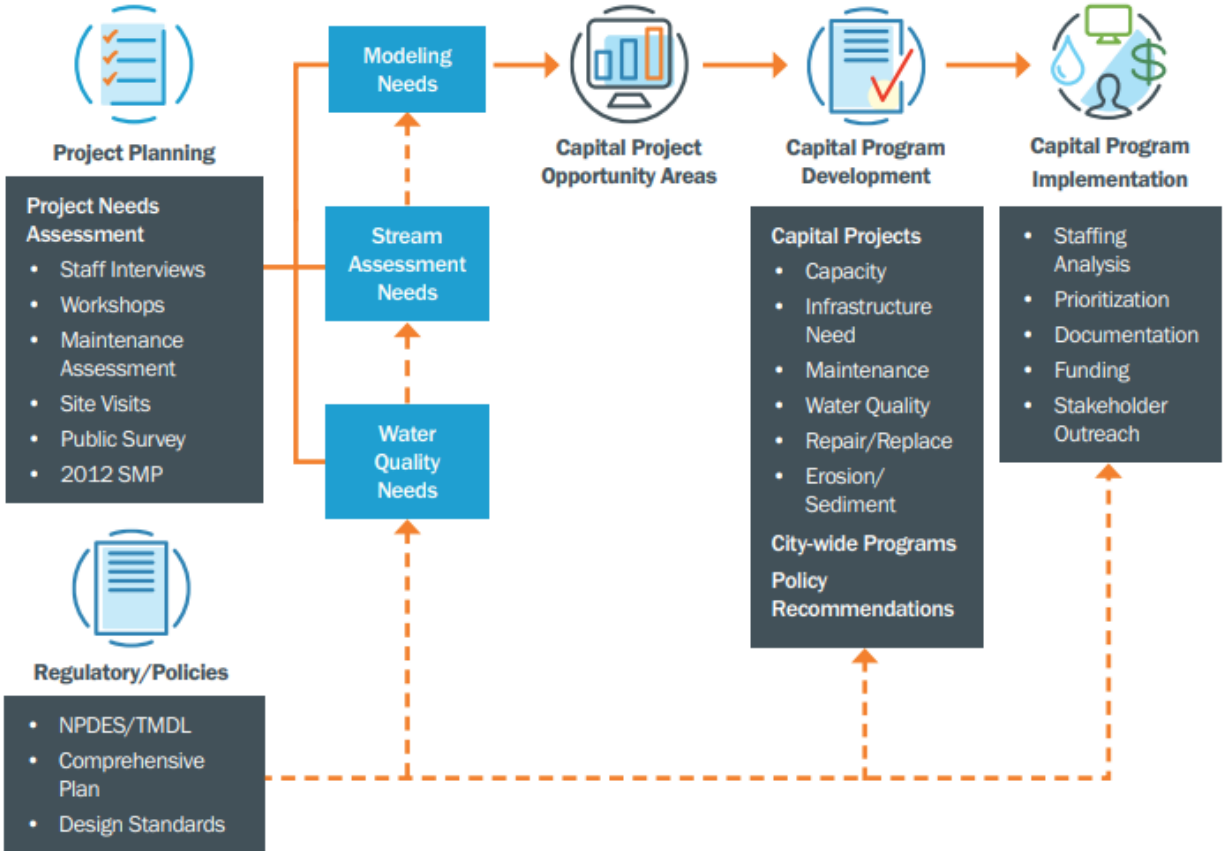

Figure 1-1: Stormwater Master Plan Approach

1.4 Supporting Documents

In addition to the 2012 SMP, several development-specific drainage reports and technical studies prepared since 2012 helped inform project development efforts. Many of these documents contain proposed infrastructure and capital improvements that have been integrated into capital projects proposed in this SMP. However, individual development master plans should still be referenced for detailed design concepts in these development areas. A summary of the reports and studies reviewed and considered for this SMP are listed in Table 1-1.

Additional detail related to regulatory drivers including the 2015 Retrofit Assessment and 2015 Hydromodification Assessment is provided in Section 2.6.

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Table 1-1. Existing Stormwater Planning Documentation and Reports		
Report	**Date**	**Summary and application to the SMP**
City of Wilsonville Stormwater Master Plan	2012	Recommends capital improvement projects to achieve city wide stormwater goals and objectives. Projects completed or in progress include SD4208 & SD4209, BC-4, BC-7, ST-6, ST-7, SD9030-9037, SD9013-9021, SD9060, ST-5, LID1, SD9022-9029, ST-9, and WD-3.
Villebois Village Master Plan	2013	Establishes projected land use categories/density requirements for the 2,300 residential unit development. Onsite and regional stormwater management concepts for treatment and detention are outlined.
Charbonneau Consolidated Improvement Plan	2014	Documents pipe replacement projects to address capacity deficiencies and poor condition of the existing stormwater collection system. Includes prioritization of stormwater pipe replacement in conjunction with other utilities (sanitary, water, etc.).
Stormwater Retrofit Plan	2015	Provides an updated prioritization of capital project needs stemming from the 2012 SMP, focusing on water quality criteria.
Hydromodification Assessment	2015	Provides an evaluation of hydromodification risk in stream corridors within the City, as well as recommended actions (including projects) for the City to implement.
Frog Pond Area Plan/West Master Plan	2015/2017	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage. The Frog Pond West Master Plan does not include information about proposed storm drain infrastructure, as that is detailed in the Area Plan.
Basalt Creek Concept Plan	2018	Provides preferred land use and recommends high-level concepts for transportation and infrastructure planning for the Basalt Creek Planning Area.
Town Center Plan	2019	Documents the proposed reconfiguration of existing stormwater infrastructure in conjunction with redevelopment of the Town Center area. Preliminary concepts send additional flow to the Library Detention Pond and remove an existing high flow bypass structure directing runoff west across I-5.
TMDL Implementation Plan	2019/2022	Outlines programmatic activities and best management practices (BMPs) implemented by the City to address instream temperature.
Frog Pond East/South Master Plan	2022	Provides the approximate size, location and cost of stormwater infrastructure needed to manage onsite drainage.

1.5 Master Plan Organization

Following this introductory Section 1, this SMP is organized as follows:

- Section 2 includes a description of the study area characteristics.
- Section 3 outlines the basis of planning, including the project needs assessment (identification of stormwater problem areas), water quality retrofit evaluation, and additional background to support the project identification and development effort.
- Section 4 summarizes the geomorphic stream assessment.
- Section 5 describes H/H modeling methods and results of the stormwater drainage system capacity evaluation and the identification of capacity-related capital project needs.
- Section 6 summarizes the stormwater capital project development effort, including development of project opportunity areas and determination of final capital project and program needs.
- Section 7 provides an overview of the implementation elements of the capital improvement program, including results of the stormwater staffing analysis specific to Public Works and Community Development, as well as project prioritization and policy recommendations.

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Section 2

Study Area Characteristics

This section provides an overview of study area characteristics, including location, topography, soils, land use, climate and rainfall, drainage system configuration, community perspectives, and regulatory objectives.

Referenced figures depicting study area characteristics are located at the end of this section.

2.1 Location and Study Area

The City of Wilsonville (City) is located primarily in Clackamas County with the northern portion of the City located in Washington County. The City is approximately 17 miles south of Portland, Oregon in the Willamette River Valley. The Willamette River runs west-east in the vicinity of the City, generally forming the southern City boundary with the majority of the City situated to the north of the river. The Charbonneau District is located south of the Willamette River (Figure 2-1). Interstate 5 (I-5) runs north to south through the center of the City and influences topography and drainage patterns.

The City covers six major basins within the city limits with topography that causes each basin to ultimately drain to the Willamette River (see Figure 2-2 at the end of this section). The waterways that define the major basins include Mill Creek (including the Corral Creek tributary), Coffee Lake Creek (including the Tapman Creek tributary), Boeckman Creek, and Meridian Creek which all flow from north to south and drain to the Willamette River. Developed areas adjacent to the Willamette River directly discharges to the Willamette River via pipe or open channel, and these areas are indicated on Figure 2-2, at the end of this section, as the Charbonneau basin and Willamette River direct basin. Together, Coffee Lake Creek/Tapman Creek and Boeckman Creek drain about 71 percent of the total city area, and their watershed boundaries extend outside the city limits and the urban growth boundary (UGB). The Coffee Lake Creek watershed is the largest, covering approximately 50 percent of the city area within the UGB.

The future Frog Pond East and South Planning District (within the UGB but partially within and outside of current City limits) will drain to Newland Creek, a tributary to the Willamette River, and the unnamed tributary to the Willamette River at SW Kruse Rd. (thereby known as Kruse Creek in this SMP).

Some drainage systems in the city have also been re-routed to accommodate new development. For example, a historical flow diversion was constructed to re-route flows from Arrowhead Creek (in the Coffee Lake Creek watershed) to Legacy Creek (outside of the city limits), and a current flow diversion is used to re-route flow from the middle tributary of Coffee Lake Creek toward upstream Boeckman Creek. While efforts have been made to redirect flows back to their historical points of discharge, impacts can still be observed.

Table 2-1 summarizes the major basins and contributing drainage areas, both within the city limits/UGB and outside of the UGB. The defined study area for this SMP reflects areas of the City where hydrologic modeling was conducted, and the study area includes all areas within the city limits and UGB, with the exception of the Frog Pond East and South Planning District, located in the Newland and Kruse Creek basins. This area is predominately outside of the current UGB and subject to basin-specific master planning for utility placement (see Section 3.5).

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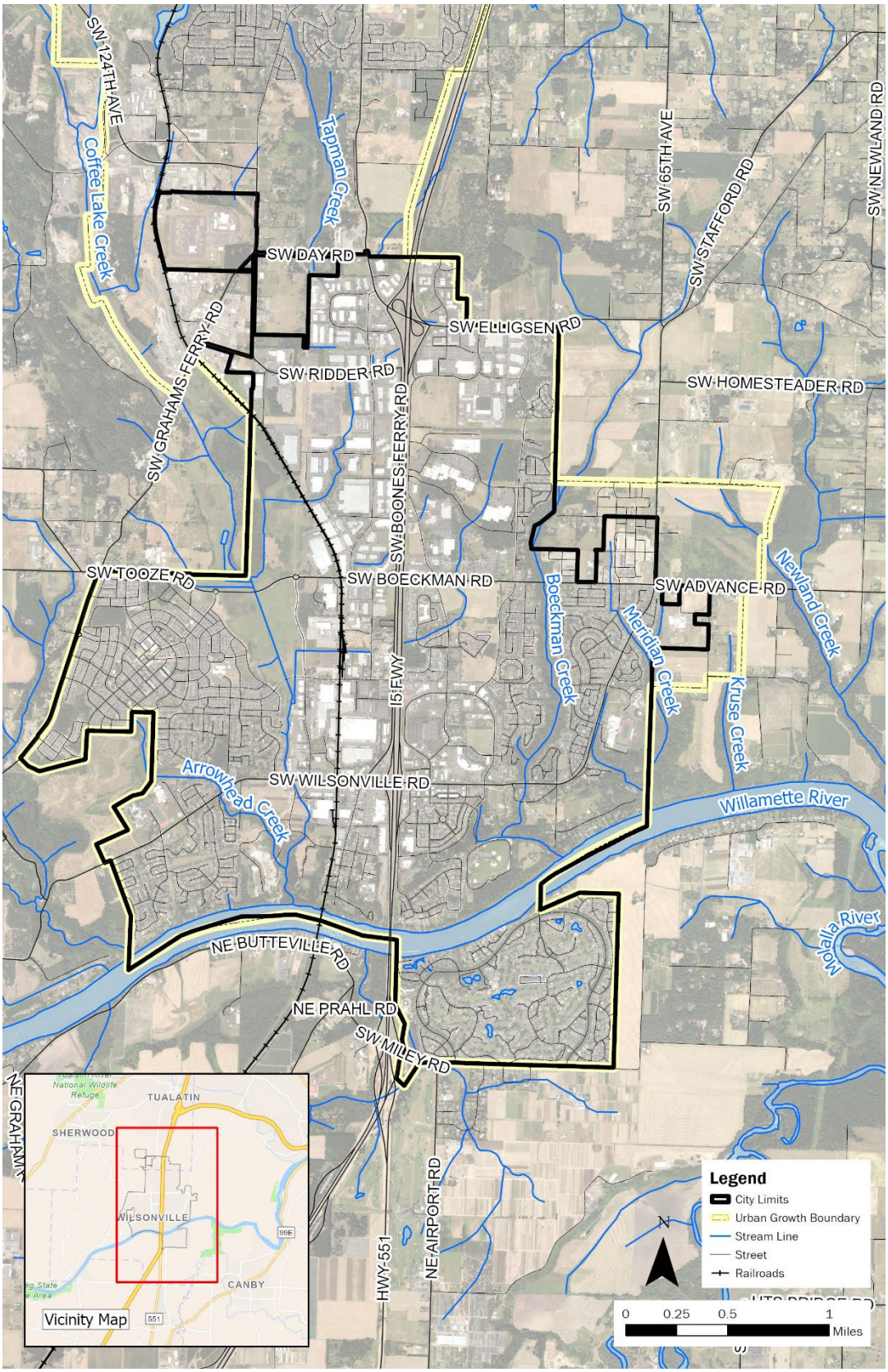

Figure 2-1: Location Overview

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Table 2-1. Study Area Overview				
Basin	Study Area (ac)			Total Study Area (ac)
	Within City Limits	Outside of City Limits (within the UGB)	Outside UGB	
Major Basins				
Boeckman Creek	1,096	70	806	1,972
Charbonneau	478	0	4	482
Coffee Lake Creek	2,332	1,418	1,412	5,162
Mill Creek[a]	101	0	10,424	10,525
Meridian Creek	283	100	87	470
Willamette River	505	0	0	505
Total	**4,795**	**1,588**	**12,733**	**19,116**
Related Basins				
Kruse Creek	13	55	231	299
Newland Creek	0	138	3,098	3,236

a. Area outside UGB is provided for informational purposes and does not contribute to City infrastructure.

2.2 Topography/Soils

Wilsonville's natural topography is characterized by steep hillsides on the eastern edge of the city, along the Boeckman Creek corridor, and relatively flat topography and floodplain area around Coffee Lake Creek basin and the associated Coffee Lake wetlands along the western portion of the city. Elevation within the city ranges from approximately 380 feet in the headwaters of Coffee Lake Creek to approximately 60 feet at the Willamette River.

Soil characteristics within the city vary by watershed. Soils within the city are generally limited in infiltration capability (Hydrologic Soil Group (HSG) C/D), although large areas of HSG B soils along the Willamette River and in the headwaters of Tapman Creek have higher infiltration rates. Soils are generally silty or silty loam, except along the canyon portion of Boeckman Creek, which are combination silt and sand. The downstream reach of Coffee Lake Creek also has a higher portion of gravel and cobble substrate materials than other city areas (ODFW, 2006).

Soils are an important watershed characteristic for evaluating potential runoff rates and volumes. Soils information for the study area was sourced from the National Resources Conservation Service (NRCS) Soil Survey online tool. Soil information is based upon data obtained from a 2016 publication from the U.S. Department of Agriculture, NRCS titled "Soil Survey (SSURGO) Database for Columbia County, Oregon."

For this SMP, soil texture classifications were considered for hydrologic modeling purposes. These texture classifications include various parameters that approximate soil runoff and infiltration potential. Generally, soils with sandy or silt textures have higher rates of infiltration and lower runoff potential, whereas soils with clay textures have lower rates of infiltration and high runoff potential.

Table 2-2 lists the NRCS Soil Texture Classes by percent coverage and by basin. Most of the study area (80 percent) is in the Silt Loam soil texture class. This soil class is characterized as, more than 70 percent silt, 50 percent or less sand, and less than 30 percent clay by weight.

Figure 2-3, at the end of this section, shows the soil texture classifications throughout the study area.

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Table 2-2. Soil Textures within the Study Area (by % of major basin)						
Basin	Clay	Loam	Sandy Loam	Silt Loam	Silty Clay Loam	Total
Boeckman Creek	0%	1%	0%	95%	4%	100%
Charbonneau	0%	67%	2%	30%	1%	100%
Coffee Lake Creek	7%	12%	0%	76%	5%	100%
Mill Creek	0%	0%	0%	97%	3%	100%
Meridian Creek	0%	0%	0%	100%	0%	100%
Willamette River	0%	16%	6%	74%	4%	100%
Total by Combined Area	**4%**	**11%**	**1%**	**80%**	**4%**	**100%**

2.3 Land Use and Population

The City resides within the Metro UGB, and as such development in and around Wilsonville is coordinated with Metro and the surrounding jurisdictions. The City has grown from a rural farming community to a thriving city encompassing approximately 7.8 square miles (approximately 5,000 acres) and is home to over 26,500 residents. The City's population has increased by approximately 3.6 percent annually over the last decade; increasing from approximately 19,509 in 2010 to 26,597 in 2022.[1]

Land use within the City of Wilsonville includes residential, commercial, and industrial, with most of the commercial and industrial development located along the I-5 corridor. Open space areas are scattered throughout the City and include a number of parks, wetlands, and riparian areas.

2.3.1 Development Conditions

Wilsonville is primarily developed within the current city limits; however, there are areas of undeveloped and underdeveloped land that are anticipated to redevelop and densify over this SMP planning period. These areas include the Town Center Planning District and existing low-density residential in the southern portion of the City.[2]

New development is projected to occur in designated future planning areas within the UGB. These future planning areas include the Coffee Creek Planning Area (industrial development), Basalt Creek Planning Area (industrial development), Frog Pond West Planning Area (residential development), and Frog Pond East and South Planning Area (residential and institutional development). The City uses a similar master planning process for the planning areas to guide infrastructure planning and provide opportunities to mitigate natural resource impacts, including the protection and restoration of adjacent stream channels.

1 United States Census Bureau (2022), https://www.census.gov/quickfacts/fact/table/wilsonvillecityoregon#

2 House Bill (HB) 2001 was adopted by the Oregon Legislative Assembly in June 2019, and it promotes middle housing to increase housing options for Oregon citizens. As such, areas zoned as "single family residential" had to be reclassified to allow for duplexes, triplexes, and other middle housing options.

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2.3.2 Land Use Coverage and Imperviousness

For this SMP, land use categories, coverages, and impervious percentages by land use category were initially prepared by the City's Planning Division and reviewed by BC to accurately reflect existing conditions and future development/densification anticipated because of House Bill (HB) 2001.[3]

Existing and future land use coverages for the study area are provided in Figure 2-4 and Figure 2-5 at the end of this section. Land use/zoning consolidation and reclassification, as well as associated impervious percentages by land use are reflected in Table 2-3. Additional description of the process for developing updated land use GIS coverages and impervious percentage estimates are reflected in Section 5.4.

Future land use coverage within the city limits or a defined concept planning area assumes that all developable (vacant) lands will develop into their underlining zoning category. In addition, specific residential areas in the City may adjust to a denser land use category (i.e., PDR2 to PDR5) per HB 2001. Aside from these situations, the existing land use coverage is generally assumed to be retained for the future development condition.

Table 2-3. Land Use Categories

Land Use Categories (2012)	Land Use Categories (Updated)	Calculated Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15 [b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential-Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used.

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City (October 2021).

b. Based on the adjusted impervious percentage value per the Boeckman Road Hydraulic Evaluation and model calibration (December 2021).

[3] Key revisions to City zoning coverage made for this SMP include the adoption of the "Planned Development Residential" (PDR) nomenclature to define residential lands, the subsequent removal of the "Villebois" designation for a subset of residential, multi-family residential, and commercial areas, and the addition of several previously uncategorized land use types.

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2.4 Climate and Rainfall

Wilsonville's climate is characterized by cool wet winters and warm summers. Most rainfall occurs between October and March. On average, December is the wettest month with an average of 7.1 inches of precipitation. July and August are the warmest and driest months with average high temperatures above 80 degrees Fahrenheit and less than 1 inch of rain per month.

The average annual precipitation for the Portland metropolitan area ranges from 37 to 43 inches, with an average of 1.8 inches of snowfall annually. There is currently no rain gage within the City of Wilsonville's jurisdiction, so the Aurora State Airport (UAO) rain gage (approximately 5 miles to the south) is used as a proxy. Based on the UAO data, Wilsonville averages 43 inches of rainfall a year and 2 inches of snowfall annually. Rainfall data from Clean Water Services (CWS) was also used to supplement H/H modeling and model validation efforts.

The lack of, and need for, local rainfall data has led the City to prioritize the installation of a rain gage and at least three flow meters as funded through the city-wide CP "City-1" (see Section 7 for more information). Acquisition of localized and real-time precipitation data allows the City to prepare for and support mitigation of precipitation-related impacts of climate change including increased rainfall intensities, storm surges and flooding, which are likely to affect many urban systems and services.

Current climate and rainfall projections show wide ranging uncertainty regionally and are not time scales typically used for designing storm systems. Therefore, modifications to the City's Public Works Design Standards (PWDS) and design storm events were not proposed for this SMP and associated CP sizing. However, urban planning is key to developing and implementing responses to changing precipitation patterns in urban systems. Incorporation of tools such as updated design storms reflecting local precipitation patterns are one way to adapt the SMP as necessary to address climate change. As data becomes available, the City will continue to work to identify how climate change is likely to impact the City's ability to operate its facilities and meet policy, program, and project objectives.

2.5 Drainage System

The City maintains an asset inventory of their stormwater collection system in GIS that contains various attribute fields depending on the asset class. This information is continually updated by City staff as new information becomes available, either from field investigations or as-built records.

The City manages approximately 83 miles (approximately 439,100 linear feet [LF]) of stormwater drainage pipe and culverts. Table 2-4 summarizes City-owned pipe and culvert system assets mapped (in GIS) throughout the City, as well as approximately 4 miles of mapped streams.[4]

4 Data for Tables 2-4 through 2-6 was sourced from City-provided GIS databases in 2021.

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Table 2-4. System Asset Inventory-Public (City) Pipe/Culvert/Stream (mapped in GIS), City-wide							
Diameter (in)	Length (ft) by basin						Total (ft)
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
<12	11,941	11,168	21,115	532	1,104	6,514	52,375
12-18	53,046	35,189	126,356	11,591	17,799	29,216	273,196
20-27	9,469	6,104	28,636	1,205	2,772	6,125	54,311
30-36	7,326	8,358	18,855	0	1,045	4,047	39,632
42-48	1,807	823	6,054	0	0	4,381	13,064
54-60	60	0	169	0	0	0	229
72-84	424	0	250	0	0	0	674
Total Pipe [a]	84,072	61,641	201,437	13,328	22,720	50,284	433,481
Total Culvert [b]	1,412	212	3,035	322	331	284	5,596
Total Pipe & Culvert	85,484	61,853	204,472	13,650	23,051	50,568	439,077
Total Mapped Stream [c]	5,791	2,718	11,003	0	2,760	197	22,469

a. Pipe refers to active, public mainlines only, excludes laterals.

b. Ownership, maintenance responsibility, and life cycle status of culverts not identified in GIS data-all available data is included in total length.

c. Mapped stream/creek total length clipped to area within city limits and excludes Willamette River shoreline.

Tables 2-5 and 2-6 summarize major City-owned storm structures, such as clean outs, inlets, manholes, stormwater treatment facilities, and outfalls.

Table 2-5. System Asset Inventory–Storm Structures (City ownership)							
Facility	Number by basin						Total
	Boeckman Creek	Charbonneau	Coffee Lake Creek	Mill Creek	Meridian Creek	Willamette River (direct)	
Clean out	566	95	656	3	104	109	1,533
Inlets [a]	618	423	1,363	101	203	292	3,000
Manholes [b]	619	304	1,574	119	158	307	3,081
Outfalls	77	5	117	18	21	24	262

Note: Excludes identified county, ODOT and private infrastructure.

a. Inlets include all inlet types: area drains, beehive inlets, catch basins, curb inlets, and other.

b. Includes all manhole types. Ownership not identified in GIS attribute data.

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Table 2-6. System Asset Inventory-Water Quality Facilities (City ownership/maintenance responsibility)

Facility	Number /Footprint Area (SF) by basin												Total	
	Boeckman Creek		Charbonneau		Coffee Lake Creek		Mill Creek		Meridian Creek		Willamette River (direct)			
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Infiltration Vault [a]	1	N/A	0		2	N/A	0		0		3	N/A	6	N/A
Vegetated Facility [b]	113	37,248	0		44	213,420	2	1,432	50	46,234	3	3,443	212	301,777
Pond	6	35,758	0		4	58,518	0		0		1	992	11	95,268

a. GIS data do not include the configuration of an infiltration vault. Based on communications with City staff, an infiltration vault is likely a proprietary filtration vault (e.g., Contech StormFilter). Infiltration vaults have N/A listed in the area column as these are point locations and not dependent on facility surface size.

b. Includes swales, lined planters, and filtration rain gardens.

Figure 2-6, at the end of this section, provides an overview of the stormwater collection system throughout the City including stormwater mains, manholes, outfalls and public stormwater treatment and detention facilities as of 2021. The City's GIS data reflecting both public and private stormwater treatment and detention/retention facilities is continuously updated by City staff, the most up to date record can be found at https://www.wilsonvillemaps.com/.

2.6 Regulatory Drivers

The Oregon Department of Environmental Quality (DEQ) is responsible for implementing provisions of the federal Clean Water Act pertaining to stormwater discharges and surface water quality. DEQ issues permits related to surface water discharges, establishes water quality criteria for waterbodies based on designated beneficial use, and conducts studies and evaluations to determine whether a waterbody adheres to water quality standards.

Regulatory drivers considered in the context of this SMP include Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) permit requirements and the Total Maximum Daily Load (TMDL) program and associated 303(d) listings for receiving waters.

2.6.1 NPDES Permit Requirements

The City is a co-permittee on the Clackamas County Phase 1 NPDES MS4 permit, along with 13 other jurisdictions in Clackamas County, for management of stormwater runoff. Other neighboring co-permittees include the cities of West Linn, Lake Oswego, and Oregon City.

The NPDES MS4 permit program regulates the discharges of stormwater to receiving waters from urbanized areas and requires permitted municipalities to develop and implement stormwater control measures to address water quality. As a co-permittee, the City is independently responsible for the implementation of their permit, although coordination through intergovernmental agreements (IGAs) with co-permittees is commonplace to help efficiently address programmatic needs such as public education and monitoring. The City's NPDES MS4 permit was reissued in October 2021 after being administratively extended when the previous permit expired in 2017. Most recently, the effective NPDES MS4 permit was modified in May 2023 to address a change in monitoring requirements.

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Implementation of the City's NPDES MS4 permit is outlined in their 2022 Stormwater Management Program document (SWMP). Stormwater activities or best management practices (BMPs) are outlined to address the elements of the permit including:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Stormwater Management for New Development and Redevelopment
- Pollution Prevention and Good Housekeeping for Municipal Operations
- Industrial and Commercial Facilities
- Monitoring and Reporting
- Stormwater Management Facilities Operation and Maintenance Activities

In addition to the elements above, the reissued NPDES permit requires an assessment of outcomes from the 2015 Hydromodification Assessment and 2015 Retrofit strategy, which was due to DEQ by December 1, 2023. This review required an evaluation of progress made under both plans and, as necessary, establishing new goals, priorities, and projects. This SMP incorporates goals and project identification efforts conducted for both documents (see Section 3.2 Water Quality Retrofit Analysis and Section 4 Stream Assessment), as well as identifies new projects and programs to support efforts in the future.

The continued consideration of water quality in conjunction with planning and development efforts is addressed within the City's NPDES MS4 permit, further necessitating the need for this SMP to address stormwater treatment, particularly in locations where treatment is not provided.

2.6.2 TMDL and 303(d) Listings

Wilsonville is in the Middle Willamette River watershed. All areas within the city limits and associated concept planning areas discharge either directly or indirectly to the Willamette River between river mile (RM) 37 and 40.

On September 21, 2006, DEQ finalized a TMDL for the Willamette Basin. The TMDL addressed water quality impairment of the Middle Willamette River and its tributaries and included previously approved TMDLs by reference. The Willamette Basin TMDL addressed bacteria, mercury, and temperature, and included wasteload allocations (WLAs) and load allocations (LAs) specific to Designated Management Agencies (DMAs), except for mercury, as it required additional monitoring and analysis prior to the development of allocations.

On November 22, 2019, DEQ issued the Final Revised Willamette Basin Mercury TMDL, which was in turn submitted and disapproved by the United States Environmental Protection Agency (USEPA) due to questions related to the identification of sources and associated concentrations used to define WLAs and LAs. On February 4, 2021, the Willamette Basin mercury TMDL was reissued by the USEPA, including WLAs specific to the stormwater.

Table 2-7 summarizes the TMDL pollutants and associated LAs and WLAs applicable to Wilsonville. The City's 2022 TMDL Implementation Plan specifies temperature management activities targeting effective shade as well as natural resource and stream channel restoration and riparian cover. Additionally, in conjunction with NPDES MS4 obligations, the City is required to develop pollutant load reduction benchmarks at the end of each permit cycle to quantify TMDL pollutant load reduction estimates due to stormwater management activities and facilities. This requires the continual

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installation of water quality treatment facilities to ensure progress is made towards TMDL pollutant load reduction goals.

Additional water quality impairments relevant to the City are reflected in the effective (2018/2020) 303(d) list for receiving waters within the City. Parameters of concern for the Middle Willamette River include aldrin, biological criteria, DDT/DDE, dieldrin, and polychlorinated biphenyls (PCBs). Such parameters represent additional targeted parameters for pollutant reduction with the City's stormwater program, as TMDLs are slated for development for these parameters in the future.

Table 2-7. TMDL Summary for Wilsonville

TMDL	Year	Subbasin(s)	TMDL Parameters	TMDL Surrogate Parameters	WLA	LA
Willamette River	2006	Middle Willamette	• Mercury • Bacteria (*E. coli*) • Temperature	Effective shade (surrogate for temperature)	• Mercury = 97% [a] • Bacteria = 75-88% reduction [b]	Temperature = 85-95% effective shade

a. Air deposition is the primary source of mercury for MS4 permittees. Through the City's reissued (2021) MS4 NPDES permit, the City was required to prepare a mercury minimization assessment and BMP effectiveness analysis to assess pollutant removal potential.

b. The WLA for bacteria varies according to season and discharge location. A 75% reduction in bacteria load is applicable for areas directly discharging to the Willamette River and a 75% reduction is applicable during the fall, winter, and spring seasons for areas discharging to tributaries. An 88% reduction during the summer season is applicable for areas that discharge to tributaries.

2.6.3 Regulatory Program Integration

Development of this SMP provides a unique opportunity to address regulatory requirements in the context of capital improvement program development, as outlined below:

- The City's 2021 NPDES MS4 permit includes expanded stormwater program and maintenance activities that will require additional stormwater resources and staffing, and such needs have been considered when developing capital project and program costs in this SMP (see Section 3.2 and Section 7.3).
- Updates to the 2015 Retrofit Plan and the 2015 Hydromodification Assessment (as required by the 2021 NPDES MS4 permit) are reflected with updated project needs identified and prioritization reflected in this SMP.
- Ongoing preservation and maintenance of stream channel vegetation and planting activities, as reflected in the 2022 TMDL Implementation Plan, are supported by capital project and program efforts (see Section 4).

Regulatory requirements have the potential to influence the City's overall stormwater capital program throughout the 20-year SMP implementation period. Figure 2-7 shows the correlation between the regulatory programs and SMP components. It reflects how requirements and activities conducted independently under individual regulatory programs help inform each other, as well as how the SMP is the primary mechanism to support capital and program funding and staffing resources that collectively benefits all programs.

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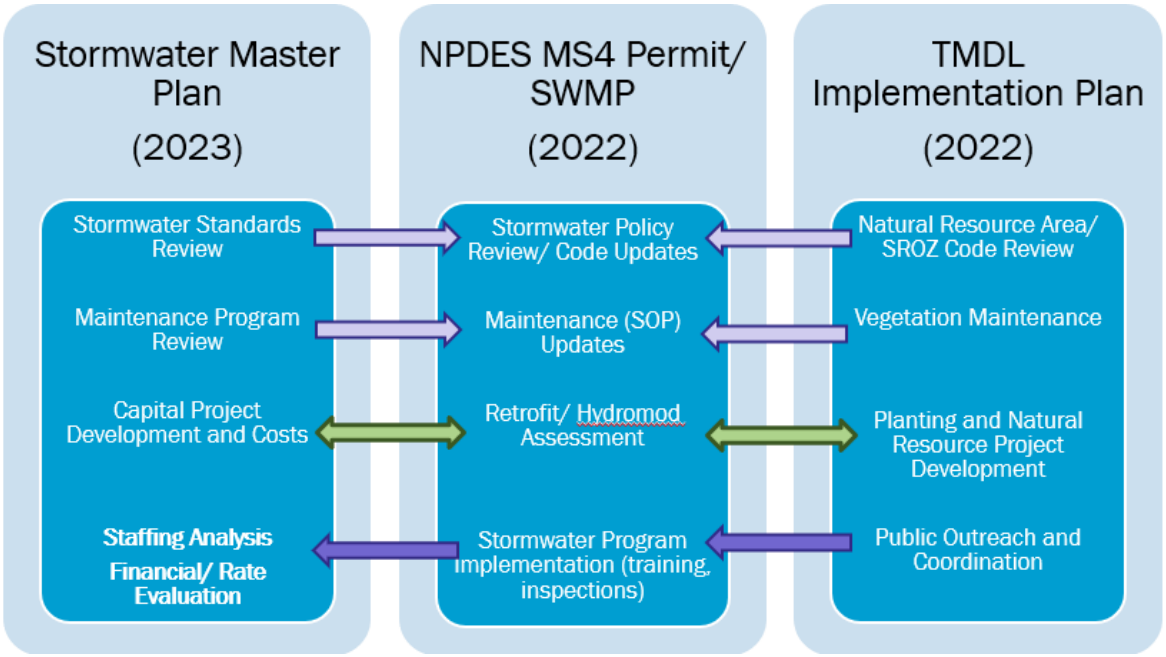

Figure 2-7: SMP and Regulatory Connectivity

2.7 Comprehensive Plan Review

All cities and counties in Oregon are required to adopt Comprehensive Plans and implement ordinances in conformance with the Statewide Planning Goals. Comprehensive Plans direct land use and development within local jurisdictions and must be legislatively adopted by the City and reviewed by the Land Conservation and Development Commission for compliance with Statewide Planning Goals. Local land use decisions must be made in conformance with the provisions and policies of the City's Comprehensive Plan.

The City of Wilsonville Comprehensive Plan (October 2018, updated June 2020) is periodically reviewed to ensure it is current and reflective of continued compliance. BC reviewed the City's Comprehensive Plan with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit. Review comments are associated with the Public Facilities and Services, under the subcategory heading "Storm Drainage Plan". Comments and suggested changes are summarized below:

- Under Policy 3.1.8, page C-8 related to the Storm Drainage Plan, to be more consistent with the MS4 NPDES permit, the reference to pollutants "temperature and turbidity" should be updated to include additional pollutants of concern.
- Under Policy 3.1.8, page C-8 and throughout the plan, there are references to "detention facilities". These references imply that detention is the main or sole type of facility used for stormwater management. Given the focus of the MS4 NPDES permit on green infrastructure, low impact development, and infiltration/retention, the term "detention facilities" should be replaced with a broader term such as "stormwater management facilities" or itemized to include more recently prioritized types of facilities.
- Under Policy 3.1.7 (based on numbering, it should be Policy 3.1.9), there is reference to constructing facilities to improve stormwater quality and control the volume of runoff. To be comprehensive this should be expanded to include reference to controlling peak rates of runoff.

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While not related to the MS4 permit, implementation measures related to natural resource areas and overlay zones in the Environmental Resources and Community Design Section (e.g., Implementation Management Measures 4.1.5.e, 4.1.5.m, and 4.1.5.n) were reviewed but no proposed adjustments are recommended in the context of the SMP.

2.8 Stormwater Operations

Stormwater-related maintenance activities are managed by the City of Wilsonville's Public Works Department, Roads and Stormwater Section. Stormwater-related planning, NPDES MS4 and TMDL compliance, and engineering activities are managed under the Community Development Department in the Engineering Division.

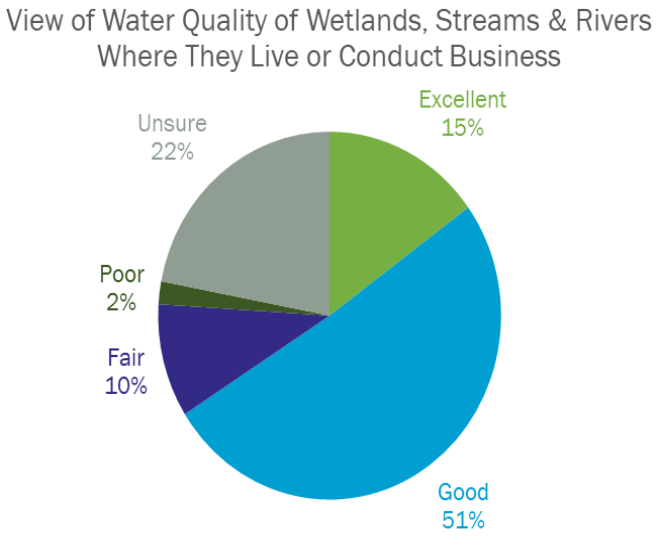
The City of Wilsonville's Public Works Roads and Stormwater Section currently has 2.74 full-time equivalent (FTE) to support ongoing stormwater maintenance efforts (0.4 FTE Stormwater Supervisor and 2.34 FTE Utility Maintenance Specialists). Of the 2.34 FTE Utility Maintenance Specialists, 2.0 FTE are dedicated to stormwater and the other 0.34 FTE reflect staff that assist with underground utility locating, but not dedicated to stormwater. Occasionally, additional coordination with Parks and Recreation is required to supplement staff to conduct routine and response-driven maintenance activities (time not reflected in the FTE summary).

The City of Wilsonville Community Development Department in the Engineering Division includes 1.5 FTE that are responsible for NPDES MS4 and TMDL compliance and directly support the Public Works Roads and Stormwater Section with facility inspections and other activities. Additional Engineering staff oversee and manage capital projects, as well as perform stormwater development review activities.

2.9 Community Perspectives

Outreach efforts were conducted at the beginning of the SMP process, in part, to obtain a better understanding of City perceptions of stormwater, as well as the perception of stormwater services provided by the City.

A public survey was advertised from April 1 to May 15, 2021, on the City's *Let's Talk Wilsonville* web platform. Interested citizens and community members were invited to participate. The survey was provided in both English and Spanish, and 90 participants completed the survey, encompassing both residential and business customers. The survey also provided a forum for participants to describe observed issues and concerns with the stormwater system operation and functionality.



Public surveys help confirm the types of capital projects most beneficial to the community

Findings from the survey indicated that more than 65 percent of the participants believe water quality in wetlands, streams, and rivers in Wilsonville are of excellent or good condition and 97 percent of participants the City had a positive impression of Wilsonville's stormwater services. For both residential and business customers, removal of pollutants before runoff enters streams; the improvement of water quality and habitat; and management of flood/flooding problems (in pipes and facilities) were identified as the most important stormwater services.

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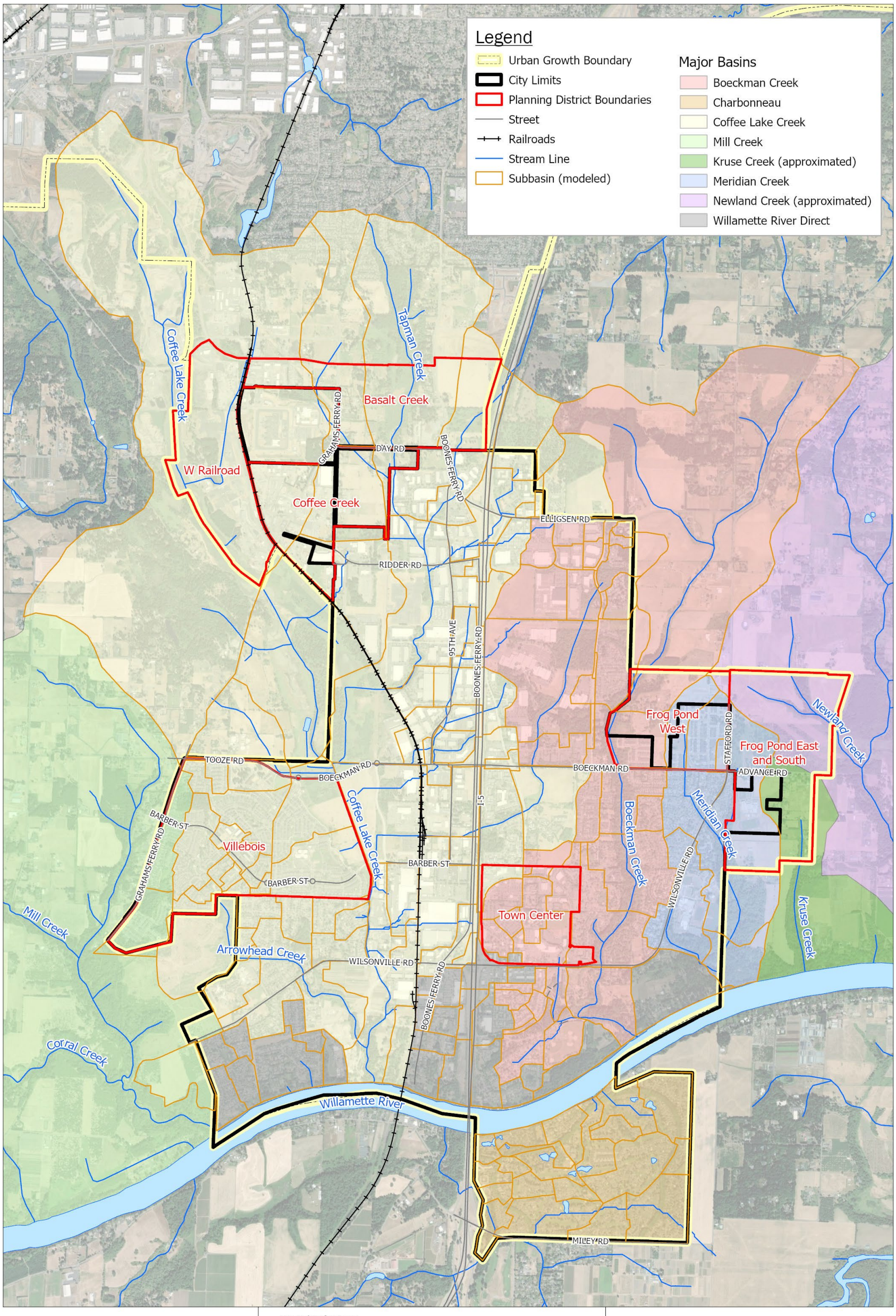

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-2: Major Basins and Planning Areas

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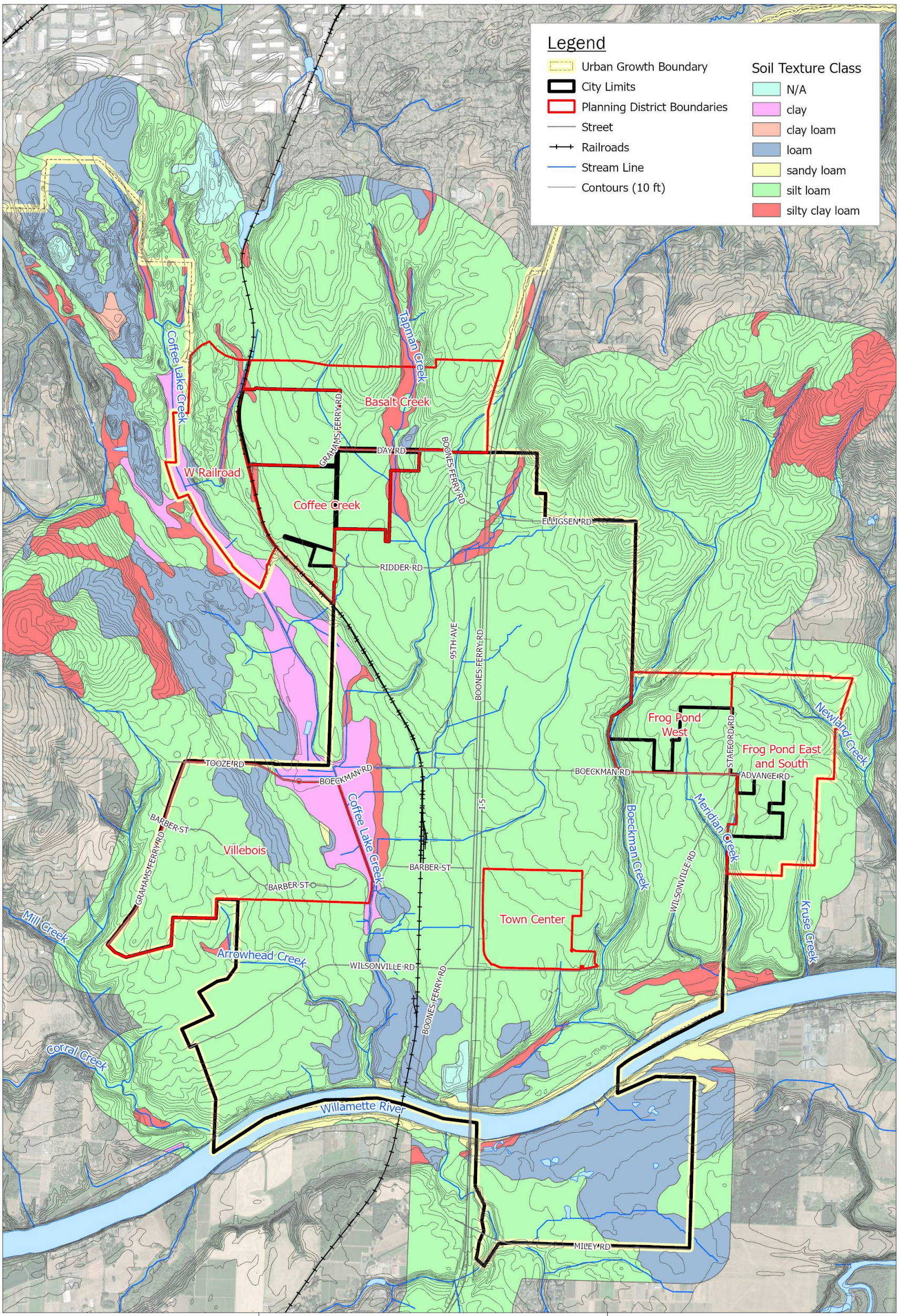

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Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Figure 2-3: Soils and Topography

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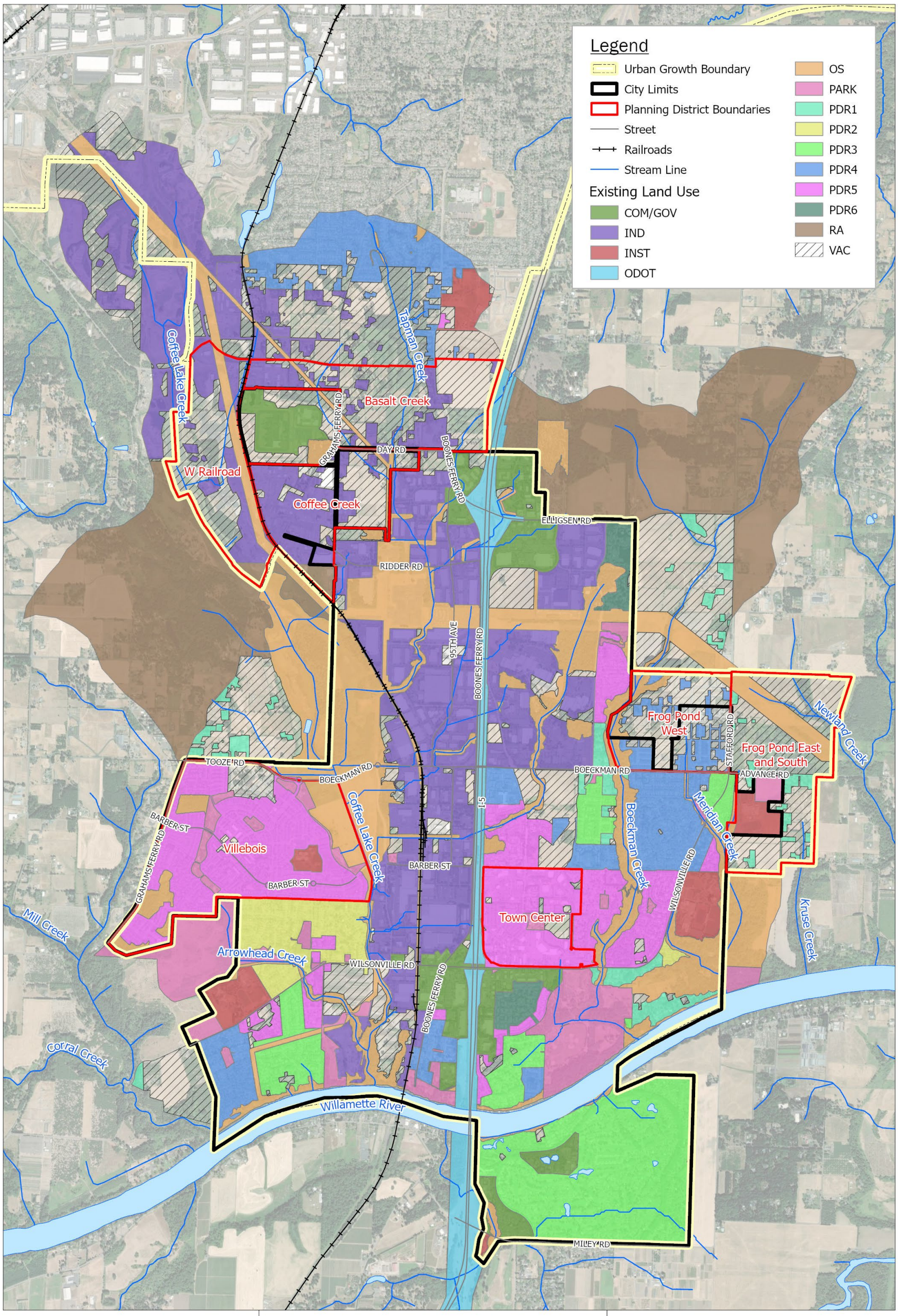

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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Figure 2-4: Existing Land Use Condition

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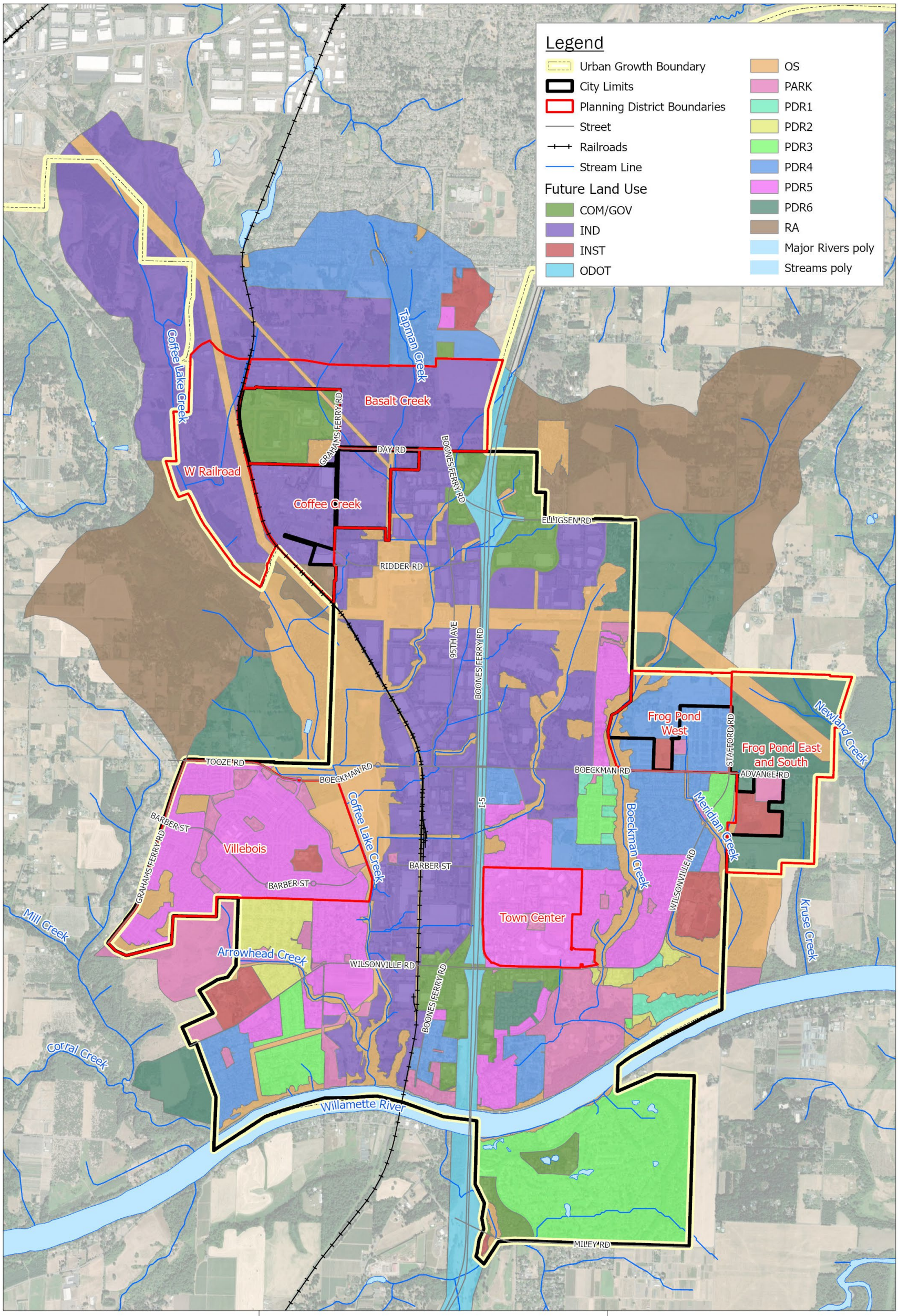

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 2-5: Future Land Use Condition

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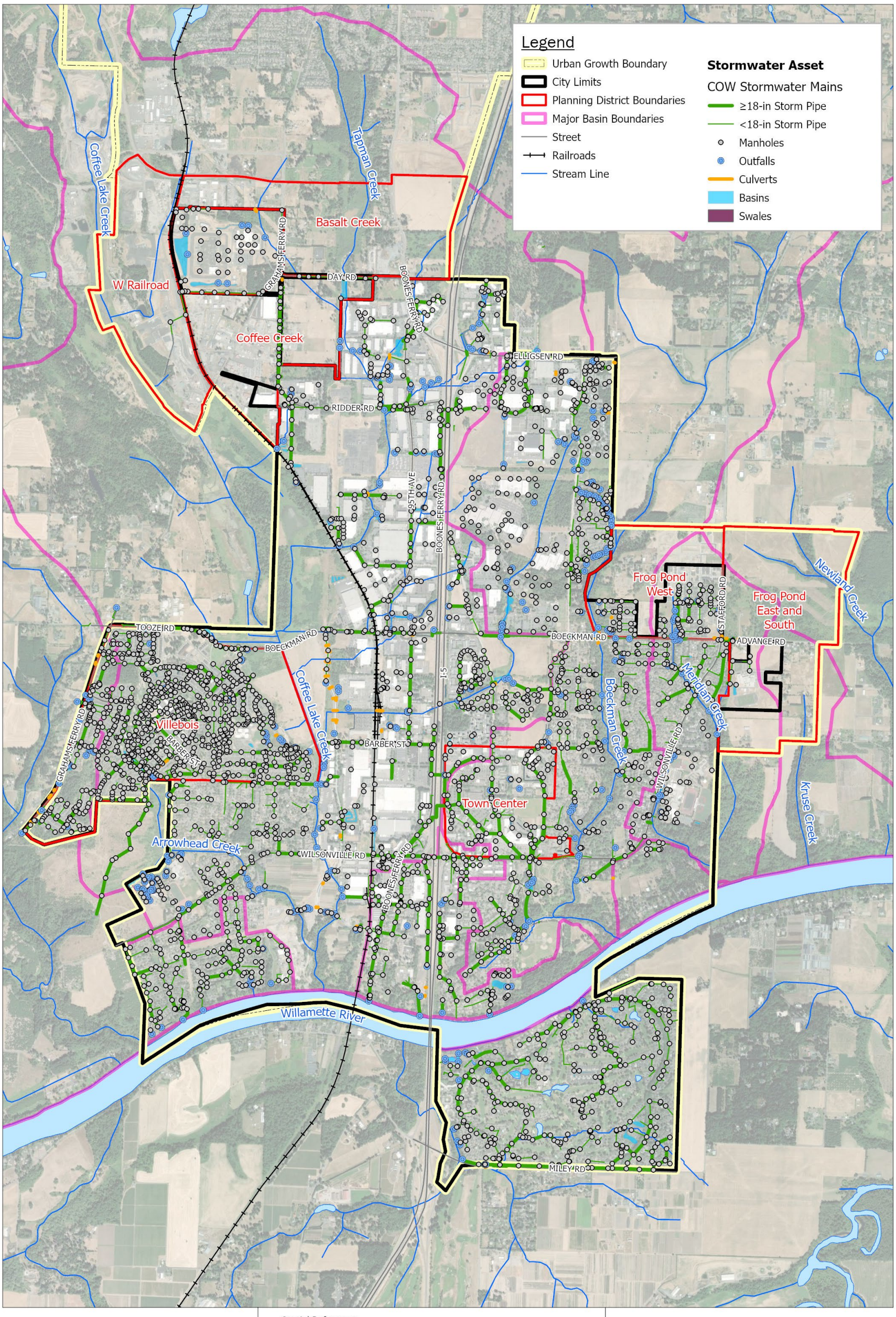

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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0 0.25 0.5 1 Miles

Figure 2-6: Stormwater System Overview

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Section 3

Basis of Planning

This section summarizes the overall project planning process and the process to identify stormwater problem areas and water quality retrofit needs, which collectively inform capital project needs identification and development efforts.

This project planning process allowed the City to develop information for areas and activities most likely to be prioritized and funded in a capital improvement program. This process qualified project and program needs in consideration of the SMP objectives, including rectifying known areas of stormwater drainage problems and flooding; enhancing and/or expanding water quality treatment and flow control; and identifying programmatic opportunities to address stormwater needs on a city-wide scale.

Appendix A includes background documentation related to the project planning activities, including a Stormwater Problem Area matrix (Appendix A, Table A-1) and a Project Opportunity Matrix (Appendix A, Table A-2). Identified project opportunities stem from the individual assessment of problem areas (Section 3.1), water quality retrofit opportunities (Section 3.2), stream assessment efforts (Section 4), and H/H modeling results (Section 5).

Referenced figures are included at the end of this section.

3.1 Problem Area Identification

A collaborative approach with Community Development and Public Works staff, as well as the public, was used to identify known stormwater problem areas where infrastructure improvement, replacement, or retrofit may be needed. Problem areas were initially identified through a combination of City staff surveys and follow-up discussions, an external survey (distributed via a virtual open house platform), review of the 2012 SMP, field investigations, and a Project Planning Workshop.

Problem areas were documented in a Stormwater Problem Area Matrix (Appendix A, Table A-1) by primary and secondary deficiency category (i.e., capacity issue, instream erosion/sediment issue, maintenance, and repair and replacement). In addition, portions of the stormwater system requiring refinement/update or expansion of the existing H/H model, as well as locations to be investigated as part of the stream assessment were identified. Problem areas are mapped by primary deficiency (see Figure 3-1 at the end of this section).

3.1.1 City Staff Surveys

In February 2021, surveys were distributed to City staff requesting input on specific locations of reported capacity deficiencies, system condition issues (i.e., pipe and open channel), frequent maintenance needs, and water quality opportunities.

On March 16, 2021, Public Works and Community Development staff collaborated and provided a summary table and accompanying map reflecting 39 problem area locations. Some locations and descriptions provided from Community Development staff overlapped with locations identified by Public Works. Specific issues included culvert misalignments, use of bubblers, standing water in roads and easements due to a lack of system capacity, flooding at open channels, crushed or

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improperly abandoned pipe, the buildup of sediment at catch basins, and damaged outfall structures.

3.1.2 External Stakeholder Surveys

To help facilitate external communications to the public (i.e., citizens and business community), a survey was prepared for external stakeholders to solicit information regarding drainage issues and project needs. External stakeholders included community members, businesses and community groups, developers and contractors, and neighboring jurisdictions.

The Let's Talk Wilsonville web platform was used to publish the external survey as well as provide general background information related to stormwater, the City's current stormwater system, and the purpose of the SMP. The external survey was publicized using local publications (i.e., Boones Ferry Messenger) as well as social media.[5] Website content was also translated into Spanish.

The external survey was open from April 1 to May 15, 2021, and included general demographic questions and questions intended to assess the level of understanding of the participant with respect to stormwater utilities. Additional questions related to values and level of service were also included. The survey included an opportunity for the participant to directly identify problem areas/locations and issues of concern.

The external surveys resulted in the identification of four additional problem areas that are documented in the Problem Area Matrix (Appendix A, Table A-1).

3.1.3 2012 Stormwater Master Plan

The City's 2012 SMP identified 50 stormwater CPs. Project categories included pipe replacement, planning/studies, restoration projects, and low impact development (LID) projects. Sixteen of the projects identified in the 2012 SMP were either completed or are in progress. Some of the proposed pipe replacement projects were subsequently reflected in the Charbonneau Infrastructure Plan (2014).

Outstanding (non-constructed) projects from the 2012 SMP were reviewed against identified problem areas and seven locations directly overlapped. The remainder of projects from the 2012 SMP were discussed with the City during a project coordination call to confirm the need to include the associated project area directly in the Problem Area Matrix. Because hydrologic modeling methods for this plan deviate from the 2012 SMP, and additional assessment efforts (water quality retrofit assessment, stream assessment) were conducted for this SMP, the City opted to independently evaluate project needs for this SMP update instead of relying on previous outdated work.

3.1.4 Project Planning Workshop

A Project Planning Workshop was conducted with City staff on August 24, 2021, to review data compilation efforts and the identification of the stormwater problem areas. The objective of the workshop was to solicit additional detail on the nature of each problem area, add any additional problem areas suggested by the City, and to categorize the problem areas by potential solution (whether project-based or programmatic).

A total of 46 problem areas were identified for discussion. Discussion included the size and scale of the anticipated project and whether a capital project solution or programmatic approach may be taken to address the issue. Problem area locations were also reviewed to establish 1) the need to conduct a site visit; 2) a need to expand model extents to evaluate the problem area; and 3) whether

[5] The current website is: Stormwater Master Plan Update | Let's Talk, Wilsonville! (letstalkwilsonville.com).

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there is benefit in including the location as part of the stream assessment effort. From the workshop, 22 locations requiring site visits were flagged and scheduled. Seven locations were flagged for consideration as part of the stream assessment effort.

3.1.5 Field Investigation

An initial field investigation was conducted September 27, 2021, to verify stormwater problem areas and assess potential project concepts in conjunction with the Project Planning Workshop. A total of 14 problem areas were visited, clustered into seven discrete site visit locations. The site visits provided BC staff with an opportunity to discuss each of the problem areas and better understand the overall drainage patterns and system to advance discussion of modeling needs and capital project concepts.

Subsequent site visits were conducted to inform H/H model validation, water quality retrofits, and capital project development efforts, and those field investigation efforts are discussed under the respective sections.

3.1.6 Results

The Problem Area Matrix (Appendix A, Table A-1) includes the findings from the Project Planning Workshop and field investigation efforts, and documents whether the problem area and potential project solution required additional evaluation as part of the stream assessment and/or hydraulic modeling (via expansion of the existing modeling extents). Problem area locations, including those where a site visit was conducted are reflected in Figure 3-1 at the end of this section.

Of the comprehensive list of 46 identified problem area locations, 11 locations were not anticipated to warrant a project or program solution but were maintained in Table A-1 for reference. Seven locations were identified for further evaluation as part of the stream assessment effort, and eight locations were identified for evaluation as part of the capacity analysis.

Following field investigations and additional evaluation efforts, vetted problem areas were carried forward as Project Opportunity Areas (see additional discussion in Section 6.1) and CP needs. Project Opportunity Areas are documented in Appendix A, Table A-2.

3.2 Maintenance Evaluation

Per Section 3.1, some problem areas were identified as the result of deferred maintenance or due to a relatively minor drainage issue that may not warrant capital project funding. These issues can be more efficiently addressed by expansion of the City's maintenance program (with increased staffing) and/or by defining a programmatic need that can be annually funded.

Maintenance activities and staffing allocations were discussed during a series of two interviews with Public Works staff in late 2021. Staff labor estimates by department and maintenance activity were compiled for use during interviews. The interviews were used to verify the current (as of 2021) maintenance activities, maintenance frequencies and internal processes to issue work orders. The City's Public Works Department uses Cartegraph for asset management, and Cartegraph refers to features (assets) in the City's GIS system to specify where maintenance is required.

Table 3-1 summarizes the primary stormwater maintenance activities conducted by the City of Wilsonville's Public Works Roads and Stormwater Section, along with a summary of the frequency and ability of the stormwater staff to meet maintenance targets (whether they are NPDES MS4 Permit-related or individual Public Works goals). Table 3-1 does not reflect an extensive list of activities but rather reflects the primary activities with a regulatory driver.

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Table 3-1. City Maintenance Activities and Potential Implementation Gaps

Activity	NPDES MS4 SWMP Requirement	Frequency Required [a]	Annual Target [a]	Regularly Meeting Target? (Y/N) [b]	Required Crew Size	Stormwater Staff Time (per person)	Department	Increased Staffing Need (Y/N)
TV inspection	Not explicitly stated	Annual	15% (60,000 LF) of public conveyance system >6"	N	2	200 ft/hr	Public Works (see Cartegraph Work Flow Process 8.0)	Y
Pipeline cleaning	Y	Annual	As required based on inspections	Y	2	250 ft/hr	Public Works	N
Priority CB inspection and cleaning	Y	Annual	All	Y	2	0.5 hr/facility	Public Works	N
Other CB inspection and cleaning (public)	Y	Every 4 years	25% of total	N	2	0.5 hr/facility	Public Works	Y
Culvert inspections and cleaning	Y	Annual	20%	Uncertain	2	2 hr/facility	Public Works	Potential
WQ MH inspection/cleaning	Y	Annual	150	N	2	1 hr/facility	Public Works	Y
Street sweeping [c]	Y	Monthly	All curbed	Y	NA	165 hours total annually	Contractor	N
System repair and maintenance	Y	As needed	–	Y	2	Varies	Public Works	N (Programmatic approach recommended)
Public water quality facility inspections	Y	Annual	All	N	2	1 hr/facility	Community Development/ Public Works	N
Public water quality facility maintenance [c]	Y	Annual	Public works performs maintenance independent of inspection results	Y (magnitude varies)	2	1-16+ hrs/facility	Public Works	Potential
Public water quality facility maintenance (landscaping)	Y	Annual	All	Y (magnitude varies	NA	291 hours	Public Works	Potential
Private WQ facility inspections [d]	Y	Annual	Varies	Y	1	4 hr/facility	Community Development	N

a. Based on the documentation in the 2022 SWMP Document and/or as documented in the City's Stormwater Maintenance Schedule.

b. Based on the available documentation in the NPDES MS4 annual reports or as provided by Public Works. This column reflects the ability of the Roads and Stormwater Section to conduct this work independently (not requiring staff supplementation from other Sections or Divisions).

c. Activity requirements vary based on inspection results.

d. Current GIS data does not differentiate types of facilities in the "basins" GIS layer. Basins includes ponds, swales, planters, and raingardens.

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3.2.1 Staffing Estimates to Support Maintenance Activities

In accordance with Table 3-1, additional staffing is required to conduct routine maintenance activities in conjunction with NPDES MS4 permit requirements. Estimated staffing needs were initially calculated based on required staff time and length/number of assets (see Section 2.5) and discussed with the Public Works Operations Manager to better incorporate the following staffing considerations:

- Approximately 35 percent of time reserved for stormwater maintenance ultimately supports other departments and emergency response needs. Because many maintenance activities require a crew of two people, the Public Works Roads and Stormwater Section (with 2.74 FTE) is unable to consistently conduct routine maintenance activities and be available to respond to emergencies.
- Based on detailed staff labor estimates compiled by the City, approximately 15 percent of work orders issued by the Stormwater Division are cancelled, which means staffing limitations are preventing the work orders from being completed.

Additional staffing estimates assume that one FTE equals approximately 1,650 hours of work after deducting estimated annual leaves, training, and other non-task related hours (Personal communication with Martin Montalvo, Public Works Department Operations Manager, November 17, 2021). The following maintenance activities were evaluated and additional staff support needs estimated.

- **CCTV Inspections:** Closed-circuit television (CCTV) inspections for stormwater and sanitary were historically contracted out by the City, but in 2021, the City took over delivery of the work. Stormwater CCTV efforts do not routinely occur. The City maintains a Public Works goal of inspecting 15 percent of their public collection system (>6 inches in diameter) annually, which is approximately 60,000 LF of pipe. Stormwater Division staff are needed to operate the CCTV equipment and review of the CCTV reports.

  Recommendation = 0.5 FTE

- **Non-priority Catch Basin/Pollution Control Manhole Cleaning:** The City regularly maintains identified priority catch basins, but routine cleaning of all catch basins is more challenging with current Roads and Stormwater section staffing levels (i.e., clean all catch basins on a 4-year cycle).

  Recommendation = 0.25 FTE

- **Vegetated System Maintenance:** LID facilities (swales/planters) and stormwater basins (ponds) require more extensive maintenance than traditional gray infrastructure (e.g., filter vaults, underground detention facilities, etc.). Maintenance activities include debris removal, vegetation removal and replacement, regrading, replacement of amended soil media, inlet and outlet cleaning, and repair of structural components. Some activities may occur during each maintenance effort (e.g., annually), whereas some may be conducted once every few years.

  Current staffing levels and maintenance efforts do not account for/include vegetation/soil replacement or the large-scale reconstruction/replanting of facilities that are not operating property. Additional staffing needs will help ensure a more proactive program for inspection and maintenance, as well as development of a standard operating procedure (SOP) to guide vegetated system maintenance (both shorter term and larger scale).

  Recommendation = 1.25 FTE (assuming annual maintenance of 4 hours for vegetated facilities; 16 hours for ponds).

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A total of two additional FTE are estimated to address recurring and deferred maintenance activities exclusive to the Public Works Roads and Stormwater Section. Final maintenance-related staffing recommendations in conjunction with the 2022 SWMP Document and identified CPs per this SMP are referenced in Section 7.3.

3.2.2 Programmatic Needs

The Project Planning Workshop and subsequent interviews with Public Works staff also identified the following ongoing programmatic activities that, if routinely conducted, could offset individual CP needs. These programmatic concepts were refined and are detailed in conjunction with CP development activities in Section 6.

- **Repair and Replacement (R/R) Program**. Dedicated funding is needed to repair/replace all public pipe 12-inches and greater within the City limits over a defined timeframe to address lifecycle costs.
- **Localized Drainage Improvements**. Dedicated funding is needed to assist with minor system configuration or installation needs or to respond to recurring maintenance needs.
- **Inlet Replacement Program**. Dedicated funding is needed to relocate and/or install curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues.
- **Green Street Retrofit Program.** A dedicated program is needed to retrofit local streets, which may include, depending on the feasibility, porous pavement overlays and/or green street facilities to promote additional infiltration and water quality treatment.

3.3 Water Quality Retrofit Analysis

Opportunities to incorporate water quality treatment are necessitated by the regulatory drivers in place for the City and supported by the community and public goals to protect water quality. These water quality retrofits can be accommodated through the addition of new water quality and/or detention facilities or the reconfiguration of existing facilities.

The problem area identification effort was focused on capacity and maintenance issues (Section 3.1) and did not focus on water quality objectives. Therefore, a separate analysis was conducted to identify locations where water quality could be integrated into the developed landscape or where pending development and future transportation projects could be leveraged to initiate construction of new facilities. To support the analysis, a GIS desktop evaluation was conducted to map public property (classified as vacant, parks, open space, or City-owned), ponds (public and private), water quality projects from the 2012 SMP, existing stormwater facility contributing drainage areas, and future transportation corridors.

Based on a review of the mapping and City staff preferences, the following objectives (strategies) were developed to guide the water quality retrofit analysis for this SMP:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects reflect water quality-related projects per the 2012 SMP. Review and integration of findings from the 2015 Retrofit Assessment was conducted to support compliance with requirements of the 2021 NPDES MS4 permit.
2. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation to address erosion/hydromodification issues.
3. Integrate water quality and/or flow control into existing project opportunity areas (where possible).

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Identification of new facilities to support future development and growth is not a preferred retrofit strategy, given the fact that private development will already be required to adhere to the City's prescriptive stormwater design standards.

Figure 3-2, at the end of this section, reflects source information used for the water quality retrofit analysis, as well as the resulting project needs.

3.3.1 2015 Retrofit Assessment Update

The City's 2015 Stormwater Retrofit Plan documents the City's stormwater policies, projects, and programs intended to improve water quality in areas of the City that are currently underserved or lacking stormwater quality controls. The 2015 Retrofit Plan included a review of twenty, non-constructed capital projects (CPs) per the City's 2012 SMP and 2014 Capital Improvement Program that had a water-quality element. Updated scoring criteria that focused on water quality objectives were applied to each project. Criteria included:

- Progress toward meeting TMDL Wasteload Allocations (i.e., bacteria and mercury)
- Priority areas for treatment (focusing on areas with no structural stormwater treatment facility and high pollutant generating areas [commercial/industrial land uses])
- Temperature control (meet the shade targets identified in the TMDL)
- Erosion prevention and control (i.e., retrofit of outfalls or stream channel restoration where active erosion results in the transport of excess sediment, increased turbidity and reduced instream water quality).
- Additional objectives (including project integration, maintenance, livability/sustainability, safety, and land acquisition).

For this SMP, the prioritized projects per the City's 2015 Retrofit Plan were reviewed to confirm: 1) projects completed and/or where a project need may have changed, and 2) projects that should be carried forward as part of this SMP.

Results of this review are detailed in Table 3-2. Identified project needs are carried forward as a Project Opportunity Area.

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	16	Viable project, but could be reflected in program (Section 6.5)		X	
LID7	SW Wilsonville Road Stormwater Planters	No	No	16	Viable project, but could be reflected in program (Section 6.5)		X	
CLC-10B	Coffee Creek Storm Projects	No	Yes	16	Not Applicable-reflects 2012 SMP CLC-1. Project number is unique to the Retrofit Assessment source document.			X
BC-5	Boeckman Creek Outfall Realignment	No	No	13	• Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. • Erosion issues not identified/confirmed in 2022 stream assessment effort. • Project location overlaps potential Boeckman Road mitigation site (Creekside Apartments). See Project Opportunity Area #23.	X		
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	13	• Referenced as a long-term project need from source document of retrofit assessment. • Project location overlaps with a portion of the Boeckman Road mitigation area (Siemens/Ash Meadows). Current METRO project may also negate the project need.			X
BC-4	Gesellschaft Water Well Channel Restoration	No	No	13	Project still viable and construction may occur in conjunction with other infrastructure projects (Interceptor Trail).	X		
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	13	Viable project, but could be reflected in program (Section 6.5)		X	
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	12	• Short term/High priority CIP need per source document from retrofit assessment. • Project locations may overlap potential Boeckman Road mitigation site (Canyon Creek Park). See Project Opportunity Area #24.	X		
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	12	• Mid-term project need from source document of retrofit assessment. • See Project Opportunity Area #9.	X		
WD-4A	Willamette Way West Outfall Replacement	No	No	11	Project location is being monitored. No immediate project needs.			X
WD-4B	Belknap Ct Outfall Protection	Yes	No	11	Complete. Remove from list.			X

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Table 3-2. 2015 Retrofit Assessment Review and Project Opportunity Status

2015 Retrofit Assessment Project ID	Project Name	Constructed?	Overlaps with 2023 SMP Problem Area Location ID	Overall Score [a]	Retrofit Assessment Findings			
					Feedback	2024 SMP Result		
						Project Opportunity	Program Opportunity	N/A
WD-4C	Morey Ct West Outfall Protection	Yes	No	11	Complete. Remove from list.			X
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	9	• Project involves rehab of five existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. • Erosion issues not identified/confirmed in the 2022 stream assessment. • Targeted retrofit of culverts has already occurred.			X
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	9	• Project was intended to enhance the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream. Mid-term project need from source document of retrofit assessment. • Project location overlaps with potential Boeckman Road flow mitigation site. See Project Opportunity Area #23.	X		
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	8	• Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. • See Project Opportunity Area #9.	X		
CLC-2	SW Parkway Avenue Stream Restoration	No	No	8	• Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.			X
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	8	• Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.			X
CLC-8	Coffee Lake Creek Restoration	No	No	8	• Project is no longer needed. This location is associated with 5th and Kinsman Project-Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.			X
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Limited access onto private property.			X
CLC-4	Ridder Road Wetland Restoration	No	No	7	• Referenced as a long-term project need from source document of retrofit assessment. • Not a high priority need for future restoration, but maintain as a future Project Opportunity Area.	X		

a. The overall score is per the 2015 Retrofit Assessment and considered for this 2024 SMP as an indication of the preferred water quality projects per the 2012 SMP.

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3.3.2 New Retrofit Opportunities

In addition to project needs maintained from the 2015 Retrofit Assessment, several opportunities to integrate water quality and/or flow control into existing, underutilized facilities or another Project Opportunity Area were identified. These opportunities and their preliminary retrofit concepts are summarized in Table 3-3.

Table 3-3. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Underutilized Facility	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-in-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. Piped stormwater system may be reconfigured to provide a flow control benefit. Opportunity to help mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Underutilized Facility and Existing Project Opportunity	Existing swale is not draining properly. Swale needs retrofit and potential relocation.
Canyon Creek Park	Existing Project Opportunity	Existing Park property has potential for construction of a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

3.4 Boeckman Road Hydraulic Evaluation and Mitigation Opportunities

Concurrent with development of this SMP, Wilsonville is constructing improvements to Boeckman Road from SW Canyon Creek Road to SW Stafford Road, as part of a Progressive Design-Build project. The Boeckman Road Corridor Project (BRCP), initiated in 2021, involves widening and reconstruction of the road, including removal of an existing culvert and instream flow control structure (FCS) on Boeckman Creek immediately north of Boeckman Road. The removal of the culvert and FCS prompted earlier planning efforts and a technical evaluation of Boeckman Creek. Opportunities for water quality and flow control mitigation within the Boeckman Creek watershed were identified and considered with project planning efforts for this SMP.

In 2021, a hydraulic evaluation of Boeckman Creek was conducted to evaluate potential changes to flows and water surface elevations (WSE) in Boeckman Creek due to removal of the FCS and the existing culvert crossing (Boeckman Road Hydraulic Evaluation, January 2022). The City's existing H/H InfoSWMM model (also used for this SMP) was refined and calibrated to reflect existing hydraulic performance. Efforts to identify potential off-site flow mitigation were initiated in 2022 with significant participation from City staff and the Progressive Design-Build consultant team. Both upland and instream mitigation locations were evaluated based on specific criteria including contributing drainage area and available storage capacity.

Four potential mitigation locations were ultimately identified as preferred locations. Preferred mitigation locations are referenced in the Project Opportunity Matrix for this SMP (see Appendix A, Table A-2).

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3.5 Growth-Related Considerations

A particular focus for this SMP is future development/growth areas, as these areas are expected to develop in the near term and require new stormwater infrastructure including pipe and stormwater management facilities. Such future development may result in increased impervious area and additional stormwater runoff.

Specific growth areas of interest for this SMP include those areas documented in the Basalt Creek Concept Plan (2018), the Town Center Plan (2019), and the Frog Pond East/South Concept Plan (2022). These growth areas represent Project Opportunity locations because new public infrastructure is required and may be funded (in part) by the City. Therefore, cost estimates for new infrastructure are required for inclusion in the overall stormwater CIP.

3.5.1 Basalt Creek Concept Planning Area

With the adoption of the Basalt Creek Concept Plan by the cities of Tualatin and Wilsonville in August 2018, efforts are underway to amend the City's Comprehensive Plan and Transportation System Plan to promote industrial development in the area. Downstream capacity deficiencies on Tapman Creek require further study and planning to address increases in impervious surface due to anticipated development. Development in the Tapman Creek basin will be subject to differing onsite stormwater management standards for new and redevelopment activities. The City of Tualatin, in the upstream portion of the basin, implements Clean Water Services (CWS) standards, whereas the City of Wilsonville regulates stormwater locally. Despite differing standards and requirements, all drainage from the Basalt Creek concept planning area will ultimately drain through City infrastructure before entering Coffee Lake Creek.

The Day Road area, including Commerce Circle, is identified as a problem area (Appendix A, Table A-1) and Project Opportunity Area (Appendix A, Table A-2) and receives flow directly from new development in the Basalt Creek Concept Planning area. Policies related to onsite stormwater management in the upstream portions of the basin may be considered to help mitigate existing, downstream capacity constraints.

3.5.2 Town Center Planning Area

The Town Center Plan (2019) addresses a key redevelopment area in the city, located north of Wilsonville Road in the Boeckman Creek basin. Redevelopment of the Town Center area is anticipated to require major reconfiguration of the existing stormwater collection system. The Town Center Plan proposes the demolition of several segments of existing stormwater trunkline and the installation of new piping alignments in conjunction with City ROW. As a result of these improvements, additional flow is anticipated to be conveyed to the downstream Library Detention Pond, south of Wilsonville Road in Memorial Park.

Inclusion of new infrastructure associated with the Town Center redevelopment area is reflected as a Project Opportunity in Appendix A, Table A-2 (Figure 3-3). In addition, the Library Pond is identified as a current problem area, as well as a Project Opportunity. Policies related to the use of the Library Pond as a fee-in-lieu strategy/facility for treatment and/or flow control for upstream redevelopment are described in Section 6.3.4.

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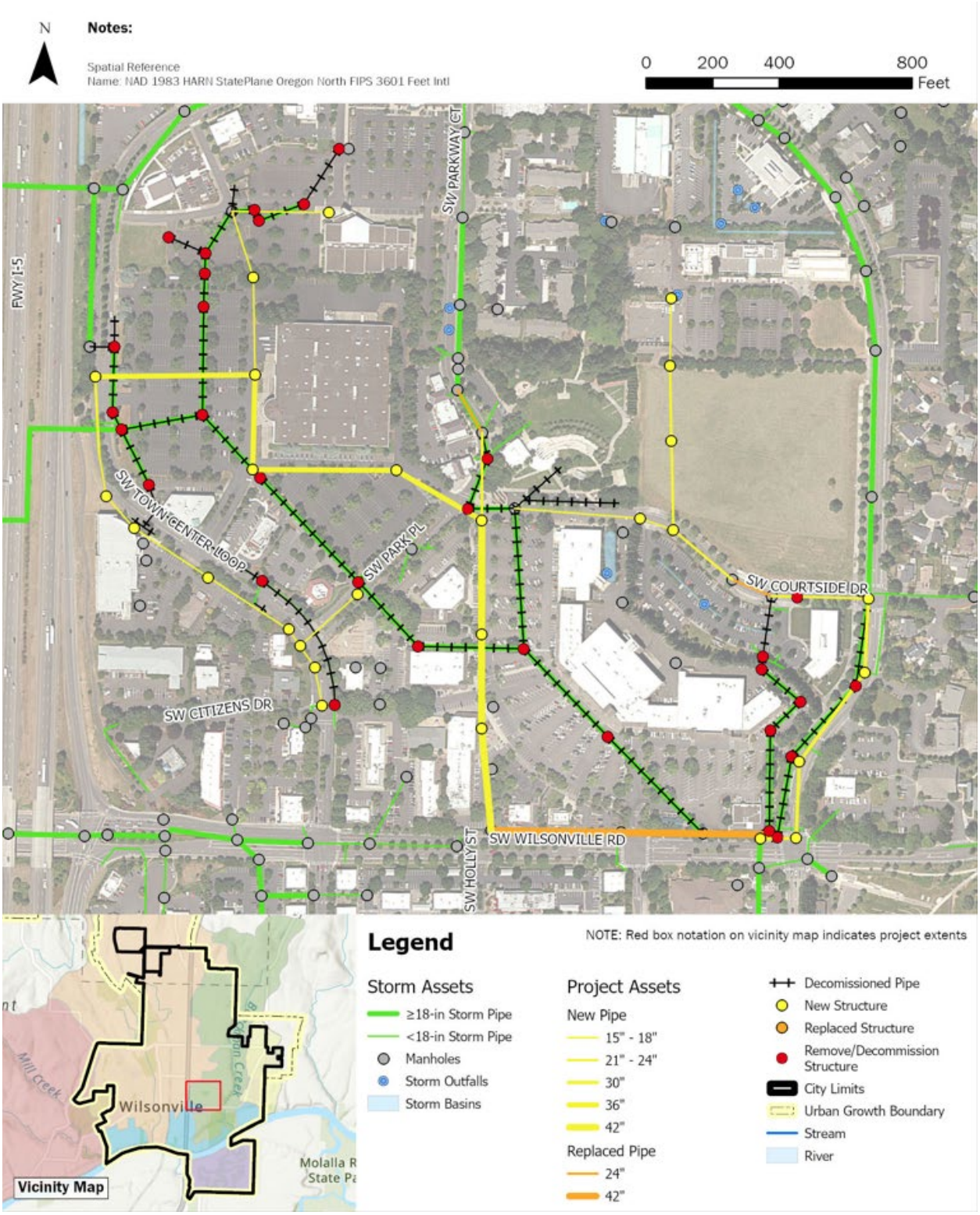

Figure 3-3: Town Center Stormwater Infrastructure Proposal

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3.5.3 Frog Pond East and South Planning Area

The Frog Pond East and South Planning Area is located east of the existing Frog Pond development, adjacent to Advance Road in the Newland Creek basin. New development warrants the installation of new stormwater trunklines and outfalls in dedicated City ROW. Inclusion of new infrastructure associated with the Frog Pond East and South Planning Area is reflected as a Project Opportunity Area (Appendix C, Table C-2).

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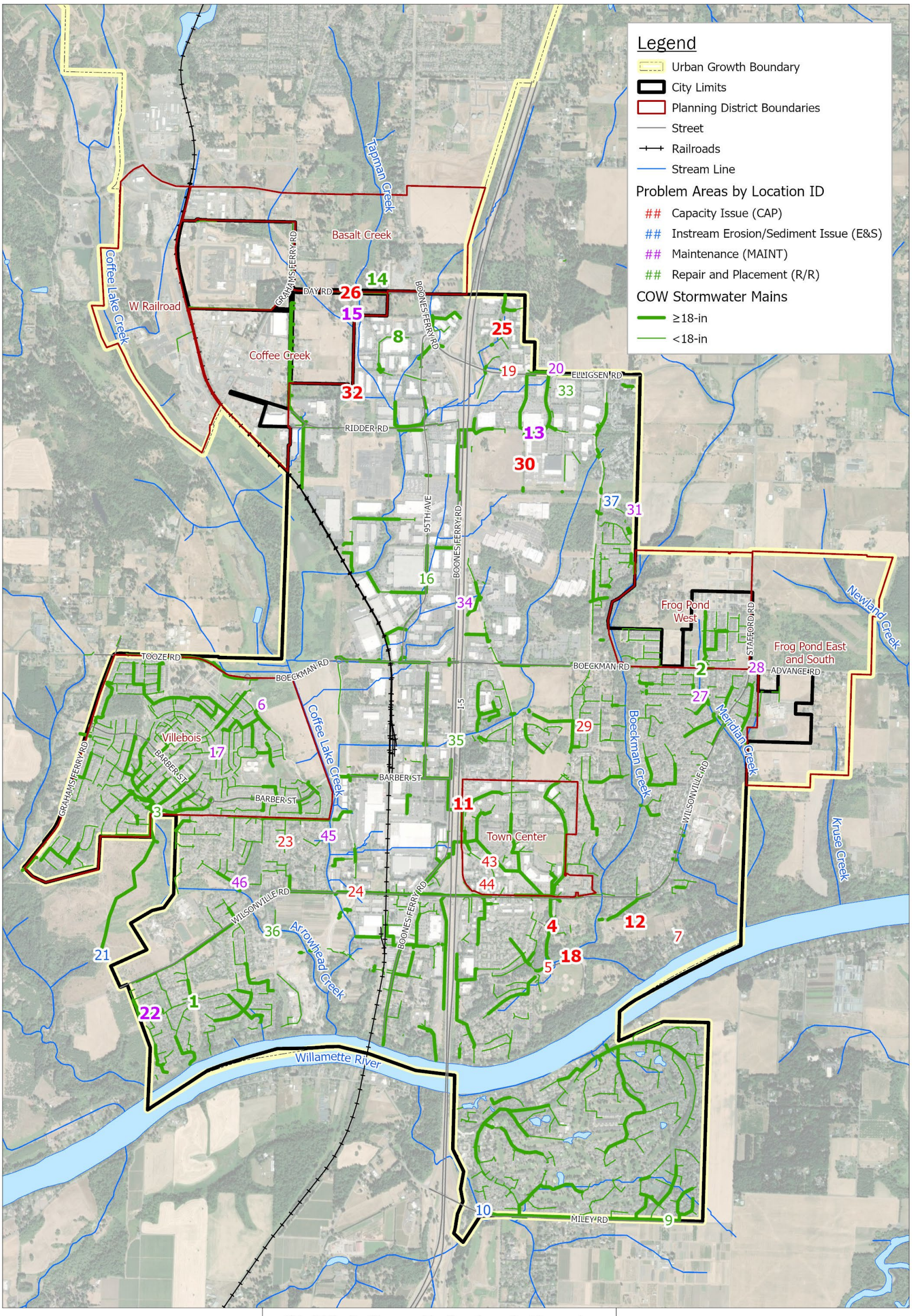

Note: Bold location IDs represent locations where a site visit occurred.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 3-1: Problem Area Location

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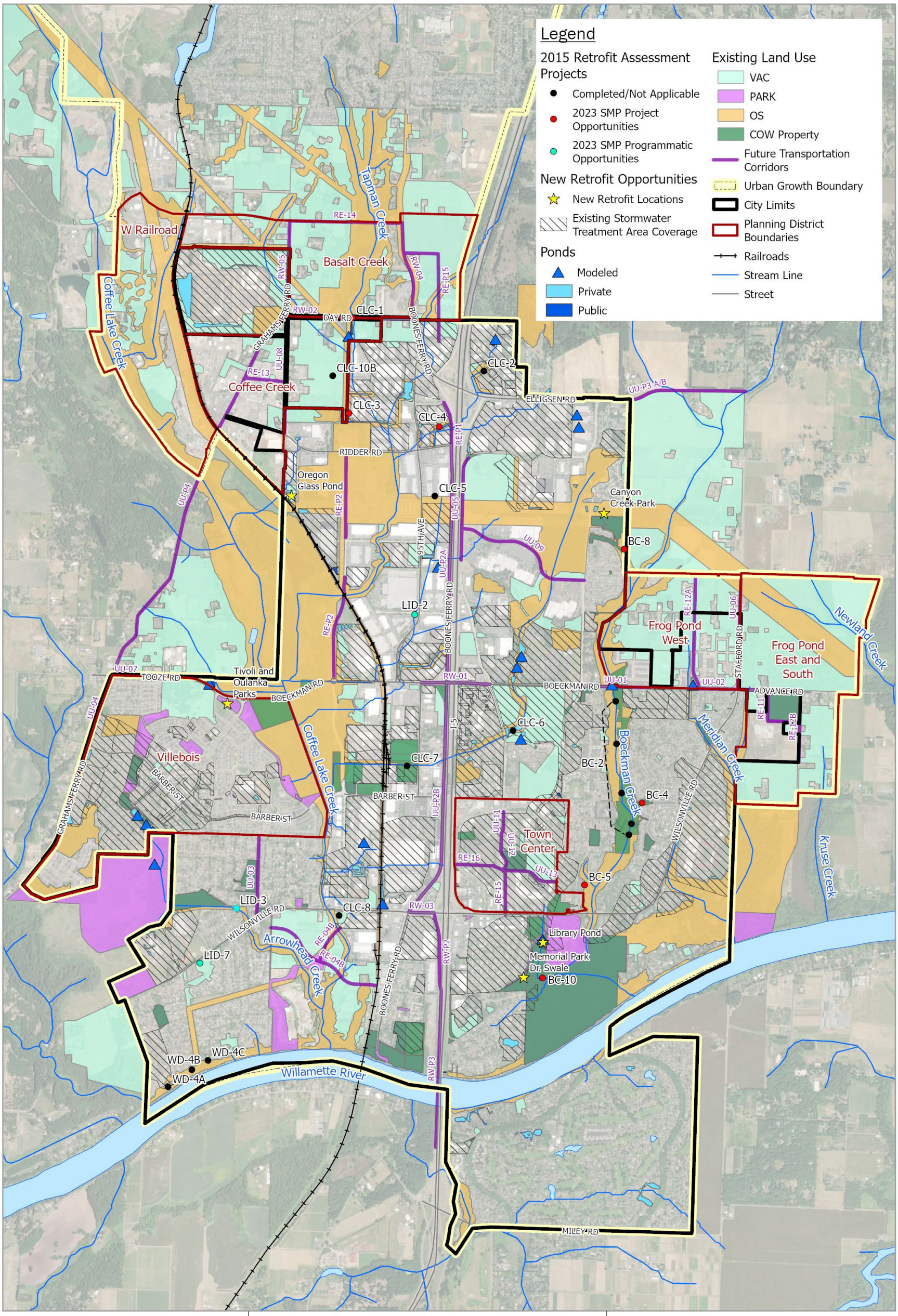

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 3-2: Water Quality Retrofit Analysis

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Section 4

Stream Assessment

Tributary stream channels to the Willamette River are an important element of the overall stormwater collection and conveyance system in the city. Stream channels provide conveyance and storage of water and sediment and provide habitat for aquatic and terrestrial species.

This section outlines results of the stream assessment conducted for this SMP to inform project, program, and policy recommendations. The stream assessment effort helps improve the understanding of hydraulic processes in the selected reaches, as well as identify infrastructure risks associated with changes in stream hydraulics. The stream assessment is described in additional detail in Appendix C. Project Opportunities stemming from the results of the Stream Assessment are detailed below and referenced in the Project Opportunity Matrix (Appendix A, Table A-2).

4.1 Regulatory Background

The City of Wilsonville prepared a 2015 Hydromodification Assessment in accordance with requirements of the City's 2012 NPDES MS4 permit. The 2015 Hydromodification Assessment focused on aspects of hydromodification[6] that are addressed in NPDES MS4 permits, specifically erosion, sedimentation, and alteration of stormwater flow, volume, and duration that may cause or contribute to water quality degradation. Efforts included a GIS desktop assessment, targeted field assessment, and review of existing planning documents and policies to inform the development of strategies and approaches to address hydromodification. Findings from the 2015 Hydromodification Assessment reflect the following:

- Observed stream channels indicate historical hydromodification impacts; minor impacts are observed in locations of concentrated flow or development encroachment.
- Current City programs and policies appear to be effective at addressing hydromodification indicators.
- Current land use and future development patterns show there is a potential for future flow increases; however, the City's current land use policies and updated stormwater design standards are in line with best practices to address hydromodification; and
- The City has identified, and is implementing projects to address hydromodification (per their 2012 SMP).

Recommendations from the 2015 Hydromodification Assessment included the following:

- Implement key capital projects to address instream hydromodification problems including erosion at stormwater outfalls and sites with historic channel modifications.
- Continue to monitor known problem areas.
- Continue to develop and implement master plans for new development areas that address natural resource and channel restoration needs.

[6] The U.S. Environmental Protection Agency (EPA) broadly defines hydromodification as the alternation of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources."

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This SMP update includes a focus on instream channel conditions and erosion prevention in conjunction with capital project development. To inform capital project and program needs, as well as directly address the recommendations per the 2015 Hydromodification Assessment, a geomorphic stream assessment was conducted for select reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse creeks to better understand the stream processes and identify infrastructure at risk due to changes in stream hydraulics.

Channel incision and aggradation can inform locations of active erosion and hydromodification risk

4.2 Objectives and Methods

The stream assessment included stream walks along priority reaches as well as desktop mapping and analysis. The objectives of the stream assessment were to:

- Provide a baseline assessment of existing physical stream conditions.
- Identify existing problem areas, such as locations of channel instability or excessive erosion that may impact private or public infrastructure.
- Assess the potential for changes and impacts to the stream channel.
- Recommend capital, operational, maintenance or other solutions or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The stream assessment was conducted by Waterways Consulting, Inc. (Waterways) to reflect the continued evaluation of stream channel conditions as recommended by the 2015 Hydromodification Assessment. Information collected as part of this assessment should be referenced and used during future inspection efforts to help assess improvements and degradation.

In accordance with the Problem Area Identification effort (Section 3.1), City staff identified priority and secondary assessment locations in the city based on the observed hydromodification impacts, land accessibility, future development potential (and the ability to establish a baseline condition of the stream), and history of staff or citizen complaints/concerns.

Figure 4-1 identifies specific stream reaches investigated for the Stream Assessment, as well as the secondary assessment locations not investigated as part of this effort that may be considered in the future.

4.2.1 Stream Walks

Stream walks were conducted over four days, in November 2021 and January 2022 in the Meridian, Boeckman, and Arrowhead Creek basins. Additional stream walks were conducted in October 2023 in the Newland Creek and Kruse Creek basins. Stream walk locations are identified generally in Figure 4-1 at the end of this section. Specific reach numbering associated with stream walk locations can be referenced in Appendix C.

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Stream walk activities included a review of key geomorphic features, stream and bank conditions, and infrastructure. During the stream walks, photographs were taken to document stream characteristics and conditions. Physical and biological stream conditions were noted and mapped and included:

- General vegetation condition.
- In-stream and hillslope erosion processes (incision, aggradation, and hillslope failures).
- Location of stormwater outfalls, exposed pipes, bridges, culverts, affected roads and trails.
- Wildlife activity (presence of beaver dams).
- Heavily eroded banks, headcuts, and bedrock outcrops.

Photo logs and stream reach summary sheets were developed to identify cross section and physical condition characteristics for each reach at the time of the stream walk (see Appendix A).

4.2.2 Desktop Analysis

The desktop assessment included compilation and analysis of geospatial data, including infrastructure, topographic, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for Boeckman, Meridian, Arrowhead, Newland, Kruse and Tapman[7] creeks. A REM shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream.

Waterways also created and analyzed topographic and geologic cross sections and stream longitudinal profiles to develop a set of field maps identifying streams and stormwater infrastructure identified during the field component.

4.3 Findings and Results

Observations made during the stream walks were used to qualitatively identify current stream channel deficiencies and potential strategies for improvement.

Table 4-1 summarizes the general findings by stream reach. Locations where ongoing vegetation management/invasive removal is needed are identified, as well as locations where future monitoring for impacts is recommended. Locations considered a Project Opportunity (see Appendix A, Table A-2) are also identified, and these locations were discussed with the City for consideration as a capital project (see Section 6). Additional detail on these locations is provided in Appendix C.

Of note, the downstream portion of Kruse Creek (Reach 4) was unable to be accessed due to bank stability issues. Future annexation and development activity along Kruse Creek should incorporate a geotechnical evaluation and consider setbacks from the top of canyon, given ongoing landslide risk.

[7] Tapman Creek is referred to as Basalt Creek in TM2.

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Table 4-1. Summary of Stream Assessment Findings

Stream	Assessment Date(s)	Reach No.[a]	Beaver Dam Presence (Y/N)	Infrastructure at Risk? (Y/N)	Invasive Vegetation Present? (Y/N)	Field Observations	Vegetation Management Need? (Y/N)	Ongoing Monitoring Need? (Y/N)	Project Opportunity? (Y/N)
Boeckman Creek	Nov. 19 and 24, 2021	2-9	Y	N	Y	Stream reaches appear laterally confined and vertically stable.	Y	Y	N
Boeckman Creek	Jan. 25, 2022	1	N	Y	N	Risk of channel incision and lateral erosion due to lack of stable beaver dams and seasonal variability in the backwater conditions on the Willamette River.	N	Y	Y
Meridian Creek	Nov. 26, 2021	1	N	Y	Y	Stable stream reaches due to bedrock base level control and lateral confinement. Obstructed culvert at Wilsonville Road (30") results in backwater conditions.	Y	Y	Y
Meridian Creek	Nov. 26, 2021	2	N	Y	Y	Historic channel incision and head cuts, but active head cuts not readily observed. Obstructed culvert at Willow Creek Drive and downstream stabilization measures in place.	Y	Y	Y
Arrowhead Creek	Jan. 25, 2022	2-3	Y	N	Y	General stream stability due to shallow hardpan and abundant beaver dams. Riparian vegetation management needed to ensure beaver activity.	Y	Y	N
Arrowhead Creek	Jan. 25, 2022	4	Y	Y	Y	Culvert at pedestrian crossing is failing. Upstream portion of culvert not evaluated due to access issues.	Y	Y	Y
Kruse Creek	Oct. 26, 2023	1-2	N	N	Y	Moderately incised channel but appears relatively stable. Riparian corridor in relatively good condition, but non-native (ivy and English holly) was noted in Reach 1.	Y	Y	N
Kruse Creek	Oct. 26, 2023	3-4	Unknown	Unknown	Unknown	Reach 4 was inaccessible due to deep channel incision and unstable banks. High groundwater table and seeps and springs contributing to natural stability issues.	Unknown	Y	N
Newland Creek	Oct. 26, 2023	1-3	N	N	N	Reaches are highly incised and likely to incise further. Culvert at SW Kahle Road is acting as grade control and likely preventing additional headcut. Riparian corridor is in good condition, but narrower in reaches 2 and 3.	N	Y	N
Newland Creek	Oct. 26, 2023	4	Y	N	N	Gradient is flatter with in-channel wood and debris dams. Reach 4 is at risk of bank stability, but only one head cut observed. Riparian corridor is in good condition.	N	Y	N

a. Reach numbering can be referenced in Appendix C.

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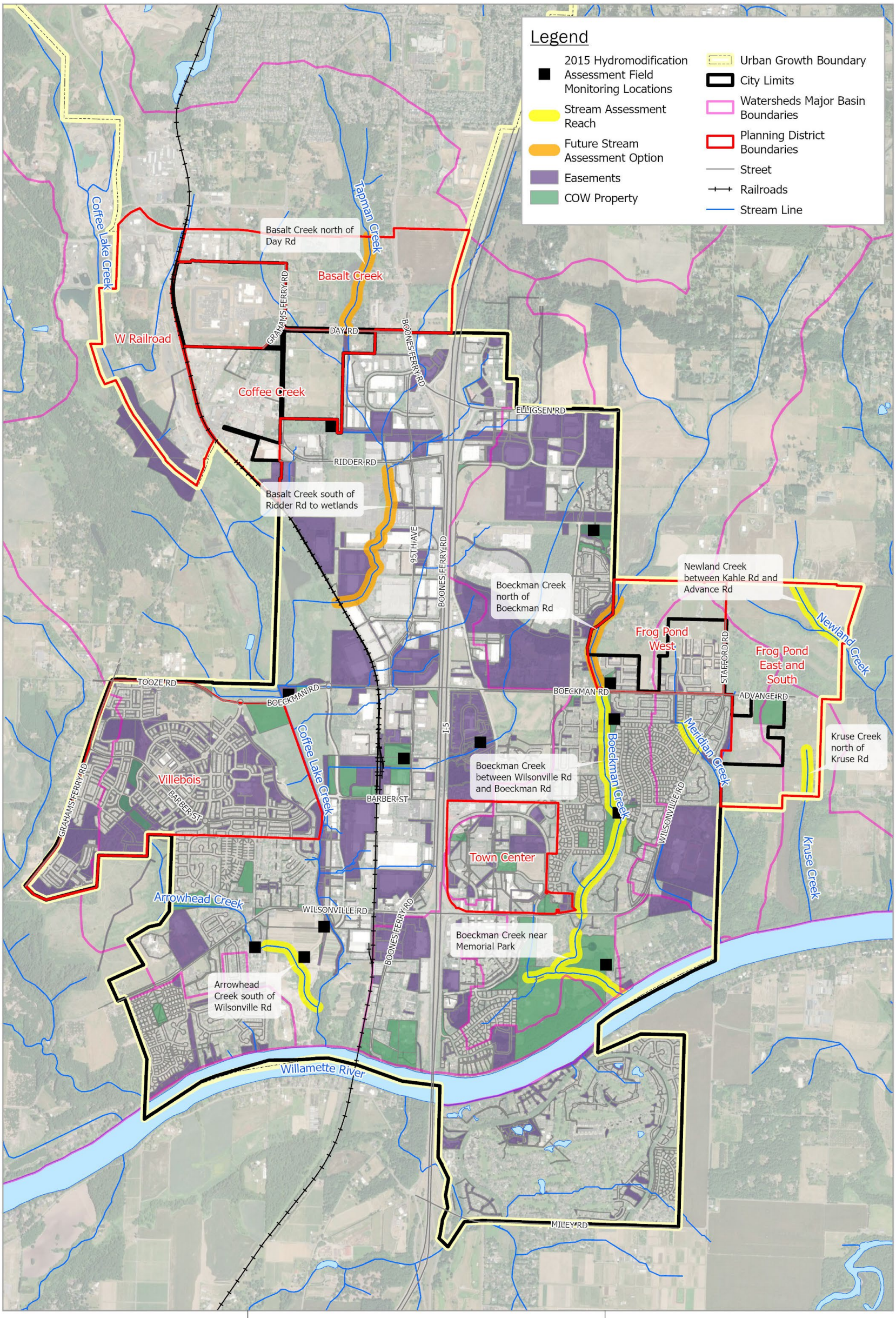

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City of Wilsonville
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 4-1: Stream Assessment

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Section 5

Capacity Evaluation

Stormwater conveyance is the primary function of the City's storm drainage infrastructure. This section summarizes the H/H system modeling methods and results to verify and identify conveyance capacity limitations.

H/H modeling conducted for this SMP used the City's existing InfoSWMM model, which was originally developed as part of the 2012 SMP effort. The model includes major hydraulic components of the City's stormwater drainage system including public stormwater pipe (15-inch-diameter and greater) and open channel conveyances defined by a simplified trapezoidal geometry. Capacity deficiencies within the study area were identified and/or problem areas validated using the H/H model.

This section summarizes the updates to the City's 2012 InfoSWMM model for this SMP effort, as well as the H/H modeling approach and results.

H/H modeling assumptions, methods and results are described in additional detail in Technical Memorandum #3 (TM3), included in this SMP as Appendix B. Referenced figures are included at the end of this section.

5.1 Objectives and Approach

The City's existing InfoSWMM model was used to simulate the hydraulic performance of select pipe and open-channel systems and evaluate the capacity limitations of City-owned stormwater infrastructure.

Targeted updates to the City's existing model were conducted where updated development activities, CP installations or identified problem areas were identified and there was a need to quantify system capacity to help develop project solutions.

For this SMP, the following modeling approach was generally used to update the H/H model and evaluate conveyance capacity:

1. Review available data (via GIS, as-builts, etc.) to compare mapped infrastructure (i.e., pipe size, slope, etc.) and existing model profiles. Update the existing hydraulic model accordingly.
2. Compile a list of known and suspected problem areas and identify areas where modeling is needed to inform corrective measures. Expand the hydraulic model extents accordingly.
3. Refine the existing subbasin delineation based on the updated hydraulic model coverage.
4. Develop an updated city-wide hydrologic model to estimate stormwater runoff generated for existing and future development conditions.
5. Validate modeled flooding using historical rainfall records, and anecdotal flooding information (photographs, City records),
6. Verify capacity constraints and identify potential sources or causes of flooding with City staff (preliminary flooding results); and
7. Use the validated hydraulic model to document existing capacity deficiencies for inclusion as Problem Opportunity Areas.
8. Use the validated hydraulic model to develop potential solutions to capacity problems (see Section 6).

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5.2 Stormwater Design Standards and Performance Criteria

Design standards and criteria related to the sizing and evaluation of stormwater infrastructure are described in the City of Wilsonville's Public Works Standards (PWS), Section 3 Stormwater & Surface Water Design and Construction Standards, as revised in December 2015.

Additional planning guidelines are described in the City of Wilsonville Code (WC), Chapter 4 Wilsonville Development Code (WDC). The WDC defines assumptions related to the concept planning district designations, overlays and open space designations, and general development regulations that inform land use coverage and hydrologic modeling assumptions for this project.

5.2.1 Planning and Sizing Criteria

Stormwater sizing/design criteria will ultimately be used to both assess the existing stormwater system for deficiencies and guide the design of capital projects in the context of the SMP. Planning and sizing design criteria for select infrastructure components are outlined in Table 5-1. Design storms referenced in the design criteria are outlined in Table 5-2.

Table 5-1. Wilsonville Drainage Standards and Design Criteria

Criteria	Source	Value
Water Quality Facility Design	• PWS 301.4.04.c	• Provide water quality treatment for a design storm of 1 inch in 24 hours. • Design water quality facilities to capture and treat 80% of the average annual runoff volume to the MEP with the goal of 70% TSS removal. • See BMP Sizing Tool.
Water Quantity Facility Design	• PWS 301.4.09.d • PWS 301.4.09.e • PWS 301.4.09.f	• Properties or development draining directly to and within 300 ft of the Willamette River or the Coffee Lake wetlands are exempt from the flow control standards. • Maximum water storage depth for the 100-year storm should not exceed 4 ft deep. • Side slopes should not exceed 4H:1V up to the maximum design water surface elevation; maximum exterior side slopes = 2H:1V. • At least 25% of the pond perimeter should be vegetated with maximum slide slopes of 3H:1V. • See BMP Sizing Tool.
Conveyance Piping Design	• PWS 301.1.10.e • PWS 301.1.13 • PWS 301.8.02 • PWS 301.8.02.c • PWS 301.9.03.b	• Mainline pipes shall be 12 inches in diameter. • Design pipes for conveyance of the 25-year undetained storm (emergency overflow structures should be designed for the 100-year storm). • A minimum of 1 ft of freeboard should be provided between the hydraulic grade line and the top of the structure or finished grade. • Mainline pipes should be reinforced concrete pipe (RCP), ductile iron pipe (CIP), polyvinyl chloride pipe (PVC), or corrugated polyethylene pipe (CPP). Pipe and fittings shall consist of one type of material throughout.
Culvert Design	• PWS 301.1.14 • PWS 301.7.02	• Culverts shall be designed for the 100-year storm. • All culverts shall be designed for fish passage in accordance with ODFW's "Fish Passage Criteria," or latest edition, unless exempt by ODFW or the City. • The headwater elevation must be at least 1 foot lower than road or parking lot subgrade. • New culverts ≤18 inches in diameter: the maximum headwater elevation (measured from the inlet invert) should not exceed 2x the pipe diameter. • New culverts >1 8 inches in diameter: the maximum headwater elevation should not exceed 1.5x the pipe diameter.

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Table 5-1. Wilsonville Drainage Standards and Design Criteria		
Criteria	**Source**	**Value**
Open Channel Design	• PWS 301.1.13.f • PWS 301.6.02	• Open channels shall be designed for the 25-year undetained storm with a minimum of 1 ft of freeboard. • Channel lining material is site specific. • The minimum slope for the flow line is 1% where practicable, but flow shall not be less than 2 fps (unless approved by City).
Pipe Cover	• PWS 301.8.02m Table 3.8 Minimum Pipe Cover	• 36" of cover: Nonreinforced, RCP Class III, Other Pipe Materials • 24" of cover: RCP Class IV • 12" of cover: RCP Class V, AWWA C-900, AWWA C-905, DIP
Structure Spacing	• PWS 301.8.06	• The maximum distance between structures (manholes, area drains, and catch basins-excluding clean outs) is 400 ft.
Outfalls to Open Channel Waterways	• PWS 301.6.04	• Design bank stabilization for the 25-year storm. • Flows from outfall structures should be directed downstream, typically no less than 30 degrees from perpendicular to waterway flow. • Outfalls must be located at higher elevations than the downstream mean low water. • Plantings (willows or other approved plantings) every 2 ft.
Manhole Design	• PWS 301.8.01 • PWS 301.9.01 • PWS 301.4.11	• Manholes are required at least every 400 ft (unless approved by the City). Required placement includes at every grade change, change in pipe size, change in alignment, pipe connection greater than 6 inches, and at the end of the main lines. • Manhole sizing: • 48-inch-diameter manhole for pipe ≤24 inches in diameter • 60-inch-diameter manhole for pipe 27 to 36 inches in diameter and pretreatment manholes • 72-inch-diameter manhole for pipe ≥42 inches in diameter • Maximum of four pipes entering/exiting a manhole. • Minimum free drop of 0.20 ft, maximum free drop of 1.5 ft.
Catch Basins/Curb Inlets	• PWS 301.8.04 • PWS 301.8.05 • PWS 301.8.05.b	• Must be designed for the 10-year storm. • All catch basins must have a sump (unless approved by the City). • Maximum of three catch basins may be connected in a series before connecting to the mainline. • Curb inlets should be constructed with an 18"minimum sump and 6 ft deep from the top of grate to the lowest pipe invert. • Between the inlet and the mainline or mainline structure, the maximum length of pipeline shall be 60 ft for 12" pipe, unless additional length is required to cross the street ROW.

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service. Design storms evaluated in this SMP include the 2-, 10-, 25-, and 100-year recurrence interval 24-hour events as well as water quality events. Design storms are listed in the City's PWS and listed in Table 5-2. The rainfall distribution for these design storms is based on a Unified Soil Classification System (USCS) Type IA distribution.

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Table 5-2. Design Storm Depths	
Design storm event	Rainfall depth, inches
2-yr, 24-hr	2.50
10-yr, 24-hr	3.45
25-yr, 24-hr	3.90
100-yr, 24-hr	4.50
Water Quality Event , 24-hr	1.00

5.2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater treatment and flow control facilities in consideration of instream hydromodification impacts. The BMP Sizing Tool (updated 2017) is intended to be used in conjunction with the City's PWS to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate facility sizes for the following BMP types:

- Rain Garden-Filtration and Infiltration
- Stormwater Planter-Filtration and Infiltration
- Vegetated Swale-Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The BMP Sizing Tool was developed and calibrated based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration-based facilities is based on the facility soil subgroup. Infiltration rates greater than 0.5 in/hr are considered acceptable for use with infiltration facilities and can be used to meet treatment and flow control standards directly. Infiltration rates less than 0.5 in/hr require use of filtration facilities that include piped underdrain systems and orifice controls to meet flow control requirements.

Use of the BMP Sizing Tool represents a shift away from traditional stormwater detention design practices to match pre- and post- development peak flows for standard (i.e., 24-hour) synthetic design storms. Instead, the tool sizes facilities to match the duration of post development peak flows to pre-development levels for the range of flows anticipated to be the most erosive. The BMP Sizing tool was used to size several CPs in this SMP as well as to evaluate policy recommendations associated with use of the Library Pond to support treatment and flow control requirements associated with the Town Center redevelopment. Additional information related to the Library Pond evaluation is discussed in Section 6.3.4 and Appendix F.

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5.3 Model Evaluation Criteria

Stormwater infrastructure was evaluated using the H/H model for capacity per the design criteria defined in Table 5-1. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding where the hydraulic grade line (HGL) exceeds the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level.

For capacity deficient locations where a CP was recommended and developed (see Section 6), the goal was to adhere to the PWS and accommodate the minimum of 1 foot of freeboard between the HGL and the ground surface.

5.4 Model Refinement

Wilsonville developed a city-wide H/H model using the Innovyze InfoSWMM model platform for the 2012 SMP. Localized model updates were incorporated in 2019.

For this SMP, updates to the model datum, hydrologic input parameters, hydraulic model extents and select hydraulic infrastructure were completed. Additional detail related to datum corrections and hydrologic model refinements are included in TM1, which are independent from this SMP. Specific locations of hydraulic model refinement, as well as more detailed explanation of the model validation effort are outlined in Appendix B.

5.4.1 Datum Conversion

As part of the GIS data review process, initiated in 2021, BC reviewed rim and invert elevation data stored in the City's GIS with LiDAR data to identify consistency regarding the vertical datum. Results of this GIS-based spatial analysis indicated inconsistency between recorded datums within the City's GIS dataset, which prompted a similar comparison effort on the City's 2012 InfoSWMM model.

Based on the model comparison results, the original (2012) hydraulic model appeared to rely on inconsistent vertical datums for select model elements. Through discussions with the City, this inconsistency was due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted hydraulic model elevations to be consistent with the City's current standard of NAVD88. Successful conversion of the existing model to NAVD88 was completed in June 2021.

5.4.2 Hydrologic Model Refinement

Hydrologic model refinements included updated subbasin delineations, existing and future land use coverage, and land-use based impervious percentages. With the adjusted subbasin delineation, updated area-weighted average values for infiltration parameters and impervious areas were assigned for each subbasin. In addition, updated subbasin areas, slopes and widths were calculated.

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The City's 2012 SMP reflected an initial subbasin delineation within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and made updates based on:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

A summary of the updated subbasin delineation by major basin is presented in Table 5-3. Please note Newland Creek (and its associated drainage area) is outside the designated study area for the H/H model and not included in Table 5-3.

Table 5-3. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

As introduced in Section 2.3, City staff developed an updated existing and future (full build-out) land use coverage using City zoning and comprehensive plan designations plus specific overlays where development is restricted (e.g., Significant Resource Overlay Zone (SROZ), METRO vacant/developable lands, City maintained vacant lands, Bonneville Power Administration (BPA) easements, significant wetlands, public parks/natural areas etc.). Impervious coverage by land use designation was based on digitization of impervious area (from aerial imagery) for representative tax lots within each existing land use category and calculated by the City as an area-weighted impervious percentage.

Land use categories reflecting reclassification due to HB 2001, as well as calculated impervious percentages are provided in Table 2-3.

5.4.3 Hydraulic Model Refinement and Model Validation

Updates to the City's 2012 InfoSWMM hydraulic model were completed from May 2021 to May 2022. Hydraulic model updates included areas of model expansion, primarily in new growth areas since the 2012 SMP was completed or identified problem areas, and updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects.

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The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments recommended as part of the Boeckman Road Hydraulic Evaluation (January 2022).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

Discussion of preliminary model flooding results with City staff focused on newly identified 25-year flooding locations where the 2012 SMP did not define a CP to address flooding under existing land use conditions. In general, City staff agreed with the preliminary flooding results presented by the model. However, based on results of the validation exercise, additional hydraulic model updates were warranted in select locations based on updated information provided by the City.

These locations included:

- Charbonneau SW French Prairie Rd. Outfall. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- Library Pond. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- Penske Truck Rental Property. Model revised to reflect updated culvert information underneath the parking lot based on as-built drawings.
- Wilsonville Distribution Center Pond. Model revised to reflect the pond outlet structure based on as-built drawings.

Figure 5-1, at the end of this section, summarizes the hydraulic modeling extents as well as locations where the hydraulic model was expanded or updated, including updates based on model validation efforts.

5.5 Model Results and Project Opportunity Area Identification

Upon completion of the model validation effort, detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm.

H/H model inputs and results are summarized for the hydrologic and hydraulic models in Appendix B, Attachment B, Tables B-2 and B-3, respectively.

5.5.1 Hydrologic Model Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events.

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are

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primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow).

Although flow attenuation with new development is anticipated through implementation of the City's stormwater design standards, for purposes of this SMP, CP sizing is based on unmitigated flows. In addition, policy recommendations may be considered to ensure that for capacity limited infrastructure, additional efforts are made to retain and mitigate stormwater flows onsite.

5.5.2 Hydraulic Model Results and Project Opportunity Areas

Hydraulic model results identify locations with the potential for flooding and the need to develop CPs to increase conveyance capacity. As described in Section 5.2, flooding within the model is defined as locations where the hydraulic grade line exceeded the structure's rim elevation. Flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storms were also simulated to identify the minimum flooding frequency. Table 5-4 and Figure 5-2, at the end of this Section, summarize the 18 locations that are anticipated to experience flooding under the existing conditions. Generally, all modeled flooding locations are designated as Project Opportunity Areas unless indicated otherwise, and the "priority need" column in Table 5-4 indicates whether a flooding location is confirmed by City staff as necessitating a CP or program to address.

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Table 5-4. Modeled Capacity Deficiencies

Flooding Location ID (Figure 5-2)	Basin	Location Description	Minimum Flooding Frequency	Flooding Predicted in 2012 SMP? (Y/N)	Project Opportunity Area (Y/N)	Priority Need
1	Charbonneau	Miley Road	10-yr	Y	Y	Y
2	Charbonneau	French Prairie Rd and Old Farm Rd	2-yr	Y	Y	Y
3	Willamette	Parkway Ave/Metolius Ln	10-yr	Y	Y	N
4	Willamette	SW Miami	25-yr	N	Y	N
5	Boeckman	Memorial Dr	2-yr	Y	Y	Y
6	Boeckman	Canyon Creek Rd	10-yr	Y	Y	N
7	Boeckman	Sysco Ditch	10-yr	N	Y	N
8[a]	Boeckman	Elligsen Rd	10-yr	Y	N	N
9	Coffee	Shrine Center Pond	2-yr	Y	Y	Y
10	Coffee	Commerce Circle Ditch	2-yr	Y	Y	Y
11	Coffee	Garden Acres	2-yr	N (not modeled)	Y	Y
12[b]	Coffee	Coffee Creek Wetlands	2-yr	Y	N	N
13	Coffee	Boberg Rd and RR crossing	10-yr	N	Y	N
14	Coffee	I-5 Culverts	25-yr	N	Y	N
15	Coffee	Barber Street	25-yr	Y	Y	N
16	Willamette	River Fox Park	2-yr	N	Y	Y
17	Willamette	Lower Boones Ferry	2-yr	Y	Y	N
18[c]	Coffee Lake	Boeckman Corp. Center Pond	10-yr	Y	N	N

a. *Flooding likely due to modeled routing (large subbasin at the upstream end of model). City indicated no Project Opportunity Area designation needed.*

b. *Generalized modeled cross sections are underrepresenting the actual storage. City indicated no Project Opportunity Area designation needed.*

c. *Model configuration questions exist in regard to an existing flow control structure in this area. City staff report no flooding and so this area was not included as a Project Opportunity at this time.*

Three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and required alternatives analysis to ensure that City objectives and preferences will be achieved. These locations are discussed further in Section 6.3 and include:

- Flooding Location ID 2: Charbonneau (French Prairie and Old Farm Road)
- Flooding Location ID 10: Commerce Circle Ditch (Day Road)
- Flooding Location ID 11: Garden Acres

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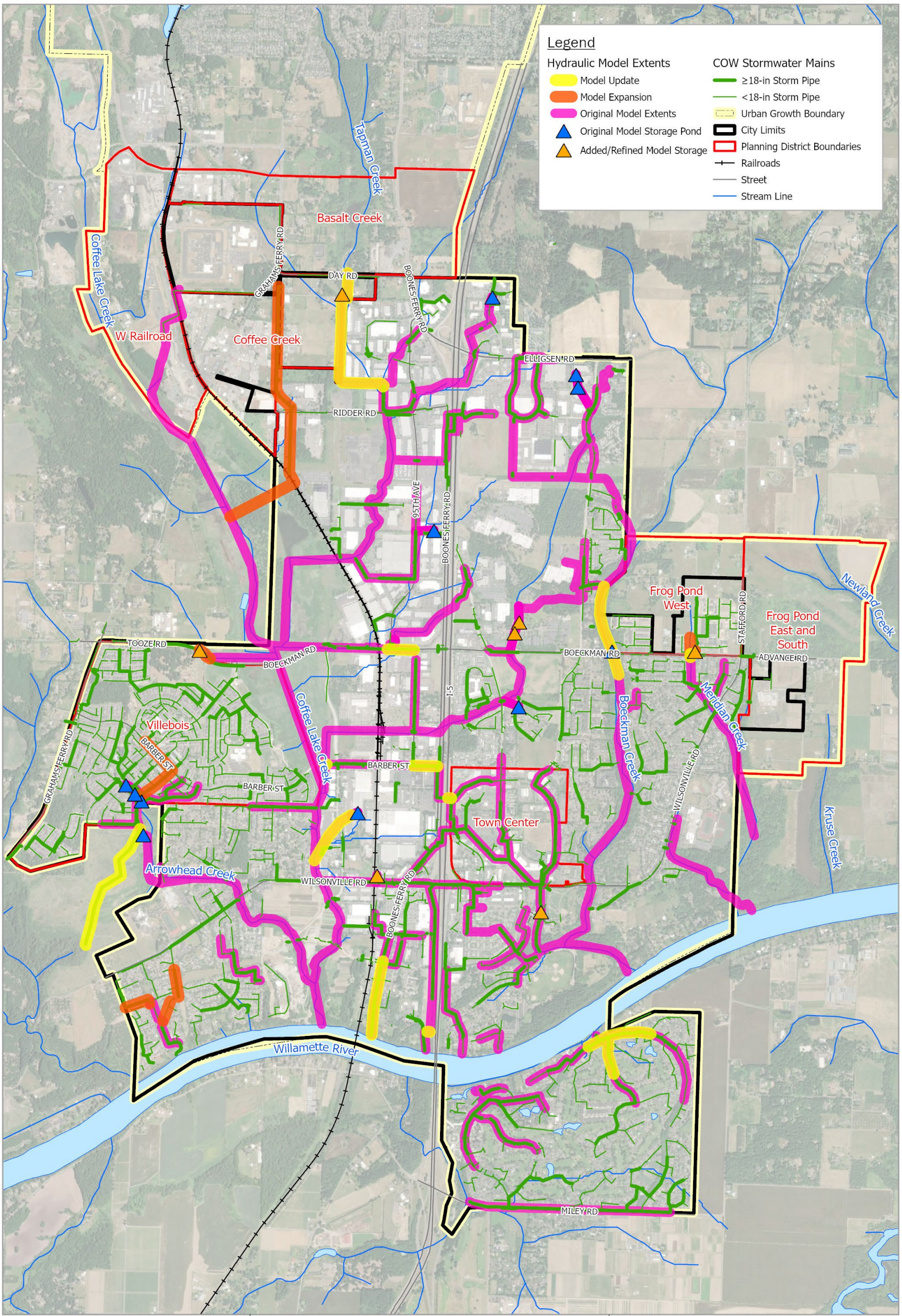

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City of Wilsonville/
Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Figure 5-1: Hydraulic Model Overview

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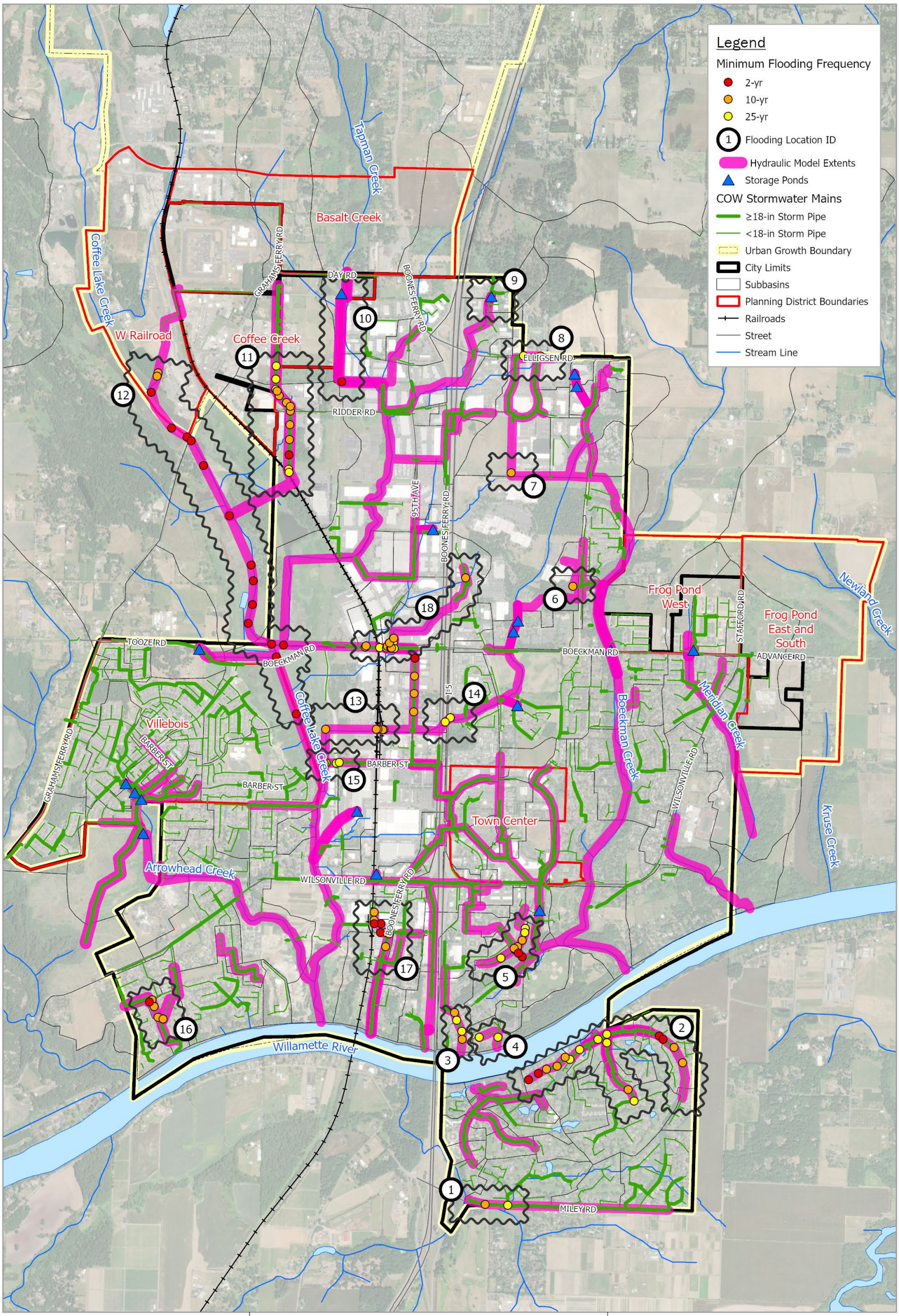

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Project # 156157

Stormwater Master Plan

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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0 0.25 0.5 1 Miles

Figure 5-2: Capacity Deficiencies (Existing Land Use)

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Section 6

Capital Program Development

Project planning and technical analyses as outlined in Sections 3, 4, and 5 of this SMP resulted in the identification of 47 Project Opportunities, which represent locations with a potential need for a Capital Project (CP) or program as part of the overall stormwater Capital Improvement Program (CIP).

Input from City staff helped focus the projects and programs selected for inclusion in the CIP on addressing the most immediate needs. Project Opportunities not developed into recommended CPs are documented in this SMP as future project needs, although full project descriptions and costs are not developed as part of this SMP.

This section describes the process to develop CPs from Project Opportunities. A detailed list of Project Opportunities is provided in Appendix A, Table A-2. Resulting fact sheets for identified CPs are provided in Appendix D and detailed cost estimates for identified CPs are provided in Appendix E.

6.1 Capital Project Needs Identification

Project Opportunities stemming from the Problem Area identification effort (Section 3.1); Water Quality Retrofit Assessment (Section 3.3); Stream Assessment (Section 4) and Model Evaluation (Section 5) were compiled into a matrix to facilitate discussion amongst Public Works and Community Development/Engineering staff. Areas with overlapping project needs were consolidated into a single Project Opportunity area to facilitate development of multi-objective project concepts.

6.1.1 Project Opportunity Matrix

The Project Opportunity matrix (Appendix A, Table A-2) details the source of the Project Opportunity; the relative deficiency or objective the project would address; and how the system evaluation activities support the project need. If applicable, the Problem Area Location (Appendix A, Table A-1) is also identified. Figure 6-1, at the end of this section, identifies all Project Opportunity Locations by primary deficiency category.

6.1.2 Capital Project Workshops

Two capital project planning workshops were held in the spring of 2023 with members of Public Works and Community Development/Engineering to discuss which Project Opportunities should be prioritized for project development. Staff considered the feasibility of construction during a 20-year Capital Improvement Plan (CIP) implementation period in the selection of locations warranting a capital project, as well as recurring maintenance activities, known/reported capacity deficiencies, and pending development drivers. These identified priority locations (i.e., Project Opportunities identified as “costed capital project needs” per Table A-2) include a conceptual project design and cost estimate that will ultimately factor into future financial evaluations and rate studies.

In some cases, an immediate project need was not identified, and instead a program to address activities at a city-wide scale was the preferred approach. These programmatic needs are identified with an annual funding mechanism (see Section 6.5). In other cases, the Opportunity Area does not warrant a more immediate project, but a project may become more necessary in the future. Those areas are identified as “unfunded capital project need” per Table A-2. These Project Opportunities

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are typically associated with a modeled capacity deficiency that was not confirmed or substantiated by city staff.

Of the Project Opportunity Areas, 22 locations resulted in a capital project conceptually designed and costed in this SMP. Notes from the respective workshops are detailed in Table A-2.

6.2 Capital Project Sizing and Design Assumptions

CP sizing generally follow the City's PWS and design criteria summarized in Table 5-1 as detailed below.

- **Capacity Projects**. Projects to replace stormwater infrastructure, including pipes and culverts, are sized in accordance with the City's PWS unless noted. Pipelines are sized for the 25-year, 24-hour design event under future land use conditions and culverts for the 100-year, 24-hour design event under future land use conditions. Where possible, replaced infrastructure was sized to adhere to the minimum one-foot freeboard between the HGL and top of structure.
- **Water Quality Facility**. For purposes of conceptual sizing and cost estimation, the BMP Sizing Tool was used to size treatment or treatment and flow control facilities in accordance with the specified facility type.
- **New Infrastructure**. Several capital projects require new infrastructure in locations where no storm system currently exists. In the case of the Frog Pond East and South Planning Area, infrastructure sizing per the concept plan was maintained for CP development and costing. For other areas, new infrastructure was sized in accordance with the City's PWS. New infrastructure alignments are in the public right-of-way (ROW). However, it should be noted that final design may require additional structures, alternate alignments, or deeper/shallower infrastructure than assumed for this conceptual project design to address utility conflicts and other constraints not identified as part of this SMP. Survey will be required to verify elevations and locations.

For certain CPs, the project description and costs are developed with a phased approach, splitting the overall project into multiple phases that may be funded and constructed on different timelines. This approach was applied to specific, higher-cost projects for this SMP. These selected projects are generally associated with the same Project Opportunity area but have separate, independent components. In some cases, additional flow monitoring and model calibration may influence the scope or size of the proposed improvements and as such, portions of the project may be delayed, warranting scheduling as a different phase.

For phased projects, Phase 1 project elements should be constructed first, and Phase 2 project elements may be conducted later or following additional evaluation efforts.

6.3 Project Alternative Analysis

In developing CP concepts, a more in-depth evaluation of alternatives was warranted for select locations. These locations include Day Road, Charbonneau, and Garden Acres Road. These areas have complicated drainage patterns and reflect Project Opportunities where a single project solution may not resolve all deficiencies.

A description of the alternatives analysis and H/H model development is provided below for these locations, identified by their Project Opportunity ID. Additional background and description of the preferred design concept is provided in the respective fact sheets (Appendix D).

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6.3.1 Day Road/Commerce Circle (Project Opportunity ID#9)

Tapman Creek, between Day Road and Ridder Road, is conveyed through a series of culverts and open channels before it enters a piped section just north of Ridder Road. The open channels include reaches of negative slope and limited capacity and storage potential. Flooding has been observed at adjacent industrial properties, and the catchment area upstream includes the Basalt Creek Planning Area (see Section 3.5.1). Pending, and future, development from the Coffee Creek Industrial Area and Basalt Creek Planning Area may increase the frequency and severity of flooding.

In 2019, AKS prepared a facility siting alternatives report, which included design concepts expected to alleviate flooding during the existing land use condition. The report did not include analysis of alternatives' performance under future land use conditions.

For this SMP, the preferred AKS concept as well as other system configurations were analyzed for both existing and future development conditions using the updated H/H model. Model results validated the AKS report's conclusion that the preferred concept would alleviate flooding under existing land use conditions, but flooding under future land use conditions is still predicted.

Therefore, to augment the preferred AKS alternative, additional system configuration alternatives were evaluated, including use of a surface detention facility, pipe/culvert upsizing at Day Road, and piped conveyance system upsizing north of Ridder Road. The 25-year storm was used to evaluate flooding, and water surface elevations (WSE) predicted during the 100-year storm were also compared to the elevation of adjacent structures. Results of the additional alternatives evaluation are shown in Table 6-1.

Table 6-1. Day Road Evaluation Summary

Alternative	25-Year Flooding Result		100-Year Flooding Result	
	Existing Land Use	Future Land Use (unmitigated)	Existing Land Use	Future Land Use (unmitigated)
Existing Conveyance	Flooding at multiple points in system	Extensive system flooding	WSE at or above structures at multiple locations	WSE at or above structures at multiple locations
AKS Preferred Concept (AKS)	None	Extensive system flooding	Approx. 2 ft freeboard to structures	WSE at or above structures
AKS + Detention Pond	None	Flooding at multiple points in system	Not analyzed[a]	WSE at or above structures
AKS + Upsizing pipes upstream of Ridder Rd	None	Flooding at multiple points in system	Not analyzed[a]	Approx. 1 ft freeboard to structures
AKS + Detention Pond + Upsizing pipes upstream of Ridder Rd	None	Minimal flooding	Not analyzed[a]	Approx. 1 ft freeboard to structures

a. Alternative not analyzed because it was assumed to have good or better performance than the AKS Preferred Concept.

Evaluation of alternatives considered the relative costs and benefits associated with the alternatives. For example, the addition of a detention pond involves significant costs and logistical challenges, while model results still predict flooding, albeit reduced, for this alternative. Ultimately, the City selected the alternative that included both the preferred AKS concept and upsizing of pipes upstream of Ridder Road. See Appendix F, CP CLC-1, Phases 1 and 2.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. Application of the City's design standards are anticipated to mitigate some of the increased flow associated with future land use.

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However, the larger drainage area to this conveyance system includes area outside of city limits, creating further uncertainty about flow mitigation. In conjunction with this CP, a policy defining and directing the implementation of design standards in the Coffee Creek Industrial Area (as well as other new development areas currently outside of the UGB but draining towards capacity-limited infrastructure and stream corridors) is recommended. In addition, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.2 Charbonneau East (Project Opportunity ID#30)

The Charbonneau East Project Opportunity reflects the continuation of identified pipe replacement and system upsizing along SW French Prairie Rd and SW Old Farm Road. The 2012 SMP identified both capacity and condition limitations throughout the Charbonneau basin. The 2014 Charbonneau Consolidated Improvement Plan categorizes the stormwater infrastructure in this neighborhood as Storm Priority 1 and 2, and efforts to replace deficient infrastructure are ongoing (Figure 6-2). Specific to the SW French Prairie Rd and SW Old Farm Road systems, some pipe upsizing and replacement has already occurred in the downstream portions of the system.

Figure 6-2: Charbonneau Consolidated Improvement Plan (2014), Charbonneau East

In accordance with this SMP, H/H modeling confirmed continued flooding along the extents of SW French Prairie Rd and SW Old Farm Road due, in part, to an undersized outfall pipe discharging to the Willamette River. Reported condition deficiencies also exist.

Various alternatives were evaluated to reduce the extent and coverage of flooding predicted under existing (25-year) and future development scenarios, while considering the portions of the piped collection system that have already been replaced. Due to space limitations, above ground detention was ruled out as a method of flow control to minimize the need for widespread pipe upsizing. Alternatives evaluated included inline detention along SW French Prairie Rd and/or SW Old Farm Rd,

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both at the upstream end and downstream end, as well as the upsizing and replacement of the outfall.

Alternatives were presented to the City in a workshop, and ultimately inline detention alternatives were not selected due to existing sanitary utility conflicts, space (limited ROW) constraints, maintenance concerns, as well as cost implications of replacing recently constructed infrastructure. The selected alternative includes a phased approach reflecting upsizing of the outfall to the Willamette River under Phase 1, and selective upsizing/replacing the remaining condition-limited pipes along SW French Prairie Rd and SW Old Farm Rd under Phase 2. See Appendix F, CP WR-4, Phases 1 and 2.

Like with the Day Road CP, a capital planning project is proposed to conduct flow monitoring to inform additional H/H model calibration with hopes of refining/confirming system upsizing needs affiliated with Phase 2.

6.3.3 Garden Acres (Project Opportunity ID#32)

The stormwater collection system along Peters Road is undersized with several pipe constrictions and a downstream pipe constriction at the P&W railroad crossing on the south end of Peters Road. The larger catchment area upstream includes portions of the Coffee Creek Industrial Area and West Railroad Planning Area. Pending development may increase the frequency and severity of flooding.

Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO. Stormwater is currently diverted towards a public stormwater pond on the 10450 SW Riddler Road parcel west of Peters Road to reduce flow through undersized storm piping (Figure 6-3). The existing pond does not have an outlet control structure and based on aerial imagery and site visits, appears to overflow to an existing stormwater ditch west of the pond along the railroad ROW.

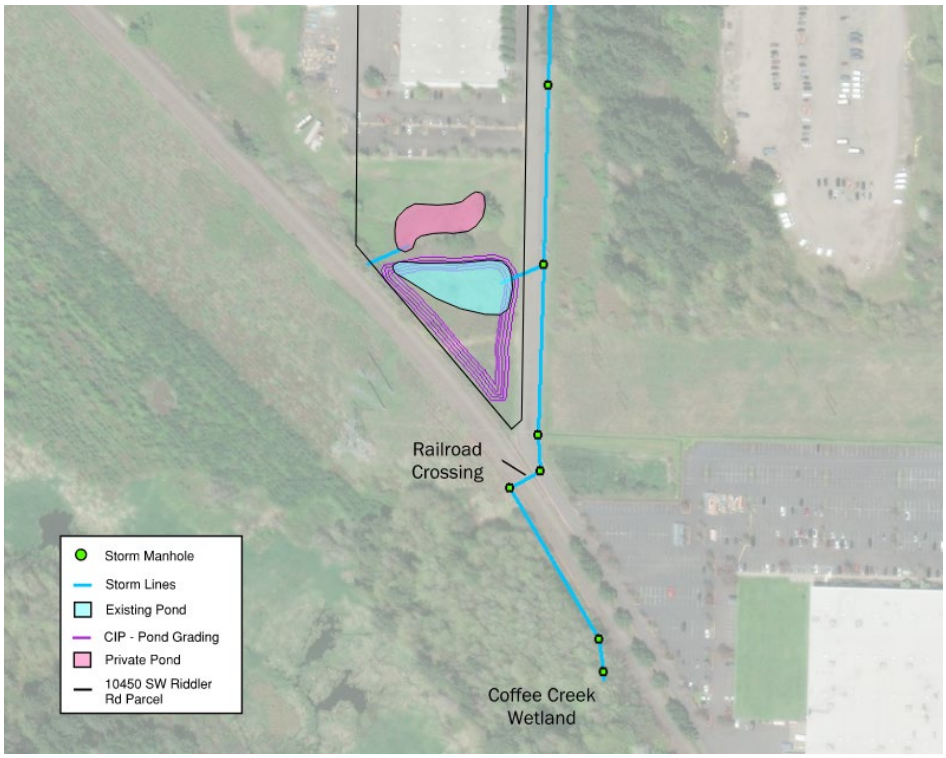

Figure 6-3: Garden Acres Pond (within Coffee Lake Wetlands)

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Several alternatives were evaluated to retrofit the existing public pond to provide additional treatment and storage (detention) of stormwater during high flow events. In addition, reconfiguration of the pond to establish a discharge route from the pond to the stormwater collection system in Peters Road would also reduce the amount of overflow to the railroad ROW. Design alternatives include expansion of the public pond footprint and available storage capacity, including one scenario to utilize additional storage capacity in a private detention pond (currently serving private development).

H/H model scenarios to optimize the storage capacity needed and relieve reported flooding in Peters Road during the 25-year storm event were developed and presented to City staff in a workshop setting. The City opted to increase the existing pond storage capacity to 39,000 cubic feet, fully utilizing the existing parcel while maintaining separation from the private pond located to the north. See Appendix F, CP CLC-3.

In accordance with the City's PWS, the City requires new and redevelopment to implement flow control standards that match pre-development site hydrology. As with the Day Road CP, application of the City's design standards is anticipated to mitigate and offset some of the increased flow associated with future land use. The Garden Acres system reflects another area of the City where adherence to current stormwater design standards requiring retention/mitigation of flows to pre-development conditions is needed, as the CP does not completely alleviate all modeled flooding in the system.

6.3.4 Library Pond Analysis (Project Opportunity ID#4)

The Library Detention Pond (Library Pond), located in Memorial Park, was originally constructed in the 1980s and receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, predominately associated with the Town Center Planning Area. Although operating as a regional detention facility, the current pond configuration has structural and sizing limitations preventing it from adhering to the City's current PWS as a water quality and flow control facility.

Dense, overgrown vegetation and accumulated sediment, combined with a lack of an outlet control structure, limits Library Pond's capacity and water quality function.

The city anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with redevelopment of the Town Center Planning Area. Therefore, as part of this SMP, a sizing evaluation was conducted to confirm capital project needs (specific to retrofit of the pond to meet current operations), as well as policy recommendations applicable to the Town Center Planning Area to allow the Library Pond to offset onsite stormwater treatment and flow control needs associated with redevelopment.

The BMP Sizing Tool was used to evaluate sizing of the Library Pond in conjunction with 1) varying pre-development conditions (to facilitate adherence to the City's flow control standard), 2) varying coverage of onsite stormwater management facilities applied to

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redevelopment areas, and 3) varying site and depth constraints associated with retrofit of the Library Pond (while maintaining the same pond footprint). Detailed findings and results of the sizing evaluation are contained in Appendix F.

Results of the evaluation conclude that there are limited redevelopment options to retrofit the Library Pond to current design standards under future development conditions. Scenarios are described in Appendix F, Table 5, with Scenario 2B and Scenario 3 being the sole options that meet pond design criteria under future development conditions.

Scenario 2B requires onsite mitigation (treatment and flow control) of approximately 50 percent of all redeveloped impervious surface, which requires redevelopment to adhere to the stormwater standards as outlined in the PWS including definition of pre-developed land cover condition and pond design criteria. Scenario 3 requires the City to approve of a policy change, allowing the definition of pre-development for the Town Center Planning Area to conform with existing development conditions (as opposed to pre-developed land cover).

For purposes of capital project development, Scenario 2B was assumed for costing and reflected in the CP fact sheet. See Appendix F, CP BC-1. In conjunction with this CP, a policy defining and directing redevelopment in the Town Center Planning Area is required. The policy needs to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment.

6.4 Cost Estimate Assumptions

CP costs are based on the total capital investment necessary to complete a project (i.e., engineering through construction). Unit costs for project (construction) elements are generally based on recent bid tabs and stormwater master planning efforts and (as necessary) adjusted for 2023 based on a historical cost index. City staff validated unit costs used in this SMP. Cost estimates presented in this SMP are Association for the Advancement of Cost Engineering (AACE) Class 5 Conceptual Level or Project Viability Estimates. Actual costs may vary from these estimates between -50 percent to +100 percent, although changes to design may result in cost differences outside of this anticipated range.

Project cost estimates use unit cost information for construction elements and generally apply a 40 percent construction contingency and multipliers to account for traffic control/utility relocation (5-10 percent), erosion control (3 percent), surveying (5 percent) and mobilization (10 percent). The range in traffic control/utility relocation is based on location (arterial vs. local street). Additional multipliers to account for engineering and permitting (20-30 percent) and construction administration (13.5 percent) are applied to the total construction cost with contingencies. The range in engineering and permitting costs is based on the anticipated permitting level of effort, such as whether in-water work is anticipated. Variations from these assumptions are noted on the project fact sheets in Appendix D.

Due to the resulting construction cost of select projects, the cost applicable to engineering and permitting and construction administration was capped in certain cases. For planning purposes, costs were rounded to the nearest $1,000 for engineering and permitting and construction administration; total project cost was rounded to the nearest $10,000 for budgeted purposes.

Appendix E includes unit costs developed for this SMP and presents the planning-level cost estimates for capital projects. Cost assumptions related to program recommendations are described in Section 6.5.

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Land acquisition and easements are not included in the cost estimates, as most projects are located on City property or within the City right-of-way (ROW).

6.5 Programmatic Recommendations

During the problem area identification (Section 3.1) and project planning efforts (Section 6.1), select maintenance-related, regulatory-driven, and condition-related project needs were consolidated into program recommendations, to address issues at a city-wide scale instead of as multiple, stand-alone individual projects.

The following programs defined below support the successful management of a municipal stormwater system. Implementation will result in cost savings by providing for proactive maintenance, replacement, and repair, as well as contracting efficiencies for smaller, localized project needs.

Costs proposed for the programs are estimated based on current City spending and vetted with City staff. Funding may accumulate over multiple years to be used on a larger cost effort.

6.5.1 Localized Drainage Improvements (P-1)

This program would dedicate funding to assist with minor system configuration/reconfiguration or installation needs or in response to a recurring maintenance need. Improvements funded under this program are not anticipated to require extensive engineering services and would help address localized issues that do not warrant a standalone capital project. These improvements may include relocation and/or installation of curb inlets instead of catch basins in high traffic roads with significant leaf debris to help address localized drainage issues, as well as the installation of additional inlets and laterals (to address localized flooding or lack of infrastructure) and the minor regrading and replanting of conveyance ditches and swales.

An annual cost of $100,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- Wilsonville Road and Kinsman Road (Project Opportunity ID #10),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Commerce Circle (Project Opportunity ID #36),
- Serenity Way (Project Opportunity ID #37),
- SW Camelot Street (Project Opportunity ID #38), and
- SW Del Monte Ct (regular maintenance need reported during staff interviews).

6.5.2 Water Quality Retrofit Program (P-2)

This program stems from the project planning efforts and the stormwater retrofit analysis. This program involves the opportunistic incorporation of LID features (planters, curb bump outs, bioretention basins, porous pavement overlays, etc.) to address water quality in conjunction with other transportation, public improvement, or utility planning projects. These types of retrofit activities promote additional infiltration and water quality treatment, which are core values reflected in results from the public survey and external stakeholder outreach efforts. Efforts will help address NPDES MS4 retrofit requirements and TMDL compliance. Targeted locations may include collector roadways, park properties, and residential neighborhoods with limited or no existing water quality treatment.

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An annual cost of $200,000 is estimated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- SW Parkway Avenue (south of Costco) (Project Opportunity ID #8),
- SW Salish Lane and Parkway Ave (Project Opportunity ID #11),
- Green Streets/LID Facilities (Project Opportunity ID #39),

6.5.3 Repair and Replacement (R/R) Program (P-3)

CCTV is one of the least expensive and most robust methods to document, assess, and identify condition-related issues in the piped stormwater network. The City's Public Works Road and Storm Section is implementing their CCTV program in accordance with staffing recommendations.

An R/R Program is used to budget the design and construction of improvements stemming from a CCTV and Asset Management Program. The gathered information and subsequent ranking of pipe and infrastructure condition will inform the locations where pipes need to be repaired or replaced in accordance with available funding and schedule. An R/R Program is key to the long-term sustainability of the stormwater collection system. An R/R program ensures that replacement is scheduled for older infrastructure nearing the end of its useful life before failure, as well as prioritizing damaged or failing pipes identified through the CCTV Program.

This program includes dedicated funding to repair/replace all public pipe 12-inches to 48-inches in diameter in-kind within the city limits over a 100-year timeframe. This fund would utilize results of the CCTV inspections to proactively schedule necessary replacement projects and exclude Charbonneau infrastructure, as replacement of a significant portion of the system is underway via a separate program effort in accordance with the Charbonneau Consolidated Improvement Plan (2014) (see Section 6.5.4).

Based on the City's asset inventory, this requires the replacement of approximately 3,700 LF of public stormwater pipe and associated manholes annually, reflecting a present-day construction cost (excluding contingencies and multipliers) of approximately $2.66M/year. However, this estimate does not consider ongoing pipe replacement efforts in CIP implementation and other drainage improvements. The estimate also excludes unknowns related to pipe age and associated lifespan of plastic pipe. As such, the City opted to allocate an additional $275,000 per year (approximately 10 percent of the annually calculated amount for this program.

6.5.4 Charbonneau R/R Program (P-4)

Since 2014, the City has implemented stormwater R/R efforts in the Charbonneau basin as part of the Charbonneau Consolidated Improvement Plan. The Charbonneau Consolidated Improvement Plan identified improvements across four utilities and consolidated utility improvements based on priority and location over a 20+ year period. To date, approximately 12,900 linear feet of pipe has been replaced. Project identification and H/H modeling efforts as part of this SMP identified two CP needs (WR-4, Phases 1 and 2 and WR-5) that incorporate pipe upsizing and direct pipe replacement in the Charbonneau basin.

This R/R program reflects direct replacement of remaining public pipe identified in the Charbonneau Consolidated Improvement Plan that has not been replaced or costed as a CP in this SMP (see Figure 6-4). This program includes in-kind replacement of approximately 30,000 linear feet of public pipe and 150 manhole structures. Pipe replacement will use PVC; pipe diameters less than 12 inches are assumed to be replaced with 12-inch pipe in accordance with the PWDS. A program duration of 20 years is maintained in conjunction with the Charbonneau Consolidated Improvement Plan.

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Program costs were calculated directly and incorporate contingency, and multipliers as outlined in Section 6.4 (see Appendix E for a detailed cost estimate). The present-day construction cost (including contingencies and multipliers) is approximately $38.36M, resulting in an annualized program cost of approximately $1.92M per year.

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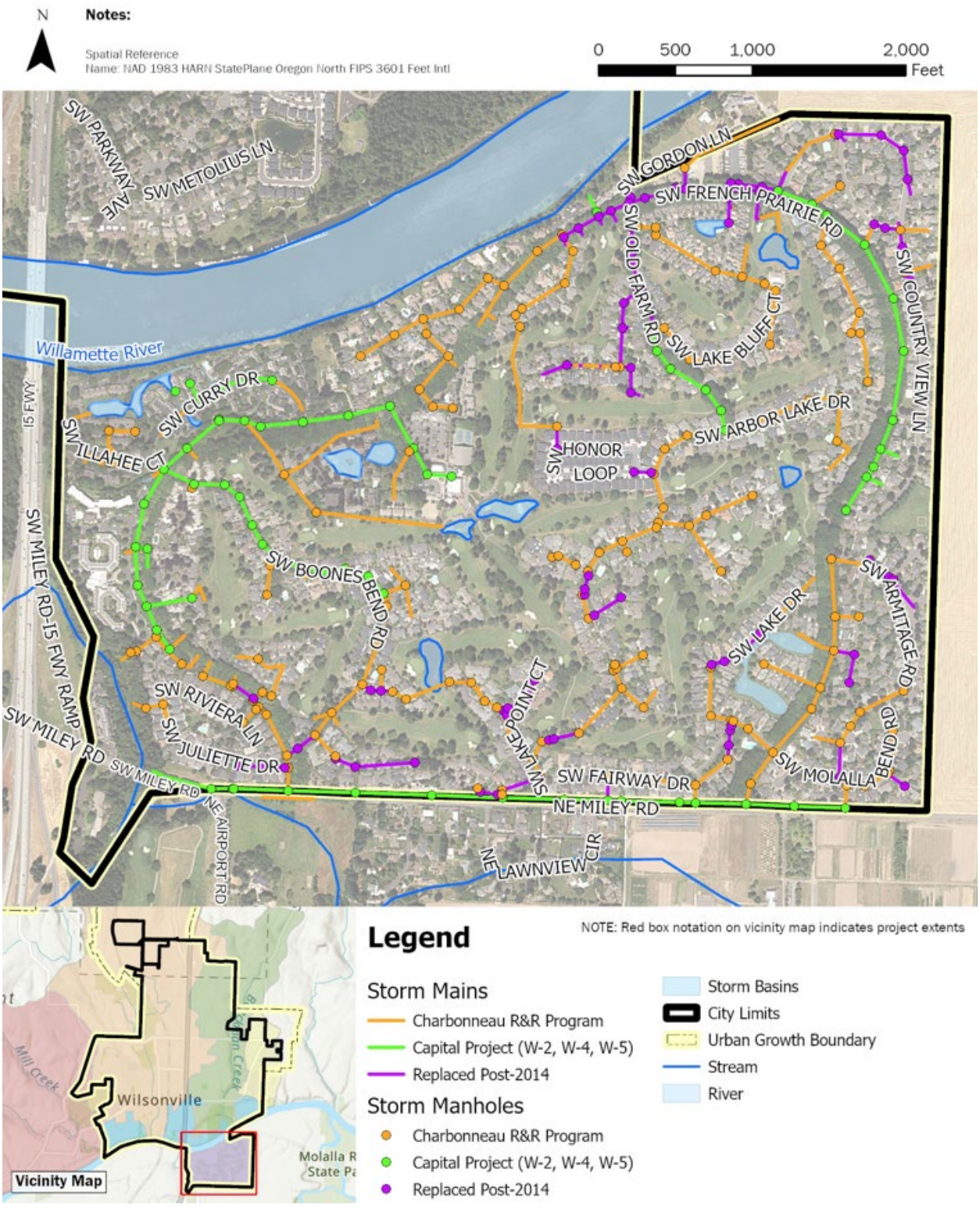

Figure 6-4: Charbonneau R/R Program Coverage

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6.5.5 Riparian Vegetation Management Program (P-5)

This program includes dedicated funding to conduct riparian vegetation management and maintenance activities along stream corridors including removal of invasive species. This need was identified in the Stream Assessment (Section 4 and Appendix C), as there was dense coverage of invasive species including Himalayan blackberry, reed canary grass, and English ivy. In some cases, extensive vegetation prevented data collection efforts. These efforts support NPDES MS4 and TMDL (temperature management) initiatives.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas and specific locations noted in the Stream Assessment (Appendix C) that would potentially benefit from this program include:

- Boeckman Creek Reaches 2-9 (Stream Assessment identified vegetation management need)
- Kruse Creek Reaches 1-2 (Stream Assessment identified vegetation management need)
- Meridian Creek in Landover Park (Reaches 1 and 2) (Project Opportunity ID #18 and #19)
- Arrowhead Creek Reach 4 (Project Opportunity ID #20)
- Boeckman Creek Instream Flow Mitigation and Restoration (Project Opportunity ID #27)

6.5.6 Stormwater Facility Enhanced Maintenance Program (P-6)

This program establishes a dedicated funding mechanism supporting Public Works staff efforts to conduct more reactive and extensive maintenance of public and private vegetated stormwater facilities. Although routine maintenance of public facilities is addressed in conjunction with existing maintenance activities and staffing levels, occasionally additional support is needed to conduct a more robust, restorative maintenance effort on a larger, regional facility or address widespread replacement of amended soils and vegetation on LID/GI facilities.

Private facilities subject to this program would include those where private facility maintenance agreements are not in place and/or not being implemented after enforcement efforts are conducted. Maintenance on private facilities where a maintenance agreement is on file may be subject to reimbursement.

An annual cost of $25,000 is allocated for this program. Project Opportunity Areas potentially benefitting from this program include the following:

- Pond F and other ponds in Villebois (Project Opportunity ID #5),
- SW Daybreak Street and SW Morningside Avenue (Project Opportunity ID #12),
- Oulanka and Tivoli Parks (Project Opportunity ID #22)

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6.6 Project and Program Numbering and Naming

CP numbering is applied to all location-specific capital projects, based on major basin. The project numbering convention maintains consistency with the 2012 SMP and includes a major basin abbreviation and number to indicate the individual project location. Phasing is defined within the project numbering. Project naming incorporates the location and primary objective of the project in the title.

Major basin abbreviations used for project numbering are listed below:

- Boeckman Creek (BC)
- Coffee Lake Creek (CC), includes projects associated with Tapman Creek drainage area
- Willamette River (WR), includes projects associated with the Charbonneau planning area
- Newland Creek (NC)

Four planning-related capital projects are identified and numbered with a “City” prefix.

Programmatic activities are numbered P-1 through P-6 and reflect city-wide implementation and an annual funding need.

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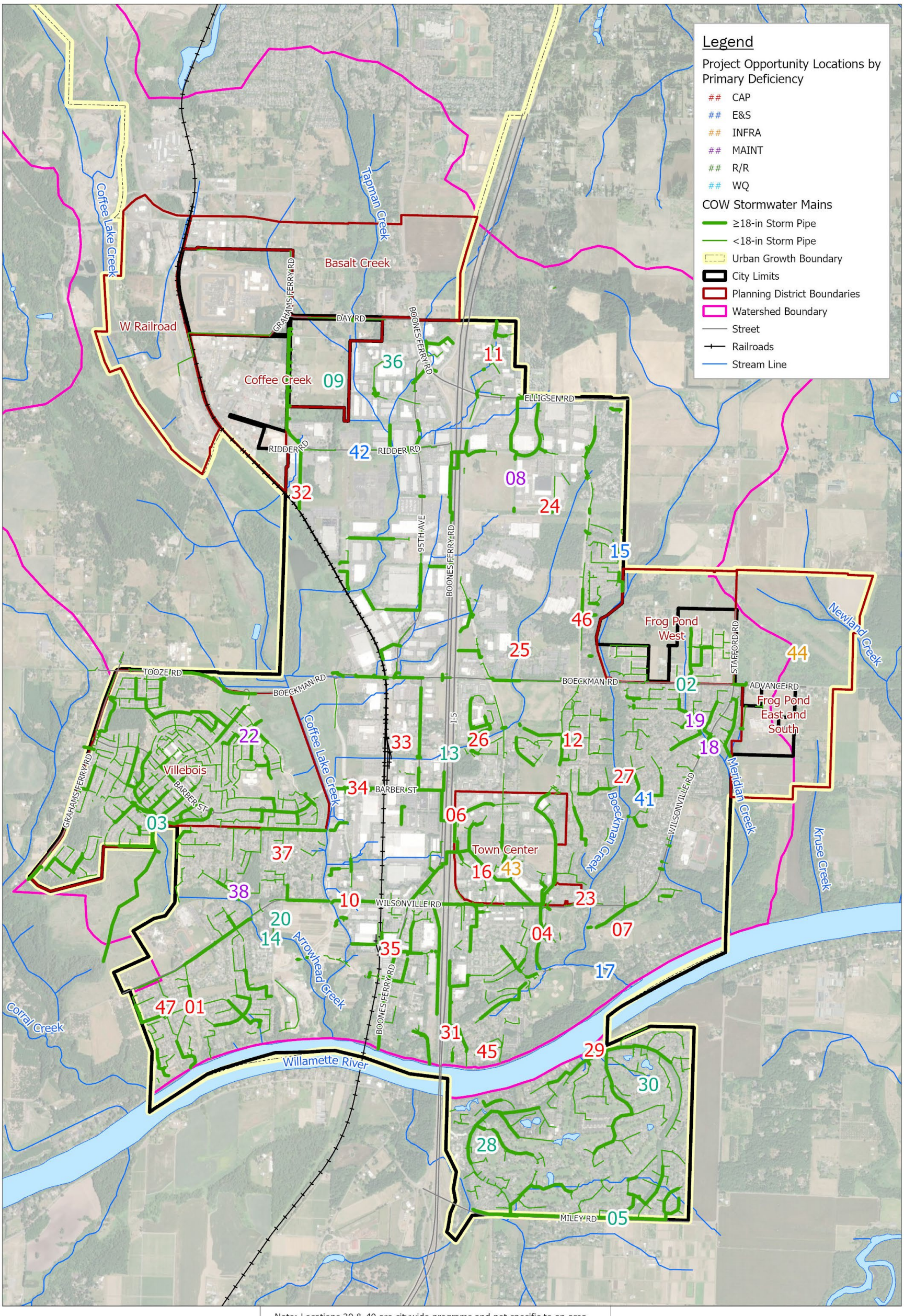

Note: Locations 39 & 40 are citywide programs and not specific to an area.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 6-1: Project Opportunity Locations

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Section 7

Capital Improvement Plan

This section summarizes the capital projects, programs, and policy recommendations identified through the master planning process, collectively comprising the City's Stormwater Capital Improvement Plan (CIP).

A total of 15 capital projects (CPs) are identified to address current and future storm drainage infrastructure needs related to system capacity, repair and replacement (R/R), a lack of infrastructure, recurring maintenance, instream erosion and sediment accumulation, and water quality. Considering multiples phases for some projects, these 15 CPs represent 20 separately costed and phased projects for purposes of project prioritization and scheduling efforts.

CP recommendations are considered a one-time cost and are shown in Figure 7-1, located at the end of this section.

In addition to the 15 CPs, there are four, city-wide planning projects that are also considered a one-time cost. These planning projects are described in Section 7.2.

Six programmatic recommendations are identified, including addressing ongoing support for localized drainage improvements, city-wide system repair and replacement (R/R) needs, water quality retrofits and expanded stormwater facility maintenance needs, and riparian vegetation management. Program recommendations are considered an annual cost, as described in Section 6.5, and intended to support ongoing asset management efforts.

Section 7.1 summarizes the recommended actions costed for this SMP. Section 7.2 summarizes the overall CIP, and Section 7.3 outlines the staffing analysis to assess Public Works and Engineering staffing needs in support of this SMP and regulatory obligations.

7.1 Summary of Recommended Actions

Project, program, and policy recommendations in this SMP are proposed to improve and enhance drainage infrastructure and water resources throughout the City, as summarized by the following recommended actions.

- Implement CPs required to address system capacity, system maintenance, repair and replacement, water quality, instream erosion/sediment control, and new infrastructure needed to accommodate pending development. These CPs are intended to manage areas of reported deficiencies and accommodate development and growth.
- Implement stormwater-related improvement programs to address recurring, maintenance-related system needs in an expedited manner, as well as address system condition issues in accordance with ongoing inspections and the City's asset management goals.
- Implement stormwater retrofits both proactively and opportunistically to enhance water quality and improve natural system aesthetics and function.
- Update policies and procedures to support public and private partnerships for new and redevelopment activities, specifically related to stormwater infrastructure replacement and stormwater fee-in-lieu payments in conjunction with the Town Center redevelopment.
- Continue implementation of the City's Public Works Design Standards (PWDS) to address regulatory drivers, support private development activities, and protect stream health.

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- Add staff necessary to maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit, as well as to implement recommendations outlined in this SMP.
- Clearly document capital project and program costs and schedule to inform future funding and rate analyses.

7.2 Capital Improvement Program Recommendations

CP locations are mapped in Figure 7-1, at the end of this section, based on the following objectives (identified in **BOLD**):

- Increase **system capacity** to address existing and potential future deficiencies (i.e., flood control).
- Install **water quality** treatment and address instream **erosion and sediment control (E&S)** to meet regulatory drivers including the City's NPDES MS4 permit and total maximum daily load (TMDL) obligations.
- Address recurring **maintenance** and **infrastructure needs** (i.e., lack of maintenance access, add infrastructure to address localized drainage issues).
- Address system condition through **repair & replacement (R&R) needs**.

Table 7-1 lists all CP and program recommendations and references the associated Project Opportunity Area as defined in Section 6. A brief description of the project and summary of project objectives are also included. Most projects address multiple objectives. Table 7-1 also reflects the anticipated implementation schedule for the CP, based on prioritization efforts. Corresponding CP fact sheets with more detailed project information are provided in Appendix D.

The portion of total project cost considered eligible for funding via system development charges (SDCs) is also provided in Table 7-1. Projects solely related to planning, repair & replacement, and maintenance were determined not eligible for SDCs, as they do not address required improvements associated with new or redevelopment. The portion of the total project cost considered SDC eligible is calculated based on the increase in flow associated with anticipated development, using percent increase in impervious coverage as a surrogate.

Description of the four planning-related projects (City-1, City-2, City-3, and City-4) are provided below. Planning projects require specific, scheduled budget allocations and so were added to the overall stormwater CIP.

7.2.1 Flow Monitoring and Rain Gauge Installation (City-1)

This planning project includes the installation of three flow monitors, installed in the piped stormwater collection system, as well as the installation of one rain gauge to assess stormwater flow and aid in the more refined calibration of the City's InfoSWMM model. Additional flow monitoring and model calibration will help confirm the need for and sizing of select CPs, particularly where City staff have not yet observed flooding issues, but the model is predicting flooding.

Recommended locations for installation of flow monitoring include locations with a phased, capacity-related CP and pending new development. They include locations in each of the three major basins: Coffee Lake Creek, Boeckman Creek, and the Willamette basin (e.g., Charbonneau). CPs potentially informed by this effort include Day Road Stormwater Improvements (Project ID CLC-1), Garden Acres Pond Retrofit (Project ID CLC-3), Morey's Landing (Project ID WR-1), Charbonneau East (WR-4), and Charbonneau West (WR-5).

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The project duration (for costing purposes) is estimated at 12 months, and the cost estimate of $100,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

7.2.2 Hydromodification Assessment and Stream Survey (City-2)

This planning project includes follow up monitoring efforts related to the 2022 geomorphic assessment of select high priority reaches as conducted for this SMP (see Appendix C). Although the focus of the assessment was to identify existing and potential future risks associated with hydromodification, the assessment also provided a baseline within the study areas to assess changes in channel, floodplain, and riparian condition over time. This was done by documenting locations of noticeable bank erosion, headcuts, neglected or compromised riparian corridor, grade control locations, and other points of interest.

Data collection efforts will use similar protocols and data sheets developed during the 2022 assessment along these high priority reaches to provide continuous monitoring of stream impacts associated with upstream development activities or hydromodification mitigation strategies. The assessment will be both field-based, consisting of stream walks along the select reaches, and qualitative, including descriptions of geomorphic setting, geomorphic trends (i.e., aggrading, incising or stable), presence of base level controls, and the primary risk to infrastructure. Reaches recommended for ongoing evaluation per the 2022 assessment include Boeckman Creek (reaches 2, and 9), Meridian Creek (reaches 1 and 2), Arrowhead Creek (reaches 2 and 3), Newland Creek (reaches 1-4), and Kruse Creek (reaches 1-3).

Additionally, the City may want to establish baseline conditions associated with identified "secondary" locations that were not included in the 2022 geomorphic assessment effort. This new evaluation may be conducted in addition to or in lieu of ongoing monitoring at select reaches.

The complete assessment will be documented in a technical memorandum summarizing the results for inclusion in TMDL and/or NPDES MS4 reporting.

This project is estimated to be completed every three years and/or following a high flow event that exceeds the 10-yr discharge. A project cost of $30,000 per monitoring event is reflected in Table 7-1 and is assumed to occur once during initial 5-year CIP implementation period; once during the second 5-year CIP implementation period; and twice during the third, 10-year CIP implementation period.

7.2.3 Porous Pavement Pilot Study (City-3)

This planning project stems from the City's NPDES MS4 Retrofit Strategy, water quality project objectives, TMDL drivers, and the need to expand water quality treatment to areas lacking in treatment. To date, use of pervious pavement, porous asphalt or other permeable road and drive surfaces has not been used in the public right-of-way (ROW). This pilot study would include the installation of a porous pavement overlay in conjunction with pavement resurfacing efforts in the City. Water quality monitoring may be conducted to confirm/inform stormwater pollutant reduction, as local research efforts have indicated water quality benefits (i.e., reduction of sediment, bacteria, heavy metals, and organic compounds) can be observed, even with an overlay versus full pavement replacement with pervious pavement.

Recommended locations for implementation of the pilot project have not yet been identified but are anticipated to coordinate with scheduled pavement maintenance. A project duration (for costing purposes) is estimated at 24 months and scheduled during the first 5-year CIP implementation period, and the cost estimate of $100,000 for this effort is based on recent efforts in the City of Milwaukie. This estimate has not been validated or based on a detailed scope.

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7.2.4 Boeckman Creek Geomorphic and Geotechnical Evaluation (City-4)

This planning project is to conduct a geomorphic and geotechnical evaluation on Reach 1 of Boeckman Creek, where continued risk of channel incision and bank erosion exists. This project stems from a recommendation in the 2022 geomorphic assessment, which was unable to confirm source, rate, or extent of bank failure in the reach (see Appendix C). A holistic evaluation of backwater conditions, geomorphic conditions and a geotechnical assessment of slope stability and potential bank stabilization techniques is recommended.

The project duration (for costing purposes) is estimated at 12 months, and a cost estimate of $150,000 for this effort is based on recent bids for similar levels of service. This estimate has not been validated or based on a detailed scope.

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID[b]	Basin/ Waterbody	Project/Program Name	Objectives[b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost[c]	SDC Eligible Cost[c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-1	4	Boeckman Creek	Library Pond Retrofit	• **Capacity** • Water Quality • Infrastructure Need	Existing Library Pond facility, east of SW Memorial Drive in Memorial Park	132.0	• Clear, regrade, and replant 0.7 acre detention pond, including adding 3 ft required rocks and media to pond bottom, to support additional treatment and flow control function for redevelopment of Town Center. • Install a new outlet structure. • Replace 70 LF of 18-inch CSP pipe. • Install 70 LF of 6-inch perforated HDPE underdrain. • Install 15-foot-wide, 25-foot-long road for maintenance access.	$1,880,000	$213,000		X		
BC-2	25, 26	Boeckman Creek	Ash Meadows Flow Mitigation	• **Capacity** • Water Quality	East of SW Ash Meadows Rd, West of SW Parkway Ave, and north of SW Greenway Dr	295.0	• Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Update 80 LF of 36-inch culvert at SW Parkway Ave to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at Ash Meadows Cir. • Clear, regrade, and replant 1.3 acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.	$2,940,000	$798,000		X		
BC-3-Phase 1	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1	• **Capacity** • Water Quality	Canyon Creek Park, north of SW Carriage Oaks Ln	295.0	• Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe.	$4,860,000	$920,000				X
BC-3-Phase 2	24	Boeckman Creek	Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2	• **Capacity** • Water Quality	Existing Wiedemann Ditch alignment, south of Sysco property	295.0	• Clear, regrade, and replant approximately 2.1 acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot-wide, 1,500-foot-long access road west of Canyon Creek Road.	$7,210,000	$1,365,000				X
BC-4	15	Boeckman Creek	Boeckman Creek Stabilization at Colvin Lane	• **Erosion/Sediment Control** • Repair/Replacement • Maintenance	Boeckman Creek corridor adjacent to Canyon Creek Estates and bounded on the west by SW Roanoke Dr	358.0	• Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch-diameter PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of 150 LF of vegetated swale in accordance with the City's PWS.	$410,000	$78,000		X		
BC-5	21	Boeckman Creek	Memorial Park Swale Retrofit	• **Water Quality** • Erosion/Sediment Control • Maintenance	Within Memorial Park, north of the parking lot by the baseball fields and south of SW Memorial Dr	33.0	• Remove 90 LF of 10-inch CSP (SD5041 and SD5042). • Remove 120 LF of 12-inch CSP (SD5044). • Remove: manhole (ST5098), swale inlet structure (CARTE ID 568), and outlet structure (CARTE ID 19). • Fill existing 1,500 SF swale and revegetate area. • Replace two 48-inch manholes (ST5200 and ST5208). • Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046). • Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206). • Replace manhole ST5208 with a 72-inch flow splitting/WQ manhole. • Install 2,400 SF vegetated water quality swale with 1 foot of drain rock and 1.5 feet of amended soil. • Install 140 LF of 6-inch perforated HDPE underdrain pipe. • Install 50 LF of 12-inch PVC pipe. • Install structures for the new swale: swale inflow spreader with rip-rad pad, beehive overflow structure, and outfall to the creek.	$910,000	$22,000				X

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID[b]	Basin/ Waterbody	Project/Program Name	Objectives[b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost[c]	SDC Eligible Cost[c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
BC-6	41	Boeckman Creek	Gesellschaft Water Well Channel Restoration	• **Erosion/Sediment Control** • Maintenance	Boeckman Creek riparian area near Wilsonville High School, at the Gesellschaft well site (29001 SW Meadows Pkwy)	25.0	• Install approx. 480 LF of 12" PVC pipe to convey discharge flows from the well maintenance. • Install two new 48-inch manholes. • Install outfall with 8 CY of Class 200 rip-rap to the creek. • Restore approx. 310 LF of the existing channel with coir log check dams and matting, and re-vegetating with native trees and shrubs.	$400,000	$2,000		X		
CLC-1 - Phase 1	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Capacity	Open channel alignment south of Day Rd	944.0	• Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 180 LF of two barrel, 36-inch diameter PVC culverts at Day Road.	$8,020,000	$3,054,000		X		
CLC-1 - Phase 2	9	Coffee Lake Creek	Day Road Stormwater Improvements, Phase 2	• **Capacity**	North of Ridder Rd through Tax Lot 500	944.0	• Remove 1.200 LF of existing pipe. • Upsize 1,800 LF of existing 36-inch parallel storm pipes to 48-inch. • Replace seven 72-inch manholes. • Install 3 trash racks.	$3,930,000	$1,497,000			X	
CLC-2	20	Coffee Lake Creek	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• **Repair/Replacement** • Maintenance	Arrowhead Creek culvert crossings under pedestrian path at the south end of SW Morey Ln	421.0	• Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.	$290,000	$16,000			X	
CLC-3	32	Coffee Lake Creek	Garden Acres Pond Retrofit	• **Capacity** • Water Quality	Existing public pond in an industrial area along Peters Rd between SW Graham's Ferry Rd to the west, SW Day Rd to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.	231.0	• Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 25,600 cubic feet and lower pond bottom invert to 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.	$3,780,000	$1,339,000			X	
NC-1	44	Newland Creek	Frog Pond East and South Conveyance Pipe Installation	• **Infrastructure Need**	East of SW Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. Only K1 Basin of Frog Pond East and South.	61.0	• Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.	$4,090,000	$3,222,000		X		

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-1 - Phase 1	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 1	• **System Capacity** • Water Quality	Along Willamette Wy East from SW Pkwy Dr to the Belknap Ct Outfall, including greenfield along BPA easement	46.0	• Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).	$2,310,000	$45,000			X	
WR-1 - Phase 2	1	Willamette River	SW Willamette Way/Morey's Landing Stormwater Improvements, Phase 2	• **System Capacity**	SW Champoeg Dr	46.0	• Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 - SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).	$1,080,000	$21,000				X
WR-2 - Phase 1	5	Willamette River	Miley Road Stormwater Improvements, Phase 1	• **Repair/Replacement** • Erosion/Sediment Control • Maintenance	Miley Rd outfall	138.0	• Replace and upsize 80 LF outfall pipe (from area drain with ENG ID 9341 to outfall) from 36-inch CMP to 42-inch PVC. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe between area drain (9341) and MH (ST9002) with same diameter 42-inch PVC. • Replace and lower invert of MH (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 25 feet along the channel upstream and downstream of the outfall.	$820,000	$0		X		
WR-2 - Phase 2	5	Willamette River	Miley Road Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	Miley Rd from NE Airport Rd to eastern intersection with SW French Prairie Rd	138.0	• Install approx. 530 LF of new 42-inch pipe from replaced MH ST9002 to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch diameter manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install 10 new 60-inch diameter manholes and approx. 3015 LF of new 36-inch storm pipe along NE Miley Road from SW French Prairie Road to new manhole adjacent to MH ST9011. • Install 2 new 48-inch diameter manholes and approx. 650 LF of new 24-inch storm pipe from the new manhole adjacent to MH ST9011 to new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets along new NE Miley Road alignment - approximately 13.	$10,510,000	$0			X	
WR-3	7	Willamette River	Rose Lane Culvert Replacement	• **Capacity** • Maintenance	SW Rose Ln between SW Wilsonville Rd and SW Montgomery Wy	14.0	• Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370). • Install approx. 40 LF of parallel 12-inch RCP culverts. Realign the culverts at a diagonal across the road with the same outlet location. • Reinforce stormwater conveyance around property near culvert to move water into ditch.	$200,000	$19,000		X		
WR-4 - Phase 1	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 1	• **Capacity** • Repair/Replacement	SW French Prairie outfall	159.0	• Remove and replace existing Charbonneau East Outfall (ENG ID: STD9005). • Upsize 115 LF of 30-inch pipe to 36-inch PVC discharging to Willamette River (ENG ID: STD9005 to ST9014). • Replace one 72-inch manhole (ST9014).	$600,000	$0				X

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

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										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
WR-4 - Phase 2	30	Willamette River	Charbonneau East Stormwater Improvements, Phase 2	• **Repair/Replacement** • Maintenance	SW French Prairie Rd and SW Old Farm Rd	159.0	• Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes. • Replace nine 60-inch manholes.	$4,440,000	$0				X
WR-5	28	Willamette River	Charbonneau West Stormwater Improvements	• **Repair/Replacement** • Maintenance	SW Curry Dr, SW French Prairie Rd, and SW Boones Bend Rd	54.0	• Pipe replacement along SW Curry Drive: • Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole). • Replace 520 LF of 18-in pipe with PVC (new manhole to PRIVATE manhole CARTE ID: 1892). • Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15). • Replace private outfall (CARTE ID: 15). • Replace two private 48-in manholes (CARTE ID 1892 and 1383). • Install three 48-in manholes. • Pipe replacement along SW French Prairie Road: • Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044) • Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043). • Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 - ENG ID unknown) • Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040). • Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041). • Replace 20 LF of 36-in pipe with PVC (unknown to ST9067). • Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall - ID unknown). • Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes. • Pipe replacement along SW Boones Bend Road: • Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058). • Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055). • Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051). • Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050). • Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040). • Replace eight 48-in manholes; and replace three 60-in manholes.	$10,370,000	$0				X
City-1	N/A	City-wide	Flow Monitoring and Rain Gauge Installation	• **Capacity**	City-wide	N/A	• Location of one rain gauge and installation of a minimum of three flow meters over a 12-month duration to aid in Info-SWMM model calibration and validation of project needs/phasing.	$100,000	N/A		X		

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Table 7-1. City of Wilsonville Stormwater Capital Project and Program Summary

Project No.[a]	Project Opportunity Area Location ID[b]	Basin/ Waterbody	Project/Program Name	Objectives[b]	Location	Contributing Drainage Area, acres	Project/Program Summary	Estimated Cost[c]	SDC Eligible Cost[c]	Recommended Project/Program Timing			
										Annual	High Priority (2024-28)	Medium Priority (2029-33)	Low Priority (2034-43)
City-2	18, 19, 27	Boeckman, Meridian, and Newland	Hydromodification Assessment and Stream Survey	• **Erosion/Sediment Control**	Stream corridors associated with developing portions of the Boeckman Creek, Meridian Creek and Newland Creek basins	N/A	• Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches where ongoing monitoring was recommended to ensure no exacerbation of existing conditions/ potential issues.	$30,000/event	N/A		X	X	X
City-3	40	City-wide	Porous Pavement Pilot Study	• **Water Quality**	City-wide	N/A	• Implementation of a porous pavement overlay and associated water quality monitoring to inform more widespread applications for improved water quality.	$100,000	N/A		X		
City-4	17	Boeckman Creek	Boeckman Creek Geotechnical Evaluation	• **Erosion/Sediment Control**	Downstream 750' of the Boeckman Creek stream corridor	N/A	• Geomorphic and geotechnical evaluation of the downstream 750' of Boeckman Creek at the confluence with the Willamette River based on findings from the 2022 geomorphic assessment.	$150,000	N/A		X		
P-1	5, 7, 10, 17	City-wide	Local Drainage Improvements Program	• **Infrastructure Need** • Capacity	City-wide	N/A	• Installation of small-scale, localized drainage improvements (i.e., new pipe, catch basins and laterals, grading to support curb-and-gutter flow) to be managed/ contracted in house to address more immediate system deficiencies. • Relocate/install curb inlets instead of catch basins in high traffic roads to address local drainage issues	$100,000/yr	N/A	X			
P-2	8, 11, 39, 40	City-wide	Water Quality Retrofit Program	• **Water Quality** • Capacity	City-wide	N/A	• Design and install opportunistic LID or green infrastructure (porous pavement overlays, regional facilities, stormwater planters/curb bump outs) along streets, within public property, and/or within available ROW to provide water quality treatment.	$200,000/yr	N/A	X			
P-3	N/A	City-wide	City-wide Repair/Replacement Program	• **Repair/Replacement** • Maintenance	City-wide	N/A	• Conduct proactive replacement of public pipe and structures over a 100-year period (assumed end of useful like). Use results of CCTV analysis to inform locations.	$275,000/yr	N/A	X			
P-4	29	Willamette River	Charbonneau Repair/Replacement Program	• **Repair/Replacement** • Maintenance	Charbonneau Basin	478.0	• In-kind repair and replacement of public pipe and manholes within the Charbonneau basin, in accordance with the Charbonneau Consolidated Improvement Plan. Excludes pipes replaced within the last 10-years (since 2014) and CP WR-4, Phases 1 and 2 and WR-5.	$1,920,000/yr	N/A	X			
P-5	18, 19, 20, 27	City-wide	Riparian Vegetation Management Program	• **Maintenance** • Water Quality	City-wide	N/A	• Conduct riparian and/or in-channel vegetation maintenance including removal of invasives in accordance with recommendations from the 2022 geomorphic assessment.	$25,000/yr	N/A	X			
P-6	5, 12, 22	City-wide	Stormwater Facility Enhanced Maintenance Program	• **Water Quality** • Maintenance	City-wide	N/A	• Conduct restorative maintenance on select public and private stormwater facilities with reported deficiencies.	$25,000/yr	N/A	X			
									TOTAL	$2.545M	$19,140,000	$20,850,000	$29,530,000

N/A: Not Applicable

a. CP numbering reflects the following drainage basins: BC = Boeckman Creek, CLC = Coffee Lake Creek, WR = Willamette River, NC = Newland Creek. Citywide planning projects are designated as "City". Programs (to be funded annually) are prefaced with a P designation.

*b. Primary objective (for mapping purposes) is identified in **BOLD**. Objectives addressed relate to project needs in the contributing watershed to resolve known and predicted system/ facility deficiencies. Refer to the Project Opportunity matrix (Appendix A, Table A-2) for background on deficiencies addressed with the project.*

c. Estimated costs and SDC eligible costs are described in Section 7 of the SMP and detailed cost summaries provided in Appendix E. City-wide planning projects and solely related to Repair/Replacement or Maintenance are not eligible for SDCs and the SDC eligible cost is indicated as N/A. For projects with no developable lands in the upstream contributing drainage area, the portion of project cost associated with SDCs is $0.

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7.3 Future/Unfunded Capital Project Opportunities

Table 7-2 summarizes potential, additional CP needs as identified during project planning efforts and documented in the Project Opportunity Matrix (Appendix A, Table A-2). However, these are considered unfunded capital projects for purposes of this SMP, as needs are more undefined and/or staff have not observed specific deficiencies in these areas. In some cases, a standalone CP may not be necessary if the project opportunity can be addressed as part of a program activity (i.e., Localized Drainage Improvement [P-1]).

Specific cost estimates have not been developed and schedule for implementation not established for these projects.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
8	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch. Downstream N-S drainage swale has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	N	Y	• Install WQ manhole(s) or other facilities to remove sediments from public runoff.
11	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	A city-owned pond receives a small amount of drainage and requires frequent maintenance (due to undersized catch basins). Model predicts flooding within the pond and outlet.	CAP		Y	N	N	• Improve maintenance access from the Shrine Center parking lot. • Expand/retrofit pond to improve water quality function and outlet configuration.
17	Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River.	E&S		N	Y	N	• Planning project (City-4) proposed to evaluate source and potential, structural repairs first. • Channel stabilization and grade control (retaining/crib wall or soldier pile) pending planning study feedback.
22	Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	Four private swales—have not been maintained consistently	MAINT	WQ	N/A	N	Y	• Acquire private swales and conduct restorative maintenance.
23	Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	Underutilized irrigation pond adjacent to Boeckman Creek. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	N/A	N	Y	• Expand water quality treatment through retrofit of existing facility. • Will require private property partnership.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
31	Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Pipe upsizing and realignment as necessary.
34	Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		Y	N	N	• Pipe upsizing and realignment as necessary. No immediate need.
35	Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		Y	N	Y	• Pipe upsizing and realignment as necessary. No immediate need.
42	Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	--	N	Y	• Future restoration/retrofit opportunity.
43	Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		--	N	Y	• Additional assets/re-piping is development driven. • New/decommissioned infrastructure pending development activities.

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Table 7-2. Unfunded/Future Capital Project Concepts

Project Opportunity Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category [a]		Project Background			
					Primary	Secondary	Modeled Capacity Deficiency (Y/N)	Stream Assessment ID Need (Y/N)	Water Quality Retrofit Opportunity (Y/N)	Project Concept
45	SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
46	Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.
47	River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	--	N	• Pipe upsizing and realignment as necessary. No immediate need.

N/A = not applicable.

a. Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.

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7.4 Staffing Evaluation

A supplemental staffing analysis was conducted to support the earlier, maintenance-related staffing evaluation described in Section 3.2. This analysis included both Public Works and Engineering staffing needs in conjunction with 1) new regulatory obligations associated with the City's 2021 NPDES MS4 permit and 2022 Stormwater Management Program (SWMP) Document, and 2) implementation of this SMP.

Specific to implementation of this SMP, additional Engineering staff are required to execute and manage the CPs over the 20-year CIP (see the construction administration cost by CP included in Appendix E). Additional Public Works staff support will be needed to maintain additional assets resulting from CP implementation. Figure 7-2 summarizes the departments and associated activities resulting in the need for additional staff. Summary tables and documentation related to this evaluation are included in Appendix G.

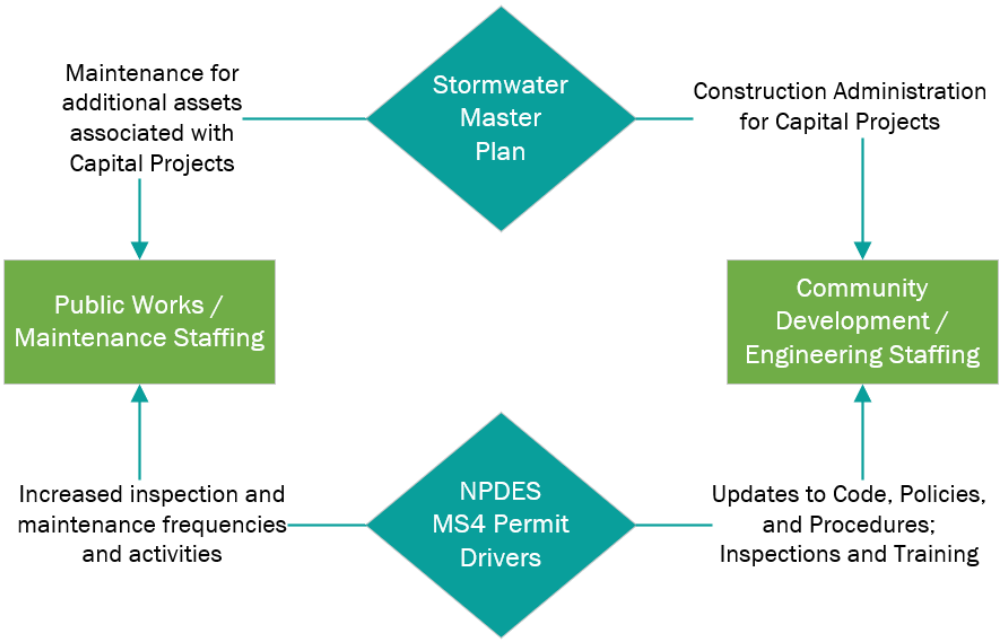

Figure 7-2: Staffing Evaluation Considerations

7.4.1 Assumptions

The following general assumptions were used to develop the staffing evaluation for both Public Works Stormwater staff and Engineering staff. Detailed assumptions specific to staffing estimates by activity are outlined in Appendix G.

- Except for the additional Public Works staffing needs identified in Section 3.2 for deferred maintenance, it is assumed that existing Public Works and Engineering staffing levels were adequate to implement the City's stormwater program and CP implementation prior to reissuance of the City's NPDES MS4 permit or implementation of this SMP. Thus, only additional activities are used to inform additional staff resource needs.
- One FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year (as confirmed by City staff).

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- The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021-Sept. 30, 2026) - reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.
- CPs are assumed implemented on an annual basis, and the CIP is assumed to be implemented over a 20-year implementation schedule, ranging from 2024-2043. Given uncertainty with schedule, CP costs are averaged across the 20-year implementation schedule equally. In practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.
- For the CPs listed in this SMP, 100 percent of engineering and permitting costs will be used for consultant support, and 100 percent of design/construction administration costs will be required for City Engineering staff.

7.4.2 Results

Table 7-3 provides a summary of the combined Public Works/Stormwater and Community Development/Engineering staffing needs for both the NPDES MS4 Permit driven activities and CP implementation activities. Detailed staffing projections, as reported in Appendix G, reflect FY 2023-2027 in alignment with the NPDES MS4 Permit timeline. However, staffing projections are relatively consistent when annualized and reflect the ongoing implementation of regulatory requirements over the 5-year permit period, as well as an annual average over a 20-year CIP implementation period. Thus, the annual average staffing is reflected below, and rounded to the nearest 0.1 FTE.

Table 7-3. Combined Staffing Assessment Summary

		Increased Staffing (FTE)
		Annual Average
Public Works/Stormwater Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.1
	Staffing contingency for NPDES MS4 Driven Activities [a]	0.4
	CP Implementation	0.2
	Public Works Staffing Total	2.7
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.2
	CP Implementation	1.2
	Community Development Staffing Total	1.4

a. Staffing contingency estimated at 20% to account unscheduled maintenance and response.

For Public Works (Roads and Stormwater Section), an increase of approximately 2.5 FTE is recommended to address both deferred and additional maintenance activities as defined with the reissued NPDES MS4 permit. This increase reflects a 20 percent contingency to account for additional, unscheduled activities as well as prescriptive maintenance efforts. An additional 0.2 FTE increase is anticipated for maintenance of new infrastructure (assets) associated with CIP implementation. However, timing of this 0.2 FTE may vary in accordance with construction of CPs and could be delayed over the 20-year implementation period.

For Community Development (Engineering Division), an increase of approximately 0.2 FTE is recommended to address additional tracking and inspection needs as defined with the reissued NPDES MS4 permit. This may be accommodated through reallocation of existing staffing or contracted support. An additional 1.2 FTE is anticipated to manage and execute contracts for CP

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design and construction services. This increase accounts for the 1.0 FTE of engineering staff currently dedicated to overseeing stormwater CP implementation, and reflects the additional staffing need. As with Public Works staffing, timing of this 1.2 FTE may vary in accordance with design and construction schedules and could be delayed over the 20-year implementation period. It should be noted that cost estimates for programmatic activities (i.e., Projects P-1 through P-5) have not been included in the staffing projections.

7.5 Project Prioritization

Project prioritization is an important component of the stormwater master planning process and can provide direction in sequencing projects in accordance with City objectives. This section summarizes the prioritization of CPs for implementation.

For this SMP, a CP prioritization tool was developed to assist with project prioritization. This Multi-Criteria Decision Analysis (MCDA) tool was developed using Microsoft Excel and includes prioritization criteria, scoring mechanism, and weighting factor schemes to present graphical and numeric rankings of CPs. The MCDA tool normalizes City-assigned scores for each criterion and project, which allows better differentiation of relative project performance (difference between best and worst options) and balances variability in scoring. Normalized scores were multiplied by their associated weights and summed to represent the overall project priority. The MCDA tool is intended to be updated on a continual basis; as projects are constructed, they can be removed from the ranking tool and new projects can be included as master plans are updated.

It should be noted that the overall stormwater CIP includes several new programs established to facilitate improvements without dedicated, individual CP consideration. Programs are not prioritized as part of this effort.

7.5.1 Prioritization Criteria

Proposed CPs are developed to address a variety of objectives including increased capacity, new infrastructure needs, maintenance, repair & replacement, water quality, and instream erosion/sediment control.

In consideration of the varied scope of proposed CPs and overlapping project objectives, the following scoring categories were used as the basis for developing project prioritization criteria.

- System Operations: System operations is a collective category representing capacity deficiencies, regular or recurring maintenance needs, and safety and accessibility as related to the location of a proposed issue or deficiency.
- System Condition: System condition reflects known problem areas where repair or replacement of an asset addresses a known or immediate issue.
- Compliance: Compliance reflects a CPs ability to address regulatory drivers including NPDES MS4 permit needs (water quality retrofits needs), TMDL and shade management drivers, and hydromodification risk.
- Other: Other criteria including contributing drainage area, project sequencing and phasing, construction constraints and funding source.

Table 7-4 summarizes the evaluation criteria and scoring guide. The scoring guide helps score projects consistently and advises others that may need to apply the tool in the future. A range of scores, from 0 to 3, is applied to each criterion for every project to yield an unweighted total score. As the City implements projects over time, and as priorities change and evolve, these criteria and the scoring guide can be revised in the CP prioritization tool.

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Table 7-4. Project Prioritization Criteria

Criteria	Scoring Definition (3 = High; 2 = Medium; 1 = Lower; 0=Does not address)			
	High (H)	Medium (M)	Lower (L)	Does not address
System Operation-Capacity	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses an existing capacity deficiency per hydraulic modeling efforts.	• Addresses a reported capacity deficiency (problem area) per Wilsonville Public Works or Engineering, and • Addresses a lack of infrastructure (infrastructure need)	• Addresses a future capacity/infrastructure need.	• May provide some capacity benefit, but the location has not been identified as an existing or future capacity deficiency.
System Operation-Maintenance	• Addresses a location that has frequent citizen complaints and onsite response requirements.	• Addresses a location that has frequent citizen complaints and will reduce existing maintenance needs.	• Addresses a location that has less frequent citizen complaints and will reduce existing maintenance needs.	• Project does not address existing maintenance deficiency or lack of infrastructure
System Operation-Safety and Accessibility	• Reduces risk near a transit line, school, or backbone utility	• Mitigates risk, including system relocation into the public ROW to avoid collateral damage, safety concerns on private property.	• Reduces risk to non-essential property/minor roadways/structures.	• The identified problem is not anticipated to address safety concerns.
System Condition	• Addresses an immediate system condition need (problem area) where delay may result in immediate property damage or safety concerns.	• Addresses a system condition need (problem area) where delay may result in additional infrastructure deterioration or property damage.	• Replaces an existing City asset.	• The project does not include replacement of an existing asset.
Compliance-Water Quality	• Provides new or enhanced water quality treatment to address pollutants of concern, qualifying as a retrofit project with potential for fee-in-lieu	• Restores or enhances water quality function or coverage, qualifying as a retrofit project only.	• Provides some water quality benefit through sedimentation.	• The project does not include water quality treatment.
Compliance-Vegetation Management	• Restores shade protection (within 100' of stream bank) to address temperature TMDL	• Enhances riparian corridor vegetation coverage; removes invasive species	• Enhances upland vegetation conditions/characteristics.	• No plantings or vegetation enhancement associated with project construction
Compliance-Hydromodification	• Addresses area of known or observed instream erosion that could result in property damage or infrastructure failure.	• Addresses area of known or observed instream erosion that could result in bank stability issues.	N/A	• Project does not address area of known hydromodification impacts
Other-Contributing Area	• Project has regional impacts (drainage area is > 100 acres)	• Project has subbasin impacts (drainage area is > 10 acres)	• Project has local impacts (drainage area is < 10 acres)	
Other-Sequencing	• Project is required as a pre-requisite or preliminary project before another prioritized project need.	N/A	N/A	• Project construction scheduling would not be impacted by other project scheduling needs.
Other-Traffic and Accessibility	• Project construction is not expected to impact traffic or private property	• Construction may impact residential streets.	• Construction may impact collector streets.	• Construction will impact arterial streets or structures on private property are expected
Other-Development Drivers	• Project is a prerequisite to a current construction project.	• Project is required to support future growth and development or a planning area.	N/A	N/A
Other-Funding Source	• Project is eligible for funding via SDCs (50% or greater)	• Project is eligible for funding via SDCs (25%-50%)	• Project is eligible for funding via SDCs (up to 25%)	• Project is not eligible for SDC funding.

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7.5.2 Scoring and Weighting Factors

Every CP was reviewed by the City Engineer, Natural Resource Manager, and Public Works Operations Supervisor and scored by assigning a "0" through "3" score to each criterion in accordance with the scoring definitions (Table 7-4).

The MCDA tool includes the ability to incorporate weighting factors schemes that vary based on the importance of various scoring categories and individual criteria. Weighting factor schemes were established in collaboration with City staff including 1) an initial weighting with emphasis on system condition and balanced weights within the system operation and compliance categories, 2) adjusted weighting to emphasize on project sequencing (part of the other category), and 3) emphasis on criteria prioritized by Public Works.

Results of the various weighting schemes were compared, and outcomes discussed internally by the City. These schemes resulted in relatively consistent prioritization of projects, with some projects moving slightly up or down in ranking depending on the scheme. Ultimately, the city selected the initial weighting scheme and opted to make some related project scheduling adjustments in accordance with Public Works feedback. Resulting weighting factors are provided in Table 7-5.

The final, average score for each criterion were multiplied by the weighting factors associated with the select weighting factor scheme and summed for a final project score creating a project ranking.

Table 7-5. Selected Weighting Schema

Scoring Category	Category Weight (%)	Criteria	Criteria Weight (%)
System Operation	30	System Operation - Capacity	10
		System Operation - Maintenance	10
		System Operation - Safety and Accessibility	10
System Condition	25	System Condition	25
Compliance	25	Compliance - Water Quality	8.33
		Compliance - Vegetation Management	8.33
		Compliance - Hydromodification	8.33
Other	20	Other - Contributing Area	5
		Other - Sequencing	5
		Other - Traffic and Accessibility	5
		Other - Development Drivers	2.5
		Other - Funding Source	2.5

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7.5.3 Prioritization Results

The CP prioritization tool provides a bar graph that illustrates scoring results (see Figure 7-3). Each bar represents the total score, and each colored segment of the bar represents a specific evaluation criterion so the user can see which criterion played the most prominent role in the scoring results for each project.

The prioritization and ranking of the CPs were reviewed and used to inform the ultimate project scheduling (see Figure 7-1). In general, the highest scoring priority projects are scheduled in the next 5 years (2024-2028); the next level of priority projects are scheduled in the following 5 years (2029-2033); and the remaining priority projects are scheduled 10 years from now (2034-2043). Based on the total number and cost of projects within any one timeframe, some project schedules were adjusted per City feedback (see Table 7-1).

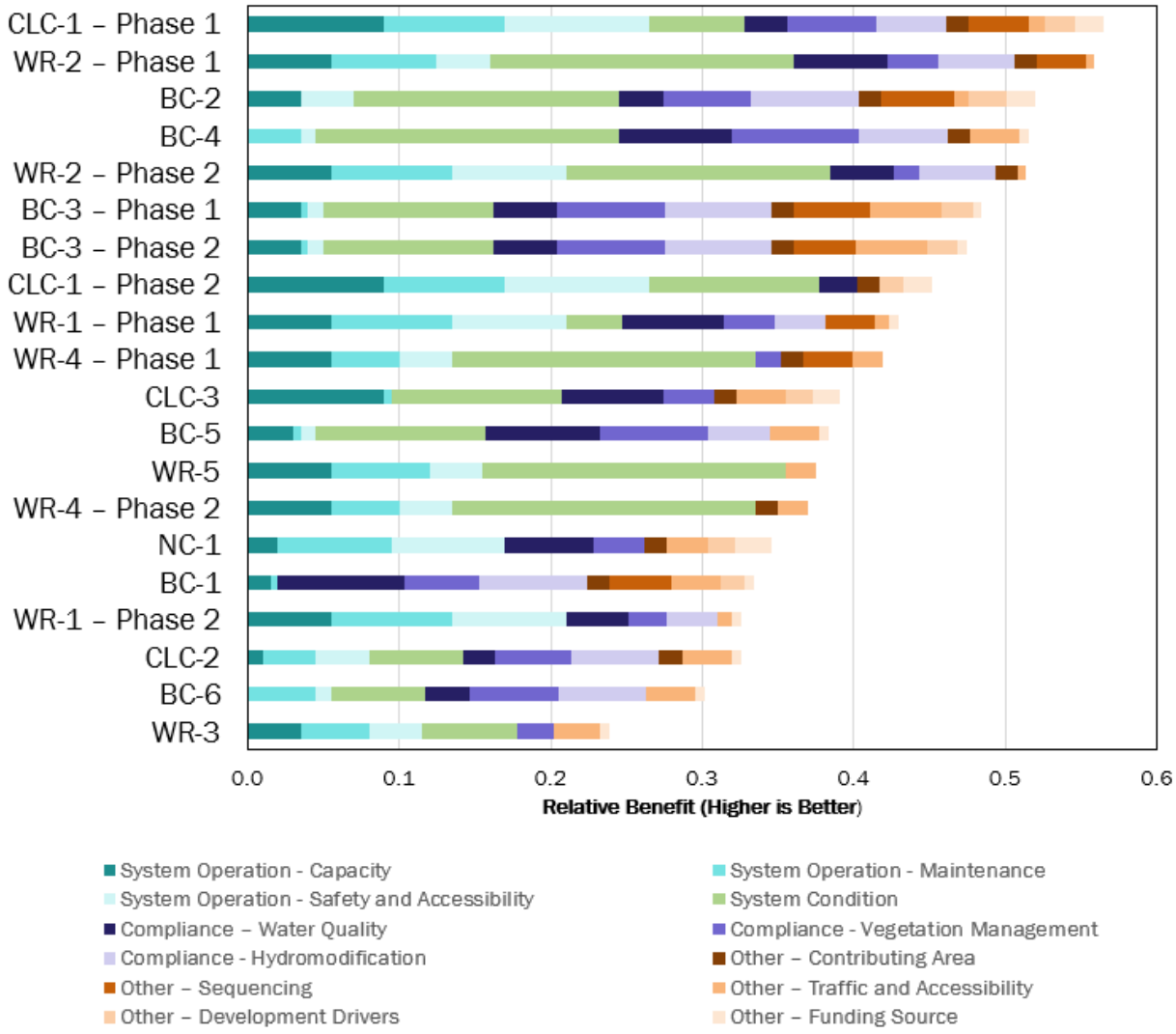

Figure 7-3: Prioritization Results

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7.6 Policy Recommendations

The following policy recommendations pertaining to the implementation of this SMP and associated CIP have been referenced in this SMP and are summarized for City consideration:

7.6.1 Stormwater Design Standards Applicable to Town Center

As described in Section 6.3.4, utilization of the Library Pond to mitigate stormwater treatment and flow control for Town Center redevelopment requires a site-specific stormwater design standard applicable to the Town Center property.

The City will need to define a fee-in-lieu program and onsite stormwater mitigation tracking system to ensure adequate capacity in Library Pond is available while adhering to the City's current design standards and definition of predevelopment. Onsite treatment and flow control will need to be provided for 50% of the redeveloped property (both private and public ROW).

7.6.2 Comprehensive Plan Updates

As summarized in Section 2.7, the City of Wilsonville Comprehensive Plan was reviewed with respect to stormwater and consistency with the City's 2021 NPDES MS4 permit to ensure it is current and reflective of continued compliance.

A detailed summary of proposed modifications to the Comprehensive Plan are provided in Appendix H.

7.6.3 Design Standards for New Development and Growth Areas

Capacity-related CPs are sized in accordance with future growth and development, both within the city limits and outside city limits to the extent future zoning is established. Most area subject to new development will be within the City's jurisdiction and subject to the city's stormwater design standards that mimic pre-development flow conditions and require the use of infiltration-based facilities to the maximum extent feasible.

Site constraints occasionally prevented CP design to adhere to the City's design criteria, and in a few cases, flooding or system surcharge is still anticipated with implementation of CPs. Implementation of the City's stormwater design standards help ensure maximum capacity in the downstream stormwater collection system.

There are a few key locations in the City where future development outside of the city limits will be subject to another jurisdictions stormwater design standards (i.e., CP CLC-1: Day Road Stormwater Improvements). Establishing consistent stormwater design standards and design metrics for key Planning Areas (Coffee Creek Industrial Planning Area, Basalt Creek Planning Area) that encompass neighboring jurisdictions including Clean Water Services and the City of Tualatin is recommended to ensure that onsite retention and flow mitigation are applied to these new development areas. This mitigation should mimic pre-development site conditions to reduce the risk of downstream capacity and hydromodification impacts, as well as preserve water quality.

7.6.4 Stormwater Facility Tracking and Maintenance for Private Facilities

The City's GIS inventory of stormwater treatment and detention facilities is currently being updated to include consistent facility naming conventions (i.e., swales, raingardens, detention ponds) and inclusion of ownership information (specific to private facilities). Such updates will allow better integration between mapping and asset management, as well as allow geographic tracking of maintenance activities and responsibilities.

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The City's Stormwater Operations and Maintenance Plan is required for newly installed private facilities to ensure that the owners recognize responsibility for inspections and maintenance of their private stormwater facilities. The Stormwater Operations and Maintenance Plan requirements went into effect in 2012 and require submittal of an Annual Inspection and Maintenance Report by May 1 each year. The City conducts private facility inspections annually, targeting facilities that did not return an Annual Inspection and Maintenance Report.

In conjunction with the identification of problem areas and Project Opportunity Areas, private facilities are routinely observed to have deficient system maintenance, due to inconsistent and infrequent maintenance. In cases where the private facility is not being maintained and functionality is compromised, the City may consider a policy to reassign maintenance responsibility for existing private stormwater facilities and conduct maintenance in accordance with public facility maintenance protocols and schedules, subject to reimbursement by the private facility owner. Implementation of this proposed policy is supported through P-5: Stormwater Facility Enhanced Maintenance Program.

7.7 Next Steps

Following adoption of this Plan, a financial analysis will be required to evaluate the City's current stormwater utility rate and SDCs to ensure adequate funding is available for implementation of CPs and programs outlined in this SMP. The resulting financial plan will provide a funding structure in accordance with the defined LOS that allows the City to implement the CPs and programs as costed and scheduled in this SMP while meeting other financial obligations and policy objectives.

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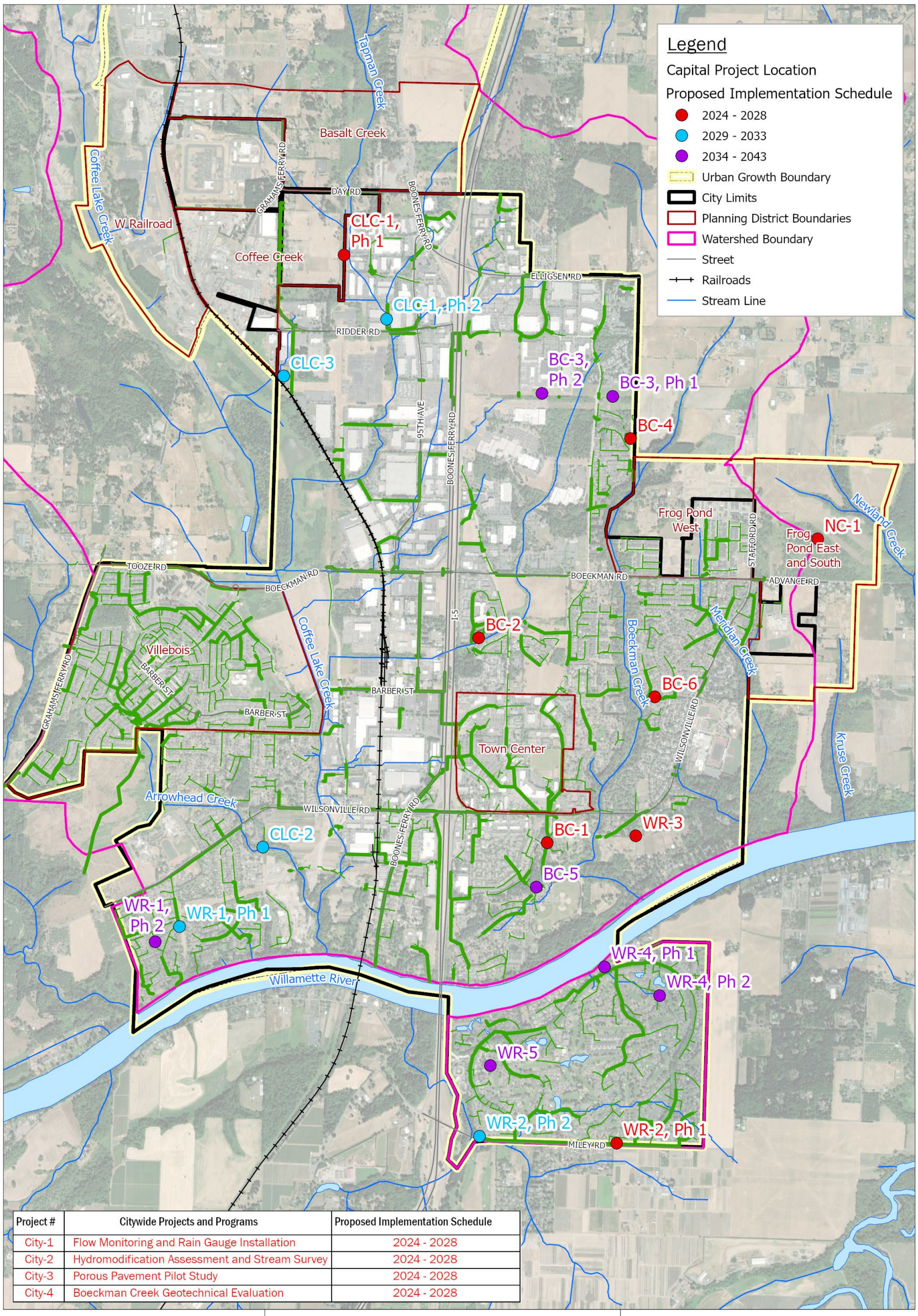

Project #	Citywide Projects and Programs	Proposed Implementation Schedule
City-1	Flow Monitoring and Rain Gauge Installation	2024 - 2028
City-2	Hydromodification Assessment and Stream Survey	2024 - 2028
City-3	Porous Pavement Pilot Study	2024 - 2028
City-4	Boeckman Creek Geotechnical Evaluation	2024 - 2028

Note: Planning Projects City-1 to City-4 and Programs P-1 to P-6 are all city-wide and not specific to a location. Programs P-1 to P-6 assume annualized funding.

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 0.25 0.5 1 Miles

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Figure 7-1: Capital Improvement Projects Prioritization

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Section 8

Limitations

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 9

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Appendices

Appendix A: Project Planning Matrices

Appendix B: TM #3: Stormwater Modeling Methods, Assumptions, and Results

Appendix C: TM #2: Stream Assessment

Appendix D: Capital Project Fact Sheets

Appendix E: Capital Project Cost Estimates

Appendix F: Library Pond Analysis

Appendix G: Staffing Evaluation

Appendix H: Comprehensive Plan Review

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Appendix A: Project Planning Matrices

Table A-1: Problem Area Matrix

Table A-2: Project Opportunity Matrix

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Public Works Community Development	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass easement area under the power line and to the river. The design (location) is flawed and the water flows into the yard of the homes that back up against the easement, requiring sandbags to redirect flow.	R/R		Y	Recent outfall projects on Belknap and Morey Lane. AKS study (2017) indicated current pipe size is not sufficient to redirect flow into pipe to SW Belnap Ct outfall. AKS study identified alternatives. Meetings have occurred with BPA related to locating a pond.	Any pond option on the BPA easement would require coordination and adequate BPA utility access. There is a high-pressured fuel line running N-S on the E edge of the easement that would need to be avoided. Infiltration rates anticipated to be high. Project development considerations: Need to understand infiltration rates for pond/gsi feasibility. Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. Both pond/GSI and pipe upsizing in one project unlikely System modeling would be needed to assess flows and size detention.	Y	N	Y*	N
2	Frog Pond ditch and culvert under Boeckman Rd.	Public Works	Ongoing flooding issue at 6920 SW Boeckman Rd. House - foundation is only 2-3 in. higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R		Y	Area has presented an ongoing issue. Model extension is needed.	Existing culvert along Boeckman Road is directed toward the homeowner's garage, where peak flows come very close to the foundation. Project development considerations: Project needed to right size the culvert underneath Boeckman Rd (currently not in the model). A box culvert may be easier to maintain. Pipe the drainage along Boeckman Road beyond the property owner's house where the channel has additional vertical drop. Projects may be implemented as part of the Boeckman Road improvements	Y	Secondary	Y*	N
3	Pond F	Public Works	Possible design flaw and blockages impeding flow; potential maintenance issue.	R/R	MAINT	N		Not visited but discussed with PW staff. Pond is already included in model but scheduled for reconfiguration.	N	N	TBD	TBD
4	Library Pond	Public Works Community Development	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP		Y	City wants to include Library Pond expansion in fee in lieu program for Town Center redevelopment. Current configuration/ contributing drainage area in model overestimates flow contribution. Model updates needed to more accurately reflect existing drainage area to pond.	Flow from the pond is a ditch inlet that requires maintenance to keep clear from vegetation and debris (currently there is a temporary fence installed for this purpose). Project development considerations: Phase 1: retrofit the pond outlet structure to include an emergency overflow for consistency with current standard pond details. Clear vegetation and debris. Phase 2: construct flow control structure per standard details and pond outlet structure to accommodate per future growth. Include a dedicated maintenance access path. No as-builts/drainage report available to confirm existing stage-storage. Model updates required to refine the current contributing drainage area (hydrology) and evaluate capacity.	N	Primary	Y*	N

[1] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[2] Stream assessment locations identified as priority or secondary.
[3] Priority project location identified with a *

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
5	Memorial Lift Station - current location	Public Works	Ditch behind lift station occasionally overflows during heavy precipitation.	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
6	Regional Parks 7 & 8; SW Coffee Lake Dr. Level Spreader	Public Works	Level spreader does not drain properly causing erosion issues	MAINT	E&S	N	Appears to be an operational issue only.	Not visited.	N	N	N	N
7	SW Montgomery Way	Public Works Community Development 2012 SMP	Channel and culvert issues are causing flooding. Future development (PDR1) is anticipated upstream of problem area.	CAP		N	City staff have not reported recent flooding issues here and don't consider it a project need any longer. 2012 MP identified a CIP (WD-1) for this location. Limited GIS information available to conduct modeling. City staff have not reported recent flooding issues here and don't consider it a project need any longer.	Not visited.	N	N	N	N
8	Commerce Circle near Delta Logics parking lot	Public Works Community Development	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	Contributing drainage area to pipeline is unclear.	Improperly abandoned storm line is not shown in the GIS. Pipe is on private property north of the street. Project/ program development considerations: Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. Current sink hole is causing a safety concern. Additional as-built research is needed to identify lateral connections to the abandoned pipe.	N	N	N	Y
9	Miley Rd sinkhole	Public Works 2012 SMP	Collapsed mainline due to age and pipe corrosion has caused a sinkhole. Remaining pipe is failing and needs replacement.	R/R		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents.	Not visited.	N	N	Y	TBD
10	Miley Rd outfall	Public Works 2012 SMP	Significant scouring into jurisdictional wetland.	E&S		Still Needed	Project location is in an extremely steep area. 2012 MP identified a CIP (SD9000 to SD9069) for this location. Location is already included in hydraulic model extents. Erosion issues are entering a jurisdictional wetland and thus replacement is beyond scope for maintenance.	Not visited.	N	N	Y*	N

Table A-1 . Wilsonville Problem Area Matrix

Problem Area Location ID	Location/Asset Description	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted?	Workshop/Coordination Call Feedback (8-24-21 and 9-1-21)	Site Visit Outcome (9-27-21) (Green font reflects action items)	Project Planning[1]			
				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
11	Town Center Loop near Les Schwab Tire Shop	Public Works Community Development	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Town Center redevelopment will impact high flow bypass for flows towards Library Pond.	CAP		Y	In 2015, ODOT installed a reducer on the 18" pipe that outfalls west before entering ODOT culvert under I-5.	ODOT reducer (12" as verified by PW 10-11-21) limits the existing 18" pipe that outfalls west to the ODOT culvert underneath I-5. Town Center redevelopment will remove the high flow bypass that currently sends flow south towards Library Pond. PW has observed flooding along Town Center Loop W via the CBs that tie into this current high flow bypass line. Project development considerations: **Model development needed to determine when it floods, and project need for existing conditions.** **Future conditions will be driven by adherence to Town Center plan.**	Y	N	Y	N
12	Rose Ln culvert	Public Works Community Development 2012 SMP	Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	City has implemented programmatic activities to resolve the issues but is still a problem. **2012 MP identified a CIP (WD-2) for this location.** **Limited GIS information available to conduct modeling.** Boeckman Road project may inform need.	Culvert underneath Rose Lane floods as vegetation on the upstream side blocks flow and drainage overtops the road and floods the neighbor's yard/garage on the downstream side. Drainage patterns here take several hard turns and is very flat. Project development considerations: **Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field.**	N	N	Y	N
13	SW Parkway Ave south of Costco	Public Works	N-S drainage swale south of Parkway has filled with sediment, surcharging the roadway drainage system, and resulting in ongoing maintenance. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	MAINT	CAP	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. **Location is already included in hydraulic model extents.**	Sysco ditch experiences high sedimentation rates due to minimal grade for the first section of the ditch. Sysco has plans to develop the lot to the west of the ditch, but timeline for this is unknown. Project development considerations: **Since this is a complicated issue (Sysco owns ditch but receives drainage from others both public/private), City may install WQ manhole (s) to remove sediments from public runoff. This would isolate any additional sediment accumulated in Sysco ditch to private sources.** **Hydraulic model review is needed to confirm long stream profile for potential improvement opportunities.** **Public works confirmed 36" pipe from Costco to 40" pipe to Sysco ditch (may attribute to Costco backwater).**	N	N	TBD	TBD
14	Culvert south of Day Rd.	Public Works	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #15/26.	R/R		Y	Location is already included in hydraulic model extents. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	Y	Secondary	Y*	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
15	South of Day Road ponds near power lines behind businesses	Public Works 2012 SMP	Without brush clearing, the ponds south of Day Road back up and flow onto the road. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Area #14/26.	MAINT		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-1) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	Area studied as part of AKS Coffee Creek Facility Study. Effort worked to identify infrastructure needs and alternatives). The 2012 MP also included several capital projects to address these issues. Project development considerations: AKS study did not directly incorporate survey into existing condition model (extra effort required to incorporate survey independently into the hydraulic model). AKS study does not alleviate flooding.	Y	Secondary	TBD	TBD
16	95th Ave north of Hillman Rd.	Public Works	Crushed storm pipe found during CCTV inspection.	R/R		N	Location is already included in hydraulic model extents. Per City (10-1-21), replacement being completed as CIP #7062 95th Avenue Storm Line Repair. North repair is replacement of 120 LF of existing 24" CMP with 24" PVC (Carte ID 2335). South Repair is replacement of 44 LF of 15" CMP with 15" PVC (Carte ID 2337).	Not visited.	N	N	N	N
17	Mont Blanc in Villebois	Public Works	Tree planted in front of inlet blocking drainage into swale	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
18	Memorial Park drainage area behind the barn	Public Works	Same drainage ditch that causes issues with Memorial lift station (see Location ID5).	CAP		N	Lift station is being relocated to the east and should mitigate this issue.	Not visited.	N	N	N	N
19	NW intersection of Elligsen Road and SW Parkway Ave near 76 gas station	Public Works External Survey	During heavy precipitation the CB backs up and floods the road at the corner	CAP		N	Additional CBs were installed with roadway improvements at low points and has alleviated flooding issue.	Visited surrounding property area and confirmed no issue.	N	N	N	N
20	NE corner of Elligsen Road and SW Parkway Center	Public Works	Sediment from the agriculture area north of Elligsen Road impacts Pheasant Ridge RV Park detention pond.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
21	NW corner of Graham Oaks parking lot	Public Works	Erosion around outfall sends debris into creek.	E&S		N	Outfall included in model for capacity only, does not evaluate erosion. Public Works filled with CDF and is continuing to monitor for erosion.	Not visited.	N	N	N	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
22	Converted bubbler River Fox Park & SW Preakness	Parks Department (via) Public Works	Piped collection system is outside of the ROW and pipe diameter is reduced. Leaf debris affects the manhole in front of 11591 SW Preakness limits flow to mainline to Willamette Way East causing flooding. "Bubbler" manhole at fenceline acts like a sump.	MAINT	CAP	Y	Manhole (Cartograph # 57) surcharges and water exits the system, overflowing to inlet Cart #1240. Issue is capacity and whether the manhole should be redesigned to actually be a bubbler and not a surcharged manhole.	Complicated SW configuration. Pipe size changes from 24" to 18" to 12". Based on conversations with the property owner at 11242 SW Champoeg Dr (adjacent to inlet grate in SW corner of park) no flooding occurs here. Project development considerations: May consider installation of a pipe to directly tie runoff that is coming from Preakness Dr. into the MH at the end of Champoeg Dr. Following site visit, PW confirmed with Parks that this is nonissue. Clearing grates of any leaf debris addresses the issue. Future CCTV at this location may be warranted to confirm configuration.	N	N	N	N
23	Cul-de-sacs west of Serenity Way	Public Works	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul-de-sac.	Not visited but confirmed that additional inlets can be included in a programmatic effort.	N	N	N	Y
24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Public Works	Recurring flooding at catchbasins occurs after cleaning.	CAP	MAINT	Still Needed	Location is already included in hydraulic model extents.	Not visited.	N	N	TBD	TBD
25	SW Salish Ln at intersection with Parkway Ave	Public Works	Undersized catch basins cause flooding (ponding in SE corner by pond).	CAP		Y	Location is already included in hydraulic model extents, but with limited detail. As-builts provided from City reflect drainage ditches but no cross sections for ditches.	City pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Project development considerations: Need improved access (for a vactor truck) to the WQ MH and pond maintenance (like Library Pond). Access should be from the Shrine Center parking lot. Refinement of the model extents not needed.	N	N	Y	TBD
26	Day Rd culvert at Tapman Creek near PGE substation	Public Works	Undersized culvert over capacity causing flooding. Conveyance and storage limitations S of Day Rd (limited areas, BPA towers, narrow channel, etc.). Related to Problem Areas #14/15.	CAP		Y	Location is already included in hydraulic model extents. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15.	N	Secondary	Y*	N
27	Storm basin SW Iron Horse St & SW Willow Creek Dr	Public Works	Reoccurring maintenance issues causing flooding; mix of private and City maintained structures	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
28	SW Advance Rd btwn Stafford Rd & SW 63rd Ave	Public Works	Outfall blockage issues caused by vegetation. City cannot access to fix	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
29	SW Daybreak St & SW Morningside Ave	Public Works	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond	CAP		N	Renaissance Pond is included in existing hydraulic model. City confirmed configuration and pond outlet to west.	Not visited.	N	N	TBD	N
30	Sysco drainage ditch south of Parkway Ave	Public Works Community Development	Historical flooding issues; can no longer be accessed due to newly constructed fence. Ditch is owned and maintained by Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Related to Problem Area #30.	CAP	MAINT	Y	Ongoing maintenance issue. Grade of swale and channel is a concern. Ditch was recently dredged. Location is already included in hydraulic model extents.	See Problem #13. Same issue.	N	N	Y	TBD
31	Off Canyon Creek Road; catch basin in a residential backyard	Public Works	When farmer plows the field east of area debris enters catch basin and causes backups.	MAINT		N	Appears to be an operational issue.	Not visited.	N	N	N	N
32	Drainage ditch west & south of Delta Logistics	Public Works 2012 SMP	Overflow floods parking lot/channel conveyance issues. Related to Problem Area#15.	CAP		Y	Location is already included in hydraulic model extents. 2012 MP identified a CIP (CLC-3) for this location. AKS Coffee Creek system evaluation included additional survey that needs to be incorporated into model. Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement.	See Problem #15. Same issue.	Y	Secondary	Y*	N
33	Elligsen Rd and Parkway Center Dr near Jeep Dealership	Public Works	Bubbler does not operate as designed; runoff goes over road.	R/R		N	Bubbler location is mapped incorrectly (located on SW Canyon Creek Rd near Burns Way). Issue deemed to be not significant by COW staff.	Not visited.	N	N	N	N
34	95th Ave at Grace Chapel	Public Works Community Development	Outfall blockage in ODOT right of way.	MAINT		N	Appears to be an operational issue requiring coordination with ODOT.	Not visited.	N	N	N	N
35	Culverts under I-5	Public Works	End of design life and need to be replaced (already modeled). Various locations along Parkway Ave & Boones Ferry Rd.	R/R		Still Needed	Locations already included in hydraulic model extents. Requires coordination with ODOT.	Not visited.	N	N	TBD	TBD

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				Primary	Secondary				Hydraulic Model Expansion/ Update Need (Y/N)	Stream Assessment Location (Y/N)[2]	Project Need? (Y/N)[3]	Program Need?
36	Culverts under Jobsey Ln. and Arrowhead Creek	Public Works 2012 SMP	Damaged and old culverts (already modeled), need to be replaced	R/R		Y	Locations already included in hydraulic model extents. 2012 MP identified a CIP (CLC-9) for this location.	Not visited.	N	N	Y	TBD
37	Boeckman Creek N of Colvin Ln.	Public Works	Erosion of streambank and migrating channel.	E&S		N	Potential stream survey evaluation area	Not visited.	N	Primary	Y	N
38	Villebois neighborhoods	Public Works	Ponding issues in front of mailboxes.	R/R		N	Staff is unaware of any ponding in this area. Existing modeling extents are adequate.	Not visited.	N	N	N	N
39	Villebois neighborhood	Public Works	Concerns about the various detention ponds and whether they are being maintained appropriately. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issues.	MAINT		Still Needed	HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the City maintains the inlets and outlets. Grahams Ferry Pond has some design issues associated with the WQ manhole and adjacent inlets. Tooze Pond needs to be added to the hydraulic model (need stage-storage curve).	Not visited but discussed with PW. Pond maintenance is an ongoing issue. Recommend dedicated program to address and review of SOPs.	Y	N	TBD	Y
40	Citywide	Public Works	1996 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
41	Citywide	Public Works	2006 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
42	Citywide	Public Works	2015 flooding event	CAP		N	No additional information provided for specific areas/structures of concern.	Not visited.	N	N	N	N
43	Town Center Loop W - Shari's	External Survey	Drainage issues -Shari's parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
44	Town Center Loop W - Starbucks	External Survey	Drainage issues -Starbucks parking lot.	CAP		N	Issue to be resolved with SW infrastructure proposed in Town Center Plan (2019).	Not visited.	N	N	Y	N
45	Coffee Creek	External Survey	Lots of trash within creek at various locations (especially at choke points).	MAINT		N	Locations already included in hydraulic model extents, but need to verify configuration.	Not visited but location discussed with PW. Modeling refinements to incorporate the 30" and 36" lines from the Coca Cola Pond, starting at Seely Road to Coffee Creek.	Y	N	N	N
46	29851/29840 SW Camelot St	External Survey	Flooding from storm drain street grate. Grate clogs with debris .	MAINT		N	Appears to be an operational issue.		N	N	N	Y

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
1	1	Morey's Landing bubbler (AKA Willamette Way East bubbler)	Willamette River	Staff Surveys	Localized flooding during high intense storm events. Existing bubbler meant to collect runoff from the streets and divert to grass area within the BPA power line easement and to the river. 2012 AKS study identified deficient pipe capacity, preventing flow from reaching SWM Belknap Court outfall. Water flows into yards adjacent to the easement, requiring sandbags to redirect flow.	R/R	WQ	Y	Y	Y	N	Y	• Project area is adjacent to high pressure fuel line. • Project will require continued coordination with BPA to locate water quality facility and maintain utility access. • Need to understand infiltration rates for retention/GSI feasibility. • Current sandbag system 'works' (UV resistant sandbags needed). Location of bubbler not ideal. • GSI and pipe upsizing in one project unlikely	Y- WR-1, Phase 1 and 2	--	--	--
2	2	Frog Pond ditch and culvert under Boeckman Rd.	Meridian Creek	Staff Surveys H&H Model	Ongoing flooding issue at 6920 SW Boeckman Rd. Culvert along Boeckman Road directs flows toward an existing garage. The foundation is only 2-3 inches higher than W Fork Meridian Creek. Possible culvert misalignment and minimal slope downstream of property.	R/R	CAP	Y	Y	Y	Y	N	• Project Fact Sheet and Cost Estimate prepared March 2022. • Project currently in design as part of the Boeckman Road improvements • Piped drainage system extended along Boeckman Road beyond the existing house, where the channel has additional vertical drop.	N	N	N	N
3	3, 39	Pond F and other ponds in Villebois	Coffee Lake Creek	Staff Surveys	Concerns whether various private detention ponds are being maintained appropriately. HOA is responsible for maintenance of ponds (currently overgrown with vegetation) and the city maintains the inlets and outlets. Maintenance issues include Grahams Ferry Pond – potential design issues for the WQ manhole and adjacent outlets. Palermo (Pond F) - a large concrete pond off Grahams Ferry Road requires routine maintenance to prevent upstream tailwater issue.	R/R	MAINT	Y	Y, except for Grahams Ferry Pond	N	N	Y	• H/H model updated to include relevant facilities. • Active maintenance implemented by HOA. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement. • Per City (6/9/23) – Pond F swales above the level spreader have been cleaned out and are no longer causing issues.	N	N	Y- P-6	Y
4*	4	Library Pond	Boeckman Creek	Staff Surveys Retrofit Analysis H&H Model	Library Pond does not have flow control/orifice structure or emergency overflow type structure. Pond currently floods into Library parking lot and Memorial Dr near park entrance.	CAP	WQ	Y	Y	Y	N	Y	• Primary objective is to accommodate redevelopment of the Town Center; secondary is to accommodate Boeckman mitigation needs. • As-builts (stage-storage) incorporated into H&H evaluation.	Y – BC-1	--	--	Y

N/A = Not Applicable
Project Opportunities in gray have been removed from consideration for further project development.
[1] Categories include: MAINT=Maintenance; R/R=Repair and Replacement; CAP=Capacity Issue; E&S=Instream Erosion/Sediment Issue; INFRA=New infrastructure need per growth and development; WQ= Water Quality.
[2] Project planning outcome results are identified. TBD means that additional discussion may be warranted following modeling evaluation. Location IDs that are shaded in gray are not anticipated to require a project or program.
[3] Stream assessment locations identified as priority or secondary.
[4] Costed Project needs = Y were confirmed with City during on 3-15-23 and require a conceptual design, fact sheet and cost estimate. Unfunded Project needs will be documented in the SMP but will not have a conceptual design or cost associated. The resulting Project ID is listed for reference.
[5] Project Opportunity Locations affiliated with the Boeckman Road mitigation efforts are indicated with a *.

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					Ongoing challenges with debris removal at existing ditch inlet (which serves as outlet from pond). City has considered expanding the pond as part of the fee in lieu program for Town Center redevelopment.								• BC to document findings specific to future policy requirements and cost improvements to the pond to adhere to current design criteria. • Policy recommendation –Require portions of redevelopment to install onsite treatment and flow control to ensure capacity in Library Pond as a fee-in-lieu opportunity.				
5	9, 10	Miley Rd sinkhole and outfall	Charbonneau	Staff Surveys 2012 SMP H&H Model	2012 MP CIP SD9000 to SD9069. Collapsed mainline due to age and pipe corrosion has caused a sinkhole at eastern edge of pipe alignment. Challenge is exacerbated by steep slopes. Remaining pipe along Miley Rd. is failing and needs replacement. Significant scouring into jurisdictional wetland. Upstream capacity deficiencies indicated by H/H modeling (preliminary flooding location #1).	R/R	CAP	Y	Y	Y	N	N	• Steep slopes will require geotechnical evaluation. • Erosion issues are entering the jurisdictional wetland, and beyond the scope of maintenance actions, such as adding riprap to dissipate energy at the outfall. • Upstream end is collapsed (replacement in kind) and upsizing with outfall. Alignment is under private retaining wall. • Modeled capacity deficiencies at the upstream portion of the alignment (due to hydrologic inputs)	Y – WR-2, Phase 1 and 2	--	--	--
6	11	Town Center Loop near Les Schwab Tire Shop	Boeckman Creek	Staff Surveys	Observed flooding along Town Center Loop W via the CBs that tie into current high flow bypass. Existing reducer (12” control on 18” pipe) was installed in 2015 to limit flow toward ODOT culvert under I-5. Restriction contributes to upstream problems through Town Center Loop. Town Center redevelopment will remove the high flow bypass for flows towards Library Pond.	CAP		Y	Y	N	N	N	• Model does not reflect flooding in this location. • Future conditions will be driven by adherence to Town Center Plan. • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
7	12	Rose Ln culvert	Willamette River	Staff Surveys 2012 SMP	2012 MP identified a CIP WD-2 for this location. Culvert under Rose Lane floods road and neighboring yard/garage on downstream side. Drainage pattern is very flat with several hard turns. Future development (PDR1) is anticipated upstream of problem area.	CAP	MAINT	Y	N	N/A	N	N	• Realign the existing culvert (at a diagonal) and/or install a secondary culvert south across Rose Lane to alleviate the US ponding that occurs in the adjacent field. • Consider opportunity to construct project in conjunction with future upstream development (PDR1). • Discussion during 3-15 Wksp confirmed historic project need requiring cost estimate.	Y – WR-3	--	--	--
8	13, 30	SW Parkway Ave south of Costco	Boeckman Creek	Staff Surveys H&H Model	N-S drainage swale south of Parkway has flat grades and is routinely filled with sediment, surcharging the roadway drainage system, and resulting in an ongoing maintenance concern.	MAINT	CAP	Y	Y	Y	N	Y	• Public works confirmed 36” pipe from Costco to 40” pipe to Sysco ditch (may attribute to Costco backwater). • Sysco intends to expand its footprint at this location, so private development may alleviate immediate open channel issue.	N	Y	Y-P-1	--

Table A-2. Project Opportunity Matrix

Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
					Ditch is owned and maintained by private owner (Sysco) but receives flows from both public and private sources. Upstream drainage from Costco includes a large underground detention system that does not function properly and holds water year-round. Modeled results indicate flooding at US node of 30" culvert at N-S end of ditch.								• Future Project/ Program Recommendation - City may install WQ manhole(s) or other facilities to remove sediments from public runoff (Localized Drainage Improvements Program or Green Street/LID Retrofit). This would isolate any additional sediment accumulated in the ditch to private sources (could be done as part of a program activity).				
9	14, 15, 26, 32	Open channel system from Day Rd. to Ridder Rd	Coffee Lake Creek	Staff Surveys 2012 SMP H&H Model	Culvert needs replacement. Conveyance and storage limitations exist south of Day Rd (limited areas, BPA towers, narrow channel, etc.). Existing AKS design does not fully alleviate modeled flooding.	R/R		Y	Y	Y	N	Y	• AKS Coffee Creek system evaluation included additional survey that was incorporated into model as part of validation efforts. AKS evaluation did not include impoundment (incorporated into BC model) or updated hydrology. • Need to evaluate area from larger perspective and investigate US/DS opportunities for improvement. • Discussion during 3-15 Wksp indicated purchasing the adjacent (to the west) parcel for installation of the detention pond (AKS concept) is complicated by access road issues. • BC to confirm feasibility of improvements and 100-year WSE with respect to adjacent structures. City to confirm what level of future flooding is acceptable. • Policy recommendation – May be required to limit/ confirm adherence to City stormwater standards upstream (north) of Day Rd and establish similar standards for Tualatin discharge. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs.	Y – CLC-1, Phase 1 and 2 and City-1	--	Y-P-5	Y
10	24	Catch basins corner of Wilsonville Rd & Kinsman Rd	Coffee Lake Creek	Staff Surveys	Recurring flooding at catch basins occurs even after cleaning.	CAP	MAINT	N	Y	N	N	Y	• Reconstruction is occurring so this may not be a pressing issue; future deficiencies to be addressed as part of a program (Localized Drainage Improvements Program)	N	N	Y-P-1	N
11	25	SW Salish Ln at intersection with Parkway Ave	Coffee Lake Creek	Staff Surveys H&H Model	Undersized catch basins cause flooding (ponding in SE corner by pond). A city-owned pond at the Shrine Center receives a small amount of drainage and requires frequent maintenance. Model predicts flooding within the pond and outlet. Pond configuration is based on original model build from 2012 SMP (preliminary flooding location #10).	CAP		Y	Y	Y	N	N	• Need improved access for a vactor truck to access the WQ MH and pond for maintenance. Access should be from the Shrine Center parking lot. • Refinement of the model extents or pond configuration determined to not be needed. • Program Recommendation - Localized Drainage Improvements Program or Green Street/LID Retrofit.	N	Y	Y-P-1	N

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Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
													• Other option would be documentation of an unfunded project for maintenance enhancement.				
12*	29	SW Daybreak St & SW Morningside Ave	Coffee Lake Creek	Staff Surveys	Capacity issues with Renaissance detention pond. Possible elevation or directional issue with flow out of detention pond. Opportunity to improve water quality treatment through retrofit and reconfiguration of existing pond property.	CAP		Y	N	N	N	Y	• Possible pond retrofit to increase storage capacity and improve water quality treatment. • Location is also affiliated with Boeckman Road mitigation alternative locations and Ash Meadows (Project Opportunity Location #26), but not a prioritized location. • Workshop recommendation – Need program for restorative maintenance of ponds (especially private). Current PW staffing doesn't support private pond maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	N	Y- P-6	Y
13	35	Culverts under I-5	Coffee Lake Creek	Staff Surveys H/H Model	End of design life and need to be replaced. Various locations along Parkway Ave & Boones Ferry Rd (crossings from E-W).	R/R		N	Y	Y	N	N	• Project may be referred to ODOT; not one that the City would initiate. • Locations already included in hyd. model.	N	N	N	N
14	36	Culverts under Jobsey Ln. and Arrowhead Creek	Coffee Lake Creek	2012 SMP Stream Assessment	2012 MP identified CIP CLC-9 for this location. Damaged and old culverts (already modeled), need to be replaced	R/R	E&S	Y	Y	N	Y	N	• Locations already included in hydraulic model. • Combine with Project Opportunity #20.	Y – CLC-2	--	N	N
15	37	Boeckman Creek N of Colvin Ln.	Boeckman Creek	Staff Surveys 2012 SMP	2012 MP identified BC-8 (Canyon Creeks Estate Pipe Removal) for this location. Erosion of streambank and migrating channel reported in downstream portion of the project site.	E&S	WQ	Y	Y	N	N	N	• Consider more detailed stream survey evaluation to understand channel constraints and extents of potential planting. • Per meeting on 3-8, City confirmed ongoing issue. Refer to 2012 SMP.	Y – BC-4	--	N	N
16	43, 44	Town Center Loop W - Shari's and Starbucks	Boeckman Creek	External Survey	Drainage issues - Shari's and Starbucks parking lot (down the road from each other).	CAP		N	Y	N	N	TBD	• May be localized ponding addressed with addition of inlets (programmatic). • This issue was identified to be addressed through the Town Center Plan (2019). • Discussion during 3-15 Wksp confirmed not an immediate need. • Policy recommendation – As a best practice, establish public/private partnerships in conjunction with road overlay efforts to replace damaged private stormwater pipe.	N	N	N	Y
17		Boeckman Creek - Reach 1 (US of Willamette R.)	Boeckman Creek	Stream Assessment	Significant risk of continued channel incision and lateral erosion along the lowest reach of Boeckman Creek prior to confluence of the Willamette River. Several properties have experienced bank failures and loss of land, and an active	E&S		Y	Y	N	Y	Y	• Consider upstream opportunities to reconnect floodplain, allow high flows to expand laterally, and dissipate channel energy. • Boeckman Road mitigation efforts (in progress) include evaluation of the tributary channel to the	Y-City-4	Possible	N	N

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					landslide is impacting the backyard and deck of one of the properties.								main reach of Boeckman and potential modification to increase upstream retention. • Per 3-15 Wksp, efforts may include stabilizing the channel and apply grade control; geotechnical investigation; retaining/ crib wall or soldier pile. • June 2023 – Per City - location to part of ongoing monitoring project (planning project need)				
18		Meridian Creek in Landover Park - Reach 1 (US of Wilsonville Rd.)	Meridian Creek	Stream Assessment	Sediment-clogged culvert (30-inch) at the Meridian Creek Crossing at Wilsonville Road. Culvert is mostly obstructed and appears to cause ponding during storm runoff.	MAINT	E&S	Y	Y	N	Y	N	• Consider location of ponding and whether infrastructure is being impacted. • If ponding is isolated to park and not overtopping any roadways or impacting private property, then maybe this isn't a problem that needs to be fixed. It's effectively a detention pond. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y- City-2	N	Y- P-5	N
19		Meridian Creek in Landover Park - Reach 2 (DS of Willow Creek Dr.)	Meridian Creek	Stream Assessment	Culvert outlet at upstream end of reach is clogged and backs up water underneath Willow Creek Dr. PVC SW outfall along reach is undermined (STA 1,100) and 6-foot section has washed out and moved downstream.	MAINT	E&S	Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • Traffic impacts to Willow Creek Drive during culvert replacement. • Per Wksp 3-15, planning project need to monitor location and confirm worsening.	Y- City-2	N	Y- P-5	N
20		Arrowhead Creek at Pedestrian Bridge (Reach 4)	Coffee Lake Creek	Stream Assessment	Culvert at upstream end of reach (at pedestrian crossing) is failing and should be considered for replacement.	R/R		Y	Y	N	Y	N	• Need in-water work permits to replace culvert. • See Project Opportunity #14.	Y – CLC-2	N	N	N
21*		Memorial Park (Swale Retrofit, Pipe Upsizing, and Mitigation)	Boeckman Creek	Retrofit Analysis H/H Model	Swale at Memorial Dr. is not draining properly. Potential concept is to extend swale all the way along the road or relocate to the base of hill. Modeling evaluation indicates that the pipe system after convergence point at Memorial Drive has a constriction resulting in backwater and upstream system flooding (preliminary flooding location #5).	MAINT	CAP	Y	Y	Y	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Location is also affiliated with Boeckman Road mitigation alternative location (raising of pedestrian trail to detain flow from entering Boeckman Creek). • Relocation of swale allows for offline facility construction. •	Y – BC-5	--	N	N
22		Oulanka and Tivoli Parks	Coffee Lake Creek	Retrofit Analysis	6 swales haven't been maintained properly - 2 are City owned and 4 need to be retrofitted and taken over by City	MAINT	WQ	Y	N	N/A	N	Y	• Level spreaders aren't working well. • Opportunity to expand water quality treatment through retrofit of existing facility. • June 2023 – Per City – PW already fixed the swales. Instead, recommend unfunded project or program for restorative maintenance of facilities (especially private). Current PW staffing doesn't support private facility maintenance. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	Y- P-6	Y

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Project Opportunity Location ID[5]	Previous Problem Area Location ID	Location/ Asset Description	Basin	Source	Problem Description	Deficiency Category[1]		Site Visit Conducted (Y/N)	Project Planning[2]					Project/Program Development			
						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
23*		Creekside Apartments (Boeckman Creek at Wilsonville Rd.)	Boeckman Creek	Boeckman Road Mitigation Study Retrofit Analysis	City staff have identified a former irrigation pond near this apartment complex adjacent to Boeckman Creek. This location may have potential to provide additional storage or provide mitigation measures. Upstream of this location there is an existing outfall to Boeckman Creek that has known erosion issues per the 2012 SMP (BC-5).	CAP	WQ	Y	N	N/A	N	Y	• Opportunity to expand water quality treatment through retrofit of existing facility. • Boeckman Road mitigation efforts originally identified as a potential flow mitigation site but was not prioritized for alternative evaluation. • Will require private property partnership. • Policy recommendation – Implement an escalating, more robust enforcement protocol with provisions for City-initiated maintenance subject to private property reimbursement.	N	Y	N	Y
24*		Wiedeman Ditch/ Canyon Creek Park/BPA Easement	Boeckman Creek	Boeckman Road Mitigation Study 2012 SMP Retrofit Analysis	City staff identified potential project opportunity to construct a regional wetland or drainage facility at this location (would require BPA coordination). Facility would be able to manage runoff from Argyle Square, Sysco, and other future developments to help offset Boeckman Creek flows. This location is adjacent to previously identified erosion issues within Canyon Creek Estates (BC-8).	CAP	WQ	Y	N	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention through retrofit of existing facility. • Boeckman Road mitigation efforts evaluated storage capabilities in Wiedeman Ditch and Canyon Creek. This location is one of the preferred alternatives. • Will require coordination with BPA. • Potential mitigation opportunity for Sysco redevelopment (discussions in progress).	Y – BC-3, Phase 1 and 2	--	N	N
25*		Mentor Graphics/Siemens Ponds	Coffee Lake Creek	Boeckman Road Mitigation Study	Existing series of ponds located on Siemens property (8005 Boeckman Rd) currently only provide flow through storage. Ponds have potential to be modified to provide detention or reconfigured to divert less flow to Boeckman Creek during large storm events.	CAP		Y	Y	N	N	Y	• Opportunity to expand water quality treatment and increase detention/retention capacity through retrofit of existing facility. • Boeckman Road mitigation efforts included evaluation of potential bypass for low flow conditions and reroute from Boeckman to Coffee Creek watershed (in line with historic drainage patterns). See Project Opportunity #26. This location is one of the preferred alternatives.	Y – BC-2	--	N	N
26*		Mentor Graphics/Siemens Flow diversion structure and Ash Meadows Detention	Coffee Lake Creek	Boeckman Hydraulic Eval TM	Eliminate flow diversion structure on private property that diverts flows to Boeckman Creek during high flows (Project Opportunity Area 25). To account for additional flow returning to the Coffee Lake Creek drainage basin, utilize the Ash Meadows area to detain flows prior to entering the ODOT culvert underneath I-5. Utilize the volume of the natural depression near Ash Meadows to detain flows during large storm events.	CAP	WQ	Y	Y	N	N	N	• Boeckman Road mitigation efforts evaluated flow control potential at this location. This location is one of the preferred alternatives. • May require additional capital improvement projects downstream of Ash Meadows to ensure adequate conveyance capacity is available. • Will require coordination with ODOT.	Y – BC-2	--	N	N
27*		Boeckman Creek Instream flow mitigation and restoration	Boeckman Creek	Boeckman Hydraulic Eval TM	Within Boeckman Creek, several concepts have been identified to provide flow mitigation for projected increases in flow.	CAP	E&S	Y	Y	N	Y	Y	• Boeckman Road mitigation efforts indicated that instream improvements wouldn't provide the level of flow protection required.	Y- City-2	N	Y- P-5	N

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						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
				Retrofit Analysis	Specific locations within Boeckman Creek have not been identified at this stage: • Beaver Analogs: Increase the depth and size of natural ponding within the creek. This would supplement the existing population of beavers and dams currently within Boeckman Creek. • Channel Improvements: Protect, harden, or slow flow in areas potentially impacted by the change in creek flows. May include the addition of large woody debris, large root wads, grade control structures or other appropriate measures to protect threatened stream banks."								• Program need - Instream restoration or vegetation enhancement. Project needs may stem from monitoring efforts.				
28		Charbonneau West - SW French Prairie Rd and SW Boones Bend Rd.	Charbonneau	2012 SMP	Stormwater system within the western portion of Charbonneau was identified in the 2012 SMP as a location that requires replacement	R/R	CAP	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • The 2012 SMP and subsequent Charbonneau Plan identified the piped infrastructure at this location in need of repair and replacement. • Per 3-15 Wksp, City confirmed need to cost out capital project for this area per the R/R Chabonneau Infrastructure Master Plan.	Y – WR-5	--	N	N
29		Charbonneau East- SW French Prairie Rd Outfall and SW Edgewater	Charbonneau	H/H Model 2012 SMP	Model predicts flooding at this outfall and along the SW Edgewater piped system. Predicted flooding along this system generally starts at the 10-yr design storm, while the most upstream pipe segments along SW Edgewater are predicted to start at the 2-yr design storm. Restriction is caused by undersized outfall (30") in comparison to upstream pipe segments (36"). This outfall pipe was replaced in 2018 during an emergency repair but was not upsized to 36" per the recommendation from the 2012 SMP.	CAP	R/R	N	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Wallis Engineering is currently designing the portion of the system on Edgewater that contributes to this outfall. Per City (11-2-22), no capital project needed for Edgewater component.	N	N	Y- P-4	N
30		Charbonneau East- SW French Prairie Rd and SW Old Farm Rd piped system	Charbonneau	2012 SMP	Model predicts flooding throughout these piped systems starting at the 2-yr design storm due to insufficient capacity at the outfall pipe (Project Opportunity #29). Flooding at this location could impact the residential properties within Charbonneau.	R/R	CAP	Y	Y	Y	N	N	• Model indicates limited capacity deficiency at this location. • Alternatives evaluated include inline detention upstream along SW French Prairie Rd and/or SW Old Farm Rd and replacement of outfall. Due to space limitations a detention pipe within the roadway cannot provide adequate flow control. • Planning Project – Conduct flow monitoring prior to Phase 2 initiation to confirm sizing needs. • City to confirm how much modeled flooding is acceptable.	Y – WR-4, Phase 1 and 2 and City-1	--	N	N

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						Primary	Secondary		Hydraulic Model Developed? (Y/N)	Modeled Capacity Deficiency (Y/N)	Stream Assessment IDd Need (Y/N)[3]	Water Quality Retrofit Opportunity (Y/N)	Project Development Considerations (per Workshop and City Discussions)	Costed Capital Project Need? (Y/N)[4]	Unfunded or Future Capital Project Need? (Y/N)[4]	Program Need? (Y/N)	Policy Need?
31		Parkway Ave./Metolius Ln.	Willamette River	H/H Model 2012 SMP	Model predicts flooding at several nodes along N-S run of pipe starting at the 10-yr design storm. Capacity is limited by the small diameter (21") pipes near the outfall which is causing a constriction. Flooding at this location could threaten the adjacent properties along SW Parkway Ave.	CAP		N	Y	Y	N	N	• Invert elevation in MH prior to outfall are misaligned, causing constriction. • Per 3-15 Wksp, PW Ops confirmed no immediate project need.	N	Y	N	N
32		Garden Acres Rd./Peters Rd.	Coffee Lake Creek	H/H Model Retrofit Analysis	Model predicts flooding along N-S piped system along Garden Acres that crosses the RR tracks and outfalls to Coffee Creek wetlands. Model flooding starts at the 2-yr design storm. City concern with obtaining easement/ coordinating with railroad to upsize pipe. Flooding at this location during the 2-yr design storm is concerning as in the future the contributing drainage area will further develop which will exacerbate this issue.	CAP		Y	Y	Y	N	TBD	• Prior to outfall, there are several smaller size pipe constraints constricting flow and causing surcharge. • As-builts were received for the existing ponds (two private, one public) located near the outfall (at the location of several small diameter pipes) of the Garden Acres Rd./Peters Rd. piped system. • Potential pipe rerouting and new outfall was evaluated to divert flow away from the undersized storm piping along Peters Rd. and towards a separate outfall to Coffee Creek. Per meeting 3-29, not a preferred option because would require new outfall. • Expanded pond to help mitigate flow downstream.	Y – CLC-3	--	N	N
33		Boberg Rd. and RR crossing	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding along N-S pipe prior to discharging into open channel starting at the 2-yr design storm. Predicted flooding also at two large diameter culverts flowing E-W underneath RR tracks. Flooding at this location could impact the industrial properties along Boberg Rd.	CAP		N	Y	Y	N	N	• May be addressed in conjunction with Opp Area #32.	---	N	N	N
34		Barber St.	Coffee Lake Creek	H/H Model 2012 SMP	Model predicts flooding at several DS nodes prior to Coffee Creek outfall and at node near RR tracks starting at the 25-yr design storm. Backwater conditions from Coffee Creek may be contributing to downstream flooding.	CAP		N	Y	Y	N	N	• Per H/H results, immediate project need is unlikely.	N	Y	N	N
35		Lower Boones Ferry Rd.	Willamette River	H/H Model	Model predicts flooding along piping that conveys private drainage (former Albertsons property) to Boones Ferry Rd starting at the 2-yr design storm. Flooding at this location could impact the commercial properties along SW Boones Ferry Rd.	CAP		N	Y	Y	N	Y	• Modeled flooding may be due in part to hydrology node placement. • Large parking lots in adjacent areas could be potential for retrofit with pervious pavements or stormwater planters for stormwater collection. • Will require coordination with private property owners. • Per Wksp 3-15, City is unaware of existing issue here.	N	Y	N	N

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36	8	Commerce Circle near Delta Logics parking lot	Coffee Lake Creek	Staff Survey	Improperly abandoned storm line on private property is causing flooding and a sink hole (safety concern).	R/R		Y	N	--	N	N	• Discussion during Public Works during site visit concludes no project need. • Public Works would like a contracting mechanism to contract the investigation and proper abandonment of this pipe independent of the PW maintenance budget. • Additional as-built research is needed to identify lateral connections and drainage area to the abandoned pipe. • Program Recommendation - Localized Drainage Improvements Program or Repair and Replacement.	N	N	Y-P-1	N
37	23	Cul-de-sacs west of Serenity Way	Coffee Lake Creek	Staff Survey	Inlets at Pleasant (Cartograph #1750) and Serenity Ln. (Cartograph #1748) become covered with leaf debris causing cul-de-sacs to flood.	CAP		N	N	--	N	N	• Program Recommendation - Localized Drainage Improvements Program. Installation of additional inlets near the intersection of Serenity Ln. may prevent ponding at the bottom of the cul de sac.	N	N	Y-P-1	N
38	46	29851/29840 SW Camelot St	Coffee Lake Creek	External Survey	Flooding from storm drain street grate. Grate clogs with debris.	MAINT	WQ	N	N	--	N	N	• Appears to be an operational issue. • Program Recommendation - Localized Drainage Improvements Program.	N	N	Y-P-1	N
39		Green Streets/LID Facilities	N/A	Retrofit Analysis	Develop a program to install LID facilities in conjunction with planned roadway improvements. Potential locations as listed in the Retrofit Assessment include SW Camelot, SW Wilsonville Road, and SW Hillman.	R/R			N	--	N	Y	• Program Recommendation – Water Quality Retrofit Program.	N	N	Y-P-2	N
40		Porous Pavement Pilot Study	N/A	Retrofit Analysis	Evaluate feasibility of porous pavement for future paving projects.	R/R			N	--	N	Y	• Consider applicability as a planning project to do porous pavement overlays for water quality in conjunction with pavement restoration/ improvement needs.	Y-City-3	N	N	N
41		Gesellschaft Water Well Channel Restoration	Boeckman Creek	2012 SMP Retrofit Analysis	Erosion is occurring within the drainage channel that enters Boeckman Creek.	E&S		N	N	--	N	Y	• Determined to be a higher priority retrofit location per 2015 Retrofit Assessment. • Per Wksp 3-15, project per 2012 SMP needed for funding.	Y – BC-6	N	N	N
42		Ridder Road Wetland Restoration	Coffee Lake Creek	2012 SMP Retrofit Analysis	Current drainage channel is underutilized with invasive vegetation. Referenced as CLC-4 per 2012 SMP.	E&S	MAINT	N	N	--	N	Y	• Determined to be a low priority retrofit location per 2015 Retrofit Assessment. • Discussion needed during planning workshop to confirm that funded project is not warranted.	N	Y	N	N
43		Town Center Conveyance Piping	Boeckman Creek	Community Development Town Center Concept Plan	Public stormwater collection pipe (>15" diameter) per Town Center Concept Plan.	INFRA		Y	N	--	N	Y	• Conveyance sizing is based on no onsite controls. • Library Pond analysis will be used to support onsite (private) collection system requirements. • Additional assets/ re-piping is development driven. No defined project need, pending redevelopment.	N	Y	N	Y

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44		Frog Pond E and S Conveyance Piping	Newland Creek	Community Development Frog Pond East and South Master Plan	Public stormwater collection pipe and outfall along SW 60th Ave. (>15" diameter) per Frog Pond Master Plan.	INFRA		N	N	--	Y	Y	• Frog Pond E and S Master Plan complete in December 2022. • Additional stream assessment conducted in October 2023 baselined receiving water characteristics. • SMP incorporates trunk line and outfall associated with proposed system along SW 60th.	Y – NC-1	--	N	N
45		SW Miami	Willamette River	H/H Model	Model predicts flooding along 15" piping starting at the 25-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
46		Canyon Creek Rd (near Xerox)	Boeckman Creek	H/H Model	Model predicts flooding at node that conveys private stormwater from Xerox to the E across Canyon Creek Rd. starting at the 10-yr design storm.	CAP		N	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N
47		River Fox Park	Willamette River	H/H Model	Model predicted flooding in 12" pipe	CAP		Y	Y	Y	--	N	• City doesn't recall location as being an issue. Per City with validation exercise, no immediate project need.	N	Y	N	N

Appendix B: TM#3: Stormwater Modeling Methods, Assumptions, and Results

Technical Memorandum: Hydrologic and Hydraulic Modeling Methodology and Results

Brown AND Caldwell

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Portland, OR 97239

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Technical Memorandum

FINAL

Prepared for: City of Wilsonville

Project Title: Stormwater Master Plan

Project No.: 156157

Technical Memorandum #3

Subject: Hydrologic and Hydraulic Modeling Methodology and Results

Date: March 7, 2023 (Final)

To: Kerry Rappold, City of Wilsonville

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Prepared by: _____
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Limitations:

This document was prepared solely for Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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List of Abbreviations

BC	Brown and Caldwell
BRCP	Boeckman Road Corridor Project
CIP	capital improvement program
City	City of Wilsonville
CMP	corrugated metal pipe
COM	Commercial
CPs	capital projects
CWS	Clean Water Services
GIS	geographic information system
GOV	Government
HB	House Bill
H/H	hydrological and hydraulic
HGL	hydraulic grade line
IND	Industrial
INST	Institution
LID	low impact development
LIDAR	Light Detection and Ranging
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NRCS	National Resource Conservation Service
ODOT	Oregon Department of Transportation
OS	Open Space
PDR	Planned Development Residential
PVC	polyvinyl chloride
PWS	Public Works Stadards
RA	Rural Agriculture
RCP	reinforced concrete pipe
SMP	Stormwater Master Plan
TM	Technical Memorandum
TMDL	total maximum daily load
TSS	total suspended solids
UGB	urban growth boundary
VAC	Vacant

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Section 1: Introduction

The City of Wilsonville (City) is developing an updated Stormwater Master Plan (SMP) to improve the understanding of stormwater system characteristics and infrastructure in the city. The SMP will include a capital improvement program (CIP) reflecting prioritized capital projects (CPs) and programmatic activities to address conveyance, capacity, water quality, and natural resource enhancement for existing and future development.

To document efforts completed as part of the SMP update, a series of Technical Memorandums (TM) have been developed. Technical Memorandum #1 (TM#1): Stormwater Basis of Planning (2/18/22) documented data collection and compilation efforts, presents applicable regulatory and design criteria, identifies stormwater problem areas (informing hydrologic and hydraulic [H/H] model updates), as well as preliminary project and programmatic concepts. Technical Memorandum #2 (TM#2): Geomorphic Analysis (5/25/22) documented field stream assessments for select stream channels within the City and identifies areas for additional consideration as a capital project.

This Technical Memorandum #3 (TM#3) builds upon the previously completed TMs to document the methodology and results of the H/H model activities. Topics covered in TM#3 include:

- H/H model evaluation criteria.
- Hydrologic model updates, including development of revised input parameters.
- Hydraulic model updates and expansion efforts, including refinement of existing modeled elements and the inclusion of additional stormwater infrastructure.
- Model validation approach, objectives, and adjustments.
- H/H model results under applicable design storm events, including identification of capacity limitations to inform development of capital projects.
- Next steps, including the comprehensive summary of project opportunities to inform CP development.

Section 2: Design Storm and Model Evaluation Criteria

The City's 2012 SMP developed a city-wide H/H model using the Innovyze InfoSWMM model platform. BC reviewed the City's existing H/H model and initiated updates as described in Sections 2.2 and 5.4 of TM#1. In addition, Brown and Caldwell (BC) reviewed Section 3 of the City's Public Works Standards (PWS) to outline planning criteria and sizing/design criteria to assess the existing stormwater system for deficiencies. This review is detailed in Section 4 of TM#1.

Section 2.1 identifies design storms that will be simulated for the H/H model and how model results will be used to assess compliance with the Surface Water Design and Construction Standards outlined in Section 3 of the City's PWS, revised December 2015.

2.1 Design Storms

Design storms are precipitation patterns typically used to evaluate the capacity of storm drainage systems and to design capital improvements for the desired level of service.

Design storms used for this study include the 2-, 10-, 25-, and 100-year, 24-hour recurrence interval events. The rainfall distribution for these design storms is based on the standard National Resource Conservation Service (NRCS) Type IA storm, which is applicable to western Oregon, Washington, and northwestern California. Table 1 lists the design storm rainfall depths used in the hydrology model, as listed in the City's PWS.

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Table 1. Design Storm Depths	
Design Storm Event	Rainfall Depth (inches)
2-year, 24-hour	2.5
10-year, 24-hour	3.45
25-year, 24-hour	3.9
100-year, 24-hour	4.5

2.2 Model Evaluation Criteria

Stormwater infrastructure within the H/H model will be evaluated for capacity per the design criteria established in the PWS. The PWS reflects design criteria for new infrastructure and will also be the basis for design of future CPs developed as part of this SMP. Key hydraulic design requirements for modeled elements are listed below:

- **Pipes and Open channels:** Sized to convey and contain the peak runoff from the 25-year design storm while also maintaining a minimum of 1 foot of freeboard between the hydraulic grade line (HGL) and the top of structure or ground surface.
- **Culverts:** Designed to safely pass the 100-year design storm flow and provide a minimum of 1 foot of freeboard between the HGL and the ground surface.
  - For new culverts 18 inches in diameter or less, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed two times the pipe diameter or three times the pipe diameter with a seepage collar, unless an exception is approved by the City.
  - For new culverts larger than 18 inches in diameter, the maximum allowable design storm event headwater elevation (measured from the inlet invert) shall not exceed 1.5 times the pipe diameter, unless an exception is approved by the City Engineer.

Specific to the identification and evaluation of conveyance capacity issues with existing City infrastructure, the model evaluation conducted in Section 7 identified capacity deficiencies up to the 25-year design storm event. Capacity deficiencies were defined based on predicted flooding which consisted of locations where the HGL exceeded the ground surface elevation. This approach allowed for deficiencies to be quickly identified throughout the system at a city-wide level. For capacity deficient locations where a CP is developed, recommended projects will follow the PWS to allow for the minimum of 1 foot of freeboard between the HGL and ground surface. For additional information on PWS design standards and criteria as it relates to this SMP, refer to TM#1 Section 4.

Section 3: Hydrologic Model Development

The hydrologic model developed for this SMP update utilizes InfoSWMM version 15.0 and the RUNOFF method, which is consistent with the original modeling approach for the 2012 SMP. The RUNOFF method is a simple yet well-established method for simulating subbasin hydrology that utilizes the Green-Ampt method for calculating infiltration.

The necessary parameters for the RUNOFF method when utilizing the Green-Ampt method for infiltration includes subbasin area, slope, width, impervious percentage, hydraulic conductivity, initial moisture deficit, and suction head. The hydrologic module in InfoSWMM converts rainfall into stormwater runoff based on design storm parameters (i.e., volume and intensity of rainfall) and the hydrologic input parameters listed above.

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This section includes detailed descriptions of the methodology used in determining each of the hydrology model input parameters to update the original model.

3.1 Subbasin Delineation

The total contributing drainage area to City owned stormwater infrastructure is approximately 8,728 acres and extends beyond both the City limits and the urban growth boundary (UGB) in some locations. This total contributing drainage area represents the study area for the SMP and is organized by watershed or major basin. The study area is further subdivided into subbasins as shown on Figure A-1 of Attachment A. The receiving water body for all watersheds is the Willamette River.

The City's 2012 SMP developed subbasin delineations within each major basin for purposes of characterizing hydrology. BC reviewed this existing watershed and subbasin delineation and updated based on the following City provided information:

- Topographic Light Detection and Ranging (LiDAR) and contour data (2019)
- Stormwater infrastructure geographic information system (GIS) data (2021)
- Aerial Imagery (2021)

Where necessary, major basin boundaries were adjusted to accurately reflect that the entire drainage area was captured. However, most adjustments occurred on the subbasin level and typically involved the refinement of existing subbasin boundaries to better reflect newly developed areas or the subdivision of subbasins to depict drainage patterns more accurately.

From this revised subbasin delineation, ArcGIS Pro was used to calculate individual subbasin areas for use as a hydrologic input into the model. A summary of the subbasins by major basin is presented in Table 2. Please note Newland Creek (and its associated drainage area) is outside the designated study area and not included in Table 2.

Table 2. Subbasin Summary

Major Basin	Subbasins			Contributing Drainage Area (acres)
	Number	Average Area (acres)	Median Area (acres)	
Boeckman Creek	46	42.2	14.5	1,941
Charbonneau [a]	20	23.9	16.8	478
Coffee Creek/Tapman Creek	77	67.4	28.5	5,192
Mill Creek	3	47.0	49.0	141
Meridian Creek	7	67.2	40.8	470
Willamette River (direct)	25	20.2	14.6	505
Total	**178**	**49.0**	**23.9**	**8,728**

a. The Charbonneau basin discharges to the Willamette River (direct) but was classified as a separate major based due to its location south of the Willamette River versus north.

The largest basins within the study area are the Boeckman Creek and Coffee Creek/Tapman Creek watersheds. These watersheds represent over 80 percent of the contributing drainage area from which the City manages stormwater runoff.

Subbasin names throughout the watershed are consistent with those developed for the 2012 SMP. This naming convention includes a unique four-digit ID (e.g., 1100, etc.) to classify each individual subbasin. Per the 2012 SMP, deviations from this convention include several subbasins that are instead named in accordance with the detention facility they drain to (e.g., CANYON_N etc.).

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Modification to subbasin naming for this SMP update only occurred when the original subbasin delineations were subdivided to provide a greater level of hydrologic detail. Split basins use “A” or “B” in the suffix to the original subbasin ID for identification purposes.

3.2 Subbasin Slope and Width

The RUNOFF method requires both subbasins slope and width parameters which are a function of the revised subbasin delineation discussed in Section 3.1. To approximate these two physical parameters for modeling purposes, the subbasin slope was first calculated based on the longest flow path line within each individual subbasin. Flow path lines were generated for each subbasin in ArcGIS Pro using automated spatial processing tools. These tools approximate the flow path line as the straight-line distance between the highest and lowest elevation points (based on LIDAR) in the subbasin. The auto generated flow path lines for each subbasin were then reviewed, and manually adjusted as necessary to correct instances where the flow path lines did not appear to represent reality. Examples of this includes flow path lines that did not follow the existing topography or followed a path outside of the subbasin due to an oddly shaped catchment or other nonstandard configuration. Subbasin slope was then calculated based on the flow path line length and upstream and downstream elevations. Subbasin width was then calculated for each subbasin by dividing the subbasin area by the flow path line length.

3.3 Infiltration Conditions and Soils

Soil classification and infiltration are important characteristics to consider when developing and evaluating runoff flow rates and volumes for subbasins. Soil classifications within the study area were identified using the NRCS Soil Survey. Soil information is based upon 2020 soil survey data in Clackamas and Washington County, Oregon. Soil texture class information for the study area is presented on Figure A-2 of Attachment A.

There are multiple methods that can be used to simulate infiltration associated with each soil type. For this project, the Green Ampt method was selected which is consistent with the 2012 SMP approach. The Green Ampt method was used due to its ability to be applied City-wide and for its use of parameters that can be sourced from available soil data without the need for field work.

The Green Ampt method requires the following input parameters for each soil texture classification:

- Average Capillary Suction. A measure of the water transport through soils due to surface tension acting in soil pores.
- Initial Moisture Deficit. The fractional difference between soil porosity and actual moisture content.
- Saturated Hydraulic Conductivity. A physical parameter reflective of the rate at which water moves through saturated soil.

All input parameters for soil texture classifications were based on the reference values in Table 6-1 of the City’s 2012 SMP and confirmed against published literature values. These values have been reproduced as Table 3.

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Table 3. Soil Infiltration Parameters (Green Ampt Method)				
Soil Texture Class	Saturated Hydraulic Conductivity (inches/hour)	Initial Moisture Deficit (fraction)	Suction Head (inches)	Percent of Contributing Drainage Area (%)
Sand	4.74	0.41	1.93	0
Loamy Sand	1.18	0.39	2.40	0
Sandy Loam	0.43	0.37	4.33	1
Loam	0.13	0.35	3.50	12
Silt Loam	0.26	0.37	6.69	79
Sandy Clay Loam	0.06	0.26	8.66	0
Clay Loam	0.04	0.28	8.27	0
Silty Clay Loam	0.04	0.26	10.63	4
Sandy Clay Loam	0.02	0.21	9.45	0
Silty Clay Loam	0.02	0.23	11.42	0
Clay	0.01	0.21	12.60	4

An area-weighted average value was assigned to each subbasin for each input parameter based on the distribution of soil texture class within the subbasin. The average input parameters for each subbasin are listed in Attachment B, Table B-2.

3.4 Land-Use and Impervious Percentage

Area-weighted impervious percentages were assigned to each subbasin based on an associated percent imperviousness for each land-use coverage in the City. Land use coverage and percent imperviousness by land use were adjusted from values used in the 2012 SMP due to refined zoning categories (i.e., impacts of House bill [HB] 2001) and improved methodology for calculating impervious coverage.

Land-use categories and coverages (reflecting existing development conditions and future, full-build out development conductions) were developed with the City in October 2021 using City zoning, comprehensive plan designations, developable lands/open space coverage, floodplain and wetland area designations, and impervious area coverages. The methodology of developing representative, current percent impervious percentages for each land-use coverage for this study is summarized in Section 2.3.2 of TM#1. A summary of the updated land use categories and associated impervious percentages are shown in Table 4 below.

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Table 4. Land-Use Categories		
SMP 2012 Categories	SMP Category	Representative Impervious Percentage [a] (%)
Agriculture	Rural Agriculture (RA)	15[b]
Commercial	Commercial/Government (COM/GOV)	82
Commercial-Villebois		
Industrial	Industrial (IND)	71
Residential	Planned Development Residential 1 (PDR1)	17
	Planned Development Residential 2 (PDR2)	33
Multi-Family Residential	Planned Development Residential 3 (PDR3)	43
	Planned Development Residential 4 (PDR4)	51
Residential–Villebois	Planned Development Residential 5 (PDR5)	52
Multi-Family Residential-Villebois	Planned Development Residential 6 (PDR6)	64
Open Space	Open Space (OS)	10
	Park	24
Vacant	Vacant (VAC)	3
NA	Institution (INST)	35
NA	Oregon Department of Transportation (ODOT)	48

NA: Category not used

a. Based on aerial imagery review and digitization of impervious surfaces conducted by the City.

b. Adjusted as part of the calibration process for the Boeckman Creek Hydraulic Evaluation TM (1/31/22). See Section 5.1 of the TM.

An area-weighted average impervious percentage by subbasin was calculated for both existing and future development conditions based on the contributing land use and associated land-use based impervious percentages. The future land use coverage assumes conversion of vacant lands that are developable to their underlying zoning or comprehensive plan designation. The existing and future impervious percentage for each subbasin is listed in Attachment B, Table B-2 and shown in Attachment A, Figures A-3, and A-4.

The revised hydrologic input parameters discussed in this section inform the amount of runoff generated and ultimately routed through the hydraulic model as discussed in Section 4.

Section 4: Hydraulic Model Development

The City's existing InfoSWMM H/H model was initially developed as part of the 2012 SMP effort with minor, localized revisions for the Elligsen Pump-to-Waste evaluation completed in 2019. This most recent version of the H/H model was provided to BC in March 2021 and additional hydraulic updates were made as necessary for this SMP effort. The following subsections provide a description of the key hydraulic inputs required for the model and a summary of the hydraulic updates completed for this SMP.

4.1 Hydraulic Input Parameters

The InfoSWMM hydraulic model includes a network of nodes connected by conduits to represent the City's stormwater system in the model environment. Hydraulic information required by the model is stored within each node or conduit dataset. Within each node or conduit element, various hydraulic information is stored to govern the calculations and flow routing performed by the model.

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4.1.1 Node Data

Model nodes include structures such as manholes, outfalls, storage facilities and junctions. These elements are informed by the City's GIS. Model nodes also include other relevant connection points in the system not defined in the GIS such as connection points between continuous open channel segments. Key model node attributes are listed in Table 5.

Table 5. Model Node Attributes

Attribute	Value
ID	The ID is maintained from the original 2012 SMP model. New nodes were assigned an ID based on the City's GIS attribute information.
Invert elevation	Invert elevation of the junction in feet (vertical datum NAVD88)[a]
Rim elevation	Elevation at the ground level in feet (vertical datum NAVD88)[a]
Storage Volume (if applicable)	Stage storage relationship (Depth vs. surface area)

a. Vertical datum of GIS data discussed in Section 4.2.1.

Storage nodes within the model allow for the simulation of ponds, underground detention, and other flow control facilities within the City's stormwater network. Each storage node is assigned a stage storage relationship (depth. vs. surface area) to represent the available volume of storage at a given water elevation. Table 6 lists the storage facilities included within the H/H model, including both those reflected in the 2012 SMP and those newly added or modified as part of this SMP update.

Table 6. Model Storage Nodes

Storage Node ID	Description	SMP update status
POND_LIBRARY	Library Pond (Memorial Dr.)	Updated
POND_E1	Villebois–Palermo Park dry pond	No adjustment
POND_E2	Villebois–Palermo Park dry pond	No adjustment
POND_F	Villebois–Palermo Park dry pond	No adjustment
COCA-COLA_POND	Coca Cola Facility Pond (SW Kinsman Rd.)	No adjustment
RENAISSANCE_POND	Renaissance Development Pond (SW Canyon Creek Rd.)	No adjustment
STAFFORD_POND	Al Kader Shrine Center pond (SW Parkway Ave.)	No adjustment
WILSONVILLE_DIST_CTR_POND	Wilsonville Distribution Center pond (Boones Ferry Rd.)	No adjustment
TONKIN_NISSAN_POND	Tonkin Wilsonville Nissan Pond (SW 95th Ave.)	No adjustment
CANYON_CR_PH2_DET	Canyon Creek Business Park underground detention facility	No adjustment
CANYON_CR_ARCH_PIPE	Canyon Creek Business Park underground detention facility	No adjustment
POND_BOECKMAN	Area upstream of Boeckman Rd. flow control structure	Updated
SIEMENS_POND_B	Private pond on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
SIEMENS_POND_C&D	Private ponds on Mentor Graphics/Siemens property (Boeckman Rd.)	Added
STAFFORD_MEADOWS_1_BASIN	Frog Pond West–Stafford Meadows pond (Boeckman Rd.)	Added
DAY_RD_IMPOUNDMENT	Impoundment south of Day Rd.	Added
TOOZE_POND	Villebois–Calais East (Tooze Rd.)	Added

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4.1.2 Conduit Data

Key attributes for conduits (i.e., pipes, culverts, and open channels) include ID, length, invert elevations, slope, shape (i.e., circular, or open channel cross-section), inlet and outlet losses, and Manning's roughness coefficient. The existing model conduit ID and naming convention was maintained for this SMP update. In locations where new conduits were integrated into the model, an ID was assigned based on the City's GIS attribute information.

Manning's roughness coefficient "n" is dependent on the material of the conduit. Table 7 provides a list of the roughness values applied, which are consistent with the documentation for the 2012 H/H model.

Table 7. Model Conduit Roughness

	Manning's *"n"* Roughness Coefficient
Pipe Material and Open Channel	Polyvinyl chloride (PVC) Pipe: 0.011
	Reinforced Concrete Pipe (RCP): 0.013
	Concrete Pipe: 0.013
	Corrugated Metal Pipe (CMP): 0.024
	Open channels: 0.035

4.2 Hydraulic Updates

Hydraulic model updates completed for this SMP update include model expansion, primarily in new growth areas since the previous 2012 SMP was completed or in identified problem areas (see TM#1), and model updates to reflect revised pipe sizing/alignment in conjunction with completed capital projects. These areas were discussed in a System Status and Modeling Extents workshop with City Staff in August 2021 to identify/confirm the specific locations for hydraulic model updates and documented in TM#1. Hydraulic updates used the City's GIS data (provided June 2021) as the primary source information and supplemented by City provided as-built drawings and field verification where necessary. Additional hydraulic model refinement described outside of this section was completed as part of the model validation adjustments discussed in Section 5.3.

4.2.1 Vertical Datum Resolution

The original hydraulic model used inconsistent vertical datums to reflect elevations of hydraulic model elements. Based on discussions with the City, this inconsistency was determined to be due to the City switching standards from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) sometime between 2006 and 2008.

To rectify this discrepancy, BC reviewed and adjusted all existing hydraulic model elevations to be consistent with the City's current standard of NAVD88. Details and assumptions related to the identification and correction of datums is included in TM#1, Section 2.1.2. With this effort complete, future hydraulic updates (Section 4.2.2) were able to be integrated into the model under a consistent datum.

4.2.2 Model Update and Area Expansion Locations

Hydraulic model updates were completed from May 2021 through May 2022 as additional data were received and concurrently with the problem area identification process (see TM#1 Section 5.1). This process supported the initial identification of stormwater problem areas for the City, as locations requiring modeling to validate an observed problem. Additionally, expanded modeling helps to identify new problem areas or predict future problem capacity deficiencies.

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Table 8 summarizes the specific locations of hydraulic model updates that were integrated into the City's InfoSWMM model for this SMP update. Comprehensive locations of hydraulic model updates are shown in Attachment A, Figure A-5.

Table 8. Hydraulic Model Update Summary

Date Completed	Type of Revision	Rationale for Update	Location	Description
May 2021	Update	Topographic survey	Boeckman Creek	Integrated open channel cross-sections surveyed in the vicinity of Boeckman Rd. crossing. Revised stage storage relationship of Boeckman Pond based on survey information.
June 2021	Update	Constructed capital project	Charbonneau	Revised model to incorporate Charbonneau pipe upsizing associated with CP SD9022-9025 (Old Farm Rd. Phase I) and CP SD9014-9016, & SD9030 (French Prairie Drive Phase II).
June 2021	Update	Constructed capital project	Barber Street	Revised model to incorporate pipe upsizing along Barber St. associated with CP SD4208 and SD4209.
August 2021	Update	GIS discrepancy	ODOT yard west of I-5	Updated diameter of modeled culvert from 40-in to 42-in to match GIS data.
August 2021	Update	GIS discrepancy	Boones Ferry Rd.	No model adjustment needed north of 5th St. for existing 24-in pipe segment. City rectified GIS data to match the 24-in pipe shown in model. Model adjusted south of 5th St. to reflect pipe upsizing to 30-in shown in GIS.
August 2021	Update	GIS discrepancy	Wilsonville Rd.	No model adjustment needed. City rectified GIS data to match 30-in pipe shown in model.
August 2021	Update	GIS discrepancy	Graham Oaks Nature Park	Adjusted model to follow correct piping alignment shown in GIS.
August 2021	Update	GIS discrepancy	Boeckman Rd. (west of I-5)	Adjusted pipe diameter to 24-in to reflect latest GIS data.
August 2021	Update	GIS discrepancy	Hillman Ct.	No model adjustment needed. City rectified GIS data to match 24-in pipe shown in model.
October 2021	Update	Problem area and site visit	Kinsman Rd.	Model adjusted to incorporate field measurements (rim and measure-down elevations) collected by Public Works.
October 2021	Update	Problem area and site visit	Town Center Loop	Model adjusted to incorporate field measurement of ODOT reducer (12-in) collected by Public Works.
November 2021	Expansion	Problem area and site visit	Tooze Pond	Model expanded to include Tooze Pond detention facility. Stage-storage relationship estimated form City provided as-built drawings.
November 2021	Update	Problem area and site visit	Day Rd. to Ridder Rd.	Model updated with culvert information (diameter, length, inverts) surveyed in 2019 as part of the Coffee Creek Stormwater Facility Study. Surveyed open channel information not incorporated.
November 2021	Update	Boeckman Creek Hydraulic TM	Boeckman Road flow control structure	Integrated as-built information to update flow control structure elevations and the storage capacity of the pond upstream of the flow control structure.
November 2021	Update	Boeckman Creek Hydraulic TM	Mentor Graphics/Siemens	Model updated based on survey information collected as part of the Boeckman Road Improvement Hydraulic Evaluation. Survey information included geometry and elevations of the Boeckman Creek diversion structure and weirs. Onsite Siemens ponds added to the model based on as-built drawings.

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Table 8. Hydraulic Model Update Summary				
Date Completed	Type of Revision	Rationale for Update	Location	Description
December 2021	Expansion	New growth	Garden Acres Rd.	Expand model to include piped stormwater infrastructure along Garden Acres Rd. to Coffee Creek outfall.
December 2021	Expansion	New growth	Villebois	Expand model to include additional large diameter (>18-in) pipe within the Villebois planning district.
December 2021	Expansion	Problem area and site visit	Willamette Way E	Expand model to include additional infrastructure associated with Belnap Court outfall and Bonneville Power Administration (BPA) easement outfall.
February 2022	Update/Expansion	Problem area and site visit	Meridian Creek at Boeckman Rd. (Frog Pond)	Revised Meridian Creek culvert information based on City provided as-built drawings. Expanded model to include the open channel and "Stafford Meadows 1 Basin" detention pond upstream of the culverts.
May 2022	Expansion	Problem area and site visit	Day Rd. impoundment	Impoundment south of Day Rd. added to model based on as-built information provided by the City.

Section 5: Model Validation

The updated H/H model went through a validation process from May to August 2022 with the objective to increase confidence in the updated model's accuracy and results. Flow monitoring and model calibration was not specifically conducted as part of this SMP update. The validation process involved several successive steps, as described below, leading to refinement of model input data to ultimately support the use of the H/H model to identify and develop CPs under this SMP update. The validation process included discussion of intermediate modeling results with the City during regular project check in meetings, which informed additional hydraulic modeling updates where the incorporation of as-built information was necessary.

The model validation effort included the following key components:

- Citywide integration of the model calibration adjustments determined as part of the Boeckman Road Hydraulic Evaluation (1/31/22).
- Simulation of a validation storm event from January 2022 and comparison of model results with photographs and field measurements collected near Ridder Rd.
- Discussion of preliminary model flooding results with City staff to confirm validity of modeled flooding locations and the need for additional refinement of hydraulic model elements using newly provided as-built data.

5.1 Boeckman Road System Calibration

The Boeckman Road Hydraulic Evaluation (1/31/22) is a separate but concurrent study conducted as a precursor to the Boeckman Road Corridor Project (BRCP). This study utilizes the same, updated, citywide InfoSWMM H/H model as being updated for this SMP. The study calibrated the H/H model for the Boeckman Creek basin based on flow monitoring data collected at the Boeckman Road flow control structure from March to June 2021. This flow data represents drainage from approximately 1,400 acres of the study area, specifically the upper Boeckman Creek watershed that drains to the Boeckman Road flow control structure.

Calibration adjustments integrated into the H/H model are summarized in Table 9 below.

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Table 9. Boeckman Rd. Hydraulic Evaluation Calibration Adjustment Summary	
Adjustment	**Description**
1. Baseflow addition	Added constant 0.4 cubic feet per second of inflow to the Boeckman Creek system and simulated the three preceding months of rainfall to replicate antecedent conditions.
2. Residential Agriculture (RA) Land Use Impervious Percentage	Revised the initial RA impervious percentage from 6 to 15 percent. This adjustment affected hydrology citywide.
3. Mentor Graphics/Siemens survey results (2022)	Updated model to better represent existing conditions of private stormwater infrastructure, which included the Boeckman Creek diversion structure and weirs.

These calibration adjustments result in model results that match (within 3 percent) the peak instream flow for the selected calibration storm (June 11-15, 2021). Since conveyance infrastructure is sized based on peak flows, matching peak flow was the primary objective for this calibration effort. Detailed results of this calibration process including assumptions and rationale are described in the Boeckman Creek Hydraulic Evaluation TM, dated 1/31/22.

The calibration adjustments were applied to the citywide H/H model as the initial validation step for this SMP update. The anticipated impact from these calibration adjustments is not expected to be substantial; however only adjustment #2 from Table 9 directly impacts basins outside of Boeckman Creek watershed. Residential agriculture (RA) land use only comprises a small portion of the study area (approximately 14 percent), and most of this area is outside of the city limits. As such, additional validation efforts beyond the Boeckman Road Hydraulic Evaluation calibration adjustments alone were needed to sufficiently validate the citywide model.

5.2 Model Validation

To further validate the City-wide model, a validation storm event from January 4 to 7, 2022, was selected by City staff for simulation in the H/H model. This event was identified based on reported flooding observed by Public Works staff near Day Road and Commerce Circle (NW portion of City limits). Available information for this storm event included anecdotal accounts of flooding, photographs, and water surface measurements. The 15-minute rainfall data was collected from a nearby rain gauge.

Public Works staff provided several photographs from January 6 (time unknown) to document the reported ponded water south of Day Road as shown in Figure 1.

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Figure 1. Validation observations (south of Day Road)

To correlate observed standing water conditions with measured data, BC staff collected a water depth measurement downstream of the observed flooding per Figure 2 (left) on January 7, 2022 at 11 a.m.. This measurement was collected at one of the 48-inch culverts underneath Ridder Road. While this measurement was collected after the peak of the storm event, water levels within the culvert remained high, as the culvert was approximately 67 percent full as shown in Figure 2 (right) below.

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Figure 2. Validation measurement location (48-in. culvert underneath Ridder Road)

Left: Location of culvert. Right: Depth of water in culvert.

Rainfall data for this validation storm event was obtained from a rain gauge owned and operated by Clean Water Services (CWS) located along 99W Pacific Hwy between King City and Sherwood near the Tualatin National Wildlife Refuge. The gauge is identified by CWS as "LTR" and is approximately 5.75 miles from the Boeckman Road and Boeckman Creek crossing. This rain gauge was also used for the model calibration effort conducted for the 2012 SMP. The validation storm event rainfall is plotted (15-minute increments) on Figure 3, and storm characteristics are summarized in Table 10.

Table 10. Validation Storm Event

Statistic	Storm 1
Start Date/Time	1/4/22, 12:00
End Date/Time	1/7/22, 12:00
Duration, hours	72
Total Rainfall, inches	1.76
Peak Intensity, inches/hour	0.28

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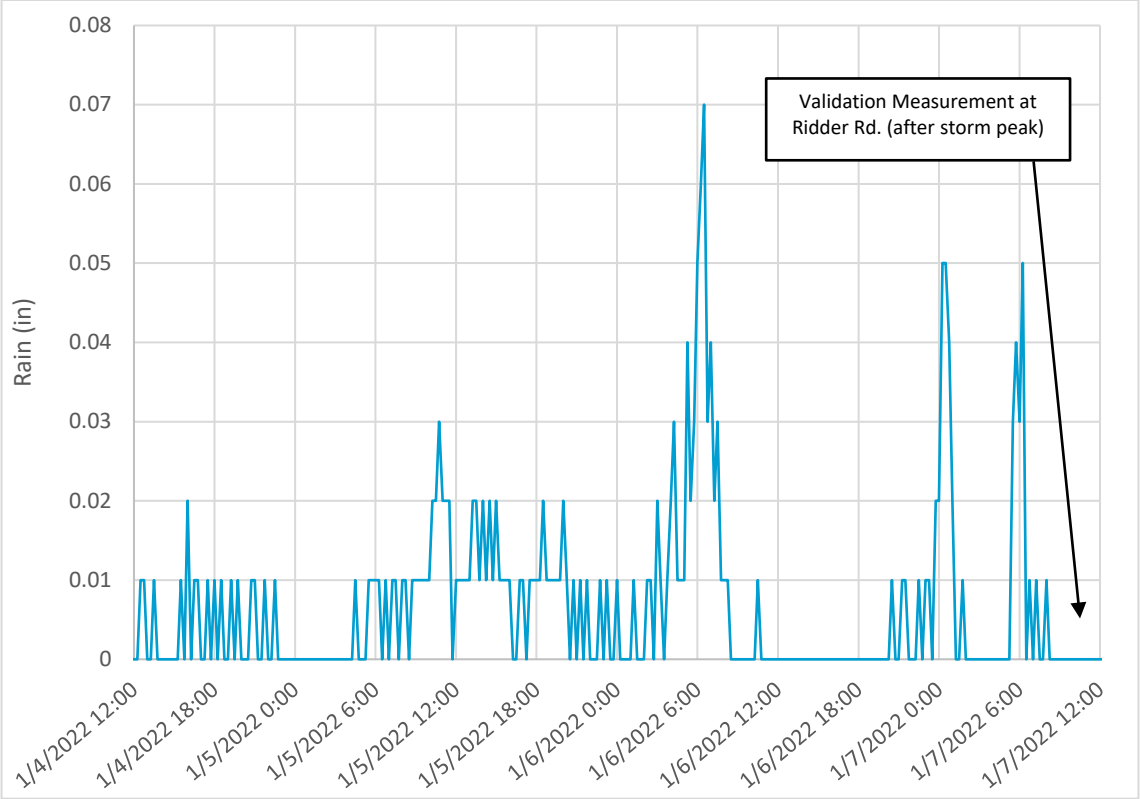

Figure 3. January 2022 validation storm event

5.2.1 Model Simulation

The validation storm was simulated in the H/H model to attempt to replicate the observed water surface elevations within the culverts at Ridder Road. The validation model simulation was unable to replicate observed conditions (i.e., standing water), indicating a discrepancy between the model results, City staff observations and BC measurements. The validation model results underpredicted the water depth measurements collected at the culverts underneath Ridder Road (Figure 2). While field measurements indicate that the culverts were approximately 67 percent full, the validation model predicted that the culverts would only be 11 percent full during that same period of the storm.

The discrepancy between the measured and simulated water surface elevation was attributed to the model not fully representing actual upstream hydraulic conditions from the culverts at Ridder Road. The modeled hydraulic reach between Day Road and Ridder Road includes simplified geometry to represent the open channel conveyance (trapezoidal cross-sections) and does not include the large wetland area north of Day Road nor the impoundment directly south of Day Road. In addition, it is suspected that during the storm event, the buildup of vegetation and sediment along this reach significantly contributed to backwater conditions and elevated water surface levels throughout the system.

5.2.2 Hydraulic Model Updates (Commerce Circle)

Adjustments to the system hydrology and hydrologic input parameters were briefly discussed with City staff but ultimately not made to resolve the large discrepancy in water surface elevations at the Ridder Road culverts. Rainfall patterns and storm volumes can vary significantly, and the rainfall gauge used to obtain the rainfall data is a relatively far distance from the validation location. Also, any adjustment to the hydrologic input parameters to increase flows at this location may have unintended consequences (i.e., impact CP sizing in other locations). The drainage area to the Ridder Road culverts is relatively small compared to the

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overall City's contributing drainage area. Therefore, it was decided that hydrologic adjustments associated with the model validation effort are not preferred and hydraulic model refinements should be made.

The hydraulic model between Day Road and Ridder Road was reviewed and updated based on available survey data within the general system area. Representative channel cross-sections were developed using the preliminary design information for AKS' 2019 Coffee Creek Stormwater Facility Study including the topographic data for the area collected by the survey team. This provided a more accurate representation of channel geometry in comparison to the conceptual trapezoidal channels included in the 2012 SMP model, although the change in the model results for the validation storm was marginal.

5.3 Preliminary Flooding Results and Additional Model Adjustments

With the large disparity in validation model results in the Day Road and Commerce Circle system (Section 5.2), it was decided jointly with the City to use a more comprehensive approach to qualify other flooding locations throughout the City.

Preliminary model results (reflecting validation adjustments described above) were discussed with the City in May 2022. This review focused on newly identified flooding locations (i.e., the 2012 SMP did not define a CP to address flooding in a specific location) throughout the City based on the 25-yr design storm (City's conveyance standard) under existing conditions. The preliminary flooding results were reviewed to identify and confirm deficiencies within the City's drainage network.

Locations with predicted flooding were cataloged in a summary table (Attachment B, Table B-2) and mapped (Attachment A, Figure A-6). City staff provided input on the preliminary modeled flooding locations as well as provided additional information (as-builts) to help refine the model prior to producing finalized results. City staff confirmed known flooding locations and locations where model flooding may not be indicative of a real-world issue.

In general, City staff agreed with the preliminary flooding results presented by the model. Preliminary flooding locations where City staff were not aware of issues were reviewed in detail to confirm their hydraulic configuration and whether the contributing drainage area and subbasin delineation was representative. For several locations where flooding had not been previously known by City staff, modeled flooding was resolved by further subdividing subbasins to simulate runoff entering the piped hydraulic system more accurately. It was decided jointly with the City that these adjustments were reasonable to resolve the issues and further effort should focus on the higher priority locations.

Additional locations (per Attachment A, Figure A-6) warranted hydraulic updates based on updated information provided by the City. These locations include:

- Location #2 Charbonneau SW French Prairie Rd. Outfall. Model revised based on as-built information to incorporate the outfall pipe lining completed as part of the emergency repair project in 2019.
- Location #6 Library Pond. Model revised to more accurately represent the pond's storage capacity based on a review of LiDAR and as-built information. The outlet pipe configuration was also modified to better reflect the ditch inlet and 18-inch outlet pipe per the as-built information.
- Location #11: Penske Truck Rental Property. Model revised to reflect updated culvert information underneath parking lot based on as-built drawings.
- Location #15: Wilsonville Distribution Center Pond: Model revised to reflect pond outlet structure based on as-built drawings.

Following hydraulic model adjustments, several locations are still predicted to flood despite City staff not being aware of any issues. These locations are outlined in Attachment B, Table B-1 as location IDs without narrative in the "City Validation Notes" column. Completion of the City-driven validation adjustments to the hydraulic model concluded the validation effort for the model. As previously discussed, traditional validation

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efforts for this H/H model were not feasible due to limited data. BC relied on feedback from City staff as part of this validation effort as it provided the most realistic path forward to continue with the capacity evaluation (Section 7) and advance CP development without requiring additional extensive data collection or flow monitoring.

Section 6: Future Flow Condition Modeling Analysis

During the model development process (Sections 3 and 4), BC evaluated different future flow assumption methodologies to determine impacts on runoff rates and ultimately CP sizing.

This analysis was initiated based on efforts to expedite design of a culvert replacement project at Meridian Creek at Boeckman Road (Problem Area #2) in February 2022. In this location, upstream development complies with current City stormwater design standards and incorporates various low impact development (LID) and flow control facilities and practices. As the sizing of CPs is typically independent of the presence of onsite facilities, the impact of onsite treatment and flow control on CP sizing was considered. While the immediate applicability of this effort was intended to inform this specific design effort (implemented and funded as part of the Boeckman Road Corridor Project), it was acknowledged that the future flow assumptions established here should apply to CPs developed as part of this SMP. This section documents the analysis for application to the SMP.

6.1 Background

The 2012 SMP developed CPs with a future flow condition that assumed each contributing subbasin would be fully built out to its zoning coverage. Future condition hydrology was developed from this future land use condition to size applicable stormwater infrastructure (i.e., pipes, culverts, ponds, etc.).

Since adoption of the 2012 SMP, the City revised their Stormwater and Surface Water Design and Construction Standards (2015). As part of this revision, developers are required to maintain pre-development runoff characteristics to minimize the effects of sediment transport and erosion, as described in Section 301.1.05 below:

> Stormwater management facilities shall be designed to maximize groundwater recharge through the process of infiltration of runoff into vegetated facilities and the use of what is referred to as Low Impact Development (LID) facilities and/or flow controls to address hydromodification.
>
> *Section 301.1.05, Wilsonville Stormwater and Surface Water Design and Construction Standards, 2015*

Compliance with this requirement provides a level of flow control for new development that was not accounted for in the 2012 SMP methodology for estimating future flows. If the same methodology is used, there is a potential to oversize CPs, as any upstream flow mitigation provided by LID facilities may reduce the peak flow to be managed by the constructed CP. The objective of this analysis was to evaluate whether implementation of onsite LID facilities should adjust the future flow methodology for CP development.

6.2 LID Facilities Modeling Approach

Evaluating the direct impact of future LID facilities associated with future development using the InfoSWMM H/H model is inherently difficult as the configuration and location of these facilities is unknown. InfoSWMM is capable of modeling specific LID facilities through its hydraulic module, but requires several known inputs such as invert elevations, depth/storage curves, outlet structure geometry, and specific locations within the drainage system to accurately retain and route flow.

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Due to the absence of this information, the impact of future LID facilities was estimated through InfoSWMM's hydrologic module, specifically by adjusting the Sub-Area routing feature. The Sub-Area routing default within InfoSWMM routes all impervious and pervious area associated with a subbasin directly to the outlet (outlet routing). An optional configuration called percent routing, allows for a percentage of the impervious area within a subbasin to be routed over the pervious area within a subbasin prior to reaching the outlet. This is illustrated in Figure 4, originally published in the EPA Storm Water Management Model Reference Manual Volume I, Hydrology.

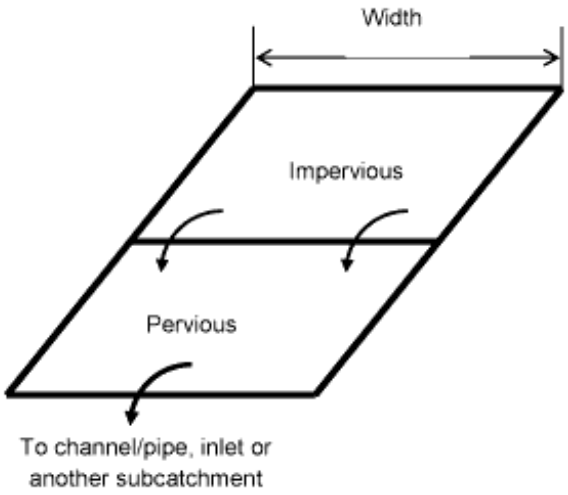

Figure 4. Percent routing diagram

Use of this percent routing feature within InfoSWMM is a simple routing mechanism. Available literature on this routing feature reflects its usage to approximate impacts of LID facilities within a subbasin, as it slows the timing of peak flow and allows for flow attenuation and additional infiltration.

The percent routed can range from 0 percent (direct outlet routing) to 100 percent (all runoff from impervious area routed to pervious area). To assess the sensitivity of the percent routing option on peak flows within the model, three different future alternative scenarios were simulated in addition to the traditional outlet routing model:

- PERV=75 percent
  - Routes 75 percent of impervious area over pervious area (less conservative)
- PERV=50 percent
  - Routes 50 percent of impervious area over pervious area
- PERV=25 percent
  - Routes 25 percent of impervious area over pervious area (more conservative)
- Outlet Routing
  - Impervious area and pervious area are routed directly to outlet (most conservative)

6.3 Results

The different future alternative scenarios were simulated for several design storms to assess relative impact on peak flows specific to the location of the Meridian Creek culvert replacement project. Results for the 10-yr design storm and the 100-yr design storm (culvert design standard) are shown below on Figures 5 and 6, respectively.

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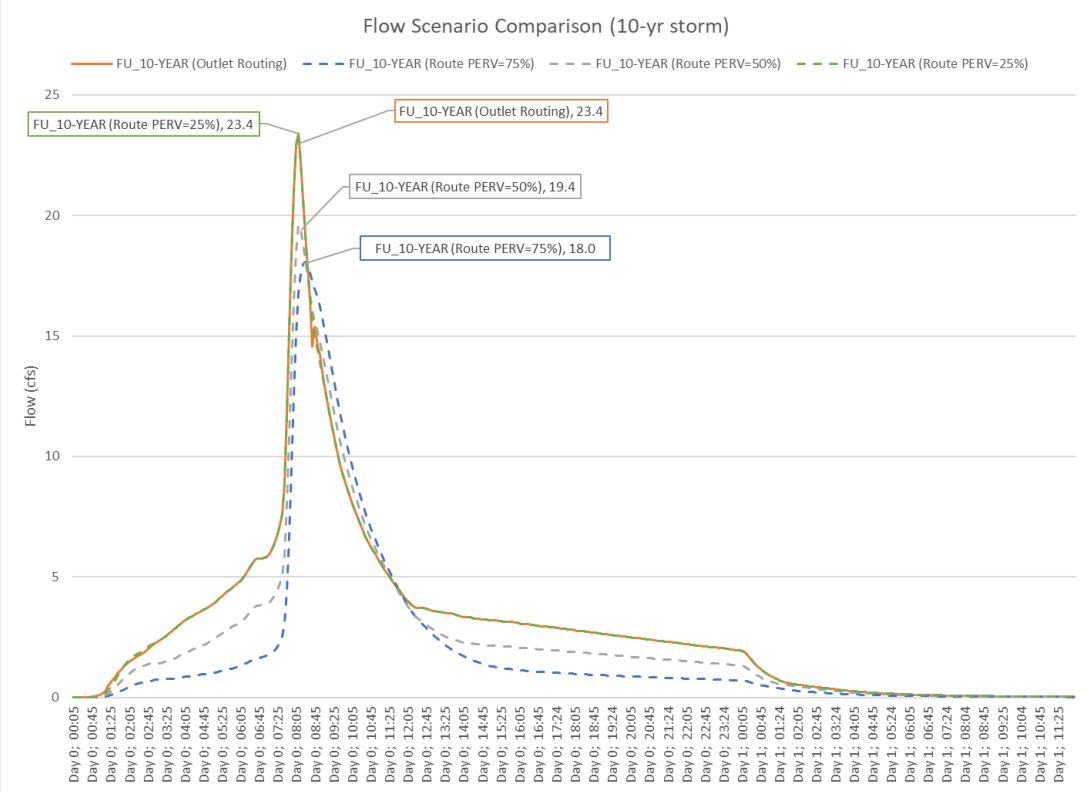

Figure 5. Meridian creek culvert–10-yr design storm

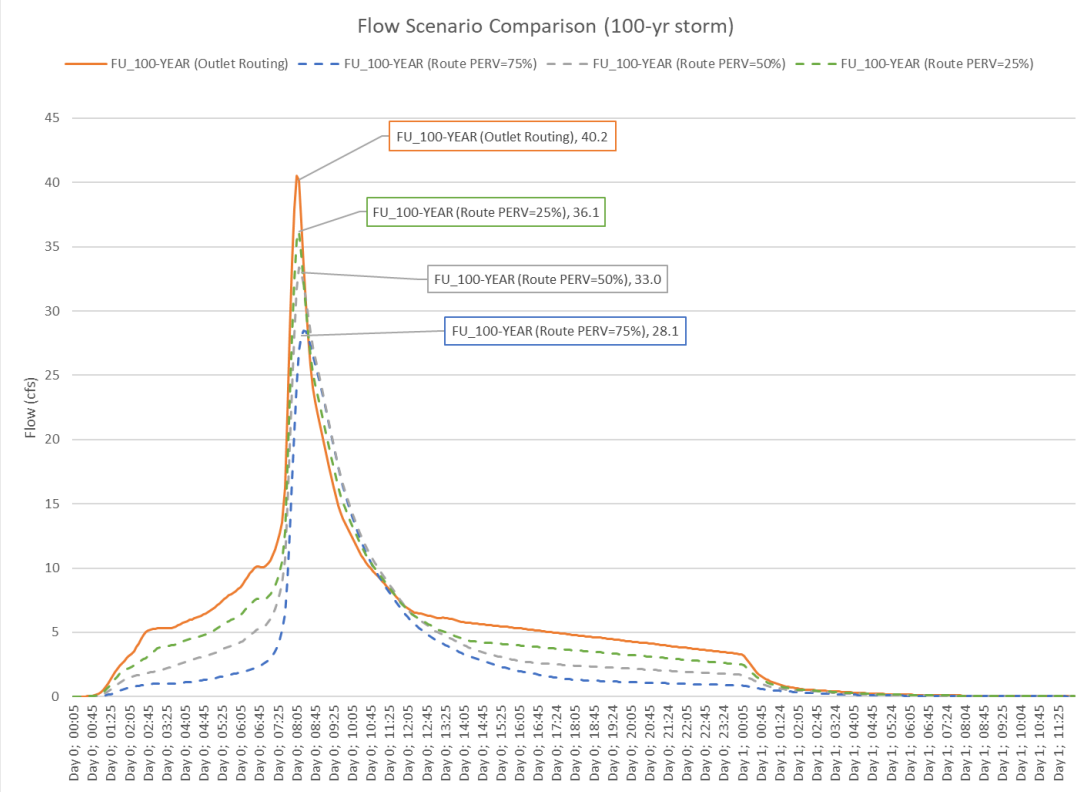

Figure 6. Meridian creek culvert–100-yr design storm

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Based on these sensitivity model runs, the following conclusions regarding peak flow percent routing were reached:

- Increasing percent routing for a subbasin reduces anticipated peak flows.
- Percent routing has a greater impact on anticipated peak flows for larger design storms (i.e., 100-yr design storm)
- Percent routing has a greater impact on subbasins with lower impervious percentages (undeveloped/vacant lands).
- For smaller design storms (i.e., 10-yr design storm) the anticipated peak flow difference between outlet routing and PERV=25 percent is insignificant.

Based on these conclusions, and the desire to build some conservatism into the sizing for future CPs, it was decided jointly with the City to proceed with future condition modeling without subbasin percent routing. It was acknowledged that this approach may lead to the oversizing of some stormwater infrastructure; however, this would only be where the contributing drainage area is primarily undeveloped.

Section 7: H/H Model Evaluation and Results

Upon completion of the model validation effort (Section 5), detailed H/H model results were simulated for the 2-yr, 10-yr, 25-yr, and 100-yr design storm. H/H model inputs and results are summarized for the hydrologic and hydraulic models in Tables B-2 and B-3, of Attachment B, respectively. The following sections present the findings resulting from the model and how the model will inform CP development efforts.

7.1 Hydrologic Results

The hydrologic model results for all design storms show that future land use conditions (and associated increased imperviousness) result in increased peak flows compared to existing land use conditions. The increase in peak flows is most significant during the 2-year storm and gradually becomes less pronounced with larger storm events. Future land use conditions represent the development of developable (vacant) lands per their associated zoning category or adjusted zoning coverage for select, developed lands based on anticipated zoning in accordance with House Bill (HB) 2001.[1]

In general, most locations within the city limits are nearly fully developed; therefore, the increase in peak flow from these areas is expected to be relatively small. This is most evident in urbanized locations such as Charbonneau, Villebois, and along the I-5 corridor. Attachment A, Figure A-7 presents subbasins within the study area and their anticipated increase in peak flows (based on percentage) from existing to future land use conditions.

The largest anticipated increases in peak flow are primarily in the subbasins located outside of city limits, specifically within the upper reaches of the Coffee Lake Creek and Boeckman Creek watersheds. These locations are primarily undeveloped, but new development is pending and will increase the amount of impervious surface (runoff flow). As noted in Section 6, flow attenuation during new development is anticipated through implementation of the City's stormwater design standards, but for purposes of this SMP, CP sizing will be based on unmitigated flows.

Detailed hydrologic inputs and peak flow results for all subbasins and design storms are included in Attachment B, Table B-2.

[1] HB 2001 was passed by the 2019 Oregon State Legislature and requires Cities to allow for middle housing (e.g., duplexes) for properties zoned as single family residential.

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7.2 Hydraulic Results

Hydraulic model results identify flooding locations with the intent to develop CPs to increase conveyance capacity and resolve flooding. For purposes of this evaluation, and as referenced in Section 2.2, flooding within the model was defined as locations where the hydraulic grade line exceeded the node rim elevation. Node flooding is a direct output from the model that can be used to efficiently identify capacity issues throughout the hydraulic system. Since the City's conveyance standard is the 25-yr design storm, this storm event was used as the benchmark to identify potential issues.

To assist in prioritizing locations by flooding severity, the 2-yr and 10-yr design storm flooding locations were also identified as shown in Attachment A, Figures A-8 and A-9. Using results from the three design storms, flooding locations were discussed with the City and cross-referenced with the Problem Area Matrix (Table A-1 of TM#1) to confirm the need to develop a CP for inclusion in the SMP.

As described in Attachment B, Table B-1, there are a total of 17 locations that continue to experience flooding in the existing condition. Of these, three locations were identified as key flooding locations based on discussions with the City. These locations are considered high priority for purposes of CP development and may require alternatives analysis to ensure that City objectives and preferences will be achieved. Description of these key flooding locations is provided below.

7.2.1 Charbonneau

Flooding is predicted within the SW French Prairie Rd. area of the Charbonneau District during rainfall events starting at the 2-yr design storm. Deficiencies (capacity and condition) in stormwater infrastructure within Charbonneau were previously identified in the 2012 SMP and subsequent Charbonneau Consolidated Improvement Plan (2014). Since the completion of those studies, some of the recommended pipe improvements have been completed and as-builts or revised GIS is integrated into the updated hydraulic model (see Table 8).

As part of the model validation exercise (Section 6), this area was reviewed in detail to investigate predicted flooding in the model since model results should incorporate completed pipe upsizing projects. Discussions with City staff led to an in-depth review of the as-builts for an emergency outfall repair project adjacent to 31233 SW Edgewater Pl. completed in 2019. Review of the as-builts indicated that the damaged section of the 30-inch corrugated metal pipe (CMP) was removed and replaced with a lined 30-inch CMP. The outfall pipe was not upsized to 36-inches as recommended by the 2012 SMP due to limitations associated with the emergency repair. While the lining of the pipe increases flow (reduces pipe roughness), the H/H model still indicates this section of pipe is a bottleneck in the system resulting in an elevated hydraulic grade line upstream of the outfall as shown on Figure 7 below.

To address predicted flooding, CP development at this location will evaluate options to incorporate detention into the upstream (non-replaced) portions of the collection system, to reduce peak flows downstream. Since available space is limited within the area, concepts that utilize a limited footprint such as detention pipes will be explored.

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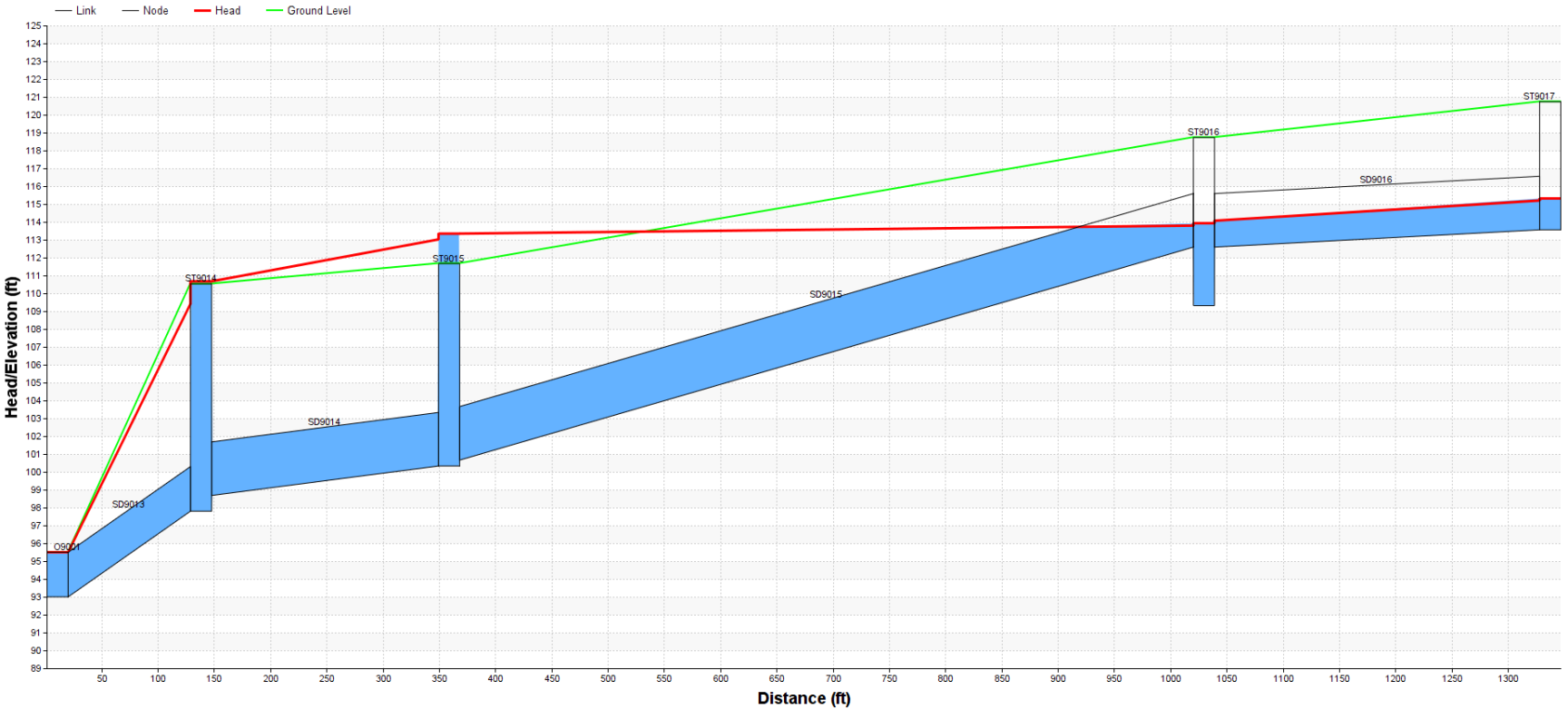

Figure 7. Charbonneau outfall–hydraulic grade line 25-yr design storm

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7.2.2 SW Garden Acres Rd./Peters Rd.

Starting at the 2-yr design storm, flooding is anticipated along the stormwater collection system running north to south along SW Garden Acres Rd. and Peters Rd. The modeled capacity issue at this location is caused by a constriction due to undersized pipes (24-inch/27-inch) prior to the system discharging to the Coffee Lake Creek wetlands as shown on Figure 8 below. The upstream drainage area to this piped system is expected to develop into a high impervious land use type (industrial) and as such currently contains large diameter conveyance pipes (42-inch/48-inch). Future development will further exacerbate the predicted flooding at this location. This location is a known issue for the City, and a CP will be developed at this location to address the capacity issues.

Early discussions with the City have identified potential issues to upsize the undersized pipe, due to the fact the alignment transects the railroad right-of-way and discharges to a greenspace property owned by Metro. To avoid railway and Metro conflicts, the City has suggested retrofit of existing (private and public) ponds along the pipe alignment near the terminus of Peters Road to provide additional flow mitigation (discussed further in Section 8.1). In addition, alternative alignments may also be considered to divert runoff from the identified pipe constriction near the existing outfall. One possibility that could avoid the railroad right-of-way and Metro property would be to install new piping along SW Clutter Rd. to the west and along Grahams Ferry Rd. to the south to outfall into Coffee Lake Creek wetlands. This concept is preliminary and will need to be investigated and tested further with the City once CPs start to be developed.

7.2.3 Commerce Circle and Day Road

Starting at the 2-year design storm, model results indicate that the open channel to the west of Commerce Circle continues to be a flooding problem area. Banks of the open channel and the existing impoundment adjacent to Day Road are expected to overtop during larger storm events. These model results are consistent with the modeling/CP development for the 2012 SMP, and the follow up study “Coffee Creek Stormwater Facility Study” completed by AKS in 2019.

This location has several deficiencies within the waterway such as undersized culverts, heavy buildup of vegetation/debris, and segments with negative grade. Historically, this location has been particularly difficult to address due to space constraints, limited available grade, and the original drainage design allowing for the adjacent parking lots to flood to provide detention. This SMP update will build upon previous preliminary design concepts to develop a refined option for implementation.

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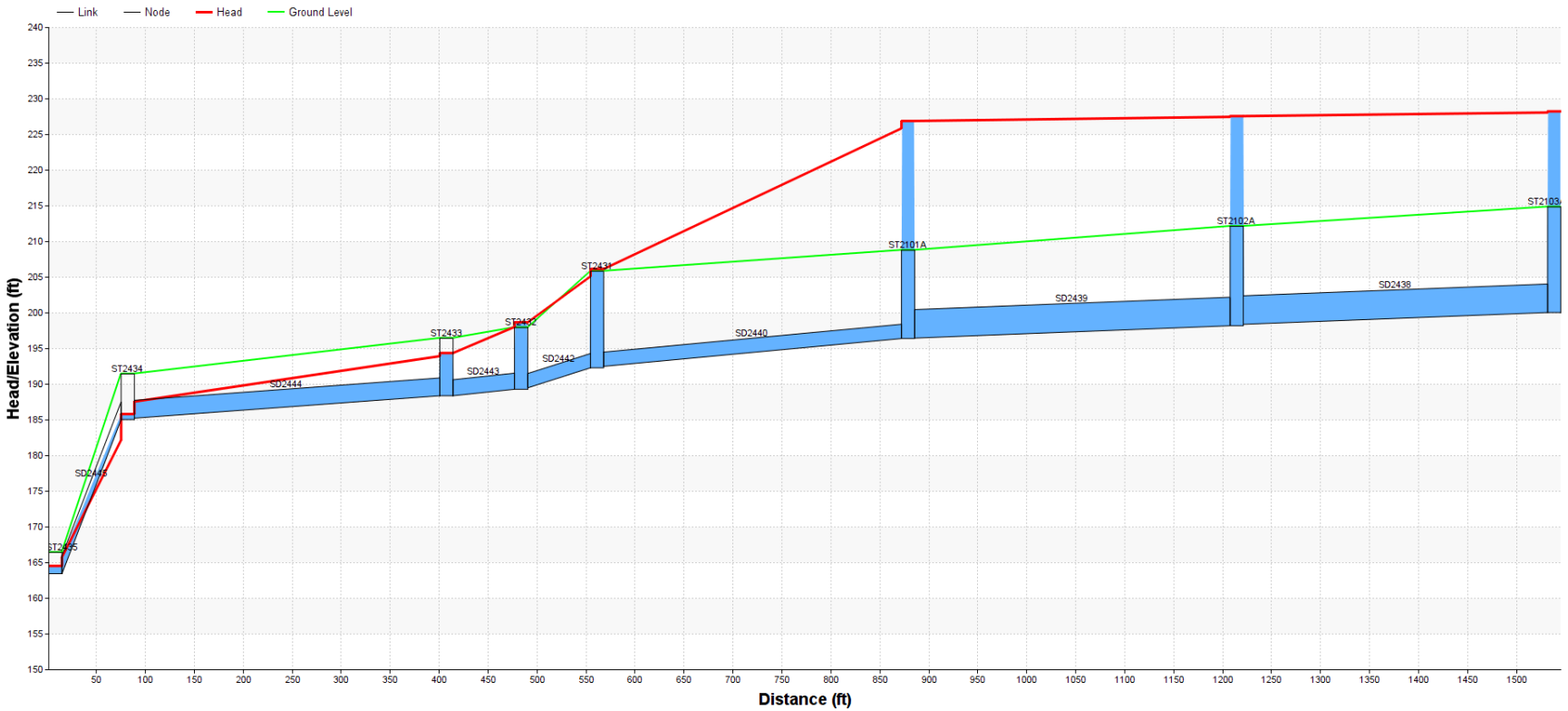

Figure 8. Peters Road–hydraulic grade line 25-yr design storm

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Section 8: Retrofit Analysis

In conjunction with the H/H modeling evaluation of the City's stormwater system, BC initiated efforts to investigate additional project opportunity locations where the addition of new water quality and/or detention facilities or the reconfiguration of such facilities can provide regulatory or development benefit within the City.

To assist in this analysis, a working map was developed to facilitate the identification of potential retrofit locations. Key elements displayed on this figure included potential property (classified as vacant, parks, open space, or City owned), ponds (public and private), water quality projects from the 2012 SMP, best management practice drainage areas, and future transportation corridors. This retrofit figure is included in Attachment A, Figure A-10.

Based on review of the retrofit analysis figure and City staff preferences, the following objectives (strategies) were developed to guide the retrofit analysis:

1. Revisit priority (higher scoring) retrofit projects previously identified in the 2015 Retrofit Assessment to confirm continued relevance. These projects generally align with water quality-related projects per the 2012 SMP. This effort supports requirements of the 2021 National Pollutant Discharge Elimination System municipal separate storm sewer permit, which requires permittees to revisit the 2015 Retrofit Assessment and provide a status update.
2. Integrate water quality and/or flow control into existing project opportunity areas (where possible).
3. Retrofit underutilized facilities such as ponds or swales to enhance water quality and/or provide downstream flow mitigation.

Identification of new facilities to support anticipated development and growth was not considered a preferred retrofit strategy, given the fact that private development already has to adhere to the City's prescriptive stormwater design standards. These strategies helped to inform the retrofit projects and program discussed below.

8.1 Potential Retrofit Project Locations

Retrofit project locations were organized into two primary categories: previously identified locations and new opportunity locations. Applicable and relevant project opportunities are discussed in the following subsections to document potential locations for future CP development.

8.1.1 Previously Identified Opportunities

The 2012 SMP originally identified 14 restoration and 7 LID projects. These projects were reassessed and prioritized as part of the 2015 Retrofit Assessment.

For this SMP update, these projects were revisited to confirm implementation status and continued applicability in conjunction with current retrofit objectives. To track these projects and document discussions with City staff, Table 11 below was produced.

In this table, eight projects were removed (see gray shading) from consideration either due to them already being completed or no longer being feasible. Most projects were deemed still applicable and thus have been retained for inclusion in the overall project opportunity list.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
LID3	SW Camelot Green Street Mid-block Curb Extension	No	Yes, 46	**16**	4	2	2	2	3	1	0	2	Reflect in Program
LID7	SW Wilsonville Road Stormwater Planters	No	No	**16**	4	2	2	2	3	1	0	2	Reflect in Program
CLC-10B	Coffee Creek Storm Projects	No	Yes	**16**	4	2	2	2	2	1	1	2	Not Applicable–reflects CLC-1. Project number is unique to the Retrofit Assessment source document.
BC-5	Boeckman Creek Outfall Realignment	No	No	**13**	2	0	0	3	3	2	1	2	Project involves realignment of an existing outfall into Boeckman Creek (330' N of Wilsonville Rd) that is causing erosion. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with a Boeckman Road mitigation need (Creekside Woods Pond). Not considered a retrofit but keep as a Project Opportunity Area.
CLC-6	Coffee Lake Creek South Tributary Wetland Enlargement	No	No	**13**	2	2	3	2	0	3	0	1	Referenced as a long-term project need from source document of retrofit assessment. Project location overlaps with Siemens/Ash Meadows. Current METRO project may also negate the project need. Remove from Project Opportunity List.
BC-4	Gesellschaft Water Well Channel Restoration	No	No	**13**	2	0	1	3	2	1	1	3	Project may be constructed in conjunction with other infrastructure projects (Interceptor Trail). Not considered a retrofit but keep as a Project Opportunity Area.
LID2	SW Hillman Green Street Stormwater Curb Extension	No	No	**13**	4	3	2	2	0	1	0	1	Reflect in Program
BC-8	Canyon Creeks Estate Pipe Removal	No	Yes, 37	**12**	2	0	1	3	0	2	1	3	Short term/High priority CIP need per source document from retrofit assessment. Maintain as a retrofit project and keep as a Project Opportunity Area (combined with problem area).
CLC-3	Commerce Circle Channel Restoration	No	Yes, 15/32	**12**	0	0	3	1	3	2	1	2	Mid-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
WD-4A	Willamette Way West Outfall Replacement	No	No	**11**	2	0	0	3	0	2	1	3	Project location is being monitored. No immediate project need. Remove as a Retrofit project and Project Opportunity Area.
WD-4B	Belknap Ct Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
WD-4C	Morey Ct West Outfall Protection	**Yes**	No	**11**	2	0	0	3	0	2	1	3	Complete. Remove from list.
BC-2	Boeckman Creek Outfall Rehabilitation	No	No	**9**	0	0	0	1	3	2	1	2	Project involves rehab of 5 existing outfalls between Wilsonville Rd and Boeckman Rd that have erosion issues. Erosion issues not identified in 2021 stream assessment. Mid-term project need from source document of retrofit assessment. Project location may overlap with other infrastructure projects. Not considered a retrofit but keep as a Project Opportunity Area.
BC-10	Memorial Park Stream and Wetland Enhancement	No	No	**9**	0	0	3	0	2	2	0	2	BC-10 enhances the existing stream channel that flows into Boeckman Creek to the N of Memorial Park baseball field (near sanitary lift station). This stream receives flow from the Memorial Drive Swales which are just upstream (Problem Area #52 & BC-9). Mid-term project need from source document of retrofit assessment. Project location overlaps with potential Boeckman Road flow mitigation site. Keep as a retrofit project and Project Opportunity Area.

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Table 11. 2015 Retrofit Assessment Review and Status Confirmation

Project ID[a]	Project Name	Constructed?	Overlaps with Existing Problem Area	Overall Score [a]	Scoring criteria (per 2015 Retrofit Assessment)							Implementation Timeframe	Notes
					Progress Toward TMDL WLA	Location	Temperature Control	Erosion Control	Integration	Impact Area	Funding Source		
					0–4	0–3	0–3	0–3	0–3	1–3	0/1	1–3	
CLC-1	Detention/Wetland Facility Near Tributary to Basalt Creek	No	Yes, 15/32	**8**	2	1	0	2	0	1	1	1	Referenced as a long-term project need from source document of retrofit assessment but aligns with problem area. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-2	SW Parkway Avenue Stream Restoration	No	No	**8**	0	0	3	1	0	2	0	2	Project is no longer needed, given onsite improvements for capacity (La Quinta). Remove from retrofit assessment.
CLC-7	Coffee Lake Creek South Tributary Stream Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed as this location conflicts with proposed new Public Works building. Current METRO project may also negate the project need.
CLC-8	Coffee Lake Creek Restoration	No	No	**8**	0	0	3	1	0	3	0	1	Project is no longer needed. This location is associated with 5th and Kinsman Project–Road isn't going to come out so project no longer applicable. Also at the driveway for Wilsonville Concrete.
CLC-5	Coffee Lake Creek Stream and Riparian Enhancement	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).
CLC-4	Ridder Road Wetland Restoration	No	No	**7**	0	0	3	1	0	2	0	1	Referenced as a long-term project need from source document of retrofit assessment. Maintain as a retrofit project and Project Opportunity Area (combined with problem area).

a. *Overall score is based on a maximum 23 points possible.*

TMDL = total maximum daily load

WLA = waste load allocation

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8.1.2 New Opportunities

In addition to the projects previously identified in the 2015 Retrofit Assessment, this SMP update identified several opportunities to integrate water quality and/or flow control into an existing project opportunity or retrofit an existing, underutilized facility. These opportunities and their preliminary retrofit concept are summarized in Table 12.

Table 12. New Retrofit Opportunities

Location	Retrofit Strategy	Retrofit Concept
Library Pond	Existing Project Opportunity	Install outlet structure to existing pond to provide flow control benefits. Drainage from Town Center is conveyed through this facility. Opportunity to implement a fee-and-lieu system for upstream redevelopment.
Tivoli and Oulanka Parks	Underutilized Facility	Combination of public and private swales at these locations. Swales have not been properly maintained and need retrofit.
Oregon Glass Pond	Underutilized Facility	Ponds near the outfall of the Ridder Rd./Peters Rd. piped stormwater system may be able to be reconfigured to provide a flow control benefit. Opportunity to help to mitigate the pipe capacity issues at this location.
Memorial Park Dr. Swales	Existing Project Opportunity and Underutilized Facility	Existing swale is not draining properly. Swale needs retrofit.
Canyon Creek Park	Existing Project Opportunity	Existing park property has potential to construct a regional facility. This facility could treat upstream runoff from Argyle Square, Sysco, and other future developments. Due to location within BPA easement, additional coordination would be required.

While these are the opportunities identified to date, additional opportunities may be identified in the future especially with the current design efforts associated with the BRCP. As part of the BRCP, mitigation opportunities associated with Boeckman Creek are currently being identified and evaluated for future project development. Any projects that result from the BRCP will be coordinated with projects developed as part of the SMP update. At this time, preferred mitigation opportunity locations have also been integrated into the larger project opportunity list for this SMP.

8.2 Potential Programs

To allow for the opportunistic integration of water quality in conjunction with transportation or other utility replacement projects, this retrofit assessment identified two potential programs that would provide a general funding mechanism to support retrofit strategies. These programs include the following:

- Green Street/LID Facilities–Allocate approximately $250,000/year to support green street and LID facility installations of facilities in conjunction with already planned utility work for select roadway improvements. This would allow for continued expansion of water quality treatment areas in areas without any existing treatment.
- Porous Pavement Pilot Study–Allocate approximately $25,000/year to install porous pavement overlays in conjunction with scheduled pavement replacement or restoration efforts. This would allow the City to begin to evaluate feasibility of adopting porous pavement for future paving projects in the City.

These programs will be considered in conjunction with other CP planning. Additional program opportunities have previously been identified as outlined in TM#1.

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Section 9: Conclusions and Next Steps

Project identification and preliminary project concepts stemming from the H/H modeling (Section 7) and retrofit assessment (Section 8), as documented in this TM, have been integrated into a Project Opportunity Matrix (Attachment B, Table B-4). The Project Opportunity Matrix expands the Problem Area Matrix that was originally included as Table A-1 in TM#1. The Project Opportunity Matrix provides a comprehensive summary of project needs in the City and will be used to facilitate City discussions and identify preferred locations to develop CPs for the SMP update.

Following City review of this TM, BC will start evaluating priority flooding locations (see Attachment B, Table B-4) to assess alternatives and feasibility of preferred project concepts. Subsequent evaluation efforts will focus on other priority locations, as confirmed through the Capital Project Workshop (scheduled for February/March 2023). Refined project concepts and cost estimates will be developed for select (approximately 15) project opportunity locations, and results documented in the SMP in graphical and tabular format.

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Attachment A: Figures

Figure A-1: Subbasin Delineation
Figure A-2: Soils and Topography
Figure A-3: Existing Land Use Condition
Figure A-4: Future Land Use Condition
Figure A-5: Hydraulic Model Overview
Figure A-6: Preliminary Flooding Results (25-yr design storm)
Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %
Figure A-8: Hydraulic Results: Existing Condition Flooding Locations
Figure A-9: Hydraulic Results: Future Condition Flooding Locations
Figure A-10: Retrofit Analysis

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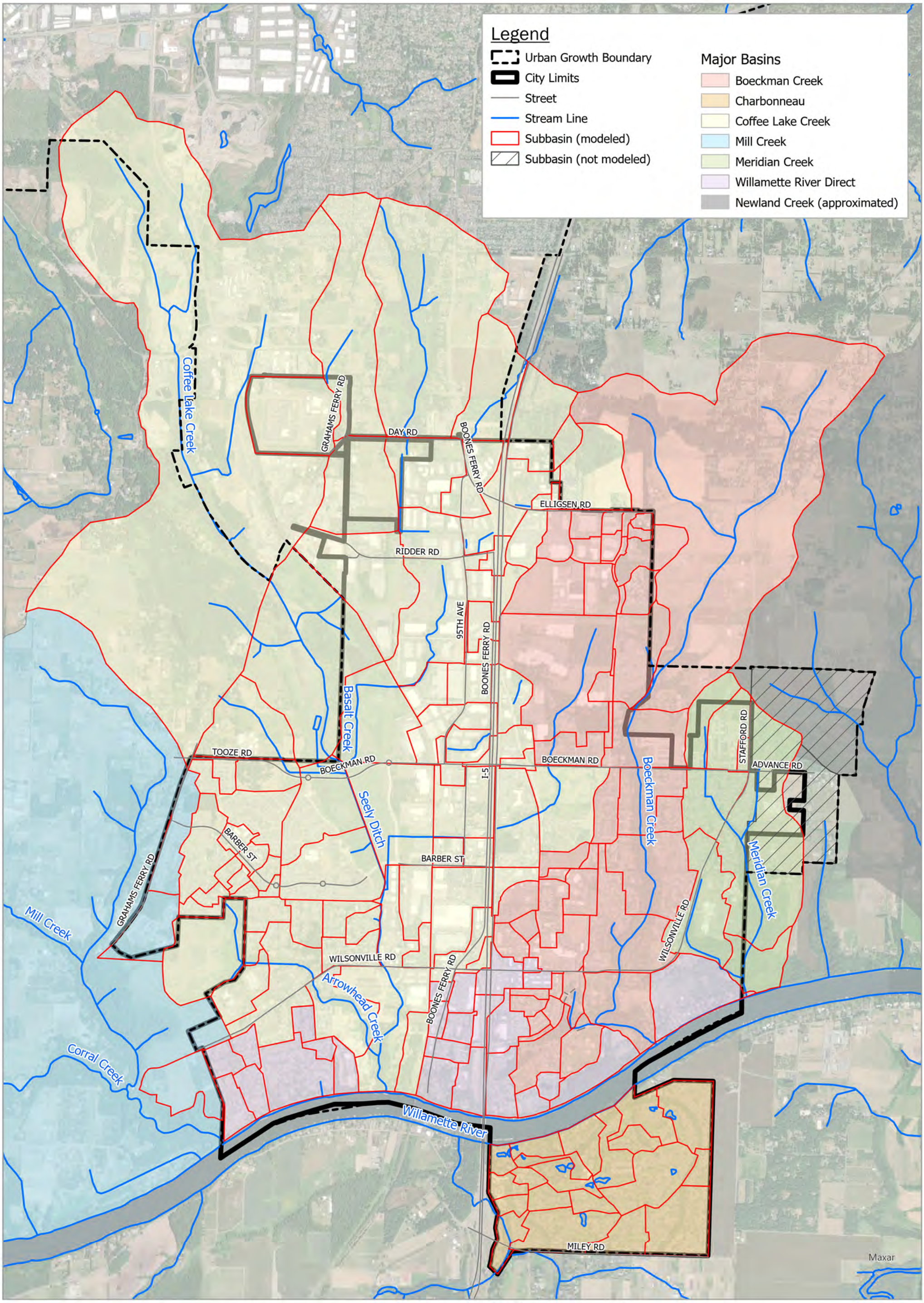

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Project # 156157

Stormwater Master Plan

Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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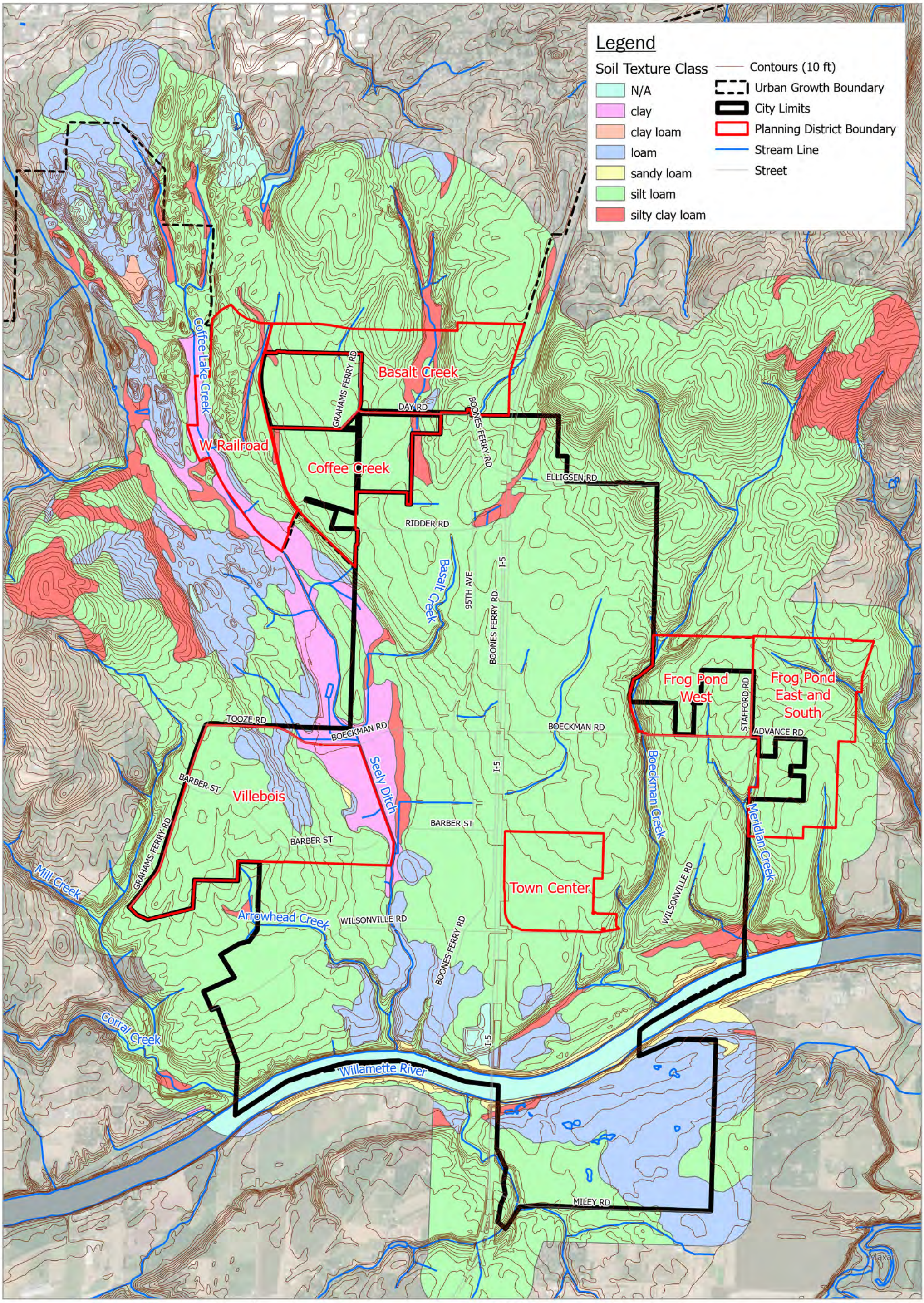
Feet

Date: 3/3/2023

Figure A-1: Subbasin Delineation



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Notes:

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Checked By:

Spatial Reference:
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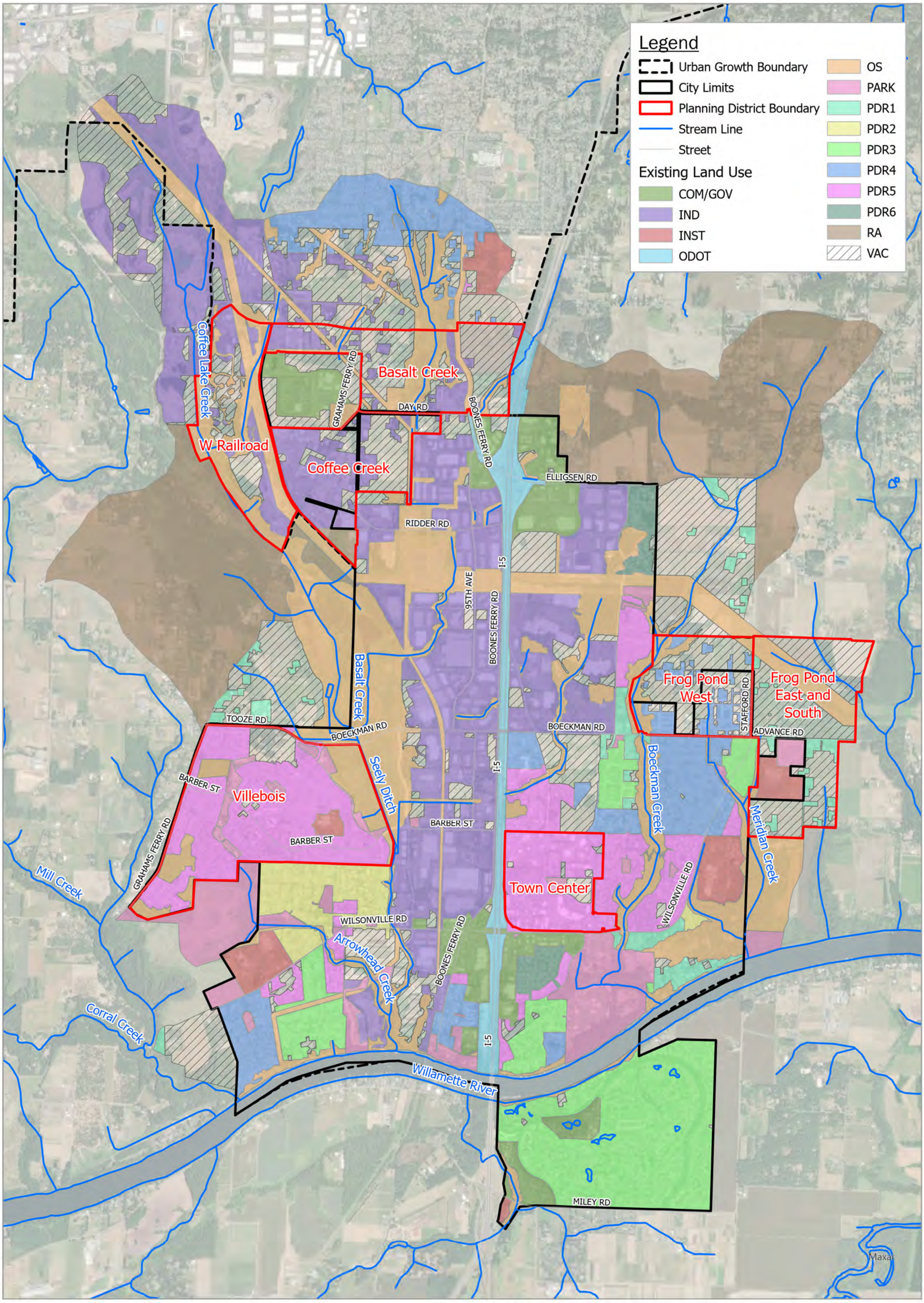
Feet

Date: 3/7/2023

Figure A-2: Soils and Topography



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Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
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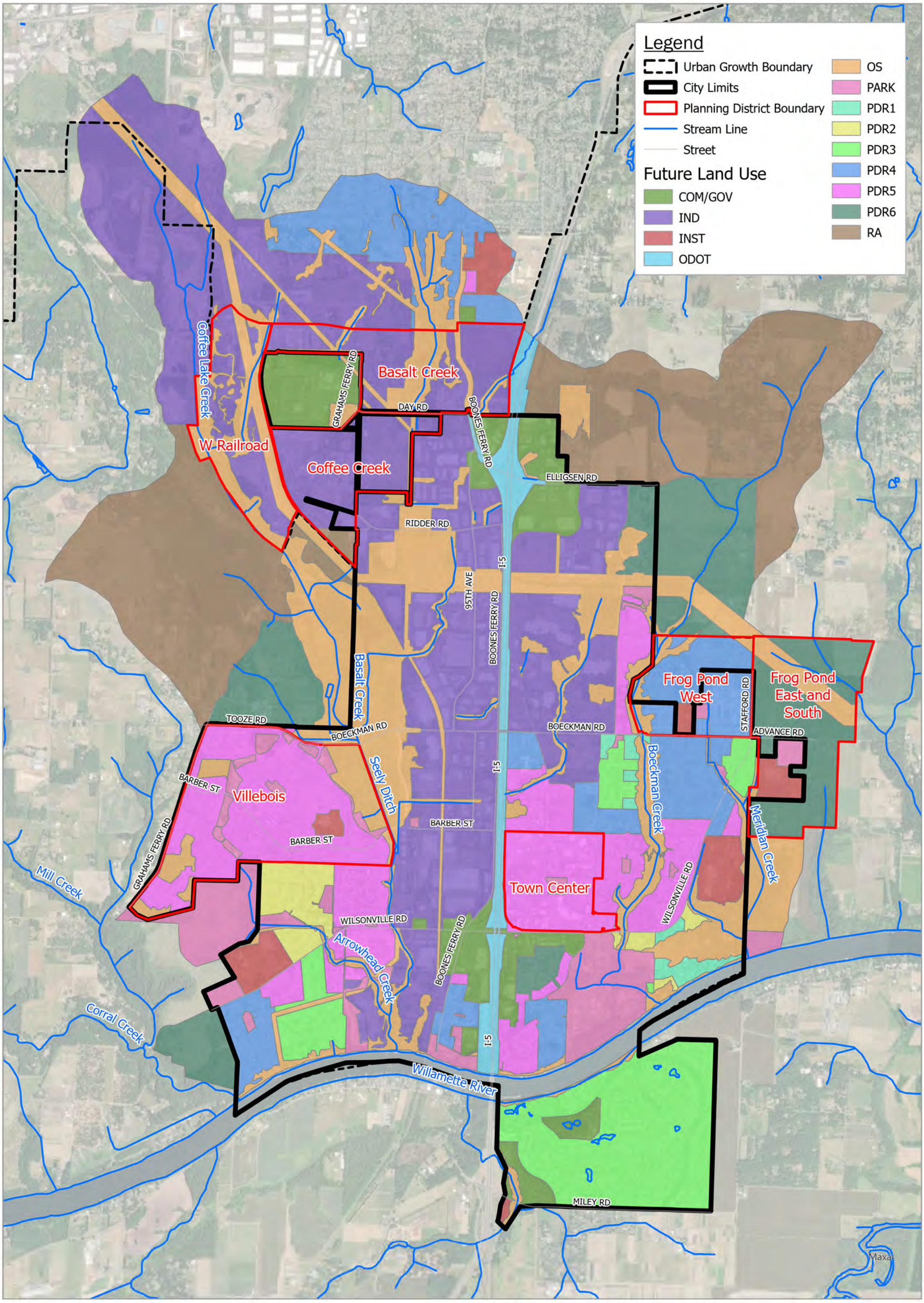
0 1,250 2,500 5,000
Feet

Date: 3/7/2023

Figure A-3: Existing Land Use Condition



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Notes:

Drawn By: SWG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,250 2,500 5,000
Feet

Date: 3/7/2023

Figure A-4: Future Land Use Condition

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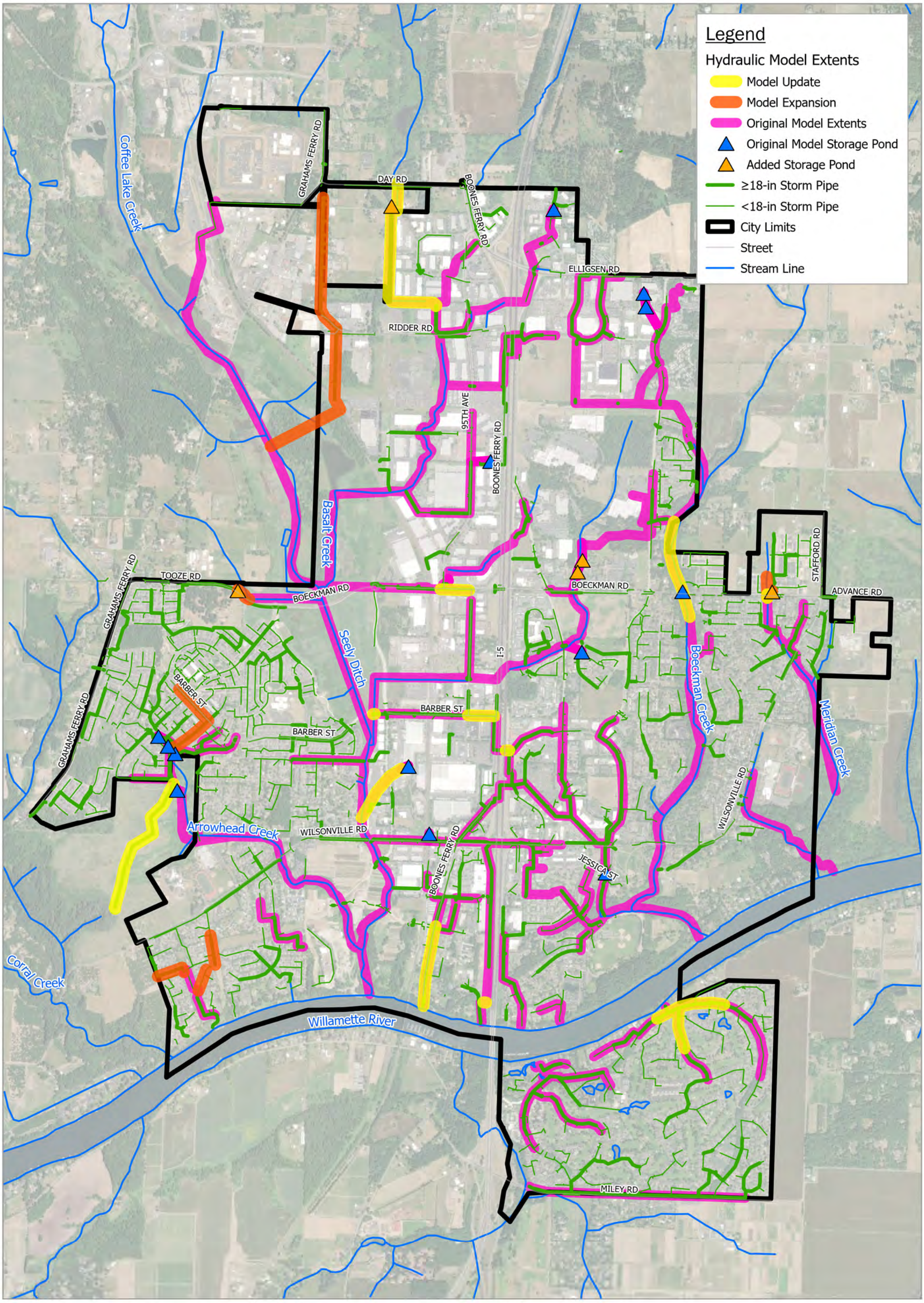

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Notes:

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Checked By:

Spatial Reference:
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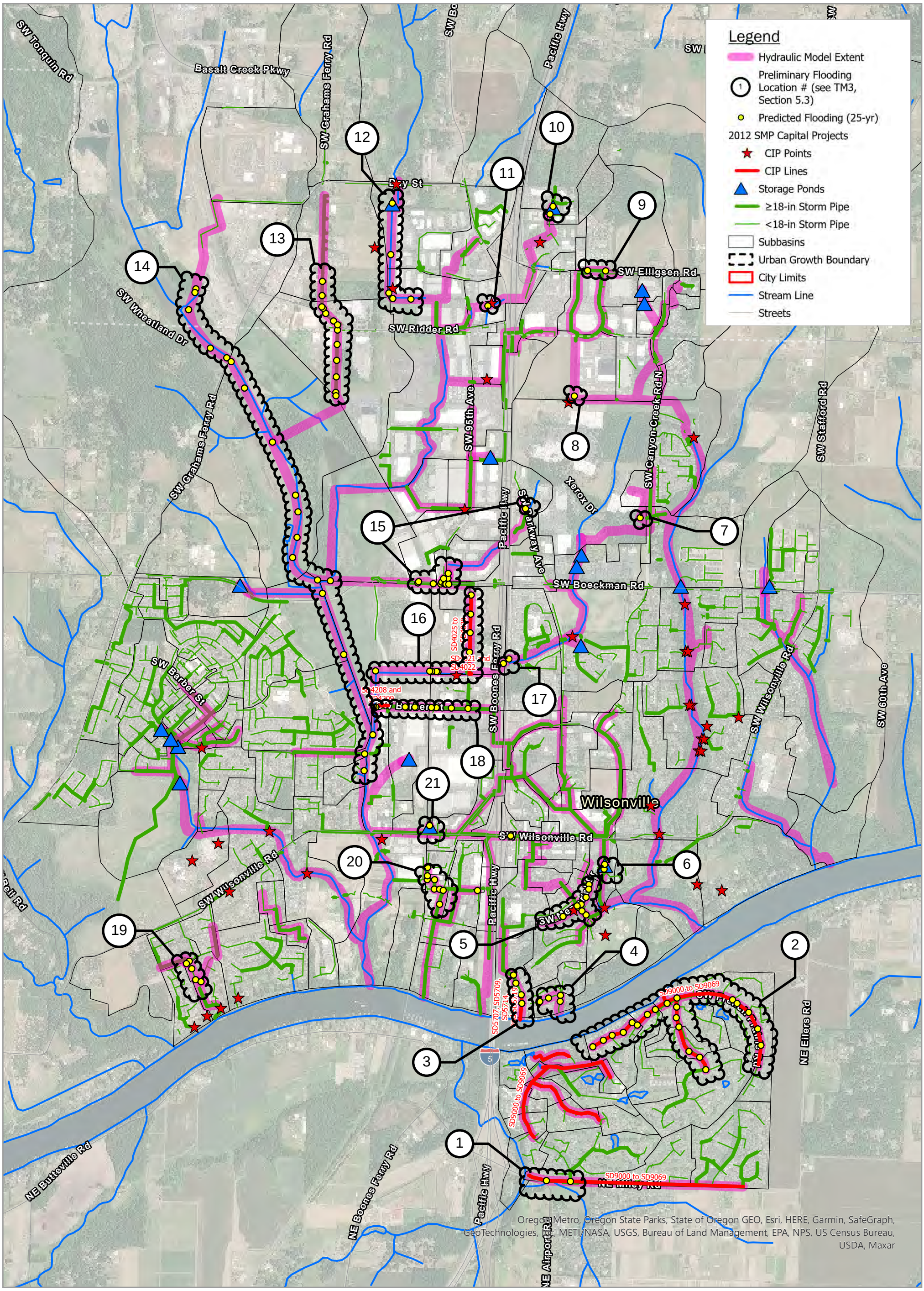
0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-5. Hydraulic Model Overview



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Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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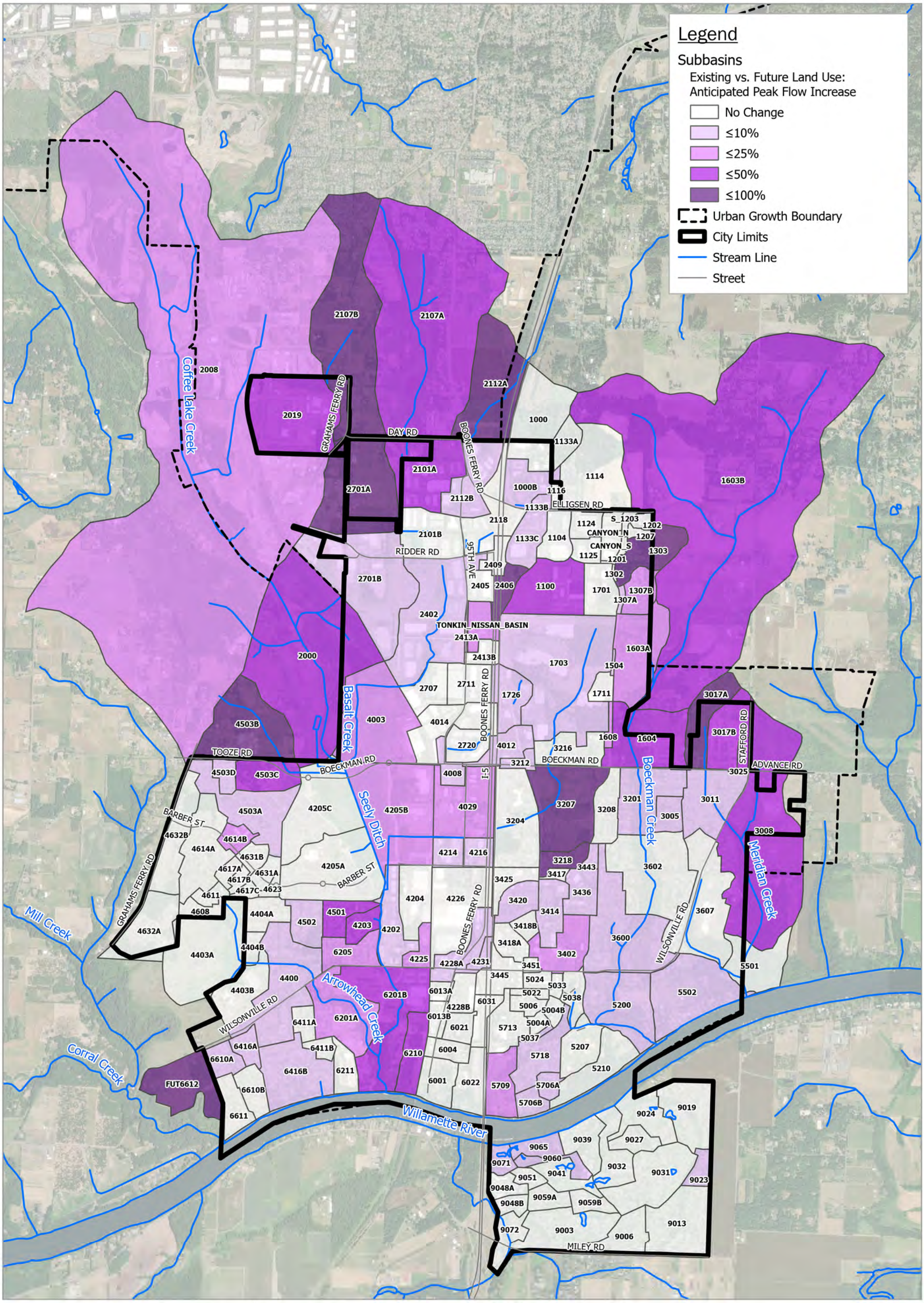
0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-6: Preliminary Flooding Results (25-yr design storm)



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Checked By:

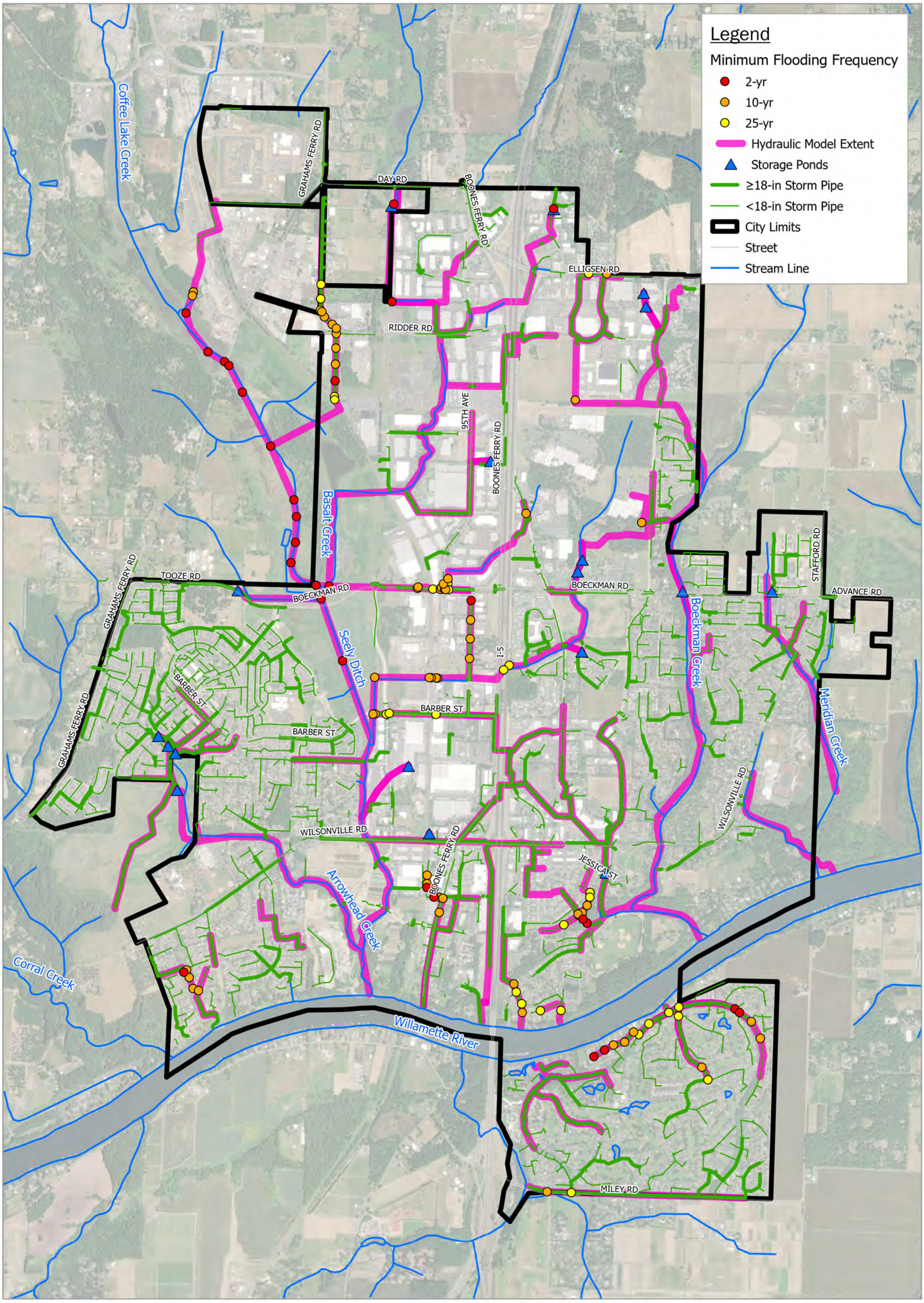
Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,250 2,500 5,000
Feet

Date: 3/7/2023

Figure A-7: Hydrologic Results: Subbasin Peak Flow Increase %



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Notes:

Drawn By: MRG
Checked By:

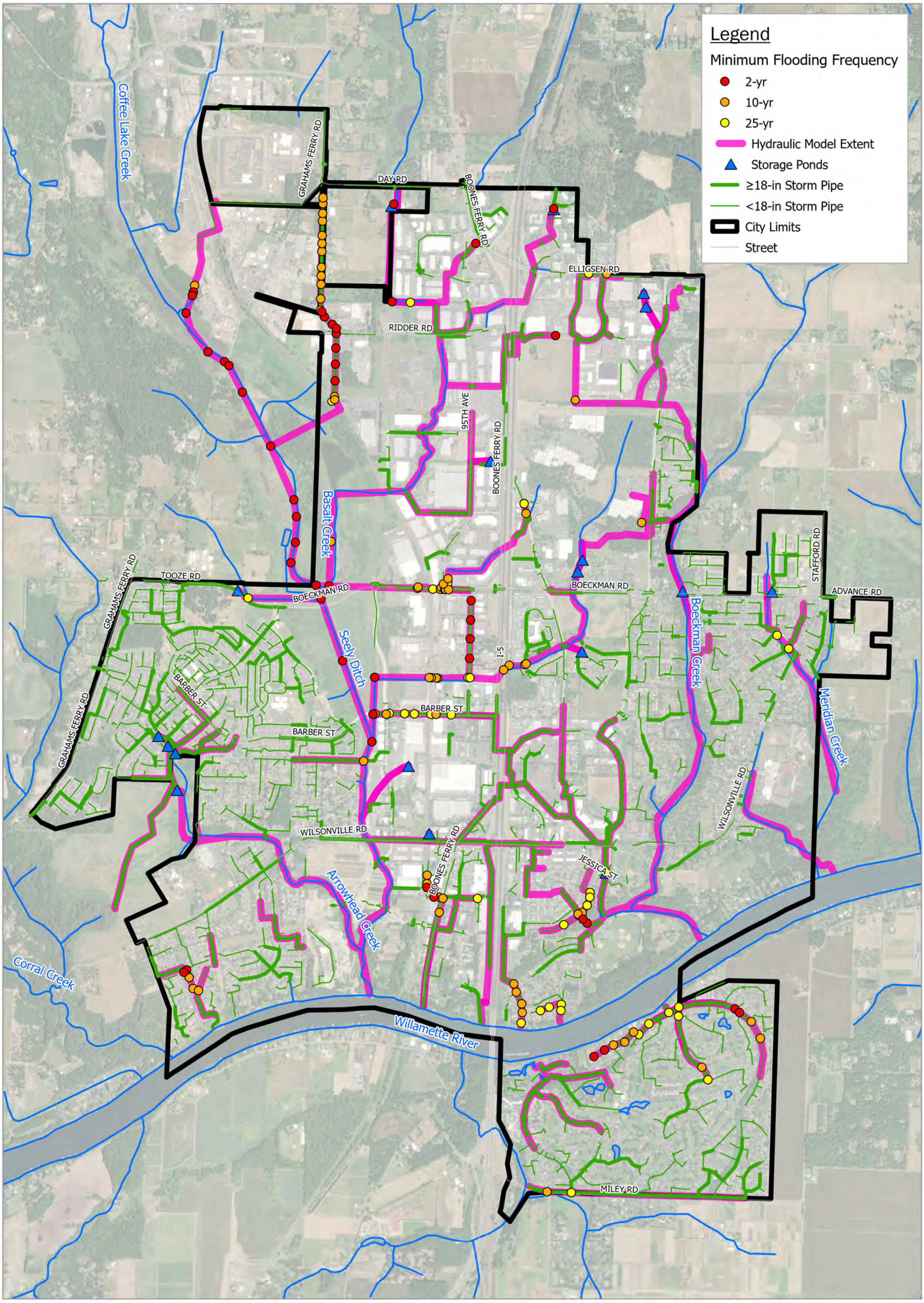
Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-8. Hydraulic Results: Existing Condition Flooding Locations



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Notes:

Drawn By: MRG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

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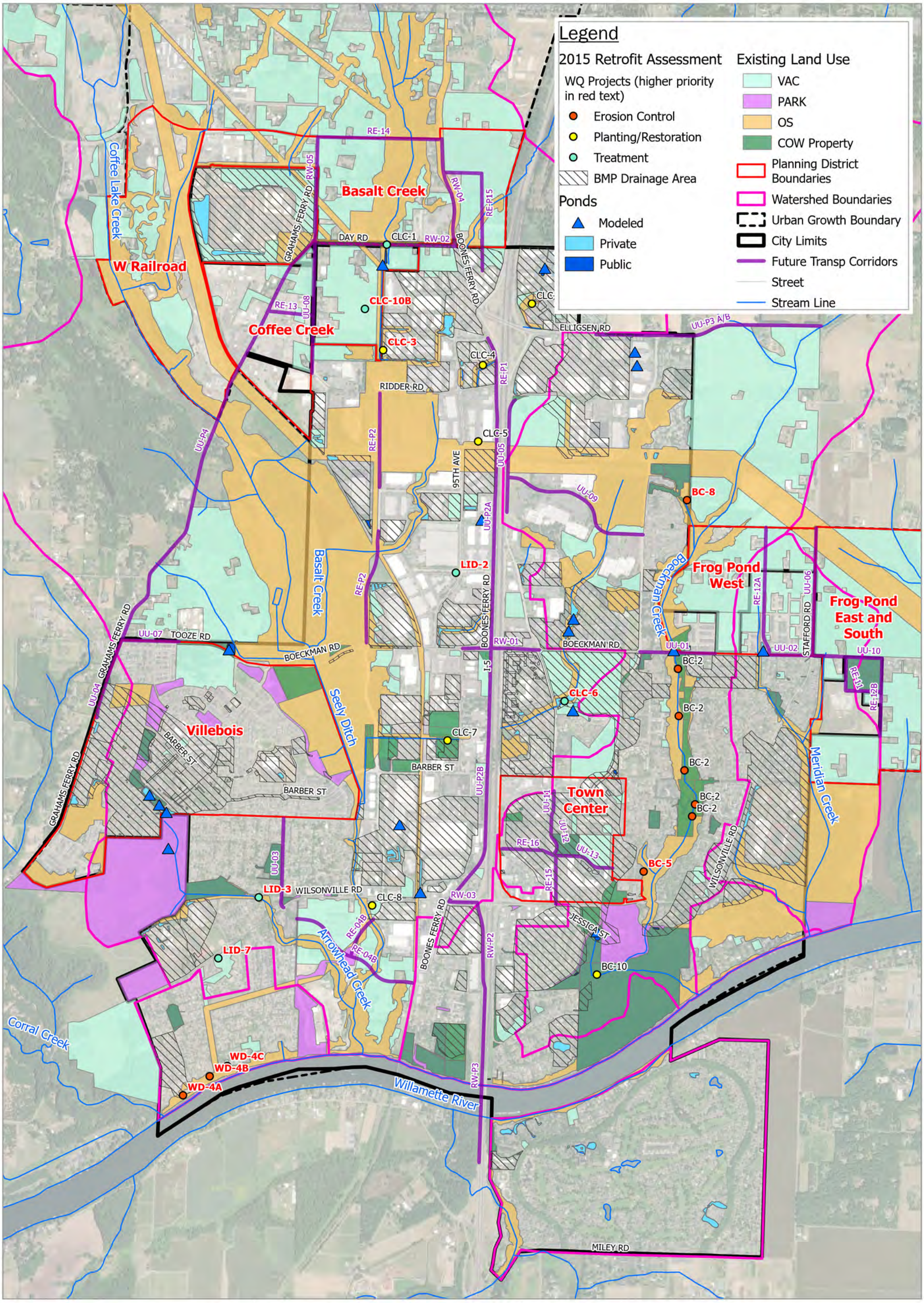
0 1,000 2,000 4,000
Feet

Date: 3/7/2023

Figure A-9. Hydraulic Results: Future Condition Flooding Locations



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Stormwater Master Plan

Date: 3/7/2023

Figure A-10. Retrofit Analysis

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Attachment B: Tables

Table B-1: Preliminary Flooding Results

Table B-2: Hydrologic Model Inputs and Results

Table B-3: Hydraulic Model Inputs and Results

Table B-4: Working Project Opportunity Matrix *(removed for the 2024 SMP deliverable, instead refer to Appendix A, Table A-2 of the SMP for the final Project Opportunity Matrix)*

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Table B-1. Modeled Capacity Deficiencies												
Flooding Location ID	**Watershed**	**Location**	**Model Description/ Preliminary Flooding Results**	**Minimum Flooding Frequency (up to 25-yr design storm)**	**Modeling Notes**	**Model Adjustments per Validation**	**Associated Problem Area from TM#1 (2022)**	**Flooding predicted in 2012 SMP?**	**Associated CIP from 2012 SMP?**	**CIP from 2012 SMP Constructed? (Y/N)**	**Flooding Predicted following Model Validation?**	**Project Need per 2022 SMP**	**Notes**
1	Charbonneau	Miley Rd.	Predicted flooding at 42" pipe segment upstream of Miley Rd. outfall.	10-yr	Rim elevations and inverts along pipe profile appears reasonable and match GIS data. No apparent issues.	None	10 (E&S)	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	N	Y	Y	City confirmed project need at this location for inclusion in the SMP.
2	Charbonneau	French Prairie Rd. & Old Farm Rd.	Flooding indicated throughout these piped systems. Model contains some pipe replacement projects completed as CIPs from the Charbonneau Consolidated Improvement Plan (2014). Small portion of all improvements recommended per the plan.	2-yr	Issues previously identified/documented in 2012 SMP and Charbonneau Consolidated Improvement Plan. Capacity issue appears to be the outfall piping (30") acting as a constriction to the upstream piping that was upsized (36") as part of the CIP.	Model previously was updated to reflect the completed CIPs. Asbuilts of the emergency outfall repair were provided and reviewed by BC. Confirmed model assumption of 30" diameter of outfall. Updated model to include revised pipe slope and Manning's roughness for installation of CMP liner based on provided asbuilt information.	None	Y	SD9000 to SD9069 (Charbonneau Pipe Replacement)	Y (select phases completed)	Y	Y	Wallis Engineering is currently working on the design of pipe upsizing along SW French Prairie and SW Edgewater. City coordinated meeting between BC and Wallis with the goal to have the capacity deficiency identified by the SMP modeling effort (outfall pipe constriction) inform current design project. based on the capacity deficiency identified by the SMP modeling effort. This work is in progress and strategies are being discussed to provide flow detention to mitigate the model predicted flooding.
3	Willamette River	Parkway Ave./Metolius Ln.	Flooding at several nodes along N-S run of pipe. Constriction appears to be the small diameter pipe at the outfall and one conduit US.	10-yr	Invert elevations in MH prior to outfall are misaligned. Pipe sequence is 48">42">21">15" causing constriction. No GIS data available to verify the existing model data. Issue previously identified in previous MP.	None. Inverts and diameters appear odd but better information is not available in GIS to resolve. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	SD5707, SD5709, SD5714, and SD5719 (SW Parkway Pipes Replacement)	N	Y	?	
4	Willamette River	SW Miami	15" conveyance pipe with US node preliminary flooding results.	25-yr	Subbasin hydrology is inserted at most US node of each pipe segment to generate flow w/in all pipes. May not be fully representative of runoff received by US nodes in reality. There also is a pond that is not currently being modeled which may alleviate flooding to the system.	Original subbasin subdivided to try and address the suspected hyrdrology input issue. However flooding still predicted at this location.	None	N. However the drainage area to this location was revised from the original model.	None	N	Y	N	City does not recall issues at this location. Maintain this location as a flooding location however development of a project is not warranted.
5	Boeckman	Memorial Dr.	Piped system near Memorial Dr. swale predicts flooding.	2-yr	After convergence point at Memorial Dr. (ST5002) pipe sizes are 24">15">12">18">24" prior to outfall to Boeckman Creek causing the constriction and US flooding.	Asbuilts of the swale and piped system were provided and reviewed by BC. Asbuilts confirmed the model configuration, no adjustments required.	52 (swale issues)	Y	BC-9 (Memorial Drive Pathway and Storm Drain Repair)	Y	Y	Y	Based on confirmed pipe configuration and known issues at this location, project at this location is needed.
6	Boeckman	Library Pond	Preliminary Library Pond flooding, Depth >9' (pond max depth). and node DS of Library Pond outlet shows flooding	N/A	Unknown how previous model build accounted for amount of library pond storage or developed the outlet curve for flow leaving the pond. From site visit, outlet should just be a pipe w grate. Seems unlikely that pond would flood based on configuration.	Model updated per asbuilts to reflect pond outlet configuration	4 (CAP)	Y	None	N	N	Y	Project to be developed at this location to provide a flow control benefit for pond storage. Project need is primarily based on providing flow control for Town Center redevelopment and not for capacity (no issues observed by City).
7	Boeckman	Canyon Creek Rd (near Xerox)	Flooding at node that convey private SW (Xerox) to the S and then E across Canyon Creek Rd.	10-yr	Pipe sequence is 15">18">15">12">12" causing constriction at Canyon Creek Rd. Final 12" pipe is at 5%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	None	Y	None		Y	N	City confirmed pipe configuration per as-built drawings. City does not recall this location as an issue and unlikely to be a project need.
8	Boeckman	Sysco Ditch	Flooding at US node of 30" culvert at end of N-S section of Sysco Ditch	10-yr	Issue (constriction) is at 30" culvert. Very steep slope @ 8.6%.	None. GIS information is the same as model. City would need to provide measurements or asbuilts to potentially update and fix model here.	30 (CAP and MAINT)	N	BC-1 (Wiedeman Road Regional SW Detention/Stream Enhancement)		Y	N	Very limited grade. Flooding shown at upstream end of culvert and impacts downstream Costco property. Sysco owns property to west of ditch. Ditch can be removed (manmade) and they are proposing. Does not warrant a City project need - up to Sysco to resolve.
9	Boeckman	Elligsen Rd	Flooding along US nodes of 18" SW piping	10-yr	Model set up seems reasonable. Large subbasins is inserted at US end which may be causing the flooding. Trailer Park pond on N side of Elligsen is not currently in the model	None. Flooding likely can be disregarded here, otherwise additional routing likely needed for model (pond and open channel for routing purposes)	20 (MAINT)	Y	None		Y	N	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
10	Coffee Creek	Shrine Center Pond	Pond flooding (HGL>4.7' max pond depth) and DS node from pond outlet	2-yr	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	25 (MAINT Access)	Y	None		Y	Y (specfic to maintenance access only)	
11	Coffee Creek	NW of 95th Ave. and Ridder Rd. intersection	Preliminary flooding at US end of culvert that conveys flow E to W under a private parking lot (Penske Truck)	N/A	Rim elevation at US end of culvert appears low. GIS does not show culvert, so unable to verify inherited model data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	None	N	CLC-4 (Ridder Rd Wetland Restoration). Proj is immediately US of culvert that floods		N	N	Culvert under parking lot - private (Penske property) and not in GIS. City not aware of issues at this location but provided as-built information. -BC incorporated revised culvert information into model from provided asbuilts. US end of culvert flooding resolved.
12	Coffee Creek	Commerce Circle Ditch	Flooding throughout N-S run of ditch and culverts to the W of Commerce Circle	2-yr	See old MP and AKS study for issues that have been well documented. Current model has updated culvert inverts from survey	None	14/15/26 (R/R, MAINT, CAP)	Y	CLC-1 (Detention/Wetl and Facility near Tributary to Basalt Creek) and CLC-3 (Commerce Circle Channel Restoration)		Y	Y	Known important project area. Beaver dam, other unknowns may not be reflected in model and factor into current discrepancy in peak flow and WSE. Redevelopment application looking to build parking area west of channel and would have to span existing channel to other development area - no access from Day Road. -BC developed 4 representative cross-sections along the Commerce Circle Ditch based on AKS survey points. Model link geometry within this reach then revised accordingly. Note that survey data was unavailable for 1 model link and thus a revised cross-section was not developed for this section.
13	Coffee Creek	Garden Acres	N-S piped system along Garden Acres Rd. and Peters Rd. Outfalls to Coffee Creek wetlands.	2-yr	Prior to outfall there is several small diameter pipes (24") that cause constriction and elevated HGL that backs up system. Most other pipes in profile are large diameter (42"/36")	None. Model matches GIS info. City (Sean S.) provided as-builts of this outfall (1994) which showed this small diameter pipe near the outlet of piping run.	None	Not modeled	None		Y	Y	City not surprised by flooding here. This is a priority need in conjunction with build out of Coffee Creek area. Private development is currently having to overdetain. Higher priority need. Railroad and METRO coordination needed (outfalls to METRO property).
14	Coffee Creek	Coffee Creek Wetlands	Flooding throughout wetlands predicted	2-yr	Main issue is the generalization of cross-sections in the model(under represents the actual amount of storage in locations)	None	None	Y	None		Y	N	
15	Coffee Creek	Boeckman Corp. Center Pond	Flooding DS of flow control structure in model and at node near the US end. Flow control structure configuration rationale is unknown but appears to be the restriction	N/A	At very US end of this pipe segment there is a 30">12">24" which seems incorrect. GIS has same info	None. Would need to thouroughly look through asbuilts to modify how this flow control structure is modeled from scratch	None	Y	None		Y	N	US portion - on Parkway. No known issue DS portion - Car dealership - existing pond is mitigation for wetland. Flooding reported downstream of pond. City not aware of any flooding in area (may be an after effect of how pond was integrated into the model. - Based on asbuilt review, control structure configuration adjusted. Pond no longer floods during 25-yr storm event.
16	Coffee Creek	Boberg Rd. and RR crossing	Flooding along N-S pipe prior to discharging into ope channel. This was an area identified in original MP. Flooding also at two large diameter culverts (59" and 51"?!) flowing E-W underneath RR tracks	10-yr	Pipe profile looks reasonable. Previous CIP location. Culverts in model (in series) do not match configuration in GIS (parallel). GIS does not have diameters or inverts	None. Need more info about culverts to make updates	None	Y	SD4025-SD4029 (Boberg Rd Pipe Replacement)		Y	?	
17	Coffee Creek	I-5 Culverts	Flooding at culverts crossing I-5 from E to W	25-yr	Profile looks reasonable. Culvert size (36") can not be verified as that info is not in the GIS data.	None. City would need to provide measurements or asbuilts to verify culvert data if desired.	35 (R&R)	N	None		Y	N	City thinks that flooding at this location is accurate. Maintain as a flooding location, however a project that upsizes ODOT culverts is unlikely.
18	Coffee Creek	Barber St	Flooding indicated at several DS nodes prior to outfall and at node near RR tracks	25-yr	DS flooding along this segment appears to be from backwatering of Coffee Creek (see location #14). Profile appears reasonable and matches the GIS data.	None	None	Y	SD4208 and SD4209 (Barber Street Pipe Replacement). -	N	Y	Unlikely	
19	Willamette River	River Fox Park (site visit	Flooding predicted within 12" pipes	2-yr	Profile looks reasonable and matches the GIS data.	None	22 (MAINT and CAP)	N	None	N/A	Y	Y	

Flooding Location ID	Watershed	Location	Model Description/ Preliminary Flooding Results	Minimum Flooding Frequency (up to 25-yr design storm)	Modeling Notes	Model Adjustments per Validation	Associated Problem Area from TM#1 (2022)	Flooding predicted in 2012 SMP?	Associated CIP from 2012 SMP?	CIP from 2012 SMP Constructed? (Y/N)	Flooding Predicted following Model Validation?	Project Need per 2022 SMP	Notes
20	Willamette River	Lower Boones Ferry	Flooding along 18" Piped segment on private property.	2-yr	Hydrology is input at most US node to generate flow through all pipes, not reflective of reality for US node flooding.	Split subbasin at this location with assumption that they have the same hydrology characteristics. Model still indicates flooding during the 25-yr event.	None	Y	None	N/A	Y	?	
21	Coffee Creek	Wilsonville Distr Center Pond	Model predicts pond flooding	N/A	Unknown how previous model build accounted for amount of pond storage or developed the outlet curve for flow leaving the pond.	None. To fix, would need to throughly investigate asbuilts for this pond.	None	N. However the original model is configured incorrectly such that flow is not actually routed through the pond.	None	N/A	N	?	

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
1000	STAFFORD_POND	69.13	33.7	33.7	11.2	1616	6.85	0.36	0.25	14.3	14.3	23.9	23.9	29.8	29.8	38.7	38.7
1000B	ST1000	28.49	59.7	62.4	3.8	673	7.26	0.35	0.23	9.9	10.3	15.0	15.6	17.8	18.4	21.7	22.3
1100	ST1100	55.81	29.9	52.1	1.5	1516	6.69	0.37	0.26	9.8	16.6	15.2	24.7	18.2	29.1	22.8	35.2
1104	ST1104	21.55	82.2	82.2	1.7	625	6.69	0.37	0.26	9.8	9.8	14.3	14.3	16.6	16.6	19.6	19.6
1114	ST1114	74.81	15.3	15.3	7.8	1303	6.69	0.37	0.26	7.1	7.1	12.8	12.8	16.5	16.5	22.5	22.5
1116	ST1116	3.25	82.2	82.2	4.6	209	6.69	0.37	0.26	1.6	1.6	2.4	2.4	2.8	2.8	3.3	3.3
1124	ST1124	14.02	70.8	70.8	4.9	601	6.69	0.37	0.26	5.9	5.9	8.9	8.9	10.5	10.5	12.6	12.6
1125	ST1125	10.91	71.6	71.6	4.5	649	6.69	0.37	0.26	4.7	4.7	7.1	7.1	8.4	8.4	10.1	10.1
1133A	ST1002	14.12	10.0	10.0	11.9	412	6.69	0.37	0.26	1.0	1.0	2.5	2.5	3.5	3.5	5.1	5.1
1133B	ST1000	4.26	74.4	79.8	3.6	370	6.69	0.37	0.26	1.9	2.1	2.9	3.1	3.4	3.6	4.1	4.3
1133C	ST1132	25.05	74.2	80.6	2.1	766	6.69	0.37	0.26	10.5	11.3	15.5	16.7	18.1	19.4	21.6	22.9
1201	ST1201	2.75	66.1	66.1	5.6	151	6.69	0.37	0.26	1.1	1.1	1.7	1.7	2.0	2.0	2.4	2.4
1202	PST1202	4.78	64.1	64.1	11.9	588	6.69	0.37	0.26	2.0	2.0	3.2	3.2	3.8	3.8	4.6	4.6
1207	PST1207	4.10	64.1	64.1	14.5	392	6.69	0.37	0.26	1.7	1.7	2.7	2.7	3.2	3.2	3.9	3.9
1302	ST1302	0.70	39.5	39.5	1.8	68	6.69	0.37	0.26	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5
1303	ST1303	35.38	19.2	51.4	5.6	841	6.69	0.37	0.26	4.2	10.7	7.4	16.3	9.4	19.5	12.6	23.9
1307A	ST1307	2.27	36.0	47.3	5.4	733	6.69	0.37	0.26	0.7	0.8	1.3	1.4	1.6	1.7	2.0	2.1
1307B	ST1402	20.17	36.0	47.3	5.4	733	6.69	0.37	0.26	4.4	5.8	7.3	9.1	9.1	11.0	11.7	13.8
1504	ST1504	1.09	37.0	43.6	2.8	82	6.69	0.37	0.26	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.8
1603A	ST1404A	63.03	30.0	37.1	3.8	1121	6.69	0.37	0.26	11.2	13.7	17.2	20.8	20.8	24.8	26.0	30.6
1603B	ST1603	809.84	12.6	26.7	3.5	3376	7.01	0.36	0.24	58.3	112.1	87.9	166.3	104.4	194.8	129.7	235.6
1604	POND_BOECKMAN	69.37	19.4	40.0	5.6	1559	6.69	0.37	0.26	8.3	16.5	14.3	25.7	18.2	31.0	24.4	38.7
1608	ST1608	3.82	49.3	62.5	4.1	209	6.69	0.37	0.26	1.1	1.4	1.9	2.2	2.3	2.7	2.8	3.2
1701	ST1701	25.65	40.7	40.7	2.2	907	6.69	0.37	0.26	6.2	6.2	9.6	9.6	11.6	11.6	14.4	14.4
1703	ST1703	171.87	41.3	46.8	1.5	2258	6.69	0.37	0.26	38.3	42.6	56.6	62.9	66.3	73.5	79.7	88.2
1711	ST1711	9.40	69.5	69.5	3.6	531	6.69	0.37	0.26	3.9	3.9	5.9	5.9	7.0	7.0	8.4	8.4
1726	ST1726	29.64	54.6	60.0	1.1	721	6.69	0.37	0.26	8.9	9.7	13.2	14.4	15.5	16.8	18.6	20.1
2000	ST2000	250.97	9.7	21.1	1.3	2548	8.82	0.30	0.14	16.6	32.0	30.9	52.7	30.4	55.3	30.9	59.8
2008	ST2008	1550.87	31.4	42.1	0.9	4917	6.57	0.34	0.19	194.4	238.8	292.4	358.6	343.9	421.2	415.2	507.8
2019	ST2019	102.09	48.4	76.9	3.6	2343	6.75	0.36	0.26	28.8	44.3	43.6	65.1	51.8	75.9	63.4	90.1
2101A	ST2120	69.86	43.0	62.5	2.9	1499	7.45	0.35	0.22	17.8	25.0	27.4	37.5	33.2	44.5	41.3	54.0
2101B	ST2101	44.71	50.7	50.7	1.4	1656	6.74	0.36	0.26	13.2	13.2	19.9	19.9	23.6	23.6	28.8	28.8
2107A	ST2123	359.21	24.0	41.2	1.2	2353	7.15	0.35	0.23	44.8	68.9	66.6	102.5	78.3	120.0	95.0	144.3
2107B	ST2123	178.65	22.1	55.4	1.9	1285	6.69	0.37	0.26	21.8	46.4	32.3	68.6	37.9	80.0	45.9	95.5
2112A	ST2112	88.70	15.9	56.5	2.9	1214	6.69	0.37	0.26	8.4	27.3	13.4	40.3	16.4	47.1	21.1	56.5
2112B	ST2112	43.89	62.6	71.3	2.9	854	6.69	0.37	0.26	15.4	17.3	22.7	25.4	26.6	29.7	31.9	35.4
2118	ST2118	42.69	52.3	52.3	2.0	571	7.85	0.34	0.19	12.1	12.1	18.4	18.4	21.8	21.8	26.6	26.6
2402	ST2402	112.36	39.2	41.2	1.6	1188	6.69	0.37	0.26	23.3	24.3	34.4	35.9	40.3	42.0	48.4	50.4

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
2405	ST2405	13.00	63.9	63.9	1.4	785	6.69	0.37	0.26	4.9	4.9	7.4	7.4	8.8	8.8	10.6	10.6
2406	ST2406	15.27	22.0	56.6	2.0	463	6.69	0.37	0.26	2.0	5.0	3.3	7.5	4.2	8.8	5.4	10.7
2409	ST2409	11.04	57.3	57.4	1.2	422	7.23	0.35	0.23	3.7	3.7	5.6	5.6	6.6	6.6	8.1	8.1
2413A	ST2413	2.04	46.8	50.2	1.1	73	6.69	0.37	0.26	0.6	0.6	0.8	0.9	1.0	1.0	1.2	1.3
2413B	ST2410	10.32	66.1	66.4	1.6	444	6.69	0.37	0.26	4.0	4.0	5.9	5.9	6.9	7.0	8.3	8.4
2701A	ST2119A	102.46	28.7	67.3	1.6	2586	6.69	0.37	0.26	17.4	38.2	26.8	56.4	32.3	65.9	40.4	78.7
2701B	ST2105A	128.40	39.2	41.1	1.8	2063	6.69	0.37	0.26	28.3	29.6	42.1	43.9	49.5	51.6	60.1	62.5
2707	ST2707	23.67	64.1	64.1	2.3	650	6.69	0.37	0.26	8.7	8.7	12.9	12.9	15.1	15.1	18.1	18.1
2711	ST2711	26.66	70.9	70.9	2.2	755	6.69	0.37	0.26	10.7	10.7	15.8	15.8	18.5	18.5	22.1	22.1
2720	ST2720	24.22	57.1	57.1	2.2	484	6.69	0.37	0.26	7.7	7.7	11.4	11.4	13.4	13.4	16.1	16.1
3005	ST3005	14.54	50.8	51.3	2.8	598	6.69	0.37	0.26	4.4	4.4	6.8	6.9	8.2	8.2	10.1	10.1
3008	ST3008	213.73	16.8	38.0	2.4	1453	6.69	0.37	0.26	20.4	41.6	30.5	61.4	36.1	71.7	44.2	85.9
3011	ST3011	51.74	45.7	46.3	2.8	2046	6.69	0.37	0.26	14.1	14.3	22.0	22.3	26.6	26.8	33.0	33.3
3017A	9067	36.66	10.9	46.6	1.5	600	6.69	0.37	0.26	2.4	9.3	4.0	13.8	4.9	16.2	6.5	19.4
3017B	STAFFORD_MEADOWS_1_BASIN	38.68	27.2	51.3	1.4	774	6.69	0.37	0.26	6.1	10.9	9.3	16.2	11.1	19.0	13.7	22.8
3025	ST3024	5.99	31.7	51.0	2.5	378	6.69	0.37	0.26	1.2	1.9	2.0	2.9	2.6	3.6	3.4	4.4
3201	ST3201	51.42	29.7	30.3	4.5	918	6.69	0.37	0.26	9.1	9.2	14.1	14.4	17.1	17.4	21.5	21.8
3204	ST3204	64.53	46.3	46.3	2.0	1078	6.69	0.37	0.26	16.7	16.7	24.7	24.7	29.1	29.1	35.1	35.1
3207	ST3207	78.25	17.7	56.7	2.1	1728	6.69	0.37	0.26	8.4	25.0	13.6	37.1	16.9	43.6	22.0	52.5
3208	RENAISSANCE_POND	25.07	41.1	41.2	0.9	587	6.69	0.37	0.26	5.8	5.8	8.6	8.6	10.1	10.1	12.2	12.2
3212	ST3212	7.21	62.2	66.8	2.1	366	6.69	0.37	0.26	2.7	2.8	4.0	4.3	4.8	5.0	5.8	6.1
3216	ST3208	30.40	62.0	62.0	2.0	881	6.69	0.37	0.26	10.8	10.8	16.0	16.0	18.8	18.8	22.6	22.6
3218	ST3218	14.44	19.6	51.8	1.8	415	6.69	0.37	0.26	1.7	4.3	2.8	6.5	3.5	7.6	4.6	9.3
3402	ST3402	34.92	41.4	52.6	1.4	1087	6.69	0.37	0.26	8.4	10.5	12.8	15.7	15.2	18.6	18.7	22.5
3414	ST3414	25.72	43.5	46.7	1.6	652	6.69	0.37	0.26	6.4	6.9	9.7	10.3	11.4	12.1	13.9	14.8
3417	ST3417	3.75	52.0	52.2	2.4	230	6.69	0.37	0.26	1.2	1.2	1.9	1.9	2.2	2.3	2.8	2.8
3418A	ST3421	14.99	51.6	52.0	0.6	631	6.69	0.37	0.26	5.6	5.7	8.9	8.9	10.4	10.4	12.2	12.3
3418B	ST3418	8.22	52.2	52.2	0.5	456	6.69	0.37	0.26	2.5	2.5	3.7	3.7	4.4	4.4	5.3	5.3
3420	ST3420	20.12	51.0	52.2	3.2	1215	6.69	0.37	0.26	6.2	6.4	10.0	10.2	12.1	12.3	15.0	15.2
3425	ST3425	15.60	51.2	51.3	1.2	378	6.69	0.37	0.26	4.5	4.5	6.6	6.6	7.8	7.8	9.4	9.4
3436	ST3436	22.08	48.4	52.2	1.8	734	6.69	0.37	0.26	6.2	6.7	9.4	10.1	11.2	11.9	13.7	14.5
3443	ST3443	4.70	49.2	51.3	2.3	314	6.69	0.37	0.26	1.4	1.5	2.2	2.3	2.7	2.8	3.4	3.5
3445	ST3445	23.46	63.5	63.5	2.6	930	6.69	0.37	0.26	8.7	8.7	13.2	13.2	15.5	15.5	18.8	18.8
3451	ST3451	3.55	56.1	56.1	0.9	289	6.69	0.37	0.26	1.2	1.2	1.8	1.8	2.2	2.2	2.7	2.7
3600	ST3600	91.20	41.5	43.1	3.7	1193	6.69	0.37	0.26	21.5	22.2	32.0	33.1	37.7	38.9	45.8	47.2
3602	ST3602	90.57	39.7	39.9	5.8	1918	6.69	0.37	0.26	21.4	21.5	33.1	33.3	40.0	40.1	49.9	50.0
3607	ST3606	82.77	36.5	36.5	2.9	916	6.70	0.37	0.26	16.9	16.9	25.0	25.1	29.4	29.5	35.6	35.7
4003	ST4003	95.74	18.9	22.1	1.7	1565	8.66	0.31	0.17	11.5	13.2	19.6	21.9	24.8	27.5	32.5	35.6

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
										2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4008	ST4008	12.06	67.5	70.9	3.3	714	6.69	0.37	0.26	4.9	5.1	7.4	7.7	8.8	9.1	10.6	10.9
4012	ST4012	22.39	59.4	66.3	2.0	626	6.69	0.37	0.26	7.6	8.4	11.3	12.4	13.3	14.6	16.0	17.5
4014	ST4014	41.33	66.2	66.2	2.7	710	6.69	0.37	0.26	14.9	14.9	22.0	22.0	25.7	25.7	30.8	30.8
4029	ST4029	59.74	51.7	64.5	2.7	1218	6.69	0.37	0.26	17.6	21.5	26.2	31.8	30.9	37.2	37.4	44.6
4202	ST4202	34.53	63.0	64.3	1.0	936	6.59	0.33	0.16	12.3	12.5	19.0	19.3	22.6	22.9	25.2	25.6
4203	ST4203	13.49	31.3	48.5	1.5	630	7.57	0.34	0.22	2.6	4.0	4.4	6.2	5.5	7.5	7.2	9.4
4204	COCA-COLA_POND	32.66	68.5	68.5	0.5	726	5.91	0.36	0.23	11.1	11.1	16.5	16.5	19.3	19.3	23.1	23.1
4205A	ST4205	89.30	40.5	40.5	3.2	1666	7.97	0.33	0.20	21.6	21.6	33.6	33.6	40.9	40.9	51.3	51.3
4205B	ST4205	113.36	28.3	34.3	1.3	2147	9.25	0.30	0.14	20.3	23.9	34.4	39.4	35.4	41.2	37.5	44.3
4205C	ST4000	79.50	29.0	29.0	3.2	1548	9.46	0.28	0.11	17.5	17.5	20.2	20.2	24.4	24.4	30.6	30.6
4214	ST4214	13.80	61.0	68.2	1.9	778	6.69	0.37	0.26	5.0	5.6	7.6	8.4	9.1	9.9	11.0	11.8
4216	ST4216	13.42	61.5	66.8	2.5	563	6.69	0.37	0.26	4.9	5.3	7.4	7.9	8.7	9.3	10.6	11.2
4225	ST4225	11.73	54.8	66.6	0.8	449	6.69	0.37	0.26	3.7	4.4	5.4	6.4	6.4	7.5	7.7	9.0
4226	WILSONVILLE_DIST_CTR_POND	65.84	68.0	68.0	1.0	1069	6.69	0.37	0.26	22.3	22.3	32.9	32.9	38.3	38.3	45.7	45.7
4228A	ST4228	28.98	72.6	74.3	1.4	623	6.69	0.37	0.26	11.2	11.4	16.4	16.8	19.2	19.5	22.8	23.2
4228B	ST6007	14.64	82.2	82.2	1.1	522	6.27	0.36	0.24	6.6	6.6	9.8	9.8	11.3	11.3	13.4	13.4
4231	ST4231	6.30	56.3	57.4	3.9	511	6.69	0.37	0.26	2.2	2.2	3.5	3.6	4.3	4.3	5.2	5.3
4400	ST4400	84.63	33.9	37.5	2.9	1896	6.69	0.37	0.26	16.9	18.6	26.1	28.5	31.4	34.1	39.2	42.2
4403A	ST4403	93.84	23.5	23.5	2.0	1987	6.88	0.36	0.25	13.2	13.2	20.7	20.7	25.2	25.2	32.1	32.1
4403B	ST4402	34.38	31.5	31.5	0.7	841	6.69	0.37	0.26	6.2	6.2	9.3	9.3	11.0	11.0	13.4	13.4
4404A	ST4639	19.90	32.9	32.9	2.6	672	6.69	0.37	0.26	3.9	3.9	6.3	6.3	7.7	7.7	9.8	9.8
4404B	ST4404	8.40	32.9	32.9	2.6	672	6.69	0.37	0.26	1.7	1.7	3.1	3.1	4.0	4.0	5.2	5.2
4501	ST4501	18.45	34.0	52.1	1.8	420	6.78	0.36	0.26	3.7	5.4	5.6	8.1	6.6	9.5	8.2	11.5
4502	ST4502	22.56	31.8	32.3	4.2	1035	6.69	0.37	0.26	4.4	4.5	7.6	7.7	9.6	9.7	12.5	12.6
4503A	ST4503	58.83	46.4	49.1	2.6	745	5.59	0.36	0.21	15.2	15.9	22.8	23.9	27.1	28.4	33.1	34.6
4503B	ST4503	81.06	6.2	64.1	3.9	1499	5.80	0.36	0.22	3.7	29.6	8.2	44.3	11.7	52.4	17.7	63.4
4503C	ST4503	30.20	13.8	39.1	5.7	899	5.86	0.33	0.14	4.2	8.5	9.9	15.3	8.3	15.0	8.8	16.5
4503D	TOOZE_POND	12.16	49.2	51.8	3.2	450	4.99	0.36	0.19	3.7	3.9	6.1	6.3	7.5	7.7	9.3	9.5
4608	ST4608	10.25	51.9	51.9	1.6	280	6.69	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4611	POND_E2	7.97	47.5	47.5	2.7	475	6.69	0.37	0.26	2.3	2.3	3.7	3.7	4.5	4.5	5.6	5.6
4614A	POND_E1	53.36	42.8	42.9	1.6	1058	6.69	0.37	0.26	12.9	12.9	19.2	19.2	22.6	22.6	27.4	27.4
4614B	ST4829	11.09	45.2	52.2	2.2	662	6.69	0.37	0.26	3.0	3.5	4.9	5.5	5.9	6.6	7.4	8.1
4617A	ST4610	6.68	52.1	52.1	1.6	378	6.69	0.37	0.26	2.1	2.1	3.2	3.2	3.8	3.8	4.7	4.7
4617B	ST4803	5.35	52.2	52.2	2.1	268	6.69	0.37	0.26	1.7	1.7	2.6	2.6	3.1	3.1	3.8	3.8
4617C	ST4617	4.89	52.2	52.2	2.2	310	6.69	0.37	0.26	1.5	1.5	2.4	2.4	2.9	2.9	3.6	3.6
4623	ST4623	4.26	52.2	52.2	1.2	453	6.69	0.37	0.26	1.4	1.4	2.2	2.2	2.6	2.6	3.3	3.3
4631A	ST4631	9.68	52.2	52.2	0.8	535	6.66	0.37	0.26	3.0	3.0	4.5	4.5	5.3	5.3	6.5	6.5
4631B	ST4806	10.14	52.2	52.2	2.4	615	6.66	0.37	0.26	3.2	3.2	5.0	5.0	6.1	6.1	7.5	7.5

Table B-2. Hydrologic Model Inputs and Results

Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
4632A	04632A	49.06	31.8	31.8	1.7	814	6.69	0.37	0.26	8.9	8.9	13.4	13.4	15.8	15.8	19.4	19.4
4632B	04632B	41.58	43.7	43.7	1.2	674	6.69	0.37	0.26	9.9	9.9	14.6	14.6	17.1	17.1	20.5	20.5
5004A	ST5004	5.30	59.7	59.7	3.1	360	5.50	0.36	0.21	2.0	2.0	3.2	3.2	3.9	3.9	4.7	4.7
5004B	ST5028	6.65	54.3	54.3	4.2	380	6.69	0.37	0.26	2.2	2.2	3.5	3.5	4.2	4.2	5.2	5.2
5006	ST5006	9.00	64.1	64.1	1.1	589	6.69	0.37	0.26	3.4	3.4	5.1	5.1	6.0	6.0	7.3	7.3
5022	ST5022	4.80	70.7	70.7	0.9	304	6.69	0.37	0.26	2.0	2.0	2.9	2.9	3.4	3.4	4.1	4.1
5024	ST5024	7.31	78.8	78.8	1.2	645	6.69	0.37	0.26	3.4	3.4	5.1	5.1	5.9	5.9	7.0	7.0
5033	ST5033	4.32	71.8	71.8	3.3	476	6.69	0.37	0.26	1.9	1.9	2.9	2.9	3.4	3.4	4.2	4.2
5037	ST5037	2.66	49.2	50.3	3.5	135	4.36	0.35	0.16	0.9	0.9	1.5	1.5	1.8	1.9	2.0	2.0
5038	ST5038	15.24	43.6	43.6	7.1	553	6.69	0.37	0.26	4.0	4.0	6.6	6.6	8.1	8.1	10.2	10.2
5200	ST5200	64.84	21.6	23.9	4.8	1222	6.75	0.36	0.26	8.5	9.3	13.9	15.1	17.2	18.6	22.4	23.9
5207	ST5207	26.98	23.7	23.7	2.5	1176	6.91	0.36	0.24	4.0	4.0	7.2	7.2	9.1	9.1	12.4	12.4
5210	05210	37.10	23.5	23.5	10.3	3038	6.21	0.37	0.29	5.3	5.3	12.9	12.9	17.2	17.2	23.0	23.0
5501	ST5501	40.80	14.3	14.3	8.6	1077	7.94	0.33	0.19	4.6	4.6	10.2	10.2	14.2	14.2	19.9	19.9
5502	05502	75.65	12.7	13.9	7.8	1936	7.24	0.34	0.24	6.5	7.0	13.7	14.4	18.5	19.3	27.1	27.9
5706A	ST5703	8.78	43.6	47.1	3.6	607	5.51	0.36	0.24	2.4	2.6	4.1	4.3	5.1	5.3	6.5	6.7
5706B	ST5706	11.41	43.6	47.1	3.6	607	5.51	0.36	0.24	3.1	3.3	5.1	5.4	6.3	6.6	8.0	8.3
5709	ST5709	29.34	43.9	53.0	6.1	642	5.20	0.36	0.22	7.8	9.3	12.3	14.4	15.1	17.3	18.9	21.4
5713	ST5713	25.39	71.0	71.0	2.9	985	6.30	0.36	0.24	10.6	10.6	15.9	15.9	18.7	18.7	22.4	22.4
5718	ST5718	34.38	39.0	46.2	7.6	1251	6.12	0.34	0.16	9.6	11.0	17.7	19.3	21.9	23.6	23.1	25.2
6001	ST6001	24.29	39.6	39.6	10.7	1121	5.08	0.36	0.19	6.8	6.8	12.5	12.5	15.8	15.8	19.6	19.6
6004	ST6003	13.42	53.7	53.7	1.6	528	5.03	0.36	0.19	4.4	4.4	6.9	6.9	8.3	8.3	10.2	10.2
6013A	ST6013	6.55	73.9	73.9	1.3	1183	4.91	0.36	0.19	3.1	3.1	4.9	4.9	5.7	5.7	6.7	6.7
6013B	ST6007	9.69	73.9	73.9	1.3	1183	4.91	0.36	0.19	4.5	4.5	7.0	7.0	8.2	8.2	9.7	9.7
6021	ST6021	12.43	68.8	68.8	1.0	513	3.99	0.35	0.15	4.9	4.9	7.8	7.8	8.9	8.9	10.4	10.4
6022	ST6022	27.99	51.1	51.1	6.8	687	5.56	0.37	0.30	8.4	8.4	12.6	12.6	15.1	15.1	18.3	18.3
6031	ST6031	14.40	65.2	65.2	1.9	429	6.61	0.37	0.26	5.3	5.3	7.9	7.9	9.3	9.3	11.1	11.1
6201A	ST6412	56.66	34.1	42.4	1.9	885	5.81	0.36	0.22	11.1	13.5	16.9	20.3	20.2	24.2	25.1	29.6
6201B	ST6201	97.87	25.0	49.0	3.0	1101	4.90	0.36	0.19	14.6	26.4	23.2	40.1	28.4	47.8	36.2	58.4
6205	ST6205	25.21	37.1	49.6	2.3	757	6.71	0.36	0.25	5.6	7.3	8.7	11.1	10.5	13.3	13.2	16.3
6210	06210	26.56	23.8	51.5	4.4	551	4.29	0.35	0.17	4.2	8.4	7.8	13.4	10.1	16.2	12.0	19.0
6211	06211	16.53	37.7	37.7	10.1	587	4.46	0.35	0.17	4.5	4.5	8.3	8.3	10.4	10.4	12.2	12.2
6411A	ST6411	10.69	40.1	40.1	2.4	565	6.37	0.36	0.25	2.6	2.6	4.3	4.3	5.3	5.3	6.7	6.7
6411B	ST6405	7.47	40.1	40.1	2.4	565	6.37	0.36	0.25	1.9	1.9	3.2	3.2	4.0	4.0	5.1	5.1
6416A	ST6653	11.82	48.7	49.7	1.7	435	6.68	0.37	0.26	3.4	3.4	5.1	5.2	6.1	6.2	7.5	7.6
6416B	06416	59.26	34.8	36.5	5.6	1204	6.68	0.37	0.26	12.3	12.9	19.3	20.0	23.3	24.2	29.4	30.4
6610A	ST6610	15.48	44.9	46.9	2.6	789	6.69	0.37	0.26	4.2	4.4	6.7	6.9	8.1	8.4	10.2	10.5
6610B	ST6605	18.06	43.6	43.6	7.3	525	6.69	0.37	0.26	4.8	4.8	7.6	7.6	9.2	9.2	11.6	11.6

Table B-2. Hydrologic Model Inputs and Results																	
Subbasin Name	Inlet Node	Area (Ac)	Impervious Area (%)		Average Subbasin Slope (ft/ft)	Subbasin Width (ft)	Green-Ampt Infiltration Parameters			Maximum Flow (cfs) for Design Storm							
			Existing Land Use	Future Land Use			Average Capillary Suction (in)	Initial Moisture Deficit (frac.)	Saturated Hydraulic Conductivity (in/hr)	2-yr storm event		10-yr storm event		25-yr storm event		100yr storm event	
										Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use	Existing Land Use	Future Land Use
6611	06611	20.49	44.0	44.1	6.3	530	6.69	0.37	0.26	5.4	5.4	8.4	8.5	10.2	10.2	12.7	12.7
9003	ST9003	52.84	50.4	50.4	1.6	900	6.35	0.36	0.25	14.6	14.6	21.6	21.6	25.3	25.3	30.5	30.5
9006	ST9006	26.30	43.4	43.4	1.8	752	4.66	0.35	0.18	7.0	7.0	11.2	11.2	13.7	13.7	17.0	17.0
9013	ST9013	58.92	43.4	43.4	0.7	1462	4.40	0.35	0.17	14.7	14.7	22.9	22.9	27.6	27.6	32.4	32.4
9019	ST9019	46.34	43.4	43.4	2.0	995	3.51	0.35	0.13	12.2	12.2	18.9	18.9	20.6	20.6	25.2	25.2
9023	ST9023	11.00	42.7	43.4	1.5	481	4.61	0.35	0.18	3.0	3.0	4.9	5.0	6.1	6.1	7.6	7.7
9024	ST9024	30.75	41.9	41.9	4.5	727	3.57	0.35	0.16	8.3	8.3	13.8	13.8	17.3	17.3	19.0	19.0
9027	ST9027	14.17	43.4	43.4	3.2	799	3.50	0.35	0.13	4.3	4.3	7.3	7.3	7.7	7.7	9.7	9.7
9031	ST9031	56.63	43.4	43.4	1.3	1438	3.51	0.35	0.13	14.8	14.8	22.9	22.9	25.0	25.0	30.5	30.5
9032	ST9032	29.13	42.7	42.7	3.9	608	3.72	0.35	0.16	7.8	7.8	12.7	12.7	15.9	15.9	17.4	17.4
9039	ST9039	24.37	51.0	51.0	5.4	777	3.58	0.35	0.16	8.1	8.1	13.4	13.4	16.6	16.6	18.3	18.3
9041	ST9066	19.00	64.7	64.7	1.2	395	4.18	0.35	0.16	6.7	6.7	10.2	10.2	12.2	12.2	13.8	13.8
9048A	ST9044	11.52	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.8	3.8	6.3	6.3	7.6	7.6	9.4	9.4
9048B	ST9048	8.86	53.9	53.9	2.6	1140	6.62	0.37	0.26	3.0	3.0	5.0	5.0	6.1	6.1	7.4	7.4
9051	ST9051	7.62	43.3	43.4	1.8	365	3.82	0.35	0.14	2.2	2.2	3.6	3.6	4.0	4.0	4.6	4.6
9059A	ST9053	13.59	43.4	43.4	1.4	582	6.15	0.36	0.24	3.5	3.5	5.5	5.5	6.6	6.6	8.3	8.3
9059B	ST9059	11.82	43.4	43.4	1.4	582	6.15	0.36	0.24	3.1	3.1	4.9	4.9	5.9	5.9	7.4	7.4
9060	ST9060	11.18	63.9	64.7	1.8	230	3.50	0.35	0.13	4.0	4.1	6.1	6.2	6.8	6.9	8.1	8.2
9065	ST9065	14.62	35.3	39.3	10.5	997	4.96	0.33	0.12	4.2	4.5	7.6	7.9	8.2	8.6	10.6	11.0
9071	09071	10.19	39.8	40.4	8.5	743	5.61	0.33	0.14	3.6	3.7	6.5	6.6	6.6	6.6	7.2	7.2
9072	09072	19.38	43.9	43.9	4.1	1126	6.69	0.37	0.26	5.2	5.2	8.7	8.7	10.7	10.7	13.5	13.5
CANYON_N	CANYON_CR_PH2_DET	7.24	70.4	70.4	9.3	367	6.69	0.37	0.26	3.1	3.1	4.8	4.8	5.6	5.6	6.8	6.8
CANYON_S	CANYON_CR_ARCH_PIPE	7.74	70.9	70.9	3.9	469	6.69	0.37	0.26	3.3	3.3	5.0	5.0	5.9	5.9	7.1	7.1
FUT6612	06612	50.30	3.7	64.1	5.1	1383	6.69	0.37	0.26	1.5	18.9	4.7	28.4	7.1	33.5	11.4	40.4
S_1203	1203	3.59	64.8	64.8	5.5	126	6.69	0.37	0.26	1.4	1.4	2.1	2.1	2.5	2.5	3.0	3.0
TONKIN_NISSAN_BASIN	TONKIN_NISSAN_POND	17.83	37.3	43.5	0.9	638	6.69	0.37	0.26	3.9	4.5	5.9	6.7	7.0	8.0	8.7	9.8

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
ST1202	1203	ST1202	CIRCULAR	1.5	-	262	276.62	265.7	3.87	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
17559	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
17558	3316	ST3017	CIRCULAR	1.5	-	77	212.75	211.2	2.08	0.024	3.2	5.0	6.0	6.8	NF	6.9	8.1	8.6	9.5	100-yr, 24-hr
SD6629	6652	ST6618	CIRCULAR	0.83	-	106.2	161.33	160.0	1.04	0.013	0.0	0.0	0.0	0.3	NF	0.0	0.0	0.0	1.8	NF
STAFFORD_MEADOWS_CHANNEL	9067	3316	STAFFORD_CHANNEL	88	3	410	214.8	212.8	0.50	0.035	2.4	3.8	4.8	6.3	NF	9.2	13.6	15.8	19.1	NF
SD2151	DAY_RD_IMPOUNDMENT	ST2107	CIRCULAR	2	-	192.4	227.55	227.5	0.07	0.01	17.4	16.7	16.4	16.4	2-yr, 24-hr	16.8	16.7	16.7	16.9	2-yr, 24-hr
SD5218	POND_LIBRARY	ST5215	CIRCULAR	1.5	-	69	140.76	136.0	4.08	0.013	19.3	22.2	22.2	22.2	100-yr, 24-hr	21.9	22.2	22.2	22.1	25-yr, 24-hr
PST1204	PST1202	PST1204	CIRCULAR	1	-	84.3	331.58	329.2	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1205	PST1204	PST1205	CIRCULAR	1	-	129.3	329.2	314.6	11.16	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1206	PST1205	PST1206	CIRCULAR	1	-	189.2	314.58	309.5	2.59	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1207	PST1206	PST1207	CIRCULAR	1	-	121.8	309.49	307.0	1.91	0.011	2.0	3.2	3.8	4.6	NF	2.0	3.2	3.8	4.6	NF
PST1208	PST1207	PST1208	CIRCULAR	1	-	61.1	306.97	292.8	8.21	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.7	NF
PST1209	PST1208	PST1209	CIRCULAR	1	-	116.5	292.77	278.1	14.30	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
1203	PST1209	1203	CIRCULAR	1	-	23.3	278.08	276.6	1.50	0.011	3.6	5.9	7.0	8.5	NF	3.6	5.9	7.0	8.5	NF
SD1740	SIEMENS_POND_C&D	ST3208	CIRCULAR	2.5	-	77	208.45	207.0	1.95	0.013	2.8	6.1	8.3	11.8	NF	3.5	7.5	10.1	14.3	NF
SD1000	ST1000	ST1129	CIRCULAR	2.5	-	142.7	257.9	253.5	3.12	0.013	18.9	25.5	28.9	33.7	NF	19.5	26.2	29.7	34.6	NF
SD1001	ST1001	ST1000	CIRCULAR	1.5	-	900	270.05	257.9	1.24	0.013	7.2	8.3	7.9	8.1	NF	7.2	7.8	7.8	8.1	NF
SD1002	ST1002	ST1001	CIRCULAR	1.25	-	540	277.75	270.1	1.38	0.013	7.2	8.4	8.7	8.3	25-yr, 24-hr	7.2	8.1	8.1	8.2	25-yr, 24-hr
SD1100	ST1100	ST1700	CIRCULAR	2.5	-	72	241.73	239.2	3.59	0.013	36.2	49.6	57.9	72.9	10-yr, 24-hr	39.6	57.3	68.1	80.4	10-yr, 24-hr
SD1101	ST1101	ST1100	SYSCO	21	3.8	1170	244.65	241.7	0.25	0.035	28.5	43.6	48.3	52.6	NF	28.5	40.9	43.8	51.9	100-yr, 24-hr
SD1102	ST1102	ST1101	CIRCULAR	3.5	-	58	244.82	244.7	0.29	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1103	ST1103	ST1102	CIRCULAR	3.5	-	77	245.25	244.8	0.30	0.011	28.9	44.2	52.2	63.0	NF	28.9	44.1	52.0	63.0	NF
SD1104	ST1104	ST1103	CIRCULAR	3	-	31	245.61	245.3	0.52	0.011	18.4	28.5	34.0	41.4	NF	18.4	28.5	34.0	41.5	NF
SD1105	ST1105	ST1104	CIRCULAR	2.5	-	150	250.61	245.6	3.20	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1106	ST1106	ST1105	CIRCULAR	2.5	-	332.6	253.77	250.6	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1107	ST1107	ST1106	CIRCULAR	2.5	-	170.5	255.79	253.8	1.07	0.011	8.7	14.6	18.2	22.8	NF	8.7	14.6	18.2	22.8	NF
SD1108	ST1108	ST1107	CIRCULAR	2.5	-	180	257.5	255.8	0.89	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1109	ST1109	ST1108	CIRCULAR	2.5	-	273.1	261.49	257.5	1.39	0.011	8.7	14.6	18.2	22.9	NF	8.7	14.6	18.2	22.9	NF
SD1110	ST1110	ST1109	CIRCULAR	2.5	-	218.1	266.69	261.5	2.29	0.011	8.7	14.6	18.1	22.8	NF	8.7	14.6	18.1	22.8	NF
SD1111	ST1111	ST1110	CIRCULAR	2	-	112.9	267.03	266.7	0.30	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1112	ST1112	ST1111	CIRCULAR	1.5	-	100	271.56	267.0	4.53	0.013	7.1	12.4	15.7	20.4	NF	7.1	12.4	15.7	20.4	NF
SD1113	ST1113	ST1112	CIRCULAR	1.5	-	67.4	272.22	271.6	0.68	0.013	7.1	12.4	15.7	20.4	25-yr, 24-hr	7.1	12.4	15.7	20.4	25-yr, 24-hr
SD1114	ST1114	ST1113	CIRCULAR	1.5	-	379.5	276.02	272.2	0.92	0.013	7.1	12.4	15.7	20.8	10-yr, 24-hr	7.1	12.4	15.7	20.8	10-yr, 24-hr
SD1115	ST1115	ST1110	CIRCULAR	2.5	-	47	268.44	266.7	2.32	0.012	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1116	ST1116	ST1115	CIRCULAR	2.25	-	79	270.48	268.4	2.58	0.013	1.6	2.4	2.8	3.3	NF	1.6	2.4	2.8	3.3	NF
SD1117	ST1117	ST1103	CIRCULAR	2.75	-	238.4	246.52	245.3	0.31	0.013	10.6	15.9	18.4	22.0	NF	10.6	15.8	18.2	21.9	NF
SD1118	ST1118	ST1117	CIRCULAR	2.75	-	350.9	247.64	246.5	0.32	0.013	10.6	15.9	18.5	22.0	NF	10.6	15.9	18.3	21.9	NF
SD1119	ST1119	ST1118	CIRCULAR	2.75	-	293.1	262.81	247.6	5.18	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1120	ST1120	ST1119	CIRCULAR	1.5	-	309	267.58	262.8	1.48	0.013	5.9	8.9	10.5	11.8	NF	5.9	8.9	10.5	11.9	NF
SD1121	ST1121	ST1120	CIRCULAR	1.5	-	277.3	271.88	267.6	1.44	0.013	5.9	8.9	10.5	12.4	NF	5.9	8.9	10.5	12.4	NF
SD1122	ST1122	ST1121	CIRCULAR	1.5	-	277.7	273.75	271.9	0.67	0.013	5.9	8.9	10.5	12.2	NF	5.9	8.9	10.5	12.2	NF
SD1123	ST1123	ST1122	CIRCULAR	1.25	-	105.6	276.24	273.8	2.12	0.013	5.9	8.9	10.5	12.2	100-yr, 24-hr	5.9	8.9	10.5	12.2	100-yr, 24-hr
SD1124	ST1124	ST1123	CIRCULAR	1.25	-	257.5	284.48	276.2	3.20	0.013	5.9	8.9	10.5	12.3	100-yr, 24-hr	5.9	8.9	10.5	12.3	100-yr, 24-hr
SD1125	ST1125	ST1118	CIRCULAR	1.75	-	193.8	251.13	247.6	1.28	0.013	4.7	7.1	8.4	10.1	NF	4.7	7.1	8.5	10.2	NF
SD1127	ST1126	ST1701	CANYON_CR	22	4	1500	246.95	237.5	0.63	0.035	12.5	19.9	24.0	31.1	NF	19.0	28.9	34.1	42.3	NF
SD1128	ST1128	ST2118	CIRCULAR	2.5	-	307.2	244.51	241.5	0.86	0.013	18.8	28.7	28.9	33.3	NF	19.3	28.8	29.4	34.1	NF
SD1129	ST1129	ST1128	BASALT_CR9	11	2	530	253.45	244.5	0.75	0.035	18.8	33.6	33.6	33.7	NF	19.3	38.5	38.5	34.3	NF
SD2411	ST1130	ST2407	CIRCULAR	2	-	727	240.02	236.7	0.43	0.024	8.7	9.4	9.8	10.4	NF	8.8	9.5	9.8	10.5	NF
SD2410	ST1130	ST2409	CIRCULAR	2	-	263.6	240.02	240.3	0.59	0.024	1.6	5.8	8.0	10.6	NF	2.1	6.2	8.2	10.8	NF
SD1130	ST1131	ST1130	CIRCULAR	2.75	-	105.9	242.76	240.0	0.32	0.024	10.5	15.4	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF
SD1131	ST1132	ST1131	CIRCULAR	2.75	-	399.7	244.2	242.8	0.31	0.024	10.5	15.5	18.0	21.5	NF	11.0	15.9	18.3	22.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1132	ST1133	ST1132	CIRCULAR	1.25	-	282.4	247.5	244.2	0.64	0.013	0.0	0.0	0.0	0.1	NF	11.0	15.9	18.3	22.0	2-yr, 24-hr
SD1302	ST1200	ST1302	CIRCULAR	2.25	-	75	257.59	256.1	1.64	0.013	8.4	12.8	14.9	19.1	NF	8.4	12.8	14.9	19.1	NF
SD1200	ST1201	ST1200	CIRCULAR	2.25	-	180	260.31	257.6	1.46	0.013	8.5	12.8	14.9	19.1	NF	8.5	12.8	14.9	19.1	NF
SD1201	ST1202	ST1201	CIRCULAR	2	-	251.1	265.7	260.3	2.05	0.013	5.0	8.0	9.5	11.5	NF	5.0	8.0	9.5	11.5	NF
SD1126	ST1300	ST1126	CIRCULAR	3	-	68	247.22	247.0	0.40	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1300	ST1301	ST1300	CIRCULAR	3	-	121	248.45	247.2	0.55	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1301	ST1302	ST1301	CIRCULAR	2.5	-	323	256.11	248.5	2.18	0.013	8.6	13.1	15.3	19.5	NF	8.6	13.1	15.3	19.5	NF
SD1303	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.33	0.011	1.4	2.8	3.6	4.3	NF	3.9	5.6	6.6	8.0	100-yr, 24-hr
SD1304	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	1.44	0.011	0.1	1.3	2.2	4.0	NF	3.1	5.4	6.4	7.9	100-yr, 24-hr
SD1305	ST1303	ST1126	CIRCULAR	1	-	90	250.55	247.0	0.44	0.011	2.7	3.2	3.5	4.3	NF	3.8	5.4	6.4	7.9	100-yr, 24-hr
SD1401	ST1304	ST1400	CIRCULAR	1.5	-	93.8	240.49	238.7	1.03	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1306	ST1305	ST1304	CIRCULAR	1	-	310.8	242.46	240.5	0.60	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1307	ST1306	ST1305	CIRCULAR	1.25	-	159	244.66	242.5	0.82	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1308	ST1307	ST1306	CIRCULAR	1.25	-	147.8	246.73	244.7	1.33	0.013	0.7	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1400	ST1400	ST1401	CIRCULAR	1.5	-	10	238.7	235.4	0.80	0.013	0.6	1.3	1.6	2.0	NF	0.8	1.4	1.7	2.1	NF
SD1402	ST1401	ST1402	CIRCULAR	4	-	68	235.43	235.4	0.49	0.013	43.7	58.1	65.6	73.7	NF	50.9	65.0	71.1	79.1	NF
SD1403	ST1402	ST1403	BOECKMAN_CR	37	9	970	235.43	197.5	3.92	0.035	45.9	61.7	69.6	78.5	NF	53.5	68.8	75.5	83.9	NF
SD1404	ST1403	ST1404A	CIRCULAR	4	-	45	197.45	195.5	4.45	0.013	45.4	61.6	69.3	78.1	NF	53.1	68.6	75.2	83.6	NF
SD1405A	ST1404A	ST1404B	BOECKMAN_CR	37	9	1285	195.45	160.9	2.69	0.035	50.8	70.3	79.8	91.8	NF	59.7	78.6	88.7	102.5	NF
SD1405B	ST1404B	ST1603	BOECKMAN_CR	37	9	500	160.9	147.5	2.69	0.035	50.8	70.3	79.7	91.8	NF	59.7	78.6	88.4	102.2	NF
SD1602	ST1500	ST1600	CIRCULAR	2.5	-	221.5	203.36	194.6	2.06	0.011	0.3	0.4	1.5	3.1	NF	0.3	0.5	1.6	3.2	NF
SD1500	ST1501	ST1500	CIRCULAR	1.5	-	153	212.81	203.4	5.47	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1502	ST1502	ST1501	CIRCULAR	1.5	-	300.9	220.39	212.8	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1503	ST1503	ST1502	CIRCULAR	1.25	-	276	227.5	220.4	2.49	0.013	0.3	0.4	0.5	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1504	ST1504	ST1503	CIRCULAR	1.25	-	54	228.96	227.5	2.52	0.013	0.3	0.4	0.6	0.7	NF	0.3	0.5	0.6	0.8	NF
SD1603	ST1600	ST1601	CIRCULAR	4	-	157.6	194.55	180.0	9.11	0.013	29.8	37.4	42.0	50.0	NF	31.3	39.9	44.8	56.1	NF
SD1604	ST1601	ST1602	CIRCULAR	4	-	169	180.04	156.6	14.03	0.013	29.8	37.4	42.0	50.2	NF	31.3	39.9	44.8	56.5	NF
SD1605	ST1602	ST1603	MENTOR_GRAPHICS	13	1	350	156.56	147.5	2.60	0.035	29.8	37.4	41.9	49.2	NF	31.3	39.9	44.8	54.5	NF
SD1607	ST1603	POND_BOECKMAN	BOECKMAN_CR_B	141.6	15.3	100	147.45	131.5	16.21	0.035	130.5	186.1	216.4	529.5	NF	196.0	278.7	707.7	651.9	NF
SD3200	ST1605	ST3200	CIRCULAR	5	-	300	131.45	127.6	1.29	0.024	124.0	161.8	210.5	289.9	25-yr, 24-hr	166.9	247.4	304.8	303.6	10-yr, 24-hr
SD1600	ST1608	ST1600	CIRCULAR	1.25	-	251	212.8	194.6	5.11	0.013	1.1	1.9	2.3	2.8	NF	1.4	2.2	2.7	3.2	NF
16687	ST1640	3316	CIRCULAR	1.5	-	125	214.82	212.8	1.54	0.011	3.7	4.9	5.3	5.9	NF	5.3	6.4	6.9	7.5	NF
SD1700	ST1700	ST1701	SYSCO-2	70	3	900	239.15	237.5	0.19	0.035	35.7	49.0	52.8	62.3	NF	39.3	52.2	59.7	70.3	NF
SD1701	ST1701	ST1702	SYSCO-3	24	5	350	237.45	236.2	0.35	0.035	43.5	57.9	65.4	73.8	NF	50.7	64.7	70.7	79.3	NF
SD1702	ST1702	ST1401	CIRCULAR	4	-	95	236.23	235.4	0.49	0.013	43.4	57.7	65.2	73.4	100-yr, 24-hr	50.6	64.6	70.7	78.7	100-yr, 24-hr
SD1703	ST1703	ST1704	CIRCULAR	4	-	56	208.45	210.4	0.18	0.013	24.9	30.8	34.7	40.2	NF	26.1	34.0	37.8	44.4	NF
SD1704	ST1704	ST1705	CIRCULAR	4	-	312	210.35	209.4	0.32	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1705	ST1705	ST1706	CIRCULAR	4	-	276.9	209.35	208.3	0.40	0.013	24.8	30.8	34.6	40.1	NF	26.1	33.5	37.7	43.7	NF
SD1706	ST1706	ST1707	CIRCULAR	4	-	263.6	208.25	207.7	0.20	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1707	ST1707	ST1708	CIRCULAR	4	-	142.8	207.72	207.4	0.23	0.013	24.8	30.8	34.6	40.1	NF	26.0	33.4	37.6	43.7	NF
SD1708	ST1708	ST1709	CIRCULAR	4	-	434.9	207.39	206.0	0.32	0.013	24.7	30.8	34.5	40.4	NF	26.0	33.4	37.6	44.4	NF
SD1709	ST1709	ST1710	CIRCULAR	4	-	277	205.99	200.6	1.93	0.013	24.8	30.8	34.6	42.4	NF	26.0	33.4	37.7	48.2	NF
SD1716	ST1710	ST1600	CIRCULAR	4	-	75	200.64	194.6	8.15	0.013	28.6	35.7	39.8	48.2	NF	29.8	38.1	42.9	54.5	NF
SD1710	ST1711	ST1712	CIRCULAR	1.25	-	310	217.25	215.0	0.71	0.013	3.9	5.9	7.1	8.4	100-yr, 24-hr	3.9	5.9	7.2	8.5	100-yr, 24-hr
SD1711	ST1712	ST1713	CIRCULAR	1.5	-	270	215.04	208.6	2.14	0.013	3.9	5.8	7.1	8.4	NF	3.9	5.8	7.2	8.4	NF
SD1715	ST1713	ST1500	CIRCULAR	1.5	-	128	208.58	203.4	9.93	0.013	0.0	0.0	1.0	2.5	NF	0.0	0.0	1.0	2.5	NF
SD1712	ST1713	ST1714	CIRCULAR	1.25	-	250.1	208.58	208.6	-0.28	0.013	3.9	5.3	6.2	6.5	NF	3.9	5.3	6.2	6.5	NF
SD1713	ST1714	ST1715	CIRCULAR	1	-	135	208.58	205.7	2.17	0.013	3.8	5.2	5.9	5.9	10-yr, 24-hr	3.8	5.3	5.9	5.9	10-yr, 24-hr
SD1714	ST1715	ST1710	CIRCULAR	1	-	20	205.65	200.6	25.88	0.013	3.8	5.2	5.9	5.9	NF	3.8	5.3	5.9	5.9	NF
SD2722	ST1717	ST2720	CIRCULAR	2	-	500	209.05	205.5	0.72	0.013	8.6	12.6	13.8	16.9	100-yr, 24-hr	9.3	13.0	14.5	17.2	100-yr, 24-hr
SD1717	ST1718	ST1717	TRAPEZOIDAL	30	2	50	209.45	209.1	0.80	0.035	8.7	12.9	13.8	17.4	100-yr, 24-hr	9.4	13.4	14.5	18.3	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD1718	ST1719	ST1718	CIRCULAR	3.5	-	107	210.45	209.5	0.93	0.024	8.8	13.1	15.0	17.7	NF	9.5	14.2	15.9	18.9	NF
SD1719	ST1720	ST1719	ARCH	2.92	2	100	211.35	210.5	0.90	0.024	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.1	18.9	NF
SD1720	ST1721	ST1720	CIRCULAR	2	-	282.2	216.15	211.4	1.70	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	18.9	NF
SD1721	ST1722	ST1721	CIRCULAR	1.5	-	38.9	216.83	216.2	0.98	0.013	8.8	13.1	15.3	18.1	NF	9.5	14.2	16.5	19.3	NF
SD1722	ST1723	ST1722	CIRCULAR	2	-	90	217.26	216.8	0.32	0.013	8.8	13.1	15.4	18.1	NF	9.5	14.2	16.5	19.3	100-yr, 24-hr
SD1723	ST1724	ST1723	CIRCULAR	1	-	40.9	217.39	217.3	0.05	0.011	8.8	13.1	15.3	18.1	25-yr, 24-hr	9.6	14.2	16.5	19.4	10-yr, 24-hr
SD1724	ST1725	ST1724	CIRCULAR	2.5	-	208	218.26	217.4	0.36	0.013	8.8	13.2	15.5	18.3	100-yr, 24-hr	9.6	14.4	16.6	19.7	100-yr, 24-hr
SD1725	ST1726	ST1725	CIRCULAR	2.5	-	34	218.56	218.3	0.56	0.013	8.9	13.2	15.5	18.6	NF	9.7	14.4	16.8	20.0	100-yr, 24-hr
SD2000	ST2000	ST4002	PRISON_OFFSITE6	33	3.5	820	139.95	139.5	0.06	0.035	127.8	162.0	174.8	191.0	2-yr, 24-hr	160.7	199.6	206.0	225.9	2-yr, 24-hr
SD2001	ST2001	ST2000	PRISON_OFFSITE6	33	3.5	331.9	140.15	140.0	0.06	0.035	157.8	187.7	190.6	190.8	2-yr, 24-hr	150.7	191.5	196.6	216.5	2-yr, 24-hr
SD2002	ST2002	ST2001	PRISON_OFFSITE5	40	3.5	630.6	140.45	140.2	0.05	0.035	143.6	179.7	178.7	184.3	2-yr, 24-hr	172.0	182.4	191.0	215.3	2-yr, 24-hr
SD2003	ST2003	ST2002	PRISON_OFFSITE4	19	3.5	359.2	140.95	140.5	0.14	0.035	166.1	167.6	177.3	181.0	2-yr, 24-hr	174.5	177.2	189.9	214.5	2-yr, 24-hr
SD2004	ST2004	ST2003	PRISON_OFFSITE4	19	3.5	1208.4	142.45	141.0	0.12	0.035	135.7	141.5	156.5	179.6	2-yr, 24-hr	145.3	175.5	189.3	214.1	2-yr, 24-hr
SD2005	ST2005	ST2004	PRISON_OFFSITE3	48	3	1322.9	142.95	142.5	0.04	0.035	121.1	143.8	156.6	177.1	2-yr, 24-hr	138.2	171.1	186.8	207.0	2-yr, 24-hr
SD2006	ST2006	ST2005	PRISON_OFFSITE2	23.4	2.3	705.4	143.85	143.0	0.13	0.035	132.5	173.0	192.3	219.2	2-yr, 24-hr	159.1	208.4	231.2	260.1	2-yr, 24-hr
SD2007	ST2007	ST2006	PRISON_OFFSITE2	23.4	2.3	46.3	143.95	143.9	0.22	0.035	137.8	182.4	203.7	232.9	2-yr, 24-hr	166.8	220.2	245.4	280.0	2-yr, 24-hr
SD2008	ST2008	ST2007	PRISON_OFFSITE2	23.4	2.3	195.6	144.15	144.0	0.10	0.035	140.3	187.1	209.8	241.4	2-yr, 24-hr	170.1	226.5	253.7	290.8	2-yr, 24-hr
SD2009	ST2009	ST2008	PRISON_OFFSITE2	23.4	2.3	1744.5	145.45	144.2	0.10	0.035	17.3	34.6	42.9	55.8	2-yr, 24-hr	19.8	39.8	54.8	73.7	2-yr, 24-hr
SD2010	ST2010	ST2009	PRISON_OFFSITE	20	4	108	150.46	145.5	4.18	0.035	29.5	78.9	115.0	90.8	10-yr, 24-hr	101.0	72.6	64.2	81.2	2-yr, 24-hr
SD2011	ST2011	ST2010	RECT_CLOSED	6	3	32	153.13	150.5	8.37	0.013	45.5	112.8	114.3	109.3	10-yr, 24-hr	110.2	115.1	81.6	86.6	2-yr, 24-hr
SD2012	ST2012	ST2011	PRISON_OFFSITE	20	4	89	160.54	153.1	8.35	0.035	28.7	54.1	57.9	62.4	100-yr, 24-hr	51.8	64.2	75.1	93.3	10-yr, 24-hr
SD2013	ST2013	ST2012	PRISON_OFFSITE	20	4	361	170.14	160.5	2.66	0.035	28.8	43.2	51.0	62.4	NF	43.8	64.2	77.1	89.5	100-yr, 24-hr
SD2014	ST2014	ST2013	RECT_CLOSED	6	3	32	170.46	170.1	1.00	0.013	28.8	43.1	51.0	62.5	NF	43.8	64.2	75.2	89.5	100-yr, 24-hr
SD2015	ST2015	ST2014	PRISON_OFFSITE	20	4	587	178.35	170.5	1.34	0.035	28.8	43.2	51.2	62.7	NF	43.9	64.5	75.6	89.8	NF
SD2016	ST2016	ST2015	CIRCULAR	3.5	-	279	187.75	178.4	3.37	0.013	28.8	43.3	51.4	62.9	NF	44.0	64.6	75.8	90.0	NF
SD2017	ST2017	ST2016	CIRCULAR	3.5	-	401	199.05	187.8	2.79	0.013	28.8	43.3	51.4	62.8	NF	44.0	64.6	75.8	90.0	NF
SD2018	ST2018	ST2017	CIRCULAR	3.5	-	551	201.95	199.1	0.50	0.013	28.8	43.4	51.4	62.9	NF	44.0	64.7	75.9	90.1	NF
SD2019	ST2019	ST2018	CIRCULAR	3.5	-	69	202.45	202.0	0.49	0.013	28.8	43.6	51.8	63.4	NF	44.2	65.1	75.9	90.1	NF
SD2403B	ST2100	ST2403	CIRCULAR	4	-	79.9	222.7	222.1	1.29	0.013	50.8	63.0	67.7	73.4	NF	58.7	69.1	72.9	77.5	NF
SD2403	ST2100	ST2403	CIRCULAR	4	-	80.8	222.7	222.1	0.84	0.013	46.1	59.5	64.6	70.1	NF	55.0	66.1	69.7	75.5	NF
SD2100	ST2101	ST2100	CIRCULAR	3	-	602.1	224.96	222.7	0.31	0.013	34.0	41.9	44.3	46.6	NF	42.8	48.0	49.3	51.2	NF
SD2101	ST2101	ST2100	CIRCULAR	3	-	603.7	224.96	222.7	0.28	0.013	33.9	41.8	44.2	46.5	NF	43.2	47.9	49.2	51.2	NF
SD2440	ST2101A	ST2431	CIRCULAR	2	-	327.1	196.41	192.3	1.19	0.013	37.9	47.3	51.3	56.2	2-yr, 24-hr	47.3	55.7	59.5	65.2	2-yr, 24-hr
SD2102	ST2102	ST2101	COMMERCE_CIR_DITCH	140.2	7.4	493.4	226.88	225.0	0.37	0.035	37.9	44.8	46.6	48.6	NF	45.0	48.8	49.9	50.3	NF
SD2439	ST2102A	ST2101A	CIRCULAR	4	-	346.6	198.2	196.4	0.50	0.013	38.8	54.5	55.8	70.9	10-yr, 24-hr	54.2	65.0	60.2	65.8	2-yr, 24-hr
SD2103	ST2103	ST2102	CIRCULAR	4	-	30	226.56	226.9	-1.07	0.024	37.9	42.6	44.4	46.1	NF	42.8	46.0	46.9	47.2	25-yr, 24-hr
SD2438	ST2103A	ST2102A	CIRCULAR	4	-	334.3	200.05	198.2	0.49	0.013	39.4	57.1	61.3	71.7	10-yr, 24-hr	57.6	62.7	63.5	69.7	2-yr, 24-hr
SD2104	ST2104	ST2103	BASALT_CR5_UPDATE	91.5	4	367.5	225.75	226.6	-0.22	0.035	38.1	43.3	44.2	45.0	2-yr, 24-hr	43.1	44.5	44.9	45.1	2-yr, 24-hr
SD2437	ST2104A	ST2103A	CIRCULAR	4	-	302.8	203.63	200.1	1.12	0.013	43.4	57.9	66.1	73.3	10-yr, 24-hr	59.9	69.9	71.2	75.6	2-yr, 24-hr
SD2105	ST2105	ST2104	CIRCULAR	4	-	96.7	226.41	225.8	0.68	0.024	39.7	44.1	45.9	47.4	NF	43.4	46.6	47.6	48.5	NF
SD2167	ST2105A	ST2104A	CIRCULAR	4	-	109.2	204.37	203.6	0.49	0.013	45.1	60.2	70.5	79.7	10-yr, 24-hr	63.2	76.4	77.6	80.1	2-yr, 24-hr
SD2106	ST2106	ST2105	COMMERCE_CIR_DITCH	42.1	9.8	754	226.75	226.4	0.05	0.035	41.0	44.6	46.7	48.8	NF	43.7	48.0	49.4	50.9	NF
SD2164	ST2106A	ST2105A	CIRCULAR	3.5	-	117.7	205.46	204.4	0.50	0.013	18.3	22.6	23.5	26.7	10-yr, 24-hr	35.8	43.4	44.2	43.4	2-yr, 24-hr
SD2107	ST2107	ST2120	COMMERCE_CIR_DITCH	26.4	7.4	965	227.47	226.7	0.08	0.035	28.8	28.8	29.1	29.5	NF	29.7	29.7	29.7	29.9	NF
SD2163	ST2107A	ST2106A	CIRCULAR	3.5	-	227.5	206.8	205.5	0.50	0.013	18.0	24.5	27.2	32.0	10-yr, 24-hr	42.2	48.6	48.5	50.6	2-yr, 24-hr
SD2108	ST2108	ST2101	BASALT_CR	24	5	300	228.84	225.0	1.27	0.035	22.8	34.0	40.2	50.4	NF	41.8	63.5	73.7	81.8	NF
17184	ST2108A	ST2107A	CIRCULAR	3.5	-	119.8	207.59	206.8	0.49	0.013	18.1	24.9	31.6	40.8	25-yr, 24-hr	41.9	48.0	48.4	48.5	2-yr, 24-hr
SD2109	ST2109	ST2108	BASALT_CR7	48	4	500	229.63	228.8	0.16	0.035	23.0	34.2	40.4	51.2	NF	42.1	63.9	74.2	85.8	NF
17195	ST2109A	ST2186	CIRCULAR	3.5	-	236.9	209.13	208.0	0.48	0.013	18.2	24.5	34.7	40.4	25-yr, 24-hr	40.5	47.4	47.7	47.6	10-yr, 24-hr
SD2110	ST2110	ST2109	CIRCULAR	3	-	70	230.56	229.6	1.33	0.013	23.0	34.4	40.6	52.0	NF	42.2	64.1	74.4	86.0	NF
17194	ST2110A	ST2109A	CIRCULAR	3.5	-	299.2	212.26	209.1	0.98	0.013	18.4	25.8	34.7	40.4	25-yr, 24-hr	40.3	47.4	47.6	47.9	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2111	ST2111	ST2110	BASALT_CR6	48	2	330	236.05	230.6	1.66	0.035	23.7	35.9	42.8	51.9	NF	44.3	64.1	74.4	86.0	NF
17203	ST2111A	ST2110A	CIRCULAR	3	-	177.8	214.19	212.3	0.80	0.013	17.4	26.8	34.5	40.4	100-yr, 24-hr	40.1	47.3	47.6	47.9	10-yr, 24-hr
SD2112	ST2112	ST2111	CIRCULAR	2	-	279.3	240.69	236.1	1.45	0.013	23.7	36.1	43.0	52.0	100-yr, 24-hr	44.4	64.2	74.5	88.8	10-yr, 24-hr
17201	ST2112A	ST2111A	CIRCULAR	3	-	178.4	215.82	214.2	0.80	0.013	17.4	28.7	34.3	40.5	100-yr, 24-hr	39.9	47.3	47.5	49.2	10-yr, 24-hr
SD2113	ST2113	ST2100	CIRCULAR	4	-	235.4	224.98	222.7	0.65	0.013	29.8	40.8	44.7	51.1	NF	30.2	41.0	45.2	51.6	NF
17269	ST2113A	ST2112A	CIRCULAR	3	-	329.5	218.27	215.8	0.68	0.013	17.4	27.5	34.2	40.5	100-yr, 24-hr	39.7	47.3	47.5	52.9	10-yr, 24-hr
SD2114	ST2114	ST2113	CIRCULAR	4	-	282.9	227.4	225.0	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17271	ST2114A	ST2113A	CIRCULAR	3	-	166	219.51	218.3	0.63	0.013	17.4	27.0	34.0	40.4	100-yr, 24-hr	39.5	47.2	50.3	57.1	10-yr, 24-hr
SD2115	ST2115	ST2114	CIRCULAR	4	-	242	229.45	227.4	0.82	0.013	29.8	40.8	44.7	51.2	NF	30.3	41.0	45.2	51.7	NF
17280	ST2115A	ST2114A	CIRCULAR	3	-	166.1	220.95	219.5	0.75	0.013	17.4	27.6	33.7	40.4	100-yr, 24-hr	39.2	48.0	52.8	60.2	10-yr, 24-hr
SD2116	ST2116	ST2115	BASALT_CR11	16	4	150	233.95	229.5	3.00	0.035	29.8	40.8	44.7	51.2	NF	30.3	41.1	45.2	51.8	NF
17282	ST2116A	ST2115A	CIRCULAR	2.5	-	300.4	224.4	221.0	0.98	0.013	17.4	28.8	33.5	40.2	100-yr, 24-hr	39.0	50.1	55.9	64.5	10-yr, 24-hr
SD2117	ST2117	ST2116	CIRCULAR	3	-	288	235.45	234.0	0.69	0.013	29.8	40.8	44.7	51.2	100-yr, 24-hr	30.3	41.1	45.2	51.8	100-yr, 24-hr
17285	ST2117A	ST2116A	CIRCULAR	2.5	-	159.9	226.55	224.4	1.22	0.013	17.4	26.7	33.2	40.2	NF	38.8	52.1	59.0	68.8	10-yr, 24-hr
SD2118	ST2118	ST2117	BASALT_CR10	44	4	380	241.45	235.5	1.45	0.035	30.8	45.2	50.3	59.7	NF	31.3	44.7	51.0	60.3	NF
17290	ST2118A	ST2117A	CIRCULAR	2.5	-	202.4	229.21	226.6	1.22	0.013	17.4	26.7	34.1	40.2	NF	38.5	53.8	61.8	72.8	10-yr, 24-hr
17291	ST2119A	ST2118A	CIRCULAR	2.5	-	120	230.56	229.2	0.96	0.013	17.4	26.7	32.4	40.2	100-yr, 24-hr	38.2	55.5	64.5	76.8	10-yr, 24-hr
SD2120	ST2120	ST2106	CIRCULAR	4	-	62	226.67	226.8	-0.13	0.024	41.8	45.3	47.2	49.5	NF	44.2	48.7	50.5	52.2	NF
SD2121	ST2121	ST2107	ARCH	3	1.67	53.8	228.59	227.5	2.10	0.024	14.1	13.5	13.2	13.3	NF	13.6	13.5	13.5	13.6	NF
DAY_RD_BYPASS_CHANNEL	ST2122	DAY_RD_IMPOUNDMENT	TRAPEZOIDAL	17	3	20	226.18	227.6	0.01	0.035	54.6	89.7	108.5	135.0	NF	105.6	163.5	193.1	233.5	NF
SD2122	ST2122	ST2121	COMMERCE_CIR_DITCH	20.9	3.7	583	226.18	228.6	-0.41	0.035	19.2	15.8	14.1	14.1	NF	14.4	14.1	14.1	14.4	NF
SD2123	ST2123	ST2122	CIRCULAR	3	-	43	226.37	226.2	0.44	0.024	66.6	98.9	116.2	140.8	NF	115.3	171.1	200.0	239.7	100-yr, 24-hr
17196	ST2186	ST2108A	CIRCULAR	3.5	-	42.6	207.99	207.6	0.47	0.013	17.6	24.7	34.8	40.4	25-yr, 24-hr	41.0	47.5	48.0	47.8	10-yr, 24-hr
SD2706	ST2400	ST2706	BASALT_CR3	42	5	1130	214.45	175.5	3.45	0.035	133.9	178.5	197.6	223.3	NF	155.1	196.9	214.7	238.8	NF
SD2400	ST2401	ST2400	BASALT_CR3	42	5	90	214.9	214.5	0.50	0.035	134.0	178.5	197.7	223.4	NF	155.1	197.0	214.8	238.9	NF
SD2401	ST2402	ST2401	BASALT_CR3	42	5	1110	220.95	214.9	0.55	0.035	134.3	178.7	197.9	223.6	NF	155.3	197.2	215.0	239.1	NF
SD2402	ST2403	ST2402	BASALT_CR8	38	5	1000	222.09	221.0	0.10	0.035	96.3	121.7	131.5	142.6	NF	113.1	134.4	141.9	152.3	NF
SD2404	ST2404	ST2402	BASALT_CR2	30	5	400	228.12	221.0	1.67	0.035	19.9	29.9	35.2	42.8	NF	23.1	33.6	39.0	47.1	NF
SD2405	ST2405	ST2404	CIRCULAR	4.5	-	250	228.12	228.1	0.00	0.013	19.9	29.9	35.2	42.9	NF	23.1	33.6	39.1	47.1	NF
SD2406	ST2406	ST2405	BASALT_CR	24	5	450	229.5	228.1	0.31	0.035	15.5	23.4	27.6	33.5	NF	18.7	27.2	31.5	38.0	NF
SD2407	ST2407	ST2406	CIRCULAR	3.5	-	677	236.7	229.5	1.06	0.011	13.8	20.6	24.1	28.9	NF	14.1	20.6	23.8	28.6	NF
SD2408	ST2408	ST2407	CIRCULAR	3	-	131	238.66	236.7	1.18	0.011	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2409	ST2409	ST2408	CIRCULAR	3	-	242.8	240.25	238.7	0.54	0.013	5.1	11.2	14.3	18.6	NF	5.4	11.2	14.1	18.3	NF
SD2716	ST2410	ST2715	CIRCULAR	1.5	-	253	214.7	210.3	1.42	0.013	5.0	7.6	9.1	11.4	NF	5.1	8.1	9.7	11.9	NF
SD2412	ST2411	ST2410	CIRCULAR	1.25	-	284	217.44	214.7	0.84	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2413	ST2412	ST2411	CIRCULAR	1.25	-	415.1	221.01	217.4	0.85	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2414	ST2413	ST2412	CIRCULAR	1.25	-	318.4	223.72	221.0	0.82	0.013	0.6	0.8	1.0	1.2	NF	0.6	0.9	1.0	1.3	NF
SD2442	ST2431	ST2432	CIRCULAR	2	-	69	192.31	189.3	4.08	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2443	ST2432	ST2433	CIRCULAR	2.25	-	67.6	189.3	188.4	1.35	0.013	37.9	47.3	51.3	56.2	100-yr, 24-hr	47.3	55.7	59.5	65.2	10-yr, 24-hr
SD2444	ST2433	ST2434	CIRCULAR	2.5	-	335.6	188.39	185.1	0.94	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	25-yr, 24-hr
SD2445	ST2434	ST2435	CIRCULAR	2.5	-	65	185.05	163.5	35.23	0.013	37.9	47.3	51.3	56.2	NF	47.3	55.7	59.5	65.2	NF
SD2446	ST2435	ST2004	PRISON_OFFSITE3	48	3	2000	163.45	142.5	1.05	0.035	37.4	47.1	51.2	56.2	NF	47.1	55.7	59.5	65.2	NF
SD2700	ST2700	ST4003	COFFEE_CR2	80	3.5	900	143.45	140.0	0.39	0.035	147.8	203.5	204.0	224.2	NF	170.4	192.2	226.7	298.4	10-yr, 24-hr
SD2701	ST2701	ST2700	COFFEE_CR2	80	3.5	1000	147.95	143.5	0.45	0.035	149.7	205.8	230.9	261.4	NF	172.0	223.8	248.1	278.0	NF
SD2702	ST2702	ST2701	COFFEE_CR2	80	3.5	1100	169.45	148.0	1.95	0.035	151.0	207.1	232.5	263.4	NF	173.3	225.7	250.1	280.6	NF
SD2703	ST2703	ST2702	COFFEE_CR	40	5	50	173.45	169.5	8.03	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2704	ST2705	ST2703	BASALT_CR4	44	4	350	173.95	173.5	0.14	0.035	151.3	207.3	232.7	263.6	NF	173.5	225.9	250.4	281.0	NF
SD2705	ST2706	ST2705	BASALT_CR3	42	5	170	175.45	174.0	0.88	0.035	133.6	178.3	197.4	223.1	NF	154.9	196.7	214.5	238.6	NF
SD2707	ST2707	ST2705	CIRCULAR	2.5	-	48	178.69	174.0	6.79	0.013	24.2	35.8	40.7	47.6	NF	24.4	36.2	41.3	48.2	NF
SD2708	ST2708	ST2707	CIRCULAR	2.5	-	452	182.05	178.7	0.70	0.013	15.6	22.9	26.0	29.3	NF	15.7	23.3	26.6	30.1	NF
SD2709	ST2709	ST2708	CIRCULAR	2	-	274	188.85	182.1	2.30	0.013	15.6	23.1	26.3	29.5	NF	15.7	23.5	27.0	33.6	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD2710	ST2710	ST2709	CIRCULAR	2	-	400	195.05	188.9	1.50	0.013	15.6	23.1	27.4	32.1	100-yr, 24-hr	15.7	23.5	30.2	32.2	100-yr, 24-hr
SD2711	ST2711	ST2710	CIRCULAR	2	-	400	200.45	195.1	1.30	0.013	15.6	23.1	27.3	32.7	100-yr, 24-hr	15.7	23.5	28.4	32.9	100-yr, 24-hr
SD2712	ST2712	ST2711	CIRCULAR	3	-	106.1	203.05	200.5	2.45	0.013	5.0	7.6	11.8	30.3	100-yr, 24-hr	5.1	8.0	13.4	29.9	100-yr, 24-hr
SD2713	ST2713	ST2712	CIRCULAR	2	-	247.2	205.72	203.1	0.76	0.013	5.0	7.6	9.1	14.3	NF	5.1	8.0	9.8	15.7	100-yr, 24-hr
SD2714	ST2714	ST2713	CIRCULAR	2	-	174.8	206.95	205.7	0.70	0.013	5.0	7.6	9.1	13.8	NF	5.1	8.0	9.7	16.9	100-yr, 24-hr
SD2715	ST2715	ST2714	CIRCULAR	1.75	-	293	210.3	207.0	1.04	0.013	5.0	7.6	9.1	11.7	NF	5.1	8.0	9.7	13.8	NF
SD2717	ST2716	ST4015	CIRCULAR	2.5	-	84.3	171.46	169.9	1.74	0.024	12.5	23.4	25.0	26.7	25-yr, 24-hr	13.7	24.1	25.5	26.9	25-yr, 24-hr
SD2718	ST2717B	ST2716	CIRCULAR	2.5	-	75	172.13	171.5	0.89	0.024	12.5	23.4	25.0	26.6	25-yr, 24-hr	13.8	24.1	25.5	26.8	25-yr, 24-hr
SD2719	ST2718	ST2717	COFFEE_CR	40	5	680	186.45	172.1	2.11	0.035	15.3	22.5	25.5	30.3	NF	15.9	23.0	26.1	31.0	NF
SD2720	ST2719	ST2718	ARCH	4.5	2.25	76	188.2	186.5	2.30	0.024	15.3	22.6	25.6	30.3	NF	16.0	23.1	26.2	31.0	NF
SD2721	ST2720	ST2719	COFFEE_CR	40	5	640	205.45	188.2	2.70	0.035	15.9	23.7	26.6	31.5	NF	16.6	24.0	27.3	32.8	NF
SD3000	ST3001	ST3201	CIRCULAR	1.25	-	111.7	171.92	113.5	25.67	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3001	ST3002	ST3001	CIRCULAR	1.25	-	71.5	180.31	171.9	11.82	0.011	4.4	6.8	8.1	10.0	NF	4.4	6.9	8.2	10.1	NF
SD3002	ST3003	ST3002	CIRCULAR	1.25	-	116.4	188.52	180.3	7.07	0.011	4.4	6.8	8.1	10.2	NF	4.4	6.9	8.2	10.2	NF
SD3003	ST3004	ST3003	CIRCULAR	1.25	-	35	190.86	188.5	4.58	0.011	4.4	6.8	8.1	11.4	NF	4.4	6.9	8.2	10.6	NF
SD3004	ST3005	ST3004	CIRCULAR	1.25	-	293	195.52	190.9	1.53	0.011	4.4	6.8	8.1	10.7	NF	4.5	6.9	8.2	10.6	NF
SD3006	ST3007	03000	N_FORK_MERIDIAN_CR	22	4	5350	153.45	58.5	1.78	0.035	36.1	52.3	59.8	71.2	NF	61.6	85.8	98.4	120.8	NF
SD3007	ST3008	ST3007	N_FORK_MERIDIAN_CR	22	4	500	169.45	153.5	2.20	0.035	38.0	54.6	62.6	73.6	NF	63.6	88.7	101.6	123.8	NF
SD3008	ST3009	ST3008	N_FORK_MERIDIAN_CR	22	4	750	185.82	169.5	2.18	0.035	18.4	26.6	29.2	35.4	NF	24.5	30.8	34.9	46.1	NF
SD3009	ST3010	ST3009	CIRCULAR	2	-	63.8	190	185.8	6.57	0.011	18.4	26.6	29.2	40.5	NF	24.5	30.9	34.9	54.0	100-yr, 24-hr
SD3010	ST3011	ST3010	CIRCULAR	2	-	198	191.45	190.0	0.73	0.011	18.4	26.6	29.2	36.8	NF	24.5	30.9	34.9	49.3	100-yr, 24-hr
SD3011	ST3012	ST3011	N_FORK_MERIDIAN_CR	22	4	260	192.03	191.5	0.22	0.035	6.9	11.2	13.6	25.3	NF	14.6	18.0	19.5	37.2	100-yr, 24-hr
SD3012	ST3013	ST3012	CIRCULAR	3	-	101.9	198.56	192.0	6.42	0.013	6.4	9.9	11.9	25.2	NF	13.7	16.1	17.2	36.7	NF
SD3013	ST3014	ST3013	CIRCULAR	3	-	27.7	200.02	198.6	4.55	0.011	6.4	9.9	11.9	29.3	NF	13.7	16.1	17.2	36.7	NF
SD3014	ST3015	ST3014	CIRCULAR	3	-	116.1	204.42	200.0	3.79	0.013	6.4	9.9	11.9	17.3	NF	13.7	16.1	17.2	36.7	NF
SD3015	ST3016	ST3015	CIRCULAR	3	-	31.7	206.09	204.4	4.32	0.013	6.4	9.9	11.9	13.6	NF	13.7	16.1	17.2	53.3	NF
SD3016	ST3017	ST3016	N_FORK_MERIDIAN_CR	22	4	600	211.15	206.1	0.84	0.035	6.5	10.1	12.0	13.7	NF	13.7	16.1	17.2	18.9	NF
SD3017	ST3018	ST3011	CIRCULAR	2	-	158.4	203.41	191.5	3.18	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	15.6	NF
SD3018	ST3019	ST3018	CIRCULAR	2	-	61.4	204.08	203.4	1.01	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	7.0	NF
SD3019	ST3020	ST3019	CIRCULAR	2	-	266.8	205.51	204.1	0.50	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	5.0	NF
SD3020	ST3021	ST3020	CIRCULAR	1.5	-	56.5	209.33	205.5	4.48	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3021	ST3022	ST3021	CIRCULAR	1.5	-	203.2	210.35	209.3	0.40	0.011	1.2	2.0	2.5	3.3	NF	1.8	2.9	3.5	4.4	NF
SD3022	ST3023	ST3022	CIRCULAR	1.25	-	38.7	211.86	210.4	0.41	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3023	ST3024	ST3023	CIRCULAR	1.25	-	220.6	212.84	211.9	0.40	0.011	1.2	2.0	2.6	3.4	NF	1.9	2.9	3.5	4.4	NF
SD3201	ST3200	ST3201	BOECKMAN_CR_D	123.6	15.8	1100	127.59	113.5	1.29	0.035	124.0	161.8	188.4	281.1	NF	166.9	227.1	280.9	280.9	NF
SD3202	ST3201	ST3202	BOECKMAN_CR2	40	10	1100	113.45	111.5	0.18	0.035	132.6	172.7	195.5	285.6	NF	173.4	232.9	284.6	284.8	NF
SD3603	ST3202	ST3603	BOECKMAN_CR2	40	10	900	111.45	105.5	0.67	0.035	132.4	172.6	195.3	285.4	NF	173.3	232.1	284.5	284.8	NF
SD3203	ST3203	ST4025	CIRCULAR	3	-	100	177.45	177.0	0.50	0.013	39.1	51.4	56.3	70.1	25-yr, 24-hr	50.1	61.4	76.5	95.2	10-yr, 24-hr
SD3204	ST3204	ST3203	S_COFFEE_CR3	29	2	250	181.45	177.5	1.60	0.035	39.1	51.4	57.6	102.9	NF	50.1	94.4	109.5	118.2	25-yr, 24-hr
SD3220	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	15.6	23.8	27.0	24.4	100-yr, 24-hr	26.4	25.2	53.8	28.2	10-yr, 24-hr
SD3225	ST3205	ST3204	CIRCULAR	3	-	100	183.45	181.5	2.00	0.024	7.8	11.9	13.5	48.8	100-yr, 24-hr	13.2	50.4	26.9	56.4	10-yr, 24-hr
SD3221	ST3206	ST3205	S_COFFEE_CR2	30	2	750	190.73	183.5	0.97	0.035	23.6	36.1	43.2	54.5	NF	39.7	58.5	68.6	77.4	NF
SD3205	ST3207	ST3206	CIRCULAR	3	-	90.5	192.45	190.7	1.90	0.013	15.1	13.0	15.4	18.5	NF	25.6	19.7	22.4	58.5	NF
SD3206	ST3207	ST3206	CIRCULAR	2	-	90.6	192.45	190.7	0.79	0.013	8.6	23.2	28.0	36.1	NF	14.2	39.0	46.4	29.8	NF
SD3207	ST3208	ST3207	S_COFFEE_CR	16	2	1400	206.95	192.5	1.04	0.035	14.5	21.7	25.9	32.4	NF	14.8	22.4	27.0	34.7	NF
SD3208	ST3209	ST3208	CIRCULAR	1.5	-	204.1	210.24	207.0	1.20	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3209	ST3210	ST3209	CIRCULAR	1.5	-	218.1	212.35	210.2	0.88	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3210	ST3211	ST3210	CIRCULAR	1.5	-	50	213.1	212.4	1.30	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3211	ST3212	ST3211	CIRCULAR	1.5	-	38	213.53	213.1	0.66	0.013	2.7	4.0	4.8	5.8	NF	2.8	4.3	5.0	6.1	NF
SD3418	ST3217	ST3417	CIRCULAR	1.25	-	279.3	188.65	186.5	0.70	0.013	1.7	2.8	3.5	4.5	NF	4.3	6.5	7.6	9.3	NF
SD3216	ST3218	ST3217	CIRCULAR	1.25	-	242.9	192.02	188.7	1.37	0.013	1.7	2.8	3.5	4.6	NF	4.3	6.5	7.6	9.3	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3400	ST3400	ST5039	CIRCULAR	4	-	88	158.96	155.2	0.48	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.5	87.7	NF
SD3401	ST3401	ST3400	CIRCULAR	3.5	-	17.3	159.33	159.0	2.14	0.013	27.6	42.8	50.7	62.4	NF	31.6	48.5	56.9	73.2	NF
SD3402	ST3402	ST3401	CIRCULAR	3.5	-	187.4	160.35	159.3	0.54	0.013	27.6	42.9	50.7	62.4	NF	31.6	48.5	56.9	70.5	NF
SD3403	ST3403	ST3402	CIRCULAR	3.5	-	400	162.32	160.4	0.44	0.013	19.3	30.7	36.5	45.3	NF	21.4	33.6	40.0	49.5	NF
SD3404	ST3404	ST3403	CIRCULAR	3	-	365	165.43	162.3	0.81	0.011	19.4	30.8	36.5	45.2	NF	21.5	33.6	39.8	50.7	NF
SD3405	ST3405	ST3404	CIRCULAR	2	-	410	170.29	165.4	0.89	0.011	7.6	11.4	13.5	16.4	NF	8.9	13.2	15.5	19.1	NF
SD3406	ST3406	ST3405	CIRCULAR	2	-	11.7	171.08	170.3	6.34	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3407	ST3407	ST3406	CIRCULAR	2	-	143	171.45	171.1	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3408	ST3408	ST3407	CIRCULAR	2	-	163	171.85	171.5	0.12	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3409	ST3409	ST3408	CIRCULAR	2	-	77	172.15	171.9	0.13	0.013	7.6	11.4	13.5	16.5	NF	8.9	13.2	15.5	18.7	NF
SD3410	ST3410	ST3409	CIRCULAR	2	-	145	174.88	172.2	1.75	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.5	18.7	NF
SD3411	ST3411	ST3410	CIRCULAR	2	-	60	175.55	174.9	0.78	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3412	ST3412	ST3411	CIRCULAR	2	-	27.1	175.43	175.6	-0.81	0.011	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.7	NF
SD3413	ST3413	ST3412	CIRCULAR	2.5	-	145	176.1	175.4	0.46	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.2	15.6	18.8	NF
SD3414	ST3414	ST3413	CIRCULAR	2.5	-	20	176.25	176.1	0.75	0.013	7.6	11.4	13.5	16.5	NF	9.0	13.3	15.6	18.8	NF
SD3415	ST3415	ST3414	CIRCULAR	1.5	-	268	178.63	176.3	0.73	0.013	1.2	1.8	2.2	2.8	NF	2.1	3.0	3.5	4.4	NF
SD3416	ST3416	ST3415	CIRCULAR	1.25	-	254	182.49	178.6	1.41	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3417	ST3417	ST3416	CIRCULAR	1	-	230.5	186.51	182.5	1.61	0.013	1.2	1.8	2.2	2.7	NF	2.1	3.0	3.5	4.1	NF
SD3433	ST3417	ST3430	CIRCULAR	1.25	-	216.6	186.51	180.4	2.76	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3419	ST3418	ST3404	CIRCULAR	3	-	591	168.26	165.4	0.47	0.013	11.8	19.5	22.9	29.8	NF	12.6	20.3	24.3	31.5	NF
SD3420	ST3419	ST3418	CIRCULAR	3	-	429.1	169.25	168.3	0.23	0.013	9.4	15.9	18.8	24.1	NF	10.2	16.8	20.2	26.0	NF
SD3421	ST3420	ST3419	CIRCULAR	3	-	258	169.73	169.3	0.15	0.013	9.4	15.9	18.8	24.2	NF	10.2	16.8	20.3	26.0	NF
SD3422	ST3421	ST3420	CIRCULAR	1.75	-	247.8	170.98	169.7	0.50	0.013	3.2	6.2	7.0	9.3	NF	3.9	6.9	8.4	10.8	NF
SD3423	ST3421	ST4236	CIRCULAR	1.5	-	638	170.98	166.9	0.65	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD3424	ST3422	ST3421	CIRCULAR	1.75	-	59	170.81	171.0	-0.29	0.013	0.4	2.9	4.4	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3425	ST3423	ST3422	CIRCULAR	1.75	-	195	171.05	170.8	0.19	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.9	7.6	NF
SD3426	ST3424	ST3423	CIRCULAR	1.75	-	74.2	171.12	171.1	0.09	0.013	0.4	2.9	4.3	5.5	NF	1.6	4.8	5.8	7.6	NF
SD3427	ST3425	ST3424	CIRCULAR	1.75	-	479.2	169.61	171.1	0.18	0.013	0.4	2.9	4.4	5.5	NF	1.7	4.9	5.8	9.3	100-yr, 24-hr
SD3428	ST3426	ST3425	CIRCULAR	1.75	-	85.1	169.79	169.6	0.21	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.3	8.0	100-yr, 24-hr
SD3429	ST3427	ST3426	CIRCULAR	1.5	-	297.3	173.44	169.8	1.20	0.013	1.7	2.8	3.5	4.9	NF	3.4	5.2	6.8	8.0	100-yr, 24-hr
SD3430	ST3428	ST3427	CIRCULAR	1.5	-	434.9	178.86	173.4	1.21	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.3	NF
SD3431	ST3429	ST3428	CIRCULAR	1.5	-	171.5	179.89	178.9	0.59	0.013	1.7	2.8	3.5	4.5	NF	3.4	5.2	6.3	8.0	NF
SD3432	ST3430	ST3429	CIRCULAR	1.5	-	65.7	180.41	179.9	0.65	0.013	1.7	2.8	3.5	4.6	NF	3.4	5.3	6.4	8.0	NF
SD3434	ST3431	ST3400	CIRCULAR	3.5	-	51.4	160.46	159.0	0.90	0.013	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	18.6	NF
SD3435	ST3432	ST3431	CIRCULAR	2.5	-	257.6	163.39	160.5	1.04	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.5	17.8	NF
SD3436	ST3433	ST3432	CIRCULAR	2.5	-	287.9	166.73	163.4	1.09	0.011	7.6	11.5	13.7	16.9	NF	8.1	12.3	14.6	17.8	NF
SD3437	ST3434	ST3433	CIRCULAR	2.5	-	262.1	169.86	166.7	1.12	0.011	7.6	11.6	13.8	16.9	NF	8.1	12.3	14.6	17.9	NF
SD3438	ST3435	ST3434	CIRCULAR	2.25	-	318.2	174.35	169.9	1.34	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3439	ST3436	ST3435	CIRCULAR	2.25	-	442.3	180.59	174.4	1.40	0.011	7.6	11.6	13.8	17.0	NF	8.1	12.3	14.6	17.9	NF
SD3440	ST3437	ST3436	CIRCULAR	1.75	-	240	186.74	180.6	2.50	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3441	ST3438	ST3437	CIRCULAR	1.75	-	240	189.99	186.7	1.26	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3442	ST3439	ST3438	CIRCULAR	1.75	-	240	191.55	190.0	0.56	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3443	ST3440	ST3439	CIRCULAR	1.75	-	240	193.2	191.6	0.58	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3444	ST3441	ST3440	CIRCULAR	1.75	-	194.9	195.11	193.2	0.88	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3445	ST3442	ST3441	CIRCULAR	1.75	-	120	197.05	195.1	1.62	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3446	ST3443	ST3442	CIRCULAR	1.75	-	177	198.16	197.1	0.54	0.013	1.4	2.2	2.7	3.4	NF	1.5	2.3	2.8	3.5	NF
SD3447	ST3444	ST6036	CIRCULAR	2	-	230	150.86	142.2	3.65	0.013	14.1	21.2	24.5	29.1	NF	14.1	21.2	24.1	29.0	NF
SD3448	ST3445	ST3444	CIRCULAR	1.5	-	66	156.67	150.9	7.70	0.013	14.1	21.2	27.1	32.0	25-yr, 24-hr	14.1	21.2	27.3	31.9	25-yr, 24-hr
SD3449	ST3446	ST3445	CIRCULAR	1.5	-	173.9	166.18	156.7	4.71	0.013	5.4	8.1	9.4	10.9	NF	5.4	8.1	9.4	10.9	NF
SD3450	ST3447	ST3446	CIRCULAR	1.5	-	29.7	166.66	166.2	1.62	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF
SD3451	ST3448	ST3447	CIRCULAR	1.5	-	198.7	168.66	166.7	1.06	0.013	5.4	8.1	9.3	10.2	NF	5.4	8.1	9.3	10.2	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD3452	ST3449	ST3448	CIRCULAR	1.5	-	214.2	171.41	168.7	1.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3453	ST3450	ST3449	CIRCULAR	1.25	-	178.4	175.05	171.4	2.20	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD3454	ST3451	ST3450	CIRCULAR	1.25	-	268.6	175.8	175.1	0.28	0.013	1.2	1.8	2.2	2.7	NF	1.2	1.8	2.2	2.7	NF
SD5204	ST3600	ST5203	BOECKMAN_CR_WILSO	42.5	5.5	49	95.2	94.5	1.53	0.035	158.4	210.4	236.5	299.5	NF	194.7	256.7	297.1	299.4	NF
SD3601	ST3602	ST3600	BOECKMAN_CR2	40	10	1250	103.45	95.2	0.66	0.035	144.2	190.0	212.1	292.0	NF	182.6	244.0	290.5	290.8	NF
SD3602	ST3603	ST3602	BOECKMAN_CR2	40	10	600	105.45	103.5	0.33	0.035	132.1	172.5	195.1	285.4	NF	173.2	231.5	284.5	284.8	NF
SD5503	ST3605	ST5501	S_FORK_MERIDIAN_CR	22	4	1250	167.45	111.5	4.48	0.035	16.7	24.7	29.1	35.3	NF	16.7	24.8	29.1	35.3	NF
SD3605	ST3606	ST3605	S_FORK_MERIDIAN_CR	22	4	530	184.96	167.5	3.31	0.035	16.8	25.0	29.3	35.5	NF	16.8	25.0	29.4	35.6	NF
SD4206	ST4000	ST4205	SEALY_DITCH	80	3.5	1450	138.45	138.0	0.03	0.035	238.1	298.7	322.9	432.6	2-yr, 24-hr	347.9	459.9	437.7	382.8	2-yr, 24-hr
SD4000	ST4001	ST4000	SEALY_DITCH	80	3.5	1600	138.95	138.5	0.03	0.035	231.5	286.9	307.7	330.4	2-yr, 24-hr	291.9	318.2	340.1	370.9	2-yr, 24-hr
SD4001	ST4002	ST4001	SEALY_DITCH	80	3.5	400	139.45	139.0	0.13	0.035	240.2	269.7	286.4	320.0	2-yr, 24-hr	272.0	306.5	325.4	345.5	2-yr, 24-hr
SD4002	ST4003	ST4002	COFFEE_CR2	80	3.5	150	139.95	139.5	0.33	0.035	158.6	212.3	215.6	236.8	2-yr, 24-hr	173.2	204.2	227.8	264.8	2-yr, 24-hr
SD4003	ST4004	ST4003	COFFEE_CR2	80	3.5	1400	149.66	140.0	0.69	0.035	29.5	50.8	54.5	58.5	NF	31.1	51.5	54.8	58.8	NF
SD4004	ST4005	ST4004	CIRCULAR	3	-	75	150.66	149.7	1.33	0.024	30.5	51.7	55.3	59.1	100-yr, 24-hr	32.0	52.4	55.6	59.3	100-yr, 24-hr
SD4005	ST4006	ST4005	CIRCULAR	3	-	300	154.66	150.7	1.33	0.024	30.5	51.7	55.3	59.1	10-yr, 24-hr	32.0	52.4	55.6	59.3	10-yr, 24-hr
SD4006	ST4007	ST4006	CIRCULAR	2.5	-	390	167.15	154.7	3.08	0.024	19.0	33.6	34.2	35.1	25-yr, 24-hr	21.3	34.0	34.6	35.3	25-yr, 24-hr
SD4007	ST4008	ST4007	CIRCULAR	2.5	-	146	168.68	167.2	1.05	0.024	19.0	33.0	33.8	34.8	10-yr, 24-hr	21.3	33.5	34.1	35.3	10-yr, 24-hr
SD4008	ST4009	ST4008	CIRCULAR	2	-	88.5	172.51	168.7	3.27	0.024	7.6	11.6	12.4	14.7	10-yr, 24-hr	8.4	12.4	13.7	15.9	10-yr, 24-hr
SD4009	ST4010	ST4009	CIRCULAR	2	-	21.1	172.71	172.5	0.95	0.024	7.6	11.3	12.4	14.7	25-yr, 24-hr	8.4	12.2	13.7	16.0	10-yr, 24-hr
SD4010	ST4011	ST4010	CIRCULAR	2	-	58.9	176.05	172.7	5.59	0.024	7.6	11.2	12.5	14.8	25-yr, 24-hr	8.4	12.0	13.7	16.0	10-yr, 24-hr
SD4011	ST4012	ST4011	CIRCULAR	2	-	429.3	185.15	176.1	2.12	0.024	7.6	11.6	13.3	15.2	100-yr, 24-hr	8.4	12.7	14.4	16.5	100-yr, 24-hr
SD4012	ST4013	ST4006	CIRCULAR	3	-	29.7	156.9	154.7	5.87	0.013	14.9	21.5	25.4	30.2	10-yr, 24-hr	14.9	21.6	25.4	30.2	10-yr, 24-hr
SD4013	ST4014	ST4013	CIRCULAR	3	-	195	159.2	156.9	0.92	0.013	14.9	22.7	25.7	30.5	100-yr, 24-hr	14.9	22.0	25.7	30.5	100-yr, 24-hr
SD4014	ST4015	ST4008	CIRCULAR	2.5	-	44.1	169.86	168.7	1.00	0.024	12.5	23.5	25.0	26.8	10-yr, 24-hr	13.8	24.2	25.6	27.0	10-yr, 24-hr
SD4015	ST4016	ST4206	S_COFFEE_CR5	16	2	700	143.95	141.7	0.29	0.035	47.7	59.0	62.8	69.7	10-yr, 24-hr	58.3	65.8	70.8	75.5	2-yr, 24-hr
SD4016	ST4017	ST4016	S_COFFEE_CR6	10	2	1150	150.25	144.0	0.55	0.035	48.5	65.6	65.8	73.3	10-yr, 24-hr	62.9	68.1	74.8	78.7	10-yr, 24-hr
SD4017	ST4018	ST4017	CIRCULAR	4.92	-	40	151.01	150.3	1.90	0.013	55.0	69.3	70.4	80.9	10-yr, 24-hr	63.7	73.8	81.3	84.7	10-yr, 24-hr
SD4018	ST4019	ST4018	S_COFFEE_CR4	9	2	90	152.72	151.0	1.90	0.035	54.9	69.6	70.8	82.0	10-yr, 24-hr	64.2	74.3	82.5	85.5	10-yr, 24-hr
SD4019	ST4020	ST4019	CIRCULAR	4.25	-	35	153.4	152.7	1.94	0.013	55.3	69.9	73.8	83.2	10-yr, 24-hr	64.7	75.2	83.7	86.3	10-yr, 24-hr
SD4020	ST4021	ST4020	S_COFFEE_CR4	9	2	580	164.48	153.4	1.91	0.035	54.5	73.8	75.3	91.8	100-yr, 24-hr	67.8	78.9	92.7	94.6	25-yr, 24-hr
SD4021	ST4022	ST4021	CIRCULAR	3.5	-	30	165.05	164.5	1.90	0.013	38.7	64.1	68.6	70.9	100-yr, 24-hr	50.1	70.4	73.0	74.8	25-yr, 24-hr
SD4022	ST4023	ST4022	CIRCULAR	3.5	-	30	165.63	165.1	1.90	0.013	38.7	67.4	72.0	73.5	100-yr, 24-hr	50.1	73.6	76.9	77.5	25-yr, 24-hr
SD4023	ST4024	ST4023	S_COFFEE_CR	16	2	540	175.95	165.6	1.91	0.035	39.1	51.4	56.3	69.2	NF	50.1	60.6	74.6	93.9	100-yr, 24-hr
SD4024	ST4025	ST4024	CIRCULAR	3	-	200	176.95	176.0	0.50	0.013	39.1	51.4	56.3	70.3	25-yr, 24-hr	50.1	60.7	76.9	95.5	10-yr, 24-hr
SD4025	ST4026	ST4021	CIRCULAR	1.75	-	400	168.35	164.5	0.83	0.013	15.9	20.7	22.4	24.8	10-yr, 24-hr	19.1	22.8	24.1	27.7	2-yr, 24-hr
SD4026	ST4027	ST4026	CIRCULAR	1.75	-	410	173.35	168.4	1.20	0.013	15.9	22.1	22.8	25.9	10-yr, 24-hr	19.4	23.2	25.5	28.7	2-yr, 24-hr
SD4027	ST4028	ST4027	CIRCULAR	1.75	-	390	175.76	173.4	0.59	0.013	16.1	21.0	23.7	27.4	10-yr, 24-hr	19.7	24.3	27.2	30.8	2-yr, 24-hr
SD4028	ST4029	ST4028	CIRCULAR	1.5	-	401.5	178.5	175.8	0.66	0.024	16.1	22.3	25.4	29.9	2-yr, 24-hr	18.9	26.2	29.7	34.5	2-yr, 24-hr
SD4200	ST4200	ST6205	RECT_CLOSED	24	7	75	135.3	135.0	0.47	0.013	298.6	357.8	386.5	416.9	NF	311.2	383.8	417.8	456.5	NF
SD4201	ST4201	ST4200	COFFEE_CR3	27	4	520	135.95	135.3	0.13	0.035	298.5	357.8	386.4	430.5	100-yr, 24-hr	311.2	423.0	417.8	456.5	10-yr, 24-hr
SD4202	ST4202	ST4201	COFFEE_CR3	27	4	500	136.95	136.0	0.20	0.035	298.5	357.8	386.4	441.2	100-yr, 24-hr	311.4	448.2	451.5	456.5	10-yr, 24-hr
SD4203	ST4203	ST4202	COFFEE_CR3	27	4	300	137.15	137.0	0.07	0.035	292.6	351.6	380.3	471.9	100-yr, 24-hr	319.3	494.6	471.4	451.4	10-yr, 24-hr
SD4204	ST4204	ST4203	COFFEE_CR3	27	4	250	137.45	137.2	0.12	0.035	291.6	350.4	379.2	507.8	100-yr, 24-hr	377.4	504.2	488.8	450.1	2-yr, 24-hr
SD4205	ST4205	ST4204	COFFEE_CR3	27	4	540	137.95	137.5	0.09	0.035	288.8	347.5	376.1	466.2	100-yr, 24-hr	414.9	469.4	461.7	446.9	2-yr, 24-hr
SD4207	ST4206	ST4205	S_COFFEE_CR7	12	2	400	141.67	138.0	0.99	0.035	55.0	66.5	69.7	97.9	10-yr, 24-hr	73.2	94.5	98.2	82.1	2-yr, 24-hr
SD4208	ST4207	ST4206	CIRCULAR	3.5	-	41.4	142.21	141.7	1.30	0.024	15.1	20.0	23.6	26.7	25-yr, 24-hr	16.0	23.9	24.6	24.9	10-yr, 24-hr
SD4209	ST4208	ST4207	CIRCULAR	3.5	-	233.4	142.32	142.2	0.05	0.024	15.4	20.4	23.3	26.5	25-yr, 24-hr	16.4	23.2	24.3	24.8	10-yr, 24-hr
SD4210	ST4209	ST4208	CIRCULAR	2.25	-	65.9	142.77	142.3	0.64	0.013	15.4	20.6	23.1	25.8	100-yr, 24-hr	16.6	22.4	24.1	25.1	25-yr, 24-hr
SD4211	ST4210	ST4209	CIRCULAR	2.25	-	319.3	144.47	142.8	0.50	0.013	15.5	20.6	23.1	25.5	100-yr, 24-hr	16.6	22.5	24.1	25.3	25-yr, 24-hr
SD4212	ST4211	ST4210	CIRCULAR	2.25	-	204	145.39	144.5	0.40	0.013	15.5	20.6	23.1	27.7	100-yr, 24-hr	16.8	22.5	23.6	26.7	25-yr, 24-hr
SD4213	ST4212	ST4211	CIRCULAR	2	-	290	147.56	145.4	0.65	0.013	15.5	20.6	23.1	26.1	NF	16.9	22.5	23.7	26.1	100-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4214	ST4213	ST4212	CIRCULAR	2	-	57	148.95	147.6	1.91	0.013	15.5	20.6	23.1	26.3	100-yr, 24-hr	16.9	22.5	26.7	26.5	25-yr, 24-hr
SD4215	ST4214	ST4213	CIRCULAR	2	-	103.6	149.03	149.0	0.08	0.013	15.5	20.6	23.1	25.9	25-yr, 24-hr	16.9	22.5	25.5	26.9	10-yr, 24-hr
SD4216	ST4215	ST4214	CIRCULAR	2	-	317	151.3	149.0	0.72	0.013	10.5	13.6	14.9	17.9	100-yr, 24-hr	11.4	14.6	17.1	17.1	25-yr, 24-hr
SD4217	ST4216	ST4215	CIRCULAR	2	-	349.1	155.45	151.3	1.16	0.013	10.5	13.6	15.0	20.0	100-yr, 24-hr	11.3	14.6	20.1	20.0	25-yr, 24-hr
SD4218	ST4217	ST4216	CIRCULAR	2	-	265.9	159.75	155.5	1.47	0.011	5.7	6.4	8.0	16.1	100-yr, 24-hr	6.1	7.4	14.0	14.0	100-yr, 24-hr
SD4219	ST4218	ST4217	CIRCULAR	2	-	288.1	163.05	159.8	1.11	0.011	5.7	6.4	6.8	11.5	NF	6.1	6.8	8.4	10.6	NF
SD4220	ST4219	ST4218	CIRCULAR	1.5	-	39.1	164.14	163.1	1.38	0.011	5.7	6.4	6.7	8.3	NF	6.1	6.8	7.6	11.1	NF
SD4221	ST4220	ST4219	CIRCULAR	2	-	355	164.8	164.1	0.14	0.013	5.7	6.4	6.7	8.0	NF	6.1	6.8	7.6	9.3	100-yr, 24-hr
SD4222	ST4221	ST4220	CIRCULAR	2	-	355.8	165.89	164.8	0.29	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	11.4	100-yr, 24-hr
SD6207	ST4223	ST6205	CIRCULAR	4	-	82.2	138.64	135.0	0.18	0.013	33.7	54.1	60.3	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4224	ST4224	ST4223	CIRCULAR	4	-	371.1	139.59	138.6	0.20	0.013	33.7	54.1	60.4	65.3	NF	35.1	56.3	62.1	66.8	NF
SD4225	ST4225	ST4224	CIRCULAR	4	-	365	140.31	139.6	0.20	0.013	33.7	54.2	60.4	65.3	NF	35.1	56.4	62.2	66.9	NF
SD4226	ST4226	ST4225	CIRCULAR	4	-	398.1	141.53	140.3	0.30	0.013	30.5	49.3	54.6	58.4	NF	31.3	50.5	55.2	58.8	NF
SD4227	ST4227	ST4226	CIRCULAR	3	-	361	143.64	141.5	0.58	0.013	15.8	24.8	29.9	34.6	NF	16.5	26.3	30.8	35.1	NF
SD4228	ST4228	ST4227	CIRCULAR	3	-	268.4	145.19	143.6	0.57	0.013	15.8	24.8	30.5	34.8	NF	16.5	26.3	31.4	35.1	NF
SD4229	ST4229	ST4228	CIRCULAR	3	-	68.6	145.77	145.2	0.85	0.024	2.2	3.5	4.4	5.1	NF	2.2	3.6	4.5	5.3	NF
SD4230	ST4230	ST4229	CIRCULAR	2.5	-	244	147	145.8	0.45	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.3	NF
SD4231	ST4231	ST4230	CIRCULAR	2.5	-	246.4	147.7	147.0	0.28	0.013	2.2	3.5	4.3	5.2	NF	2.2	3.6	4.3	5.5	NF
SD4232	ST4232	ST4228	CIRCULAR	2.5	-	173.8	146.98	145.2	0.60	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4233	ST4233	ST4232	CIRCULAR	1.75	-	471.6	151.25	147.0	0.76	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.6	8.5	NF
SD4234	ST4234	ST4233	CIRCULAR	1.5	-	426	159.45	151.3	1.88	0.013	2.7	5.4	7.4	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4235	ST4235	ST4234	CIRCULAR	1.5	-	27.5	164.24	159.5	1.49	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.7	8.5	NF
SD4236	ST4236	ST4235	CIRCULAR	1.5	-	110.9	166.85	164.2	2.21	0.013	2.7	5.5	7.5	8.1	NF	3.2	6.6	7.8	8.5	NF
SD4241	ST4241	ST4242	CIRCULAR	2.5	-	80.5	143.45	142.1	1.74	0.013	0.6	0.7	0.9	1.3	NF	0.6	0.7	0.9	1.3	NF
SD4242	ST4242	ST4202	CIRCULAR	2.5	-	564	142.05	137.0	0.90	0.013	0.6	0.7	0.9	4.0	NF	0.6	3.1	2.7	1.3	NF
SD6413	ST4400	ST6413	CIRCULAR	4	-	100	161.45	159.5	2.00	0.013	52.4	71.8	80.9	92.7	NF	53.9	74.2	82.4	94.3	NF
SD4400	ST4401	ST4400	ARROWHEAD_CR2	28	6	400	163.45	161.5	0.50	0.035	32.7	47.0	55.5	65.6	NF	32.8	47.1	55.7	65.9	NF
SD4401	ST4402	ST4401	ARROWHEAD_CR	32	4	800	169.67	163.5	0.78	0.035	33.2	47.8	56.3	75.3	NF	33.2	47.8	56.5	76.0	NF
SD4402	ST4403	ST4402	ARROWHEAD_CR	32	4	100	170.45	169.7	0.78	0.035	25.4	35.8	42.1	58.0	NF	25.5	35.9	42.5	58.5	NF
SD4403	ST4404	ST4402	CIRCULAR	1.25	-	355	178.69	169.7	2.23	0.013	1.7	3.1	3.9	5.2	NF	1.7	3.1	3.9	5.2	NF
SD4500	ST4500	ST4204	CIRCULAR	2	-	421	143.57	137.5	1.44	0.013	8.1	13.0	15.9	21.2	NF	9.9	16.6	20.4	24.1	100-yr, 24-hr
SD4501	ST4501	ST4500	CIRCULAR	2	-	561	149.45	143.6	0.99	0.013	8.1	13.0	16.0	20.7	NF	9.9	15.6	18.9	24.4	NF
SD4502	ST4502	ST4501	CIRCULAR	1.5	-	473.6	167.3	149.5	2.81	0.013	4.4	7.6	9.5	12.5	NF	4.5	7.7	9.6	12.9	NF
SD4503	ST4503	ST4001	SEALY_CR	58	2	400	146.55	139.0	1.90	0.035	33.9	53.4	65.1	82.2	100-yr, 24-hr	63.2	94.0	110.8	133.4	25-yr, 24-hr
SD4600	ST4601	ST4600	CIRCULAR	2	-	57.2	195.67	190.2	0.49	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.3	4.7	5.8	NF
SD4601	ST4602	ST4601	CIRCULAR	2	-	101.1	195.67	195.7	0.01	0.013	3.0	4.1	4.6	5.8	NF	3.0	4.1	4.7	5.8	NF
SD4602	ST4603	ST4602	CIRCULAR	2	-	135	195.87	195.7	0.15	0.013	3.0	4.3	4.6	5.8	NF	3.0	4.2	4.7	5.8	NF
SD4603	ST4604	ST4603	CIRCULAR	2	-	265.6	197.91	195.9	0.29	0.011	3.0	4.6	5.0	5.8	NF	3.0	4.5	5.0	5.8	NF
SD4604	ST4605	ST4604	CIRCULAR	2	-	165.8	198.78	197.9	0.40	0.011	3.0	4.5	5.3	6.1	NF	3.0	4.5	5.3	6.0	NF
SD4605	ST4606	ST4605	CIRCULAR	2	-	352.4	200.59	198.8	0.43	0.011	3.0	4.5	5.3	6.6	NF	3.0	4.5	5.3	6.6	NF
SD4606	ST4607	ST4606	CIRCULAR	1.5	-	58.5	201.4	200.6	1.04	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4607	ST4608	ST4607	CIRCULAR	1.5	-	186.5	202.57	201.4	0.41	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4612	ST4609	ST4614	CIRCULAR	2.5	-	36	196.32	196.0	0.28	0.01	7.1	8.3	8.5	11.2	NF	7.1	8.2	8.5	11.2	NF
SD4609	ST4610	ST4609	CIRCULAR	2.5	-	86	196.84	196.3	0.08	0.011	6.6	7.8	8.1	10.5	NF	6.6	7.8	8.0	10.5	NF
SD4610	ST4611	ST4610	CIRCULAR	2.5	-	125	197.42	196.8	0.16	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4611	ST4612	ST4611	CIRCULAR	2.5	-	102	198.17	197.4	0.34	0.011	4.8	5.8	6.7	9.2	NF	4.8	5.8	6.7	9.2	NF
SD4613	ST4613	ST4609	CIRCULAR	1.5	-	42	197.53	196.3	0.50	0.01	0.5	0.6	0.6	0.8	NF	0.5	0.6	0.6	0.8	NF
SD4608	ST4614	ST4600	CIRCULAR	3	-	36	195.97	190.2	0.92	0.011	15.0	20.3	23.1	28.9	NF	15.5	20.8	24.0	29.7	NF
SD4614	ST4615	ST4600	CIRCULAR	2.5	-	103.5	195.7	190.2	0.38	0.013	5.8	8.1	9.5	12.6	NF	5.8	8.0	9.5	12.7	NF
SD4615	ST4616	ST4615	CIRCULAR	2.5	-	58.3	196.06	195.7	0.27	0.013	5.8	8.2	9.5	12.6	NF	5.8	8.1	9.5	12.8	NF
SD4616	ST4617	ST4616	CIRCULAR	2.5	-	151.3	196.68	196.1	0.28	0.013	5.8	8.5	9.5	12.6	NF	5.8	8.4	9.5	12.7	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD4617	ST4618	ST4617	CIRCULAR	2.5	-	191.5	197.23	196.7	0.18	0.013	4.3	6.4	7.1	9.2	NF	4.3	6.4	7.0	9.2	NF
SD4618	ST4619	ST4618	CIRCULAR	2	-	134.6	198.35	197.2	0.68	0.011	1.4	2.2	2.5	3.2	NF	1.4	2.2	2.5	3.3	NF
SD4619	ST4620	ST4619	CIRCULAR	1.5	-	355.3	199.97	198.4	0.40	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.7	3.3	NF
SD4620	ST4621	ST4620	CIRCULAR	1.5	-	142	200.83	200.0	0.46	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4621	ST4622	ST4621	CIRCULAR	1.5	-	94.8	201.43	200.8	0.42	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4622	ST4623	ST4622	CIRCULAR	1.5	-	106.3	202.53	201.4	0.85	0.011	1.4	2.2	2.6	3.3	NF	1.4	2.2	2.6	3.3	NF
SD4623	ST4624	ST4618	CIRCULAR	2	-	52.2	197.64	197.2	0.40	0.011	3.0	4.4	5.1	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4624	ST4625	ST4624	CIRCULAR	2	-	47.6	198.06	197.6	0.46	0.011	3.0	4.4	5.2	6.1	NF	3.0	4.4	5.1	6.2	NF
SD4625	ST4626	ST4625	CIRCULAR	2	-	69.4	198.46	198.1	0.29	0.011	3.0	4.4	5.3	6.1	NF	3.0	4.4	5.2	6.2	NF
SD4626	ST4627	ST4626	CIRCULAR	2	-	58.4	198.89	198.5	0.39	0.011	3.0	4.4	5.3	6.2	NF	3.0	4.4	5.3	6.2	NF
SD4627	ST4628	ST4627	CIRCULAR	2	-	118.1	199.56	198.9	0.40	0.011	3.0	4.4	5.3	6.3	NF	3.0	4.4	5.3	6.3	NF
SD4628	ST4629	ST4628	CIRCULAR	1.5	-	44.5	200.15	199.6	0.88	0.011	3.0	4.4	5.3	6.5	NF	3.0	4.4	5.3	6.5	NF
SD4629	ST4630	ST4629	CIRCULAR	1.5	-	104.2	200.85	200.2	0.48	0.011	3.0	4.5	5.3	6.4	NF	3.0	4.5	5.3	6.4	NF
SD4630	ST4631	ST4630	CIRCULAR	1.5	-	95.2	201.33	200.9	0.29	0.011	3.0	4.5	5.3	6.5	NF	3.0	4.5	5.3	6.5	NF
SD4641	ST4633	ST4634	CIRCULAR	2.5	-	18.1	190.22	190.2	0.39	0.013	10.4	18.4	24.7	35.2	NF	10.5	18.9	25.5	36.5	NF
SD4633	ST4634	ST4635	CIRCULAR	2.5	-	100.3	190.15	189.3	0.54	0.013	10.4	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4634	ST4635	ST4636	CIRCULAR	2.5	-	259.5	189.31	187.4	0.62	0.013	10.7	18.4	24.7	35.2	NF	11.6	18.9	25.5	36.5	NF
SD4635	ST4636	ST4637	CIRCULAR	3	-	262.3	187.4	189.4	-0.76	0.013	10.5	18.4	24.7	35.2	NF	10.6	18.9	25.5	36.5	NF
SD4637	ST4638	ST4639	CIRCULAR	2.5	-	85.7	189.38	188.4	1.10	0.013	9.6	17.1	18.4	19.8	NF	9.7	17.3	18.5	19.9	NF
SD4638	ST4639	ST4403	ARROWHEAD_CR	32	4	1200	188.44	170.5	1.50	0.035	12.5	20.1	23.3	27.8	NF	12.5	20.4	23.6	28.0	NF
SD4640	ST4640	O-SDDI	CIRCULAR	3	-	3151.9	189.38	168.1	0.68	0.013	0.9	1.3	6.1	15.2	NF	0.9	1.6	6.8	16.3	NF
3594	ST4656	ST4767	CIRCULAR	2.5	-	67.9	200.74	197.9	3.89	0.013	7.9	12.3	15.1	18.5	NF	8.3	12.9	16.0	19.3	NF
SD4654	ST4767	ST4614	CIRCULAR	2.5	-	59	197.9	196.0	3.27	0.013	7.9	12.3	14.9	18.4	NF	8.3	12.9	15.8	19.1	NF
949	ST4768	ST4656	CIRCULAR	2.5	-	55.2	201.23	200.7	0.62	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
950	ST4802	ST4768	CIRCULAR	2.5	-	109.6	202.54	201.2	1.01	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4741	ST4803	ST4802	CIRCULAR	2.5	-	129.9	203.75	202.5	0.39	0.013	7.9	12.3	14.8	18.5	NF	8.3	12.9	15.5	19.3	NF
SD4830	ST4804	ST4803	CIRCULAR	2.5	-	268.2	205.38	203.8	0.53	0.013	6.2	9.8	11.8	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4742	ST4805	ST4804	CIRCULAR	2.5	-	149.4	206.36	205.4	0.52	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.5	NF
SD4789	ST4806	ST4805	CIRCULAR	2.5	-	116.6	207.03	206.4	0.40	0.013	6.2	9.8	11.9	14.8	NF	6.7	10.4	12.5	15.6	NF
SD4790	ST4828	ST4806	CIRCULAR	2	-	335.2	208.63	207.0	0.42	0.013	3.0	4.8	5.9	7.4	NF	3.5	5.4	6.5	8.1	NF
SD4752	ST4829	ST4828	CIRCULAR	2	-	335.2	211.99	208.6	1.00	0.013	3.0	4.9	5.9	7.4	NF	3.5	5.5	6.6	8.1	NF
SD5000	ST5000	ST5209	CIRCULAR	1	-	56	108.6	90.9	32.36	0.024	11.4	14.0	14.6	15.3	2-yr, 24-hr	11.4	14.0	14.6	15.3	2-yr, 24-hr
SD5001	ST5001	ST5000	CIRCULAR	1.25	-	120	124.12	108.6	12.89	0.024	11.4	14.3	14.7	15.3	10-yr, 24-hr	11.5	14.4	14.7	15.3	10-yr, 24-hr
SD5002	ST5002	ST5001	CIRCULAR	2	-	113	138.96	124.1	14.63	0.024	11.4	17.8	19.5	20.2	10-yr, 24-hr	11.5	17.8	19.5	20.2	10-yr, 24-hr
SD5003	ST5003	ST5002	CIRCULAR	1.5	-	34	145.4	139.0	2.44	0.024	6.5	10.0	11.3	13.3	10-yr, 24-hr	6.5	10.0	11.3	13.3	10-yr, 24-hr
SD5004	ST5004	ST5003	CIRCULAR	1.5	-	154.8	158.38	145.4	8.41	0.011	6.5	9.9	11.7	14.9	NF	6.5	9.9	11.7	14.9	NF
SD5005	ST5005	ST5004	CIRCULAR	1.5	-	129	161.19	158.4	2.02	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5006	ST5006	ST5005	CIRCULAR	1.5	-	319.1	163.74	161.2	0.74	0.011	4.5	6.7	7.9	10.2	NF	4.5	6.7	7.9	10.2	NF
SD5007	ST5007	ST5006	CIRCULAR	1.25	-	84.1	164.9	163.7	0.43	0.011	1.2	1.7	2.0	3.1	NF	1.2	1.7	2.0	3.0	NF
SD5008	ST5008	ST5007	CIRCULAR	1.25	-	82.4	165.39	164.9	0.59	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5009	ST5009	ST5008	CIRCULAR	1.25	-	100	165.88	165.4	0.49	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5010	ST5010	ST5009	CIRCULAR	1.25	-	100	166.39	165.9	0.51	0.011	1.2	1.7	2.0	3.4	NF	1.2	1.7	2.0	3.4	NF
SD5011	ST5011	ST5010	CIRCULAR	1	-	100	166.89	166.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5012	ST5012	ST5011	CIRCULAR	1	-	100	167.39	166.9	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5013	ST5013	ST5012	CIRCULAR	1	-	100	167.89	167.4	0.50	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5014	ST5014	ST5013	CIRCULAR	1	-	70.5	168.05	167.9	0.23	0.011	1.2	1.7	2.0	3.2	NF	1.2	1.7	2.0	3.2	NF
SD5015	ST5015	ST5014	CIRCULAR	1.5	-	292.7	169.56	168.1	0.43	0.011	1.2	1.7	2.0	3.5	NF	1.2	1.7	2.0	3.5	NF
SD5016	ST5016	ST5015	CIRCULAR	1.5	-	248.9	170.98	169.6	0.49	0.011	1.2	1.7	2.0	3.7	NF	1.2	1.7	2.0	3.7	NF
SD5017	ST5017	ST5016	CIRCULAR	1.5	-	132.4	171.76	171.0	0.44	0.011	1.2	1.7	2.0	3.6	NF	1.2	1.7	2.0	3.6	NF
SD5018	ST5017	ST5018	CIRCULAR	1.5	-	169.7	171.76	171.1	0.23	0.011	0.8	1.2	1.5	1.8	NF	0.8	1.2	1.5	1.8	NF
SD5019	ST5018	ST5019	CIRCULAR	1.5	-	167.1	171.09	170.0	0.45	0.011	0.8	1.2	1.5	2.0	NF	0.8	1.2	1.5	2.0	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5020	ST5019	ST5020	CIRCULAR	1.5	-	109.3	170	169.4	0.38	0.011	4.2	6.3	7.2	7.6	NF	4.2	6.3	7.2	7.6	NF
SD5021	ST5020	ST3448	CIRCULAR	1.5	-	87.6	169.38	168.7	0.59	0.011	4.2	6.3	7.1	7.6	NF	4.2	6.3	7.1	7.6	NF
SD5022	ST5021	ST5017	CIRCULAR	1.25	-	100	172.92	171.8	0.96	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5023	ST5022	ST5021	CIRCULAR	1.25	-	100	173.42	172.9	0.50	0.011	2.0	2.9	3.4	4.1	NF	2.0	2.9	3.4	4.1	NF
SD5024	ST5023	ST5019	CIRCULAR	1.5	-	154.3	171.31	170.0	0.63	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5025	ST5024	ST5023	CIRCULAR	1.25	-	159.8	172.11	171.3	0.38	0.011	3.4	5.1	5.9	7.0	NF	3.4	5.1	5.9	7.0	NF
SD5026	ST5025	ST5002	CIRCULAR	2	-	88	145.03	139.0	0.92	0.024	4.1	6.5	6.9	7.6	10-yr, 24-hr	4.1	6.5	6.9	7.6	10-yr, 24-hr
SD5027	ST5026	ST5025	CIRCULAR	2	-	181	146.43	145.0	0.66	0.024	4.1	6.8	8.7	9.0	25-yr, 24-hr	4.1	6.8	7.7	9.0	25-yr, 24-hr
SD5028	ST5027	ST5026	CIRCULAR	1.25	-	180	152.77	146.4	3.36	0.024	4.1	6.6	7.3	7.9	25-yr, 24-hr	4.1	6.6	7.1	7.9	25-yr, 24-hr
SD5029	ST5028	ST5027	CIRCULAR	1.25	-	97	157.4	152.8	4.53	0.024	4.1	6.7	7.3	8.3	25-yr, 24-hr	4.1	6.6	7.2	8.3	25-yr, 24-hr
SD5030	ST5029	ST5028	CIRCULAR	1.25	-	27	157.89	157.4	1.37	0.024	1.9	3.0	4.1	4.9	100-yr, 24-hr	1.9	3.0	4.0	4.8	100-yr, 24-hr
SD5031	ST5030	ST5029	CIRCULAR	1.25	-	38.1	159.14	157.9	1.60	0.011	1.9	3.9	4.0	4.8	100-yr, 24-hr	1.9	3.8	4.0	4.8	100-yr, 24-hr
SD5032	ST5031	ST5030	CIRCULAR	1.25	-	88.3	160.04	159.1	0.79	0.011	1.9	3.3	3.9	4.8	NF	1.9	3.3	3.9	4.7	NF
SD5033	ST5032	ST5031	CIRCULAR	1.25	-	47.8	160.69	160.0	0.94	0.011	1.9	2.9	4.1	4.7	NF	1.9	2.9	4.1	4.7	NF
SD5034	ST5033	ST5032	CIRCULAR	1.25	-	372.1	164.77	160.7	1.04	0.011	1.9	2.9	3.8	4.7	100-yr, 24-hr	1.9	2.9	3.7	4.7	100-yr, 24-hr
SD5035	ST5034	ST5002	CIRCULAR	1.25	-	372	152.22	139.0	2.00	0.024	0.9	1.5	2.6	3.0	25-yr, 24-hr	0.9	1.5	2.6	3.0	25-yr, 24-hr
SD5036	ST5035	ST5034	CIRCULAR	1.25	-	179	161.98	152.2	5.21	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5037	ST5036	ST5035	CIRCULAR	1.25	-	119	167.87	162.0	4.74	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5038	ST5037	ST5036	CIRCULAR	1.25	-	188	169.38	167.9	0.69	0.024	0.9	1.5	1.8	2.0	NF	0.9	1.5	1.8	2.0	NF
SD5219	ST5038	POND_LIBRARY	CIRCULAR	4	-	190	143.45	140.8	1.11	0.013	38.9	59.9	71.1	88.2	NF	43.5	66.0	78.4	96.6	NF
SD5039	ST5039	ST5038	CIRCULAR	4	-	308.1	155.16	143.5	0.92	0.013	35.1	54.3	64.4	79.2	NF	39.7	60.7	71.4	87.5	NF
SD5200	ST5200	ST5204	BOECKMAN_CR2	40	10	1200	78.85	71.7	0.60	0.035	199.1	271.7	306.4	352.8	NF	234.8	306.3	337.9	380.4	NF
SD5201	ST5201	ST5200	BOECKMAN_CR2	40	10	930	94.45	78.9	1.68	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.1	NF
SD5202	ST5202	ST5201	KOLBE_BRIDGE	55	11	70	92.45	94.5	-2.86	0.035	158.2	210.3	236.4	299.5	NF	194.6	256.4	297.1	299.2	NF
SD5203	ST5203	ST5202	BOECKMAN_CR2	40	10	430	94.45	92.5	0.47	0.035	158.3	210.3	236.4	299.5	NF	194.6	256.6	297.1	299.3	NF
SD5205	ST5204	ST5205	MEMORIAL_PARK_BRID	88	20	55	71.7	71.7	0.02	0.035	198.5	271.3	305.9	351.5	NF	234.6	304.8	336.3	379.1	NF
SD5206	ST5205	05200	BOECKMAN_CR2	40	10	1500	71.69	63.5	0.55	0.035	198.3	271.1	305.7	350.9	NF	234.5	304.2	335.7	378.7	NF
SD5207	ST5206	ST5200	BOECKMAN_CR	37	9	500	83.65	78.9	0.96	0.035	40.9	57.6	64.5	69.5	NF	43.2	59.3	66.3	71.8	NF
SD5208	ST5207	ST5206	BOECKMAN_CR	37	9	150	85.1	83.7	0.97	0.035	24.7	38.1	45.0	49.8	NF	26.2	39.8	46.7	52.0	NF
SD5210	ST5208	ST5207	CIRCULAR	2	-	201	87.14	85.1	1.02	0.024	11.4	14.0	14.6	15.3	NF	11.4	14.0	14.6	15.3	NF
SD5211	ST5209	ST5208	CIRCULAR	1.5	-	50	90.89	87.1	6.65	0.024	11.4	14.0	14.6	15.3	NF	11.5	14.0	14.6	15.3	NF
SD5212	ST5210	ST5206	CIRCULAR	1.75	-	164.3	102.15	83.7	5.61	0.024	19.3	20.0	21.9	21.9	NF	19.8	20.2	21.7	21.8	NF
SD5213	ST5211	ST5210	CIRCULAR	1.75	-	125	109.15	102.2	5.61	0.024	19.3	20.1	20.8	21.0	NF	20.0	20.2	21.0	20.8	NF
SD5214	ST5212	ST5211	CIRCULAR	1.75	-	105.4	115.05	109.2	5.61	0.024	19.3	20.1	20.8	21.1	NF	20.0	20.2	20.8	20.8	NF
SD5215	ST5213	ST5212	CIRCULAR	1.75	-	123.2	121.95	115.1	5.61	0.024	19.3	20.2	20.7	21.4	NF	20.0	20.2	20.7	20.7	NF
SD5216	ST5214	ST5213	CIRCULAR	1.75	-	108.9	128.05	122.0	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.9	20.9	20.9	20.8	NF
SD5217	ST5215	ST5214	CIRCULAR	1.75	-	141.1	135.95	128.1	5.61	0.024	19.3	20.8	20.9	21.6	NF	20.8	20.9	20.9	20.8	NF
SD5501	ST5500	05500	S_FORK_MERIDIAN_CR	22	4	282.7	71.45	63.5	2.83	0.035	20.7	34.1	42.2	54.1	NF	20.7	34.1	42.3	54.2	NF
SD5502	ST5501	ST5500	S_FORK_MERIDIAN_CR	22	4	1130	111.45	71.5	3.54	0.035	20.8	34.3	42.5	54.4	NF	20.8	34.3	42.5	54.4	NF
SD5701	ST5701	05701	CIRCULAR	1.25	-	79.1	84.07	72.0	15.48	0.024	5.5	9.2	10.9	12.8	NF	5.9	9.7	11.2	13.4	NF
SD5702	ST5702	ST5701	CIRCULAR	1.25	-	158	86.6	84.1	1.60	0.013	5.5	9.2	10.9	13.1	25-yr, 24-hr	5.9	9.8	11.2	13.3	25-yr, 24-hr
SD5703	ST5703	ST5702	CIRCULAR	1.25	-	126	89.82	86.6	2.40	0.013	5.5	9.2	10.9	12.9	100-yr, 24-hr	5.9	9.8	11.3	13.0	100-yr, 24-hr
SD5704	ST5704	ST5703	CIRCULAR	1	-	103	95.76	89.8	4.68	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.3	100-yr, 24-hr
SD5705	ST5705	ST5704	CIRCULAR	1.25	-	160	96.61	95.8	0.40	0.013	3.1	5.1	6.1	7.1	100-yr, 24-hr	3.3	5.4	6.4	7.2	25-yr, 24-hr
SD5706	ST5706	ST5705	CIRCULAR	1.25	-	199.8	97.61	96.6	0.40	0.013	3.1	5.1	6.1	7.6	25-yr, 24-hr	3.3	5.4	7.0	7.9	25-yr, 24-hr
SD5719	ST5707	ST5719	CIRCULAR	3.5	-	260	100.45	99.0	0.56	0.013	18.4	24.0	25.9	28.7	25-yr, 24-hr	19.8	24.6	27.1	29.6	10-yr, 24-hr
SD5708	ST5708	ST5707	CIRCULAR	4	-	270	101.32	100.5	0.32	0.013	18.4	24.6	28.6	33.5	25-yr, 24-hr	19.9	25.1	31.0	35.0	10-yr, 24-hr
SD5709	ST5709	ST5708	CIRCULAR	3.5	-	165	102.47	101.3	0.70	0.013	18.4	26.5	29.9	37.5	10-yr, 24-hr	19.9	27.5	33.7	39.5	10-yr, 24-hr
SD5710	ST5710	ST5709	CIRCULAR	4	-	246	107.43	102.5	1.79	0.011	10.6	18.1	19.9	24.2	NF	10.6	15.7	20.0	23.7	NF
SD5711	ST5711	ST5710	CIRCULAR	4	-	224.6	121.09	107.4	6.00	0.011	10.6	17.4	19.9	22.4	NF	10.6	17.4	19.4	22.4	NF
SD5712	ST5712	ST5711	CIRCULAR	4	-	314	137.34	121.1	5.15	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD5713	ST5713	ST5712	CIRCULAR	4	-	358.4	150.79	137.3	3.73	0.011	10.6	15.9	18.7	22.4	NF	10.6	15.9	18.7	22.4	NF
SD5714	ST5714	O5702	CIRCULAR	1.25	-	67	88.49	62.5	44.03	0.024	18.4	22.5	24.4	26.5	100-yr, 24-hr	19.7	22.9	25.0	26.9	100-yr, 24-hr
SD5209	ST5715	ST5207	BOECKMAN_CR	37	9	267	90	85.1	0.92	0.035	9.4	17.4	21.8	22.9	NF	10.9	19.1	23.5	25.0	NF
SD5715	ST5716	ST5715	CIRCULAR	2.5	-	198	90.69	90.0	0.35	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.2	23.6	25.2	NF
SD5716	ST5717	ST5716	CIRCULAR	2.5	-	131	91.23	90.7	0.26	0.013	9.5	17.6	21.9	23.1	NF	10.9	19.3	23.6	25.2	NF
SD5717	ST5718	ST5717	CIRCULAR	2.5	-	123	91.7	91.2	0.22	0.013	9.6	17.6	21.9	23.1	NF	11.0	19.3	23.6	25.2	NF
SD5707	ST5719	ST5714	CIRCULAR	1.75	-	108	99	88.5	10.99	0.024	18.4	22.5	24.4	26.6	10-yr, 24-hr	19.7	22.9	25.1	27.0	10-yr, 24-hr
SD6000	ST6000	O6000	CIRCULAR	2.5	-	466.3	117.95	60.5	11.84	0.013	29.7	43.8	51.2	60.3	NF	29.7	43.8	51.2	60.3	NF
SD6001	ST6001	ST6000	CIRCULAR	2.5	-	182.4	122.86	118.0	4.23	0.013	29.8	43.9	51.3	60.3	NF	29.8	43.9	51.3	60.3	NF
SD6002	ST6002	ST6001	CIRCULAR	2.5	-	632.1	135.95	122.9	1.54	0.013	23.1	31.7	36.0	41.9	NF	23.1	31.7	36.1	41.9	NF
SD6003	ST6003	ST6002	CIRCULAR	2.5	-	167.5	137.28	136.0	0.79	0.013	23.1	31.8	36.1	41.5	NF	23.1	31.8	36.2	41.5	NF
SD6004	ST6004	ST6003	CIRCULAR	2.5	-	196.6	138.85	137.3	0.80	0.013	18.8	25.8	28.3	32.2	NF	18.8	25.8	28.3	32.2	NF
SD6005	ST6005	ST6004	CIRCULAR	2.5	-	68	139.17	138.9	0.47	0.013	14.0	18.2	20.0	22.6	NF	14.0	18.2	20.0	22.6	NF
SD6006	ST6006	ST6005	CIRCULAR	1.5	-	297.9	141.48	139.2	0.87	0.013	14.0	18.1	20.0	22.6	10-yr, 24-hr	14.0	18.1	20.0	22.6	10-yr, 24-hr
SD6007	ST6007	ST6006	CIRCULAR	2	-	302	142.11	141.5	0.21	0.013	14.0	18.5	20.4	23.3	10-yr, 24-hr	14.0	18.5	20.4	23.3	10-yr, 24-hr
SD6008	ST6008	ST6007	CIRCULAR	2	-	79	142.55	142.1	0.30	0.013	3.7	6.7	6.8	6.9	10-yr, 24-hr	3.7	6.5	6.8	6.9	10-yr, 24-hr
SD6009	ST6009	ST6008	CIRCULAR	2	-	112	142.9	142.6	0.31	0.013	3.7	6.2	6.1	6.2	10-yr, 24-hr	3.7	6.2	6.2	6.2	10-yr, 24-hr
SD6010	ST6010	ST6009	CIRCULAR	1.5	-	197	143.59	142.9	0.30	0.013	3.7	5.6	5.3	5.3	10-yr, 24-hr	3.7	5.6	5.4	5.3	10-yr, 24-hr
SD6011	ST6011	ST6010	CIRCULAR	1.5	-	154	144.25	143.6	0.30	0.013	3.5	4.8	4.8	5.4	10-yr, 24-hr	3.8	4.8	4.8	5.2	10-yr, 24-hr
SD6012	ST6012	ST6011	CIRCULAR	1.5	-	79	144.69	144.3	0.30	0.013	3.6	5.5	6.3	6.0	10-yr, 24-hr	4.0	5.4	5.8	6.3	10-yr, 24-hr
SD6013	ST6013	ST6012	CIRCULAR	1.5	-	177	145.43	144.7	0.31	0.013	3.5	6.2	5.5	7.5	10-yr, 24-hr	3.7	5.3	6.9	6.9	10-yr, 24-hr
SD6014	ST6014	ST6004	CIRCULAR	1.75	-	303.3	141.45	138.9	0.82	0.013	4.9	7.7	8.7	9.7	NF	4.9	7.7	8.7	9.7	NF
SD6015	ST6015	ST6014	CIRCULAR	1.5	-	290	143.21	141.5	0.52	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6016	ST6016	ST6015	CIRCULAR	1.5	-	251	144.97	143.2	0.70	0.013	4.9	7.7	8.8	9.7	NF	4.9	7.7	8.8	9.7	NF
SD6017	ST6017	ST6016	CIRCULAR	1.5	-	89	145.42	145.0	0.51	0.013	4.9	7.8	8.8	9.7	NF	4.9	7.8	8.8	9.7	NF
SD6018	ST6018	ST6017	CIRCULAR	1.5	-	60	145.99	145.4	0.95	0.013	4.9	7.8	8.8	9.7	100-yr, 24-hr	4.9	7.8	8.8	9.7	100-yr, 24-hr
SD6019	ST6019	ST6018	CIRCULAR	1.5	-	160	147.08	146.0	0.68	0.013	4.9	7.8	8.8	9.8	100-yr, 24-hr	4.9	7.8	8.8	9.8	100-yr, 24-hr
SD6020	ST6020	ST6019	CIRCULAR	1.5	-	177	147.97	147.1	0.50	0.013	4.9	7.8	8.8	10.0	100-yr, 24-hr	4.9	7.8	8.8	10.0	100-yr, 24-hr
SD6021	ST6021	ST6020	CIRCULAR	1.25	-	114	148.43	148.0	0.18	0.013	4.9	7.8	8.8	10.3	25-yr, 24-hr	4.9	7.8	8.8	10.3	25-yr, 24-hr
SD6022	ST6022	O6001	I5	16	2	300	108.45	73.5	11.75	0.035	26.3	39.3	45.8	54.5	NF	26.3	39.3	45.9	54.4	NF
SD6023	ST6023	ST6022	I5	16	2	80	111.36	108.5	3.64	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6024	ST6024	ST6023	CIRCULAR	3.5	-	50	120.41	111.4	18.40	0.013	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6025	ST6025	ST6024	I5	16	2	20	123.14	120.4	13.78	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6026	ST6026	ST6025	I5	16	2	700	132.99	123.1	1.41	0.035	19.2	28.5	32.0	38.0	NF	19.2	28.5	32.0	37.9	NF
SD6027	ST6027	ST6026	CIRCULAR	3.5	-	33	133.08	133.0	0.27	0.013	19.3	28.5	32.0	38.0	NF	19.3	28.5	32.0	38.0	NF
SD6028	ST6028	ST6027	CIRCULAR	3.5	-	394	134.09	133.1	0.26	0.013	19.3	28.5	32.0	38.1	NF	19.3	28.5	32.0	38.0	NF
SD6029	ST6029	ST6028	CIRCULAR	3.5	-	394	135.08	134.1	0.25	0.013	19.3	28.6	32.1	38.1	NF	19.3	28.6	32.1	38.1	NF
SD6030	ST6030	ST6029	CIRCULAR	3.5	-	394	136.06	135.1	0.25	0.013	19.3	28.7	32.1	38.3	NF	19.3	28.7	32.2	38.2	NF
SD6031	ST6031	ST6030	CIRCULAR	3.5	-	394	137.05	136.1	0.25	0.013	19.4	28.7	32.1	38.4	NF	19.4	28.7	32.2	38.4	NF
SD6032	ST6032	ST6031	CIRCULAR	3.5	-	394	138.03	137.1	0.25	0.013	14.1	21.1	23.4	27.6	NF	14.1	21.1	23.1	27.5	NF
SD6033	ST6033	ST6032	CIRCULAR	3.5	-	246	138.62	138.0	0.24	0.013	14.1	21.1	23.5	27.7	NF	14.1	21.1	23.3	27.6	NF
SD6034	ST6034	ST6033	CIRCULAR	3.5	-	254.4	139.24	138.6	0.24	0.013	14.1	21.2	23.8	27.8	NF	14.1	21.2	23.4	27.6	NF
SD6035	ST6035	ST6034	CIRCULAR	3	-	131	139.88	139.2	0.49	0.013	14.1	21.2	24.1	27.9	NF	14.1	21.2	23.5	27.7	NF
SD6036	ST6036	ST6035	CIRCULAR	2.25	-	131	142.21	139.9	1.40	0.013	14.1	21.2	24.3	28.0	NF	14.1	21.2	23.6	27.8	NF
SD6200	ST6200	O6200	COFFEE_CR4	27	4	650	79.45	62.2	2.66	0.035	370.6	484.3	525.3	529.3	NF	427.5	479.5	515.4	633.0	NF
SD6201	ST6201	ST6200	COFFEE_CR4	27	4	420	88.45	79.5	2.14	0.035	370.7	484.3	525.4	529.3	NF	427.6	479.7	515.6	633.1	NF
SD6202	ST6202	ST6201	ARROWHEAD_CR2	28	6	850	125.45	88.5	4.36	0.035	60.8	86.5	97.5	111.9	NF	64.3	92.2	102.9	117.2	NF
SD6203	ST6203	ST6202	ARROWHEAD_CR2	28	6	900	143.45	125.5	2.00	0.035	61.2	86.7	97.5	111.9	NF	64.5	92.4	103.0	117.3	NF
SD6205	ST6204	ST6201	COFFEE_CR4	27	4	900	123.95	88.5	3.95	0.035	323.6	384.7	413.8	443.0	NF	347.4	399.3	437.7	479.8	NF
SD6206	ST6205	ST6204	COFFEE_CR4	27	4	1300	134.95	124.0	0.85	0.035	323.6	384.7	413.8	443.1	NF	347.5	399.3	437.7	479.8	NF
SD6400	ST6400	O6400	CIRCULAR	2.5	-	10	146.95	145.0	20.41	0.011	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD6401	ST6401	ST6400	CIRCULAR	2.5	-	109	148.55	147.0	0.59	0.013	4.5	7.3	9.0	11.5	NF	4.5	7.3	9.0	11.5	NF
SD6402	ST6402	ST6401	CIRCULAR	2.5	-	229.6	149.5	148.6	0.25	0.013	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6403	ST6403	ST6402	CIRCULAR	2.5	-	217.4	150.99	149.5	0.46	0.011	4.5	7.3	9.0	11.6	NF	4.5	7.3	9.0	11.6	NF
SD6404	ST6404	ST6403	CIRCULAR	2.5	-	207	151.76	151.0	0.33	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6405	ST6405	ST6404	CIRCULAR	2	-	75.4	152.6	151.8	0.85	0.011	4.5	7.4	9.1	11.6	NF	4.5	7.4	9.1	11.6	NF
SD6406	ST6406	ST6405	CIRCULAR	2	-	89	153.47	152.6	0.98	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6407	ST6407	ST6406	CIRCULAR	2	-	172.2	155.78	153.5	1.34	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6408	ST6408	ST6407	CIRCULAR	1.5	-	109.3	158.01	155.8	1.47	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6409	ST6409	ST6408	CIRCULAR	1.5	-	45.3	158.66	158.0	1.35	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6410	ST6410	ST6409	CIRCULAR	1.25	-	219.7	161.47	158.7	1.17	0.011	2.6	4.2	5.2	6.6	NF	2.6	4.2	5.2	6.6	NF
SD6411	ST6411	ST6410	CIRCULAR	1.25	-	346	164.48	161.5	0.81	0.011	2.6	4.3	5.2	6.6	NF	2.6	4.3	5.2	6.6	NF
SD6204	ST6412	ST6203	CIRCULAR	4	-	70	149.45	143.5	8.60	0.013	61.4	86.8	97.5	111.9	NF	64.6	92.5	103.0	117.3	NF
SD6414	ST6413	ST6414	ARROWHEAD_CR2	28	6	50	159.45	158.7	1.56	0.035	51.8	71.4	80.6	92.6	NF	53.1	73.8	82.6	94.2	NF
SD6415	ST6414	ST6415	CIRCULAR	3.5	-	100	158.67	157.1	1.56	0.024	51.2	71.3	80.0	92.6	NF	52.2	73.6	82.2	94.2	NF
SD6412	ST6415	ST6412	ARROWHEAD_CR2	28	6	490	157.1	149.5	1.56	0.035	50.9	71.2	80.0	92.6	NF	51.8	73.6	82.2	94.2	NF
SD6601	ST6601	O6600	CIRCULAR	1.5	-	37.1	100.63	97.1	9.58	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6602	ST6602	ST6601	CIRCULAR	1.5	-	53.4	114.29	100.6	26.04	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6603	ST6603	ST6602	CIRCULAR	1.5	-	149.2	129.78	114.3	10.30	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6604	ST6604	ST6603	CIRCULAR	1.75	-	233.4	139.31	129.8	4.00	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6605	ST6605	ST6604	CIRCULAR	1.75	-	178.1	147.4	139.3	4.43	0.013	8.9	12.4	14.4	17.3	NF	9.1	12.5	14.5	17.4	NF
SD6606	ST6606	ST6605	CIRCULAR	0.83	-	144.2	150.98	147.4	2.35	0.013	4.2	5.3	5.9	6.8	10-yr, 24-hr	4.3	5.4	6.0	6.9	10-yr, 24-hr
SD6607	ST6607	ST6606	CIRCULAR	1	-	120.7	153.15	151.0	1.62	0.013	4.2	5.4	6.1	7.1	10-yr, 24-hr	4.3	5.5	6.3	7.3	10-yr, 24-hr
SD6608	ST6608	ST6607	CIRCULAR	1	-	245	156.07	153.2	1.10	0.013	4.2	5.7	6.4	7.6	10-yr, 24-hr	4.3	5.8	6.6	7.8	10-yr, 24-hr
SD6609	ST6609	ST6608	CIRCULAR	1	-	165.6	158.29	156.1	1.08	0.013	4.2	6.0	7.1	8.6	10-yr, 24-hr	4.3	6.2	7.3	8.8	10-yr, 24-hr
SD6610	ST6610	ST6609	CIRCULAR	1	-	77	159.64	158.3	1.40	0.013	4.2	6.4	7.7	9.6	10-yr, 24-hr	4.4	6.7	8.0	9.8	10-yr, 24-hr
SD6630	ST6618	ST6619	CIRCULAR	0.83	-	117.9	160.03	155.8	3.32	0.013	0.0	0.0	0.1	0.4	NF	0.0	0.0	0.2	1.9	NF
SD6632	ST6619	ST6606	CIRCULAR	0.83	-	348.8	155.79	151.0	1.35	0.013	0.0	1.1	1.2	1.5	NF	0.0	1.2	1.2	1.5	100-yr, 24-hr
SD6616	ST6653	ST6654	CIRCULAR	1.5	-	210.7	171.05	167.7	1.57	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6617	ST6654	ST6655	CIRCULAR	1.5	-	197	167.65	161.9	2.89	0.013	3.4	5.1	6.1	7.5	NF	3.4	5.2	6.2	7.6	NF
SD6619	ST6655	STD6604	CIRCULAR	2	-	213.9	161.85	161.0	0.42	0.013	3.4	5.1	6.1	7.4	NF	3.4	5.2	6.2	7.6	NF
SD9000	ST9001	09000	CIRCULAR	3	-	74	100.78	100.6	0.24	0.024	34.8	51.9	62.5	71.6	NF	34.8	51.9	62.5	70.7	NF
SD9001	ST9002	ST9001	CIRCULAR	3.5	-	317	101.89	100.8	0.32	0.024	34.8	51.9	62.5	71.6	10-yr, 24-hr	34.8	51.9	62.5	70.7	10-yr, 24-hr
SD9002	ST9003	ST9002	CIRCULAR	3.5	-	504.5	109.78	101.9	1.54	0.024	35.2	55.0	65.2	72.1	25-yr, 24-hr	35.2	55.0	65.2	71.1	25-yr, 24-hr
SD9003	ST9004	ST9003	CIRCULAR	3	-	436.8	119.75	109.8	2.17	0.013	21.1	33.2	40.0	45.9	NF	21.1	33.2	40.0	46.4	NF
SD9004	ST9005	ST9004	CIRCULAR	3	-	498	126.25	119.8	1.29	0.013	21.1	33.2	40.4	45.9	NF	21.1	33.2	40.4	46.6	NF
SD9005	ST9006	ST9005	CIRCULAR	3	-	460	127.45	126.3	0.24	0.013	21.1	33.2	40.5	53.2	NF	21.1	33.2	40.5	53.4	100-yr, 24-hr
SD9006	ST9007	ST9006	CIRCULAR	3	-	402.2	139.5	127.5	2.97	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.9	NF
SD9007	ST9008	ST9007	CIRCULAR	3	-	283.7	141.13	139.5	0.57	0.013	14.5	22.7	27.3	31.7	NF	14.5	22.7	27.3	31.7	NF
SD9008	ST9009	ST9008	CIRCULAR	3	-	86.3	141.35	141.1	0.26	0.013	14.6	22.7	27.3	31.7	NF	14.6	22.7	27.3	31.7	NF
SD9009	ST9010	ST9009	CIRCULAR	3	-	379.9	143.25	141.4	0.50	0.013	14.6	22.7	27.4	31.7	NF	14.6	22.7	27.4	31.7	NF
SD9010	ST9011	ST9010	CIRCULAR	3	-	432.6	144.96	143.3	0.40	0.013	14.6	22.8	27.5	31.9	NF	14.6	22.8	27.5	31.9	NF
SD9011	ST9012	ST9011	CIRCULAR	2	-	315	147.48	145.0	0.27	0.013	14.7	22.9	27.6	31.9	NF	14.7	22.9	27.6	31.9	NF
SD9012	ST9013	ST9012	CIRCULAR	2	-	332	148.38	147.5	0.27	0.013	14.7	22.9	27.6	31.9	100-yr, 24-hr	14.7	22.9	27.6	31.9	100-yr, 24-hr
SD9013	ST9014	09001	CIRCULAR	2.5	-	117	97.82	93.0	4.11	0.018	54.8	83.2	88.4	94.1	100-yr, 24-hr	54.8	83.2	88.1	94.2	100-yr, 24-hr
SD9014	ST9015	ST9014	CIRCULAR	3	-	217	100.35	97.8	0.76	0.011	40.2	62.1	64.8	70.3	25-yr, 24-hr	40.3	62.2	64.5	70.4	25-yr, 24-hr
SD9015	ST9016	ST9015	CIRCULAR	3	-	701.7	109.33	100.4	1.70	0.011	14.4	19.6	22.5	27.6	NF	14.5	19.7	22.3	27.6	NF
SD9016	ST9017	ST9016	CIRCULAR	3	-	311	113.58	109.3	0.31	0.011	14.5	19.6	21.2	24.0	NF	14.5	19.7	21.2	24.0	NF
SD9017	ST9018	ST9017	CIRCULAR	1.75	-	240	115.7	113.6	0.84	0.024	14.5	19.7	21.2	23.7	2-yr, 24-hr	14.5	19.7	21.2	23.7	2-yr, 24-hr
SD9060	ST9019	ST9018	CIRCULAR	1.75	-	121.7	116.62	115.7	0.67	0.024	14.8	20.0	21.5	24.5	2-yr, 24-hr	14.8	20.0	21.5	24.6	2-yr, 24-hr
SD9018	ST9020	ST9019	CIRCULAR	1.5	-	309	118.6	116.6	0.56	0.013	3.9	6.1	6.3	7.4	10-yr, 24-hr	3.8	6.2	6.4	7.5	10-yr, 24-hr
SD9019	ST9021	ST9020	CIRCULAR	1.25	-	395	130.67	118.6	2.99	0.013	2.9	5.3	5.6	6.5	10-yr, 24-hr	3.0	5.4	5.7	6.5	10-yr, 24-hr

Table B-3. Hydaulic Model Inputs and Results

Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions				
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
SD9020	ST9022	ST9021	CIRCULAR	1.25	-	351	140.33	130.7	2.72	0.013	2.9	4.9	6.2	8.0	25-yr, 24-hr	3.0	4.9	6.3	8.0	25-yr, 24-hr
SD9021	ST9023	ST9022	CIRCULAR	1.25	-	453.5	145.89	140.3	1.20	0.013	3.0	4.9	6.2	7.9	100-yr, 24-hr	3.0	4.9	6.3	7.9	100-yr, 24-hr
SD9022	ST9024	ST9015	CIRCULAR	3	-	159.4	103.27	100.4	1.51	0.011	27.0	43.2	46.6	50.3	25-yr, 24-hr	27.0	43.5	46.4	62.5	25-yr, 24-hr
SD9023	ST9025	ST9024	CIRCULAR	3	-	238.4	106.07	103.3	1.17	0.011	18.8	29.5	30.4	34.5	100-yr, 24-hr	18.8	29.7	32.9	45.9	100-yr, 24-hr
SD9024	ST9026	ST9025	CIRCULAR	2.5	-	175.8	110.34	106.1	2.39	0.011	18.9	29.2	30.2	34.5	100-yr, 24-hr	18.9	29.4	32.9	38.3	25-yr, 24-hr
SD9025	ST9027	ST9026	CIRCULAR	2.5	-	271.6	117.35	110.3	2.58	0.011	18.9	29.1	30.2	35.0	NF	18.9	29.1	32.8	34.8	NF
SD9026	ST9028	ST9027	CIRCULAR	2	-	142	121.35	117.4	2.75	0.024	14.7	21.9	23.1	25.7	100-yr, 24-hr	14.7	21.9	23.0	25.7	100-yr, 24-hr
SD9027	ST9029	ST9028	CIRCULAR	2	-	160	125.35	121.4	2.44	0.024	14.7	21.9	23.1	25.9	100-yr, 24-hr	14.7	21.9	23.0	25.8	100-yr, 24-hr
SD9028	ST9030	ST9029	CIRCULAR	2	-	258	131.45	125.4	2.33	0.024	14.7	21.9	23.1	26.5	10-yr, 24-hr	14.7	21.9	23.0	26.4	10-yr, 24-hr
SD9029	ST9031	ST9030	CIRCULAR	2.5	-	296	135.35	131.5	1.28	0.024	14.7	22.9	27.0	28.8	25-yr, 24-hr	14.7	22.9	26.9	28.8	25-yr, 24-hr
SD9030	ST9032	ST9014	CIRCULAR	3	-	263.3	102.61	97.8	1.49	0.011	15.4	22.3	25.1	27.5	100-yr, 24-hr	15.4	22.3	25.1	30.4	100-yr, 24-hr
SD9031	ST9033	ST9032	CIRCULAR	1.75	-	202.4	103.63	102.6	0.45	0.024	7.7	10.9	13.1	16.7	100-yr, 24-hr	7.7	10.9	13.1	17.2	100-yr, 24-hr
SD9032	ST9034	ST9033	CIRCULAR	1.75	-	306.4	105.2	103.6	0.48	0.024	7.7	10.9	13.1	13.6	25-yr, 24-hr	7.7	10.9	13.1	14.9	25-yr, 24-hr
SD9033	ST9035	ST9034	CIRCULAR	1.5	-	118.7	107.06	105.2	0.40	0.013	7.7	10.9	12.8	12.6	25-yr, 24-hr	7.7	10.9	12.8	12.7	10-yr, 24-hr
SD9034	ST9036	ST9035	CIRCULAR	1.5	-	276	108.14	107.1	0.39	0.013	7.7	10.9	12.1	12.5	10-yr, 24-hr	7.7	10.9	12.1	12.5	10-yr, 24-hr
SD9035	ST9037	ST9036	CIRCULAR	1.5	-	242	108.87	108.1	0.39	0.013	7.7	10.6	12.5	13.5	10-yr, 24-hr	7.7	10.6	12.5	13.5	10-yr, 24-hr
SD9036	ST9038	ST9037	CIRCULAR	1.25	-	212.2	109.62	108.9	0.22	0.013	7.7	11.2	13.5	14.7	2-yr, 24-hr	7.7	11.2	13.5	14.7	2-yr, 24-hr
SD9037	ST9039	ST9038	CIRCULAR	1.25	-	260.1	110.29	109.6	0.22	0.013	7.9	12.4	15.1	16.6	2-yr, 24-hr	7.9	12.4	15.1	16.6	2-yr, 24-hr
SD9058	ST9040	ST9041	CIRCULAR	2.5	-	203	111.71	108.3	1.51	0.013	15.5	24.9	29.8	37.0	NF	15.5	24.9	29.8	37.0	NF
SD9057	ST9041	ST9068	CIRCULAR	2.5	-	275	108.31	104.0	1.21	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9038	ST9042	ST9040	CIRCULAR	2	-	294.3	114.63	111.7	0.98	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9053	ST9043	ST9066	CIRCULAR	1.5	-	961	122.65	108.0	1.51	0.013	4.0	6.0	6.7	8.0	NF	4.0	6.1	6.8	8.1	NF
SD9045	ST9044	ST9042	CIRCULAR	2	-	250	116.13	114.6	0.60	0.013	6.8	11.2	13.6	16.8	NF	6.8	11.2	13.6	16.8	NF
SD9054	ST9045	ST9044	CIRCULAR	1.5	-	249.8	117.91	116.1	0.51	0.013	3.0	4.9	6.1	7.5	NF	3.0	4.9	6.1	7.5	NF
SD9056	ST9046	ST9045	CIRCULAR	1.5	-	150	118.6	117.9	0.33	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9055	ST9047	ST9046	CIRCULAR	1.25	-	168.6	120.31	118.6	0.87	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9046	ST9048	ST9047	CIRCULAR	1.25	-	148.2	121.19	120.3	0.59	0.013	3.0	5.0	6.1	7.4	NF	3.0	5.0	6.1	7.4	NF
SD9047	ST9049	ST9040	CIRCULAR	2.25	-	217.2	114.26	111.7	1.06	0.013	8.8	13.8	16.2	20.2	NF	8.8	13.8	16.2	20.2	NF
SD9048	ST9050	ST9049	CIRCULAR	2	-	200.7	115.86	114.3	0.80	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9049	ST9051	ST9050	CIRCULAR	2	-	118	116.69	115.9	0.70	0.013	8.8	13.8	16.2	20.3	NF	8.8	13.8	16.2	20.3	NF
SD9050	ST9052	ST9051	CIRCULAR	1.75	-	208	118.6	116.7	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9044	ST9053	ST9052	CIRCULAR	1.75	-	143	119.74	118.6	0.80	0.013	6.6	10.2	12.3	15.7	NF	6.6	10.2	12.3	15.7	NF
SD9051	ST9054	ST9053	CIRCULAR	1.75	-	157	120.84	119.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9040	ST9055	ST9054	CIRCULAR	1.75	-	180	121.74	120.8	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9043	ST9056	ST9055	CIRCULAR	1.5	-	125	122.87	121.7	0.70	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9041	ST9057	ST9056	CIRCULAR	1.5	-	150	123.62	122.9	0.50	0.013	3.1	4.8	5.8	7.4	NF	3.1	4.8	5.8	7.4	NF
SD9042	ST9058	ST9057	CIRCULAR	1.5	-	150	124.37	123.6	0.50	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9039	ST9059	ST9058	CIRCULAR	1.25	-	135	125.5	124.4	0.65	0.013	3.1	4.8	5.9	7.4	NF	3.1	4.8	5.9	7.4	NF
SD9059	ST9060	ST9061	CIRCULAR	1.25	-	248.8	129.87	124.3	2.25	0.013	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.2	NF
SD9052	ST9061	ST9043	CIRCULAR	1.25	-	65.9	124.27	122.7	2.26	0.024	4.0	6.1	6.8	8.1	NF	4.1	6.2	6.8	8.1	NF
SD9061	ST9062	ST9063	CIRCULAR	1.5	-	265.8	97.57	95.7	0.70	0.011	4.2	7.5	8.1	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9067	ST9063	ST9069	CIRCULAR	1.5	-	128	95.65	94.8	0.75	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.1	NF
SD9062	ST9064	ST9062	CIRCULAR	1.5	-	138.1	99.06	97.6	1.08	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.5	11.0	NF
SD9063	ST9065	ST9064	CIRCULAR	1.25	-	98.2	99.89	99.1	0.54	0.011	4.2	7.6	8.2	10.6	NF	4.5	7.9	8.6	11.0	NF
SD9064	ST9066	ST9067	CIRCULAR	2.5	-	205	107.95	103.8	2.00	0.013	10.7	16.2	18.8	21.7	NF	10.7	16.3	18.9	21.8	NF
SD9065	ST9067	09003	CIRCULAR	3	-	145	103.75	100.0	2.60	0.013	26.2	40.9	48.4	58.6	NF	26.2	40.9	48.5	58.7	NF
SD9066	ST9068	ST9067	CIRCULAR	3	-	10	103.95	103.8	2.00	0.013	15.5	24.9	29.7	37.0	NF	15.5	24.9	29.7	37.0	NF
SD9068	ST9069	ST9070	CIRCULAR	1.5	-	110	94.81	92.8	1.44	0.011	4.1	7.5	8.0	10.6	NF	4.5	7.8	8.5	11.0	NF
SD9069	ST9070	09002	CIRCULAR	1.5	-	30	92.83	92.9	-0.27	0.011	4.1	7.5	8.0	10.6	NF	4.4	7.8	8.5	11.0	NF
1207	STD3400	ST4221	CIRCULAR	1.5	-	290.7	169.61	165.9	1.11	0.013	5.7	6.4	6.7	7.9	NF	6.1	6.8	7.7	9.7	NF
SD4592	TOOZE_POND	ST4503	CIRCULAR	2	-	264	147.24	146.6	0.26	0.013	3.6	5.8	7.0	8.7	NF	3.8	6.0	7.3	9.0	NF

Table B-3. Hydaulic Model Inputs and Results																				
Conduit			Conduit Atributes							Existing Land Use Conditions					Future Land Use Conditions					
							Invert Elevation (ft)				Peak Flow (cfs)					Peak Flow (cfs)				
ID	US Node	DS Node	Shape	Diameter (ft)/ Max Width (ft)	Depth (ft)	Length (ft)	US	DS	Slope (%)	Manning's Roughness	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient	2-yr, 24-hr	10-yr, 24-hr	25-yr, 24-hr	100-yr, 24-hr	When Hydraulically Deficient
1323	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1	-	38	146.45	141.5	1.32	0.013	1.8	2.7	3.5	22.9	100-yr, 24-hr	1.8	2.7	3.5	22.9	100-yr, 24-hr
4826	WILSONVILLE_DIST_CTR_POND	ST4226	CIRCULAR	1.5	-	30	146.45	141.5	22.88	0.024	14.9	22.9	22.3	4.4	100-yr, 24-hr	14.9	22.9	22.3	4.4	100-yr, 24-hr

NF = No Flooding

Appendix C: TM #2: Stream Assessment

Technical Memorandum: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks

TECHNICAL MEMORANDUM - FINAL UPDATED

To: Angela Wieland, Brown and Caldwell

From: Waterways Consulting, Inc.

Date: January 30, 2024

Re: Geomorphic Reconnaissance of Parts of Boeckman, Meridian, Arrowhead Creeks, Newland, and Kruse Creeks

Introduction

Brown and Caldwell (BC) was hired by the City of Wilsonville (COW) to prepare an updated Stormwater Master Plan that will develop an integrated and long-term approach for managing stormwater in the city. Wilsonville is one of Oregon's fastest growing cities, and its rapid growth has necessitated updates to previous Stormwater Master Plans (URS, 2012) to reflect changes in land use and improvements to stormwater management practices.

As part of this process BC requested that Waterways Consulting, Inc. (Waterways) conduct geomorphic stream assessments of a subset of stream segments within and adjacent to the City of Wilsonville to inform the updated Stormwater Master Plan. The assessments are meant to improve the understanding of stream processes in the selected reaches and to identify infrastructure risks associated with changes in creek hydrology as the city develops. The assessment was conducted in two phases with an initial phase that included evaluations of portions of Boeckman, Meridian and Arrowhead Creeks. The second phase, conducted in Fall 2023, included evaluations of portions of Newland Creek and an unnamed tributary to the Willamette River, referred to as Kruse Creek in this report.

Boeckman, Meridian, Arrowhead creeks (tributary to Coffee Lake Creek), Newland, and Kruse Creeks are small tributaries of the Willamette River flowing in narrow canyons bordered by thick deposits of fine-grained sediment deposited by the Missoula Floods. These creeks flow in confined valleys with steep, landslide-prone valley walls. In some areas, residential development encroaches to the edge of the adjacent terraces[1], while in other areas, including the assessed portions of Arrowhead Creek, Newland Creek, and Kruse Creek, the adjacent land use is agricultural, rural residential, or industrial. Large portions of the watersheds upstream of the assessment reaches have, are in the process of, or will be converted from open space to suburban residential neighborhoods. These land use changes have, and will continue to have, the potential to impact the morphology of these streams as the channels respond to changes in flow, direct modifications, and changes in sediment supply. This assessment focuses on evaluating the current condition of the channels within the study reach, identifies any ongoing infrastructure concerns associated with past hydromodification impacts, and evaluates the susceptibility of the streams to future hydromodification impacts.

[1] This assessment focuses only on stream-based hazards and concerns and does not address landslide risks on the valley walls.

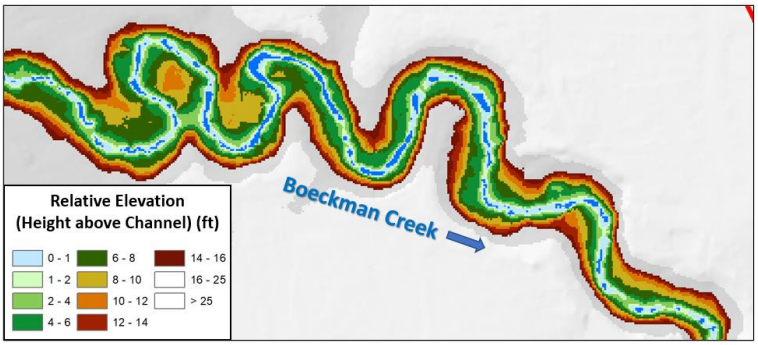
Approach

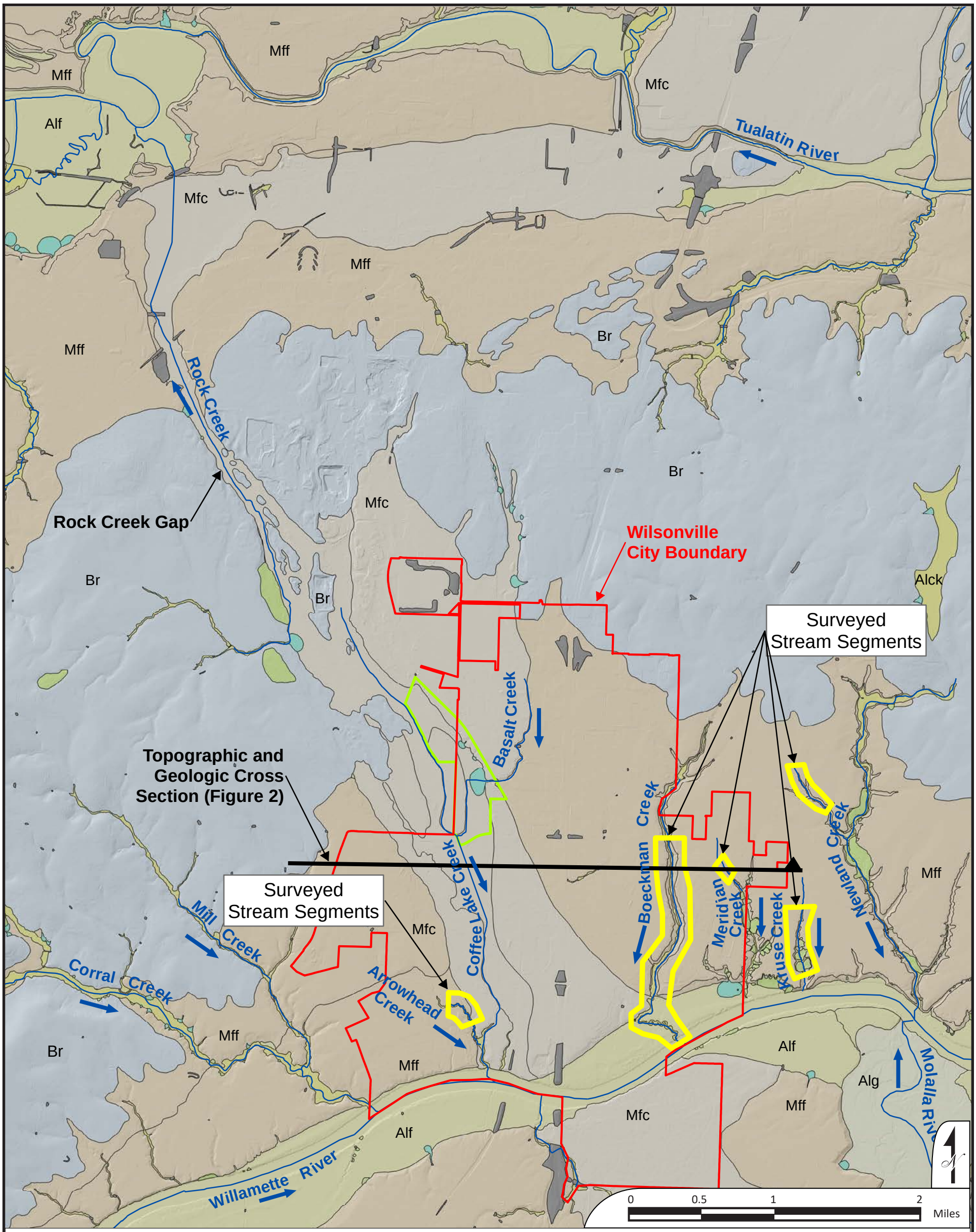
The purpose of the assessment is to understand and map the dominant geomorphic processes in the assessment reaches and identify any infrastructure-related issues that should be considered within the context of the updated Stormwater Master Plan. A key component of the assessment is the understanding that the reaches may be impacted by further hydromodification in the near future as a result of new upstream residential development or changes in other land use, such as agriculture or road development. Future efforts will include using the assessment information to identify potential Capital Improvement Projects (CIPs) or stream restoration actions that would address the identified risks to infrastructure or improve the resiliency of the stream corridor to impacts associated with hydromodification.

The assessments consisted of reconnaissance-level field observations supported by desktop mapping and analysis. The field protocols involved an experienced geomorphologist walking a designated stream reach twice in one day, starting and ending at the same location. In the first pass, the geomorphologist traversed the channel by wading, mapping and collecting georeferenced photographs of individual point features of interest, such as beaver dams, bridges, culverts, exposed pipes, affected roads and trails, headcuts, bedrock outcrops, heavily eroding banks, etc. The locations of these point-scale features were recorded in a tabular format and later digitized (these point-scale observations are presented in the tables in **Appendix A** of this report). During the first pass, the geomorphologist subdivided the stream into mappable "subreaches," typically several hundreds to thousands of feet long, within which geomorphic conditions are relatively consistent and could be characterized. The second pass consisted of walking back through the reach and evaluating the subreaches' key geomorphic features, conditions, infrastructure risks, restoration opportunities, etc. The reach-scale observations were recorded in a matrix-based field form specifically developed for this project. Subreach summary tables for the surveyed reaches are provided later in this report.

The desktop component of this assessment included compilation and analysis of geospatial data, including infrastructure data, topographic data, and geologic information. Waterways used the 2014 LiDAR data to create "Relative Elevation Models" (REMs) for each of the creeks within the assessment area. An REM is a topographic model created from a LiDAR elevation surface that shows the height of the ground surface relative to the adjacent streambed, which is helpful for identifying and interpreting geomorphic surfaces relative to the stream (e.g., **Figure 1**). The REMs for the creeks are provided as .tif files in a digital appendix to this report (**Appendix B**). In addition, as part of the desktop portion of the assessment Waterways created and analyzed topographic and geologic cross sections and stream longitudinal profiles and produced a set of field maps identifying streams and stormwater infrastructure identified during the field component. The field maps are provided as **Appendix C**.

Figure 1. *Example of Relative Elevation Model of Part of Lower Boeckman Creek*





Legend

City Limits

Stream Centerline

Coffee Lake Wetlands (City of Wilsonville)

Surficial Geology (from compilation by Ma et al., 2012)

Af - Artificial Fill

Alck - Creek Alluvium

Alf - Fine Alluvium

Alg - Coarse Alluvium

Br - Columbia River Basalts

Df - Debris Flow Fans

Ls - Large Landslides

Mfc - Missoula Flood Coarse Bedload Deposits

Mff - Missoula Fine Flood Deposits

Ma, L., Madin, I.P., Duplantis, S., and K.J. Williams. 2012. LiDAR- Based Surficial Geologic Map and Database of the Greater Portland Area, Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill Counties, Oregon, and Clark County, Washington. State of Oregon Department of Geology and Mineral Industries, Open File Report O-12-02.

Geologic and Geomorphic Setting Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 2

Geologic and Geomorphic Setting

Geomorphic processes in the creeks that dissect the Wilsonville area are influenced by their recent geologic history (**Figure 2**). Wilsonville sits on sedimentary deposits laid down by the Missoula Floods (Bretz, 1969), a series of dozens of gigantic floods that inundated the Willamette Valley between approximately 20,000 and 14,000 years ago (O'Connor et al., 2020). These cataclysmic floods originated from Glacial Lake Missoula in Montana and traveled down the Columbia River valley. A constriction downstream from Portland hydraulically impounded these flows, causing backwater flooding up the Willamette Valley. One of the main flow pathways for the Missoula Floods into the Willamette Valley was through a path that includes Lake Oswego and the "Rock Creek Gap" north of Wilsonville (O'Connor et al., 2001) (**Figure 3**). At these locations, huge flows moving south into the Willamette Valley were concentrated through narrow gaps in bedrock, forming underwater vortices powerful enough to carve deep channels ("scablands") and lakes ("kolks") in the resistant basalt bedrock in these locations.

The City of Wilsonville lies on an alluvial fan that formed in these floods where concentrated floodwater moving into the Willamette Valley spread out after moving through the Rock Creek Gap. The sudden widening downstream of the gap caused giant lobes of poorly sorted gravel and boulders to deposit along a pathway that bisects the City of Wilsonville (**Figure 2**). Drill logs from Canby and Wilsonville indicate that these coarse-grained, poorly sorted Missoula Flood deposits (labeled ***Mfc*** on **Figure 2**) range from 50 to 120 feet thick and are typically covered with 5-15 feet of sand and silt (Allison, 1978). In Wilsonville, the north-south oriented swath of ***Mfc*** is bounded on both sides by finer grained Missoula Flood deposits (***Mff*** in **Figure 2**). These sediments are thick, stratified silt and clay deposits that cover much of the lowland Willamette Valley floor. The finer-grained sediments (***Mff***) were laid down at a later phase in the Missoula Floods when the Willamette Valley was ponded as the main floods moved through the Columbia River.

Figure 4 is an east-west topographic and geologic profile through the main creeks of Wilsonville, passing through several of the reaches included in this assessment. The profile illustrates the differences between the parallel north-south creeks flowing through Wilsonville. Coffee Lake Creek, the largest creek in the city, flows in an "underfit" valley created by the Missoula Floods, and is underlain by coarse Missoula Flood sediments (***Mfc***). This geological setting explains why the Coffee Lake Creek valley is a wide, flat valley containing ecologically important wetlands, along with other unique geologic features of Wilsonville area, such as scablands and kolks, including the ecologically important Coffee Lake Wetlands as well as the 3.5-acre kolk pond at the Tonquin geologic area managed by Metro.

In contrast with Coffee Lake Creek, Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks carved deeper canyons in thick deposits of fine-grained Missoula Flood deposits (***Mff***) (**Figure 4**). Boeckman Creek is in a narrow canyon as much as 100 feet deep, with steep, unstable hillslopes prone to landslides. Boeckman, Meridian, Arrowhead, and Newland Creeks appear to have incised through the softer deposits to the point where their beds have encountered more consolidated clay deposits, or in the case of Arrowhead, where it reached the base level established by Coffee Lake Creek. Th presence of marginally resistant, consolidated clay in the streambed in some locations on all of these creeks provides a degree of base level stability. In some cases, including Boeckman and Arrowhead, the creeks appear to be no longer incising, especially in the lower reaches of these watersheds. Conversely, the headwater reaches assessed on Meridian and Newland Creek, appear to be experiencing incision despite exposures of more consolidated substrates. The morphology of the channel and valley on Kruse Creek is more dominated by the presence of valley-wide landslides and a high groundwater table.

Figure 3. *Pathway of Missoula Floods into the Willamette Valley through Wilsonville (modified from Minervini et al., 2003)*

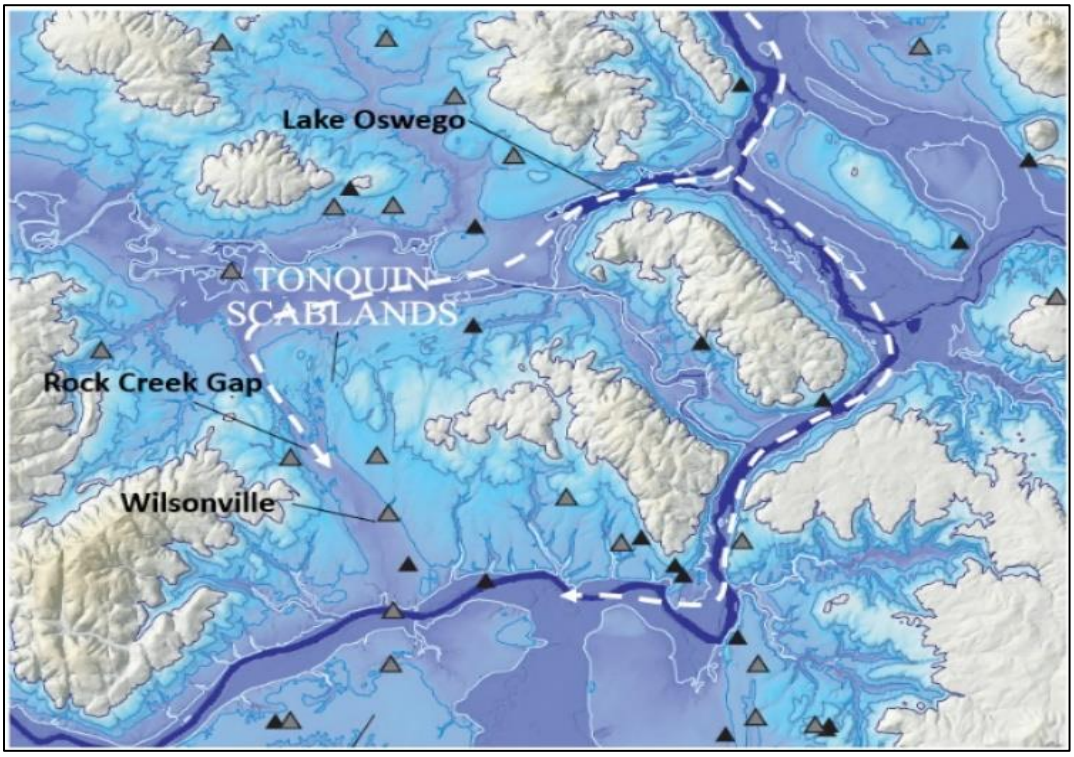
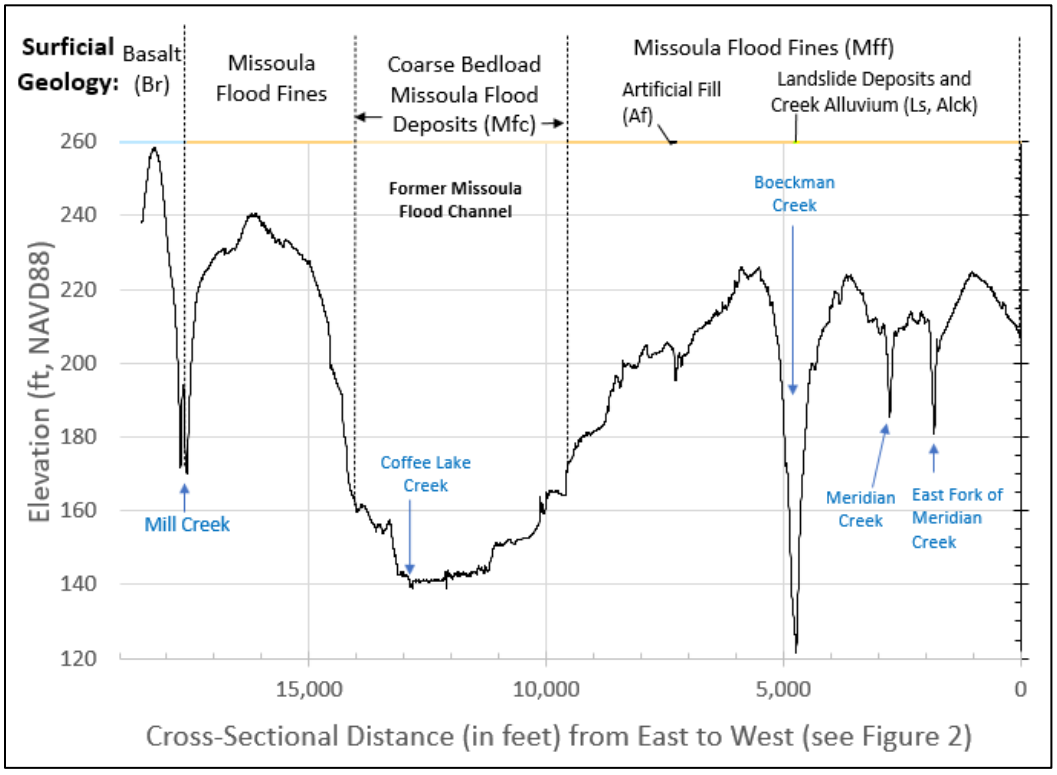


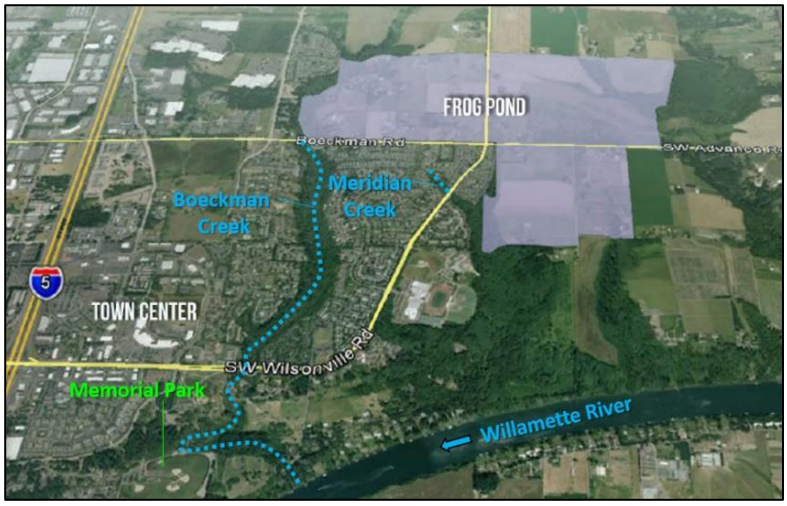
Figure 4. *Topographic and Geologic Cross Section Across the Wilsonville Area (See Fig. 2 for Profile Location)*



Human Impacts and Infrastructure

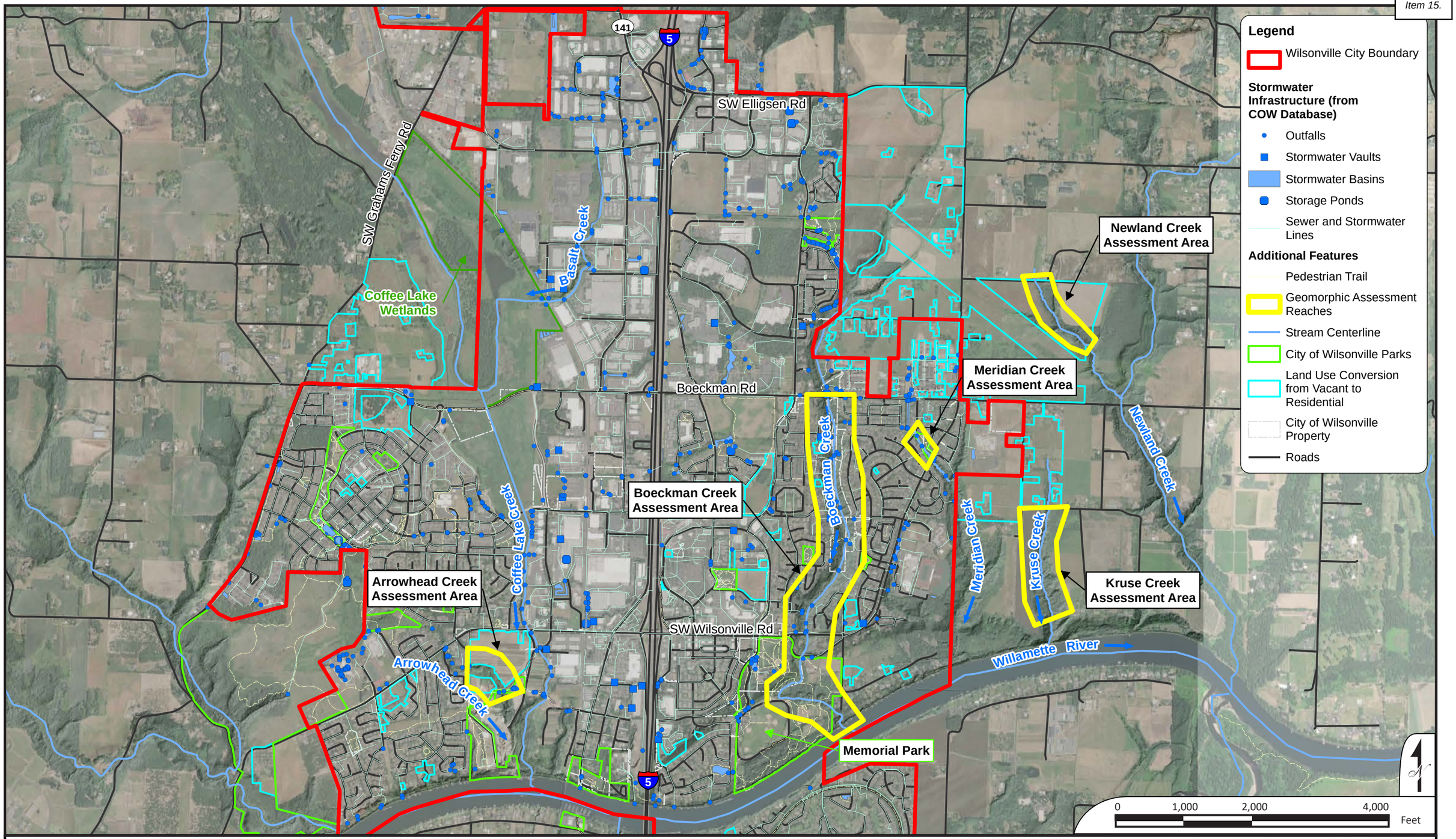
Most of the assessment reaches are adjacent to existing developed areas or are downstream of zones in the process of, or anticipated to be, converted from agricultural uses to residential developments (***Figure 5***). Hydromodification impacts in the assessment reaches are not limited to impacts associated with urban and residential development. Hydromodification impacts on these stream channels have been ongoing for over a century when the forested landscape was converted to agriculture, roads were built, culverts were installed, and fields were tile drained. These land use changes specifically intended to reduce water storage on the landscape while increasing the efficiency of runoff to adjacent waterbodies.

Figure 5. *Location of Phase 1 Assessment Reaches (dashed blue lines) relative to Existing and Planned Developed Areas (modified from APG. 2015)*



In the assessment reaches, Boeckman, Meridian, Arrowhead, Newland and Kruse Creeks flow in incised canyons. Along Boeckman and Meridians Creeks, residences are built to the edges of the canyons and the streams flow in confined valleys 20 to 100 feet deep. Water enters the streams from paved areas through a complex network of stormwater pipes that discharge along the steep valley walls (***Figure 6***).

The assessment reaches in Boeckman and Meridian are downstream of recently developed areas within the Frog Pond Development Area, a 500-acre residential neighborhood under construction within the urban growth boundary (**Figure 5**). The Newland and Kruse Creek assessment reaches are located downstream of an undeveloped portion of the Frog Pond Development area located to the east of Wilsonville and Stafford Roads. The long-planned development will include residences, schools, parks, transit, and trails, including a new regional trail following Boeckman Creek along the assessment reach (APG, 2015). To mitigate for potential hydromodification impacts from the existing and proposed portions of the Frog Pond Development area on the assessment reaches and other receiving streams, the developments are implementing Best Management Practices (BMP's) that are specifically designed to maintain the natural hydrology and limit the discharge of stormflow off of newly created impervious surfaces. Both "upland" and "in-stream" strategies for mitigating hydromodification risks have been adopted by the City and are being implemented within newly developed portions of Wilsonville, including the Frog Pond area (Brown and Caldwell, 2015). Those BMP's include infiltration and detention facilities, neighborhood-based Low Impact Development strategies, retrofitting existing stormwater detention basins, rehabilitating stormwater outfalls along the creek, culvert upgrades, and riparian vegetation improvements. The assessment reaches, especially along Newland and Kruse Creeks, provides an opportunity to establish a baseline of channel conditions prior to development occurring in the contributing watershed.



Human Impacts and Infrastrucure Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 6

Field Observations

The assessment included 5 days of field time to document conditions in priority reaches of Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks. These reaches were prioritized by the City of Wilsonville based on the importance of the streams, likelihood of hydromodification impacts, land access, and available budget. Additional reaches may be added to the assessment in the future.

The highest priority reach was the section of Boeckman Creek from Boeckman Road to the Willamette River, an along-stream distance of 12,200 feet (2.3 miles) (**Figure 7**). The second priority for the assessment was the 600-foot-long (0.1-mile) reach of Meridian Creek adjacent to Willow Creek/Landover Park (also shown in the top right corner of **Figure 7**). Sections of Basalt Creek and Arrowhead Creek were also identified as potential assessment reaches. Arrowhead was prioritized for the assessment over Basalt Creek due to the lack of landowner agreements along Basalt Creek.

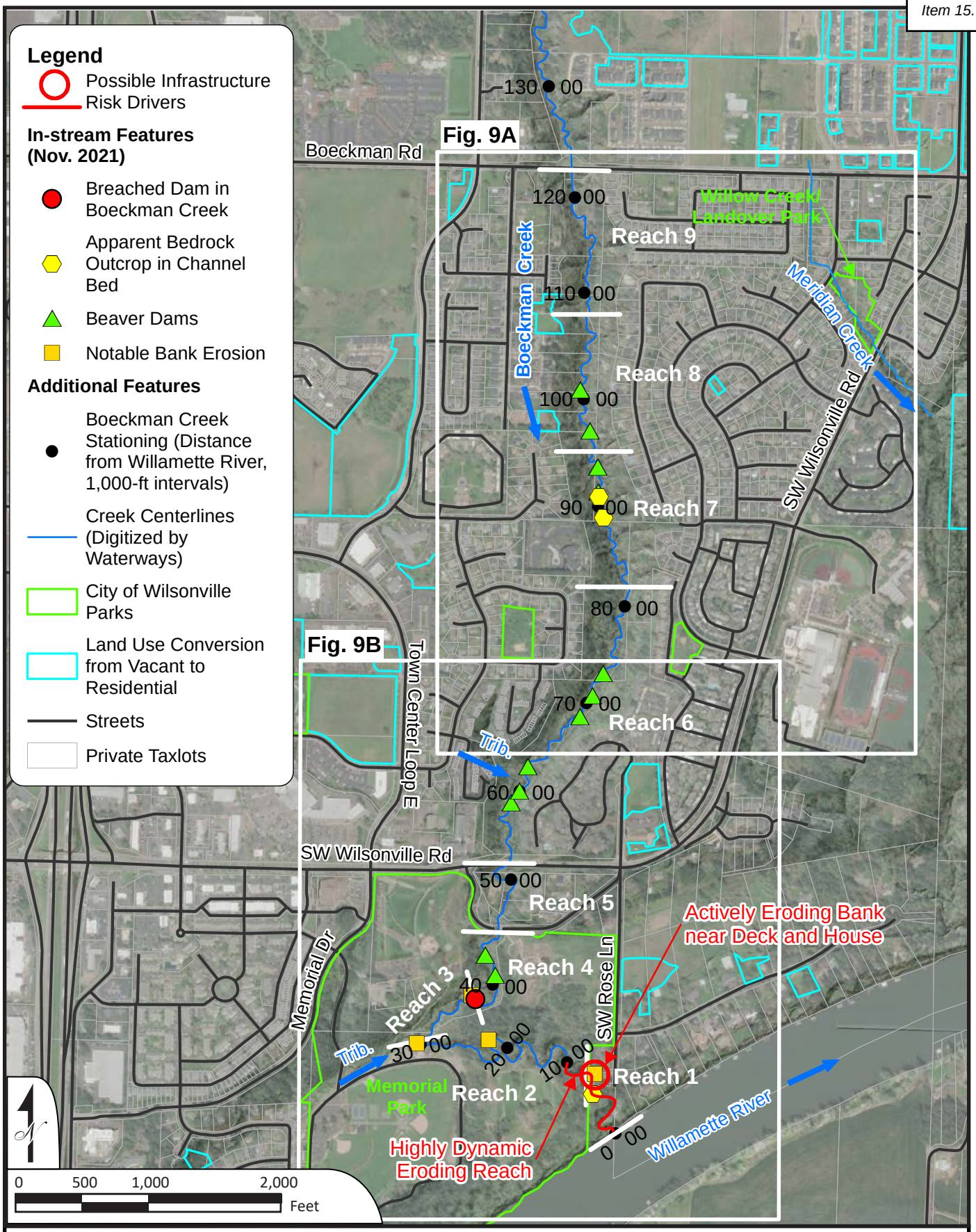
Approximately 1,000 feet (0.2 miles) was assessed on Arrowhead Creek. In Fall 2023, portions of Newland and Kruse Creeks that have the potential to be impacted by the Frog Pond Development or any additional eastward expansion of Wilsonville were also included in the assessment. Approximately 1,700 feet (0.3 miles) of Newland Creek and 2,200 feet (0.4 miles) of Kruse Creek was evaluated.

Boeckman Creek

The field assessment for Boeckman Creek occurred on November 19 and 24, 2021. The first day covered the lower reach within Memorial Park, from the private property boundary at Station 750 to Kolbe Lane (Sta. 4,500). The second day covered the reach from Wilsonville Road (Sta. 5,300) to Boeckman Road (Sta. 12,200). Two sections between the Willamette River and the private property boundary (Sta. 0 to 750) and between Kolbe Lane and Wilsonville Road (Sta. 4,500 to 5,300) were not accessed because those sections were on private property and Waterways did not have access permission. Permissions for the portion of private property located near the Willamette River were received in January 2022 and this section of channel (from Sta. 0 to 750) was assessed on January 25, 2022.

General Observations and Interpretations

- Specific point-scale observations of this section of Boeckman Creek are listed in **Appendix A1**.
- Boeckman Creek is confined within a narrow canyon bounded by steep valley walls prone to erosion and landsliding. At the bottom of the canyon, there is a meandering channel and a narrow, discontinuous floodplain covered by dense invasive species, especially Himalayan blackberry, reed canary grass, and English ivy. Very dense blackberry made for a difficult and slow traverse of the channel.
- Within the assessment reaches, Boeckman Creek has incised to a stable base level with a straight profile and relatively low gradient (about 0.6%), as illustrated in the longitudinal profile (**Figure 8**). The valley is graded to the Willamette River, and Boeckman Creek appears to no longer be actively incising, except in the most downstream reach at the confluence with the Willamette.
- The assessment area was subdivided into nine geomorphic sub-reaches ranging in length from 750 feet to 2,850 feet, within which geomorphic conditions and processes are relatively consistent. The subreaches are shown on the overview map (**Figures 7**), longitudinal profile (**Figure 8**), and detailed maps (**Figures 9a and 9b**). **Table 1** provides information and observations that characterize the geomorphic conditions and infrastructure features within each reach.



Boeckman Creek Geomorphic Survey Overview

Geomorphic Assessment of Wilsonville Creeks

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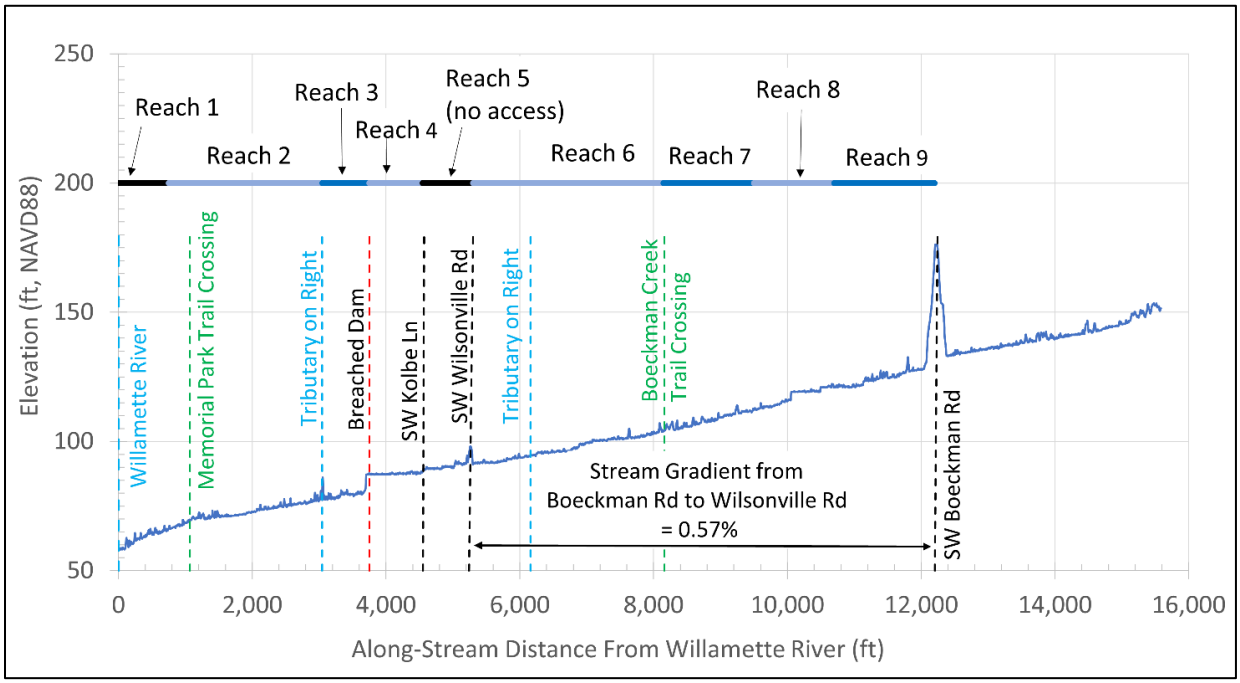
FIGURE 7

Figure 8. *Longitudinal Profile of Boeckman Creek (from 2014 LiDAR data)*



- Beaver are abundant throughout most of the assessment reaches and have a dominant impact on processes along Boeckman Creek. The most obvious impacts are from the channel-spanning dams that create a stairstep of flat water environments. Most of the grade control features shown on the field result map (**Figures 9a and 9b**) are beaver dams. The beaver dams range in height from about 1 foot to about 5 feet and pond long, continuous sections of the assessment area. The dams are actively maintained by beaver and most of them appear to be stable through typical floods in Boeckman Creek. Beaver are less prevalent or absent in the lower reaches of Boeckman Creek (Reaches 1 and 2), and are most abundant in the upper section (Reaches 6 through 9).
- The lack of stable beaver dams and seasonal variability in the backwater extent of the Willamette River along lower Boeckman Creek creates a highly dynamic condition with increased risk of erosion of the bed and banks. Dams throughout the Willamette River watershed, and the associated flow storage that those dams provide, results in a low stage in the Willamette River, relative to historic condition. Hydromodification impacts can potentially exacerbate channel instability by producing high flow events in early fall when the Willamette River is still low and the backwater influence is absent. This reach of Boeckman Creek is the most at-risk from hydrologic changes in the watershed.
- The breached former dam at Sta. 3,750 has an important reach-scale influence on the geomorphology in Boeckman Creek. Although the dam is breached, the remaining concrete and boulders are still present and provide a significant grade control feature, holding about 7 feet of grade (**Figure 8**). A wedge of fine sediment deposited upstream of the dam is covered with reed canary grass and extends as much as 800 feet upstream to the SW Kolbe Lane bridge.

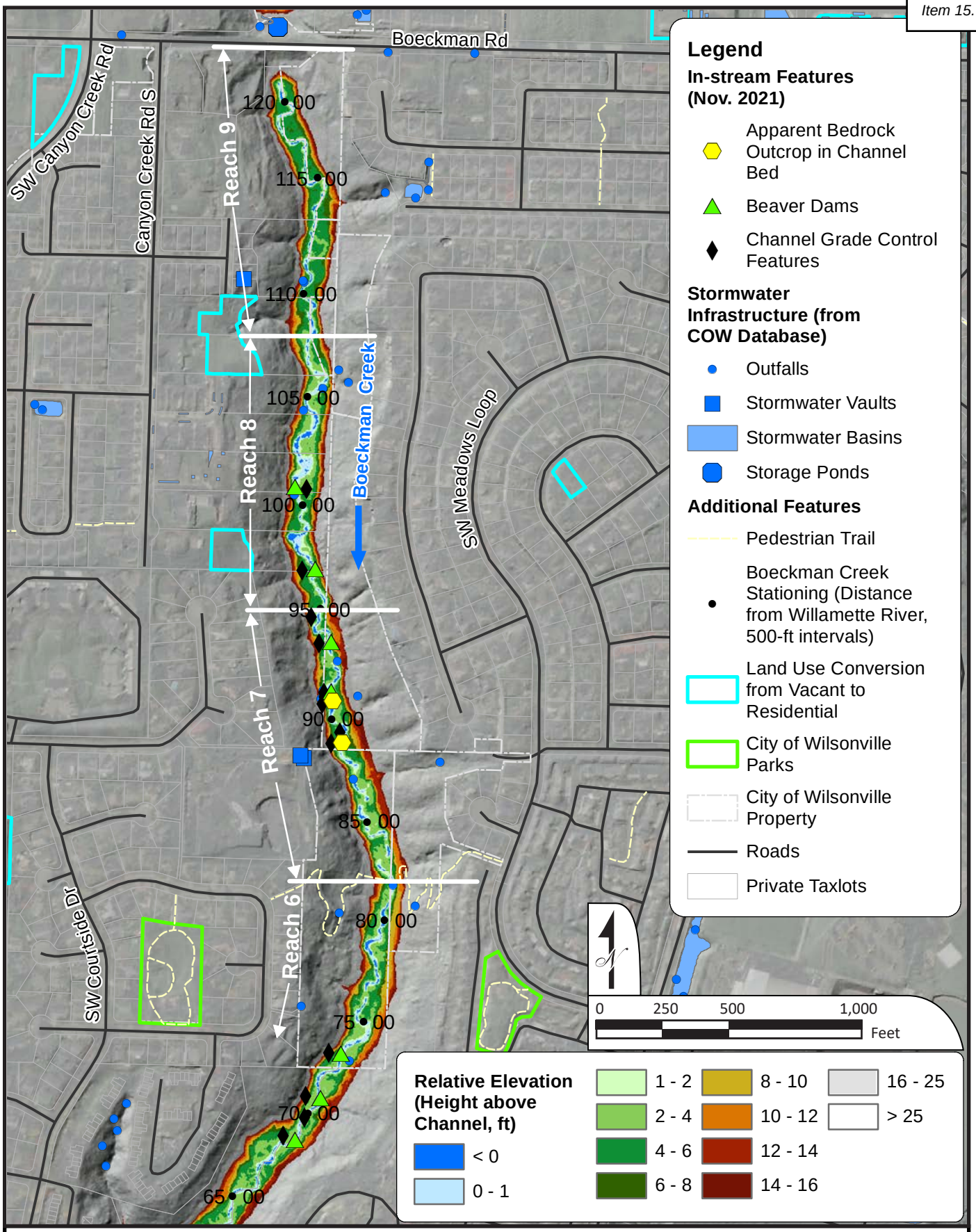
- There are at least three places where consolidated bedrock or other resistant material was observed within the channel bed in Boeckman Creek. These were noted by feel underfoot while wading. It was not possible to observe these resistant bed features due to the presence of turbid water about two to three feet deep at the time of the site visit.
- The presence of stable grade control – including resistant bed material, abundant stable beaver dams, fallen logs, boulders, and the 7-foot-high concrete and boulder grade control at the former dam – distributed throughout the project reach implies that much of Boeckman Creek cannot continue to incise. Collectively these features stabilize most of the channel bed, which is not susceptible to further incision due to hydromodification (**Figures 9a and 9b; Appendix A**).
- Waterways' geomorphologist also inspected the lower portions of two tributaries that enter Boeckman Creek from the west: one at Station 3,050 in Memorial Park, and one at Station 6,020 draining a residential area upstream of Wilsonville Road. Both tributaries appeared to be stable with no obvious infrastructure-related concerns:
    - The downstream tributary enters Boeckman Creek on river-right through a culvert under a road crossing in Memorial Park. The lower section of this tributary is deeply incised, low-gradient, gravel- and sand-bed stream in a dense blackberry thicket. Some bank erosion was observed along the steep banks but was not identified as an infrastructure concern. There is a partially clogged culvert on this tributary at a road crossing several hundred feet upstream of the confluence with Boeckman Creek. The clogged culvert backs water up to a footbridge in a grassy field in the park but does not appear to have any detrimental impacts. More descriptions are provided in **Appendix A1,** and photographs of this tributary can be found in the photo log (**Figure 10a**).
    - The upstream tributary drains the residential area along the west side of the creek north of Wilsonville Road. The tributary was only accessible at one location due to dense blackberry. At that location the channel bed was alluvial fine gravel and appeared stable.

SUMMARY CONCLUSIONS FROM BOECKMAN CREEK

- With the exception of Reach 1, the field reconnaissance did not identify any obvious concerns or infrastructure risk drivers related to geomorphology and hydromodification in the assessed portion of Boeckman Creek. No infrastructure appears at risk in the valley bottom. The stream in the assessment reach is laterally confined and vertically stable, and relatively little infrastructure is in the stream. Any increases to stormwater related to land use changes at the Frog Pond Development area are not expected to pose significant specific infrastructure risks. (*Note that the assessment area did not include the Boeckman Road crossing above the upstream extent of the assessment reach*).
- Within Reach 1, there is a risk of continued channel incision and bank erosion. Several properties have experienced bank failures and loss of land over the past several decades, and an active bank failure is impacting the backyard and deck of one of the properties. This study does not make any findings regarding the cause(s) and extent of bank failure in Reach 1. Further investigation of the bank failure should be conducted by a geotechnical engineer to determine if the source is associated with fill placed behind a now failed retaining wall, or if there is a larger slope stability issue at the site. If a further investigation to determine cause(s), extent, and possible remediation is conducted, then the investigation should consist of a slope stability analysis along with recommendations to address the instability within the context of existing site conditions. There is currently insufficient data to understand erosion rates and associated

risks. Longer-term geomorphic monitoring of this reach might be warranted, which would include establishing cross-sections that would be resurveyed every three to five years to document erosional or depositional trends over time.

- The most significant risks in the canyons may relate to instability of the valley walls, which is outside the scope of this study. In a large rainstorm or possibly during an earthquake, mass wasting (landslides) from the valley wall could potentially occur, possibly blocking the channel, potentially endangering infrastructure near the top of the canyon walls.
- It is possible that a large flood could breach one or more of the apparently stable beaver dams. If that were to happen, one or more waves of incision could move upstream through parts of the assessment reach. However, the consequences of such an event appear to be relatively low given the stable base level, lack of infrastructure in the valley bottom, and the likelihood that the beaver would reestablish impacted dam sites.
- Collapses of individual beaver dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the beaver dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy riparian corridor consisting of a mix of native riparian species in Boeckman Creek would be a beneficial long term management strategy to maintain the beaver population.
- **Figures 10a and 10b** provides some summary photographs showing conditions within the assessed portion of Boeckman Creek in November 2021 and January 2022.



Boeckman Creek Geomorphic Survey (Upstream)

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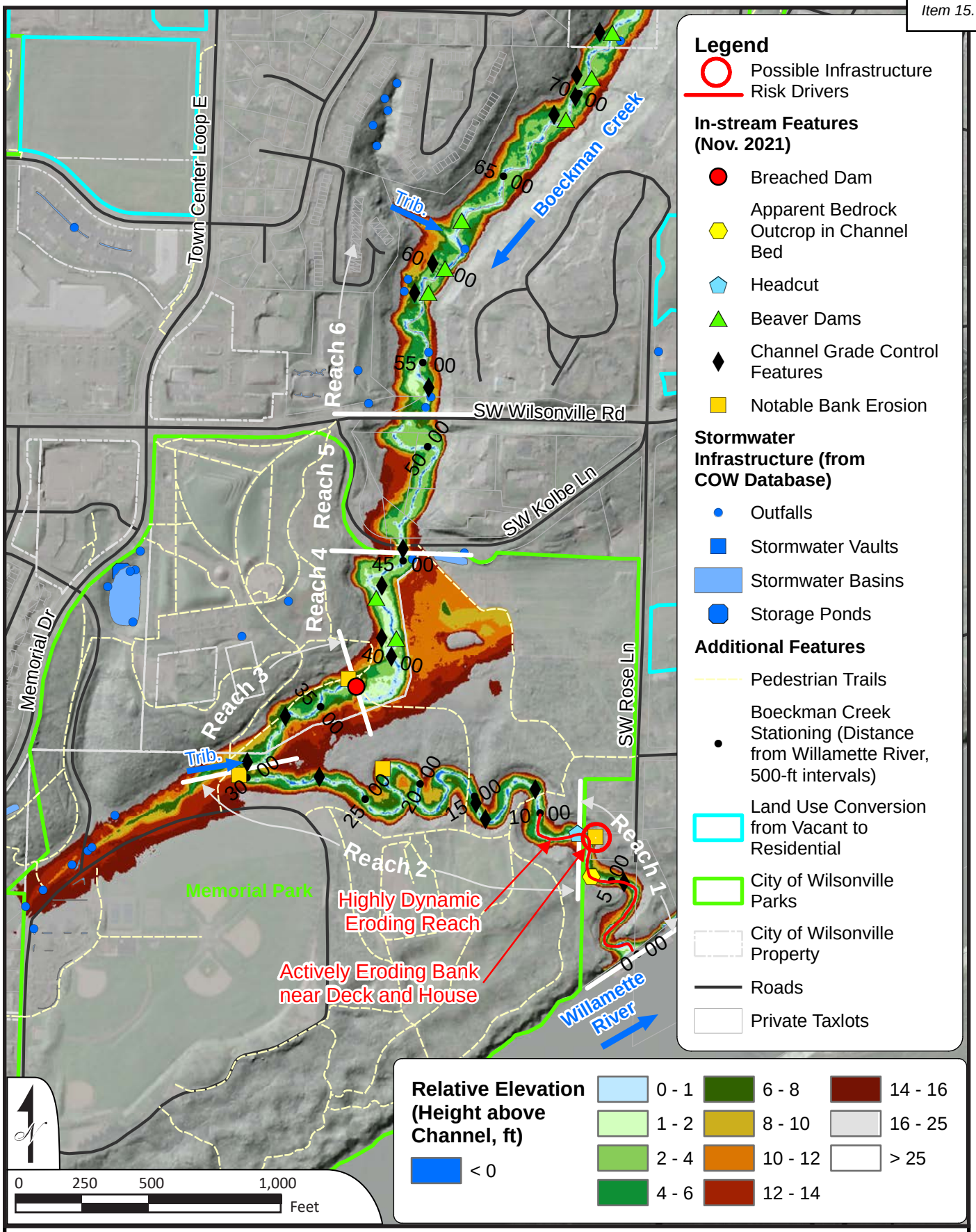
FIGURE 9A



Boeckman Creek Geomorphic Survey (Downstream)

Geomorphic Assessment of Wilsonville Creeks

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FIGURE **9B**

Table 1. *Field Observations for Geomorphic Subreaches Within Boeckman Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	0	750	Dynamic reach with seasonal backwater from Willamette River	1.07%	Pool-Riffle	gravel / fines	Incised	Willamette River	Valley walls susceptible to mass wasting	Yes, but no dams	Incising and wideneing	4	3	5	5	Grade control and bank stabilization	Actively incising and eroding, especially upper extent of reach where active small headcuts still migrating. Lower Willamette water level combined with high intensity rainfall in fall cause incision and widening. Recommend detailed geotechnical slope stability analysis in locatoin of active bank erosion and landsliding.
2	750	3,050	Incised Meandering Reach in Willamette Floodplain	0.44%	Pool riffle	Mud, wood, boulder, cobble	Incised, Stable	Some boulder steps, downed logs, Willamette base level	High mud terraces; tree roots	Yes upstream of 2,400' ; Maybe downstream of 2,400'	Stable	2	3	2	1	Remove invasive blackberry and ivy	From property boundary at downstream end to the tributary on right in Memorial Park. Reach is within the historic Willamette River floodplain and river terrace. Single-thread, incised meanders with banks between 6 feet and 40 feet high. Generally the amount of incision increases in the downstream direction. Banks are massive mud deposits from Missoula Flood fines and/or Willamette River floodplain deposits. Bed contains mud, wood, and some gravel reaches. From about Station 1,400' downstream, Willamette River bedload deposits are visible in the banks. Little to no beaver presence below Sta 2,400'; beaver present between 2,400 and 3,040'.
3	3,050	3,700	Meander Reach below Breached Dam	0.37%	Pool riffle	Mud, wood	Incised, Stable	Beaver dams, downed logs	Valley walls, reed canary grass root mass	Yes, abundant	Stable	2	2	2	1	Remove invasives, add wood	From right bank tributary in Memorial Park to site of breached dam. Meandering channel with stable banks, beaver dams, relatively low floodplains covered in reed canary grass. Inundated areas are mostly reed canary grass, less blackberry than in other parts of the creek.
4	3,700	4,500	Low Gradient Depositional Reach above Former Dam	0.01%	Pool riffle	Mud, wood	Stable	Breached dam; beaver dam	reed canary grass in floodplain	Yes	Stable	1	2	1	1	Good reach for potential floodplain restoration	Reach from breached dam to SW Kolbe Lane in Memorial Park. Low gradient, meandering reach with relatively low, frequently inundated floodplain. Abundant beaver presence consisting of dams, canals, burrows, slides, and lot of chewed wood. Banks heavily covered with reed canary grass. Water is about 2 to 3 feet dep at this flow (moderately high flow), with mud dominated bed. A floodplain vegetation restoration project to replace reed canary grass with willow and alder could work well here.
5	4,500	5,300	Not Surveyed														Skipped this reach due to property access constraints

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
6	5,300	8,150	Stepped Beaver Pond Reach above Wilsonville Road	0.47%	Ponded by beaver dams	Mud, gravel, some bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1 (some trail erosion)	Remove invasives, add wood	Reach from Wilsonville Road to Boeckman Trail footbridge. Reach is mostly ponded by a series of beaver dams, most are small but with at least 2 large dams at Sta 6,250 and 7,300. The dams are built so that ponds are mostly continuous throughout the entire reach, with the toe of each dam close to the head of each pool of the downstream beaver pond. Reach is moderately incised but not as much as in other reaches of Boeckman Creek.
7	8,150	9,500	Mostly Free-Flowing Reach between Beaver Dammed Reaches	0.59%	Pool riffle	Gravel, mud	Stable, little to moderate incision	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	1	1 (some trail erosion)	Remove invasives, add wood	From Boeckman Trail footbridge to big beaver dam at Sta 9,500. Free flowing reach without much beaver activity. Riffle pool, gravel bed with some resistant bedrock in channel bed within the upper part of the reach. Some small beaver dams present but are not dominant.
8	9,500	10,700	Floodplain Inundated by Ponding at Several Large Beaver Dams	0.86%	Ponded by beaver dams	Mud	Stable, low banks	Beaver dams, bedrock	Reed canary grass root mass; valley walls	Yes, abundant	Stable	1	3	1	1	Remove invasives, add wood	From beaver dam at Sta 9,500 to transition to more free-flowing reach. Deep ponded reach, with inundated floodplain over large areas. It is like this because either (1) dams are larger than those inreaches 6 and 9; and/or (2) the reach is less incised with lower banks. Viewed from trail on river left with some stops; unlike downstream reaches, I did not traverse the channel through this entire reach due to difficult access and need to speed up assessment. Did not visit outfall at Sta. 10,500
9	10,700	12,200	Incised Beaver Pond Reach	0.61%	Ponded, pool riffle	Mud, gravel, possible bedrock	Incised and stable	Beaver dams	Reed canary grass root mass; valley walls	Yes, abundant	Stable	2	3	3	1	Remove invasives, add wood	Similar to Reach 6, but deeper incision. Reach dominated by a series of beaver dams, not all were mapped due to difficult access. Did not visit crossing under Boeckman Road due to apparent private property

Selected Photos From Boeckman Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE
10A

Selected Photos From Boeckman Creek, January 2022

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FIGURE 10B

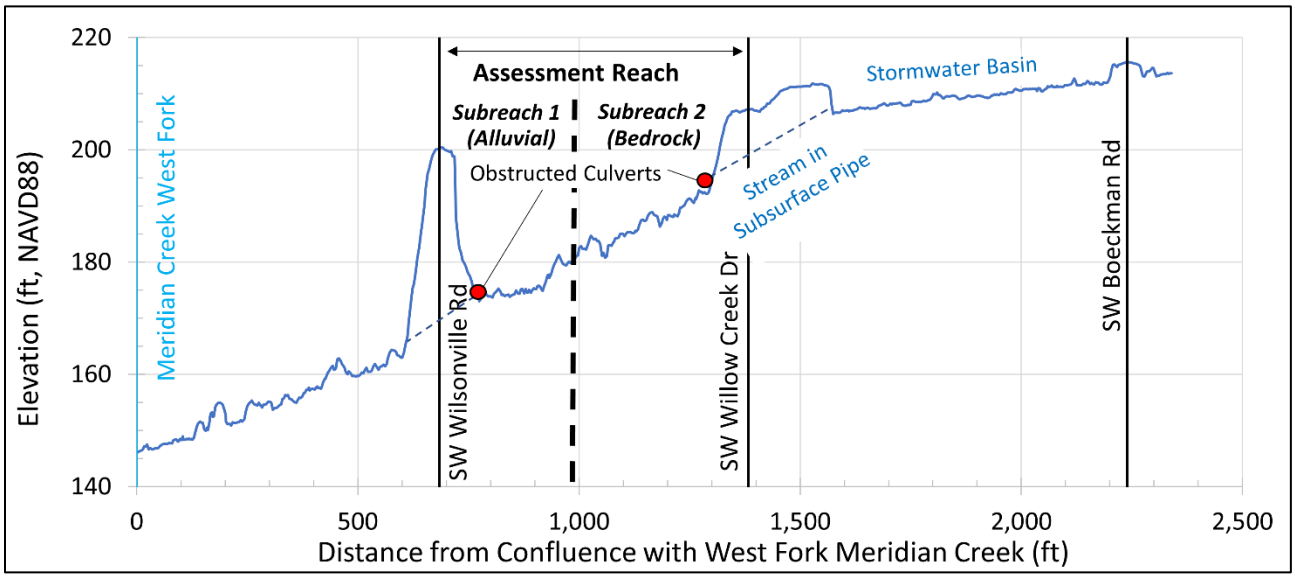
Meridian Creek in Landover Park

The field assessment for Meridian Creek occurred on November 26, 2021. The assessment included a 600-foot-long section of Meridian Creek between Wilsonville Road and SW Willow Creek Drive (**Figure 11**). This reach is immediately downstream of part of the Frog Pond Development Area. **Figure 12** is a longitudinal profile of the creek. **Table 2** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A2**. **Figure 13** contain photographs from this section of Meridian Creek.

General Observations and Interpretations

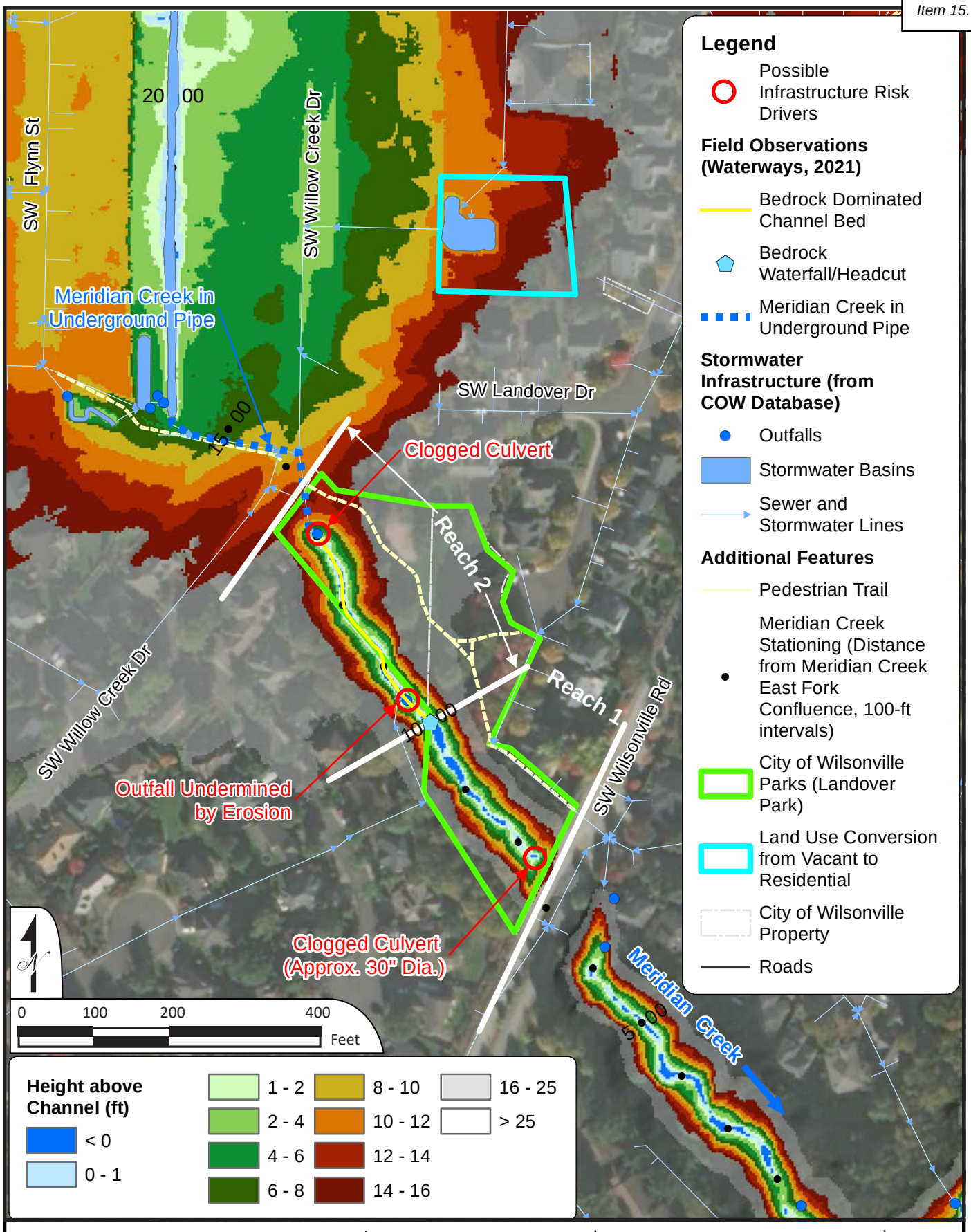
- This portion of Meridian Creek is incised in a very narrow canyon without any floodplains, whose steep slopes bound one side of the channel with a developed park on the other. The canyon is not as deep as the Boeckman Creek canyon, as can be seen in **Figure 4,** but the valley walls are steep with potentially unstable slopes underlain by fine-grained sediments and covered with dense blackberry thickets. The western valley wall is more at risk of landslides because Meridian Creek flows along the western margin of the canyon (right bank looking downstream).
- There are two distinct subreaches within the assessed area, delineated at a 4-foot-high bedrock/hardpan waterfall at Station 1,000 (**Figure 12**). The waterfall does not appear to be an active headcut advancing upstream and appears relatively stable. Downstream of the waterfall, the channel has an alluvial bed and is influenced by an obstructed culvert at Wilsonville Road. Upstream of the waterfall, a resistant layer of consolidated fine-grained sediment is exposed over most of the channel bed.
- The culvert at SW Willow Creek Drive appears to be undersized which may limit more significant hydromodification impacts from occurring downstream. Rock placed downstream of the culvert suggests that streambed erosion has been a concern in the past. This reach likely experienced significant channel incision and headcutting in the past but the active headcutting has been mostly arrested by the presence of hardpan material in the streambed. The discontinuity in the longitudinal profile across SW Willow Creek Drive (**Figure 12**) provides evidence for this field-based interpretation.

Figure 12. *Longitudinal Profile of portion of Meridian Creek (from 2014 LiDAR data)*



SUMMARY CONCLUSIONS FROM MERIDIAN CREEK

- The stream is stable in this reach due to the bedrock base level control and being confined laterally by valley walls and culverts at the upstream and downstream end.
- The main risk drivers are the culverts at the downstream and upstream ends of the reach:
  - There is a sediment-clogged culvert at the Meridian Creek crossing at Wilsonville Road (Station 775). The culvert under the high road prism is mostly obstructed and appears to cause ponding during storm runoff (**Figure 12**). It is unlikely that ponded water would overtop Wilsonville Road, but backwatering behind the road could result in significant ponding and potential for piping through the road prism, which was not likely designed to act as a dam. The risks at the crossing should be further evaluated as part of the Stormwater Master Plan. Hydraulic modeling may provide an opportunity to understand maximum inundation depths if the culvert were to plug.
  - The grate at the outlet of the culvert at the Willow Creek Drive appears to have been modified to address past channel incision and headcut migration. This location should be monitored to determine if the stabilization measures installed downstream of the culvert provide adequate, long-term grade stabilization.
- The PVC stormwater outfall on the creek at Station 1,100 is undermined and a 6-foot section has washed out and moved downstream.



Meridian Creek Geomorphic Survey

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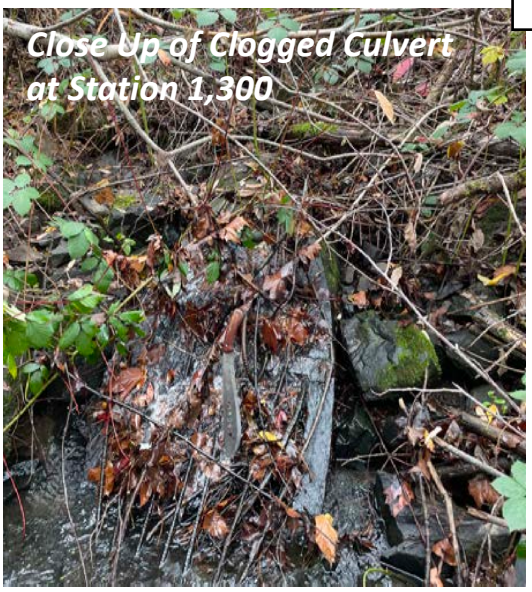
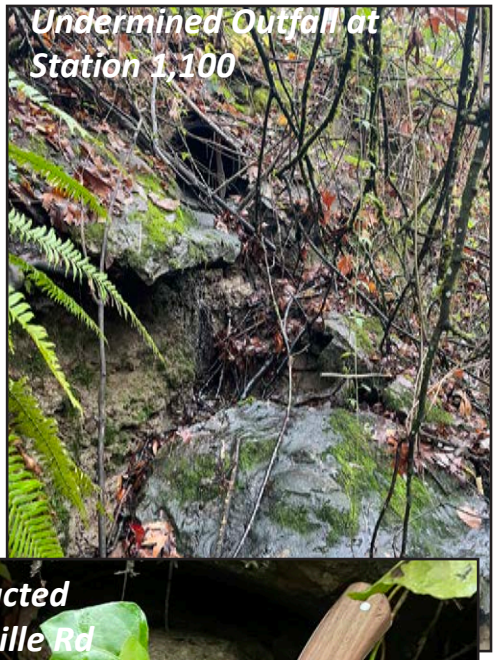
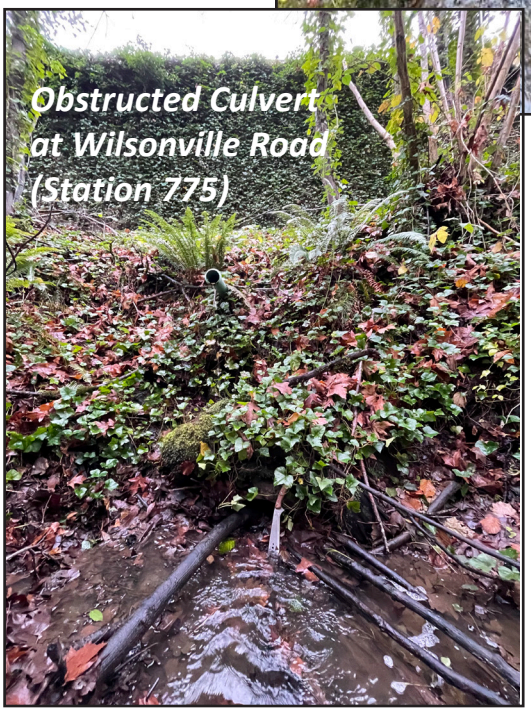
FIGURE 11

Table 2. *Field Observations for Geomorphic Subreaches Within Meridian Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	775	1,000	Gravel depositional reach behind clogged culvert	1.05%	Step Pool	Gravel, fines, wood	Incised, Stable	Culvert at Wilsonville Road	Narrow valley wall	No	Stable or aggrading	1	3	4	4	Address downstream drainage, invasives removal	Short alluvial reach behind the obstructed culvert at Wilsonville Road. Gravel bed, one or more small steps formed by fallen logs. Channel is incised to base level at the culvert, but could incise more if culvert is cleared. Small incised channel in narrow valley with unstable mud valley walls subject to landsliding. Obstructed culvert at Wilsonville road could become a problem, and should be evaluated further as to whether it is a risk that should be addressed.
2	1,000	1,300	Reach incised to bedrock above waterfall	3.74%	Plane Bed	Bedrock (consolidated mud)	Incised, Stable	Bedrock channel bed	Narrow valley wall	No	Stable	1	3	3	3	Address upstream culvert drainage, invasives removal	Bedrock reach upstream of a 4'-high waterfall. Reach incised to consolidated mud bedrock. There are at least 2 waterfalls in reach, and at least one boulder step h from probable artificially placed boulders. Dense blackberry throughout reach. The culvert at the upstream end of reach is clogged and backs up water underneath Willow Creek drive.







Selected Photos From Meridian Creek, November 2021

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 13

Arrowhead Creek

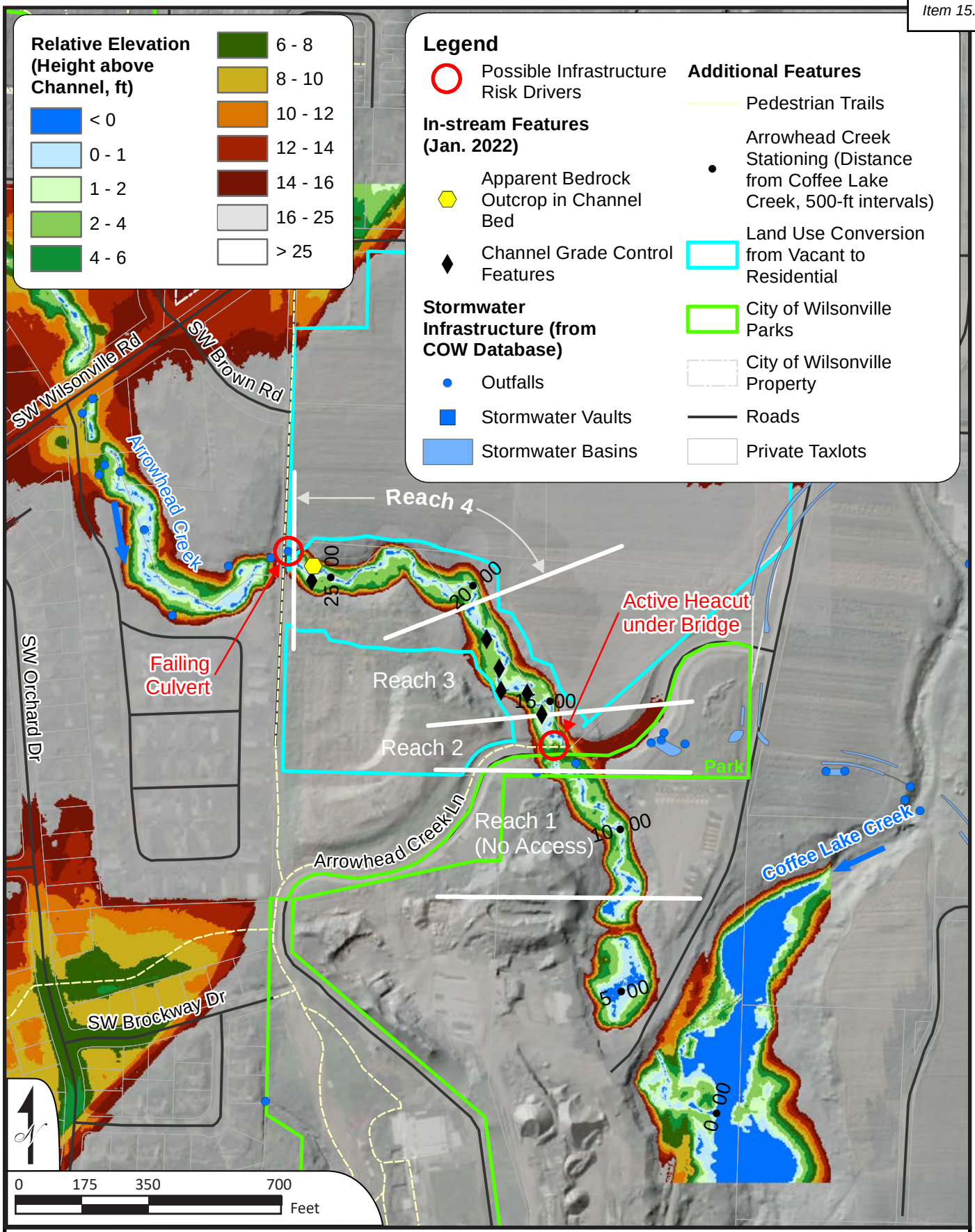
The field assessment for Arrowhead Creek occurred on January 25, 2021. The assessment included a 1,400-foot-long section of Arrowhead Creek between an asphalt pedestrian crossing and Arrowhead Creek Road (**Figure 14**). **Figure 15** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A3**. **Figure 16** contain photographs from this section of Arrowhead Creek.

General Observations and Interpretations

- The assessment area on Arrowhead Creek was divided into three subreaches based primarily on where beaver are active and have established stable dams that act as both local and regional grade control for the channel at the time of the assessment.
- Throughout the assessment area Arrowhead Creek consists of a meandering channel that is moderately incised within a broad floodplain that ranges between 40 and 80 feet. The channel and floodplain are inset 30 to 40 feet into the fine Missoula Flood deposits.
- Moderate incision of the channel limits high flow access to much of the broad floodplain except where beaver have built dams across the channel, and in some cases across the entire floodplain. In Reach 3, where the beaver dams create continuous backwater conditions along the entire reach, water engages the floodplain creating a complex mosaic of backwater and secondary channels.
- The culvert located at the pedestrian crossing at the upstream extent of the assessment area is in the process of failing and should be considered for replacement. It appeared from the downstream end that water may be piping through the fill and creating void spaces that are causing the culvert to fail. We did not evaluate the upstream end of the culvert due to lack of landowner permissions.
- English ivy dominates much of the project area and has the potential to limit the food and dam building resources for the beaver which could be detrimental to the beaver population and associated channel stability over the longer term. The ivy has already killed, or is at risk of killing, many of the alder and maple throughout the project area.

Summary Conclusions from Arrowhead Creek

- The stream is stable in this reach due to the presence of shallow hardpan and abundant beaver dams that act as local base level control and the fact that the channel is small and meanders across a broad floodplain with stable valley wall confinement.
- The main risk drivers consist of the following:
  - Failing condition of the upstream culvert. The fill prism appears to consist of relatively coarse material and therefore may be somewhat porous, limiting the potential for catastrophic failure of the prism. Further investigation by a geotechnical engineer is recommended.
  - Some instability was observed where Arrowhead Creek flows under the Arrowhead Creek Road bridge that appears to be related to construction of the channel under the crossing. Given the degree of channel stability observed upstream and downstream of the crossing the poor conditions at the crossing was determined to be relatively low risk unless there are significant changes to the active maintenance of the beaver dams.
  - Long-term, the loss of riparian trees and understory associated with dominance of English ivy does present some risk if there is a significant loss of food resources and dam building material for beaver.



Arrowhead Creek Geomorphic Survey

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FIGURE 14

Figure 15. *Longitudinal Profile of portion of Arrowhead Creek (from 2014 LiDAR data)*

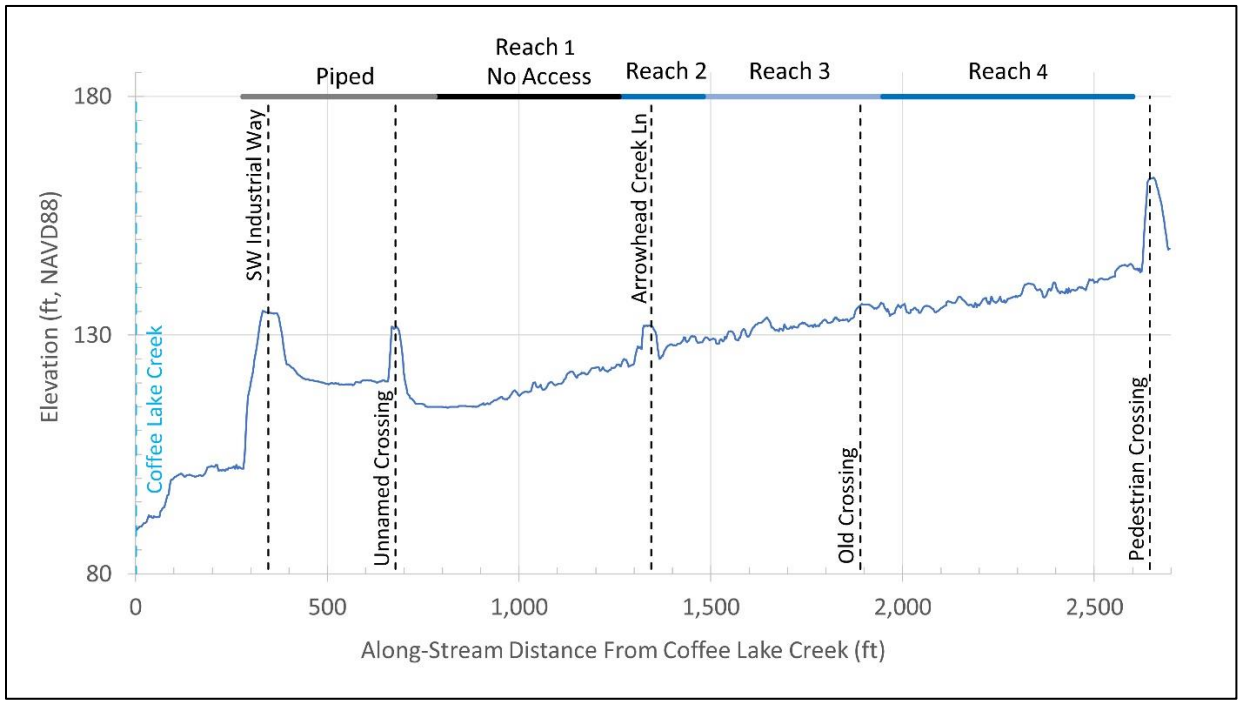

Table 3. *Field Observations for Geomorphic Subreaches Within Arrowhead Creek*

				Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Reach Summary Description	Gradient	Dominant Channel Morphology	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ibility to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
				Based on Profile Extracted from 2014 LiDAR		Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in orrder of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	7+80	12+60	Not Surveyed														Did not visit this reach due to property access constraints.
2	12+60 (GPS 11)	14+80	Unstable reach associated with bridge replacement at Arrowhead Creek Road but low risk due to good stability in upstream and downstream reaches	1.95%	plane bed meandering	gravel	incised	limited. Could impact upstream reach	bridge and valley walls	Y, but limited by vegetation	incising but limited activity	3	1	3	3 - irrigation pipe at risk	remove blackberry and revegetate	Bridge reach at Arrowhead Road. Construction of crossing appears to have impacted channel with limited mitigation measures. Riparian not restored so blackberry dominates. Irrigation line crosses channel unburied.
3	14+80	19+50	Meandering channel in highly stable reach associated with actively maintained beaver dams	1.44%	plane bed meandering	hardpan bedrock gravel	incised but stable	bedrock hardpan and beaver dams	valley wall ~25'-30' with low energy	Y	stable	1	2	2	1	Ivy removal and riparian	Beaver dominated. Very similar to Reach 1, but beaver present which have built successive dams backwatering channel. Increased floodplain engagement. Poor ripariain condition long-term. Cottonwood/maple dominated.
4	19+50	26+00	Stable reach with hardpan grade control. Culvert at upstream extent of reach is in the process of failing	1.31%	plane bed meandering	hardpan bedrock gravel	incised but stable	shallow alluvium intermittent on hardpan bedrock	valley walls ~25-ft high with low energy	N	stable	1	2	2	2	Ivy removal and riparian restoration	Subreach consists of 50'-75' valley bottom confined by 25'-30' of 1:1 valley walls. Channel incised 2'-5' into valley bottom with some active inset foodplains. Creek flows on hardpan bedrock. Cottonwood/alder/fir canopy threatened by ivy which dominates groundcover.

Selected Photos From Arrowhead Creek, January 2022

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 16

Newland Creek

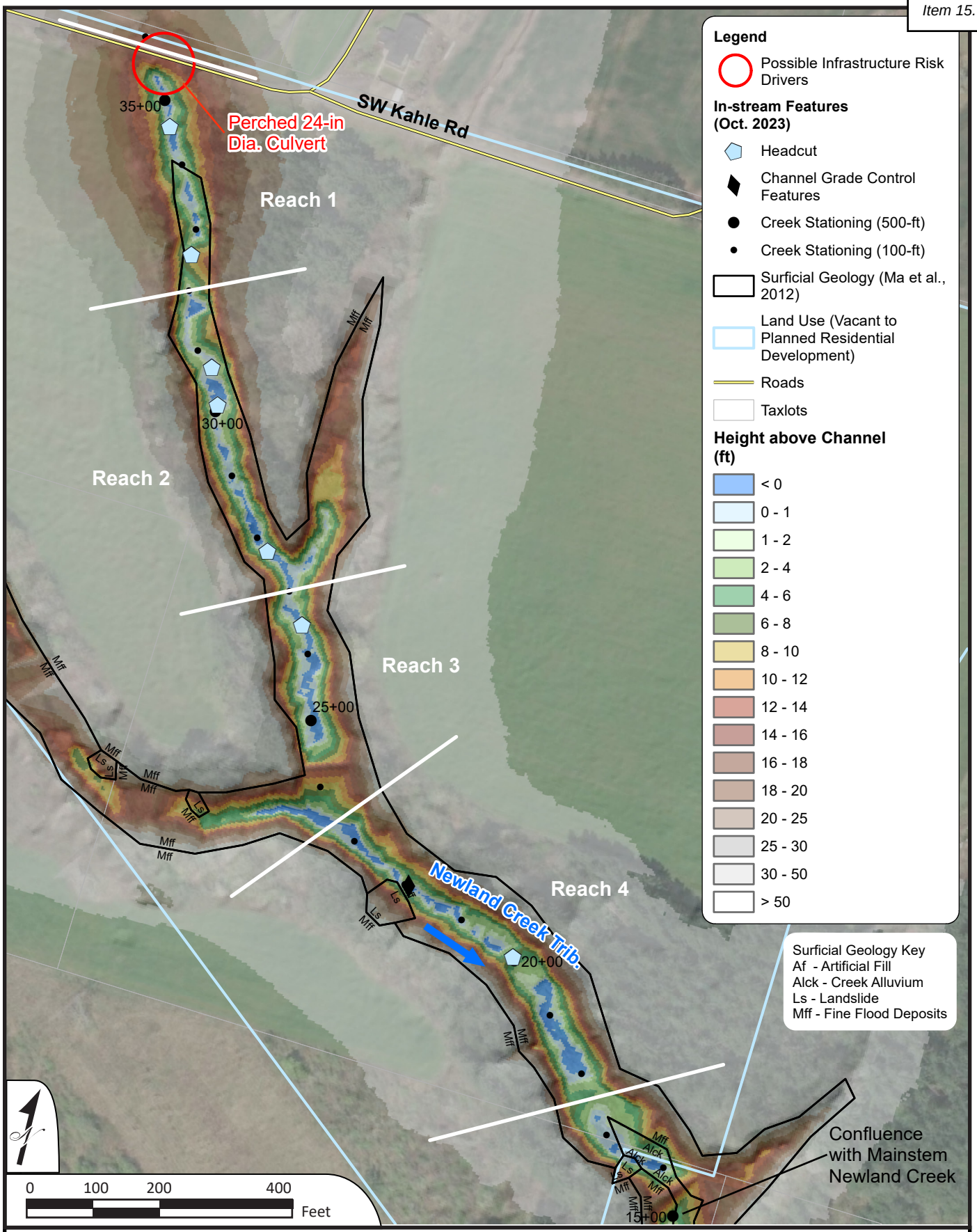
The field assessment for Newland Creek occurred on October 26, 2023. The assessment included a 1,700-foot-long section of a tributary to the mainstem of Newland Creek with the Urban Growth Boundary (UGB) with the upstream extent located at SW Kahle Road (**Figure 17**). **Figure 18** is a longitudinal profile of the creek. **Table 4** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A4**. **Figure 19** contain photographs from this section of Newland Creek.

General Observations and Interpretations

- The assessment area on Newland Creek was divided into four subreaches based primarily on the assessment boundaries and two tributaries that entered that had an influence on channel size.
- The culvert located at SW Kahle Road looked relatively new, consisting of a 24" corrugated plastic pipe. The culvert is significantly perched with about a 6-ft drop to the channel bed. Moderately sized angular rock was placed to dissipate energy. SW Kahle Road likely has prevented continued upstream movement of a large headcut by acting as a grade control.
- Upstream of SW Kahle Road the channel is small and the adjacent fields have been tiled and the tile drains closest to the road are exposed and eroding. The road probably also contributes a significant amount of stormwater.
- Reach 1 and 2 are highly incised with a least a half dozen headcuts that are eroding into erodible hardpan material. The channel is a notch in many places, characterized by a channel that is 3 to 4 feet wide and equally as deep cut into a narrow, confined valley that is 20 to 30 feet deep.
- The tributary entering from river left is also very incised.
- The gradient of Reach 4 is much flatter, after a larger tributary enters from river right. The channel is larger but still very incised and a deeper valley.
- Only one large headcut was observed in Reach 4. This reach may be in a widening phase in response to past incision as more bank instability was observed.
- More in-channel wood was observed in Reach 4 along with several debris jams that were holding grade.
- The riparian corridor is in good condition with a mix of mature coniferous and deciduous trees.
- Blackberry is the dominant understory in some areas though there are also significant stands of dogwood and vine maple.

Summary Conclusions from Newland Creek

- Reaches 1, 2, and 3 are highly unstable and likely to incise further and widen over time independent of additional upstream development.
- Reach 4 is at risk of bank instability.
- All reaches were considered to be at risk from hydromodification.
- The main risk drivers consist of the following:
  - Condition of the culvert at SW Kahle Road. Although the risk of failure of this culvert does not appear to be imminent, future development will likely increase downstream risks. As mentioned above, the culvert is likely acting as a grade control, preventing the downstream channel incision from moving upstream. Any future replacement of the crossing will need to incorporate grade control to prevent future upstream channel incision.
  - Instability in the tributaries entering Reach 2 and 3 should be considered if adjacent agricultural lands are developed. The riparian buffers on these tributaries are narrower.



Newland Creek Geomorphic Survey

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FIGURE 17

Figure 18. *Longitudinal Profile of portion of Newland Creek (from 2014 LiDAR data)*

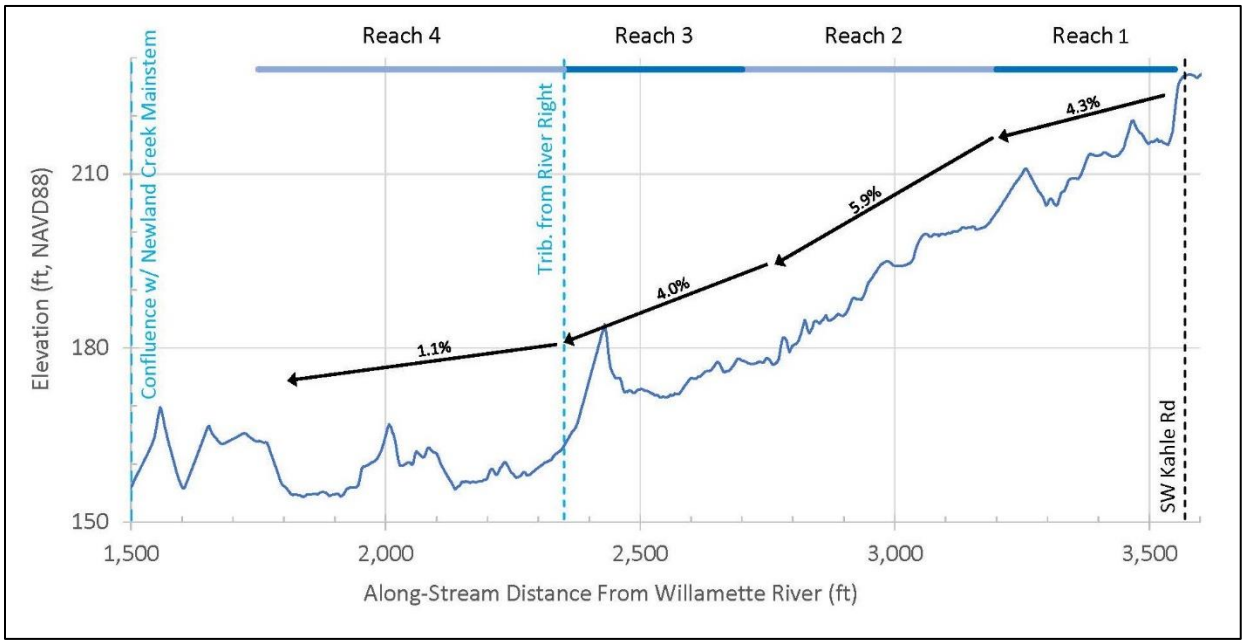

Table 4. *Field Observations for Geomorphic Subreaches Within Newland Creek Tributary*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LIDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	32+00	35+50	4.31%	bedrock/hardpan; confined	hardpan	incised	none	steep hillslopes	No	incising	5	3, but maybe not in widening phase	5	4, upstream culvert and road	Address profile instability if culvert is replaced	Steep, actively incising reach with several large to moderate headcuts. Early stage of channel evolution.
2	27+00	32+50	5.92%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	Headcuts should be monitored and addressed if results suggest rapid incision	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	23+50	27+00	4.03%	bedrock/hardpan; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Headcuts should be monitored and addressed if results suggest rapid incision	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.
4	17+50	23+50	1.12%	plane bed; confined	hardpan w/ angular cobble	incised	hardpan but only limited effectiveness	steep valley walls	No	incising	4	4, some softer bank material, maybe landslides	5	same as previous reaches	Consider adding large wood to channel to improve profile stability channel; though access is poor	Hardpan is more solid in this reach. Hillslopes not as steep though bank material is less consolidated. Maybe old landslides. Most of bed is hardpan though some coarse substrate consisting of basalt from tributary. More wood in channel.

Selected Photos From Newland Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

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FIGURE 19

Kruse Creek

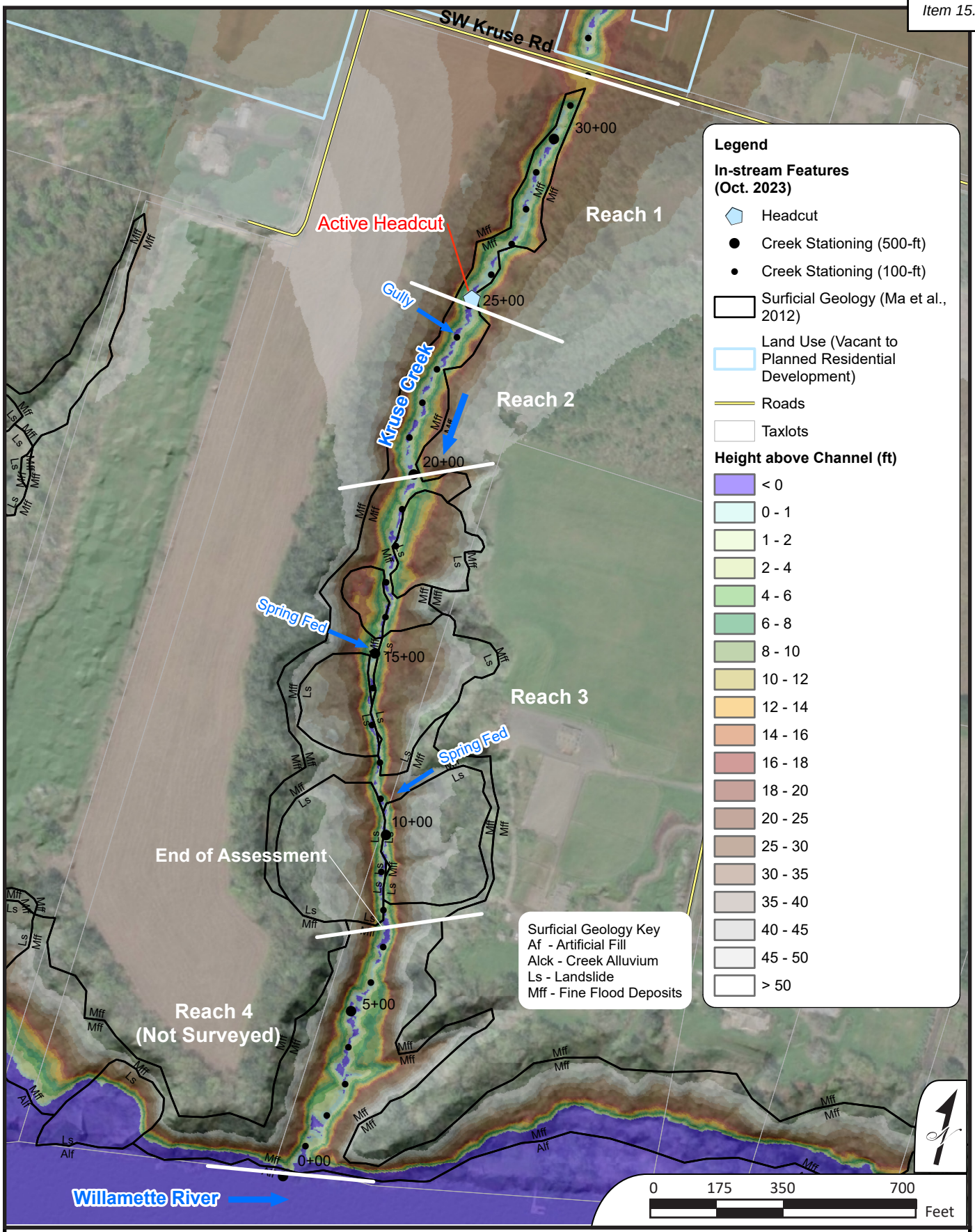
The field assessment for Kruse Creek occurred on October 26, 2023. The assessment included a 2,500-foot-long section of Kruse Creek between SW Kruse Road and the confluence with the Willamette River (**Figure 20**). **Figure 21** is a longitudinal profile of the creek. **Table 3** summarizes the reach scale observations and interpretations from this site visit, and the point-specific observations are listed in **Appendix A5**. **Figure 22** contains photographs from this section of Kruse Creek.

General Observations and Interpretations

- Reaches 1 and 2 are geomorphically distinct from Reach 3 and 4 due to the presence of large landslides from both the western and eastern hillslopes that extend continuously along approximately 1,400 feet of Kruse Creek.
- Although the channel is moderately incised in both Reaches 1 and 2, only one headcut was observed with the rest of the channel being relatively stable. This is likely due to the downstream landslides, which begin at the Reach 2 to 3 transition, and act as a downstream base level for these upstream reaches.
- The culvert at SW Kruse Road was difficult to access due to heavy growth of vegetation but it was perched which suggests some past channel incision that was likely arrested at the crossing.
- Reach 3 and 4 were very inaccessible due to deep channel incision and unstable banks associated with the adjacent large landslides.
- Active landslides and bank failures followed by subsequent channel incision through unconsolidated landslide debris is indicative of channel conditions through all of Reach 3 and potentially Reach 4. High ground water tables and seeps and springs through much of Reach 3 adds to the instability.
- The riparian corridor is in relatively good condition and consists of a mix of mature coniferous and deciduous trees with a good understory. Ivy is prevalent throughout the assessment reach and is climbing up many of the trees.
- On the eastern terrace in Reach 1 there is an extensive area of non-native English holly that was likely part of a former commercial holly farm.

Summary Conclusions from Kruse Creek

- Due to the presence of active landslides through Reach 3, Kruse Creek could be considered naturally unstable. This fact should be considered if the area were to develop in the future with riparian buffers adjusted to account for existing landslide activity and the potential for landward movement of the landslide scarps.
- It is unclear what the risk of hydromodification would be on this section of Kruse Creek. In Reaches 1 and 2 there would likely be additional channel incision and widening. A geotechnical engineer should be consulted to better understand the risk of increased sediment transport in Reach 3 that could cause rapid channel incision and destabilization of the toes of the existing landslides.
- Protection of the existing mature forest should be a priority in this area including management of ivy and removal of holly.
- Profile stabilization will need to be considered if the crossing at SW Kruse Road is upgraded.



Kruse Creek Geomorphic Survey

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FIGURE **20**

Figure 21. *Longitudinal Profile of portion of Kruse Creek (from 2014 LiDAR data)*

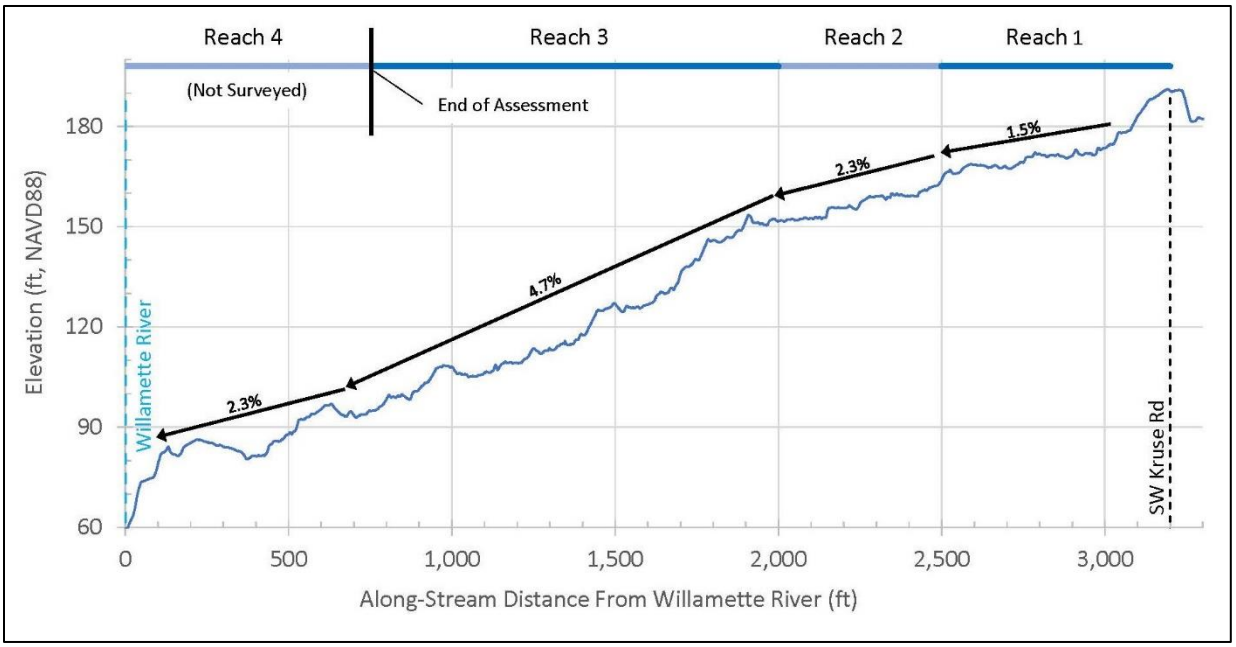

Table 5. *Field Observations for Geomorphic Subreaches Within Kruse Creek*

			Observational Data							Interpretive or Subjective Information						
Subreach	Downstream Station	Upstream Station	Gradient	Channel Pattern Type	Dominant Substrates	Current Condition	Base Level Control	Lateral Constraints	Beaver Presence	Geomorphic Trajectory (Incising, Stable, Aggrading)	Bed Stability	Lateral Stability	Suscept-ability to Hydro-modification	Infrastructure Risk in Reach	Potential Stream Enhancements	Reach Description
			LiDAR-based	Based on Montgomery and Buffington, 1997 (dominant form is listed first)	Bedrock, Boulders, Cobble, Gravel, Sand, Fines (dominant listed first)	Incised, Aggraded, Stable	Site Specific: e.g., Bedrock in Streambed, Culvert, Trunk Stream Confluence, etc. "None" if No Specific Controls Present	Site Specific: Valley Walls, Root Strength, Rock Bank Protection, etc. (listed roughly in order of importance)	Yes, No, Maybe	Incising, Stable, Aggrading	1= Stable or Aggrading; 5= Incising	1 = Stable Banks, 5 = Heavily Eroding Banks	1 = Not Susceptible, 5 = Highly Susceptible	1 = No Identified Risks; 5 = Obvious Potential Risks	Site Specific: Add Large Wood, Remove Invasive Species, Floodplain Benching, etc.	
1	25+00 (PM 3)	32+00 (at culvert)	1.51%	plane bed; confined	fines with some gravel	stable	none, some wood debris	valley slopes adjacent to small floodplain	No	stable, headcut downstream reach boundary	1, high incision potential	2, stable but rate of movement of downstream headcut could increase risk	4	No	ivy removal to save large trees	Low to moderate gradient channel. Small with adjacent low floodplain. Channel 6-ft top, 0.5-ft depth. Overall valley bottom width 20-ft. Lots of blackberry and ivy. Good canopy of douglas fir, cedar, but ivy is growing up a lot of trees. Reach break at headcut.
2	20+00 (PM 5)	25+00	2.29%	bedrock/hardpan; confined	hardpan	incised	none, though harder bedrock outcrops observed	steep valley walls	No	incising	5	3, but could be entering a widening phase	5	increased bank erosion. Loss of mature riparian trees	ivy removal to save large trees	Channel lower slope then reach 1 but highly and actively incising. Good riparian canopy with some non-natives but large mature trees including maple and douglas fir. Some ivy which should be addressed to keep trees healthy.
3	7+50	20+00	4.66%	colluvial; confined	hardpan	incised	none	steep valley walls	No	incising	5	3	5	increased incision + bank erosion + loss of canopy trees	Access is poor; Establish valley wide buffer to limit future infrastructure impacts	Similar to upstream reach. Small headcut + 2 large ones though hardpan material seems more competent. Valley walls less steep.

Selected Photos From Kruse Creek, October 2023

Geomorphic Assessment of Wilsonville Creeks

WATERWAYS CONSULTING, INC.
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FIGURE 22

Summary of Findings

Boeckman Creek

Boeckman Creek flows in a deep valley that appears to have formed quickly following the Missoula Floods, which ended about 15,000 years ago. The creek appears to have achieved a stable base level thousands of years ago, with a flat slope graded to the Willamette River. The assessment identified several smooth, hard surfaces in the channel bed that may be resistant bedrock or hardpan, which would prevent further downcutting and indicate that the stream has reached its limit of incision.

A major base level control in the reach is at the site of a breached concrete dam within Memorial Park (**Figure 9b**). The remnants of the dam are large concrete and boulders, creating a cascade, which should remain stable under future flood scenarios.

Upstream of the dam, and especially above Wilsonville Road, beaver are the primary controller of the morphology of the Boeckman Creek channel. Although the channel itself is moderately incised, beaver dams create a stair-stepped backwater condition that allow high flows to access the floodplain and reduce stream power and associated erosional forces. Numerous large and small dams were identified during the field investigation. The beaver dams create ponded areas and form complex environments and habitats in addition to providing base level stability in Boeckman Creek. Most of the dams appear stable, although they may be more likely to collapse as a result of larger or more frequent floods. The collapse of individual dams should not endanger or affect infrastructure in Boeckman Creek, but loss of all the dams could have significant negative consequences, including significant loss of ecological value and an increase in infrastructure risks. Therefore, maintaining a healthy beaver population in Boeckman Creek would be a beneficial long term management strategy. Riparian restoration, which would include removal of blackberry and ivy, would benefit beaver and improve the long-term resiliency of the reaches dominated by beaver.

The most at-risk area to past and future changes in the hydrology associated with hydromodification within the watershed is near the confluence with the Willamette River (**Figure 9b**). In this reach the combination of high flow conditions, an incised channel, and seasonal backwatering from the Willamette River appear to limit the long-term stability of beaver dams that provide local grade control elsewhere along Boeckman Creek. Although seasonally the Willamette River does provide base level control, hydromodification impacts, especially in fall when the Willamette River is typically low, has led to channel incision and widening in the reach downstream of Memorial Park.

Meridian Creek

Meridian Creek is incised in a small canyon between houses on the west and Landover Park on the east. Meridian Creek is incised to “bedrock,” which is a resistant layer of consolidated fine-grained sediment. The valley walls confine the channel on both sides. The valley slopes are covered with dense blackberry and are prone to landsliding, which could affect some backyards. A stormwater outfall pipe on the west side of the stream, near the Reach 1 and Reach 2 boundary, is undermined and a section has washed away (**Figure 11; Photo on Figure 13**).

The primary infrastructure issue in this reach is the crossing of Meridian Creek under Wilsonville Road (**Figure 11; Photos on Figure 13**). The culvert appears to be undersized and is nearly clogged with fine sediment. This obstruction caused a wedge of sediment to accumulate in the channel upstream. The lack of drainage appears to cause some ponding under current conditions, and complete plugging of the culvert seems like a reasonable possibility. It is unlikely that ponded water would overtop Wilsonville Road, but repeated ponding behind the road could cause geotechnical instability through other

mechanisms. The risks at this crossing should be further evaluated as part of the Stormwater Master Plan.

Secondary infrastructure issues in this reach are:

- The debris rack at the outlet of the culvert under Willow Creek Drive is clogged with leaves, debris and sediment, backing up water under Willow Creek Drive (**Figure 11; Photo on Figure 13)**. The undersized culvert at Willow Creek Drive may limit future hydromodification impacts downstream.

Arrowhead Creek

The Arrowhead Creek channel meanders across a broad floodplain that is inset approximately 30-40 feet from the upper Missoula Flood terraces. Grade control is provided through a combination of localized exposures of hardpan "bedrock" and beaver dams that are continuous and redundant along more than 60% of the project reach.

The primary infrastructure risk observed through the project reach is the condition of the culvert at the pedestrian pathway at the upstream extent of the assessment area, which is piping and failing and should be evaluated further by a structural engineer (**Figure 14; Photo on Figure 16**). An additional risk factor that was considered low to moderate and should be monitored in the future was the potential for instability and headcut migration within the vicinity of the Arrowhead Creek Lane crossing. The constructed streambed under the relatively new bridge crossing lacks adequate grade control and has the potential to incise further and threaten the series of beaver dams in the upstream, stable reach (**Figure 14).** The lack of grade control may be due to downstream mobilization of the streambed substrate that was installed during construction of the crossing. A pile of angular cobble was noted approximately 200 feet downstream of the crossing that may have been eroded from the channel at the bridge. An indirect risk factor in the assessment area relates to the condition of the riparian corridor. Much of the riparian vegetation is being impacted by the growth of English ivy, which has the potential to impact long-term beaver use of this section of creek, which could impact the primary source for grade control in this section of Arrowhead.

Newland Creek

The assessment reach included a portion of a tributary to the mainstem of Newland Creek within the existing Urban Growth Boundary. The channel is highly incised, and relatively steep, and flows within a canyon that increases in width in the downstream direction as it incises into a broader terrace surface. Past and active channel incision has resulted in a highly perched condition at the culvert at SW Kahle Road which is the upstream boundary of the assessment area. A half dozen headcuts were mapped through the project reach that ranges from 2 feet to 4 feet high with likely low to moderate rates of upstream movement as the bed of the channel flows over hardpan material.

The primary infrastructure risk identified in the project reach is the perched culvert at SW Kahle Road (**Figure 17; Photo on Figure 19**). Although this culvert isn't immediately at risk due to placement of energy dissipation rock at the outlet, upgrades to the road will need to address the profile discontinuity and also consider the likelihood of additional channel incision associated with future headcut migration. This reach lacks grade control other than exposure of hardpan material in the bed, which will slow channel incision, but not eliminate it, especially if there are significant flow increases that occur in the future associated with development. Channel incision and active headcuts along the two tributary channels entering the assessment reach should also be considered in any future development planning.

Kruse Creek

Geomorphic conditions in the assessed portion of Kruse Creek are dominated by the presence of the presence of large landslides through the lower quarter mile of the canyon. These landslides are associated with a high water table, active springs and seeps along the entire lower canyon, and sets the base level control for the upper sub reaches of the assessment area. Active slumping into and across the Kruse Creek channel, followed by reincision into landslide debris characterizes channel conditions which were difficult to directly access during the assessment.

The primary infrastructure risk observed through the project reach is the condition of the culvert at W Kruse Road (**Figure 20**). The corrugated metal pipe is perched and, although not immediately at risk of failure, would need to be addressed, along with the apparent profile discontinuity, if the crossing was replaced during upgrades to the road, which is currently a narrow, relatively undeveloped asphalt road. Although there is no direct infrastructure risk associated with the mapped landslides, any planned development might have an impact on their rate of movement. Creating large buffers along Kruse Creek that considers existing geologic and geotechnical conditions as well as how those might be exacerbated by changes to watershed hydrology will be important to limit future impacts to infrastructure. Addressing non-native species, especially the potential for English ivy to impact mature trees, would also benefit the Kruse Creek corridor.

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APPENDIX A

Field Observations in Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks

Appendix A1 *: Record of Field Observations in Boeckman Creek*

Dates: 11/19/2021, 11/24/2021 and 01/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features								
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
450	1										Steel beam, full span			3	Rock grade control in channel		Private bridge at upstream extent of Willamette backwater. Accesses 1 property. Landowner there since 1976. Creek has incised and widened when Memorial Park bridge replaced culvert. Rock grade control provides limited protection. Rocks are small and could get flanked.
580	2						X										Bedrock exposed in bed along right bank. Shale. May not be continuous across bed. Overlain by fine sediments.
700	3	L	Active, 50'x25'	5	None								Deck and House	5			Actively eroding bank. Local incision and widening of channel undermined bank. May be exacerbated by fill/retaining wall at house. Retaining wall has since failed.
780	4							18"					Old crossing				Old crossing. Some road fill still present. Upstream extent of ??? headcut migration. Possibly associated with debris log jam.
1000-800	2115-2121																Reach below bridge to private property boundary consist of a 100' section with boulders and gravel, followed downstream by a 100' section of mud and wood bed before reaching property boundary. Appears to be significant bank erosion in the downstream section underneath the private homes (see photo 2121)
1050	2109, 2111, 2127-2129										Trail footbridge						High foot bridge over creek. Low chord is about 20 feet above creek, well engineered. A few boulders and rounded gravel lag deposits in the channel under the bridge
1100	2107, 2112-2113							12" boulder drop							X		Small step with boulder rip rap just upstream of bridge
1400	2096-2100						Willamete River bed material								X		Outcrop of a contact between overlying fine-grained sediments and underlying partially cemeted gravel close to the current water level. Gravel is well rounded basalt pebbles and cobbles, looks like probably old Willamette River bed material. This suggests stream from here down is probably not susceptible to much further incision due to exposing the coarser bed material and also as approaching the base level of the Willamette River
1500	2093-2094														X		Large, recently fallen cedar tree in channel. Log jam beginning to form, accumulating wood, and will probably persist for many years
2000 - 1500	2080-2093																Deeply incised meanders in low gradient channel. Not actively moving meanders. Bank walls as high as 40' and as low as 12 feet above channel Steps are formed at several fallen logs, mostly featureless runs. Abandoned floodplain is covered with mostly ivy (not as much blackberry here)
2050	2079-2080							30" high step, log							X		step from fallen log and debris. Doesn't appear to be a beaver dam

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
2200	2069-2071	L	50' Long by 30' high	2													Bank erosion on outside of a sharp bend in incised meandering reach. 30' high near-vertical brank held up by several large fir trees composed of Missoula Flood fines. There's foot traffic at top of bank, trail may be endangered from erosion (didn't climb up to top to be sure)
2700-2200	2069-2078																Mud and wood channel bottom, 2' to 4' deep at current high flows. Channel bed about 12 feet wide, mostly runs. Ivy/blackberry floodplain, incised. Floodplain is about 6 to 12 feet above floodplain
2700	2066-2068								18"						X		Small step within mud reach, likely beaver dam but not clearly so. Could be a downed log covered with debris. Low gradient, mud reach. Lots of ivy on floodplain
3000	2026-2031	R				Tributary enters from River Right											Tributary enters from river right through a large (>36") corrugated metal culvert under a road fill. Culvert is open but backwatered by Boeckman Creek about 24" deep. Scour pool at mouth of tributary
3050 to 2700	2059-2065; 2132-2134														X		Relatively featureless reach below tributary junction; incised, heavy blackberry and ivy on terraces; mud bed; lots of wood in channel bed
3050	2058	R	75' long by 6' high	3													Bank erosion and incision on river right below fence and facility on the top of bank downstream of tributary.
3050	**TRIBUTARY DESCRIPTION**																Inspected the lower end of tributary at request from B&C. Visited lower portion of tributary up to the road crossing in Memorial Park. Low gradient, deeply incised. For the first 200 to 300 feet upstream of confluence, upstream of access road, the channel is incised in blackberry thicket with no floodplain. Channel is about 5-10' bottom width, about 20' top width. Occasional lower benches, mud in channel
3350	2016, 2024														X		100-foot-long boulder riffle with boulder bank protection on river right @ 3350. Some of the boulders transported a short distance downstream forming a stable base level control over about 50-100' distance
3450	2019-2023; 2135-2138	R															Relatively broad floodplain surface covered with blackberry
3675	2003-2004	R	50' long by 16' high	5													Big eroding bank on right bank just downstream of dam. Banks composed of Missoula Flood fine facies

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
3700	1990-1999, 2145-2147														X		Breached dam in creek. Dam made from stone and mortar, about 15' wide. Even though it is breached it is still a 4 to 5 foot drop over a distance of about 30 feet, and provides a stable base level control. Boulders on the downstream side of dam. Possible fish passage barrier at low flows (not at the current high flow). Currently an aluminum pipe ~8" crosses above channel at former dam, looks like it is no longer used.
3700 to 4000	2148-2156	R											depositional floodplain				Relatively broad, flat surface covered in reed canary grass. Appears to be a deposit in an impoundment behind former dam at 3700
4000	1983	R			2 to 3' boulders								boulder riffle		X		Boulder bank protection and boulders in streambed. It looks like the boulders were installed to protect the right bank and provide grade control. There is about a 2 foot drop over the riffle
4100	1975-1979								2 to 3'						X		2 to 3' high beaver dam. Exact height not clear due to high flows. Appears to be stable
4300	2157, 1968, 1970								18"						X		Beaver dam (?) with reed canary grass root mat. Unclear height due to high flow. Chewed sticks. RCG is providing added strength to apparent damn
4450	1965, 1966	L								30" PVC							Stormwater outfall from parking lot in park. Discharges onto slope about 4 feet above channel. Rocked around outfall, no notable erosion
4500	1960 - 1964										SW Kolbe Lane Single lane vehicle bridge				X		Single lane auto bridge at Kolbe lane. Wood single span lower chord about 12 to 15 feet above channel. Headcuts or small beaver dams under the bridge
11/24/2021 - Wilsonville Road to SW Boeckman Road																	
5250	2168, 2183	R								18"	SW Wilsonville Road Bridge						High bridge with 4 sets of 3 large concrete piers about 40-50' above the streambed. No apparent hazards related to the stream. There is a record of a past stream realignment project here but no obvious evidence of what was done here. Old concrete stormwater outfall into the channel on river right under the bridge
5350	no photo	R															Drainage off senior living community parking lot creates a ponded area on the floodplain on river right, at least during wet season.
5400	2186								2'						X		Small beaver dam a short distance upstream of bridge backs up water around 400 feet. The pond is confined within banks about 15' wide, only about 2' above water level.
5800	2199																Upstream end of beaver pond from dam at 5400' . Flow into pond comes from a beaver dam just 50' upstream of top of pool. Beaver clearly know how to build dams so that the pond ends just below the toe of next upstream dam.

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
5850	2201-2202								2'						X		2 foot high beaver dam just above ponded area from downstream dam
5900	2205	R								Surface water from outfall							Trickle of water entering from gully which begins at a stormwater outfall high up on hillslope/valley wall. The gully is protected with sandbags, minor erosion
6000	2206-2208								1.5'						X		Beaver dam around 18" high at upstream end of pond from the dam at 5850
6200	2220-2226	R				Small tributary											Small tributary from river right, incised in dense blackberry, enters just downstream of the small tributary. I was only able to reach the stream in one spot about 100' from Boeckman Creek confluence due to blackberry. Creek has pebble gravel bed and appears reasonably stable. No clear hazards noted
6250	2213-2216								**4 to 5' high**						X		Big (4 to 5' high) beaver dam inundating lot of area upstream from here. High dam spreads water onto floodplain for as much as 500' upstream
6200-6600	2217-2234																Ponded, meandering reach upstream of large beaver dam at 6250. Water spreads out onto floodplain. Lots of blackberry, slow walking through here.
6550	2233-2235																Large fallen cedar tree across channel. 3'-4' DBH within the ponded area upstream of dam at 6250. Seems certain to trap any wood traveling through this reach for many years to come.
6650	2240-2242								1'						X		Small beaver dam just upstream of the pond behind the dam at 6250
7000	2245-2246							2' high step							X		Small (2') step or beaver dam. Could be behind a collapsed block of root mats, or a fallen tree. Unclear due to accumulated debris, but it's backing up water similar to beaver dam
7100	2248								2'						X		Apparently stable 2' high step in channel as a rsult of a beaver dam reinforced by reed canary grass sod. Looks very stable and long lived
7300	2259-2267								**3-4'**						X		Big beaver dam with lots of reed canary grass covered floodplain that is flooded by this dam
7300-8000	2270-2282																Reach mostly impounded by the big dam at 7300. Impounded area continues almost up to the footbridge. Impenetrable blackberry throughout this reach
8150	2284-2286										Boeckman Creek Trail Bridge						Boeckman Creek trail footbridge crosses over creek. At this location, stream is flowing, not ponded; gravel, with riffle-pool morphology and small wood. Lots of blackberry

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features								
Approx River Station (Distance from Willamette R. in ft)	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
8150-8650																	Mostly gravel riffle-pool reach from bridge to 8650; low floodplain with blackberries, not ponded reach
8650	2299-2303	L															Gully and drainage from river left. It appears that a PVC culvert pipe under the trail had washed out and was moved out of the way. Former homeless encampment here.
8890															X		Resistant bedrock in channel underwater near the dam.
8900	2308								2' high dam						X		Beaver dam, around 2 feet high. Lots of blackberry
9070															X		Apparent bedrock under water
9075	2315								2' high dam						X		Another beaver dam short distance upstream of the one at 8900, also resistant bed here underwater based on feel (not visible due to turbid water). Clearly a stable base level here
9100	2317-2324									18" pipe and box							Stormwater outfall and energy dissipator on the right bank, just above the beaver dam. It appears to be sitting on basalt bedrock. It remains clear of debris. Appears to be working well, no concerns or hazards noted
9300	2329-2331								2' high dam						X		Small beaver dam ~2' high; pond backs up to toe of the next upstream dam
9500	2335-2337								**5' high**						X		Tall but narrow beaver dam. Dam is built off of one large fallen log. 5 feet high by 15 feet wide
9700	2343-2344								**3-4' high beaver dam**						X		Large beaver dam, difficult to access. Ponds water a far distance upstream.
10000	2345-2346								2' high dam						X		Beaver dam near mapped outfall. Only viewed from the trail, did not get close to it. Difficult access
10000-10500	2350-2351																Reach with mostly ponded water. Beaver pond is effectively inundating much of the valley floor throughout this reach
10500		R								plastic pipe							Large pipe down long hillside on river right valley wall. Did not visit except from trail across the valley

***Appendix A2** : Record of Field Observations in Meridian Creek*

Date: 11/26/2021

Location		Bank Features				Tribu-tary	Channel Bed Features			Infrastructure Features							Notes
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	
11/26/2021 - SW Wilsonville Road to SW Willow Creek Dr																	
775	2372-2383										Wilsonville Road				X	Fix drainage at culvert	Meridian Creek crossing at Wilsonville Road. Clogged, apparently undersized (approx 30") culvert under high road prism under Wilsonville Road. Culvert is clogged on the upstream end with about 2 feet of sediment which is backing up a wedge of sediment for about 50 feet. There is a outfall (or possibly overflow pipe inlet) above main culvert, 6" plastic pipe. This is a hydromodification risk factor that should be evaluated. Unlikely there's enough water that it could overtop the road. But could plugging the culvert and an extended period of standing water following a storm destabilize the road embankment?
850	2388-2392									18" PVC							Section of corrugated plastic culvert pipe, about 6' long, along side of the channel. It appears to have been washed down from upstream
875	2393							18" step							X		Small log jam forming a 1.5' foot high step in the channel. Gravel sediment stored in a wedge behind it. If this were to fail or collapse, sediment could easily clog the rest of the culvert at Wilsonville road
1000	2415-2417							4' high waterfall in bedrock`							X		Waterfall in consolidated fine-grained bedrock. Marks transition from alluvial bed below and a bedrock stream above the waterfall.
1050	2421-2425									18" PVC							Stormwater outfall, 18" PVC on river right, about 6' above where the channel is in bedrock.There is a concrete support under the outfall which is undermined and failing. This is where the 6' long piece of pipe at Sta. 850 came from
1200	2448-2452							2' step							X		Boulder step in consolidated mud bedrock. Boulders may have been placed here for some reason,. Perhaps they were installed as bank protection and fell into the creek.
1300	2456-2466														X		Culvert outlet at top of reach under SW Willow Creek Drive. Culvert has a metal grate at the outlet that is clogged mostly by leaves. Some water is leaking through but this is a low flow. It is probably backwatered during storm flow. Currently, there is standing water about 2' deep under Willow Creek Drive behind the clogged grate. The channel upstream of Willow Creek drive is a stormwater basin which may reduce the amount of runoff from the developed area, but this culvert should be evaluated in the context of hydromodification upstream.

Appendix A3 *: Record of Field Observations in Arrowhead Creek*

Date: 1/25/2022

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
13+50	10							3 (2')			Arrowhead Road; freespan truss			3			Arrowhead Road. Freespan concrete truss. Active headcutting at creek under bridge. Mitigated somewhat by beaver activity upstream. Unknown irrigation line (6" PVC) in channcel crosses creek several times.
18+50	5-9								Series of 5 beaver dams. See notes for locations and height								Series of beaver dams. Ramps and chew suggest active site. Dams (Stationing and Height): 18+50 and 17+30 = 18" high; 16+80 = 24" high; 15+90 = 12" high; 14+80=30" high
18+80	4												old crossing	1			Old road bed/crossing. Approach fill still present and evident in LiDAR. Crossing not evident.
23+00	3												rock groin on left bank				Boulder groin on left bank at toe at apex of meander bend. Upper bank ~55' high but no evidence of active erosion. Remnant training structure.
25+50	2						hardpan										Channel flowing on hardpan. Channel 6' wide incised 2'-3' feet into floodplain. No evidence of floodplain activation. Stable channel profile.
26+00	1									Culvert at trail				3			Double concrete box cultert 5'x5' (x2). Only looked at outlet. Drop of 2'-3' to channel. Concrete base of culvert failing. Water subbing under structure. High risk to infrastructure.

Reach Name: Newland Creek Trib. - Reach 1 Date: 10/26/2023 **Appendix A4**

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
35+50	PM 1									24" Dia CPP							Culvert at Kahle Rd 24-in CPP perched 6-ft above channel bed. Stormwater from road enters uncontrolled. Concrete rubble placed at culvert outlet. Outfall relatively stable though channel downstream is highly incised compared to upstream.
34+50	PM 2							3-ft over 10-ft (4)									Channel highly incised into erodible hardpan. Steep on both banks with a narrow channel notch 4-ft wide by 4-ft deep. Headcut 3-ft distributed over 10-ft channel not even deeper and narrower downstream of headcut.
32+50	PM 3							4-ft over 6-ft (5)									Larger headcut 4-ft over 6-ft incised into erodible hardpan. Steep banks.
30+75	PM 5							3-ft (3)									Headcut 3-ft held up by maple roots.
30+00	PM 6							4-ft over 15-ft (3)									Two closely spaced headcuts. 4-ft over 115-ft. Harder bedrock exposure along right bank. Unsure if its continuous across channel.
28+00	PM 7							4-ft (5)									Headcut 4-ft tall. Risk level 5.
26+50	PM 9							3-ft (5)									Headcut 3-ft tall. Risk is 5.
22+00	PM 12								debris jam of small wood								Debris jam holds 18-in of grade. Fine sediment accumulated upstream.
20+00	PM 14							2-ft (3)									Downstream extent of assessment

Reach Name: Kruse Creek

Date: 10/26/2023

Appendix A5

Location		Bank Features				Tributary	Channel Bed Features			Infrastructure Features							
Approx River Station	GPS photo ID	Right or Left Bank	Significant Bank Erosion (Length, Height, ft)	Eroding Bank Intensity (1-5)	Bank Protection (type, length, height)	Tributary (Name, R or L, Channel Type)	Bedrock Type	Headcut or step height (ft); Risk level (1-5)	Beaver Dam (Height, ft)	Pipe/Culvert Outfall (Side of channel; Diameter,ft)	Bridge (Name, Type)	Pipe Crossing (type, material, diameter)	Other Feature (type)	Hydromodification Risk	Grade Control Feature	Capital Project Needs	Notes
32+00	PM 1									24" Dia CMP							Culvert 24-in CMP perched 4-ft above channel. Large scour hole and circular erosion. Undercut.
25+00	PM 3							4-ft (5)									Headcut 4-ft. Risk 5
24+00	PM 4					right gully											Small gully entering from right bank 2-ft wide, 3-ft wide. Appears to be stormwater runoff. Extends to conifers 40-ft upslope.
15+00	PM 6					right spring fed											Drainage from landslide area enters from right bank. Flow equal to or exceeds main channel flow. Flow is piping through landslide along bank.
11+00	PM 7					left spring fed											Tributary or drainage input from left bank. Might be from landslide. Steep drainage. Could be highly erosive if additional water is delivered to the drainage.

APPENDIX B

Field Maps for

Boeckman, Meridian, Arrowhead,

Newland, and Kruse Creeks

Secondary Location
Basalt Creek north of Day Rd

Sheet 7

Basalt Creek

W RailRoad

Coffee Creek

006

Sheet 6

Secondary Location
Boeckman Creek north of Boeckman Rd

Sheet 4

Priority Location
Basalt Creek South of Ridder Rd to wetlands

37

Secondary Location
Meridian Creek at Landover Park

Sheet 3

Advance Rd

005

010

007

004

Villebois

Priority Location
Boeckman Creek between Wilsonville Rd and Boeckman Rd

011

Sheet 2

Sheet 5

Town Center

003

001

002

012

21

Priority Location
Boeckman Creek near Memorial Park

Secondary Location
Arrowhead Creek south of Wilsonville Rd

10

Maxar

Legend

Hydromodification-Related Capital Projects

- Erosion Prevention/Flow Bypass
- Instream Channel Improvement
- Upland Flow Control (Detention or Infiltration)
- Completed
- Field Observation Locations
- 43 E&S Problem Area ID
- COW Property
- Easements
- Planning District Boundaries
- Watershed Boundaries
- Urban Growth Boundary
- City Limits
- Stream Line
- Streets

Accessed By: MGLASS at 08/23/2021

Path: Q:\156157 - Wilsonville Stormwater Master Plan\GIS_Internal BC\APRX\Modeling Workshop\Stream Assessment.aprx

Brown AND Caldwell

City of Wilsonville/
Project # 156157

Stormwater Master Plan

Notes:

Drawn By: MRG
Checked By:

Spatial Reference:
Name: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

N

0 1,000 2,000 4,000
Feet

Date: 8/23/2021

Stream Assessment

Legend

- Boeckman Creek Stationing (500-ft)
- Boeckman Creek Stationing (100-ft)
- Surficial Geology (Ma et al., 2012)
- Completed
- Instream Channel Improvements
- Erosion Prevention/Flow Bypass
- Field Observation Locations
- Outfall (COW)
- Stormwater Vault (COW)
- Stormwater Basin (COW)
- Storage Ponds (COW)
- Culvert
- Sewer Line (COW)
- Swales (COW)
- Problem Areas
- Land Use (Vacant to Planned Residential Development)
- COW Property
- Roads
- Taxlots

SW Wimbledon Cir S
Matchline
N
SW Courtside Dr
SW Valley St
Boeckman Creek
SW Rose Ln
SW Wilsonville Rd
SW Kolbe Ln
SW Schroeder Way
SW Montgomery Way
012
Memorial Park
0 150 300 600 Feet

Surficial Geology Key
Af - Artificial Fill
Alf - Fine Alluvium
Alck - Creek Alluvium
Ls - Landslide
Mfc - Coarse Flood Deposits
Mff - Fine Flood Deposits

Legend

Matchline

Height above Channel (ft)

< 0	0 - 1	6 - 8	14 - 16
	1 - 2	8 - 10	16 - 25
	2 - 4	10 - 12	> 25
	4 - 6	12 - 14	

Boeckman Creek Downstream (1 of 3) - Priority Location

Wilsonville Stormwater Master Plan

WATERWAYS CONSULTING, INC.
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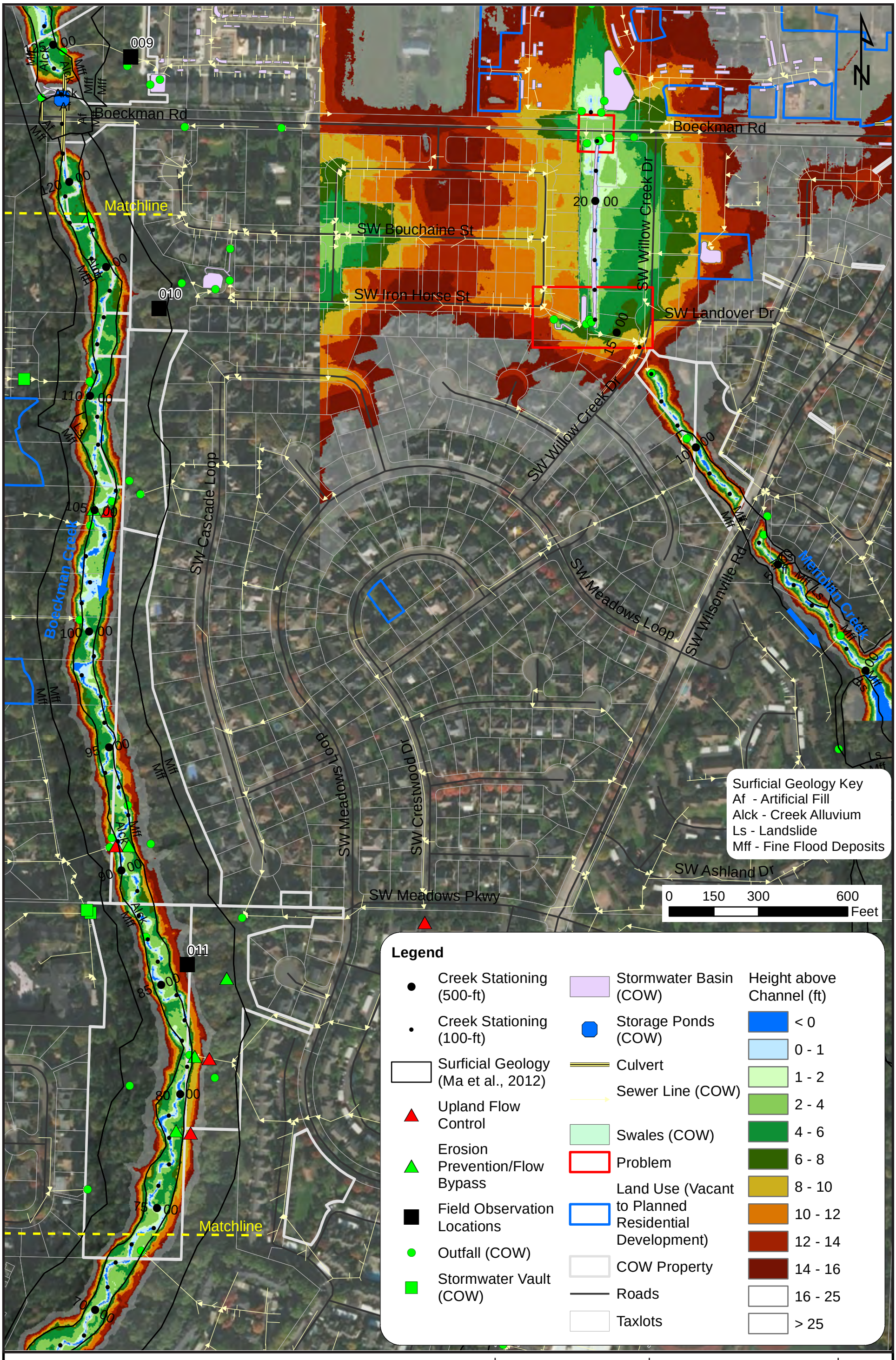
FIGURE 2



Boeckman Creek Mid (2 of 3) - Priority Location

Wilsonville Stormwater Master Plan

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FIGURE 3

Boeckman Creek Upstream (3 of 3) - Secondary Location

Wilsonville Stormwater Master Plan

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Santa Cruz, CA | watways.com | Portland, OR

FIGURE 4

SW Canyon Creek Rd
SW Thornton Dr
Roanoke Dr S
SW Cooper Creek Loop
Boeckman Creek
Boeckman Rd
Matchline
Af
Alck
Mff
Ls
009
010
155 00
150 00
145 00
140 00
135 00
130 00
125 00
120 00
110 00

Surficial Geology Key
Af - Artificial Fill
Alck - Creek Alluvium
Ls - Landslide
Mff - Fine Flood Deposits

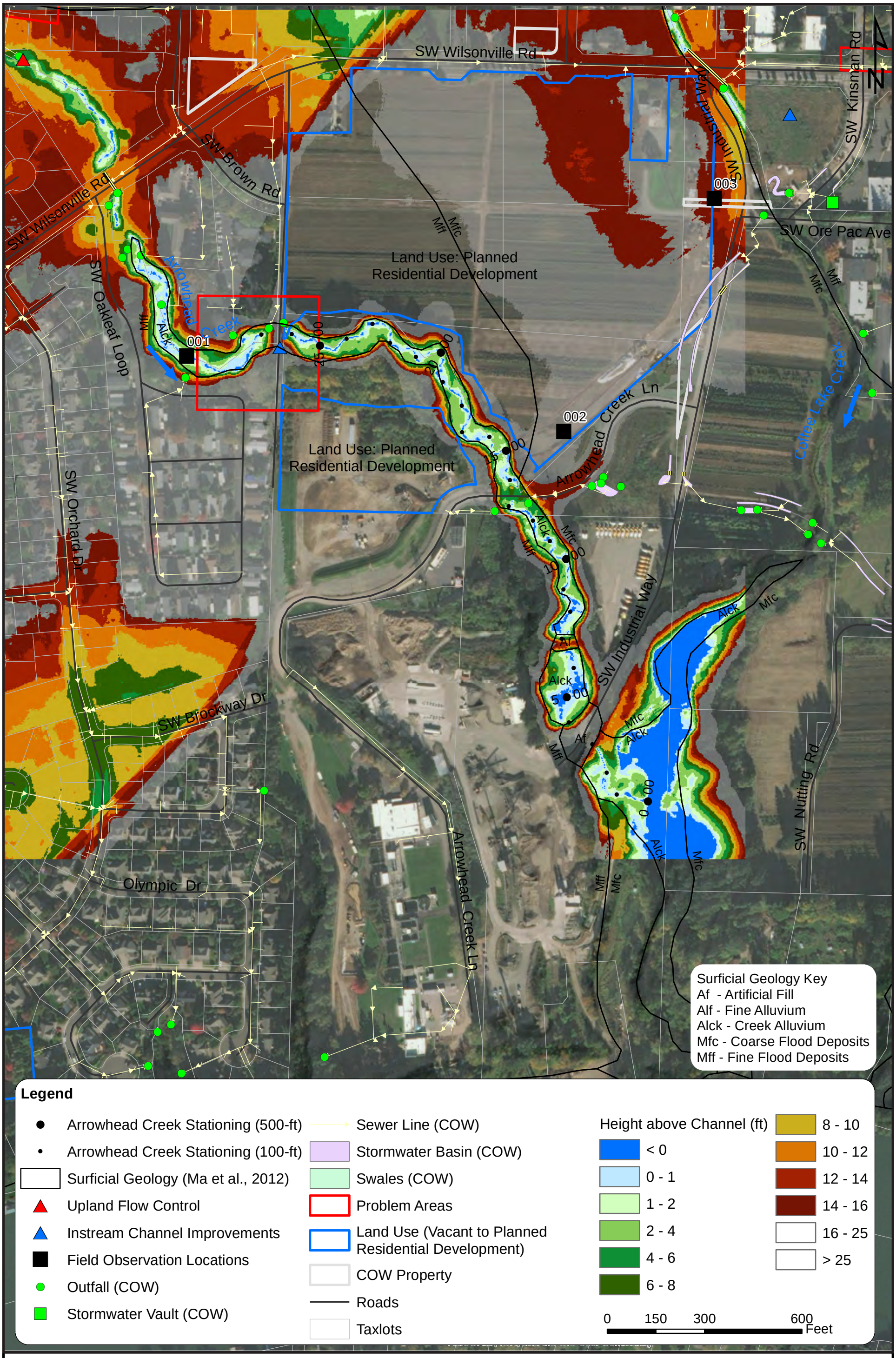
0 150 300 600 Feet

Legend

- Boeckman Creek Stationing (500-ft)
- Boeckman Creek Stationing (100-ft)
- Surficial Geology (Ma et al., 2012)
- Erosion Prevention/Flow Bypass
- Field Observation Locations
- Outfall (COW)
- Stormwater Vault (COW)
- Stormwater Basin (COW)
- Storage Ponds (COW)
- Culvert
- Sewer Line (COW)
- Swales (COW)
- Problem
- Land Use (Vacant to Planned Residential Development)
- COW Property
- Roads
- Taxlots

Height above Channel (ft)

- < 0
- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 25
- > 25



Arrowhead Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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FIGURE 5

Legend

- Basalt Creek Stationing (500-ft)
- Basalt Creek Stationing (100-ft)
- Surficial Geology (Ma et al., 2012)
- Upland Flow Control
- Outfall (COW)
- Stormwater Vault (COW)
- Culvert
- Sewer Line (COW)
- Stormwater Basin (COW)
- Problem Areas
- Metro Taxlot
- Roads
- Taxlots

Height above Channel (ft)

- < 0
- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 25
- > 25

0 150 300 600 Feet

N

SW Ridder Rd

SW Boones Ferry Rd

45 00

40 00

35 00

30 00

25 00

20 00

15 00

10 00

5 00

SW Freeman Dr

SW Freeman Dr

SW Kinsman Rd

SW Nike Dr

SW Hillman Ct

Railroad

Railroad

Basalt Creek

Mfc

Mff

Af

Df

Surficial Geology Key
Af - Artificial Fill
Df - Debris Flow Fans
Mfc - Coarse Flood Deposits
Mff - Fine Flood Deposits

Basalt Creek Overview - Priority Location

Wilsonville Stormwater Master Plan

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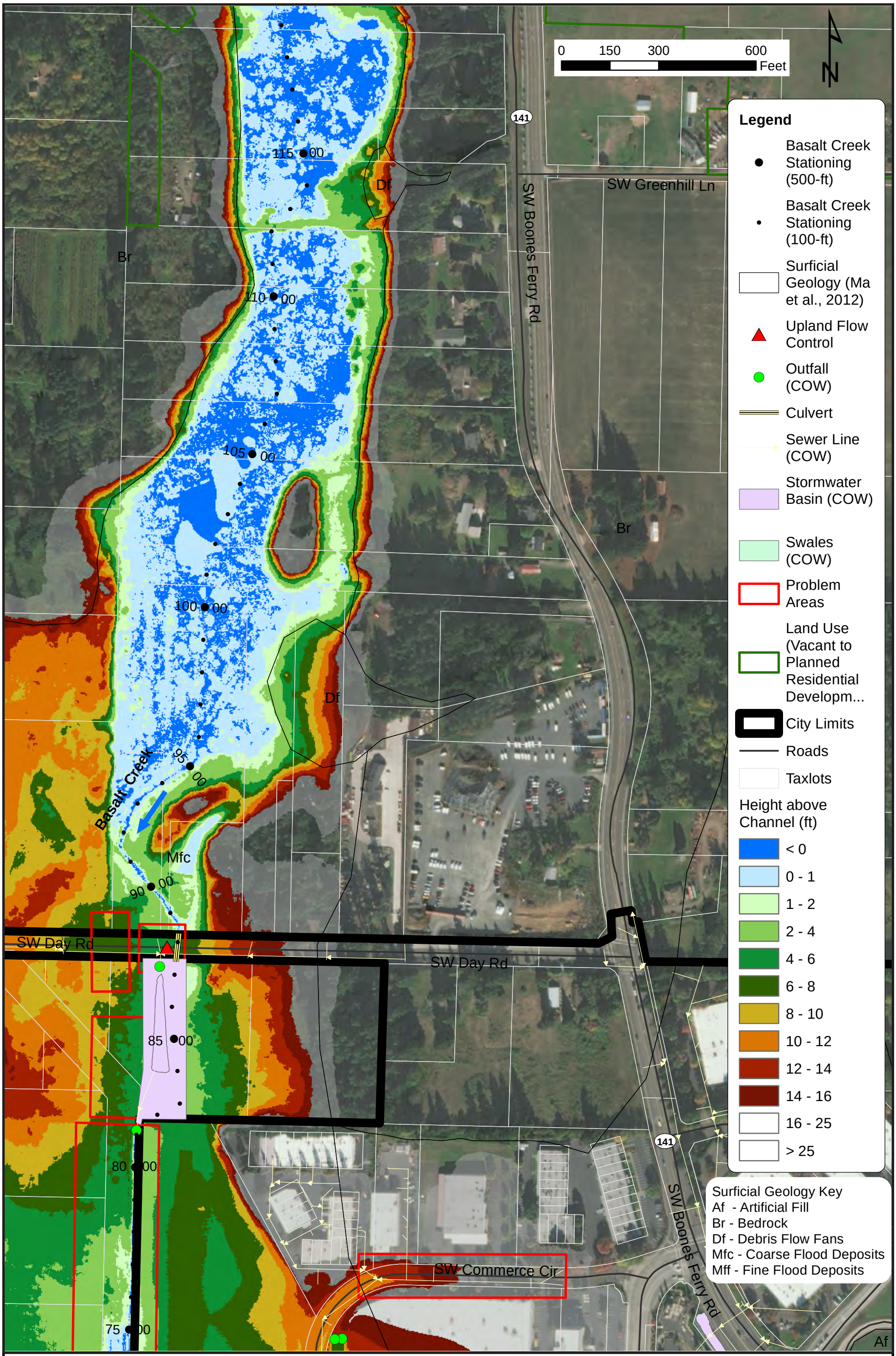
FIGURE 6



Basalt Creek Overview - Secondary Location

Wilsonville Stormwater Master Plan

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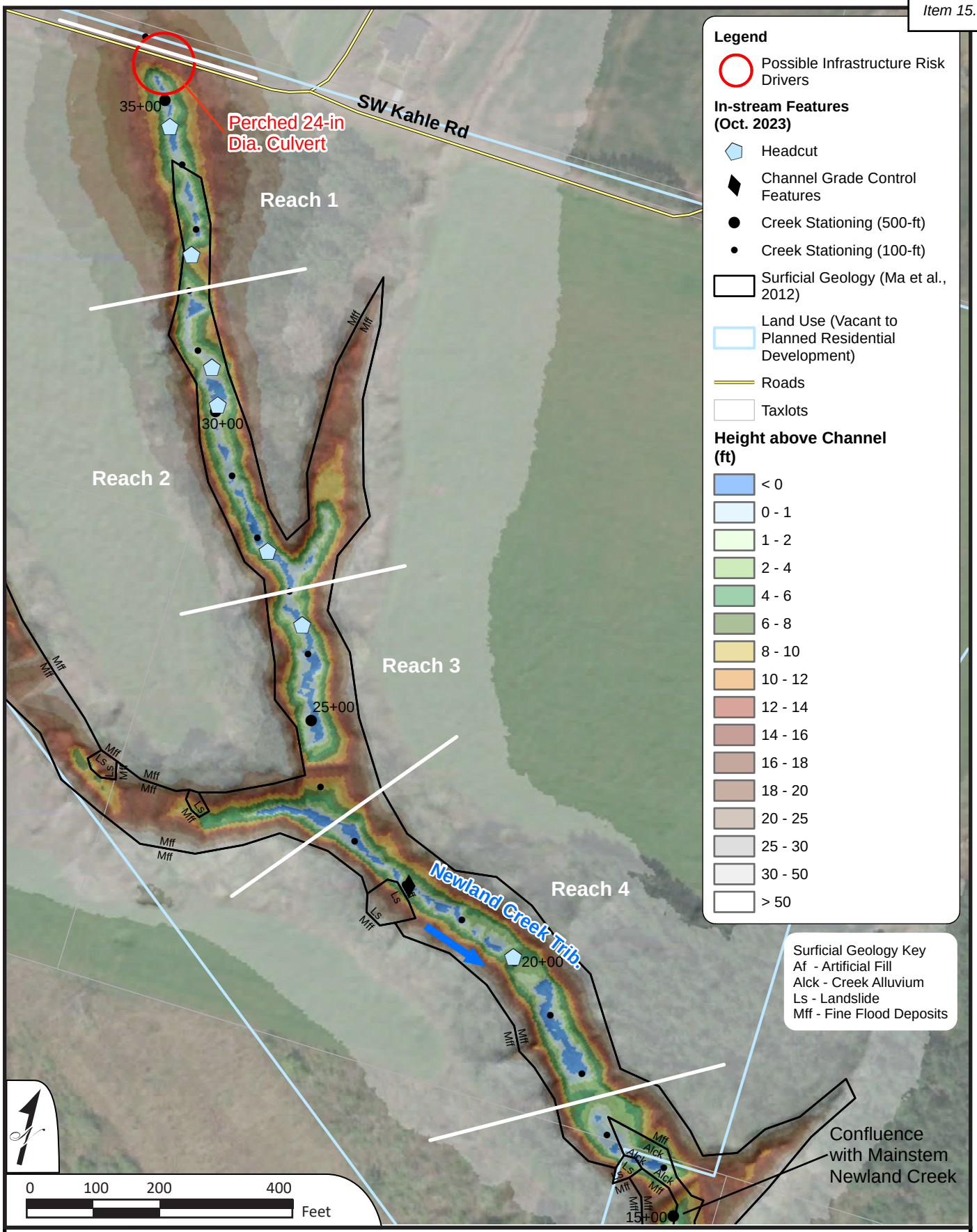
FIGURE 7



Newland Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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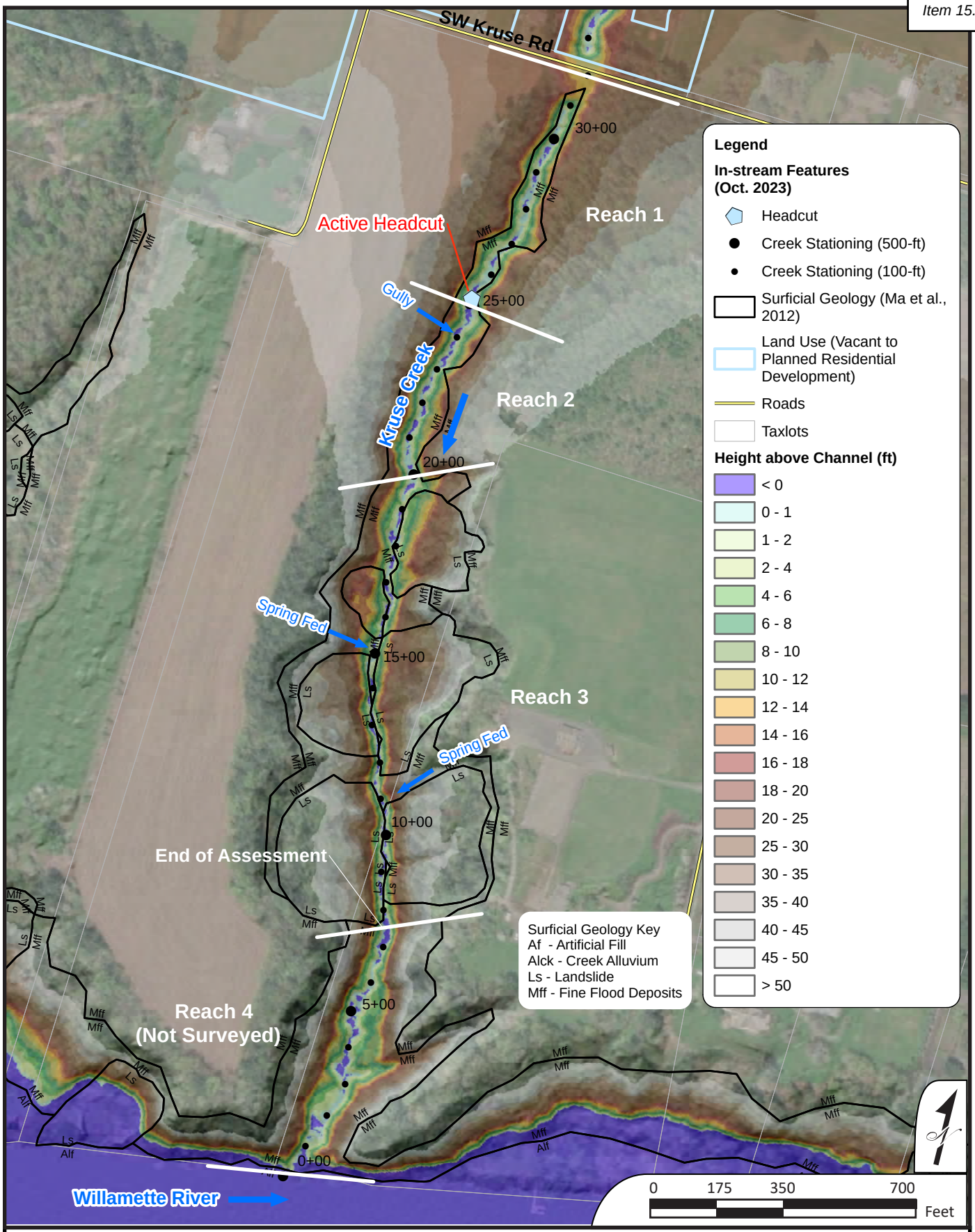
FIGURE 8



Kruse Creek Geomorphic Survey

Geomorphic Assessment of Wilsonville Creeks

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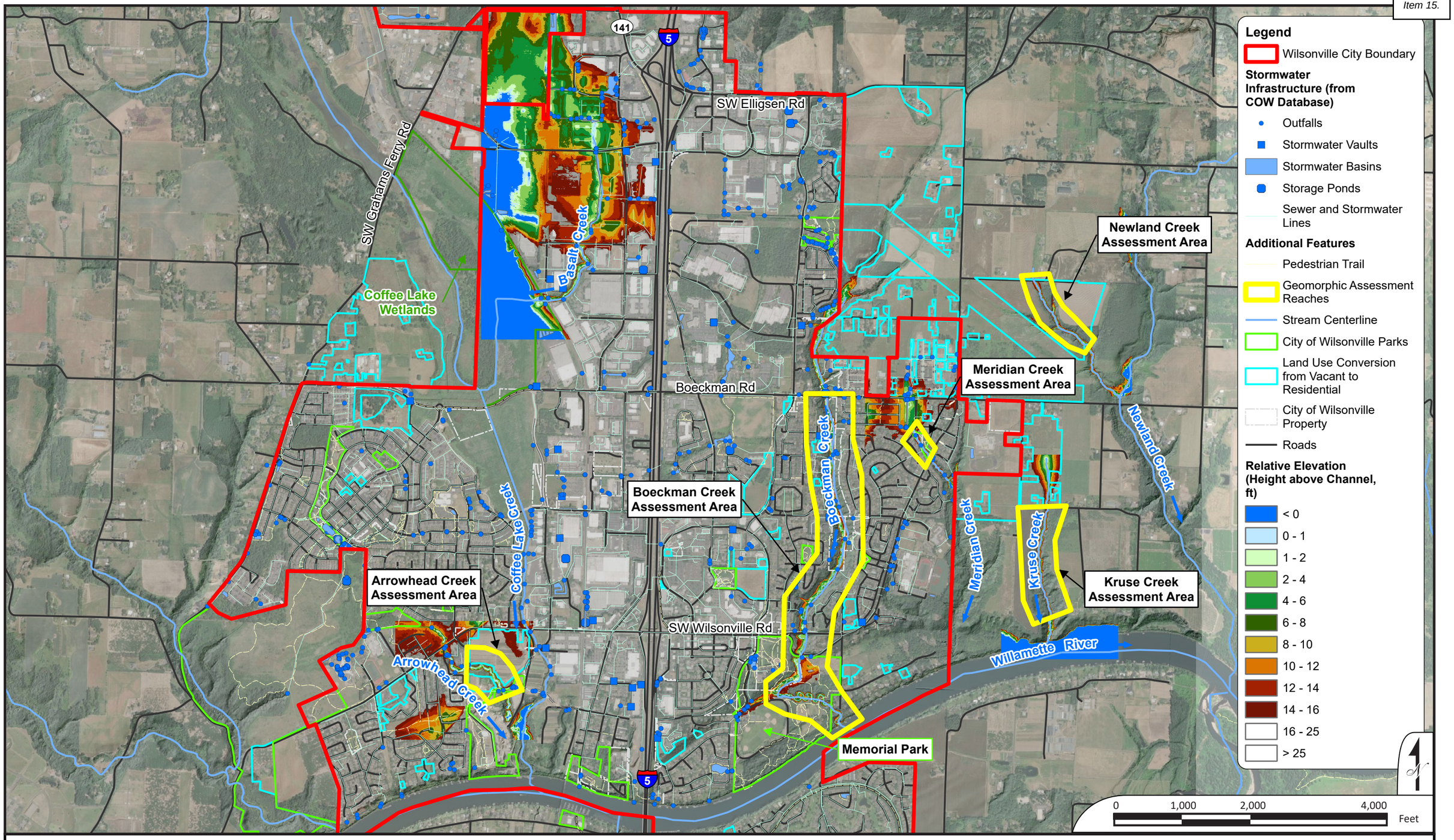
FIGURE 9

APPENDIX C

Relative Elevation Maps for Boeckman, Meridian, Arrowhead, Newland, and Kruse Creeks in Wilsonville Oregon

(Overview PDF; full data sets are provided as .tif digital files)



Relative Elevation (Height above Channel) Overview Map

Geomorphic Assessment of Wilsonville Creeks

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FIGURE C1

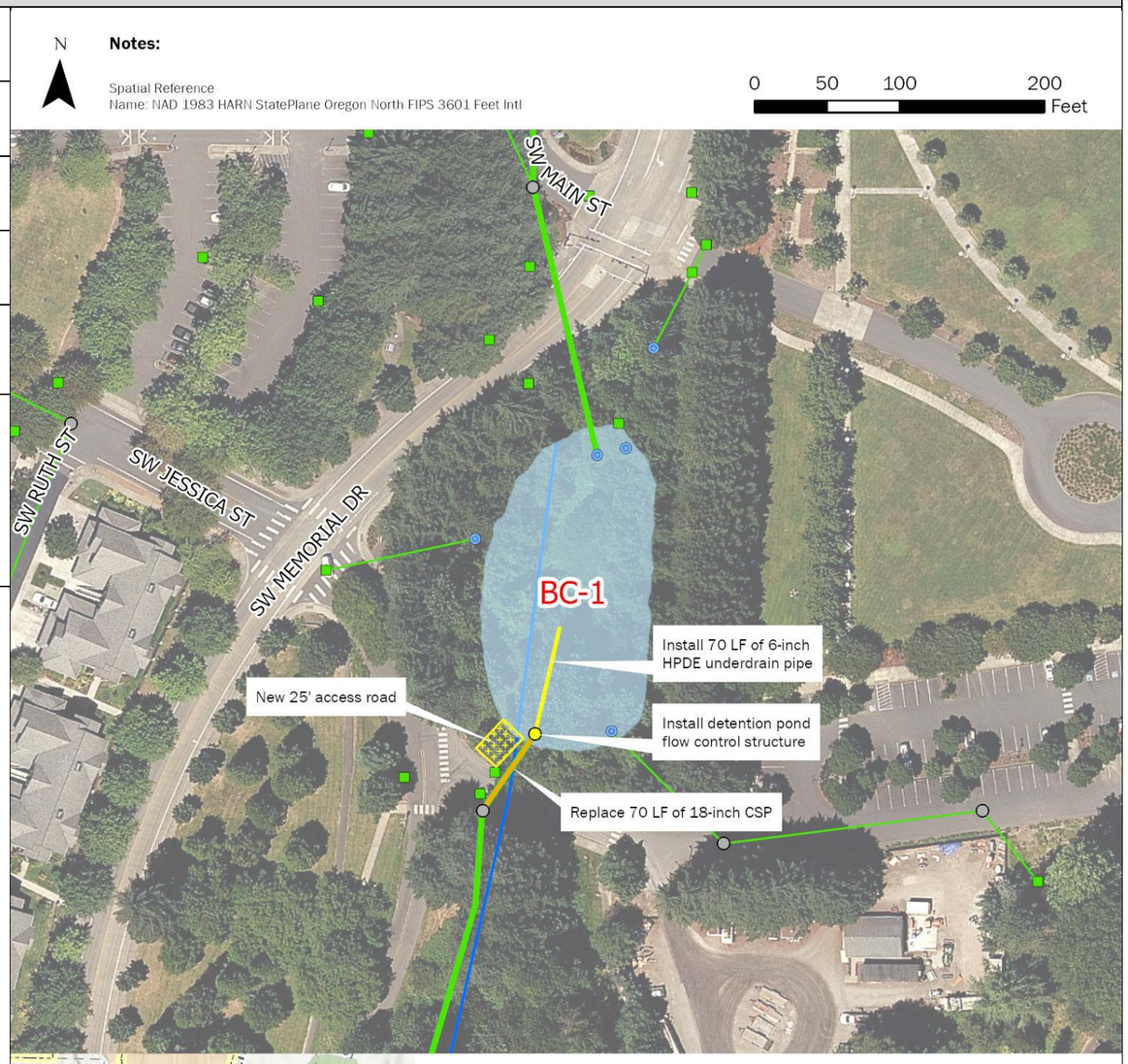
APPENDIX D (provided separately)

Digital Folders Containing Georeferenced Photographs from Boeckman and Meridian Creeks (including .kmz files with geolocated thumbnails)

Appendix D: Capital Project Fact Sheets

BC-1: Library Pond Retrofit
BC-2: Ash Meadows Flow Mitigation
BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1 & 2
BC-4: Boeckman Creek Stabilization at Colvin Lane
BC-5: Memorial Park Swale Retrofit
BC-6: Gesellschaft Water Well Channel Restoration
CLC-1: Day Road Stormwater Improvements, Phase 1 & 2
CLC-2: Arrowhead Creek Culvert Replacement at Jobsey Lane
CLC-3: Garden Acres Pond Retrofit
NC-1: Frog Pond East and South Conveyance Pipe Installation
WR-1: Willamette Way East/Morey's Landing Stormwater Improvements, Phase 1 & 2
WR-2: Miley Road Stormwater Improvements, Phase 1 & 2
WR-3: Rose Lane Culvert Replacement
WR-4: Charbonneau East Stormwater Improvements, Phase 1 & 2
WR-5: Charbonneau West - SW French Prairie Road and SW Boones Bend Road

BC-1	Library Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	4		
Contributing Drainage Area	132 acres		
Estimated Existing Impervious Area (%)	47%	**Estimated Future Impervious Area (%)**	53%
Project Location	The project site is located adjacent to Memorial Park, north of the Wilsonville Public Library parking lot and east of SW Memorial Drive.		
Statement of Need	The current configuration of Library Pond does not support routine maintenance activities (ongoing challenges are reported related to debris removal at the existing outlet structure), nor does it have a flow control/orifice structure or emergency overflow to provide downstream flow mitigation. Retrofit of the Library Pond is proposed to provide regional water quality treatment and flow control for the Town Center redevelopment, as part of the fee-in-lieu program.		
Project Description	This project retrofits the existing Library Pond to meet current City Standards and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years. Project details are as follows: • Install a pond outlet structure in compliance with current design standards. • Install 70 LF of 6-inch HDPE underdrain pipe. • Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media. • Install 15-ft wide, 25-feet long access road for maintenance access. • Replace 70 LF of 18" CSP pipe (SD5213) at new design depth, approx. 15 feet deep.		



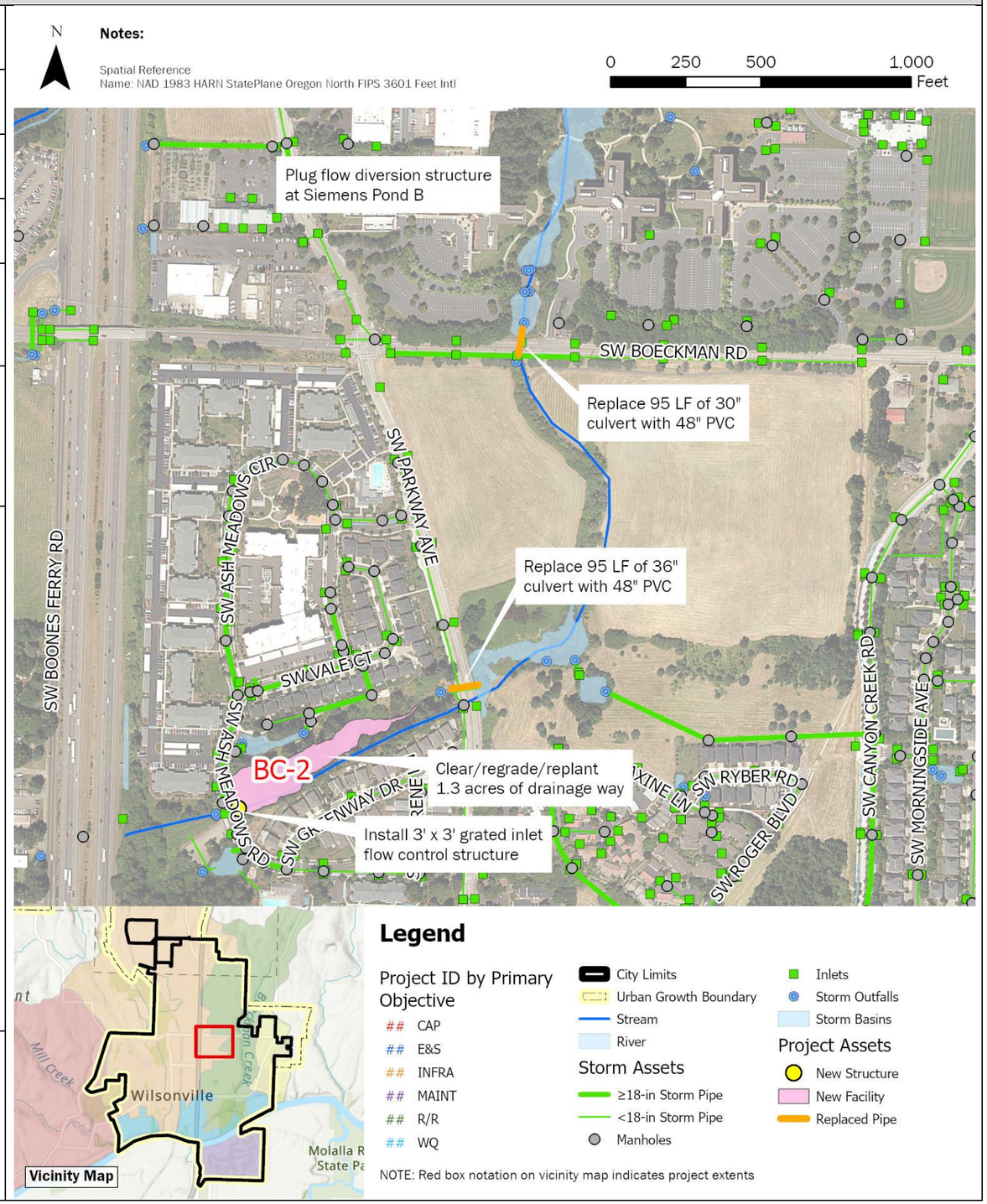
BC-1	Library Pond Retrofit	
Design Considerations / Assumptions	• The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V. • Facility sizing is based on adherence to the City's 2015 PWS Section 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool. • To size the pond in accordance with PWS design standards, approximately 48 acres (50% of total new and redeveloped impervious area associated with the Town Center redevelopment) require onsite treatment and flow control prior to discharge into Library Pond detention facility. • Total pond depth includes drain rock (15-inches), separation layer (3-inches), and growing media (18-inches), in accordance with the PWS Section 3, Appendix A landscape and soil media requirements. • Upstream (SD5053) and downstream (SD5213) pipe sizes are anticipated to remain unchanged. • Inlet structure into the pond (CARTE ID: 27) to remain unchanged. • Outlet structure (standard drawing ST-6110) assumes an additional field inlet for the 100-year overflow event. • Assuming bottom of the pond shape is roughly 70' x 100' - placing underdrain through 2/3 of the of the pond (based on ST-6060), approx. 70 LF.	
Estimated Project Cost	Capital Expense Total	$1,407,000
	Design / Construction Admin. (13.5%)	$190,000
	Engineering & Permitting (20%)	$281,000
	Total Cost	**$1,880,000**
Project Cost Notes	• Cost is for the Library Pond retrofit only. It does not include any additional LID BMPs that are needed to offset some of the contributing drainage area. • Assumes upstream inlet pipe (SD5053) and inlet structure to Library Pond (no ENG ID available) can remain unaltered. • Limited traffic control/utility relocation and surveying will be required, as the site is already developed and has access and staging areas.	

Additional Figures

Overview of the detention pond from maintenance entrance to Memorial Park near the intersection of SW Memorial Drive and SW Jessica Street (Jan 2023)

Outlet of pond that functions as the ditch inlet (Sep 2021)

BC-2	Ash Meadows Flow Mitigation		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	25 and 26		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	37.6%	**Estimated Future Impervious Area (%)**	51.6%
Project Location	This project is in a residential area near the Ash Meadows apartment complex. The area is bounded to the west by Interstate-5, SW Vale Court to the north, SW Parkway Avenue to the east, and SW Greenway Drive to the south.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project reestablishes historic flow patterns to Coffee Lake Creek by rerouting high flows from the Siemens Pond B (Opp. ID 25) and Boeckman Creek back to the Coffee Lake Creek basin.		
Project Description	This project mitigates flow to Boeckman Creek by plugging the diversion structure that currently routes high flows from the Siemens Pond B (Opp. ID 25) east to Boeckman Creek. Rerouted flows will be conveyed through the culvert under Boeckman Road and down the natural drainage path toward Coffee Lake Creek. To mitigate the rerouted high flows, in-line storage will be enhanced between Ash Meadows Lane and Parkway Ave (Opp. ID 26). Project details are as follows: • Plug the flow diversion structure at Siemens Pond B. • Upsize 95 LF of 30-inch culvert at Boeckman Road to 48-inch diameter PVC. • Upsize 80 LF of 36-inch culvert at Parkway Ave (main barrel) to 48-inch diameter PVC. • Install a 3-foot x 3-foot grated inlet to serve as a flow control structure at SW Ash Meadows Circle. • Clear, regrade, and replant 1.3-acres of drainage way and embankment to ensure a low-flow drainage path and healthy vegetation.		



Brown AND Caldwell

City of Wilsonville
Project No: 156157

Wilsonville Stormwater Master Plan

Capital Project Fact Sheet

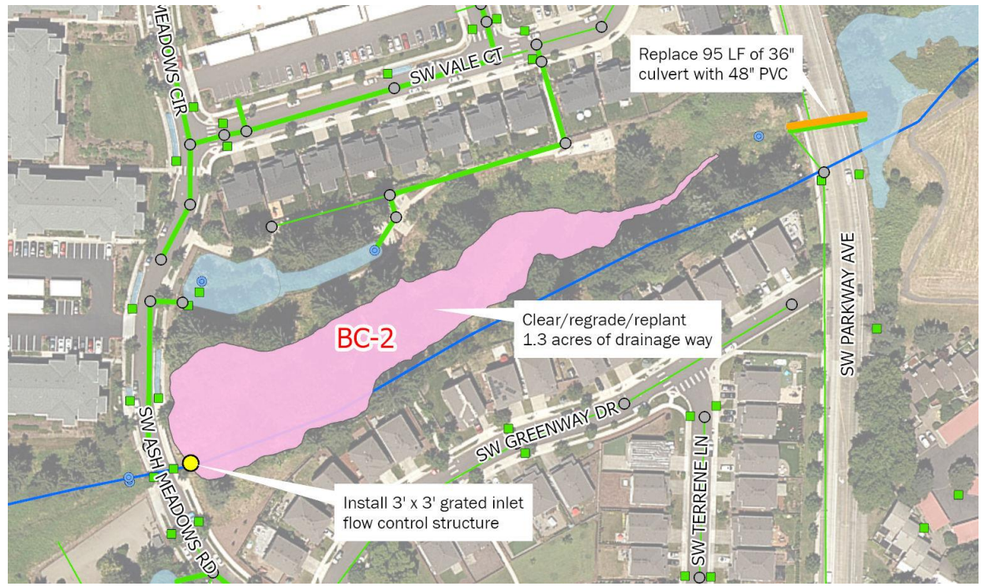
BC-2 – Ash Meadows Flow Mitigation

BC-2	Ash Meadows Flow Mitigation	
Design Considerations / Assumptions	• This project is predicted to mitigate 75% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions. • This project and cost estimate do not include any modification of the area east of SW Parkway Avenue and south of Boeckman Road. • Existing topography at the Ash Meadows site ranges between 182 -190 feet in elevation, with an estimated storage potential of 181,000 cubic feet. • This project is intended to mitigate additional flow to the culvert under I-5, approximately 300 feet downstream of the Ash Meadows site, and mimic existing flow conditions. • The flow control structure will store 25-year peak flows at a maximum water surface elevation (WSE) of 190 feet. This max WSE will maintain 2 feet of freeboard to neighboring residential properties. Final design will include confirmation of flow control structure sizing.	
Estimated Project Cost	Capital Expense Total	$1,737,000
	Design / Construction Admin. (13.5%)	$234,000
	Engineering & Permitting (50%)	$869,000
	Geotechnical	$100,000
	Total Cost	**$2,940,000**
Project Cost Notes	• The Ash Meadows site is approximately 55,000 square feet. Earthwork estimates assume 1.5-feet of excavation and 6-inches of amended soils over the site area. • Clearing and plant restoration is necessary for entire area to 190 ft elevation. • Project concept and cost estimates developed in conjunction with the Boeckman Road Corridor Project. • A 50% Engineering and Permitting multiplier was applied based on design cost estimate. • A 15% Traffic Control/Utility Relocation multiplier was applied based on design cost estimate. • A 20% Surveying multiplier was applied based on design cost estimate. • A $100,000 lump sum cost was included for Geotechnical work based on design cost estimate.	

Additional Figures

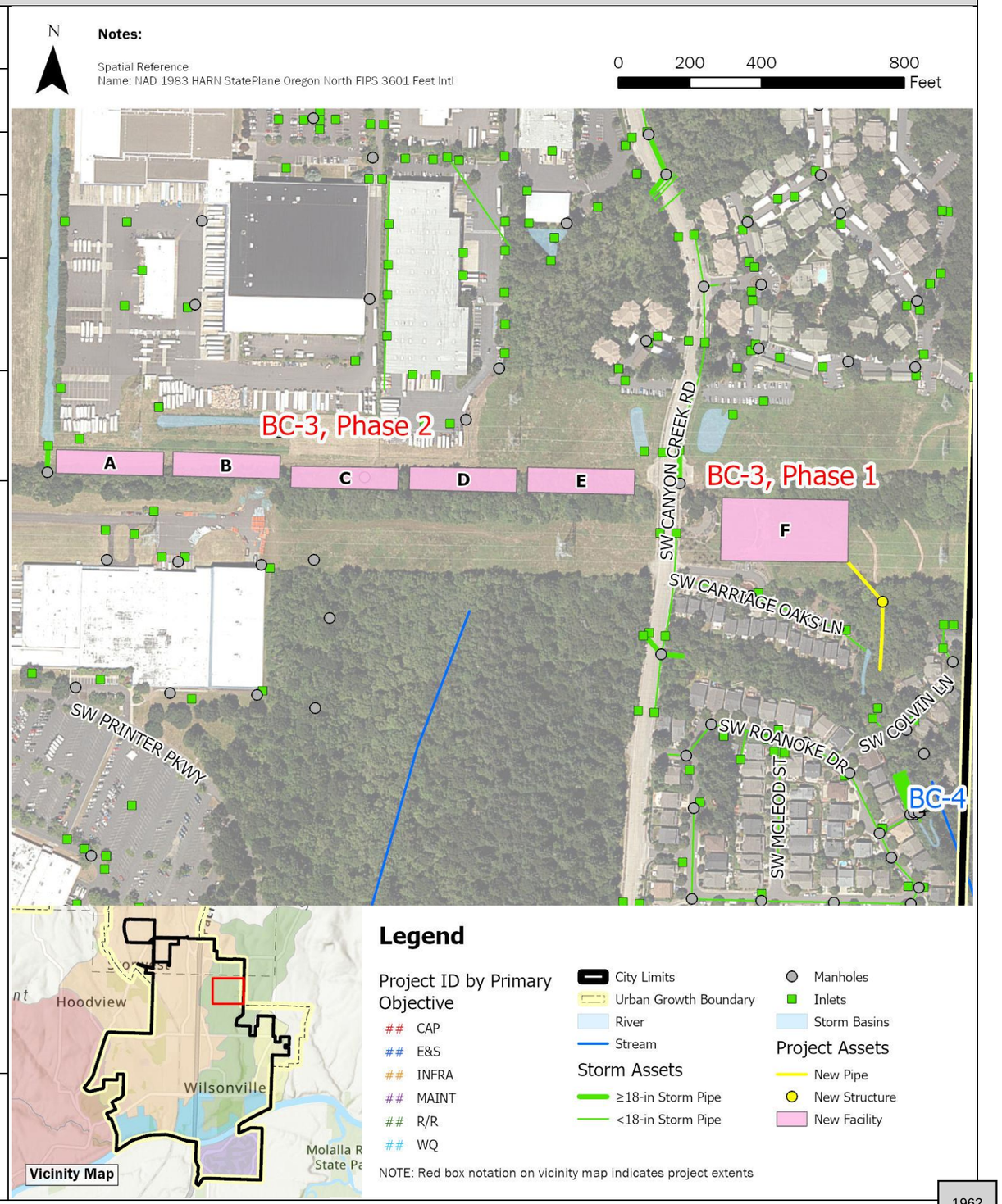
Ash Meadows Drainage Way (Jan 2023)

Siemens Pond Diversion (Nov 2021)



Area map showing zoomed in view of Ash Meadows drainage way.

BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	24		
Contributing Drainage Area	295 acres		
Estimated Existing Impervious Area (%)	38.1%	**Estimated Future Impervious Area (%)**	47.0%
Project Location	This project is located east and west of SW Canyon Creek Road along the existing BPA easement. Phase 1 is located at Canyon Creek Park, north of SW Carriage Oaks Lane. Phase 2 extends west to east along the existing Wiedemann Ditch alignment, south of the Sysco property.		
Statement of Need	The Boeckman Road Corridor Project requires mitigation of increased flow in Boeckman Creek due to the planned removal of the flow control structure at Boeckman Road. This project provides additional floodplain storage through enhancement of the existing Wiedemann Ditch alignment and installation of a storage facility at Canyon Creek Park.		
Project Description	This project mitigates flow to Boeckman Creek through the creation of a series of linear wetland complexes along the existing Wiedemann Ditch within the BPA easement (Facilities A-E). Discharge from the linear wetland complexes will be routed through the existing 48-inch culvert underneath Canyon Creek Rd. prior to entering the proposed vegetated storage facility (Facility F) within available, undeveloped space at Canyon Creek Park. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Canyon Creek Park) • Clear, regrade, and replant approximately the 1.6-acre proposed vegetated storage facility. • Install a flow control/outlet structure with emergency overflow at the storage facility. • Install 350 LF of 36-inch diameter PVC to discharge from the southeast corner of the site towards Boeckman Creek. • Install one new manhole at bend in new 36-inch pipe. Phase 2 (Wiedemann Ditch) • Clear, regrade, and replant approximately 2.1-acres along the existing ditch alignment to install five, tiered wetland complexes. • Install a 12-foot wide, 1,500-foot-long access road west of Canyon Creek Road.		



BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit

Design Considerations / Assumptions

- This project is predicted to mitigate 98% of the increased peak flow to Boeckman Creek resulting from the removal of the Boeckman Creek flow control structure during the 25-year storm, under existing hydrological conditions.
- Coordination with both Sysco and BPA is necessary prior to design and construction.
- The Canyon Creek Park facility (Phase 1) is to be designed per the City's surface water requirements with an assumed active storage depth of four feet and 3:1 side slope. Sizing is based on the desire to maximize the flow mitigation potential of the site. If less flow mitigation is needed, the pond footprint and/or depth may be reduced.
- The Wiedemann Ditch alignment (Phase 2) receives drainage from the existing north-south Sysco ditch on Sysco property. Sysco has identified this location as a potential mitigation site for their planned facility expansion.
- The linear wetlands (Phase 2) will be hydraulically connected, using weirs to provide a storage depth of two feet within each cell.

Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$3,491,000	$5,253,000
Design / Construction Admin. (3.5% + $200K)	$322,000	$384,000
Engineering & Permitting (30%)	$1,047,000	$1,576,000
Total Cost	**$4,860,000**	**$7,210,000**

Project Cost Notes

- The Canyon Creek Park site (Phase 1) is approximately 69,000 sf. Earthwork estimates assume 1.5-feet of excavation over the site area and the 6-inches of amended soil, per City Standards.
- Final design will include confirmation of weir sizing and layout.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Project concept and cost estimates were initially developed in conjunction with the Boeckman Road Corridor Project. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

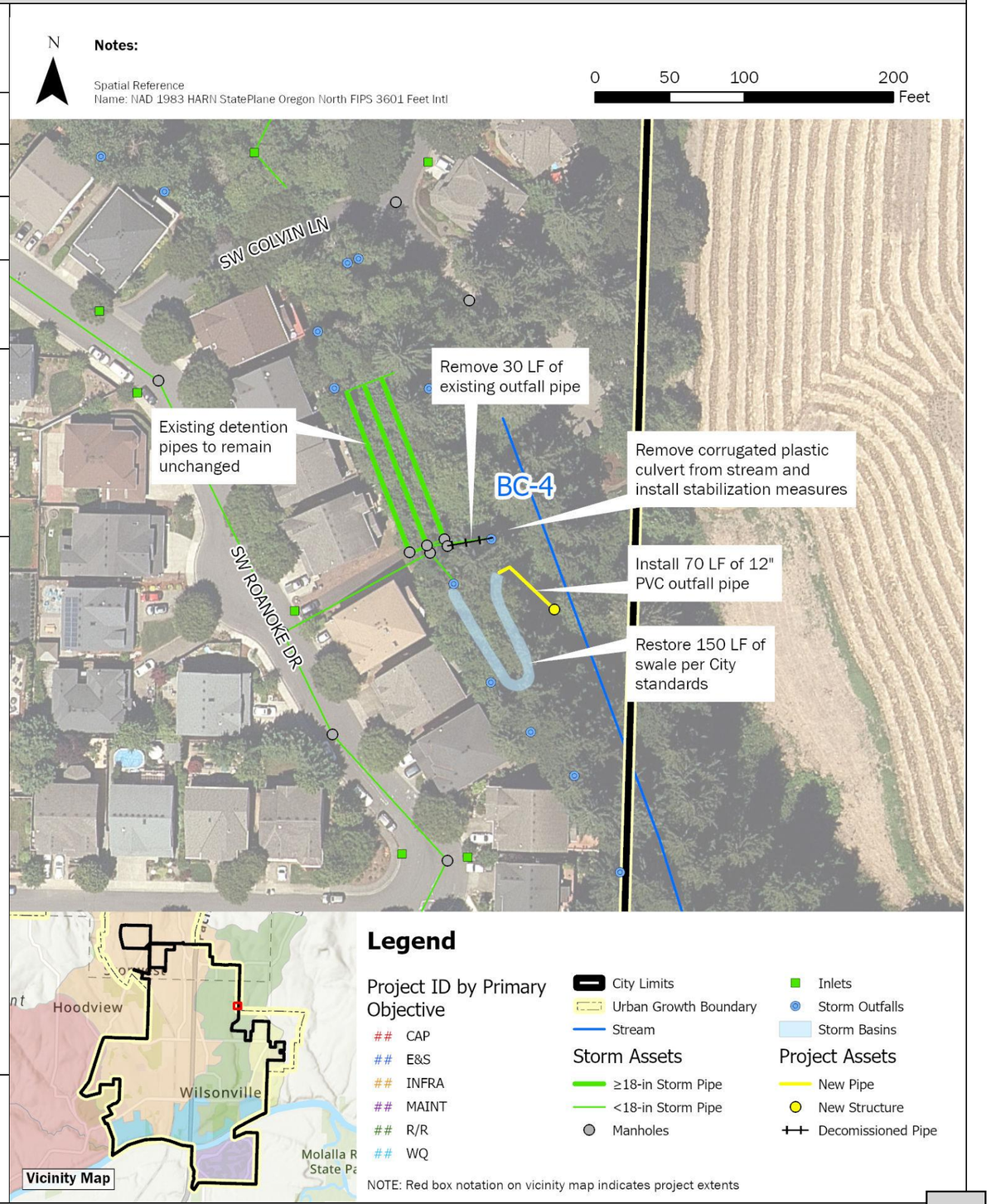
Additional Figures

Canyon Creek channel (Jan 2023)

Canyon Creek channel (Jan 2023)

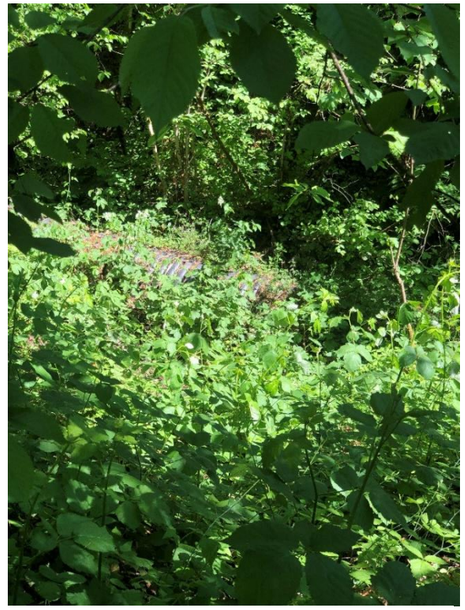
Wiedemann Ditch alignment (Sep 2021)

BC-4	Boeckman Creek Stabilization at Colvin Lane		
Project Objective(s)	Erosion/Sediment Control Repair/Replace Maintenance		
Project Opportunity ID	15		
Contributing Drainage Area	358 acres		
Estimated Existing Impervious Area (%)	36.7%	**Estimated Future Impervious Area (%)**	45.3%
Project Location	This project is located along the Boeckman Creek corridor, adjacent to a residential neighborhood (Canyon Creek Estates) and bounded to the west by SW Roanoke Drive. SW Colvin Lane is directly north of the project location.		
Statement of Need	Streambank erosion and channel migration have been observed in the Boeckman Creek tributary segment, which discharges to Boeckman Creek downstream of SW Colvin Lane. The 2012 Master Plan identified this location as a project need (BC-8), and subsequent site visits and conversations with City staff confirmed the need. Corrugated plastic piping installed by a resident with the intention of mitigating erosion was not approved by the City. Trees have fallen and additional tree loss may occur due to streambank loss.		
Project Description	This project includes riparian and in-channel bank stabilization measures to address resident concerns and stabilize the section of the tributary channel bank. This project also includes restoration of the existing water quality swale. Project details are as follows: • Removal of approx. 30 LF of existing outfall pipe. • Installation of approx.70 LF of 12-inch PVC to serve as a new outfall. • Install planting and bioengineered restoration/stabilization measures along approx. 600 LF of stream corridor. • Reconstruction of approx. 150 LF of vegetated swale in accordance with the City's Public Works Standards (PWS).		



BC-4	Boeckman Creek Stabilization at Colvin Lane	
Design Considerations / Assumptions	• The pipe system upstream of the outfall, including detention pipes in the City easement adjacent to 7590 Roanoke Drive N. will be preserved. Issues have not been reported and these pipes are assumed to be functioning as intended. • Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Swale reconstruction to be confirmed with final design.	
Estimated Project Cost	Capital Expense Total	$282,000
	Design / Construction Admin. (13.5%)	$38,000
	Engineering & Permitting (30%)	$85,000
	Total Cost	**$410,000**
Project Cost Notes	• Assumes clearing/grubbing including stump removal and removal of existing corrugated pipe. • No costs included for access. Assumes access can be attained through an existing temporary City easement.	

Additional Figures



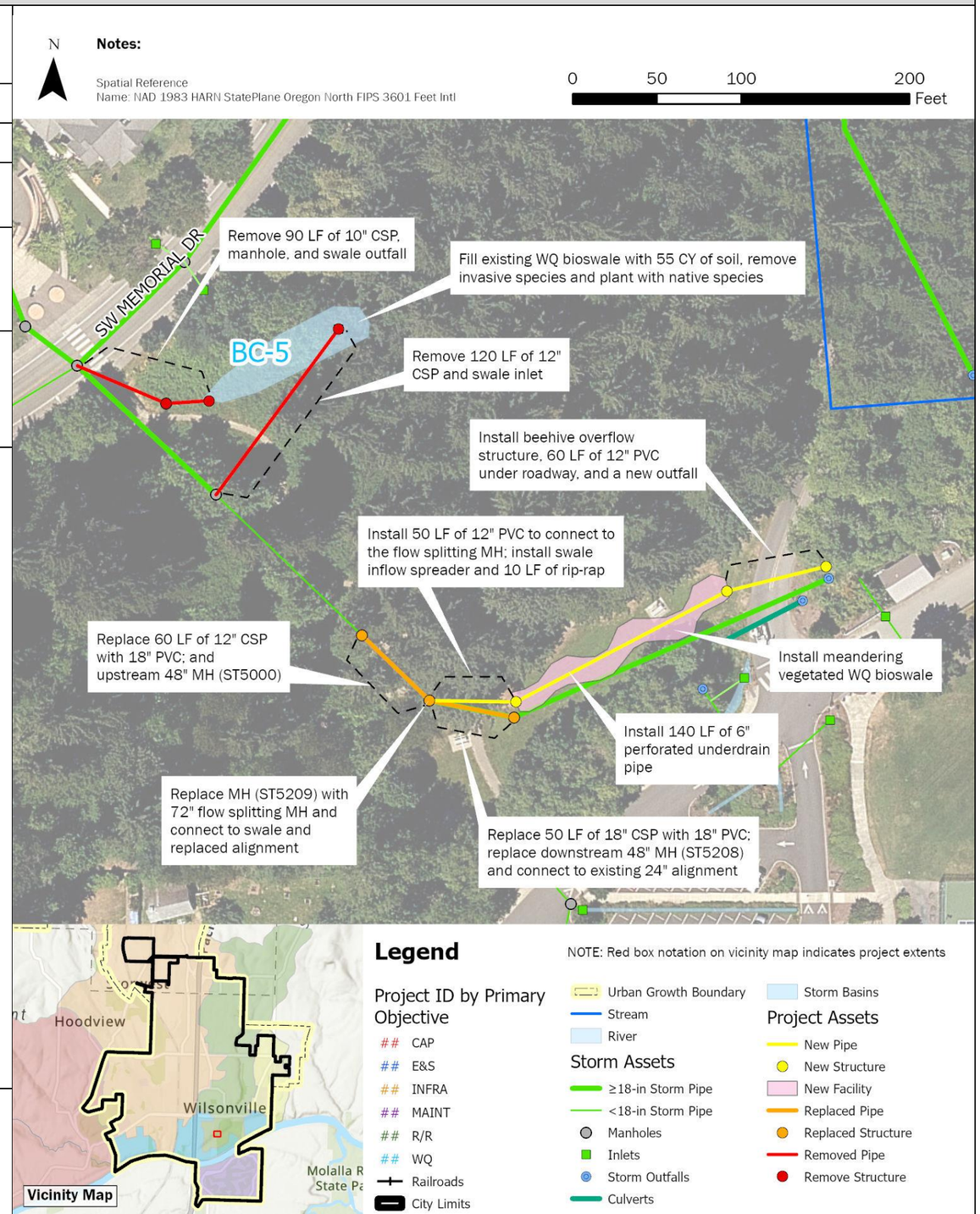
Streambank with resident-installed corrugated plastic pipe (May 2023)

City-owned outfall pipe (May 2023)

Upstream detention pipes location (May 2023)

BC-5	Memorial Park Swale Retrofit		
Project Objective(s)	Water Quality Erosion/ Sediment Control Maintenance		
Project Opportunity ID	21		
Contributing Drainage Area	33 acres		
Estimated Existing Impervious Area (%)	56.3%	**Estimated Future Impervious Area (%)**	57.7%
Project Location	This project site is located in the southeast portion of the City within the Boeckman Creek watershed. The project is bounded by SW Memorial Drive to the north, the Memorial Park parking lot/baseball fields to the south, and forested area within Memorial Park to the east and west.		
Statement of Need	The water quality bioswale at SW Memorial Drive is eroded, not draining properly, and not providing a water quality benefit. Modeling evaluation indicates that the pipe system after the convergence point at SW Memorial Drive has a constriction resulting in backwater and upstream system flooding.		

Project Description	This project includes removal and relocation of an existing water quality bioswale off SW Memorial Drive and installation of a new water quality bioswale and associated infrastructure at the downslope near the Memorial Park parking lot.
	
	Project details are as follows:
	• Remove existing water quality swale (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available):
	  ○ Remove 90 LF of 10-inch CSP (SD5041 and SD5042).
	  ○ Remove 120 LF of 12-inch CSP (SD5044).
	  ○ Remove manhole (ST5098).
	  ○ Remove swale inlet structure (CARTE ID 568).
	  ○ Remove swale outfall structure (CARTE ID 19).
	  ○ Fill existing swale and revegetate area.
	• Replace two 48-inch manholes (ST5000 and ST5208).
	• Replace 60 LF of 12-inch CSP with 18-inch PVC pipe (SD5046).
	• Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206).
	• Install a new meandering water quality swale near the Memorial Park parking lot:
	  ○ Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole.
	  ○ Install 50 LF of 12-inch PVC pipe.
	  ○ Install 140 LF of 6-inch perforated HDPE underdrain pipe.
	  ○ Install swale inflow spreader.
	  ○ Install 10 ft x 4 ft rip-rap pad in front of inflow spreader.
	  ○ Install beehive overflow structure.
	  ○ Install new outfall into the creek.
	  ○ Install vegetated swale with required 1 foot of drain rock and 1.5 feet of amended soil.		



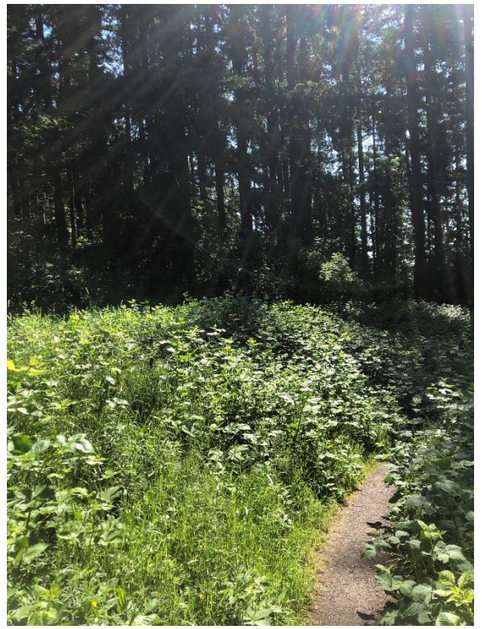
BC-5	Memorial Park Swale Retrofit	

Design Considerations / Assumptions	• Installation of the water quality bioswale is a water quality retrofit project, as the site is space constrained limiting the use of the BMP Sizing Tool for required facility sizing. Approx. size of the facility is 200 ft x 12 ft = 2,400 SF.
	  ○ Existing swale (to be removed) is estimated to be approx. 1,500 SF.
	• Soil infiltration rates are anticipated to be very low (0.02-0.07 in/hr based on USDA NRCS survey).
	• The maximum width of the swale is 12 feet.
	• Maximum side slopes of the swale are 3H:1V with a 2-foot minimum width flat bottom.
	• The maximum depth from growing media to overflow elevation is 1 foot.
	• Three feet of required media (12-inches of drain rock, 3-inches of open graded aggregate, and 18-inches of growing media minimum).
	  ○ Table 3.11 of the PWS notes that by increasing the growing media by 12 inches or more the facility surface area can be reduced by 25 percent.
	• A small portion of the facility resides within the FEMA 100-year floodplain. As this is not an infiltration site it does not require additional seasonal high groundwater testing.
	• Upsizing the 12-inch CSP (SD5046) with 18-inch PVC reduces the duration of modeled flooding at ST5000. Given the significant amount of vegetation and steep slopes in the area, full replacement of the alignment is not proposed.
	• Installation of a diversion manhole upstream of the swale may result in periodic surcharge of the swale that will overflow into the nearby creek.
	Standard Detail references:
	• Vegetated swale – filtration reference ST-6045.
	• Swale inflow spreader reference S-2225.
	• Planter, Rain Garden, Swale Flow Control Structure reference ST-6105.	

Estimated Project Cost	Capital Expense Total	$631,000
	Design / Construction Admin. (13.5%)	$85,000
	Engineering & Permitting (30%)	$189,000
	Total Cost	**$910,000**
Project Cost Notes	• Onsite fill from excavation of new swale to be stockpiled and used to fill existing swale footprint. • All existing conveyance piping and manholes to remain in place except for those identified for removal from the existing swale and replacement from manholes ST5000 to ST5208. • Project cost estimate assumes a single meandering, vegetated swale. Parallel vegetated swales may also be considered to increase capacity of the facility at this site. • Engineering and permitting estimate reflect in water work required for outfall installation.	

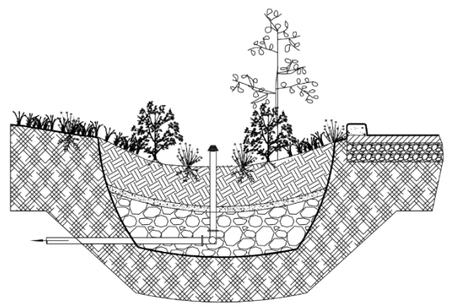
Additional Figures

Current water quality swale near SW Memorial Drive (Jan 2023)



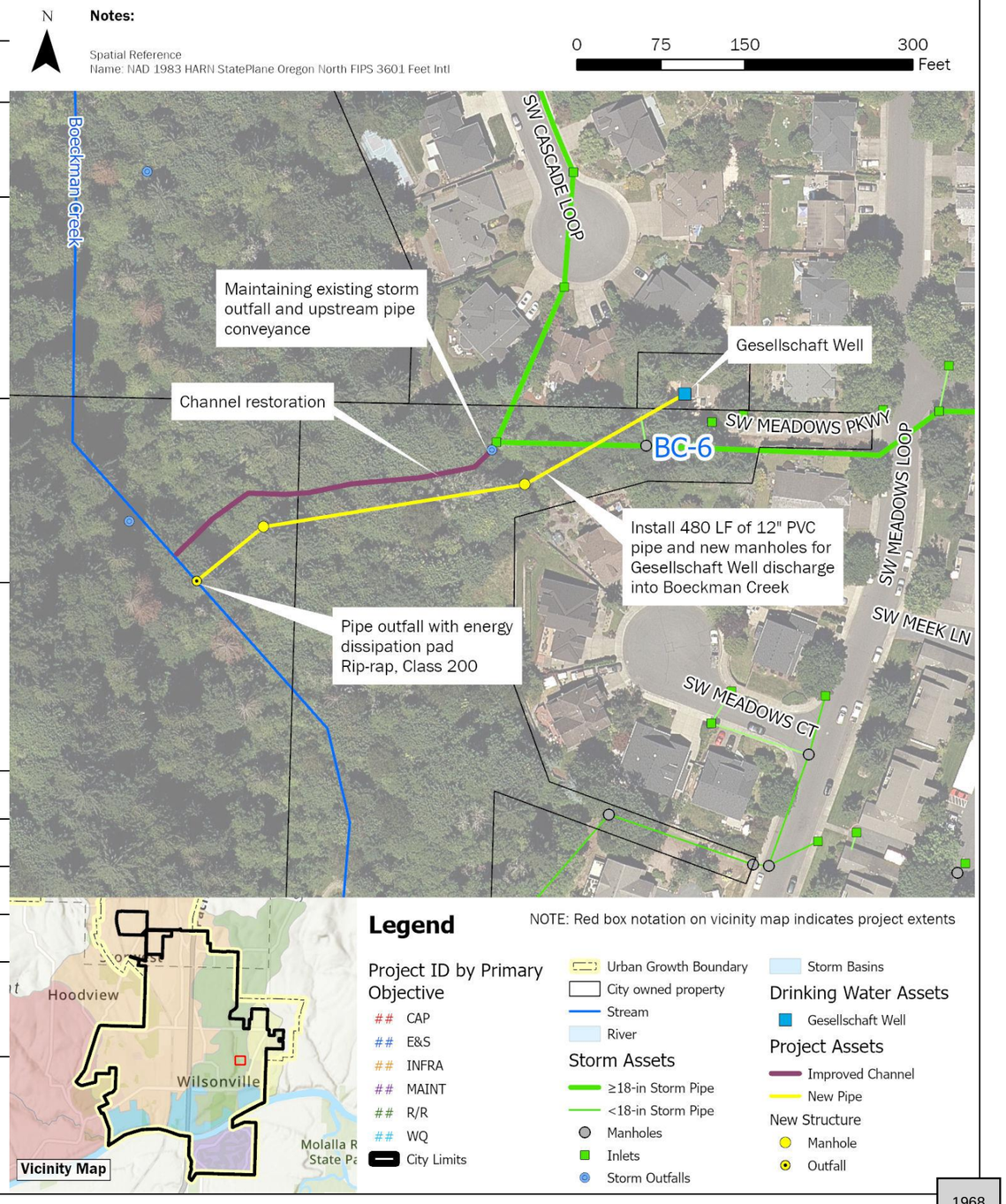
Water quality swale in the spring overgrown with invasive species (May 2023)

Open area along the creek to relocate the Memorial Park Swale (May 2023)

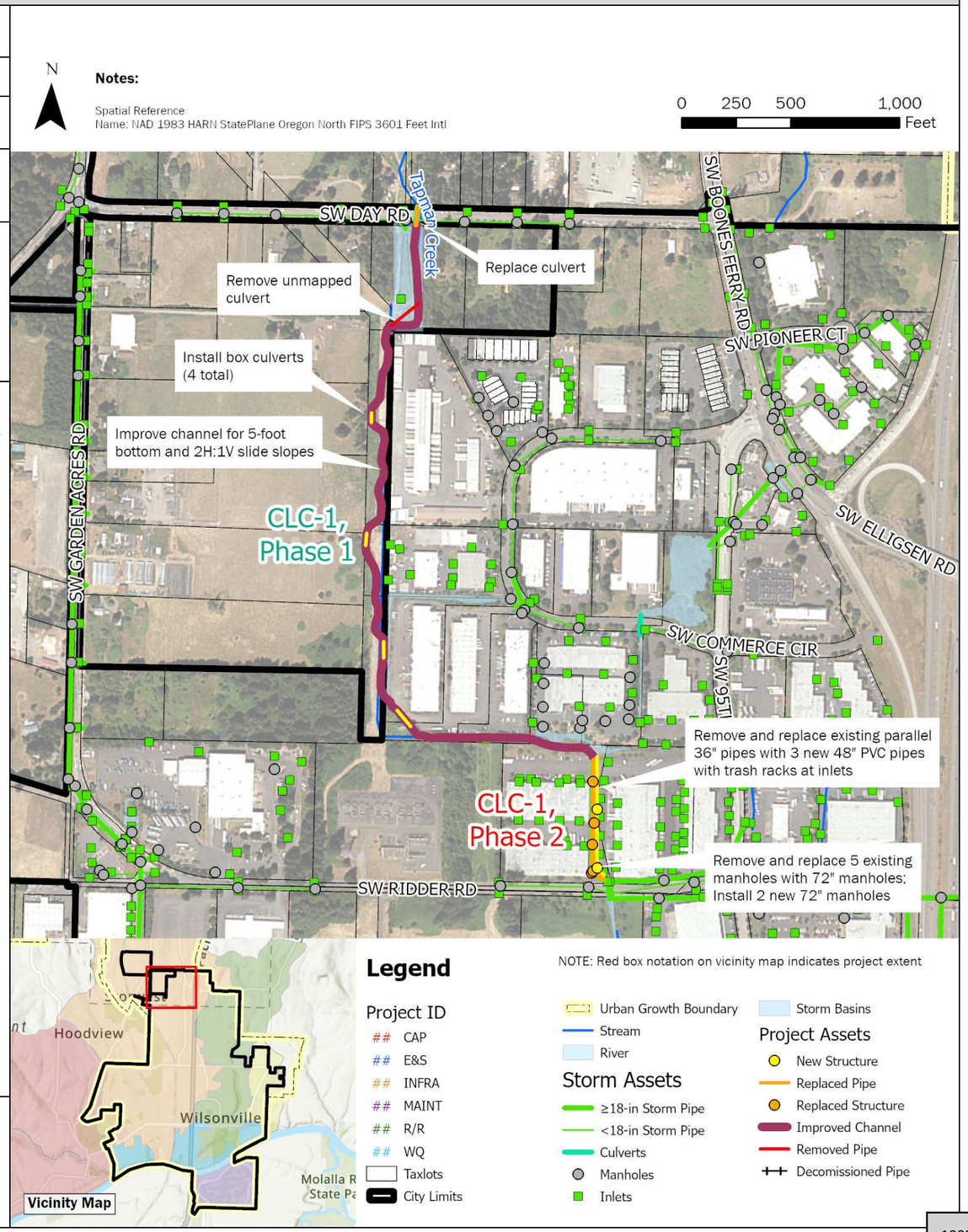


Vegetated Swale – Filtration (ST-6045)

BC-6	Gesellschaft Water Well Channel Restoration		
Project Objective(s)	Erosion/Sediment Control Maintenance		
Project Opportunity ID	41	**Contributing Drainage Area (acres)**	25 acres
Estimated Existing Impervious Area (%)	39.7%	**Estimated Future Impervious Area (%)**	39.9%
Project Location	This project is in the Boeckman Creek riparian area, near Wilsonville High School, at the Gesellschaft Well site (29001 SW Meadows Parkway). The area is directly west of SW Meadows Loop and bounded to the west by Boeckman Creek and SW Meadows Parkway to the north.		
Statement of Need	Weekly potable discharge from the Gesellschaft drinking water well and contributing stormwater runoff have caused severe erosion of the existing drainage channel to Boeckman Creek. The Gesellschaft well provides backup water supply and the City exercises the water well weekly to maintain quality and regulatory compliance. Under Capital Project #7054 (Fiscal Year 2015-2017) the City installed an asphalt apron and gabion boxes in three locations, but they have been undermined and are no longer effective at dissipating energy. The area is currently overgrown with blackberry brambles and inaccessible to conduct routine maintenance.		
Project Description	Project details are as follows: • Install approximately 480 LF of 12" PVC with 2 new MHs top pipe the weekly discharge from the well to the bottom of the slope into Boeckman Creek and bypass the existing drainage channel. • Install outfall and energy dissipation pad with Class 200 riprap. • Restore the eroded discharge channel (approximately 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.		
Design Considerations / Assumptions	• Project need was identified in the 2012 SMP (BC-4). • Existing outfall (STD3008) and upstream stormwater pipes can remain as is for the contributing 25-acre drainage area. • The weekly discharge rate from the drinking water well is unknown. The pipe is sized based on the City's PWS and the smallest acceptable diameter for the public system. ODWR well logs were reviewed to verify pipe sizing. • Water discharge conveyance designed to comply with stormwater conveyance standards.		
Estimated Project Cost	Capital Expense Total	$279,000	
	Design / Construction Admin. (13.5%)	$38,000	
	Engineering & Permitting (30%)	$84,000	
	Total Cost	**$400,000**	
Project Cost Notes	• Connection to the well discharge point unknown and not included in cost estimate. • Channel restoration estimates are based on 2012 SMP and City staff feedback; the site was inaccessible during site visits.		



CLC-1	Day Road Stormwater Improvements		
Project Objective(s)	Repair and Replacement Capacity		
Project Opportunity ID	9	**Contributing Drainage Area**	944 acres
Estimated Existing Impervious Area (%)	30.4%	**Estimated Future Impervious Area (%)**	49.1%
Project Location	This project is in an industrial area south of Day Road and north of Ridder Road. The project extents run along the Bonneville Power Authority (BPA) easement before crossing the parking lot of industrial Tax Lot 500.		
Statement of Need	Stormwater conveyance between Day Road and Ridder Road includes a series of culverts and open channels and is limited in capacity and storage potential. Portions of the channel have a negative slope. Flooding is routinely observed at adjacent properties. Development in the Tapman Creek basin may increase the frequency and severity of flooding. In 2019, AKS prepared a facility siting alternatives report, which included design concepts to alleviate existing flooding, but future development conditions were not evaluated.		
Project Description	This project includes a phased approach to mitigate flooding of adjacent industrial properties. Phase 1 includes construction of the channel improvements and culvert installation consistent with AKS' Alt A-3 per the 2019 report. Phase 2 includes upsizing the two existing 36-inch parallel pipes to 48-inch beneath the parking lot of Tax Lot 500 and installing a third, parallel 48-inch pipe to reduce modeled flooding expected in the future development condition. Project details are as follows: Phase 1 - refer to Alt A-3 of the AKS report for full details. • Regrade and reconstruct approx. 4,500 feet of open channel to eliminate negative slope. The resulting channel shall be approximately 5-foot wide (bottom width) ranging from 1-foot to 6-feet deep. The channel widens at elevation 223.0 to create a floodplain. Side slopes are designed at 2H:1V. • Construct a structural earth wall at bends in the channel and along the east-west portion of the alignment, as specified in the AKS report. • Install 200 LF of open-bottom or box culverts (4 culverts total) to provide access to the existing BPA utility poles while also maximizing conveyance. • Remove the unmapped, 50-foot existing culvert at the northwest corner of the northernmost industrial property south of Day Road. • Install approx. 190 LF of two barrel, 36-inch diameter PVC culverts at Day Road. Phase 2 • Remove and replace the two existing, approx. 600 LF, 36-inch parallel storm pipes located beneath the parking lot of Tax Lot 500 with approx. 600 LF, 48-inch PVC parallel storm pipes. • Remove and replace five existing manholes along existing pipes with 72-inch manholes. • Install a third 600 LF of 48-inch PVC storm pipe parallel to the upsized pipes. • Construct two new 72-inch manholes on the new 48" pipe alignment. • Construct trash racks at the inlet at each of the three new pipes.		



CLC-1	Day Road Stormwater Improvements

Design Considerations / Assumptions

- The AKS project concept was modeled and incorporated into the updated InfoSWMM model for this SMP, which reflects updated hydrology.
- Model results indicate that the proposed concept alleviates flooding in the existing land use condition. Future land use conditions assume unmitigated flow from new/ redevelopment. Modeled flooding is still predicted in the future land use condition, but adherence to PWS requiring onsite retention should reduce future flows to this area.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- PWS design criteria for culverts (using the 100-year storm) is met at both Day Road and Ridder Road. The criteria are not met under future (unmitigated) land use condition.
- The catchment area draining to this project includes areas outside of City limits within the City of Tualatin. Application of local design standards in Tualatin may impact future flow conditions to this location.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- The small pond at inlet of culverts across Ridder Road is assumed landscape features, not detention and were not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.

Estimated Project Cost

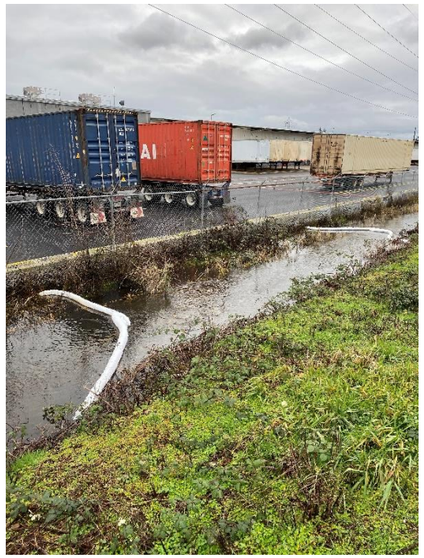
	Phase 1	*Phase 2*
Capital Expense Total	$5,860,000	$2,738,000
Design / Construction Admin. Phase 1: 3.5% + $200K Phase 2: 13.5%	$405,000	$370,000
Engineering & Permitting (30%)	$1,758,000	$821,000
Total Cost	**$8,020,000**	**$3,930,000**

Project Cost Notes

- Where possible, quantities for project components listed in the 2019 AKS report were verified and maintained. Costs are calculated based on the unit costs developed for this SMP. Unit costs for items derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Multipliers were applied as consistent with other capital projects. Lump sum costs used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers have been included for consistency with other capital project estimates. A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

Additional Figures

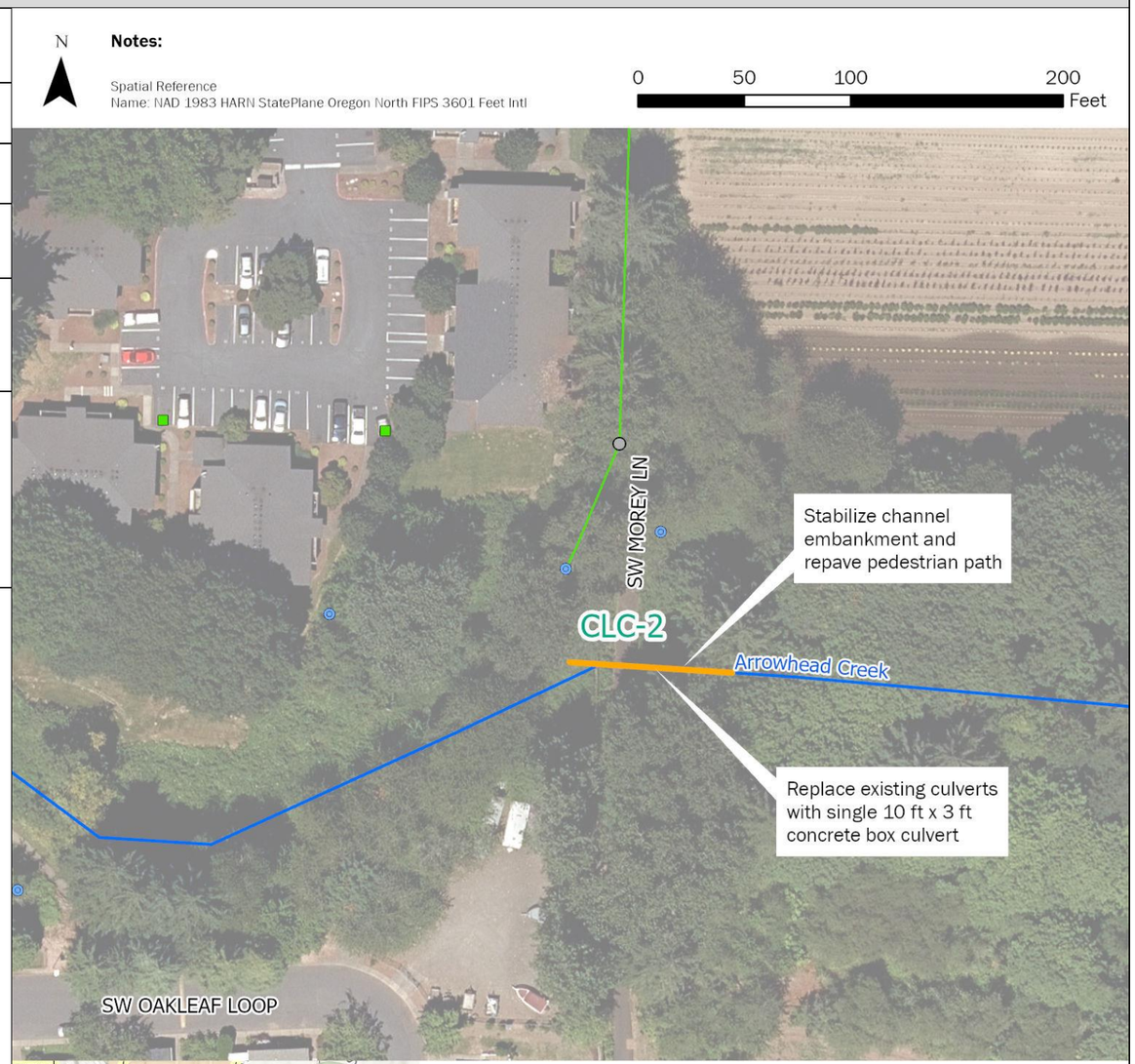
Ponding north of Day Road (Jan 2022)



Conveyance channel south of Day Road (Jan 2022)

Conveyance channel and impoundment south of Day Road after storm (Jan 2022)

CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail		
Project Objective(s)	Repair/Replacement Maintenance		
Project Opportunity ID	14		
Contributing Drainage Area	421 acres		
Estimated Existing Impervious Area (%)	35.25	**Estimated Future Impervious Area (%)**	37.29
Project Location	This project is located at the Arrowhead Creek culvert crossings under the Arrowhead Creek Trail. SW Oakleaf Loop is directly to the south of the project location.		
Statement of Need	The two existing, parallel 5-foot x 5-foot concrete box culverts that convey Arrowhead Creek under the pedestrian path are failing and in need of replacement. The 2012 Stormwater Master Plan identified this location as a project need (CLC-9), and subsequent site visits, results and findings of the 2022 stream assessment conducted for this SMP, and conversations with City staff confirmed the need.		
Project Description	This project includes replacement of the existing parallel 5-foot x 5-foot concrete box culverts with new 10-foot by 3-foot concrete box culverts to address the failing culverts and stabilize the Arrowhead Creek channel and pedestrian trail's creek crossing. Project details are as follows: • Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert. • Install planting and bioengineered restoration/stabilization measures after replacement of the culvert to stabilize an area approximately 20 feet along the pedestrian path length and approximately 50 feet upstream and downstream of the crossing. • Repave approx. 30 LF of the approx. 20-foot-wide pedestrian path after culvert replacement.		



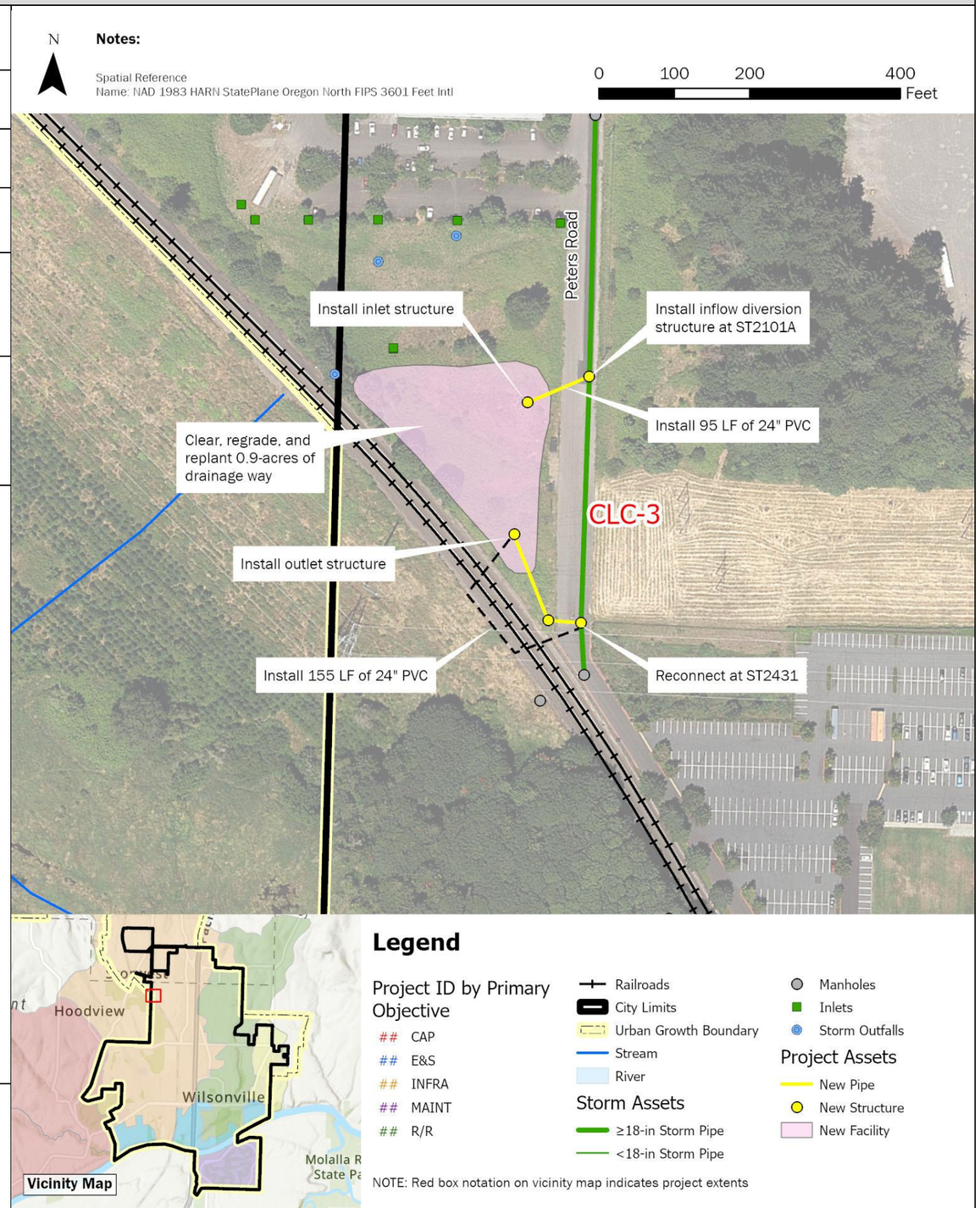
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	
Design Considerations / Assumptions	• Model results indicate that a 10-foot x 3-foot concrete box culvert has sufficient capacity to convey the 100-year design storm flow in Arrowhead Creek without decreasing freeboard when compared to the current twin 5-foot x 5-foot culverts. • Culvert sizing to be confirmed with final design. • Assumes that access to the site for construction equipment can be obtained via the pedestrian path at Arrowhead Creek Lane. • Exact stabilization measures to be determined during project design. Stabilization measures may include targeted planting, bio-engineered solutions such as live stakes or fascines, and gabion walls if necessary. • Note that the City's GIS includes a 48" diameter culvert at this location, which is inconsistent with field observations from Stream Assessment conducted May 2022.	
Estimated Project Cost	Capital Expense Total	$179,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$290,000**
Project Cost Notes	• Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction. • No costs included for access - assumed access can be attained through pedestrian path. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Failing twin 5 ft x 5 ft culverts under pedestrian crossing looking upstream

(Source: Geomorphic Stream Assessment, Waterways Consulting, May 2022)

CLC-3	Garden Acres Pond Retrofit		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	32		
Contributing Drainage Area	231 acres		
Estimated Existing Impervious Area (%)	34.1%	**Estimated Future Impervious Area (%)**	52.8%
Project Location	This project is located at an existing public pond in an industrial area along Peters Road. The area is bounded to the west by SW Graham's Ferry Rd, SW Day Road to the north, SW 95th Ave to the east, and the Coffee Lake Wetlands to the south.		
Statement of Need	The stormwater collection system along Peters Road is undersized with several pipe constrictions limiting flow upstream of the railroad crossing. Future development is anticipated to increase runoff to the system. Options to upsize the collection system at the railroad crossing are limited due to required coordination with the railroad and METRO.		
Project Description	This project entails the retrofit of an existing public pond, located in a greenfield east of Peters Road, to provide additional storage of stormwater during high flow events. Retrofit of the pond includes increasing its current storage capacity from 13,200 to 39,200 cubic feet. Stormwater will be diverted towards the pond to reduce flow through undersized storm piping along Peters Road. Rerouted flow from the pond will reconnect to the main network prior to discharge in Coffee Lake Wetlands. Project details are as follows: • Install a flow diversion structure at Peters Road (ST2101A). • Install 95 LF of 24-inch PVC pipe from Peters Road to the inlet of the detention pond. • Increase existing detention pond capacity by 26,000 cubic feet and lower pond bottom invert to an elevation of 196-ft. • Clear, regrade, and replant 0.9-acres of pond footprint area. • Install an outlet control structure within the detention pond. • Install 155 LF of 24-inch diameter PVC pipe from the detention pond to the stormwater conveyance system on Peters Road (ST2431). • Install 50 LF of 6-inch HDPE underdrain pipe. • Install pond underdrain media in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.		



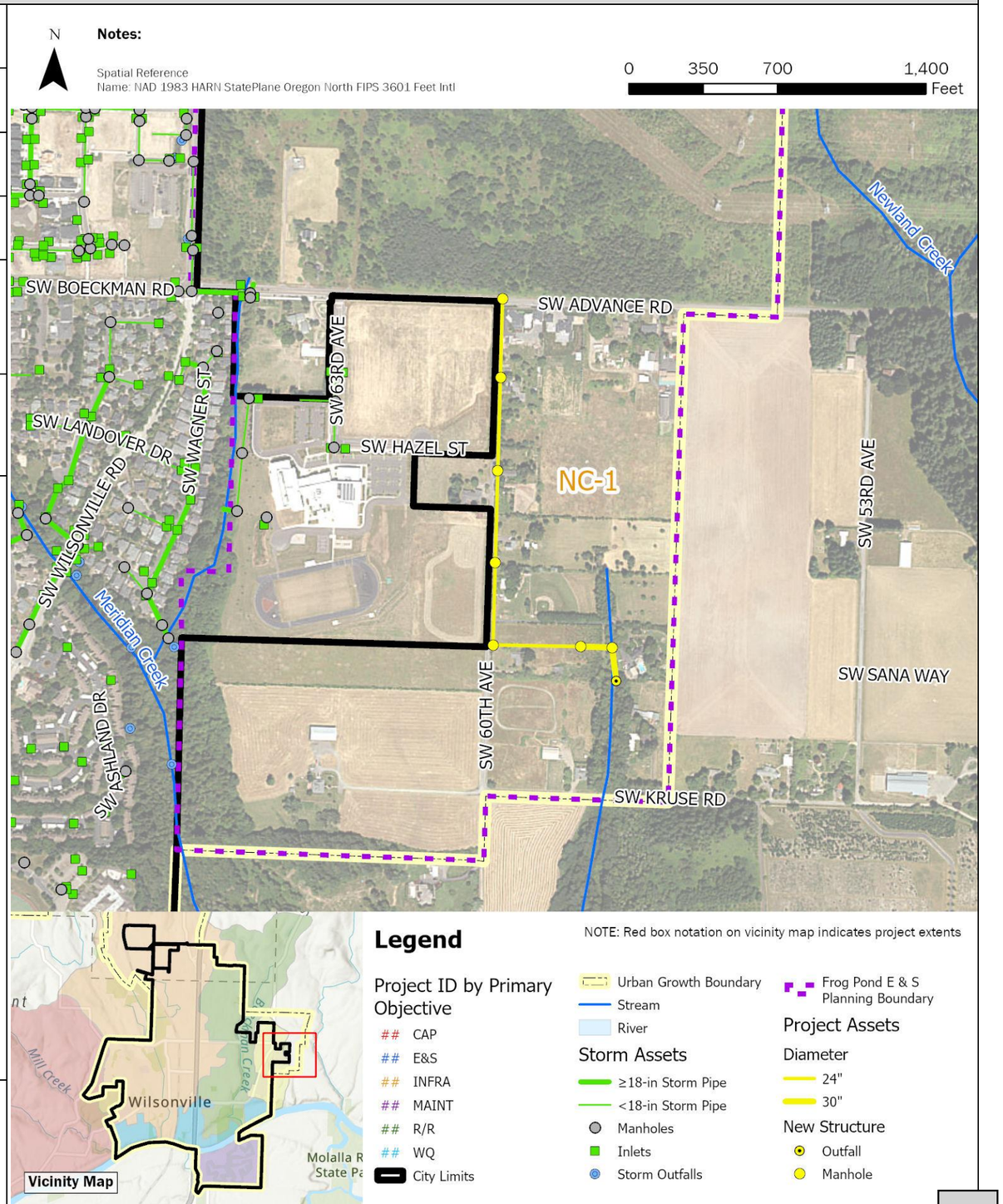
CLC-3	Garden Acres Pond Retrofit	
Design Considerations / Assumptions	• As-builts were received for the existing public pond and existing storage volume estimated from the as-builts. • All proposed improvements are within the public pond boundaries. Property lines to be verified by survey. • This project is intended to alleviate modeled flooding of the Peters Road system under current land use conditions; however, future development conditions may still result in flooding along Peters Road and SW Garden Acres Road. Future development will be required to adhere to current stormwater design standards and retain/mitigate flow to pre-development conditions. • H/H modeling was used to confirm the flow diversion structure configuration and pond operation up to the 25-year storm event. The proposed design incorporates an emergency spillway to the railroad ditch for higher storm events.	
Estimated Project Cost	Capital Expense Total	$2,897,000
	Design / Construction Admin. (3.5% + $200K)	$301,000
	Engineering & Permitting (20%)	$579,000
	Total Cost	**$3,780,000**
Project Cost Notes	• The proposed detention facility footprint is approximately 39,200 square feet. Earthwork estimates assume additional excavation of 25,600 cubic feet to provide the required storage. • Final design will include confirmation of vegetation enhancement and structure sizing. • A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.	

Additional Figures

Garden Acres Pond Existing Inflow Pipe (May 2023)

Garden Acres Detention Pond (May 2023)

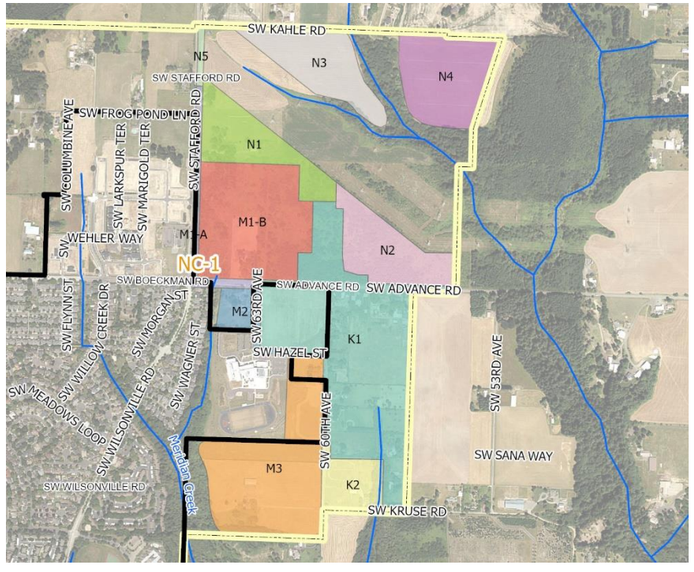
NC-1	Frog Pond East and South Conveyance Piping (Basin K1 only)		
Project Objective(s)	Infrastructure Need (New Development)		
Project Opportunity ID	44		
Contributing Drainage Area (acres)	61 acres		
Estimated Existing Impervious Area (%)	12.1%	**Estimated Future Impervious Area (%)**	57.0%
Project Location	This project is located east of Stafford Road and the Frog Pond West development area in Wilsonville, outside of the current city limits and UGB. This future planning area is bounded to the west by SW Stafford Road and bisected into east and south by SW Advance Road.		
Statement of Need	The Frog Pond East and South Master Plan (2022) identified stormwater improvements required for development of the Frog Pond East and South neighborhoods.		
Project Description	The full 2022 Frog Pond East and South Master Plan stormwater conveyance layout has been simplified for this CP to only include the storm main and outfall along SW 60th Ave to outfall near unnamed tributary (under SW Kruse Rd). This drainage basin is referred to in the Master Plan as K1 (encompassing approx. 61 acres). Project details are as follows: • Install 2,050 LF of 24-inch PVC pipe. • Install 310 LF of 30-inch PVC pipe. • Install seven 60-inch manholes. • Install 1 outfall.		



NC-1	Frog Pond E and S Conveyance Piping	
Design Considerations / Assumptions	• Infrastructure sizing is based on recommendations in the Frog Pond East and South Master Plan (Dec 2022). No additional modeling was performed using InfoSWMM per this SMP for this area. • The Frog Pond East and South Master Plan divides the planning area into 11 basins. The breakdown of proposed infrastructure by basin is detailed below: ○ **K1**: install 1,200 LF of 18-inch PVC pipe, 2,050 LF of 24-inch PVC pipe, and 310 LF of 30-inch PVC pipe; 3- 48-inch manholes, 7-60-inch manholes and 1 outfall. ○ **K2**: install 220 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M1-A**: install 2,630 LF of 12-inch PVC pipe, 8- 48-inch manholes, and 1 outfall. ○ **M1-B**: install 1,050 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **M2**: install 400 LF of 12-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **M3**: install 1,160 LF of 24-inch PVC pipe, 5- 60-inch manholes, and 1 outfall. ○ **N1**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N2**: install 7,670 LF of 18-inch PVC pipe, 3- 48-inch manholes, and 1 outfall. ○ **N3**: install 670 LF of 18-inch PVC pipe, 2- 48-inch manholes, and 1 outfall. ○ **N4**: install 1,150 LF of 18-inch PVC pipe, 5- 48-inch manholes, and 1 outfall. ○ **N5**: install 730 LF of 12-inch PVC pipe, 3- 48-inch, and 1 outfall. • Proposed public LID and water quality treatment facilities have not been costed as part of this project, given development-driven installation needs. • Future stream assessments in conjunction with planning-related capital projects will be conducted in the area to evaluate natural system prior to and during development activities.	
Estimated Project Cost	Capital Expense Total	$3,064,000
	Design / Construction Admin. (13.5%)	$414,000
	Engineering & Permitting (20%)	$613,000
	Total Cost	**$4,090,000**
Project Cost Notes	• Cost estimates assume use of PVC for all new pipe materials. • Project cost assumes pipe installation will occur in roadways. Pavement restoration and trenching are assumed in the pipe unit costs. • No earthwork beyond trenchwork is included. • Only the main stormwater pipes along SW 60th Ave towards the outfall (24-inch and 30-inch in diameter) are included in the project estimate, per City direction. • Regional stormwater storage facilities and low impact development (LID) facilities are not included in this project estimate.	

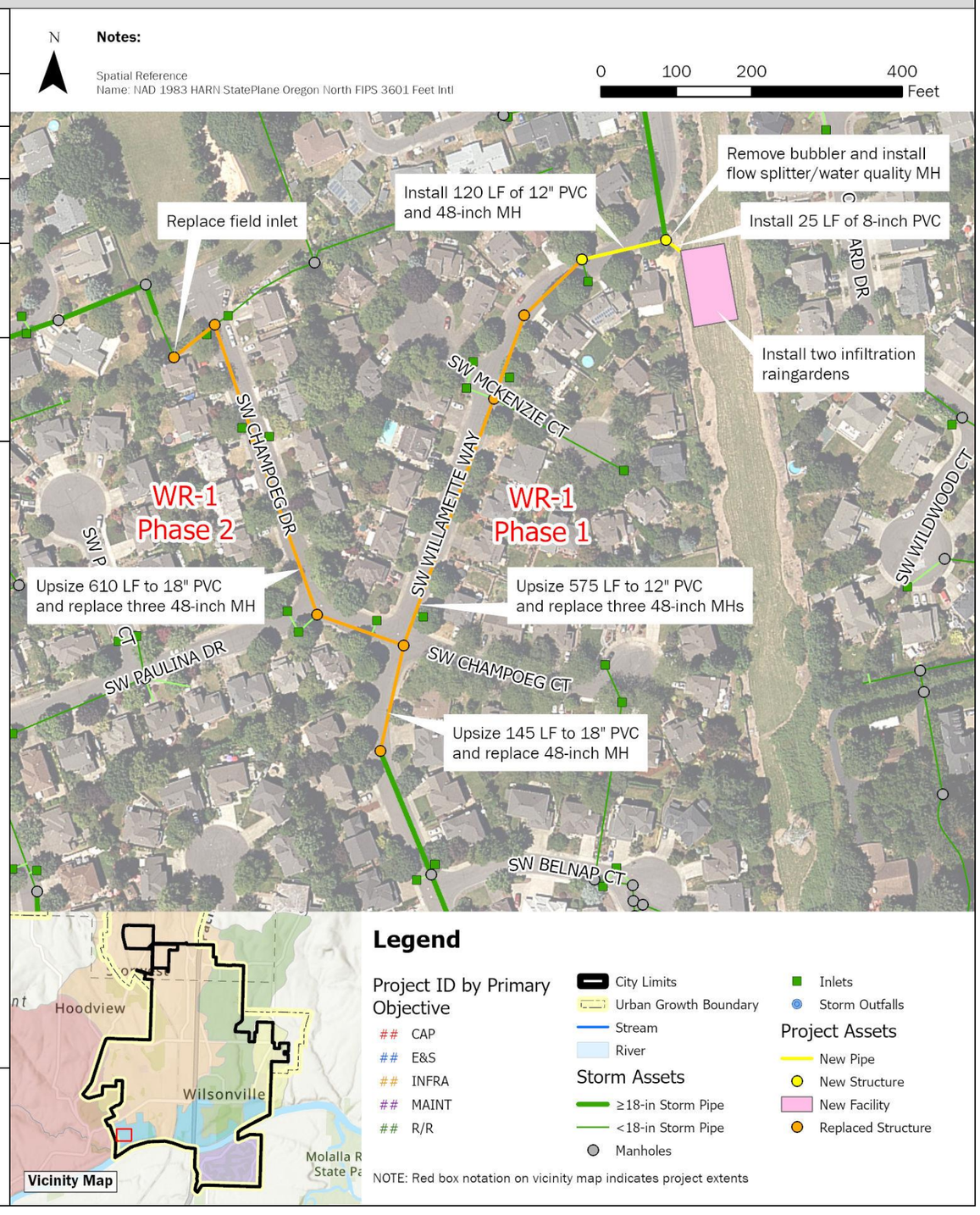
Additional Figures

Frog Pond East & South Master Plan Areas from Master Plan (Dec 2022)



Frog Pond East & South Basins from Master Plan (Dec 2022)

WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements		
Project Objective(s)	Capacity (Mitigation) Water Quality		
Project Opportunity ID	1		
Contributing Drainage Area	46 acres		
Estimated Existing Impervious Area (%)	45.4%	**Estimated Future Impervious Area (%)**	46.3%
Project Location	This project is in a residential area near the Willamette River. The project area is located along SW Willamette Way and SW Champoeg Dr, approximately 1,200 feet north of the Belknap Outfall to the Willamette River.		
Statement of Need	The Morey's Landing Bubbler at SW Willamette Way results in local flooding and impacts to neighboring residential property during large rainfall events. Downstream capacity deficiencies were identified by H/H modeling, and current public storm drainage pipe sizes do not adhere to the City's PWS.		
Project Description	This project mitigates flooding by removing the existing bubbler structure (STD6604) and reroutes the water quality (1-inch/24 hr storm) flows to a nearby Bonneville Power Administration (BPA) easement, utilizing the Belknap Court Outfall to bypass high flow events. Water quality events will drain to two proposed infiltration raingardens constructed within the adjacent BPA easement. High flows will bypass to new 12-inch and 18-inch PVC pipes along SW Willamette Way, upstream of the Belknap Court Outfall. Additional capacity deficiencies will be addressed by upsizing pipes along SW Willamette Way and SW Champoeg Ct. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Morey's Landing Bubbler): • Remove existing Morey's Landing Bubbler (STD6604). • Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement. • Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall. • Install 120 LF of 12-inch PVC for flow exceeding the water quality event. • Upsize 575 LF of 10-inch CPS to 12-inch PVC (SD6629, SD6630, SD6632). • Upsize 145 LF of 10-inch CSP to 18-inch PVC (SD6638). • Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605). Phase 2 (SW Champoeg Ct): • Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637). • Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).		



WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements

Design Considerations / Assumptions

- This project is intended to mitigate stormwater overflow from an existing bubbler and increase capacity of downstream piped infrastructure to the Belknap Court outfall.
- The raingarden facilities (Phase 1) were sized as a water quality, filtration raingarden using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP may be constructed as an infiltration facility, pending infiltration testing.
- Pipe replacement/upsizing along SW Willamette Way is proposed to adhere to the minimize pipe size required for public infrastructure.
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.
- H/H modeling was used to confirm the flow diversion structure configuration, which uses an 8-inch low flow pipe and weir to divert the water quality event to the raingarden and bypass high flows to the piped collection system.
- Coordination with BPA will be required to obtain easement for the raingarden facilities.

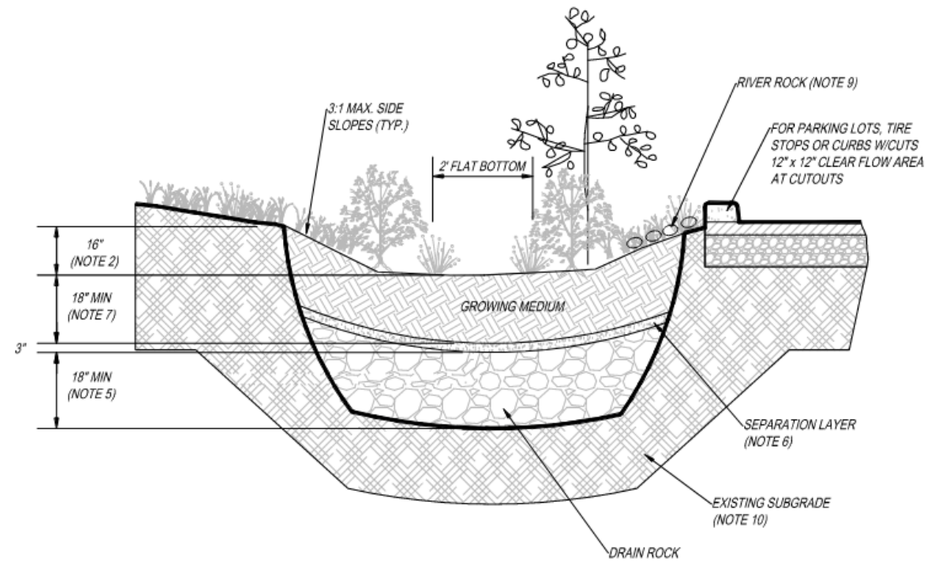
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$ 1,729,000	$811,000
Design / Construction Admin. (13.5%)	$233,000	$109,000
Engineering & Permitting (20%)	$ 346,000	$162,000
Total Cost	**$2,310,000**	**$1,080,000**

Project Cost Notes

- The required raingarden facility footprint is approximately 5,800 square feet. Earthwork estimates assume 5 feet of over excavation to an elevation of 163-ft to accommodate the low flow pipe grade.
- Final design will include confirmation of vegetated facility plantings and structure sizing.

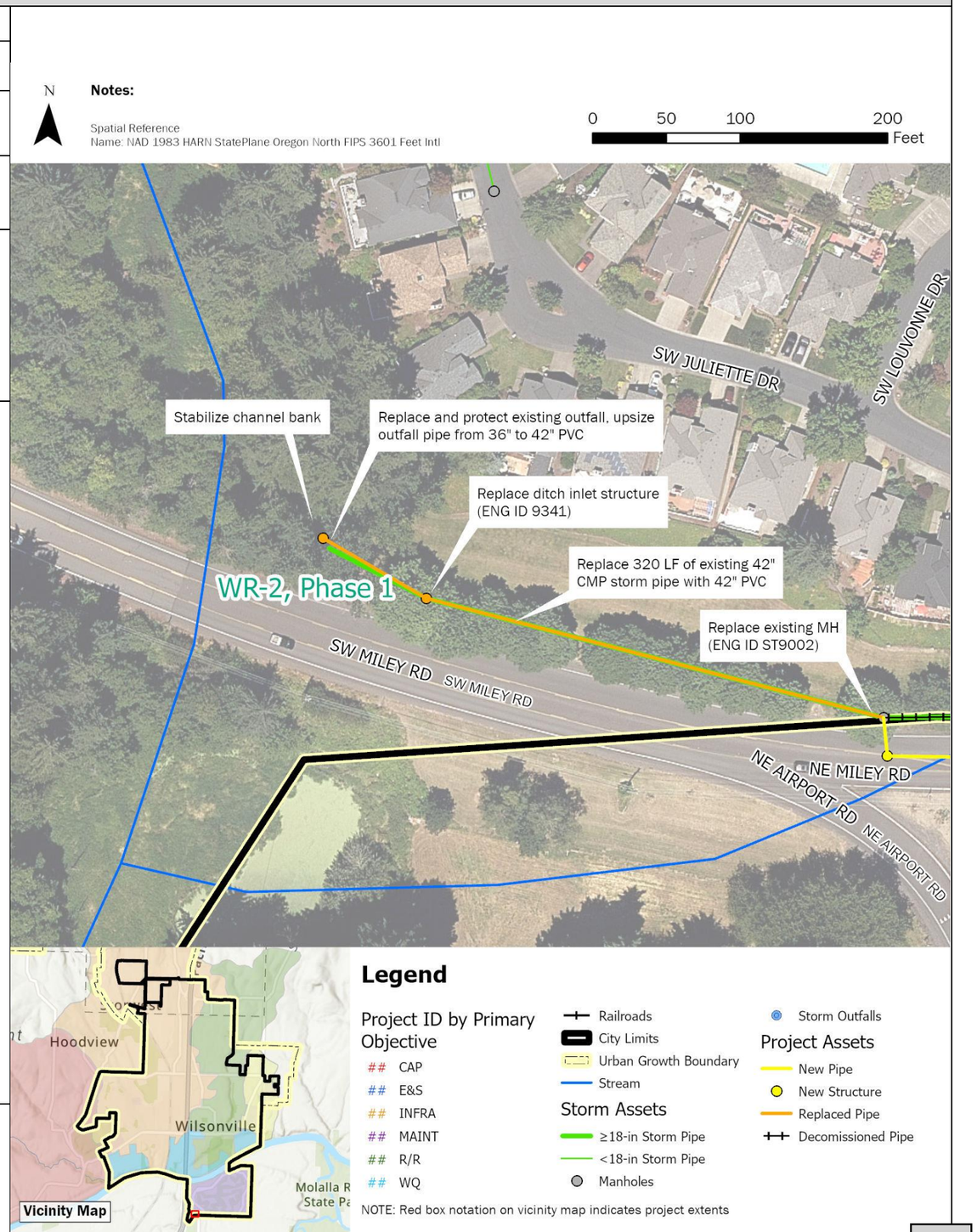
Additional Figures



BMP Sizing Tool Standard Detail – Infiltration Raingarden

Existing Bubbler Structure (May 2023)

WR-2	Miley Road Stormwater Improvements		
Project Objective(s)	Repair/Replace, Erosion/Sediment Control, Maintenance		
Project Opportunity ID	5	**Contributing Drainage Area**	138.0 acres
Estimated Existing Impervious Area (%)	46.1%	**Estimated Future Impervious Area (%)**	46.1%
Project Location	This project is located along Miley Road, from the outfall just north of SW Miley Road east approximately 1,200 feet from the corner of NE Miley Road and NE Eilers Road. Phase 1 of the project is located outside of the ROW. Phase 2 is located within the NE Miley Road ROW.		
Statement of Need	The Miley Road outfall is in poor condition with overgrown vegetation and difficult access. The outfall is causing scouring into the adjacent jurisdictional wetland. Further upstream, the existing storm main that runs parallel with Miley Road has collapsed due to age, pipe corrosion, and potential settling of a private brick wall installed along a portion of the alignment. The pipe failure has caused a sinkhole at the upstream (eastern) edge of the pipe alignment. Upstream capacity deficiencies were identified by H/H modeling. This location was identified in the 2012 SMP as CIP SD9000 to SD9069.		
Project Description	This project includes a phased approach to improve the stormwater system along Miley Road, which serves a significant portion of the Charbonneau development. Phase 1 includes replacement of the outfall and approximately 400 LF of pipe outside of the ROW. Phase 2 includes construction of a new pipe alignment in the Miley Road ROW to replace the failing storm pipe, and extension of the existing main connections to the new alignment. This new alignment includes upsizing of 650 LF of pipe from 24-inches to 36-inches to address capacity deficiencies in this area. Project details are as follows: Phase 1 • Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall. • Restore approx. 30 ft of channel bank on either side of new outfall. • Replace area drain (ENG ID 9341). • Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002). • Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH. Phase 2 • Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road. • Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road. • Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011. • Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral. • Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall. • Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.		



WR-2	Miley Road Stormwater Improvements

Design Considerations / Assumptions

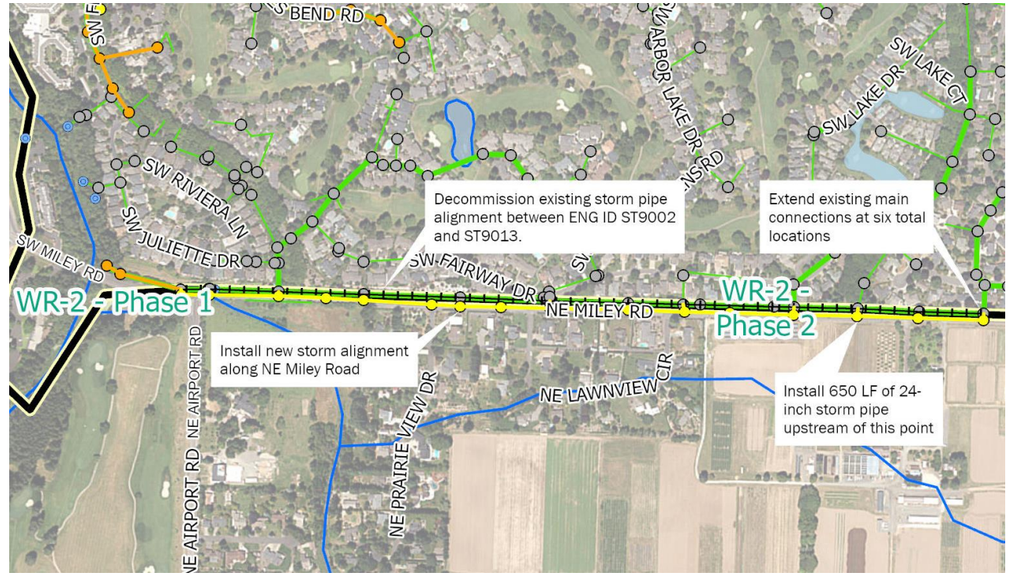
- Access to the outfall is assumed to be feasible without significant permitting requirements.
- Pipe sizing for the new alignment was conducted using changes to the existing pipe alignment, including the existing inverts, to confirm capacity. As such, capacity using inverts for the new pipe alignment should be confirmed during project design.
- Extending the connections to the existing alignment may require work underneath the private brick wall that stands on top of much of the existing alignment. Constructability considerations and trenchless methods should be investigated during design.
- Miley Road lies outside of Wilsonville City limits. Clackamas County requirements and permitting should be reviewed during project design.

Estimated Project Cost

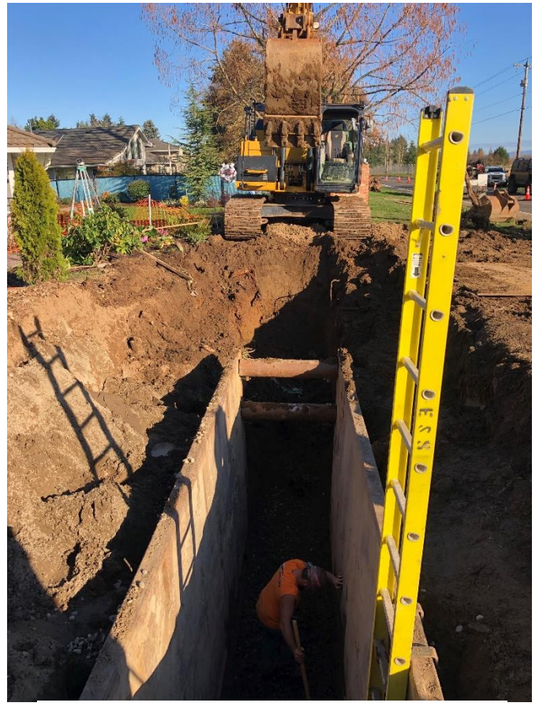
	Phase 1	*Phase 2*
Capital Expense Total	$574,000	$7,720,000
Design / Construction Admin. Phase 1: 13.5% Phase 2: 3.5% + $200K	$77,000	$470,000
Engineering & Permitting (30%)	$172,000	$2,316,000
Total Cost	**$820,000**	**$10,510,000**

Project Cost Notes

- Costs have not been included for access requirements.
- Costs for connections to existing system under brick wall have been assumed based on the existing number of connections and associated pipe length only.
- Costs assume that existing pipe alignment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.
- Replacement of inlets and laterals along Miley Road is not accounted for.
- Miley Road lies outside of Wilsonville City limits. An 8.83% multiplier has been applied to the project cost to account for Clackamas County permitting costs.
- A modified construction administration multiplier was applied per direction from the City. No cap on engineering and permitting was applied, given potential design and permitting complexity of the project.

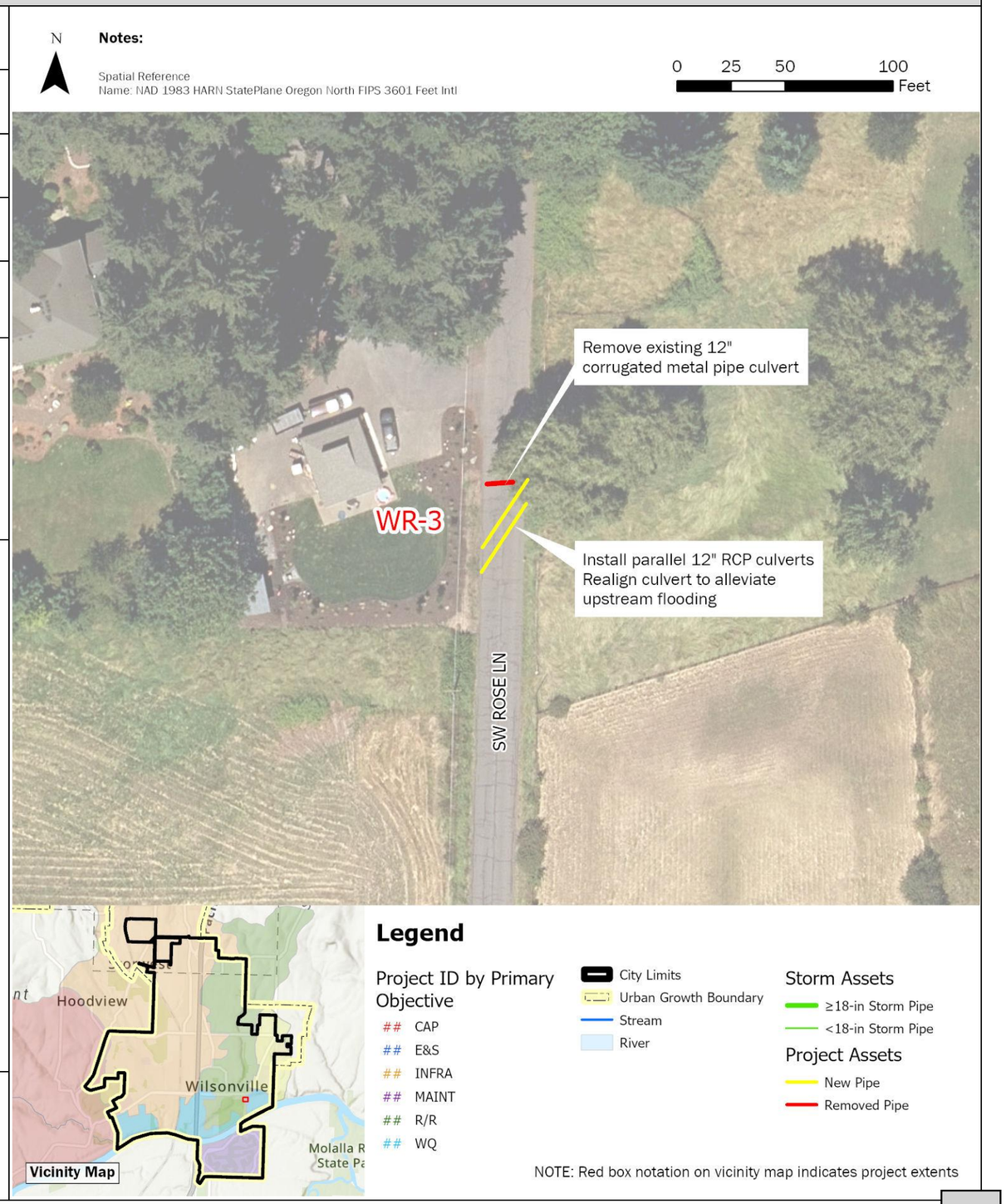


Sinkhole observed at upstream end of Miley Road alignment



Temporary construction work on sinkhole

WR-3	Rose Lane Culvert Replacement		
Project Objective(s)	Capacity Maintenance		
Project Opportunity ID	7		
Contributing Drainage Area	Approx. 14 acres (estimated as a portion of subbasin 5200)		
Estimated Existing Impervious Area (%)	21.6%	**Estimated Future Impervious Area (%)**	23.9%
Project Location	This project is located in the Boeckman Creek watershed, along SW Rose Lane between SW Wilsonville Road and SW Montgomery Way near tax lot 31W24A 03900.		
Statement of Need	The culvert under SW Rose Lane appears to be undersized, causing flooding on the road and neighboring private property on upstream side. This area is very flat with undefined drainage patterns. The existing culvert alignment is perpendicular to the upstream open channel alignment, which limits the ability to route/divert flow east. In addition, the roadway and associated culvert are located at a lower elevation than surrounding upstream or downstream property, causing water to collect and flood over the roadway. This project was originally identified as WD-2 in the 2012 SMP.		
Project Description	This project replaces an existing 12-inch corrugated metal pipe culvert under Rose Lane with realigned dual 12-inch RCP culverts to adequately convey flows. Project details are as follows: • Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available). • Install approximately 40 LF of parallel 12-inch RCP culverts. • Realign the existing culvert at a diagonal across the road so that the culvert outlet location remains the same, but the culvert inlet is at least 30 feet to the south (away from the residential structure). This will also help soften the hard bends in the system. • Reinforce stormwater conveyance around property near culvert to move water into ditch and avoid overland sheet flow and potential flooding.		

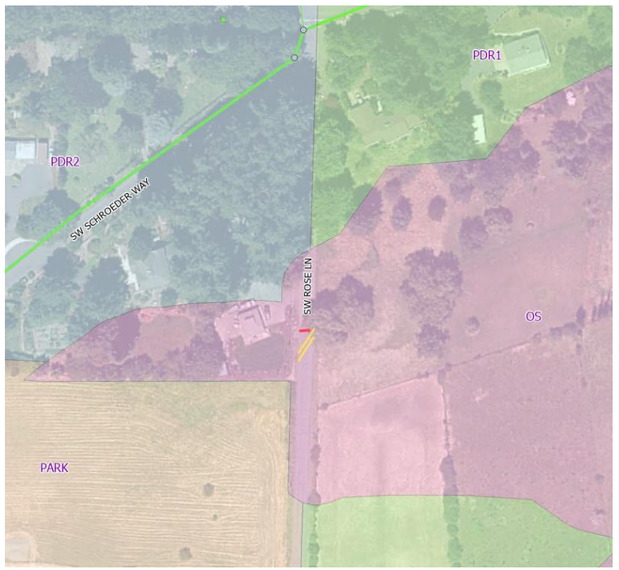


WR-3	Rose Lane Culvert Replacement	
Design Considerations / Assumptions	• Project was identified in the 2012 SMP (WD-2) with a proposed culvert sizing of 36-inches and roadway modifications. To avoid raising the roadway this project utilizes parallel 12-inch RCP culverts to convey flows under Rose Lane with the required amount of pipe cover. • Minimum 12-inch cover on top of culvert. • Surveying is required for this project as available topography displayed minor changes in elevation that may require additional grading of both the ditch and roadway. • Maximum allowable depth for roadside ditches is 2-feet. • Minimum separation distance between parallel storm sewers and other utilities is 5-feet measured from the edge of each pipe. • Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides. This channel and the culvert were not surveyed or reflected in the H/H modeling associated with this SMP. • Most future land use for the contributing area to this project location is designated as Parks and Open Space/Natural Area. However, some surrounding areas are anticipated to develop as Planned Development Residential (PDR1 and PDR2) that may influence stormwater runoff patterns to this project location in the future.	
Estimated Project Cost	Capital Expense Total	$86,000
	Design / Construction Admin. (Cap)	$35,000
	Engineering & Permitting (Cap)	$75,000
	Total Cost	**$200,000**
Project Cost Notes	• Modifications to the roadway beyond trenching were not developed as part of the cost estimate. • Surveying is required. • Clearing and grubbing 1,000 SF of vegetation on both sides of the road is included. • A minimum cap on Design/ Construction Admin and Engineering & Permitting was applied at the direction of the City.	

Additional Figures

Upstream ditch along west side of Rose Lane (May 2023)

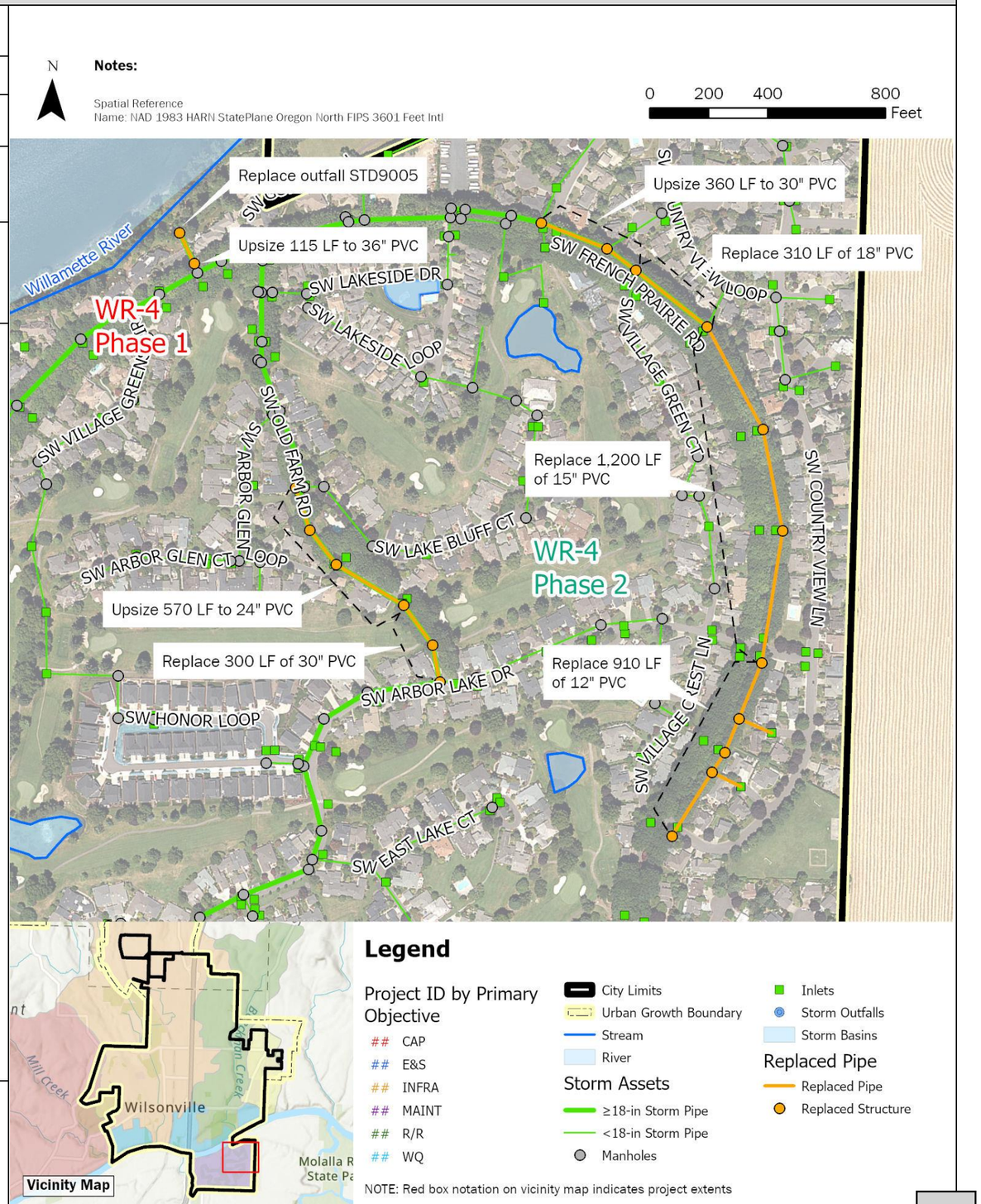
Culvert inlet under Rose Lane (May 2023)



Future Land Use Zoning around project area

Downstream of culvert, east side of Rose Lane (May 2023)

WR-4	Charbonneau East Stormwater Improvements		
Project Objective(s)	Capacity Repair and Replacement		
Project Opportunity ID	30	**Contributing Drainage Area**	159 acres
Estimated Existing Impervious Area (%)	43.1%	**Estimated Future Impervious Area (%)**	43.1%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Village Green Circle, the Willamette River to the north, SW Country View Lane to the east, and the SW Lake Drive to the south.		
Statement of Need	Charbonneau East reflects replacement and select upsizing of stormwater pipe and associated structures along SW French Prairie Rd and SW Old Farm Road. System upsizing and replacement was reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		
Project Description	This project mitigates modeled flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Select pipe upsizing (per modeled capacity limitations) and replacement (due to reported system condition issues) along SW French Prairie Rd and SW Old Farm Rd are reflected as Phase 2 of the project, subject to flow monitoring results. Due to project complexity and size, this project is costed as two phases and numbered based on recommended sequencing. Project details by phase are as follows: Phase 1 (Charbonneau East Outfall): • Replace existing Charbonneau East Outfall (STD9005). • Replace one 72-inch manhole (ST9014). • Upsize 115 LF of 30-inch pipe to 36-inch diameter PVC discharging to Willamette River (STD9005 to ST9014). Phase 2 (Storm Sewer Replacement): • Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end). • Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242). • Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020). • Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019). • Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017). • Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027). • Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030). • Replace eight 48-inch manholes (ST9020 to ST9242). • Replace nine 60inch manholes (ST9017 to ST9019, and ST9027 to ST9031).		



WR-4	Charbonneau East Stormwater Improvements

Design Considerations / Assumptions

- This project mitigates projected flooding along SW French Prairie Rd and/or SW Old Farm Rd by increasing the diameter of the outfall pipe discharging to the Willamette River (Phase 1). Due to space limitations, above ground detention cannot be used to provide flow control. Additional configurations, including various inline detention along SW French Prairie Rd and/or SW Old Farm Rd, were explored as part of CIP development. Flow monitoring and model calibration in this area are recommended to confirm simulated flooding results and pipe upsizing needs.
- Portions of the stormwater conveyance along Old Farm Road and SW Prairie Road have been replaced in conjunction with the Charbonneau Consolidated Improvement Plan. These pipe segments include ST003 to ST9017 along SW French Prairie Road and ST9369 to ST9027 along Old Farm Road.
- Pipes indicated as upsizing needs (Phase 2) do not include replacement of recently replaced piping per modeled capacity needs. Pipes indicated as replacement are identified due to condition.
- Design and construction of CIP SD9030-9037 (Edgewater Drive E and French Prairie Road) per the 2012 SMP is in progress and not reflected in this project.
- Phase 2 sizing and overall need may be influenced by system conditions following implementation of Phase 1 of each project. Ongoing monitoring of site conditions should be considered prior to initiating work on Phase 2.

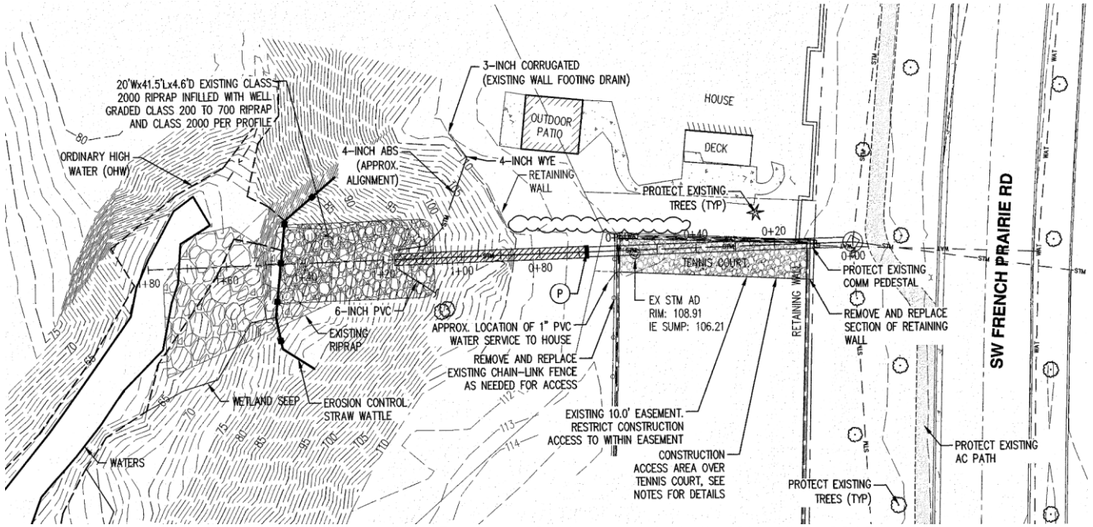
Estimated Project Cost

	Phase 1	*Phase 2*
Capital Expense Total	$201,000	$3,325,000
Design / Construction Admin. Phase 1: 25% Phase 2: 13.5%	$50,000	$449,000
Engineering & Permitting Phase 1: 50% Phase 2: 20%	$101,000	$665,000
Outreach Coordination (Flat Rate - Phase 1 only)	$250,000	N/A
Total Cost	**$600,000**	**$4,400,000**

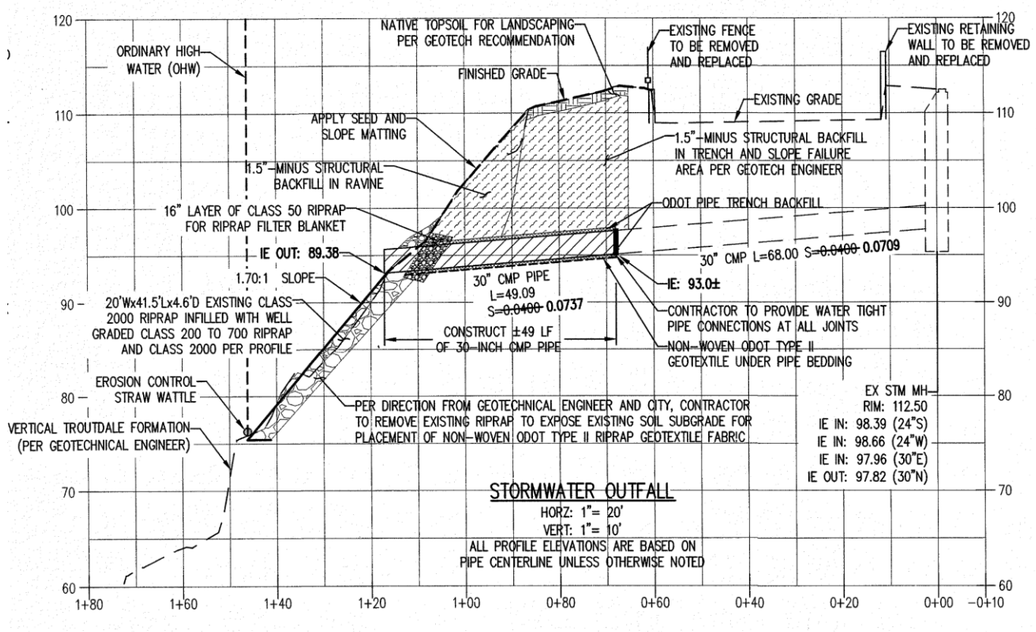
Project Cost Notes

- Due to in-water work and private property constraints, Phase 1 engineering and permitting multiplier was set to 50%. Design/Construction Administration multiplier was set to 25% per direction from the City.
- Cost estimates use PVC for all new and replacement pipe materials.
- Project contingency increased to 50% for Phase 1 due to private property constraints.

Additional Figures



Outfall to Willamette River Emergency Replacement As-builts (Plan View, 2019)



Outfall to Willamette River Emergency Replacement As-builts (Profile View, 2019)

WR-5	Charbonneau West Stormwater Improvements		
Project Objective(s)	Repair and Replacement, Maintenance		
Project Opportunity ID	28	**Contributing Drainage Area (acres)**	54 acres
Estimated Existing Impervious Area (%)	46.5%	**Estimated Future Impervious Area (%)**	46.5%
Project Location	This project is located in the Charbonneau residential area near the Willamette River. The area is bounded to the west by Interstate 5, the Willamette River to the north, Charbonneau Golf Club to the east, and NE Miley Road to the south.		
Statement of Need	Charbonneau West reflects replacement of stormwater pipe and associated structures along SW French Prairie Rd. SW Curry Dr., and SW Boones Bend Rd. System replacement needs were reflected in the 2012 SMP as well as the Charbonneau Consolidated Improvement Plan (2014).		

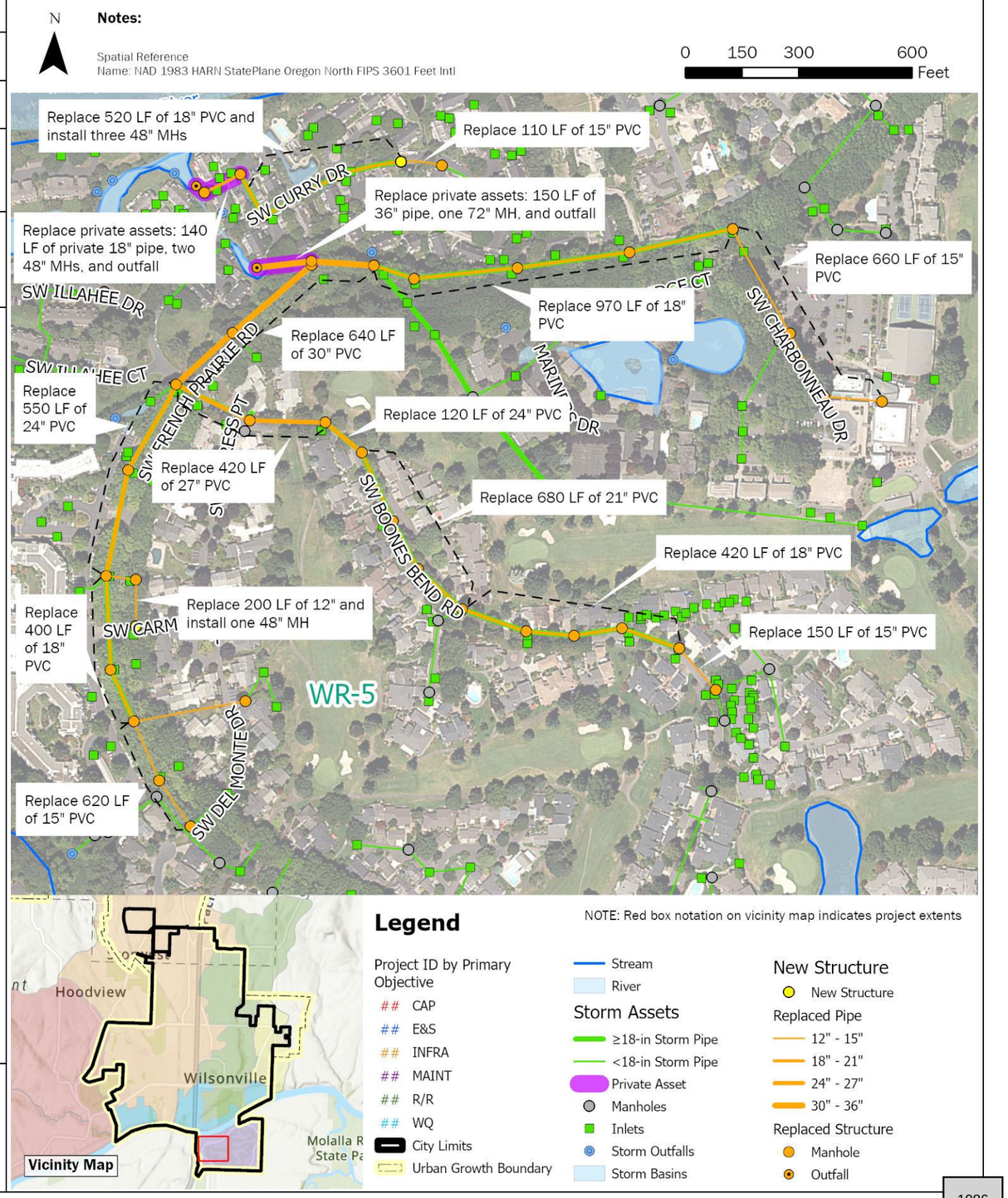
Project Description

This project replaces select public and private stormwater infrastructure throughout the Charbonneau West area, as identified in the Charbonneau Consolidated Improvement Plan. Private system improvements are specifically referenced on the figures and project details as identified per the City's GIS mapping.

Project details are as follows (ENG IDs provided in parentheses when applicable, CARTE ID provided when ENG ID is not available):

- Pipe replacement along SW Curry Drive:
  - Replace 110 LF of 15-in pipe with PVC (PST9012 to new manhole).
  - Replace 520 LF of 18-in pipe with PVC (new manhole to private manhole CARTE ID: 1892).
  - Replace 140 LF of 18-in private pipe with PVC (private manhole CARTE ID: 1892 to private outfall CARTE ID: 15).
  - Replace private outfall (CARTE ID: 15).
  - Replace two private 48-in manholes (CARTE ID 1892 and 1383).
  - Install three 48-inch manholes.
- Pipe replacement along SW French Prairie Road:
  - Replace 200 LF of 12-in pipe with PVC (ST9331 to ST9044)
  - Replace 1,280 LF of 15-in pipe with PVC (ST9048 to ST9046; ST9269 to ST9046; and ST9281 to ST9043).
  - Replace 1,370 LF of 18-in pipe with PVC (ST9046 to ST9044 and ST9043 to CARTE ID: 1859 – ENG ID unknown)
  - Replace 550 LF of 24-in pipe with PVC (ST9044 to ST9040).
  - Replace 640 LF of 30-in pipe with PVC (ST9040 to ST9067, ST9041 to ST9067, and unknown to ST9041).
  - Replace 20 LF of 36-in pipe with PVC (unknown to ST9067).
  - Replace 150 LF of private 36-in PVC pipe (ST9041 to private outfall – ID unknown).
  - Replace private outfall; install one 48-in manholes and replace 14 48-in manholes; replace four 60-in manholes; and replace two 72-in manholes.

Continued on page 2.



WR-5	Charbonneau West Stormwater Improvements	

Project Description (*continued*)	• Pipe replacement along SW Boone's Bend Road:
	  ○ Replace 150 LF of 15-in pipe with PVC (ST9059 to ST9058).
	  ○ Replace 420 LF of 18-in pipe with PVC (ST9058 to ST9055).
	  ○ Replace 680 LF of 21-in pipe with PVC (ST9055 to ST9051).
	  ○ Replace 120 LF of 24-in pipe with PVC (ST9051 to ST9050).
	  ○ Replace 420 LF of 27-in pipe with PVC (ST9050 to ST9040).
	  ○ Replace eight 48-in manholes; and replace three 60-in manholes.	

Design Considerations / Assumptions	• This project is summarized in conjunction with the Charbonneau Consolidated Improvement Plan 2014. Pipe segments greater than 12 inches in diameter and identified as Priority 1 or 2 in the Charbonneau Consolidated Improvement Plan were incorporated.
	• Pipes with unknown diameters were assumed to have the same diameter as the adjoined downstream pipe.
	• Manholes with unknown diameters were sized based on incoming and outgoing pipe diameters.
	• The following manholes (ENG IDs) are anticipated to be replaced in conjunction with pipe replacement:
	  ○ Twenty-five 48-in: ST9281 to ST9066, unknown (CARTE ID 1859), ST9059 to ST9052, ST9278 to ST9045, ST9269, ST9165, PST9012, two private manholes (CARTE ID 1383 and 1892).
	  ○ Seven 60-in: ST9051, ST9050, ST9049, ST9044, ST9042, ST9040, and ST9041.
	  ○ Two 72-in: ST9067 and ST9041	

Estimated Project Cost	Capital Expense Total	$8,235,000
	Design / Construction Admin. (3.5% + $200K)	$488,000
	Engineering & Permitting (20%)	$1,647,000
	Total Cost	**$10,370,000**
Project Cost Notes	• A modified Design/Construction Administration multiplier was applied per direction from the City. • All assumed as PVC replacement. • Private pipe and outfall replacement are included in cost estimate to maintain consistency with the Charbonneau Consolidated Improvement Plan 2014. • Connections to existing public stormwater mains greater than 12-inches in diameter are included in the cost estimate. • Connections to laterals not included in cost estimate.	

Additional Figures

Stormwater replacement prioritization from Charbonneau Consolidated Improvement Plan (2014)

Appendix E: Capital Project Cost Estimates

Unit Cost Table			
Item	**Unit**	**Proposed Unit Cost Mar 2023**	**Notes, Unit Cost Mar 2023**
Earthwork			
General Earthwork/Excavation	CY	78	City of Wilsonville, provided by Zach Weigel December 2023
Excavation, to onsite stockpile	CY	20	For site grading (not structural). Source: BC Assembly using RSMeans pricing.
Fill, imported clean	CY	115	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Fill, from onsite stockpile	CY	60	For site grading (not structural), includes compaction. Source: BC Assembly using RSMeans pricing.
Embankment	CY	35	City of Wilsonville, provided by Zach Weigel December 2023
Structural Earth Wall	SF	50	City of Wilsonville, provided by Zach Weigel December 2023
Clear and Grub brush including stumps	AC	22,000	Source: ODOT 2022Q4, Item 0320-010000R, avg award + 10%. This item INCLUDES stump removal
Clearing and Grubbing	AC		ODOT does not have a bid item without stump removal.
Amended Soils and Mulch	CY	165	Source: ODOT 2022Q3, Item 1040-0194000K (Compost mulch), avg award + 10%
Jute Matting, Biodegradeable	SY	8	Source: ODOT 2022Avg, Item 0280-0105010,20,30,40 avg, avg award + 10%
Tree removal	EA	1,200	City of Wilsonville, provided by Zach Weigel December 2023
Geotextile	SY	7	Source: ODOT 2022Q4, Item 0350-010000J (drainage geotex Type 1), avg award + 10%
Energy dissapation pad - Rip-Rap, Class 50	CY	161	Source: ODOT 2022Avg, Item 0390-010500K, avg award + 10% - **ANDREW SAID NOT TO USE THIS ONE**
Energy dissapation pad - Rip-Rap, Class 100	CY	124	Source: ODOT 2022Avg, Item 0390-010800K, avg award + 10%
Energy dissapation pad - Rip-Rap, Class 200	CY	81	Source: ODOT 2022Avg, Item 0390-011000K, avg award + 10%
Dewatering (pipeline construction)	DAY	550	Recommend $550/day minimum for pipeline construction
Dewatering (other)	LS	5,000 - 50,000	Select as needed based on project needs (T. Suesser April 2023)
Drain Rock	CY	110	City of Wilsonville, provided by Zach Weigel December 2023
Streambed Cobble	TON	120	City of Wilsonville, provided by Zach Weigel December 2023
Water Quality Facility Installation			
Outflow Control Structure	EA	20,000	City of Wilsonville, provided by Zach Weigel December 2023
Swale Flow Spreader	EA	20,000	Unique facility (ditch inlet + outflow control) - City spec S-2225
Facility Inlet Structure	EA	10,000	Same as Outflow Control Structure
Water Quality Facility Plantings with Trees	SF	40	City of Wilsonville, provided by Zach Weigel January 2024
Rain Garden/ Swale	SF	130	City of Wilsonville, provided by Zach Weigel December 2023
Stormwater Planter	SF	180	City of Wilsonville, provided by Zach Weigel December 2023
Gravel Access Road	SF	5	2023RSMeans, for 9" thick gravel with geotextile
Beehive Overflow	EA	6,100	City of Wilsonville, provided by Zach Weigel December 2023
Structure Installation			
Field Ditch Inlet	EA	5,600	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 9-12' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	City of Wilsonville, provided by Zach Weigel December 2023
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	City of Wilsonville, provided by Zach Weigel December 2023
8'x8'x10' Concrete Vault	EA		
Precast Concrete Manhole (72", >12' deep)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	City of Wilsonville, provided by Zach Weigel December 2023
Contech CDS (Model CDS3025, 72")	EA		
StormFilter (2-cartridge catch basin unit, 18" cartridges)	EA		
Drywell (48", 20-25' deep)	EA	14,100	Source: BC Assembly using RSMeans pricing
Curb Inlet	EA	8,300	Source: ODOT 2022Q4, Item 0470-0304000E (Concrete inlet, Type CG-1), avg award + 10%
ADA Ramp	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Catch Basin, all types	EA	8,300	Same as Curb Inlet
Concrete Fill - UIC Decomissioning	EA		
Connection to Existing Lateral	EA	6,000	City of Wilsonville, provided by Zach Weigel December 2023
Connection to Existing Structure, standard	EA	10,000	City of Wilsonville, provided by Zach Weigel December 2023
Abandon Existing Pipe, no excavation (12")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (15"-18")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (21"-24")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, no excavation (27"-36")	FT		Use pipe plugs priced below or fill with grout item
Abandon Existing Pipe, fill with grout	CF	8	Source: BC Assembly using previous bid pricing
Abandon Existing Structure	EA	3,400	Source: ODOT 2022Q4, Item 0490-0117000E (filling abandoned structures), avg award + 10%
Demo pipe	LF	30	Assumes 12" RCP pipe. Does not include excavation. Source: BC Assembly using RSMeans pricing
Remove existing pavement	SY	120	City of Wilsonville, provided by Zach Weigel January 2024
Remove structure	EA	1,700	Source: ODOT 2022Q4, Item 0310-0105000E (removal of manholes), avg award + 10%
Plug Existing Pipe, up to 18" dia, at manhole	EA	1,800	Source: BC Assembly using RSMeans pricing.
Plug Existing Pipe, up to 36" dia, at manhole	EA	2,300	Source: BC Assembly using RSMeans pricing.
Retrofit diversion structure	EA	50,000	Conservative estimate to retrofit diversion structure on seimens property. Options include raising invert elevation, plugging altogether, etc.
Check dams	EA	570	Aggregate Type 1 (Erosion Control) check dam. Source: ODOT 2022Q4, Item 0280-0106010E, avg award + 10%
Stem wall check dam	LF	600	Assume similar to retaining wall, 4' wide footing x 1' deep (buried 1' deep) with 4' tall wall x 12" th. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, larger than 48" pipe	EA	35,000	Assume approx 8' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA	25,000	Assume approx 5' tall x 15' long. Includes excavation/backfill. Source: BC Assembly using RSMeans pricing.
Headwall with wingwalls, up to 48" pipe	EA		
Outfall Improvements	EA		
Restoration/Resurfacing			
Non-Water Quality Facility Landscaping	AC	27,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (Non-irrigated)	AC	36,000	City of Wilsonville, provided by Zach Weigel December 2023
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	City of Wilsonville, provided by Zach Weigel December 2023
Planting and Bioengineered Restoration	SY	60	City of Wilsonville, provided by Zach Weigel December 2023
4-foot Chain Link Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Split Rail Fence	LF	60	City of Wilsonville, provided by Zach Weigel December 2023
Hydroseed, large quantities	AC	22,000	Source: ODOT 2022Avg, Item 1030-0110000R (Perm seeding, mix No. 2), avg award + 10%
Seeding, small quantities (< 5,000 sf)	SF	0.68	Source: ODOT 2022Q4, Item 1030-0138000J (lawn seeding), avg award + 10%
Sidewalk Installation	SF	17	Source: ODOT 2022Avg, Item 0759-0128000J (concrete walks), avg award + 10%
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	Source: ODOT 2022Avg, Item 0495-0100000J, avg award + 10%

Unit Cost Table			
Item	Unit	Proposed Unit Cost Mar 2023	Notes, Unit Cost Mar 2023
Permeable Paver Installation	SF	46	Source: ODOT 2022Avg, Item 0760-010000J (Unit pavers), avg award + 10%
Porous Asphalt Paving	SF	5	Source: 2023RSMeans, Item 32-12-16.13, 0600 (1" porous friction course over 3" bit course) adjusted to include hauling
Concrete Curbs	FT	74	Source: ODOT 2022Avg, Item 0759-0103000F (conc curb & gutter), avg award + 10%
Retaining wall, block	SF	119	Source: ODOT 2022Avg, Item 0596-B002000A (Retaining wall, prefab modular gravity), avg award + 10%
Retaining wall, CIP concrete	SF	250	City of Wilsonville
Retaining wall, sheet pile	SF	190	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Retaining wall, soldier pile	SF	210	Up to 20' high exposed face. Source: BC Assembly using RSMeans pricing.
Root wad	EA	61	Source: Oregon, OH bid tab 2019 escalated
Trash rack	EA	5,600	Same as Field Ditch Inlet. City of Wilsonville, provided by Zach Weigel December 2023
Pipe Unit Cost			
Underdrain Pipe, 4"	LF	55	City of Wilsonville
Underdrain, 6" perforated HDPE	LF	60	City of Wilsonville
HDPE, 12", 10' to invert, not in road	FT	171	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, not in road	FT	179	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 10' to invert, in road	FT	470	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 12", 15' to invert, in road	FT	567	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, not in road	FT	298	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, not in road	FT	310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 10' to invert, in road	FT	649	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
HDPE, 24", 15' to invert, in road	FT	778	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 8", 10' to invert, not in road	FT	136	Interpolated
PVC, 12", 10' to invert, not in road	FT	206	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 10' to invert, not in road	FT	293	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 15' to invert, not in road	FT	215	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 18", 15' to invert, not in road	FT	304	Interpolated from equivalants at 12" and 24" diam, SG 6/20/23
PVC, 12", 10' to invert, in road	FT	506	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 12", 15' to invert, in road	FT	602	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 15", 10' to invert, in road	FT	535	Interpolated from equivalants at 12" and 18" diam, MT 7/7/24
PVC, 15", 15' to invert, in road	FT	666	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 10' to invert, not in road	FT	249	Interpolated from equivalants at 12" and 18" diam, SG 1/23/24
PVC, 15", 15' to invert, not in road	FT	259	Interpolated from equivalants at 12" and 18" diam, SG 1/23/25
PVC, 18", 10' to invert, in road	FT	563	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 18", 15' to invert, in road	FT	731	Interpolated from equivalants at 12" and 24" diam, MT 6/22/23
PVC, 24", 10' to invert, not in road	FT	381	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, not in road	FT	393	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 21", 10' to invert, in road	FT	647	Interpolated from equivalants at 18" and 24" diam, MT 7/7/23
PVC, 21", 15' to invert, in road	FT	796	Interpolated from equivalants at 18" and 24" diam, SG 1/23/24
PVC, 21", 15' to invert, not in road	FT	348	Interpolated from equivalants at 18" and 24" diam, SG 1/23/25
PVC, 24", 10' to invert, in road	FT	732	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 24", 15' to invert, in road	FT	860	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 27", 10' to invert, in road	FT	805	Interpolated from equivalants at 24" and 30" diam, MT 7/7/23
PVC, 30", 10' to invert, not in road	FT	477	Interpolated from equivalants at 24" and 36" diam, MT 6/29/23
PVC, 30", 10' to invert, in road	FT	879	Interpolated from equivalants at 24" and 36" diam, MT 6/29/24
PVC, 36", 10' to invert, not in road	FT	573	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, not in road	FT	591	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 10' to invert, in road	FT	1,027	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 36", 15' to invert, in road	FT	1,220	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 42", 10' to invert, not in road	FT	703	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 42", 10' to invert, in road	FT	1,169	Interpolated from equivalants at 36" and 48" diam, T. Suesser 6/14/23
PVC, 48", 10' to invert, not in road	FT	834	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, not in road	FT	855	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 10' to invert, in road	FT	1,310	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
PVC, 48", 15' to invert, in road	FT	1,536	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, not in road	FT	198	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, not in road	FT	207	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 10' to invert, in road	FT	498	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 12", 15' to invert, in road	FT	594	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 15", 15' to invert, in road	FT	326	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 18", 15' to invert, in road	FT	391	Interpolated from equivalants at 12" and 24" diam, MT 6/30/23
RCP, 24", 10' to invert, not in road	FT	303	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, not in road	FT	315	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 10' to invert, in road	FT	653	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 24", 15' to invert, in road	FT	782	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 27", 15' to invert, in road	FT	766	Interpolated from equivalants at 24" and 36" diam, MT 7/06/23
RCP, 30", 10' to invert, in road	FT	866	Interpolated from equivalants at 24" and 36" diam, MT 6/30/23
RCP, 36", 10' to invert, not in road	FT	625	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, not in road	FT	642	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 10' to invert, in road	FT	1,079	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 36", 15' to invert, in road	FT	1,272	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, not in road	FT	877	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, not in road	FT	898	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 10' to invert, in road	FT	1,353	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 48", 15' to invert, in road	FT	1,579	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, not in road	FT	1,375	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, not in road	FT	1,401	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 10' to invert, in road	FT	1,861	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
RCP, 72", 15' to invert, in road	FT	2,151	See PipeCostBasis tab Notes, increase by 10% per City of Wilsonville
Box Culvert (8' x 3')	FT	705	Source: 2023RSMeans, Item 33-42-11.60, 0200, excavation/backfill not included
Box Culvert (10' x 3')	FT	950	Source: 2023RSMeans, Item 33-42-11.60, 0300, excavation/backfill not included
Box Culvert (12' x 3')	FT	2070	Source: 2023RSMeans, Item 33-42-11.60, 0400, excavation/backfill not included
Contingencies and Multipliers			
Mobilization/Demobilization	LS	10%	
Erosion and Sediment Control	LS	3%	
Contingency	LS	40%	Updated per City of Wilsonville
Traffic Control/Utility Relocation	LS	5-10%	Dependent on work in ROW
Surveying	LS	5%	
Clackamas County Permitting	LS	8.83%	Applicable to Miley Road, added 6/22/23 per Kerry's instructions
Capital Expense Total (including contingency)			

Unit Cost Table			
Item	Unit	Proposed Unit Cost Mar 2023	Notes, Unit Cost Mar 2023
Design/Construction Administration (%)	LS	13.5%	Reflects City staff technical and administrative needs to execute the project. Per City of Wilsonville, assume minimum of $35,000.
Engineering and Permitting (%)	LS	20-30%	In-water dependent and capped on a case-by-case basis at $500,000 per City of Wilsonville. Per City of Wilsonville, minimum of $75,000.

BC-1: Library Pond

Key Project Elements

- Retrofit the existing Library Pond stormwater detention facility to meet current City PWS and accommodate future condition flows associated with the Town Center Development Plan, which anticipates full build out in the next 20+ years.
- Install a pond outlet structure in compliance of current design standards.
- Clear, regrade, and replant the 0.7-acre detention pond, including amending the pond bottom to include the 3 feet of required rocks and media.
- Install 15-ft wide, 25-ft long access road for maintenance access. Assume existing gate can be maintained.
- Remove and replace 70 LF of 18" CSP pipe at new design depth, approx. 15' deep.

Design Assumptions

- The existing pond footprint remains unchanged due to roadway and development constraints. Interior side slopes are assumed to be 3H:1V.
- Facility sizing is based on adherence to the City's Public Works Standards (PWS), Chapter 3 requiring flow matching to pre-development conditions (classified as Oak Savanna). Sizing utilizes the BMP Sizing Tool.
- To size the pond in accordance with PWS design standards, approximately 48 acres require onsite treatment and flow control prior to discharge into Library Pond detention facility.
- Total pond depth includes drain rock (15"), separation layer (3"), and growing media (18"), in accordance with the 2015 PWS Section 3, Appendix A landscape and soil media requirements.
- Inlet and outlet pipe sizes are anticipated to remain unchanged. The outlet structure (standard drawing ST-6110) assumes an additional field inlet for 100-year overflow event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,350	$47,000
Fill, from onsite stockpile	CY	60	1,289	$77,340
Clear and Grub brush including stumps	AC	22,000	0.70	$15,400
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	324	$35,648
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Gravel Access Road	SF	5	375	$1,875
Water Quality Facility Plantings with Trees	SF	40	13,550	$542,000
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Demo pipe	LF	30	70	$2,100
Remove existing pavement	SY	120	210	$25,200
Remove structure	EA	1,700	1	$1,700
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	70	$4,200
PVC, 18", 15' to invert, not in road	FT	304	70	$21,252
Project Sub-Total				$863,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$86,300
Erosion and Sediment Control	LS	3%		$25,890
Contingency	LS	40%		$345,200
Traffic Control/Utility Relocation	LS	5%		$43,150
Surveying	LS	5%		$43,150
Capital Expense Total (including contingency)				$1,407,000
Design/Construction Administration (%)	LS	13.5%		$190,000
Engineering and Permitting (%)	LS	20%		$281,000
			TOTAL	$1,880,000

BC-2: Ash Meadows Flow Mitigation

Key Project Elements

- Plug flow diversion structure at Siemens Pond B.
- Upsize culvert under Boeckman Road from 30" to 48" PVC.
- Upsize culvert under SW Parkway Ave. from 36" to 48" PVC.
- Construct flow control structure at upstream end of culverts under Ash Meadows Road.
- Regrade and restore drainage way between Ash Meadows Road and Parkway Avenue.

Design Assumptions

- Excavate 18" depth for amended soils for entire 55,000 sq ft footprint area, per City Standards.
- Final design will include confirmation of flow control structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,056	$238,368
Clear and Grub brush including stumps	AC	22,000	1.3	$28,600
Amended Soils and Mulch	CY	165	1,019	$168,135
Tree removal	EA	1,200	30	$36,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	40	$3,240
Dewatering (other)	LS	50,000	1	$50,000
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Demo pipe	LF	30	175	$5,250
Retrofit diversion structure	EA	50,000	1	$50,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.3	$78,000
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, in road	FT	1,310	175	$229,268
Project Sub-Total				$924,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$92,400
Erosion and Sediment Control	LS	3%		$27,720
Contingency	LS	40%		$369,600
Traffic Control/Utility Relocation	LS	15%		$138,600
Surveying	LS	20%		$184,800
Capital Expense Total (including contingency)				$1,737,000
Design/Construction Administration (%)	LS	13.5%		$234,000
Engineering and Permitting (%)	LS	50%		$869,000
Geotechnical	LS	Flat Rate		$100,000
			TOTAL	$2,940,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 1

Key Project Elements

- Construct a detention pond at Canyon Creek Park that would receive drainage from the wetland complexes described under Phase 2.

Design Assumptions

- Canyon Creek (phase 1) work includes only the installation of a vegetated facility at Canyon Creek Park and necessary conveyance.
- Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
- Final design will include confirmation of vegetated facility plantings and structure sizing.
- Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	13,900	$1,084,200
Clear and Grub brush including stumps	AC	22,000	1.6	$34,470
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	1.6	$94,008
4-foot Chain Link Fence	LF	60	1,130	$67,800
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$2,142,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$214,200
Erosion and Sediment Control	LS	3%		$64,260
Contingency	LS	40%		$856,800
Traffic Control/Utility Relocation	LS	5%		$107,100
Surveying	LS	5%		$107,100
Capital Expense Total (including contingency)				$3,491,000
Design/Construction Administration (%)	LS	3.5% + $200K		$322,000
Engineering and Permitting (%)	LS	30%		$1,047,000
			TOTAL	$4,860,000

BC-3: Wiedemann Ditch and Canyon Creek Park Retrofit, Phase 2

Key Project Elements

• Construct a series of linear wetland complexes to replace the existing Wiedemann ditch. Existing ditch would be enhanced to provide additional floodplain storage and mitigate flows received from Sysco ditch.

Design Assumptions

• Excavate 18" depth for amended soils for entire vegetated facility footprint area, per City Standards.
• Final design will include confirmation of weir sizing and layout.
• Final design will include confirmation of vegetated facility plantings and structure sizing.
• Cost estimates were developed directly with the City, without input or review by the TSJV, the Design-Builder.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	25,600	$1,996,800
Clear and Grub brush including stumps	AC	22,000	3.6	$79,924
Amended Soils and Mulch	CY	165	3,792	$625,625
Energy dissapation pad - Rip-Rap, Class 200	CY	81	20	$1,620
Water Quality Facility Installation				
Facility Inlet Structure	EA	10,000	1	$10,000
Structure Installation				
Gravel Access Road	SF	5	18,000	$90,000
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.6	$217,975
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	350	$200,585
Project Sub-Total				$3,223,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$322,300
Erosion and Sediment Control	LS	3%		$96,690
Contingency	LS	40%		$1,289,200
Traffic Control/Utility Relocation	LS	5%		$161,150
Surveying	LS	5%		$161,150
Capital Expense Total (including contingency)				$5,253,000
Design/Construction Administration (%)	LS	3.5% + $200K		$384,000
Engineering and Permitting (%)	LS	30%		$1,576,000
			TOTAL	$7,210,000

BC-4: Boeckman Creek Stabilization at Colvin Lane

Key Project Elements

- Remove existing outfall pipe.
- Install approx. 70 LF of new outfall pipe with angle closer to parallel with creek channel.
- Install bioengineered plantings to stabilize streambank.
- Remove corrugated plastic pipe in existing channel bottom.

Design Assumptions

- Assumes that access to the outfall stabilization area can be attained via the City easement between 7590 and 7598 Roanoke Drive N. No cost included for access.
- Exact stabilization measures to be determined during project design.
- Assumes clearing/grubbing including stumps can include removal of existing corrugated pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	194	$15,132
Clear and Grub brush including stumps	AC	22,000	0.20	$4,400
Jute Matting, Biodegradeable	SY	8	90	$720
Embankment	CY	35	50	$1,750
Amended Soils and Mulch	CY	165	83	$13,695
Tree removal	EA	1,200	5	$6,000
Energy dissapation pad - Rip-Rap, Class 100	CY	124	10	$1,240
Drain Rock	CY	110	56	$6,160
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	1,500	$60,000
Structure Installation				
Demo pipe	LF	30	30	$900
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	360	$21,600
Pipe Unit Cost				
HDPE, 12", 15' to invert, not in road	FT	179	150	$26,895
PVC, 12", 10' to invert, not in road	FT	206	70	$14,399
Project Sub-Total				$173,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,300
Erosion and Sediment Control	LS	3%		$5,190
Contingency	LS	40%		$69,200
Traffic Control/Utility Relocation	LS	5%		$8,650
Surveying	LS	5%		$8,650
Capital Expense Total (including contingency)				$282,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$85,000
			TOTAL	$410,000

BC-5 Memorial Park Swale Retrofit

Key Project Elements

- Remove the existing WQ swale and relocate it at the bottom of the hill.
- Only designing for the WQ storm event (treatment only in the BMP Sizing Tool).
- Swale design is based on a retrofit approach. Facility sizing per PWS is not possible within available space. Design of swale with variance from design criteria (top width maximum) may allow for optimization of available space.
- Ideally keep swale outside of the 100-yr floodplain, but not a permit issue if within since it is not infiltration based.

Design Assumptions

- Remove 90 LF of 10-inch corrugated steel pipe (SD5041 and SD5042).
- Remove 120 LF of 12-inch corrugated steel pipe (SD5044).
- Remove: manhole (ST5098); inlet structure (CARTE ID 568); and outfall structure (CARTE ID 19).
- Fill existing swale and revegetate area.
- Replace 60 LF of 12" CSP with 18" PVC (SD5046); replace 2 48" MHs (ST5200 and ST5208).
- Replace 50 LF of 18-inch CSP with 18-inch PVC pipe (SD5206).
- Replace manhole ST5209 with a 72-inch flow splitting/WQ manhole.
- Install 50 LF of 12-inch PVC.
- Install 140 LF of 6-inch perforated HDPE underdrain pipe.
- Install inflow spreader with rip-rap pad, beehive overflow structure, and outfall to the creek.
- Install a new meandering water quality swale with 1 ft of drain rock and 1.5 ft of amended soil.
- Install split rail fence along pedestrian path north of the swale.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	55	$1,100
Fill, from onsite stockpile	CY	60	55	$3,300
General Earthwork/Excavation	CY	78	265	$20,670
Energy dissapation pad - Rip-Rap, Class 200	CY	81	2.2	$178
Drain Rock	CY	110	90	$9,900
Amended Soils and Mulch	CY	165	135	$22,275
Water Quality Facility Installation				
Beehive Overflow	EA	6,100	1	$6,100
Swale Flow Spreader	EA	20,000	1	$20,000
Facility Inlet Structure	EA	10,000	1	$10,000
Water Quality Facility Plantings with Trees	SF	40	2,400	$96,000
Structure Installation				
Demo pipe	LF	30	210	$6,300
Remove structure	EA	1,700	3	$5,100
Connection to Existing Structure, standard	EA	10,000	2	$20,000
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Outfall Improvements	EA	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Non-Water Quality Facility Landscaping	AC	27,000	0.5	$13,500
Split Rail Fence	LF	60	160	$9,600
Pipe Unit Cost				
Underdrain, 6" perforated HDPE	LF	60	140	$8,400
PVC, 12", 10' to invert, not in road	FT	206	50	$10,285
PVC, 12", 10' to invert, in road	FT	506	60	$30,360
PVC, 18", 10' to invert, not in road	FT	293	110	$32,247
Project Sub-Total				$387,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$38,700
Erosion and Sediment Control	LS	3%		$11,610
Contingency	LS	40%		$154,800
Traffic Control/Utility Relocation	LS	5%		$19,350
Surveying	LS	5%		$19,350
Capital Expense Total (including contingency)				$631,000
Design/Construction Administration (%)	LS	13.5%		$85,000
Engineering and Permitting (%)	LS	30%		$189,000
			TOTAL	$910,000

BC-6 - Gesellschaft Water Well Channel Restoration

Key Project Elements

- Existing outfall (STD3008) and upstream stormwater pipes can remain unchanged for the contributing 25 acres.
- Bypass the channel entirely by piping the weekly discharge from the well to the bottom of the slope into Boeckman Creek.
- Pipe is sized using PWS, smallest diameter (12-inch) to convey the flows.
- Weekly discharge of well volume is unknown, ODWR well logs were reviewed to verify that pipe size works with likely flows.
- Water discharge conveyance designed to comply with stormwater conveyance standards.

Design Assumptions

- Install approx. 480 LF of 12-inch PVC.
- Install 2 MHs along the new pipe alignment.
- Intall outfall and energy dissipation pad with Class 200 riprap.
- Restore the eroded discharge channel (approx. 310 LF) through the installation of coir log check dams, coir matting, and re-vegetating with native trees and shrubs.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	214	$16,692
Energy dissapation pad - Rip-Rap, Class 200	CY	81	8	$648
Structure Installation				
Outfall Improvements	LS	10,000	1	$10,000
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	345	$20,700
Pipe Unit Cost				
PVC, 12", 10' to invert, not in road	FT	206	480	$98,736
Project Sub-Total				$171,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$17,100
Erosion and Sediment Control	LS	3%		$5,130
Contingency	LS	40%		$68,400
Traffic Control/Utility Relocation	LS	5%		$8,550
Surveying	LS	5%		$8,550
Capital Expense Total (including contingency)				$279,000
Design/Construction Administration (%)	LS	13.5%		$38,000
Engineering and Permitting (%)	LS	30%		$84,000
			TOTAL	$400,000

CLC-1: Day Road Stormwater Improvements, Phase 1

Key Project Elements

- Replace the double-barrel 36-inch culverts that cross Day Road.
- Construct the channel improvements and culvert installations proposed by AKS in 2019 report (concept A-3).

Design/ Cost Assumptions

- The AKS concept was modeled and incorporated into BC's updated InfoSWMM model, which included updated hydrology.
- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits.
- Access to BPA alignment, towers, and overhead power lines must be maintained.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.
- The AKS cost estimate did not include costs for Design/Construction Admin or Engineering/Permitting. These multipliers were maintained in this estimate for consistency with other capital project estimates.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	26,500	$2,067,000
Structural Earth Wall	SF	50	16,900	$845,000
Clear and Grub brush including stumps	AC	22,000	3	$66,000
Jute Matting, Biodegradeable	SY	8	4,950	$39,600
Energy dissapation pad - Rip-Rap, Class 100	CY	124	125	$15,500
Streambed Cobble	TON	120	900	$108,000
Water Quality Facility Installation				
Gravel Access Road	SF	5	15,000	$75,000
Structure Installation				
Demo pipe	LF	30	50	$1,500
Restoration/Resurfacing				
Riparian/Wetland Planting (w/temporary irrigation)	AC	60,000	3.2	$192,000
Pipe Unit Cost				
PVC, 36", 10' to invert, in road	FT	1,027	180	$184,932
Box Culvert (10' x 3')	FT	950	200	$190,000
Project Sub-Total				$3,595,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$359,500
Erosion and Sediment Control	LS	3%		$107,850
Contingency	LS	40%		$1,438,000
Traffic Control/Utility Relocation	LS	5%		$179,750
Surveying	LS	5%		$179,750
Capital Expense Total (including contingency)				$5,860,000
Design/Construction Administration (%)	LS	3.5% + $200K		$405,000
Engineering and Permitting (%)	LS	30%		$1,758,000
			TOTAL	$8,020,000

CLC-1: Day Road Stormwater Improvements, Phase 2

Key Project Elements

- Upsize the two existing parallel storm pipes located beneath the parking lot of Tax Lot 500, from 36-inch to 48-inch.
- Install a third, parallel 48-inch storm pipe.

Design/ Cost Assumptions

- Assessment of flooding during the 100-year storm was based on maximum WSE in relation to the elevation of adjacent structures.
- The catchment area draining to this project includes areas outside of City limits. The establishment of similar onsite retention standards for Tualatin discharge may mitigate future flooding of this area.
- The small ponds at inlet of culverts across Ridder was not modeled - it is assumed that there is adequate space for outlets of the three proposed 48" pipes to this pond.
- Where possible, quantities listed in the 2019 AKS report for Alt A-3 were used and costs recalculated using City-reviwed unit costs of similar items developed for this SMP.
- Unit costs for project elements not reflected in this SMP's unit cost list were derived directly from the 2019 AKS report were escalated to 2023 based on ENR CCI.
- Contingency multipliers such as Mobilization were applied as consistent with other capital projects. Lump sum costs for these items used in the AKS estimate were not carried over.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	7	$126,000
Demo pipe	LF	30	1,200	$36,000
Restoration/Resurfacing				
Trash rack	EA	5,600	3	$16,800
Pipe Unit Cost				
PVC, 48", 10' to invert, not in road	FT	834	1,800	$1,500,840
Project Sub-Total				$1,680,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$168,000
Erosion and Sediment Control	LS	3%		$50,400
Contingency	LS	40%		$672,000
Traffic Control/Utility Relocation	LS	5%		$84,000
Surveying	LS	5%		$84,000
Capital Expense Total (including contingency)				$2,738,000
Design/Construction Administration (%)	LS	13.5%		$370,000
Engineering and Permitting (%)	LS	30%		$821,000
			TOTAL	$3,930,000

CLC-2: Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail

Key Project Elements

- Remove and replace approx. 70 LF existing double 5 ft x 5 ft concrete box culverts with a 10 ft x 3 ft concrete box culvert.
- Stabilize and restore embankment and channel after culvert replacement.
- Repave pedestrian path after culvert replacement.

Design Assumptions

- Assumes clearing/grubbing with stump removal in immediate areas as necessary for construction.
- No costs included for access - assumed access can be attained through pedestrian path.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	45	$3,510
Fill, imported clean	CY	115	45	$5,175
Embankment	CY	35	90	$3,150
Clear and Grub brush including stumps	AC	22,000	0.10	$2,200
Energy dissapation pad - Rip-Rap, Class 200	CY	81	10	$810
Structure Installation				
Demo pipe	LF	30	70	$2,100
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	270	$16,200
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
Box Culvert (10' x 3')	FT	950	70	$66,500
Project Sub-Total				$110,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,000
Erosion and Sediment Control	LS	3%		$3,300
Contingency	LS	40%		$44,000
Traffic Control/Utility Relocation	LS	5%		$5,500
Surveying	LS	5%		$5,500
Capital Expense Total (including contingency)				$179,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$290,000

CLC-3: Garden Acres Pond Retrofit

Key Project Elements

• Retrofit existing detention pond to increase storage capacity and water quality treatment along Peters Road and provide detention during high flow events.

Design Assumptions

• Install an inflow diversion structure at Peters Road (ST2101A).
• Install 95 LF of 24-inch PVC culvert at inlet of upsized detention pond.
• Increase existing detention pond capacity by 25,600 ft3 and lower pond invert to 196-ft elevation.
• Clear, regrade, and replant 0.9-acres of drainage way to ensure a low-flow drainage path and healthy vegetation.
• Install 155 LF of 24-inch PVC culvert at outlet of upsized detention pond.
• Install an outlet control structure at Peters Road (ST2431).
• Install pond underdrain in accordance with the 2015 PSW Section 3, Appendix A landscape and soil media requirements. Including 15" of drain rock, a 3" separation layer, and 18" of growing media.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	3,220	$251,160
Clear and Grub brush including stumps	AC	22,000	0.9	$19,800
Amended Soils and Mulch	CY	165	1,240	$204,600
Drain Rock	CY	110	1,030	$113,300
Water Quality Facility Installation				
Water Quality Facility Plantings with Trees	SF	40	22,310	$892,400
Outflow Control Structure	EA	20,000	1	$20,000
Structure Installation				
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	1	$14,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	980	$58,800
Pipe Unit Cost				
Field Ditch Inlet	EA	5,600	1	$5,600
Connection to Existing Structure, standard	EA	10,000	4	$40,000
PVC, 24", 10' to invert, not in road	FT	381	205	$78,023
PVC, 24", 10' to invert, in road	FT	732	45	$32,918
Project Sub-Total				$1,777,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$177,700
Erosion and Sediment Control	LS	3%		$53,310
Contingency	LS	40%		$710,800
Traffic Control/Utility Relocation	LS	5%		$88,850
Surveying	LS	5%		$88,850
Capital Expense Total (including contingency)				$2,897,000
Design/Construction Administration (%)	LS	3.5% + $200K		$301,000
Engineering and Permitting (%)	LS	20%		$579,000
			TOTAL	$3,780,000

NC-1: Frog Pond E and S Conveyance Pipe Installation

Key Project Elements

- Install stormwater collection system for main alignments in basin K1 identified in the Frog Pond East and South Master Plan.

Design Assumptions

- Pipe sizes and alignment was taken directly from the Frog Pond E and S Master Plan. This area was not included in the InfoSWMM modeling effort for this SMP.
- Install 2,050 LF of 24-inch PVC pipe.
- Install 310 LF of 30-inch PVC pipe.
- Install seven 60-inch manholes.
- Install 1 outfall.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Outfall Improvements	EA	10,000	1	$10,000
Pipe Unit Cost				
PVC, 24", 10' to invert, in road	FT	732	2,050	$1,499,575
PVC, 30", 10' to invert, in road	FT	879	310	$272,630
Project Sub-Total				$1,880,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$188,000
Erosion and Sediment Control	LS	3%		$56,400
Contingency	LS	40%		$752,000
Traffic Control/Utility Relocation	LS	5%		$94,000
Surveying	LS	5%		$94,000
Capital Expense Total (including contingency)				$3,064,000
Design/Construction Administration (%)	LS	13.5%		$414,000
Engineering and Permitting (%)	LS	20%		$613,000
			TOTAL	$4,090,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 1

Key Project Elements

- Remove existing Morey's Landing Bubbler (STD6604).
- Clear, grade, and replant 0.12-acres to create two infiltration raingardens within the BPA easement.
- Install a flow control diversion structure and low flow pipe at Willamette Way E to route water quality events to new raingardens and high flow events to the stormwater collection system along SW Willamette Way.
- Install a flow control diversion structure and 25 LF of 8-inch PVC to route water quality events (low flow) to new raingardens and high flow events to the Belknap Court outfall.
- Install 120 LF of 12-inch PVC on SW Willamette Way for flow exceeding the water quality event.
- Upsize 575 LF of 10-inch CPS to 12-inch PVC on SW Willamette Way (SD6629, SD6630, SD6632).
- Upsize 145 LF of 10-inch CSP to 18-inch PVC on Willamette Way (SD6638).
- Install one 48-inch manhole and replace four 48-inch manholes (ST6618, ST6619, ST6606, and ST6605).

Design Assumptions

- The raingardens (Phase 1) were sized as a filtration facility using the BMP Sizing Tool. Due to design constraints and lack of feasible outlet, this BMP will be constructed as an infiltration facility, pending infiltration testing. It is to be designed per the City's standard details for the selected BMP structure and used to treat the 1" water quality event.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Excavation, to onsite stockpile	CY	20	2,055	$41,100
Fill, from onsite stockpile	CY	60	1,289	$77,340
Amended Soils and Mulch	CY	165	389	$64,167
Drain Rock	CY	110	376	$41,360
Water Quality Facility Installation				
Rain Garden/ Swale	SF	130	120	$15,600
Geotextile	SY	7	2.5	$18
Energy dissapation pad - Rip-Rap, Class 100	CY	124	1	$124
Water Quality Facility Plantings with Trees	SF	40	5,782	$231,280
Restoration/Resurfacing				
4-foot Chain Link Fence	LF	60	305	$18,300
Flow Splitter/WQ Manhole (72", all depths)	EA	28,000	1	$28,000
Structure Installation				
Remove structure	EA	1,700	6	$10,200
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	5	$60,000
Pipe Unit Cost				
PVC, 8", 10' to invert, not in road	FT	136	25	$3,394
PVC, 12", 15' to invert, not in road	FT	215	120	$25,740
PVC, 12", 10' to invert, in road	FT	506	575	$290,950
PVC, 18", 10' to invert, in road	FT	563	145	$81,635
Connection to Existing Structure, standard	EA	10,000	4	$40,000
Project Sub-Total				$1,029,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$102,900
Erosion and Sediment Control	LS	3%		$30,870
Contingency	LS	40%		$411,600
Traffic Control/Utility Relocation	LS	10%		$102,900
Surveying	LS	5%		$51,450
Capital Expense Total (including contingency)				$1,729,000
Design/Construction Administration (%)	LS	13.5%		$233,000
Engineering and Permitting (%)	LS	20%		$346,000
			TOTAL	$2,310,000

WR-1: Willamette Way East/ Morey's LandingStormwater Improvements - Phase 2

Key Project Elements

- Upsize 610 LF of 12-inch CSP to 18-inch PVC on SW Champoeg Dr E (SD6634 – SD6637).
- Replace three 48-inch manholes (ST6607, ST6608, and ST6609) and field inlet (6647).

Design Assumptions

- Flows over the water quality event will be routed to the Belknap Court outfall (part of Phase 2 network).
- The conveyance along SW Champoeg Ct (Phase 2) is identified as under capacity and will be upsized from existing 12-inch to 18-inch.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Demo pipe	LF	30	610	$18,300
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	3	$36,000
Pipe Unit Cost				
PVC, 18", 10' to invert, in road	FT	563	610	$343,430
Connection to Existing Structure, standard	EA	10,000	8	$80,000
Project Sub-Total				$483,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$48,300
Erosion and Sediment Control	LS	3%		$14,490
Contingency	LS	40%		$193,200
Traffic Control/Utility Relocation	LS	10%		$48,300
Surveying	LS	5%		$24,150
Capital Expense Total (including contingency)				$811,000
Design/Construction Administration (%)	LS	13.5%		$109,000
Engineering and Permitting (%)	LS	20%		$162,000
			TOTAL	$1,080,000

WR-2: Miley Road Stormwater Improvements - Phase 1

Key Project Elements

- Upsize 80 LF of 36-inch CMP to 42inch PCV from area drain (ENG ID 9341) to outfall.
- Restore approx. 30 ft of channel bank on either side of new outfall.
- Replace area drain (ENG ID 9341).
- Replace 320 LF of existing storm pipe with same diameter 42-inch PVC between area drain (ENG ID 9341) and manhole (ST9002).
- Replace and lower invert of manhole (ST9002) to ensure 3 ft cover requirement is met for incoming pipe. Maintain 0.2 ft drop within MH.

Design Assumptions

- Access to outfall for removal and replacement is assumed feasible - costs have not been included for access requirements

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
General Earthwork/Excavation	CY	78	100	$7,800
Embankment	CY	35	100	$3,500
Clear and Grub brush including stumps	AC	22,000	0.1	$2,200
Jute Matting, Biodegradeable	SY	8	100	$800
Energy dissapation pad - Rip-Rap, Class 200	CY	81	50	$4,050
Structure Installation				
Field Ditch Inlet	EA	5,600	1	$5,600
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Demo pipe	LF	30	400	$12,000
Outfall Improvements	EA	10,000	1	$10,000
Remove structure	EA	1,700	2	$3,400
Restoration/Resurfacing				
Planting and Bioengineered Restoration	SY	60	55	$3,300
Pipe Unit Cost				
PVC, 42", 10' to invert, not in road	FT	703	400	$281,380
Project Sub-Total				$352,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$35,200
Erosion and Sediment Control	LS	3%		$10,560
Contingency	LS	40%		$140,800
Traffic Control/Utility Relocation	LS	5%		$17,600
Surveying	LS	5%		$17,600
Capital Expense Total (including contingency)				$574,000
Design/Construction Administration (%)	LS	13.5%		$77,000
Engineering and Permitting (%)	LS	30%		$172,000
			TOTAL	$820,000

WR-2: Miley Road Stormwater Improvements - Phase 2

Key Project Elements

- Install 530 LF of 42-inch PVC from replaced manhole (ST9002) to new manhole at the near intersection with SW French Prairie Road.
- Install three 72-inch manholes for the above 42-inch line, the most upstream of which is at the SW French Prairie Road.
- Install ten 60-inch manholes and 3,015 LF of 36-inch PVC along NE Miley Road from SW French Prairie Road to new manhole adjacent to manhole ST9011.
- Install two 48-inch manholes and 650 LF of 24-inch PVC from the new manhole adjacent to manhole ST9011 to the new manhole at upstream most lateral.
- Extend six total existing main connections to the new pipe alignment (approx. 40 LF each, varying diameters). Note that these points of connection run under the existing brick wall.
- Reconnect all existing curb inlets (approx. 13) along new NE Miley Road alignment.

Design Assumptions

- Costs for connections to existing system under brick wall have been assumed for connections and pipe length only. Constructability to be verified during detailed design.
- Costs assume that existing pipe alingment (where not replaced, where moved to ROW) will be abandoned and filled with grout at key connection points.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	2	$24,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	10	$140,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	3	$54,000
Connection to Existing Lateral	EA	6,000	19	$114,000
Abandon Existing Pipe, fill with grout	CF	8	3705	$29,640
Pipe Unit Cost				
PVC, 12", 15' to invert, in road	FT	602	80	$48,136
PVC, 18", 15' to invert, in road	FT	731	80	$58,476
PVC, 24", 10' to invert, in road	FT	732	650	$475,475
PVC, 24", 15' to invert, in road	FT	860	40	$34,408
PVC, 36", 10' to invert, in road	FT	1,027	3055	$3,138,707
PVC, 42", 10' to invert, in road	FT	1,169	530	$619,438
Project Sub-Total				$4,736,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$473,600
Erosion and Sediment Control	LS	3%		$142,080
Contingency	LS	40%		$1,894,400
Traffic Control/Utility Relocation	LS	5%		$236,800
Surveying	LS	5%		$236,800
Clackamas County Permitting	LS	8.83%		$418,189
Capital Expense Total (including contingency)				$7,720,000
Design/Construction Administration (%)	LS	3.5% + $200K		$470,000
Engineering and Permitting (%)	LS	30%		$2,316,000
			TOTAL	$10,510,000

WR 3 - Rose Lane Culvert Replacement

Key Project Elements

- Remove the existing 25 LF of 12-inch culvert (CARTE ID: 24370, ENG ID not available).
- Install approximately 40 LF of parallel 12-inch RCP culverts.
- Reconfiguring culvert diagonally across roadway to move it away from the residental building (garage) and remove hard bends.
- Maintain 12-inch pipe cover in roadway (minimum amount).

Design Assumptions

- Assuming recommended culvert sizing is sufficent to convey H/H flows. Unable to easily model due to lack of stream information (seasonal stream in wetland).
- Survey required.
- Roadwork beyond trenching not evaluated.
- Waterbody is a seasonal stream with open marsh/wetlands on upstream and downstream sides.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Earthwork				
Clear and Grub brush including stumps	AC	22,000	0.05	$1,100
Structure Installation				
Demo pipe	LF	30	25	$750
Field Ditch Inlet	EA	5,600	2	$11,200
Pipe Unit Cost				
RCP, 12", 10' to invert, in road	FT	498	80	$39,864
Project Sub-Total				$53,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$5,300
Erosion and Sediment Control	LS	3%		$1,590
Contingency	LS	40%		$21,200
Traffic Control/Utility Relocation	LS	5%		$2,650
Surveying	LS	5%		$2,650
Capital Expense Total (including contingency)				$86,000
Design/Construction Administration (%)	LS	13.5%		$35,000
Engineering and Permitting (%)	LS	30%		$75,000
			TOTAL	$200,000

WR-4: Charbonneau East Stormwater Improvements, Phase 1

Key Project Elements

- Upsize and replace the existing stormwater outfall (serving Charbonneau development) along the Willamette River.

Design Assumptions

- Remove and replace existing Charbonneau East Outfall.
- Upsize 115 LF of 30-inch pipe discharging to Willamette River to 36-inch diameter PVC.
- Replace 72-inch manhole (ST9014).

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	1	$18,000
Connection to Existing Structure, standard	EA	10,000	1	$10,000
Energy dissapation pad - Rip-Rap, Class 200	CY	81	145	$11,745
Restoration/Resurfacing				
Trench resurfacing, Permanent ACP, 6-Inch Depth	SY	144	70	$10,080
Pipe Unit Cost				
PVC, 36", 10' to invert, not in road	FT	573	115	$65,907
Project Sub-Total				$116,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$11,600
Erosion and Sediment Control	LS	3%		$3,480
Contingency	LS	50%		$58,000
Traffic Control/Utility Relocation	LS	5%		$5,800
Surveying	LS	5%		$5,800
Capital Expense Total (including contingency)				$201,000
Design/Construction Administration (%)	LS	25.0%		$50,000
Engineering and Permitting (%)	LS	50%		$101,000
Outreach Coordination	LS	Flat Rate		$250,000
			TOTAL	$600,000

WR-4: Charbonneau East Stormwater Improvements, Phase 2

Key Project Elements

- Upsize and replace stormwater network along SW French Prairie Rd or SW Old Farm Rd.

Design Assumptions

- Replace 230 LF of 10-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9087 to end, and ST9088 to end).
- Replace 680 LF of 12-inch pipe with 12-inch PVC on SW French Prairie Rd (ST9023 to ST9242).
- Replace 1,200 LF of 15-inch pipe with 15-inch PVC on SW French Prairie Rd (ST9023 to ST9020).
- Replace 310 LF of 18-inch pipe with 18-inch PVC on SW French Prairie Rd (ST9020 to ST9019).
- Upsize 360 LF of 21-inch pipe to 30-inch PVC on SW French Prairie Rd (ST9019 to ST9017).
- Replace 570 LF of 24-inch pipe with 24-inch PVC on Old Farm Rd (ST9030 to ST9027).
- Replace 300 LF of 30-inch pipe with 30-inch PVC on Old Farm Rd (ST9031 to ST9030).
- Replace eight 48-inch manholes.
- Replace nine 60-inch manholes.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	4	$48,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	4	$60,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	5	$70,000
Precast Concrete Manhole (60", 13-20' deep)	EA	22,000	4	$88,000
Connection to Existing Structure, standard	EA	10,000	12	$120,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	910	$460,460
PVC, 15", 10' to invert, in road	FT	535	1,200	$641,400
PVC, 18", 10' to invert, in road	FT	563	310	$174,530
PVC, 30", 10' to invert, in road	FT	879	360	$316,602
PVC, 24", 10' to invert, in road	FT	732	570	$416,955
PVC, 30", 10' to invert, in road	FT	879	300	$263,835
Project Sub-Total				$1,979,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$197,900
Erosion and Sediment Control	LS	3%		$59,370
Contingency	LS	40%		$791,600
Traffic Control/Utility Relocation	LS	10%		$197,900
Surveying	LS	5%		$98,950
Capital Expense Total (including contingency)				$3,325,000
Design/Construction Administration (%)	LS	13.5%		$449,000
Engineering and Permitting (%)	LS	20%		$665,000
			TOTAL	$4,440,000

WR-4: Charbonneau West Stormwater Improvements

Key Project Elements

- Replace stormwater network along SW French Prairie Road, SW Curry Drive, SW Boones Bend Road

Design Assumptions

- Replace 200 LF of 12-inch pipe along SW French Prairie Road with PVC (ENG ID: ST9048 to ST9281)
- Replace a total of 1,540 LF of 15-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace a total of 2,450 LF of 18-inch pipe along SW Curry Drive, SW French Prairie Road, and SW Boones Bend Rd with PVC.
- Replace 680 LF of 21-inch pipe along SW Boones Bend Road with PVC.
- Replace 670 LF of 24-inch pipe along SW French Prairie Road and SW Boones Bend Road with PVC.
- Replace 420 LF of 27-inch pipe along SW Boones Bend Road with PVC.
- Replace 640 LF of 30-inch pipe along SW Boones Bend Road with PVC.
- Replace 170 LF of 36-inch pipe along SW Boones Bend Road with PVC.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	29	$348,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	7	$98,000
Precast Concrete Manhole (72", 0-8' deep)	EA	18,000	2	$36,000
Connection to Existing Lateral	EA	6,000	15	$90,000
Outfall Improvements	EA	10,000	2	$20,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	200	$101,200
PVC, 15", 10' to invert, in road	FT	535	1,540	$823,130
PVC, 18", 10' to invert, in road	FT	563	2,450	$1,379,350
PVC, 21", 10' to invert, in road	FT	647	680	$440,130
PVC, 24", 10' to invert, in road	FT	732	670	$490,105
PVC, 27", 10' to invert, in road	FT	805	420	$338,300
PVC, 30", 10' to invert, in road	FT	879	640	$562,848
PVC, 36", 10' to invert, in road	FT	1,027	170	$174,658
Project Sub-Total				$4,902,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$490,200
Erosion and Sediment Control	LS	3%		$147,060
Contingency	LS	40%		$1,960,800
Traffic Control/Utility Relocation	LS	10%		$490,200
Surveying	LS	5%		$245,100
Capital Expense Total (including contingency)				$8,235,000
Design/Construction Administration (%)	LS	3.5% + $200K		$488,000
Engineering and Permitting (%)	LS	20%		$1,647,000
			TOTAL	$10,370,000

Charbonneau R&R Program

Key Project Elements

- Replace pipe in Charbonneau District that isn't being replaced by another CIP or hasn't been recently replaced. Recently replaced pipe was designated by the City as anything replaced between 2015-2022.
- Assume minimum pipe size of 12-inch. Assume all other pipe is replace-in-place.
- Assume replacements of all manholes (except those excluded from above mentioned projects).

Design Assumptions

- Replace 19,460 LF of 12-inch diameter PVC pipe.
- Replace 4,590 LF of 15-inch diameter PVC pipe.
- Replace 3,620 LF of 18-inch diameter PVC pipe.
- Replace 1,210 LF of 21-inch diameter PVC pipe.
- Replace 750 LF of 24-inch diameter PVC pipe.
- Replace 180 LF of 27-inch diameter PVC pipe.
- Replace 340 LF of 30-inch diameter PVC pipe.
- Replace 470 LF of 36-inch diameter PVC pipe.

Item	Unit	Unit Cost (2023)	Quantity	Total Cost
Structure Installation				
Precast Concrete Manhole (48", 0-8' deep)	EA	12,000	120	$1,440,000
Precast Concrete Manhole (48", 9-12' deep)	EA	15,000	13	$195,000
Precast Concrete Manhole (48", 13-20' deep)	EA	18,000	3	$54,000
Precast Concrete Manhole (60", 0-8' deep)	EA	14,000	15	$210,000
Precast Concrete Manhole (72", 9-12' deep)	EA	23,000	2	$46,000
Pipe Unit Cost				
PVC, 12", 10' to invert, in road	FT	506	13,470	$6,815,820
PVC, 12", 15' to invert, in road	FT	602	2,500	$1,504,250
PVC, 12", 10' to invert, not in road	FT	206	3,210	$660,297
PVC, 12", 15' to invert, not in road	FT	215	280	$60,060
PVC, 15", 10' to invert, in road	FT	535	2,220	$1,186,590
PVC, 15", 15' to invert, in road	FT	666	570	$379,805
PVC, 15", 10' to invert, not in road	FT	249	1,680	$419,034
PVC, 15", 15' to invert, not in road	FT	259	120	$31,086
PVC, 18", 10' to invert, in road	FT	563	1,870	$1,052,810
PVC, 18", 15' to invert, in road	FT	731	880	$643,236
PVC, 18", 10' to invert, not in road	FT	293	630	$184,685
PVC, 18", 15' to invert, not in road	FT	304	240	$72,864
PVC, 21", 10' to invert, in road	FT	647	670	$433,658
PVC, 21", 15' to invert, in road	FT	796	520	$413,699
PVC, 21", 15' to invert, not in road	FT	348	20	$6,963
PVC, 24", 10' to invert, in road	FT	732	410	$299,915
PVC, 24", 10' to invert, not in road	FT	381	340	$129,404
PVC, 27", 10' to invert, in road	FT	805	180	$144,986
PVC, 30", 10' to invert, in road	FT	879	340	$299,013
PVC, 36", 10' to invert, not in road	FT	573	240	$137,544
PVC, 36", 15' to invert, in road	FT	1,220	230	$280,577
Project Sub-Total				$17,101,000
Contingencies and Multipliers				
Mobilization/Demobilization	LS	10%		$1,710,100
Erosion and Sediment Control	LS	3%		$513,030
Contingency	LS	40%		$6,840,400
Traffic Control/Utility Relocation	LS	10%		$1,710,100
Surveying	LS	5%		$855,050
Capital Expense Total (including contingency)				$28,730,000
Design/Construction Administration (%)	LS	13.5%		$3,879,000
Engineering and Permitting (%)	LS	20%		$5,746,000
			TOTAL	$38,360,000

Appendix F: Library Pond Analysis

Technical Memorandum

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Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan Update

Project No.: 156157

Technical Memorandum

Subject: Library Pond Evaluation

Date: June 14, 2023

To: Kerry Rappold, City of Wilsonville

From: Brown and Caldwell

Prepared by: Shelby Gilmartin, E.I.T

Reviewed by: Angela Wieland, P.E.

Limitations:

This document was prepared solely for City of Wilsonville in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Wilsonville and Brown and Caldwell dated January 11, 2021. This document is governed by the specific scope of work authorized by City of Wilsonville; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by City of Wilsonville and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Executive Summary

This Technical Memorandum (TM) describes a sizing evaluation conducted on the Library Pond stormwater detention facility (also referred to as the Memorial Park Pond). This evaluation was conducted as part of the City's 2023 Stormwater Master Plan (SMP) Update to determine capital project needs (specific to retrofit of the Library Pond), as well as policy recommendations (to be documented in the SMP) related to redevelopment of the Wilsonville Town Center, which contributes stormwater to the Library Pond.

This evaluation utilized the City of Wilsonville's BMP Sizing Tool, which is intended for use in conjunction with the *2015 Stormwater & Surface Water Design & Construction Standards,* as well as historic as-built drawings, results from the InfoSWMM model, Geographic Information System (GIS) data, and the *2019 Wilsonville Town Center Plan* to analyze pond sizing and ability to effectively mitigate stormwater flows under three development scenarios. The development scenarios reflect unique land cover and impervious conditions specific to pre-development (Oak Savanna) land use conditions, existing (current) land use conditions, and future (Town Center build-out) land use conditions.

Section 1: Background

The Library Pond Stormwater Detention Facility (Library Pond) was originally constructed in the 1980s. Modifications were made to the pond in 1992 as part of the Memorial Park site improvements. These improvements include enlarging the pond, installing new stormwater piping, an outfall, and inlet, as well as enclosing the pond with a chain-link fence.

The Library Pond receives drainage from approximately 180 acres of commercial property in the southeastern portion of Wilsonville, east of Interstate 5 and adjacent to Wilsonville Road. The Library Pond discharges to a piped collection system, which outfalls to an unnamed tributary to Boeckman Creek approximately 750 feet downstream of the Library Pond. Boeckman Creek is a tributary to the Willamette River. Water quality monitoring has been conducted at the Library Pond since the late 1990's in accordance with the City's National Pollutant Discharge Elimination System (NPDES) municipal separate storm sewer (MS4) permit. Although operating as a regional stormwater facility, there are several notable characteristics of the pond that may contribute to observed capacity and water quality issues:

- There is no flow control/orifice structure or emergency overflow type structure, thus providing limited detention benefit.
- Vegetation is overgrown with invasive species and sediment has accumulated along the pond bottom, limiting pond capacity and water quality function.
- As shown in the as-builts and verified on-site, the facility has very steep side slopes (estimated to be 2H:1V), limiting facility access and maintenance.
- City staff have experienced ongoing challenges with debris removal at existing ditch inlet, which serves as the outlet from the pond so impounded trash can quickly result in a flooding issue.

Hydraulic analysis of the Library Pond conducted for the SMP in 2022 indicates that flooding occurs during the 25-year future development condition. This finding is confirmed by City staff who have observed flooding of the Wilsonville Public Library parking lot and Memorial Drive near the entrance to Memorial Park. The contributing drainage area to the Library Pond is subject to redevelopment in both the near term and long term as part of the Wilsonville Town Center Plan (adopted May 6, 2019).

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The three phases of the Willamette Town Center Plan include:

- Phase I - infill and redevelopment of vacant and/or underutilized land over the next 10 years (approx. 2019-2029). This will focus on areas where landowners can develop new buildings on vacant or underused parking without impacting existing businesses. The mostly likely type of redevelopment occurring will be existing retail and commercial buildings, multifamily residential, and some mixed-use development.
- Phase 2 - redevelopment, multiuse, and parking garage integration in the next 10-20 years (approx. 2029-2039). This phase includes office and mixed-use development with attached structured parking leading to the redevelopment of surface lots, redesign of the street grid because of development, and streetscape management.
- Phase 3 – the full build out will include high-density, mixed-use buildings, completion of pedestrian networks and vehicle roadways, and reallocation of parking facilities behind or integrated into buildings. This phase is anticipated to occur in the next 20+ years (approx. 2039-TBD).

The City anticipates using the Library Pond as a regional stormwater facility to mitigate stormwater treatment and flow control requirements associated with private redevelopment and public improvements in the Town Center Plan area. Design and construction of the Library Pond retrofit may be funded exclusively through system development charges (SDCs) applied to Town Center redevelopment, allowing the City to charge Town Center development a fee-in-lieu.

Section 2: City of Wilsonville Stormwater Design Standards

Over the past decade, stormwater management practices in Oregon have evolved to require consideration of hydromodification as well as more traditional water quality and peak flow (detention) requirements. Hydromodification is the change in runoff patterns caused by land use and impervious area changes that result in the degradation of stream channels and water quality (i.e., stream erosion from the extended duration of peak flows). Traditional stormwater treatment and detention design practices typically analyze pre- and post-development peak flows associated with a standard (i.e., 24-hour) synthetic design storm. A hydromodification standard requires continuous simulation flow modeling to evaluate both peak flow but also the duration of flows exceeding a specific recurrence interval. Adherence to a hydromodification standard assumes that peak flow and flow duration for the post-development condition does not exceed the pre-developed condition for a range of geomorphically significant flows—those capable of moving sediment and eroding streambanks. For the City of Wilsonville, the range of geomorphically significant flows is established as 42 percent of the 2-year flow to the 10-year flow.

Given the complexity of evaluating stormwater controls to adhere to a hydromodification standard, municipalities that have adopted a hydromodification standard have also developed tools to aid developers with design.

2.1 Design Standards

The City's Public Works Design Standards (PWS) (i.e., *City of Wilsonville's 2015 Stormwater & Surface Water Design & Construction Standards, Section 3*) were updated in December 2015 to emphasize low-impact development (LID) facilities that incorporate infiltration to address both pollutant reduction and flow control as well as develop facility sizing to address hydromodification impacts.

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2.2 BMP Sizing Tool

The cities of Wilsonville and Oregon City, together with Clackamas Water Environment Services (WES) developed a custom tool, referred to as the BMP Sizing Tool, to help size stormwater facilities for hydromodification-based standards. The BMP Sizing Tool (last updated in 2017) is used in conjunction with the City's PWS and by developers and engineers to automate some of the required calculations to support sizing and design for a specific set of stormwater management facility types based on long-term rainfall records, soils, and land use cover data. The BMP sizing tool can be used to calculate the following BMP types:

- Rain Garden - Filtration and Infiltration
- Stormwater Planter - Filtration and Infiltration
- Vegetated Swale - Filtration and Infiltration
- Infiltrator
- Detention Pond

The BMP Sizing Tools offers two design options: (1) treatment and flow control, or (2) treatment only. The BMP types that are available for each design option depend on the native soil infiltration rate at the location of the BMP facility. The tool was developed based on local conditions (rainfall, soil characteristics, etc.) for Clackamas County, Oregon. The distinction between infiltration and filtration is based on the facility soil subgroup. Groups A1 – B3 include infiltration rates greater than 0.50 in/hr and are considered acceptable for use with infiltration facilities. Groups C1 – D1 reflect infiltration rates from 0.02 – 0.49 in/hr and are considered acceptable for use with filtration facilities. Infiltration facilities use only infiltration to manage runoff. Filtration facilities include piped underdrain systems and orifice controls.

The following table is an excerpt from the *User's Guide for the BMP Sizing Tool* which shows the BMP sizing dimension for each facility type. The focus for this analysis will be on the capabilities of the Detention Pond for treatment and flow control settings in the tool.

Table 4. BMP Dimensions Required for the Sizing Tool to Apply

Facility	Drain Rock, min. in.	Separation Layer, in.	Growing Media, min. in.	Ponding Depth, in.	Freeboard, min. in.	Side Slope, ratio	Bottom Width, min. in.	Liner
Stormwater Planter - Filtration	12	3	18	12	4	0	18	If required
Stormwater Planter - Infiltration	28	3	18	12	4	0	30	No
Rain Garden - Filtration	18	3	18	12	4	3:1 max	24	If required
Rain Garden - Infiltration	18	3	18	16	N/A	3:1 max	24	No
Vegetated Swale - Filtration	12	3	18	12	4	3:1 max	24	If required
Vegetated Swale - Infiltration	18	3	18	12	N/A	3:1 max	24n	No
Detention Pond	15	3	18	Per sizing model (12 in. min.)	12[a]	3:1 max	N/A	If required

a. The surface area of the detention pond, the filtration rain garden and the filtration swale sized by the tool does not take freeboard into account. In addition, see Note 12 on the Detention Pond detail regarding an emergency spillway.

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Although the table states a side slope ratio of 3H:1V max for detention ponds, the 2015 PWS section 301.4.09 states a General Facility Design Requirement that stormwater management facilities shall not exceed 4H:1V up to the maximum design water elevation. The initial analyses used 4H:1V sizing requirements. After review by the City, the scenarios were refined to optimize pond sizing and incorporated a 3H:1V side slope to maximize potential storage at Library Pond.

For detention ponds, the tool can be used to either calculate a simple geometry or a custom geometry. A simple geometry uses a known surface area or depth and entered slope to calculate the bottom area and depth or surface area (whichever was initially an unknown variable). While the custom geometry relies on known depth, area, and flow values. For each configuration option, the BMP Sizing Tool routes the post-development flow through the pond, performs statistical analyses for flow duration and peak flow criteria, and reports if the pond is sized adequately.

For ponds sized using simple geometry, the required outlet dimensions for the pond will be calculated. This includes inverts and dimensions of lower orifice, upper orifice, and overflow weir which correspond to the provided facility schematic (see Figure 1). Figure 1 depicts the main features of the outlet structure with the locations of their inverts. The overflow weir is at 1 foot below the 10-year pond water surface elevation. It is assumed that the pond will need to include additional freeboard (typically 1 foot) above the 10-year water surface elevation.

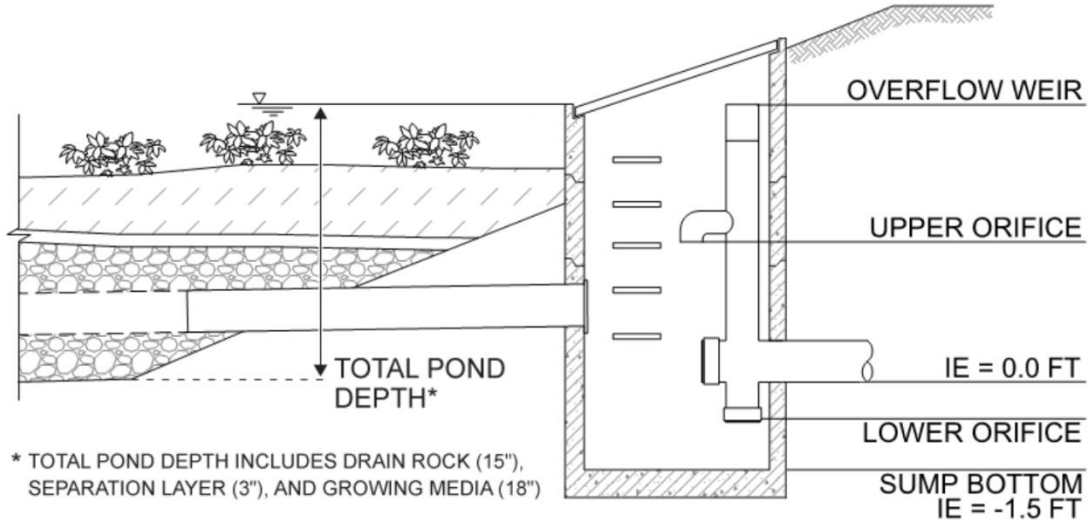

Figure 1. Detention pond facility schematic

The BMP Sizing Tool also calculates flow duration and peak flow frequency curves to compare pre-development to post-project flows. The curves represent the flow and duration over the range of geomorphically significant flows (i.e., lower threshold of 42 percent of the 2-yr storm and an upper threshold of the 10-yr storm). When a pond is adequately sized the mitigated post-development curve (blue per the BMP Sizing Tool output) falls below the pre-development curve (red per the BMP Sizing Tool output). It will also be sized to ensure treatment of 80 percent of the average annual runoff.

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Section 3: Evaluation and Methodology

With the 2015 updates to the PWS, the Library Pond as it exists today does not meet the City's current stormwater design and construction specifications. This TM documents the evaluation of the existing pond location and footprint against several pre- and post- development scenarios. The process used for this evaluation of the facility includes:

1. Utilize facility as-builts, the InfoSWMM model, and the Town Center Plan to determine the current pond facility size, contributing drainage area and land use, and the pond's stage storage curve;
2. Determine if the current pond storage volume and outlet structure address current flows reflective of existing development conditions and pre-development flows reflective of historic land use conditions, as required in the 2015 PWS;
3. Use the BMP Sizing Tool to compare pond sizing and outlet adjustments, assuming existing development conditions and historic land use conditions, to meet the minimum criteria in the City's design standards;
4. Locate potential impervious areas within the Town Center redevelopment for upstream, low impact development (LID) planter facilities to meet the City's water quality treatment and flow control requirements associated with the City's established hydromodification standard;
5. Use the BMP Sizing Tool to iterate and optimize pond sizing and outlet configurations in conjunction with LID sizing/placement to meet the City's design standards in conjunction with future development of the Town Center and associated site constraints, and
6. Document LID placement needs associated with future development to determine fee-in-lieu policy implications.

To evaluate Library Pond sizing in conjunction with the above-mentioned process, the 11 subbasins (delineated as part of the SMP) that drain into the Library Pond were subdivided based on various land cover and impervious conditions reflective of pre-development, existing, and future development conditions. Under future development conditions, the Town Center development plans include demolition of existing stormwater infrastructure and installation of new pipes to convey stormwater drainage in conjunction with the proposed roadway configuration.

Because the existing footprint of the pond, approximately 0.7 acres, is constrained by limitations (roadways, trees, etc.), simple pond sizing was employed by holding the pond surface area constant and allowing the BMP Sizing Tool to calculate a required pond depth and bottom surface area.

3.1 Discharge Management Areas

The BMP Sizing Tool requires users to first delineate Discharge Management Areas (DMAs), also referred to as subcatchments, which are used to define a contributing drainage area to each planned BMP facility on a site. The BMP Sizing Tool has limitations on the size of individual DMAs to individual LID facilities. In addition, to facilitate iteration of scenarios related to BMP sizing, flexibility had to be incorporated into the DMAs. Therefore, the contributing drainage area to the Library Pond had to be categorized and subdivided.

The DMAs were initially developed by subdividing each of the 11 subbasins (totaling 179.8 acres) into their respective Hydrologic Soil Groups (HSGs) - either B, C, or D (note: soils that fell into a dual-HSG category are reflected by the less infiltrating soil. For example, a soil in group C/D was calculated as HSG D). The total area of analysis was found to be 35% HSG B, 42% HSG C, and 23% HSG D, with the actual site of Library Pond in HSG B soils.

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The areas were then further subdivided by land cover to separate existing roadways/Right-of-ways (ROWs) from private property. Existing ROW areas were confirmed against the future Town Center Plan to ensure the area would remain roadways in the future development condition. Similarly, building (rooftop) area and pavement areas were also designated and digitized to inform the delineation of DMAs. An example of how this hierarchy was implemented is shown in Figure 2.

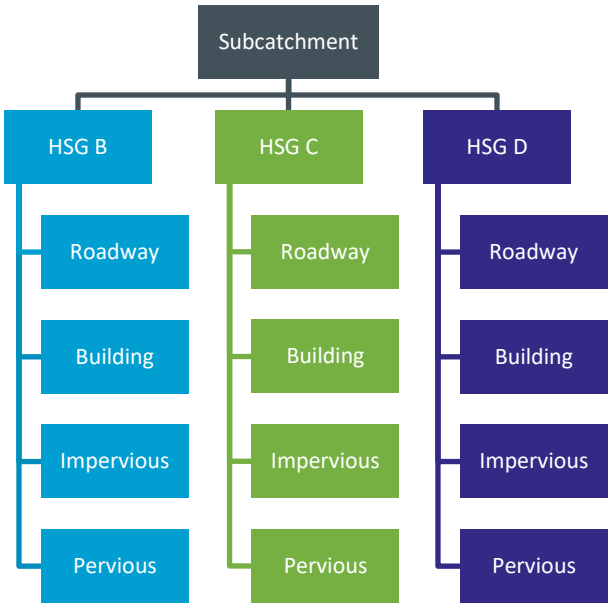

Figure 2. Example hierarchy of how the subcatchments were divided into DMAs

The DMAs were set-up to meet each of the three (3) initial scenarios for evaluation:

1. Pre-development (Oak Savanna) to existing conditions (today)
2. Pre-development (Oak Savanna) to future conditions (Town Center build out)
3. Existing conditions (today) to future conditions (Town Center build out)

To accommodate each of these scenarios, a total of 98 individual DMAs were established to represent the soil characteristics and development types over the 11 subcatchments. Each of the DMAs has a unique pre-development and post-development surface types associated with a specific soil type.

A database and specific naming convention was used to track DMAs and associated information. DMAs were named by subcatchment number, HSG letter, the existing development type, and the future development type. For example, a DMA from scenario 3 may read as 3414_D_Ex_Perv_Fu_Imp with an area of 3,995 square feet. This naming convention indicates that this DMA is currently a pervious surface (noted as Grass in the tool) but is anticipated to become an impervious surface (Conventional Concrete or Asphalt) under the full Town Center development.

3.2 Best Management Practices

Although the BMP Sizing Tool has eight (8) available facility types to develop sizing, this analysis focused on the Detention Pond with treatment and flow control to represent the Library Pond. Since the Library Pond is located in HGL B soils, the more conservative group B value (called B3 in the tool) with an infiltration rate of 0.50-0.99 in/hr was used to represent these soils. This range was verified against data from the United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) soil survey database which identified the soil in this area to be primarily Willamette silt loam with a saturated hydraulic conductivity (Ksat) between 0.57-1.98 in/hr.

The pond was modeled using both custom and simple geometry in the tool in order to compare existing pond sizing as well as determine sizing and outlet control adjustments. The custom geometry was used in the BMP Sizing Tool to represent the existing facility under current and future conditions to confirm if it meets design standards. For the custom sizing, the geometry data was extracted from the InfoSWMM model (based on the 1992 as-built data) to determine the depth in feet (ft), area in square feet (sq ft), and flow in cubic feet per second (cfs) based on modeled stage storage for the 10-year storm event. The stage storage information extracted from InfoSWMM is listed in Table 1.

Table 1. Library Pond Stage Storage

Depth (ft)	Area (sq ft)	Flow (cfs)
0	0	0
1	10,018	9.4
2	17,859	14.3
5	23,522	19.7
9	32,670	Not reached in 10-year storm
10	34,848	Not reached in 10-year storm

It is assumed that usable storage within the pond must remain below the elevation of the chain link fence at its lowest position (near the outlet structure where it passes under the road). This elevation contour of 147 ft is considered the upper limit of the pond with a calculated surface area of 30,130 sq ft. The lowest full elevation contour of the pond was calculated to be 137 ft with a surface area of 17,800 sq ft. It was assumed that the existing footprint of the pond is a hard constraint, and the surface area of the pond could not be expanded.

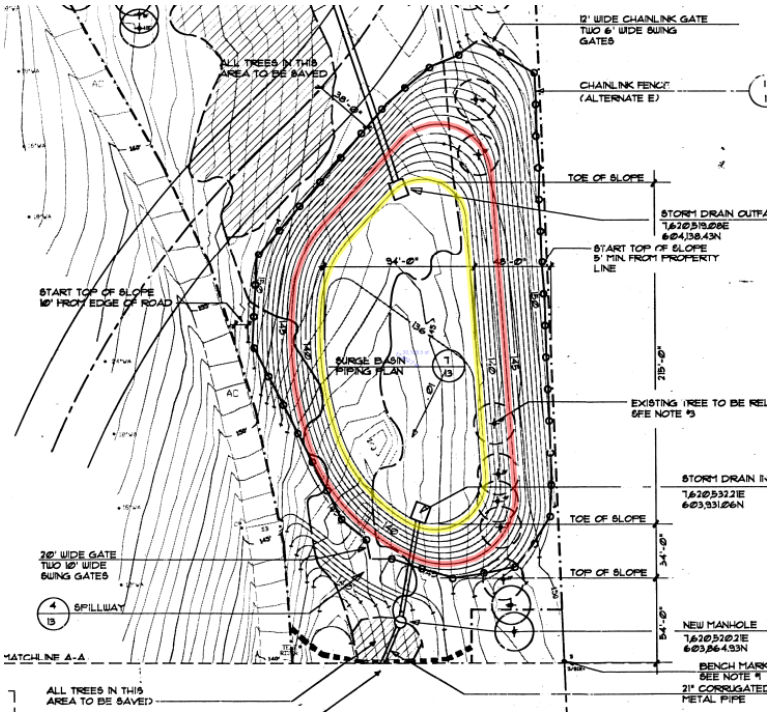

Figure 3. Library Pond 1992 as-builts, upper 147 ft contour (red) and lower 137 ft contour (yellow)

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Alternatively, the simple geometry calculation was used to confirm modifications needed to retrofit the pond to current PWS design standards, based on each of the scenarios. The simple geometry could be run with either a known pond surface area, a known depth, or both. If one variable is unknown the tool calculates it based on the provided information for the surface area and/or depth and slope (H:V), as well as calculated the bottom area of the pond. Values for the surface area and slope were rounded to the nearest whole number for calculations.

Since the detention pond is being evaluated to meet both the water quality and flow control criteria, the BMP Sizing Tool was used to evaluate and size the pond facility to address peak flow duration matching for flows ranging from 42 percent of the 2-year peak flow to the 10-year peak flow as well as ensure treatment of 80 percent of the average annual runoff.

Section 4: Scenarios

The following three (3) scenarios were established to compare past, present, and future conditions of the Town Center Development area and associated sizing of the Library Pond. Each scenario was input into the BMP Sizing Tool to see how the system (pond) would respond under the varying development assumptions, with accompanying scenarios evaluated to confirm what level of retrofit or policy change regulating upstream LID installations are needed to meet the City's design standards.

4.1 Scenario 1: Pre-development to Existing Conditions

This scenario simulated pre-development conditions, referred to as Oak Savanna in the 2015 PWS, and existing development conditions to confirm whether the existing Library Pond sizing is adequate to meet design standards. The contributing drainage area under existing conditions is 47 percent impervious. In comparison, Oak Savanna is considered 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type.

Simply comparing the aerial photography from 1992 (which is not representative of Oak Savanna but represents the oldest web accessible archived image) to aerial imagery from 2022, it is evident that this area has experienced a large amount of development over the past 30 years.

Figure 4. Aerial images of site and surrounding area

Left: after retrofit in June 1994

Right: July 2022, representative of existing condition.

4.1.1 Pond Sizing Evaluation

Simulation of the Library Pond configuration in the BMP Sizing Tool indicates that the existing pond does not meet the current stormwater design standards per the 2015 PWS. The existing pond geometry was entered into the tool using stage storage information from the 1992 as-builts and SMP InfoSWMM model. As seen in Figure 5, the blue line represents the discharge occurring from the pond and it is consistently higher than the red, pre-development (Oak Savannah) flow frequency and flow duration curves. Library Pond in its current configuration does not adequately match the pre-development curves and additional pond storage is needed.

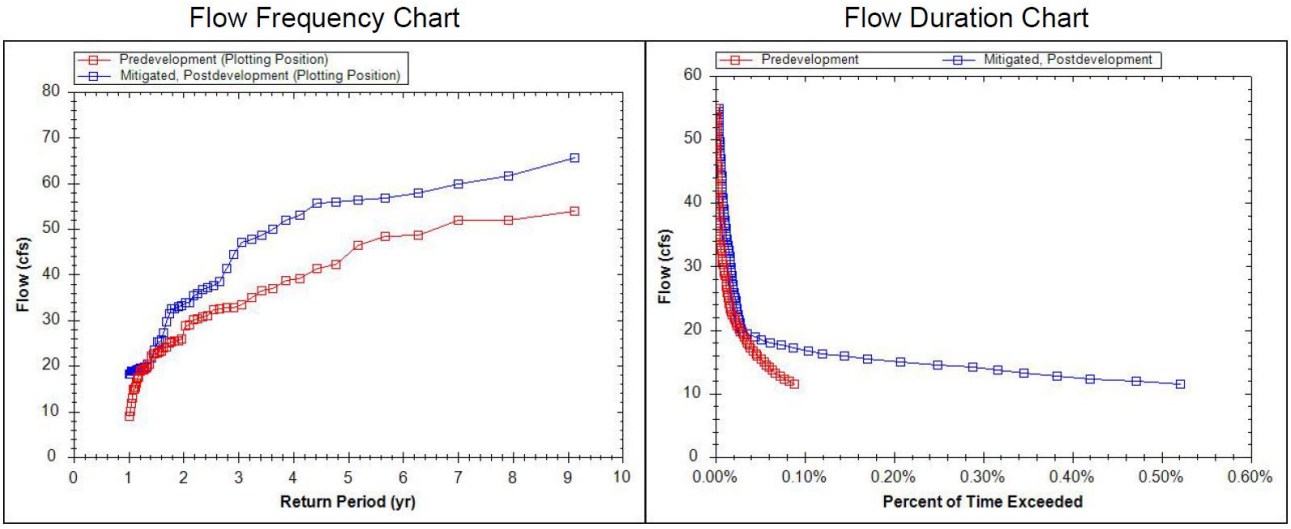

Figure 5. Curves based on existing stage storage information from as-builts

Pre-development shown in red. Mitigated, Post-Development shown in blue.

4.1.2 Pond Retrofit Evaluation

The BMP Sizing Tool was used to simulate additional scenarios associated with the pond configuration and size, as outlined in Table 2, to calculate pond retrofits required to meet current design standards. The BMP Sizing Tool calculations show that significant design modifications are required to ensure the pond is adequately sized; specifically the pond would need to be retrofit to have 1H:1V side slopes with a depth of nearly 24 feet (Figure 6) to adhere to the City's hydromodification standard (see Attachment A, Scenario 1A). This design fails to meet the design criteria for detention ponds having 3H:1V slopes and results in an excessively deep detention facility. Retrofit of the pond to meet City design standards based on existing development conditions is considered infeasible.

Table 2. Scenario 1 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information per as-builts				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, geometry doesn't work
	1:1	Auto calculate depth	23.98	15,780	Yes, sized adequately

Note: there is some variation between calculated depths with the same slope based on the tool and the outset structure sizing/configuration.

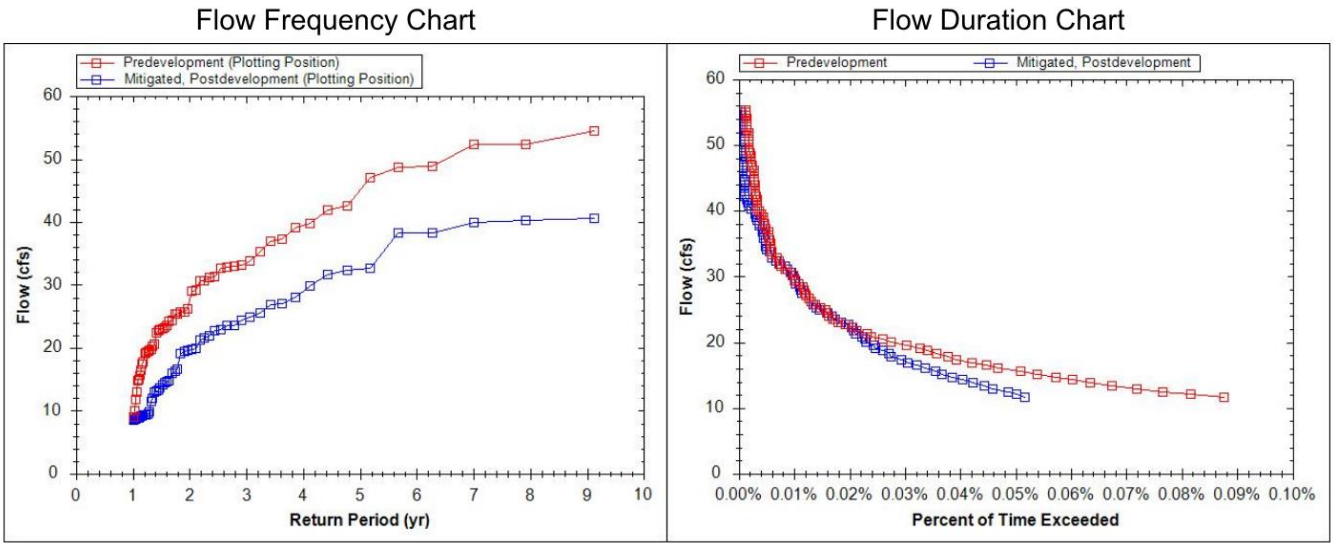

Figure 6. Flow frequency and duration curves if retrofit is to have 1H:1V side slopes and a depth of nearly 24 feet

Pre-development (red) to Existing condition (blue)

4.1.3 Onsite Flow Mitigation Evaluation

An additional, theoretical investigation was conducted to see how much of the current contributing drainage area to Library Pond would need to be managed onsite (i.e., routed to onsite LID) for the pond to meet current design standards.

To evaluate, the BMP Sizing Tool was used to automatically size the detention pond, maintaining the existing pond surface area of 30,130 sq. ft., and adjusting the side slopes to meet the PWS of 3H:1V. The automatic sizing mode to calculate the depth and bottom area of the pond. DMAs were then selectively removed from contributing area to the detention pond with the assumption that removed DMAs would require onsite stormwater management (retention) and use of LID such as planters or raingardens.

By removing approximately 20 percent of the existing total drainage area (roughly 36 acres of impervious surface or 43% of the contributing impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. This reduces the total drainage area to the Library Pond to 143.3 acres. The resulting pond sizing requires deepening the Library Pond to 15.08 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,906 sq. ft. See Attachment A, Scenario 1B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.08 feet and 3H:1V side slopes is as follows in Figures Figure 7 and Figure 8.

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Structure	Size
Lower Orifice Diameter	9.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	25.2 in
Upper Orifice Invert	9.8 ft
Weir Length	6.3 ft
Weir Invert	13.6 ft

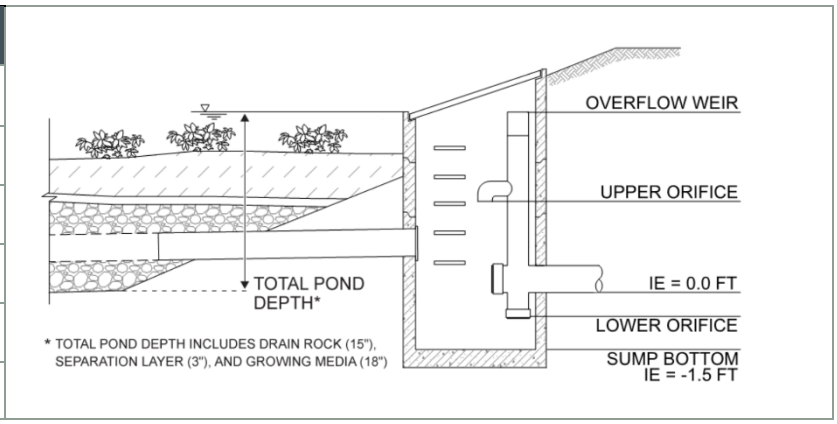

Figure 7. Scenario 1 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

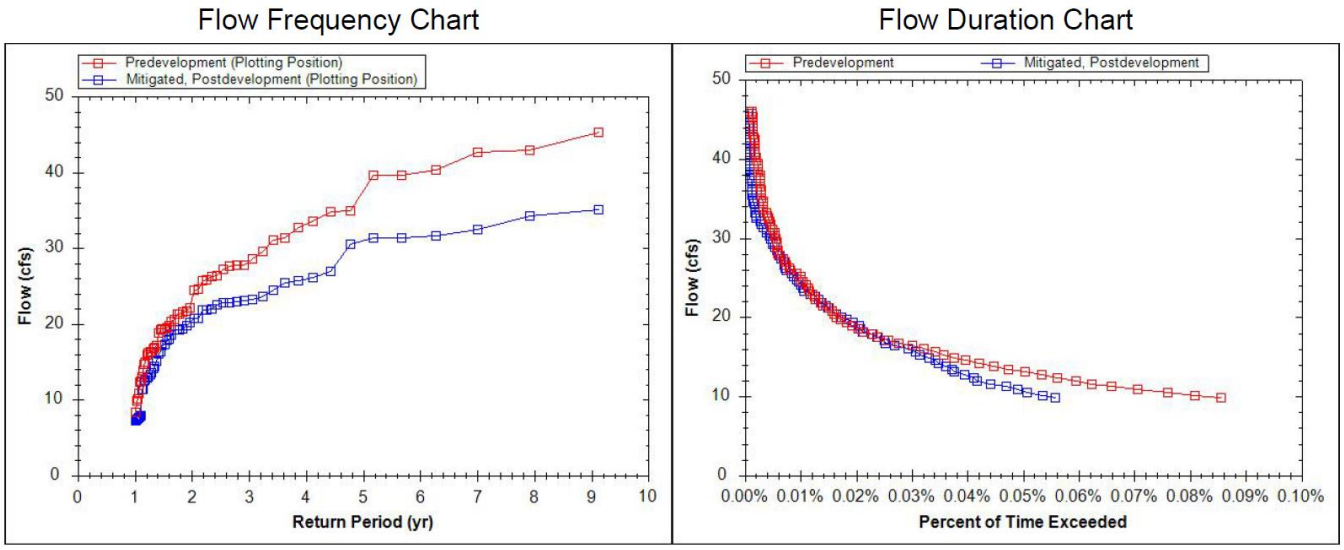

Figure 8. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to existing condition (blue)

4.2 Scenario 2: Pre-development to Future Conditions

The second scenario was simulated in the BMP Sizing Tool, comparing pre-development conditions, referred to as "Oak Savanna" in the 2015 PWS, to the future development conditions outlined in the Town Center Plan at full build out (20+ year planning horizon) to confirm sizing needs for the Library Pond. The contributing drainage area under future conditions is 53 percent impervious. In comparison, Oak Savanna is 100 percent pervious, with all DMAs identified as 'Grass' for the pre-development surface type. Like Scenario 1, expansion of the existing footprint of the pond, approximately 0.7 acres, is not possible due to constraining site limitations (roadways, trees, etc.).

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4.2.1 Pond Sizing and Retrofit Evaluation

Based on Scenario 1 findings, it is assumed that the existing pond sizing would not meet the City's design standards as is in conjunction with future redevelopment of the Town Center area (Figure 9). Since the existing pond configuration does not meet the City's design standards for existing development conditions, it was not expected that the pond is adequately sized for future development conditions either.

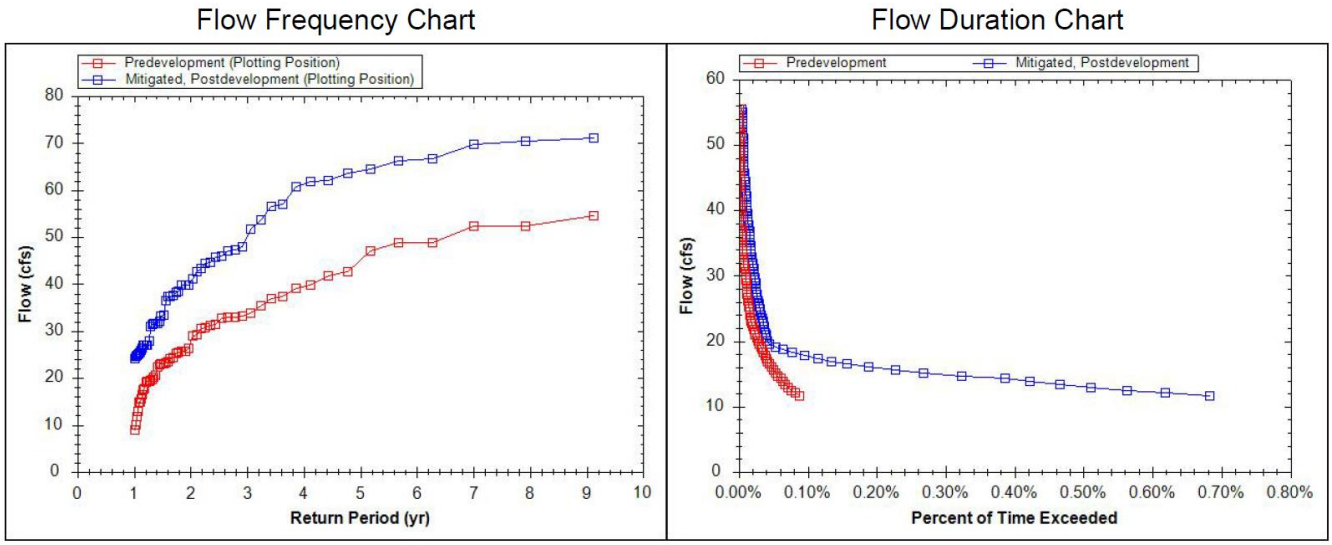

Figure 9. Flow frequency and duration curves based on existing stage storage information from as-builts

Pre-development shown in red and future development conditions shown in blue.

The BMP Sizing Tool was simulated for the additional scenarios outlined in Table 3 to calculate the required pond sizing and retrofit needs. As shown in Table 3 and Figure 10, like with the previous scenario, the BMP Sizing Tool calculated that the pond would have to be retrofit to have 1H:1V side slopes with a depth of approximately 30.4 feet and a bottom geometry of over just over 12,700 sq. ft to meet current design standards (see Attachment A, Scenario 2A). However, these detention pond design criteria do not meet the 2015 PWS requirements.

Table 3. Scenario 2 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	3:1	Auto calculate depth	Cannot be calculated, bottom reaches zero before depth is reached		No, geometry doesn't work
	2:1	Auto calculate depth	43.39	0	No, not large enough
	1:1	Auto calculate depth	30.40	12,719	Yes, sized adequately

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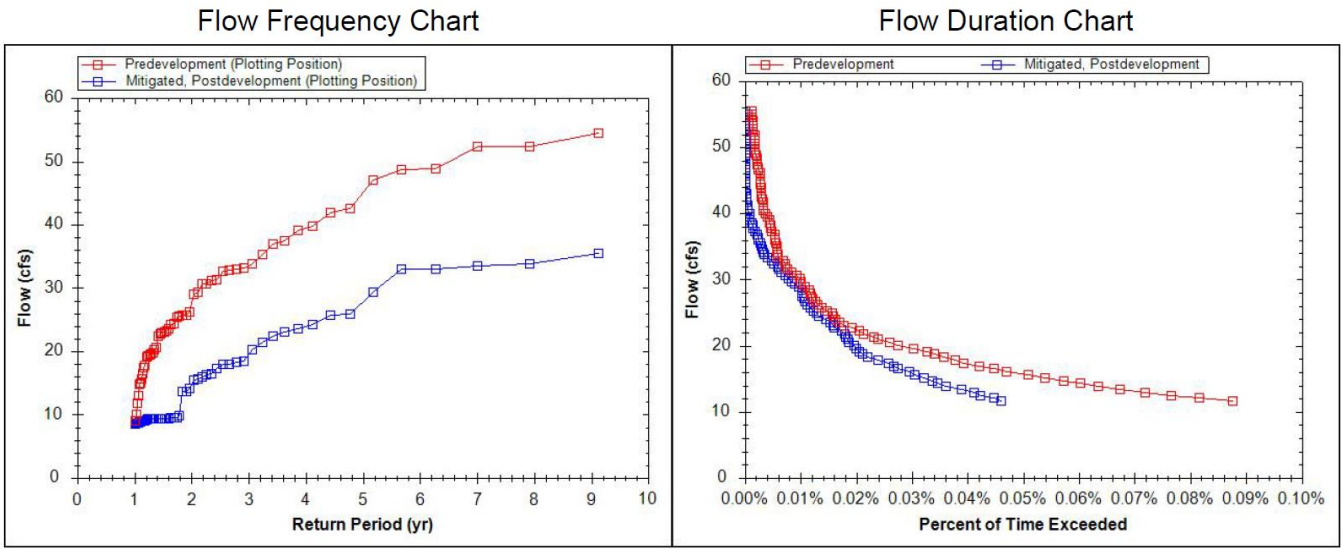

Figure 10. Flow and durations curves if retrofit was to have 1H:1V side slopes with a depth of over 30 feet.

Pre-development (red) to future development conditions (blue).

4.2.2 Onsite Flow Mitigation Evaluation

Based on these findings, a secondary analysis for Scenario 2 was developed. Similar to Scenario 1, this analysis removed select DMAs from contributing to the pond, assuming that these areas could be treated by additional LID facilities, to determine how much of Town Center property would require onsite stormwater management in order for Library Pond to meet City design standards.

Again, to evaluate the reduction in DMAs, the BMP Sizing Tool maintained the existing surface area of 30,130 sq. ft., set the slope to meet the City directed use of the PWS maximum of 3H:1V, and used the automatic sizing mode to calculate the depth and bottom area of the pond.

By removing approximately 27 percent of the total contributing drainage area (approximately 48 acres impervious area) to Library Pond, the BMP Sizing Tool was able to size the pond to meet PWS requirements. All 48 acres of removed DMAs were impervious surfaces and represents all roadways (approximately 27 acres) plus an additional 21 acres of impervious area. **The removed impervious surfaces to be redirected constitutes 50 percent of the total new or redeveloped impervious surfaces contributing to the pond.** This removed area was assumed rerouted to infiltration planters onsite and modeled in the BMP Sizing Tool through a series of Stormwater Water Planter BMPs that connect to Library Pond as upstream LIDs. Although site-specific infiltration testing would be needed to confirm whether an infiltration or filtration-based LID is needed, for integration into the BMP Sizing Tool an infiltration planter that provides treatment and flow control was selected. Since the facility infiltration rate at Library Pond is associated with HSG B3 (0.50-0.99 in/hr), for purposes of this initial analysis the same infiltration rate was assumed as a representative of the soils for the LID facilities. With a portion of contributing drainage area removed, the total drainage area to Library Pond to 131.8 acres. The resulting pond sizing requires deepening the Library Pond to 15.04 feet (including the 3 feet of media at the bottom) and maintaining a bottom area of 6,946 sq. ft. See Attachment A, Scenario 2B.

The pond schematic and structure sizing reflecting the reduced contributing drainage area, a depth of 15.04 feet and 3H:1V side slopes is as follows in Figure 11 and Figure 12.

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Structure	Size
Lower Orifice Diameter	10.6 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	27.4 in
Upper Orifice Invert	10.1 ft
Weir Length	6.3 ft
Weir Invert	14.0 ft

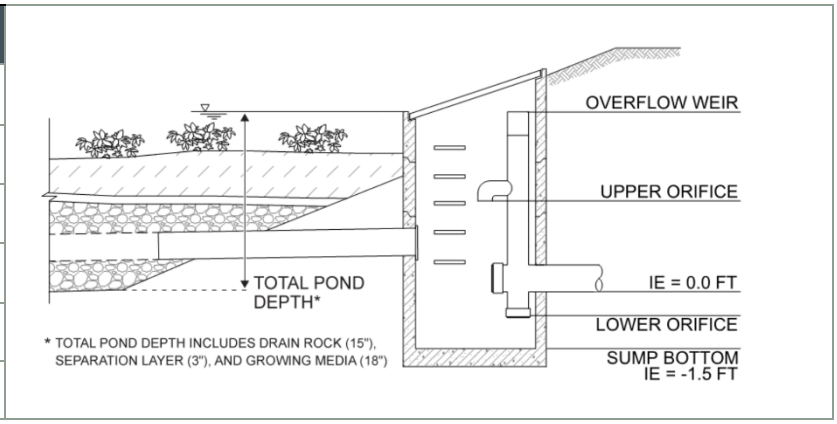

Figure 11. Scenario 2 outfall structure sizing and schematic for reduced contributing drainage area and 3H:1V sides slopes

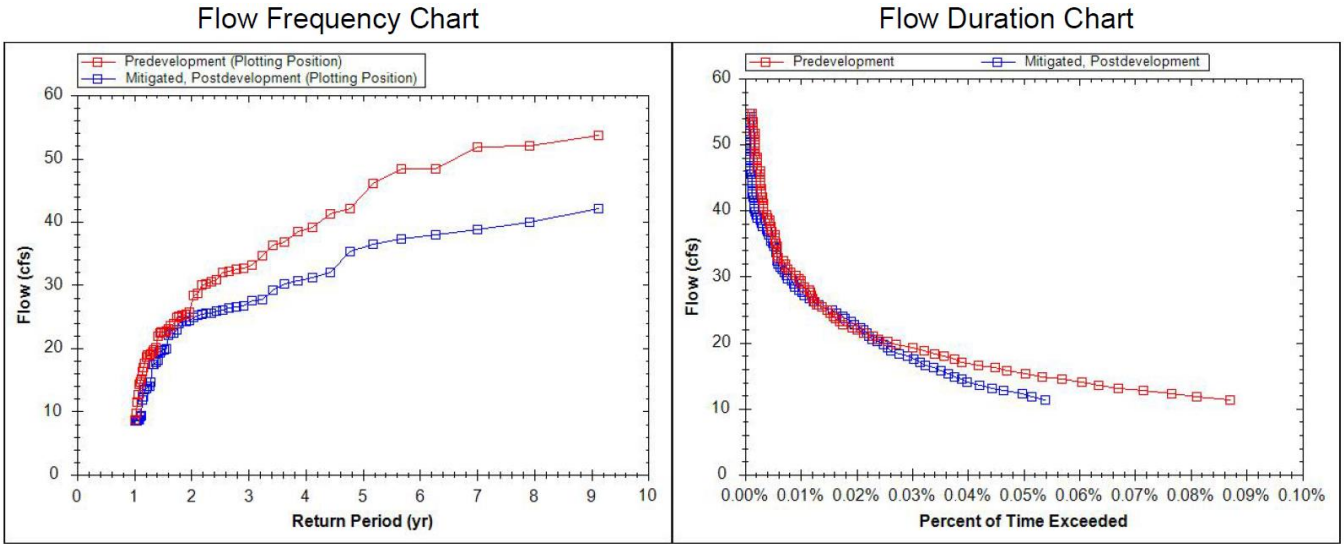

Figure 12. Reduced contributing drainage area for flow frequency and duration curves with a 3H:1V pond

Pre-development (red) to future development condition (blue).

4.3 Scenario 3: Existing to Future Conditions

The last scenario assumes that adherence to the City's design standards could be accomplished by allowing redevelopment of Town Center to adhere to predevelopment flows reflecting existing land use conditions as opposed to historic (Oak Savannah) land cover conditions. The contributing drainage area under existing conditions is 47 percent impervious and under future conditions increases to 53 percent impervious through both redevelopment and the addition of approximately 10 acres of impervious surface. As seen in Figure 13, the Town Center development plans anticipate redevelopment of many currently developed and impervious areas, which is why the amount of impervious area only increases by about 7 percent. However, all redevelopment area is subject to the City's design standards including utilization of Green Infrastructure and Low Impact Development (GI/LID) strategies to mitigate stormwater.

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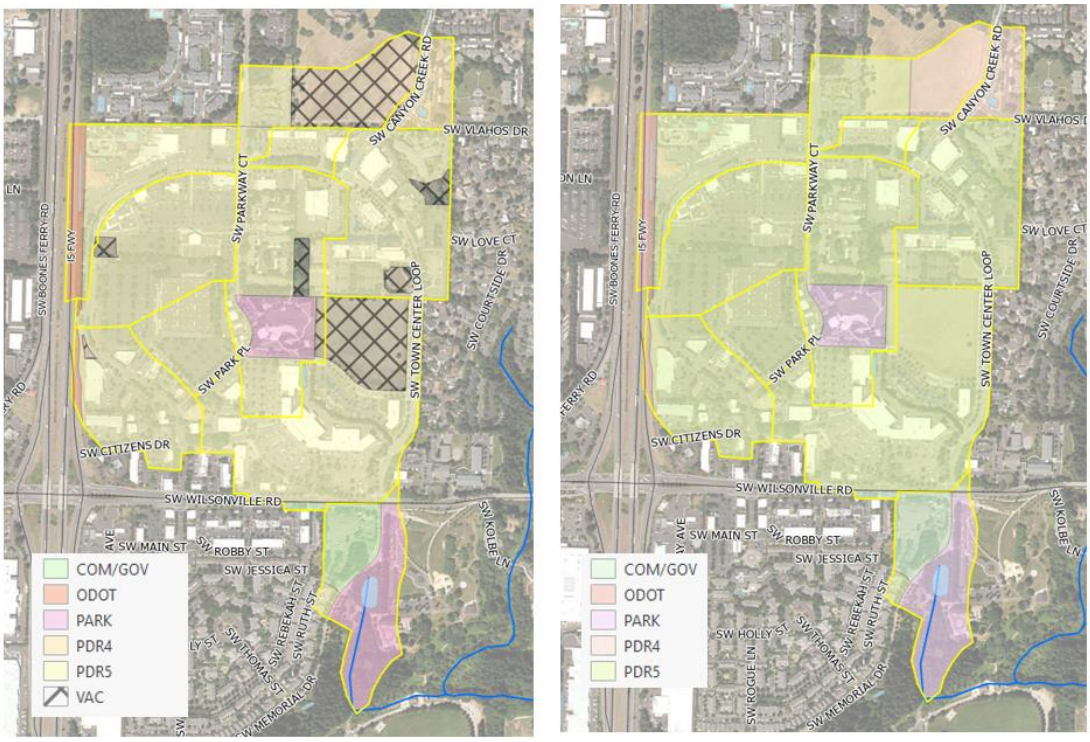

Figure 13. Existing land use at 47% impervious (left); future land use at 53% impervious (right)

The BMP Sizing Tool was run through the following scenarios outlined in Table 4 to calculate how the existing pond may handle future flows as well as design modifications that would be required.

Assuming pre-development conditions reflect existing land use, the pond as-is does not adequately meet City design standards for sizing. Some modifications to Library Pond are required, specifically the pond needs to be deepened to approximately 7.1 feet, which includes 3 feet of media at the bottom of the facility and adjustment of side slopes to 4:1 is required. Utilizing this comparison methodology, this approach requires a policy change since for the City since it redefines "pre-development" from historic (Oak Savanna) land coverage to current land use conditions.

Table 4. Scenario 3 Iterations

Geometry Type	Slope (H:V)	Sizing Mode	Depth (ft)	Bottom Area (sq ft)	Does it Pass the Tool?
Custom Geometry	Stage Storage Information				No, not large enough
Simple Geometry	4:1	Auto calculate depth	7.09	13,656	Yes, sized adequately
	3:1	Auto calculate depth	6.24	18,534	Yes, sized adequately

Note: Additional analysis of slopes 2H:1V and 1H:1V were not recorded as the 4H:1V and 3H:1V slope design standard slope meets sizing requirements.

The pond schematic and structure sizing reflect a depth of 7.09 feet and 4H:1V side slopes is as follows in Figure 14 and Figure 15.

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Library Pond Evaluation TM_v4

Structure	Size
Lower Orifice Diameter	16.9 in
Lower Orifice Invert	0.0 in
Upper Orifice Diameter	40.9 in
Upper Orifice Invert	4.8 ft
Weir Length	6.3 ft
Weir Invert	6.1 ft

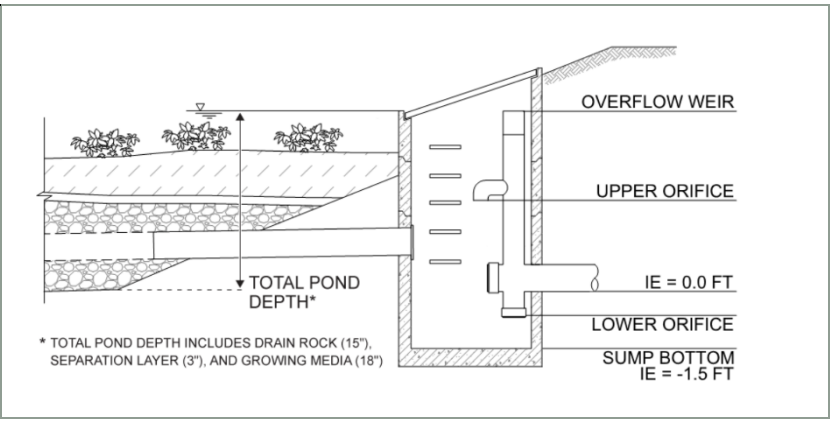

Figure 14. Scenario 3 outfall structure sizing and schematic for reduced contributing drainage area and 4H:1V sides slopes

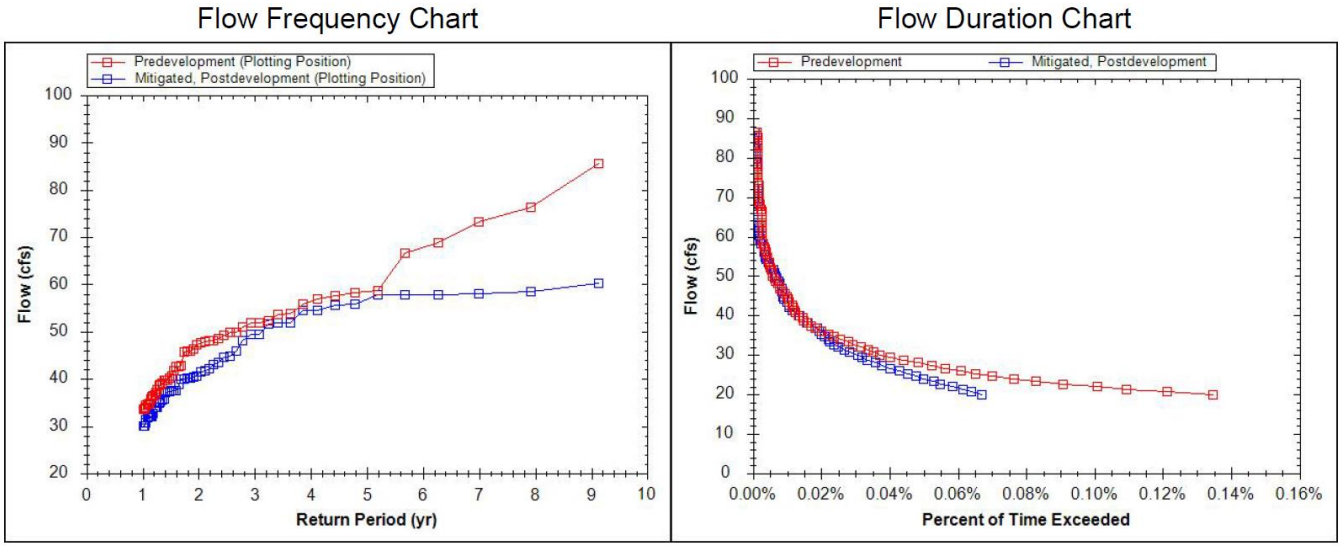

Figure 15. Flow and durations curves show adequate sizing for 4H:1V side slopes at 7.09 feet deep

Existing development conditions (red) to future development conditions (blue).

Section 5: Conclusions

Scenarios simulated using the BMP Sizing Tool for Library Pond indicate there are limited options to retrofit the pond to meet the existing stormwater design standards. Table 5 summarizes the scenarios iterated and the resulting design adjustments (retrofit) required for Library Pond based on assumptions discussed in Section 4.

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Library Pond Evaluation TM_v4

Table 5. Scenario Summary							
Scenario No.	Scenario Description and Land Cover Conditions	Total Contributing Area (acres)	Meets Hydraulic Requirements?	Pond Retrofit Requirements		Meets Pond Design Criteria?	Notes
				Slope (H:V)	Depth (feet)		
1.A	Pre-Development Land Cover to Existing Land Cover	179.8	Yes	1:1	21.33	No	Pond sides are too steep and pond is too deep
1.B	Pre-Development Land Cover to Existing Land Cover	143.3	Yes	3:1	15.08	Yes	Requires onsite mitigation (retention) for 36 acres of existing impervious area
2.A	Pre-Development Land Cover to Future Land Cover	179.8	Yes	1:1	32.01	No	Pond sides are too steep, and pond is too deep
2.B	Pre-Development Land Cover to Future Land Cover	131.8	Yes	3:1	15.04	Yes	Requires onsite mitigation (retention) for 48 acres of existing impervious area
3	Existing Land Cover to Future Land Cover	179.8	Yes	4:1	7.09	Yes	Requires an established policy adjusting the definition of pre-developed land cover for Town Center redevelopment.

As seen in Table 5, Scenarios 1A and 2A are unable to meet the 2015 PWS stormwater design standards for ponds, specific to side slope (both are 1H:1V and the standard is 3H:1V) and depth. Only if onsite retention occurs for a portion of the upstream contributing drainage area will pond retrofit be able to meet the City's design standards. Only Scenario 3 allows for the entire upstream contributing drainage area to be managed by Library Pond and the pond adhere to design criteria outlined in the PWS. This pond retrofit can be designed with a more gradual 4H:1V slope, and results in a reasonable pond depth of 7.09 feet deep, which is shallower than the existing Library Pond with the 3 feet of required media in the bottom.

However, Scenario 3 mandates a policy change to adjust pre-development land cover from historic Oak Savanna to current land use conditions. This consideration will need to be evaluated by the City.

If a policy change related to the pre-development condition associated with Town Center is not possible, Scenarios 1B and 2B reflect the percentage and acreage of impervious area that would need to be retained or managed onsite using GI/LID BMP facilities and no longer routed to Library Pond. The following assumptions were made to estimate the amount of onsite infiltration planters required to offset 48 acres of impervious surfaces in the future condition (or 50% of the total new or redeveloped impervious area to Library Pond).

- Pre-development conditions are grass cover per PWS Oak Savanna designation with soil conditions reflective of the associated HSG;
- Soil and infiltration characteristics for the LID facilities are similar to that of the Library Pond, characterized as B3 (0.5-0.99 in/hr infiltration), which prompts use of an infiltration facility;
- Per Appendix B of the BMP Sizing Tool User Manual, onsite LID sizing would equate to a sizing factor of approximately 7.4, based on an area weighted average of sizing factors and soil characteristics for area removed from the Library Pond drainage area.

Using the above assumptions, onsite retention of 48 acres of impervious surface is possible using approximately 154,725 sq. ft. (3.6 acres) of infiltration planters located throughout the Town Center development. It should be noted that site-specific infiltration testing may result in adjustment of the LID sizing and/or need for a filtration-based facility to be used instead.

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Library Pond Evaluation TM_v4

Retrofit of the Library Pond would require regrading and structural improvements, resulting in a 3:1 side slope and depth of 15.04 feet. This is a conservative design approach and conservative design assumptions based on onsite management of approximately 48 acres of the contributing drainage area to Library Pond onsite. Pond sizing may vary depending on the use and characteristics of upstream LID.

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Library Pond Evaluation TM_v4

References

Stormwater & Surface Water Design & Construction Standards, Section 3, "Public Works Standards," City of Wilsonville, 2015, pp.1-104.

User's Guide for the BMP Sizing Tool, City of Wilsonville and City of Oregon City, 2017, pp. 1-23.

Wilsonville Town Center Plan, City of Wilsonville, 2019, pp. 1-104.

Attachment A: BMP Sizing Tool Scenario Reports

1. Scenario 1 – Stage Storage Report
2. Scenario 1A – Automatically Calculated Depth Report
3. Scenario 1B – Automatically Calculated Depth Report – Reduced Area
4. Scenario 2 – Stage Storage Report
5. Scenario 2A – Automatically Calculated Depth Report
6. Scenario 2B – Automatically Calculated Depth Report – Reduced Area
7. Scenario 3 – Stage Storage Report
8. Scenario 3A – Automatically Calculated Depth Report

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WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Predevelopment (Oak Savanna) to Existing
Project Type	Planning
Location	
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Existing
3218_D_Imp	53,626	Grass	ConventionalConcrete	D	Library Pond_Existing
3218_D_Perv1	201,064	Grass	Grass	D	Library Pond_Existing
3218_D_Perv2	304,657	Grass	Grass	D	Library Pond_Existing
3218_D_Rd	47,500	Grass	ConventionalConcrete	D	Library Pond_Existing
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
3402_B_Imp	141,471	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Existing
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Existing
3402_C_Bdg	98,396	Grass	Roofs	C	Library Pond_Existing
3402_C_Imp	42,160	Grass	ConventionalConcrete	C	Library Pond_Existing
3402_C_Perv	429,486	Grass	Grass	C	Library Pond_Existing
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Existing

3414_B_Bdg	58,379	Grass	Roofs	B	Library Pond_Existing
3414_B_Imp	63,926	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Existing
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Existing
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	Library Pond_Existing
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	Library Pond_Existing
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
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3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	Library Pond_Existing

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Existing
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
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LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	5.00	30,130.0	0	150,650.0	96,416.0	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

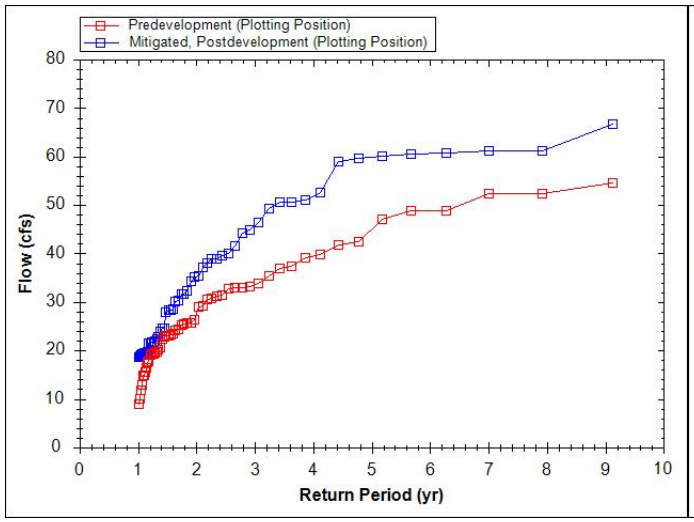
Custom Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

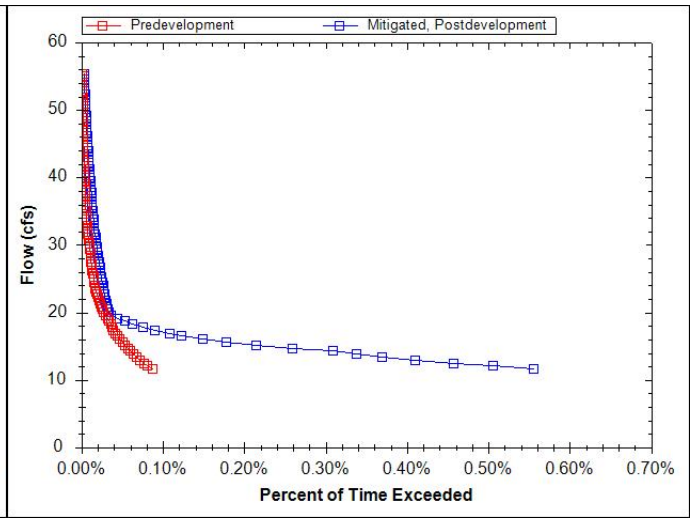
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

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Jurisdiction	OutofDistrict

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LID Facility Sizing Details

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Library Pond_Existing	FCWQT	B3	23.98	30,130.0	1	541,267.4	511,485.0	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

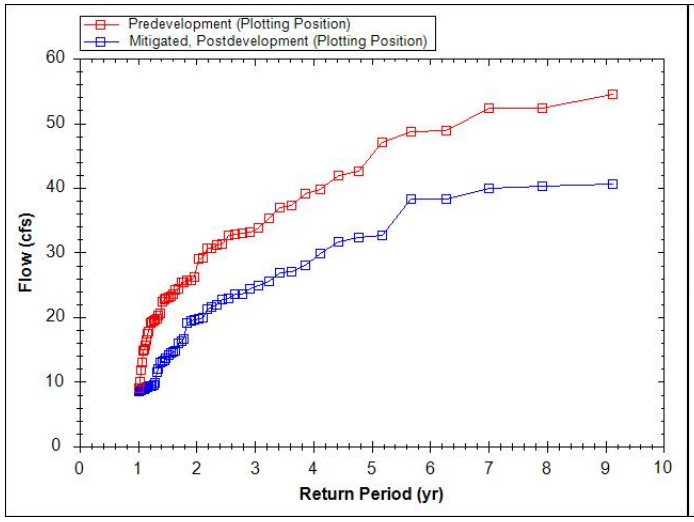
Shape Curve

Depth (ft)	Area (sq ft)
24.0	30,130.0

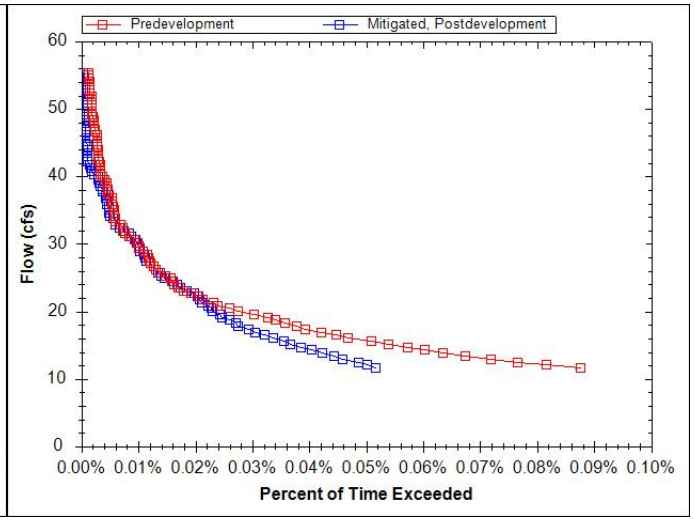
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.5
Upper Orifice Invert(ft)	16.1
Upper Orifice Dia (in)	24.5
Overflow Weir Invert(ft)	23.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

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Project Applicant	
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3218_D_Rd	47,500	Grass	ConventionalConcrete	D	NA
3402_B_Bdg	188,724	Grass	Roofs	B	Library Pond_Existing
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3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Existing
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	NA
3414_C_Bdg	126,069	Grass	Roofs	C	Library Pond_Existing
3414_C_Imp	82,826	Grass	ConventionalConcrete	C	Library Pond_Existing
3414_C_Perv	308,800	Grass	Grass	C	Library Pond_Existing
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	NA
3414_D_Bdg	14,315	Grass	Roofs	D	Library Pond_Existing
3414_D_Imp	49,279	Grass	ConventionalConcrete	D	Library Pond_Existing
3414_D_Perv	109,766	Grass	Grass	D	Library Pond_Existing
3414_D_Rd	22,834	Grass	ConventionalConcrete	D	NA
3417_D_Bdg	28,358	Grass	Roofs	D	Library Pond_Existing
3417_D_Imp	26,856	Grass	ConventionalConcrete	D	Library Pond_Existing
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Existing
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	NA
3418A_B_Bdg	104,425	Grass	Roofs	B	Library Pond_Existing
3418A_B_Imp	86,889	Grass	ConventionalConcrete	B	NA
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Existing
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	NA
3418B_B_Bdg	88,068	Grass	Roofs	B	Library Pond_Existing
3418B_B_Imp	139,481	Grass	ConventionalConcrete	B	NA
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Existing

3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	NA
3420_B_Imp	23,265	Grass	ConventionalConcrete	B	Library Pond_Existing
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Existing
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	NA
3420_C_Bdg	109,273	Grass	Roofs	C	Library Pond_Existing
3420_C_Imp	275,853	Grass	ConventionalConcrete	C	Library Pond_Existing
3420_C_Perv	386,959	Grass	Grass	C	Library Pond_Existing
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	NA
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Existing
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Existing
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Existing
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	NA
3425_D_Bdg	11,387	Grass	Roofs	D	Library Pond_Existing
3425_D_Imp	31,398	Grass	ConventionalConcrete	D	Library Pond_Existing
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Existing
3436_C_Bdg	88,720	Grass	Roofs	C	Library Pond_Existing
3436_C_Imp	80,765	Grass	ConventionalConcrete	C	Library Pond_Existing
3436_C_Perv	238,917	Grass	Grass	C	Library Pond_Existing
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	NA
3436_D_Bdg	96,205	Grass	Roofs	D	Library Pond_Existing
3436_D_Imp	75,308	Grass	ConventionalConcrete	D	Library Pond_Existing
3436_D_Perv	257,884	Grass	Grass	D	Library Pond_Existing
3436_D_Rd	76,800	Grass	ConventionalConcrete	D	NA

3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Existing
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Existing
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Existing
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	NA
5038_B_Bdg	35,902	Grass	Roofs	B	Library Pond_Existing
5038_B_Imp	71,437	Grass	ConventionalConcrete	B	Library Pond_Existing
5038_B_Perv	305,799	Grass	Grass	B	Library Pond_Existing
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	NA
5038_C_Bdg	46,318	Grass	Roofs	C	Library Pond_Existing
5038_C_Imp	18,733	Grass	ConventionalConcrete	C	Library Pond_Existing
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Existing
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	NA

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Existing	FCWQT	B3	15.08	30,130.0	3	258,676.8	243,359.2	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Existing
Design: FlowControlAndTreatment

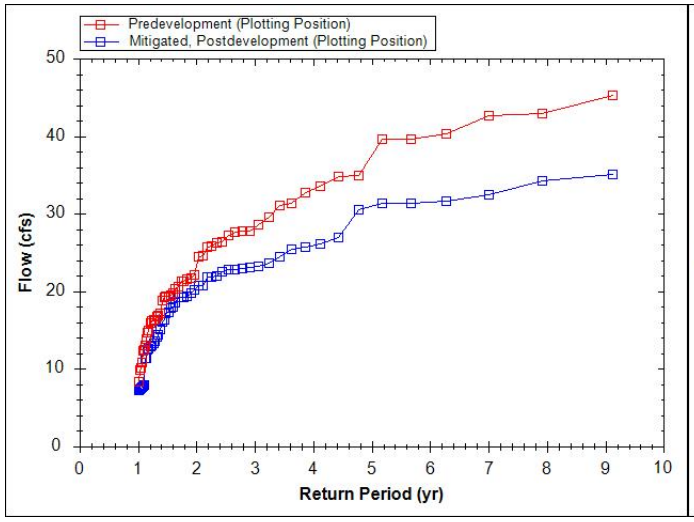
Shape Curve

Depth (ft)	Area (sq ft)
15.1	30,130.0

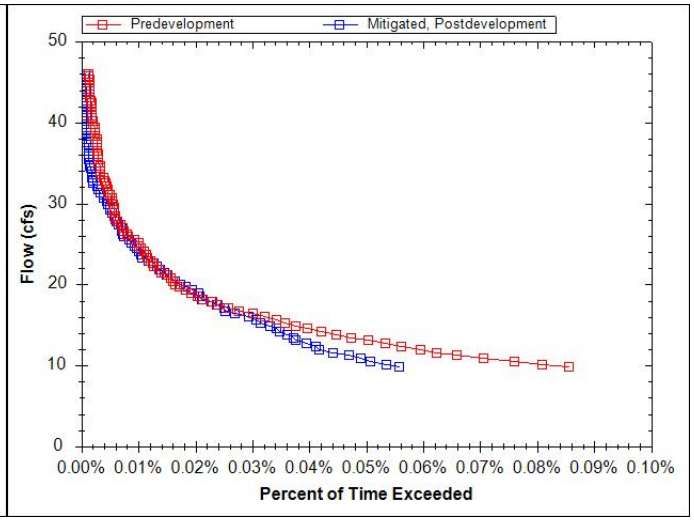
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	9.9
Upper Orifice Invert(ft)	9.8
Upper Orifice Dia (in)	25.2
Overflow Weir Invert(ft)	13.6
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

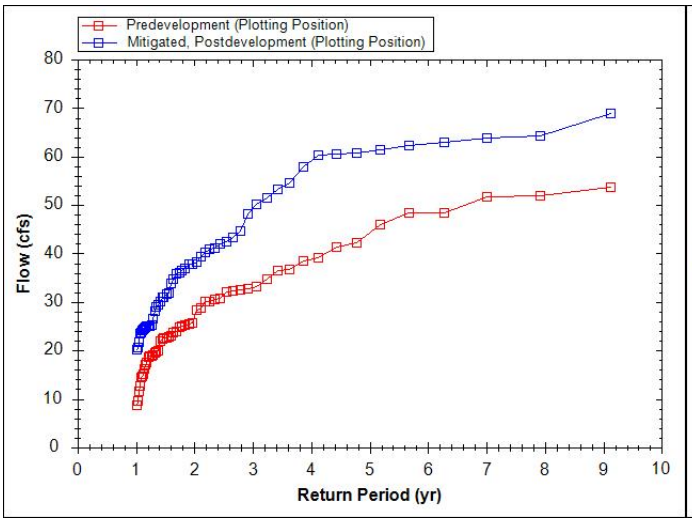
Custom Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

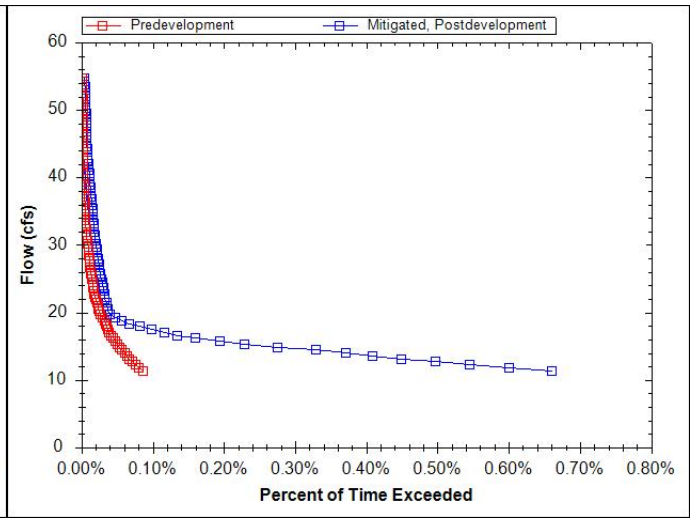
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Library Pond_Future
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Library Pond_Future
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Library Pond_Future
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Library

			ncrete		Pond_Future
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Library Pond_Future
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Library Pond_Future
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Library Pond_Future
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Library Pond_Future
3420_B_Bdg	13,450	Grass	Roofs	B	Library Pond_Future
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Library Pond_Future
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalCo	B	Library

			ncrete		Pond_Future
3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Library Pond_Future
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Library Pond_Future
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Library Pond_Future
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Library Pond_Future
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Library Pond_Future
3402_C_Bdg	250,938	Grass	Roofs	C	Library

					Pond_Future
3402_B_Perv	385,991	Grass	Grass	B	Library Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Library Pond_Future
3402_B_Bdg	330,195	Grass	Roofs	B	Library Pond_Future
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Library Pond_Future
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Library Pond_Future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	30.40	30,130.0	1	632,574.3	608,440.5	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

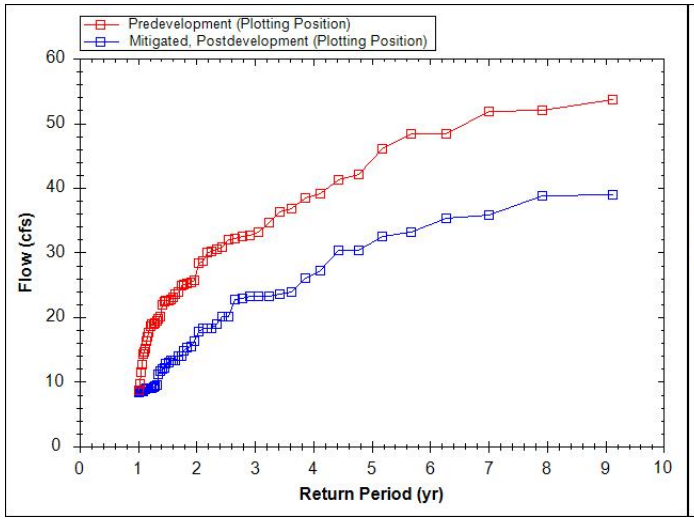
Shape Curve

Depth (ft)	Area (sq ft)
30.4	30,130.0

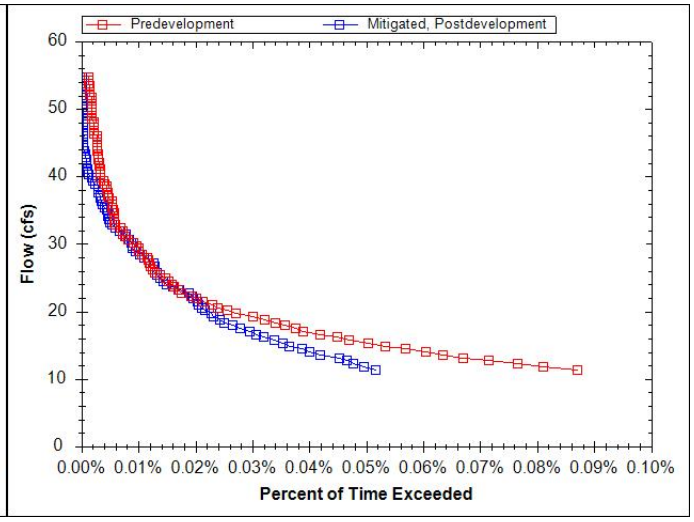
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	7.5
Upper Orifice Invert(ft)	38.8
Upper Orifice Dia (in)	19.5
Overflow Weir Invert(ft)	56.9
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Oak Savanna to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
5038_C_Perv	105,053	Grass	Grass	C	Library Pond_Future
5038_C_Rd	16,137	Grass	ConventionalConcrete	C	Planter 2
5038_C_Bdg	50,147	Grass	Roofs	C	Library Pond_Future
5038_B_Perv	268,537	Grass	Grass	B	Library Pond_Future
5038_B_Rd	64,436	Grass	ConventionalConcrete	B	Planter 2
5038_B_Bdg	36,815	Grass	Roofs	B	Library Pond_Future
5038_B_Imp	122,689	Grass	ConventionalConcrete	B	Library Pond_Future
3443_D_Perv	99,259	Grass	Grass	D	Library Pond_Future
3443_D_Rd	72,345	Grass	ConventionalConcrete	D	Planter 3
3443_D_Bdg	27,464	Grass	Roofs	D	Library Pond_Future
3443_D_Imp	5,664	Grass	ConventionalConcrete	D	Library Pond_Future
3436_D_Perv	245,470	Grass	Grass	D	Library Pond_Future
3436_D_Rd	76,800	Grass	ConventionalCo	D	Planter 2

			ncrete		
3436_D_Bdg	122,187	Grass	Roofs	D	Library Pond_Future
3436_D_Imp	61,740	Grass	ConventionalConcrete	D	Planter 4
3436_C_Perv	213,971	Grass	Grass	C	Library Pond_Future
3436_C_Rd	47,127	Grass	ConventionalConcrete	C	Planter 3
3436_C_Bdg	120,495	Grass	Roofs	C	Library Pond_Future
3436_C_Imp	73,935	Grass	ConventionalConcrete	C	Library Pond_Future
3425_D_Perv	40,770	Grass	Grass	D	Library Pond_Future
3425_D_Bdg	22,979	Grass	Roofs	D	Library Pond_Future
3425_D_Imp	19,807	Grass	ConventionalConcrete	D	Library Pond_Future
3425_C_Perv	202,555	Grass	Grass	C	Library Pond_Future
3425_C_Rd	259,711	Grass	ConventionalConcrete	C	Planter 1
3425_C_Bdg	68,156	Grass	Roofs	C	Library Pond_Future
3425_C_Imp	68,156	Grass	ConventionalConcrete	C	Library Pond_Future
3420_C_Perv	379,853	Grass	Grass	C	Library Pond_Future
3420_C_Rd	9,675	Grass	ConventionalConcrete	C	Planter 3
3420_C_Bdg	290,343	Grass	Roofs	C	Library Pond_Future
3420_C_Imp	101,889	Grass	ConventionalConcrete	C	Library Pond_Future
3420_B_Perv	39,389	Grass	Grass	B	Library Pond_Future
3420_B_Rd	32,226	Grass	ConventionalConcrete	B	Planter 3
3420_B_Bdg	13,450	Grass	Roofs	B	Planter 6
3420_B_Imp	9,815	Grass	ConventionalConcrete	B	Planter 4
3418B_B_Perv	100,636	Grass	Grass	B	Library Pond_Future
3418B_B_Rd	28,000	Grass	ConventionalConcrete	B	Planter 3

3418B_B_Bdg	158,586	Grass	Roofs	B	Library Pond_Future
3418B_B_Imp	68,963	Grass	ConventionalConcrete	B	Library Pond_Future
3418A_B_Perv	312,748	Grass	Grass	B	Library Pond_Future
3418A_B_Rd	148,903	Grass	ConventionalConcrete	B	Planter 2
3418A_B_Bdg	174,556	Grass	Roofs	B	Library Pond_Future
3418A_B_Imp	16,758	Grass	ConventionalConcrete	B	Library Pond_Future
3417_D_Perv	74,227	Grass	Grass	D	Library Pond_Future
3417_D_Rd	33,919	Grass	ConventionalConcrete	D	Planter 3
3417_D_Bdg	55,214	Grass	Roofs	D	Library Pond_Future
3414_D_Perv	105,771	Grass	Grass	D	Library Pond_Future
3414_D_Rd	22,834	Grass	ConventionalConcrete	B	Planter 2
3414_D_Bdg	52,414	Grass	Roofs	D	Library Pond_Future
3414_D_Imp	15,175	Grass	ConventionalConcrete	D	Library Pond_Future
3414_C_Perv	280,831	Grass	Grass	C	Library Pond_Future
3414_C_Rd	25,301	Grass	ConventionalConcrete	C	Planter 3
3414_C_Bdg	236,864	Grass	Roofs	C	Library Pond_Future
3414_B_Perv	209,761	Grass	Grass	B	Library Pond_Future
3414_B_Rd	49,096	Grass	ConventionalConcrete	B	Planter 3
3414_B_Bdg	88,565	Grass	Roofs	B	Library Pond_Future
3414_B_Imp	33,740	Grass	ConventionalConcrete	B	Library Pond_Future
3402_C_Perv	319,104	Grass	Grass	C	Library Pond_Future
3402_C_Rd	105,818	Grass	ConventionalConcrete	C	Planter 2
3402_C_Bdg	250,938	Grass	Roofs	C	Planter 6
3402_B_Perv	385,991	Grass	Grass	B	Library

					Pond_Future
3402_B_Rd	128,278	Grass	ConventionalConcrete	B	Planter 1
3402_B_Bdg	330,195	Grass	Roofs	B	Planter 5
3218_D_Perv	304,657	Grass	Grass	D	Library Pond_Future
3218_D_Rd	47,500	Grass	Grass	B	Planter 1
3218_D_Bdg	22,140	Grass	Roofs	D	Library Pond_Future
3218_D_Imp	254,690	Grass	ConventionalConcrete	D	Planter 4

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
Planter 1	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	31,696.4	31,697.0	0.0
Planter 2	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	43,376.2	43,377.0	0.0
Planter 3	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	23,933.0	23,933.0	0.0
Planter 4	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	14,129.5	14,357.0	0.0
Planter 5	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	49,529.3	54,273.0	0.0
Planter 6	FlowControlAndTreatment	Stormwater Planter - Infiltration	B3	12,055.0	12,247.0	0.0

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_Future	FCWQT	B3	15.04	30,130.0	3	258,400.3	243,002.9	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_Future
Design: FlowControlAndTreatment

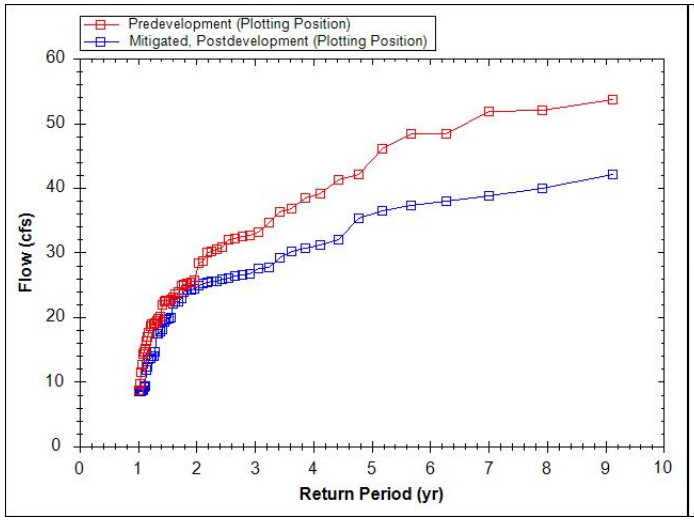
Shape Curve

Depth (ft)	Area (sq ft)
15.0	30,130.0

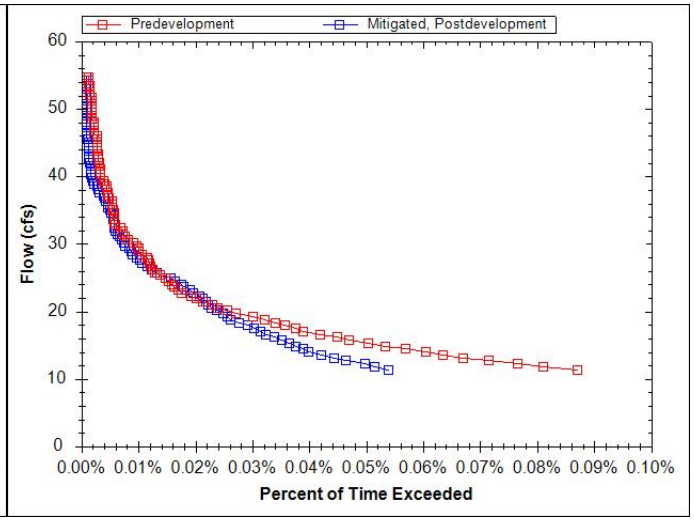
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	10.6
Upper Orifice Invert(ft)	10.1
Upper Orifice Dia (in)	27.4
Overflow Weir Invert(ft)	14.0
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	No

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

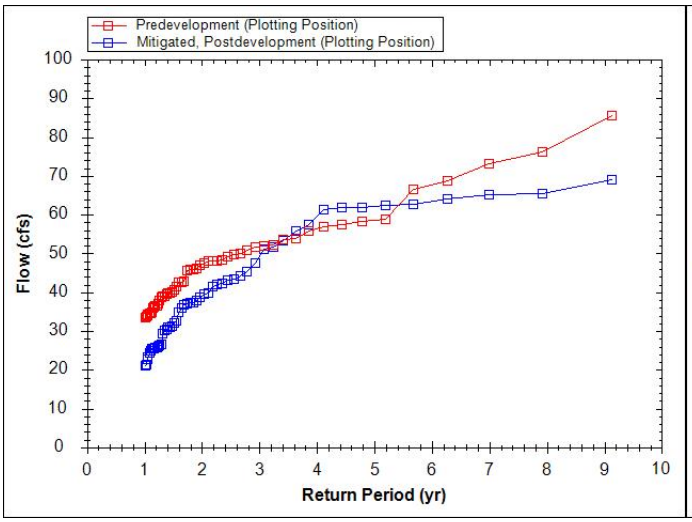
Custom Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

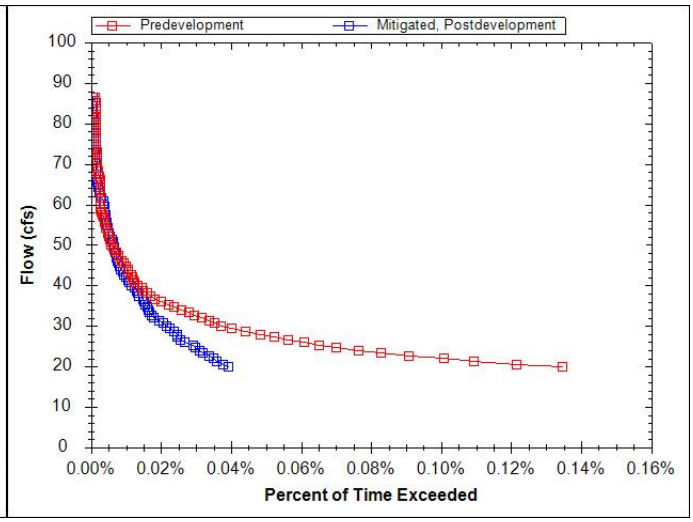
Shape Curve

Depth (ft)	Area (sq ft)	Discharge (cfs)
.0	.0	.0
1.0	10,018.0	9.4
2.0	17,859.0	14.3
5.0	23,522.0	19.7

Flow Frequency Chart



Flow Duration Chart



WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	Library Pond_Existing to Future
Project Type	Planning
Location	Wilsonville Public Library, 8200 SW Wilsonville Rd, Wilsonville, OR 97070
Stormwater Management Area	30130
Project Applicant	
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
3417_D_Ex_Imp_Fu_Bdg	26,856	Impervious	Roofs	D	Library Pond_existing to future
5038_C_Ex_Perv_Fu_Perv	105,053	Grass	Grass	C	Library Pond_existing to future
5038_C_Ex_Rd_Fu_Rd	16,137	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_C_Ex_Bdg_Fu_Bdg	46,318	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Bdg	3,829	Impervious	Roofs	C	Library Pond_existing to future
5038_C_Ex_Imp_Fu_Imp	14,903	Impervious	ConventionalConcrete	C	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Imp	37,262	Grass	ConventionalConcrete	B	Library Pond_existing to future
5038_B_Ex_Perv_Fu_Perv	268,537	Grass	Grass	B	Library Pond_existing to future
5038_B_Ex_Rd_Fu_Rd	64,436	Impervious	ConventionalConcrete	B	Library Pond_existing to future

5038_B_Ex_Bdg_Fu_Bdg	35,902	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Bdg	913	Impervious	Roofs	B	Library Pond_existing to future
5038_B_Ex_Imp_Fu_Imp	70,524	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Perv_Fu_Perv	245,470	Grass	Grass	D	Library Pond_existing to future
3436_D_Ex_Rd_Fu_Rd	76,800	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_D_Ex_Bdg_Fu_Bdg	96,205	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Bdg	25,982	Impervious	Roofs	D	Library Pond_existing to future
3436_D_Ex_Imp_Fu_Imp	49,326	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Bgd	12,532	Grass	Roofs	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Imp	12,414	Grass	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Perv_Fu_Perv	213,971	Grass	Grass	C	Library Pond_existing to future
3436_C_Ex_Rd_Fu_Rd	47,127	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3436_C_Ex_Bdg_Fu_Bdg	88,720	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Bdg	19,243	Impervious	Roofs	C	Library Pond_existing to future
3436_C_Ex_Imp_Fu_Imp	61,521	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_D_Ex_Pe	40,770	Grass	Grass	D	Library

rv_Fu_Perv					Pond_existing to future
3425_D_Ex_Bdg_Fu_Bdg	11,387	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Bdg3425_D_Ex_Imp_Fu_Bdg	11,592	Impervious	Roofs	D	Library Pond_existing to future
3425_D_Ex_Imp_Fu_Imp	19,807	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3425_C_Ex_Perv_Fu_Perv	202,555	Grass	Grass	C	Library Pond_existing to future
3425_C_Ex_Rd_Fu_Rd	259,711	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3425_C_Ex_Bdg_Fu_Bdg	68,156	Impervious	Roofs	C	Library Pond_existing to future
3425_C_Ex_Imp_Fu_Imp	68,156	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Bgd	7,106	Grass	Roofs	C	Library Pond_existing to future
3420_C_Ex_Perv_Fu_Perv	379,853	Grass	Grass	C	Library Pond_existing to future
3420_C_Ex_Rd_Fu_Rd	9,675	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_C_Ex_Bdg_Fu_Bdg	109,273	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Bdg	173,964	Impervious	Roofs	C	Library Pond_existing to future
3420_C_Ex_Imp_Fu_Imp	101,889	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3420_B_Ex_Perv_Fu_Perv	39,389	Grass	Grass	B	Library Pond_existing to future
3420_B_Ex_Rd_Fu_Rd	32,226	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3420_B_Ex_Im	13,450	Impervious	Roofs	B	Library

p_Fu_Bdg					Pond_existing to future
3420_B_Ex_Imp_Fu_Imp	9,815	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Perv_Fu_Perv	100,636	Grass	Grass	B	Library Pond_existing to future
3418B_B_Ex_Rd_Fu_Rd	28,000	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418B_B_Ex_Bdg_Fu_Bdg	88,068	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Bdg	70,518	Impervious	Roofs	B	Library Pond_existing to future
3418B_B_Ex_Imp_Fu_Imp	68,963	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Perv_Fu_Perv	312,748	Grass	Grass	B	Library Pond_existing to future
3418A_B_Ex_Rd_Fu_Rd	148,903	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3418A_B_Ex_Bdg_Fu_Bdg	104,425	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Bdg	70,131	Impervious	Roofs	B	Library Pond_existing to future
3418A_B_Ex_Imp_Fu_Imp	16,758	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3443_D_Ex_Perv_Fu_Perv	99,259	Grass	Grass	D	Library Pond_existing to future
3443_D_Ex_Rd_Fu_Rd	72,345	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3443_D_Ex_Bdg_Fu_Bdg	27,464	Impervious	Roofs	D	Library Pond_existing to future
3443_D_Ex_Imp_Fu_Imp	5,664	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3402_C_Ex_Perv_Fu_Bgd	110,382	Grass	Roofs	C	Library Pond_existing

					to future
3402_C_Ex_Perv_Fu_Perv	319,104	Grass	Grass	C	Library Pond_existing to future
3402_C_Ex_Rd_Fu_Rd	105,818	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3402_C_Ex_Bdg_Fu_Bdg	98,396	Impervious	Roofs	C	Library Pond_existing to future
3402_C_Ex_Imp_Fu_Bdg	42,160	Impervious	Roofs	C	Library Pond_existing to future
3402_B_Ex_Perv_Fu_Perv	385,992	Grass	Grass	B	Library Pond_existing to future
3402_B_Ex_Rd_Fu_Rd	128,278	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3402_B_Ex_Bdg_Fu_Bdg	188,724	Impervious	Roofs	B	Library Pond_existing to future
3402_B_Ex_Imp_Fu_Bdg	141,471	Impervious	Roofs	B	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Imp	201,064	Grass	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Perv_Fu_Perv	304,657	Grass	Grass	D	Library Pond_existing to future
3218_D_Ex_Rd_Fu_Rd	47,500	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3218_D_Ex_Bdg_Fu_Bdg	22,140	Impervious	Roofs	D	Library Pond_existing to future
3218_D_Ex_Imp_Fu_Imp	53,626	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Bdg_Fu_Bdg	28,358	Impervious	Roofs	D	Library Pond_existing to future
3417_D_Ex_Rd_Fu_Rd	33,919	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3417_D_Ex_Perv_Fu_Perv	74,227	Grass	Grass	D	Library Pond_existing to future

3414_B_Ex_Imp_Fu_Imp	33,740	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Imp_Fu_Bdg	30,186	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Bdg_Fu_Bdg	58,379	Impervious	Roofs	B	Library Pond_existing to future
3414_B_Ex_Rd_Fu_Rd	49,096	Impervious	ConventionalConcrete	B	Library Pond_existing to future
3414_B_Ex_Perv_Fu_Perv	209,761	Grass	Grass	B	Library Pond_existing to future
3414_C_Ex_Imp_Fu_Bdg	82,826	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Bdg_Fu_Bdg	126,069	Impervious	Roofs	C	Library Pond_existing to future
3414_C_Ex_Rd_Fu_Rd	25,301	Impervious	ConventionalConcrete	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Perv	280,831	Grass	Grass	C	Library Pond_existing to future
3414_C_Ex_Perv_Fu_Bgd	27,969	Grass	Roofs	C	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Imp	11,180	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Imp_Fu_Bdg	38,099	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Bdg_Fu_Bdg	14,315	Impervious	Roofs	D	Library Pond_existing to future
3414_D_Ex_Rd_Fu_Rd	22,834	Impervious	ConventionalConcrete	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Perv	105,771	Grass	Grass	D	Library Pond_existing to future
3414_D_Ex_Perv_Fu_Imp	3,995	Grass	ConventionalConcrete	D	Library Pond_existing to future

LID Facility Sizing Details

Pond Sizing Details

Pond ID	Design Criteria(1)	Facility Soil Type	Max Depth (ft)(2)	Top Area (sq-ft)	Side Slope (1:H)	Facility Vol. (cu-ft)(3)	Water Storage Vol. (cu-ft)(4)	Adequate Size?
Library Pond_existing to future	FCWQT	B3	7.09	30,130.0	4	151,419.6	121,444.8	Yes

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only

2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).

3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.

4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

Simple Pond Geometry Configuration

Pond ID: Library Pond_existing to future
Design: FlowControlAndTreatment

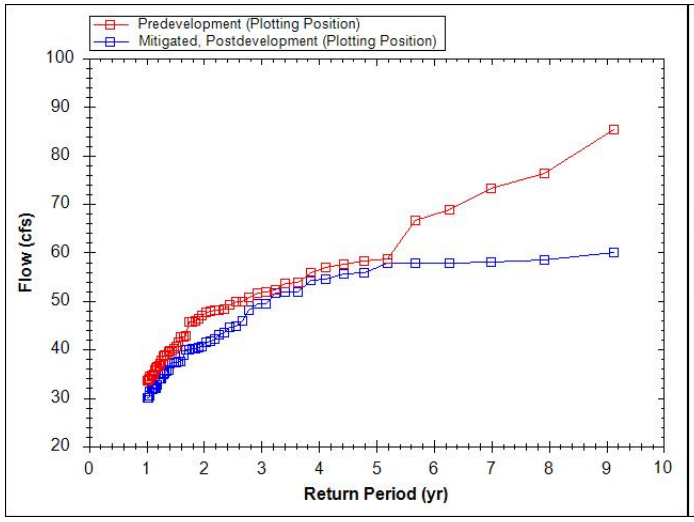
Shape Curve

Depth (ft)	Area (sq ft)
7.1	30,130.0

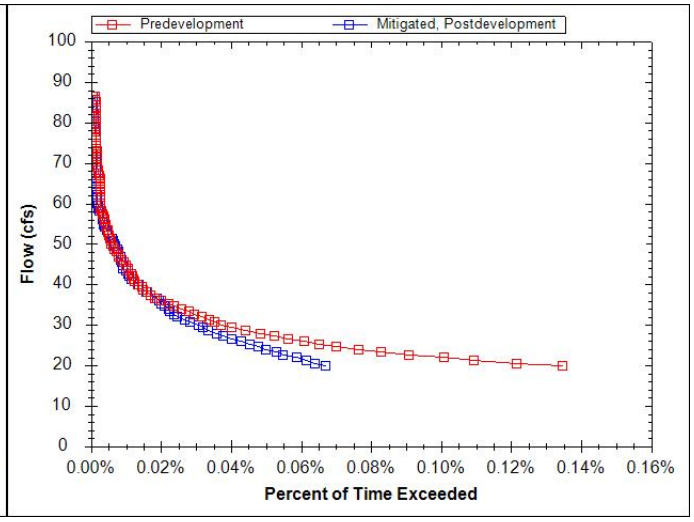
Outlet Structure Details

Lower Orifice Invert (ft)	0.0
Lower Orifice Dia (in)	16.9
Upper Orifice Invert(ft)	4.8
Upper Orifice Dia (in)	40.9
Overflow Weir Invert(ft)	6.1
Overflow Weir Length (ft)	6.3

Flow Frequency Chart



Flow Duration Chart



Appendix G: Staffing Evaluation

6500 S Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville

Project Title: Wilsonville Stormwater Master Plan

Project No.: 156157.002.001

Staff Analysis Tables

Subject: Stormwater Staffing Analysis

Date: January 24, 2024

To: Kerry Rappold, City of Wilsonville

From: Angela Wieland, Brown and Caldwell

Prepared by: Shelby Gilmartin, EIT

Reviewed by: Angela Wieland, PE

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List of Abbreviations

BMP	Best Management Practice
CCTV	Closed-circuit Television
City	City of Wilsonville
CP	Capital Project
CREST	Center for Research in Environmental Sciences & Technologies
DEI	Diversity, Equity, and Inclusion
EC	Construction Site Runoff Control
Ft	Feet
FTE	Full-Time Employee
FY	Fiscal Year
Hr	Hour
HPSE	High Pollutant Source Facilities
ILL	Illicit Discharge Detection and Elimination
IND	Industrial and Commercial Facilities
IPM	Integrated Pest Management
LF	Linear Feet
NPDES	National Pollution Discharge Elimination System
OM	Pollution Prevention and Good Housekeeping for Municipal Operations
OSHA	Occupational Safety and Health Administration
PC	Post-Construction Site Runoff for New Development and Redevelopment
PEO	Public Education and Outreach
PI	Public Involvement
SF	Square Feet
SMP	Stormwater Master Plan
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TBD	To Be Determined
TM	Technical Memorandum (Tech Memo)
WERK	Wilsonville Environmental Resource Keepers

Assumptions

A. This staffing analysis assumes that existing City staff is able to implement the current stormwater program (pre-2022 conditions). Additional activities not previously conducted by the City under current staffing were used to create the estimates of additional staff resource needs. Additional activities include those associated with the reissued NPDES MS4 permit (2021) and implementation of the proposed Capital Projects (CP) in the Stormwater Master Plan (2023).

B. One (1) FTE represents 1,650 hrs (after deducting estimated annual leaves, training, and other non-task replaced hours); 0.02 FTE represents 40 hrs. For purposes of calculating an equivalent FTE cost estimate, an annual FTE labor cost was assumed at $200,000/year.

C. Assume that 100 percent of Engineering and Permitting Costs are for use of a consultant, and 100 percent of Design/Construction Administration Costs are required for internal City staff.

D. The NPDES program costs are based on an implementation schedule covering a 5-year permit term (Oct. 1, 2021 – Sept. 30, 2026) – reported in tables as Fiscal Years (FY) 2023-2027, with an anticipated administrative extension after FY 2027.

E. Stormwater Master Plan (SMP) implementation is projected on an annual basis and assumes a 20-year CP implementation schedule from 2024-2043, with higher project projects occurring sooner:

- High Priority (2024-2028); Medium Priority (2029-2033); and Low Priority (2034-2043).
- Capital Projects costs are averaged over the 20-year implementation period and shown as a standard annual value. While in practice there will be cycles of more and less staff time demands based on which projects are in construction/constructed.

Where applicable the following asset assumptions are divided between 1) those needed to maintain existing assets and commitments under the Stormwater Management Program (SWMP) BMPs and meet the requirements of the NPDES MS4 permit and 2) those for future assets constructed as part of the SMP Capital Projects. If not distinguished, the assumption applies to newly constructed assets.

F. Piped Conveyance System

- *For SWMP BMPs*: CCTV and cleaning activities were evaluated as part of the maintenance evaluation in SMP TM#1 and this program requires an additional 0.5 FTE to meet current maintenance needs.
- *For SMP CPs*: 250 ft of pipe cleaning can be accomplished per hour, and 200 ft of closed-circuit television inspections (CCTV) can be accomplished per hour. Inspection and maintenance to occur on at least 15 percent of City pipes annually (assuming cleaning/inspection will occur four times over 20-year CP cycle).
    - Perforated pipe does not require regular cleaning and inspection and is anticipated to only occur if needed.
    - Pipe connections/laterals are not included in the annual maintenance estimate.
    - Pipe inspection and maintenance activities require a 2-person crew.

G. Manholes

- *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
- For *SMP CPs:* 0.5 hr/facility/year is needed for maintenance of a standard manhole. 1.0 hr/facility/year is needed for inspection and maintenance of a water quality manhole.
    - Manhole inspection and maintenance activities require a 2-person crew.

H. **Catch Basins**
   - *For SWMP BMPs:* Cleaning activities associated with pollution control manholes and catch basins were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 0.25 FTE due to deferred maintenance.
   - *For SMP CPs:* 0.5 hr/facility/year is needed for maintenance.
     - Catch basin maintenance requires a 2-person crew.

I. **Vegetated Systems (swales, rain gardens, planters, etc.):**
   - *For SWMP BMPs:* Maintenance activities associated with vegetated system were evaluated as part of the maintenance evaluation in SMP TM#1, and this program requires an additional 1.25 FTE to meet maintenance needs.
   - *For SMP CPs:* 8 hr/facility/year for inspection and maintenance for public systems.
     - Vegetated system inspections and maintenance requires a 2-person crew.

J. **Ditches**: 20 ft of ditch maintenance can be accomplished per hour.
   - Maintenance is required once every 5 years.
   - Ditch maintenance requires a 2-person crew.

K. **Outfalls**: 0.5 hr/facility/year is needed for inspection and maintenance of outfalls.
   - Outfall inspection and maintenance requires a 2-person crew.

L. **Inlets/Outlets**: 0.5 hr/facility/year is needed for inspection and maintenance of inlets/outlets.
   - Inlet/outlet inspection and maintenance requires a 2-person crew.

M. **Detention Pond**: 16 hrs/facility/year is needed for inspection and maintenance of detention ponds.
   - Detention pond inspection and maintenance requires a 2-person crew.

N. **Culverts:** 2 hr/facility/year is needed for culvert cleaning and inspection.
   - Culvert inspection and cleaning requires a 2-person crew.

O. **Private Water Quality Facilities:** 4 hr/facility/year is required for inspections.
   - The City holds *Stormwater Maintenance and Access Easement Agreements* with private water quality facilities owners to actively maintain facilities in conformance with City of Wilsonville's Public Work Standards and annually inspect and report on the facility.
   - Private water quality facility inspections require a 1-person crew.

P. **Restoration/Stabilization:** Planting and bioengineered restoration/stabilization is a single installation and does not require annual maintenance.

Q. **Replacement or Removal:** Replacement or removal of assets does not require continued maintenance and is not accounted for as additional annual maintenance activity.

R. **Driveways/Pathways:** Addition of, or modifications to driveways, accessways, or paths does not require annual maintenance. These facilities will be maintained only when identified as needed.

S. **Street Sweeping:** 165 hr/year is needed for street sweeping of all curbed areas. This work is completed by a contractor.

T. **Training:** Assume general training includes 3 staff and industrial/commercial training includes 1 staff.

NOTE: Recommended Programs developed for the SMP (P-1 to P-3, and P-5 to P-6) are outlined in the SMP Table 7-1 as an annual cost only and not staff hours which is why it was removed from the Public Works/Maintenance Staffing and Community Development/Engineering Staffing sections. Program P-4 is included in *SMP Implementation - Community Development/Engineering Staffing Assessment* analysis.

NPDES MS4 Permit Driven Activities (per 2022 SWMP)

Public Works/Maintenance Staffing Assessment

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr).	3	2 hrs/yr 6 hrs/permit term	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)	7.2 hrs (0.004 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/ equipment costs	• Organizing public outreach programs such as Adopt-a-Road and WERK Day. • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	N	No Change.			N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.						
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	N	No Change.			N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
OM-2	Routine Road Maintenance	Conduct street sweeping, maintenance, and winter weather protocols.	N	No Change.			N	• Sweep all curbed City streets monthly. • Schedule and conduct street maintenance activities during dry weather conditions. • Continue to sponsor the Adopt-a-Road program, Bulky Waste Day, and Fall Leaf Collection Day.						
			Y	Implement Winter Weather Response Plan (2021) – including snow removal, sanding, chemical application, and proper management of materials. Staff time is winter conditions dependent, assume additional 40-hrs for additional tracking of materials and activities per year.	1	40 hrs/yr	N	N/A – New requirement.	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)	40 hrs (0.02 FTE)
OM-3	Pest Management	Follow the IPM Plan (2018) principles for public landscape maintenance.	N	No Change.			N	• Track the amount of pesticides and fertilizers applied to public property and general areas of application. • Estimate number and area of sites where the planting of native vegetation was incorporated into the maintenance activities.						
			Y	Publish annual IPM activity on City website (assume 1-hr/year).	1	1 hr/yr	N	N/A – New requirement.	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)	1 hr (0.0006 FTE)
OM-4	Conveyance System Cleaning	Maintain and repair public stormwater conveyance system components including the storm sewer pipes,	Y	• Conduct CCTV inspection of approximately 15% of the public stormwater conveyance system (>6-inch pipe) annually. • Inspect other public conveyance systems as required.	Analysis in SMP TM#1		N	• Inspect public conveyance system annually for maintenance needs. • Maintain and repair public conveyance system as needed based on inspections.	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)	825 hrs (0.5 FTE)

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		manholes, outfalls, culverts, and swales.	Y	Refine the internal inspection guidelines annually to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hr/permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-5	Catch Basin Cleaning	Inspect, maintain, and repair public stormwater catch basins annually during dry season.	N	No Change.	Analysis in SMP TM#1		N	• Clean all high-priority public catch basins annually and remaining public catch basins over a 4-year period. • Inspect catch basins for maintenance and repair needs during catch basin cleaning activities. Schedule repair activities as needed, based on inspections.	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)	412.5 hrs (0.25 FTE)
			Y	Refine the internal inspection guidelines to help facilitate ongoing inspection efforts (assume 40-hr for refinement, review and periodic update).	1	40 hrs/ permit term	N	N/A	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
			Y	Update tracking database during each maintenance cycle (assume 10-hr/year).	1	10 hrs/yr	N	N/A	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.	Analysis in SMP TM#1		N	• Inspect public structural controls annually; maintain and repair as needed. • Maintain GIS “atlas” for both public and private.	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)	2,062.5 hrs (1.25 FTE)
			Y	In conjunction with post-construction standards updates, by Dec. 1, 2024, update the City's internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) used in the City (assume 40-hr for refinement, review and periodic update).	1	40 hrs by Dec. 2024	N	N/A	20 hrs (0.012 FTE)	20 hrs (0.012 FTE)	--	--	--	8 hrs (0.005 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						

NPDES MS4 Permit Driven Activities - Public Works/Maintenance Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Public Works/Maintenance Staff Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) annually over the permit term.	1	6 hrs/permit term	N	N/A	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)	1.2 hrs (0.0006 FTE)
NPDES MS4 Driven Activities Subtotal of Public Works/Maintenance Staff Cost								Annual Staff Time (Hours)	3,395.4	3,395.4	3,375.4	3,375.4	3,375.4	3,383.4
								Annual Staff Time (FTE)	2.06	2.06	2.05	2.05	2.05	2.05
								Staffing contingency (FTE) (estimated at 20% to account for unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
								NPDES MS4 Public Works/Maintenance Activities Sub-Total staff cost (FTE)	2.47	2.47	2.46	2.46	2.46	2.46

Community Development/Engineering Staffing Assessment

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
PEO-1	Public Education Participation	• Promote public awareness through City newsletters, doorhangers, social media, and website. • Annually publish 2 articles/year in the Wilsonville Business Newsletter and 3 articles/year educating the public on stormwater issues.	N	No change.			Y – printing	During the 2021-22 reporting year, 5 educational/informational articles were published in the City newsletter and 4 were posted to the City's social media pages.						
		Engage the City's DEI Committee to identify additional language translations needs of the public, if necessary.	Y	Twice over permit term engage with the DEI Committee to verify that materials are translated into representative languages for the public. Assume two 1-hour meetings.	1	2 hrs/ permit term	N	N/A – Committee was formed in 2021.	--	1 hr (0.001 FTE)	--	1 hr (0.001 FTE)	--	0.4 hrs (0.001 FTE)
		Support regional public education campaigns and programs.	N	No change (varies by year).			Y - financial support	• Financially support regional public education campaigns and programs. • During the 2021-22 reporting year, the City contributed $15,000 to Friends of Trees.						
PEO-2	Staff Training	Staff training includes educational activities for City staff and crews on erosion control measures, proper spill response procedures, safe work practices, and record keeping.	Y	Trainings in addition to pre-2022 BMP activities: Annually: • City's inspection checklist training (assume 1-hr). • Review Dry Weather Screening SOP (assume 1-hr). Once per permit term: • IDDE SOP review training (assume 1-hr). • IDDE training modules (assume 1-hr). • Review ESC plan review check list and update as necessary (assume 1-hr). • Training on City's site inspection SOP (assume 1-hr). • Training on City's SOP and schedule for MS4 maintenance (assume 1-hr). • Training on the City's Industrial and Commercial Facilities Strategy (assume 1-hr). Assume 40-hr/yr to develop trainings.	2	40 hrs/yr	N	• 40 hr HAZWOPER and 8-hr annual refresher trainings. • Licensed pesticide training continuing education training (40-hr over 5 years requirement). • Training on City's IPM. • CESCL training (assume 8-hrs) every 3 years. • Internal training after the adoption of new or updated design standards. • Joint agency workshop or professional group presentation. • Training on City's municipal pollution prevention plan or SOPs. • Training on the City's SWPPP.	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)	80 hrs (0.048 FTE)
		Staff attend local trainings and conferences to improve skills related to stormwater controls and surface water quality.	N	No change.			Y – conference registration (as applicable)	Staff attended 4 conferences and trainings related to stormwater management during the 2021-22 reporting year.						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
		Staff attend Clackamas County co-permittee meetings to engage in collective efforts related to education, monitoring, and NPDES requirements.	N	No change.			Y – Cost sharing (as applicable).	Coordinate with other Clackamas County co-permittees regarding regional water quality efforts through scheduled co-permittee meetings.						
PI-1	Public Involvement and Participation	Provide opportunity for public participation in the development, implementation, and modification of the City's stormwater management program.	Y	• Maintain a publicly accessible website with the SWMP, Monitoring Plan, annual reports, program contact information, educational/reference materials, and reporting requirements for illicit discharges. • Provide a 30-day public comment period, and consider comments received for updates to the Monitoring Plan, the SWMP, and other strategy documents as required. • Maintain MS4 Document Library on website. Assume 8 hr/year for website management.	1	8 hrs/yr	N	N/A – new requirement.	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
PI-2	Public Stewardship Opportunities	Continue to conduct/support a variety of stewardship events to increase public involvement and participation in stormwater-related programs.	N	• Annually, the City sponsors the Wilsonville Environmental Resource Keepers (WERK) day event, the Adopt-a-Road Program for trash and invasive species removal, Friends of Trees, and the Backyard Habitat Certification Program. Sponsorship generally includes staff time and associated City resources such as equipment. • City provides community workshops on IPM and native planting. • Collaboration with CREST.			Y – program/equipment costs	• Organizing public outreach programs (e.g., Adopt-a-Road and WERK Day). • Participate in the Backyard Habitat Certification Program and CREST to support workshops and environmental programs. • Support the planting of urban trees through partnering with Friends of Trees and providing native trees through the Tree Coupon program. • Promote stewardship- related events on the City's website and social media.						
ILL-1	Illicit Discharge Detection and Elimination	The City prohibits illicit discharges into their MS4 system and conducts response and enforcement as needed.	N	No Change.			N	• Implement the City's IDDE Program as outlined in the IDDE SOP. • For identified illicit discharges, conduct appropriate actions to remove the discharge. Track enforcement activities related to investigation.						
		Review and update the City's IDDE SOP to clarify enforcement procedures and response timeframes in conjunction with the NPDES MS4 permit.	Y	Review and update IDDE SOP by Dec. 1, 2023. Assume 8-hrs to review and update annually. Consult will support 2023 update.	1	8 hr/yr	N	Implement existing IDDE SOP (2012).	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)	8.0 hrs (0.005 FTE)
ILL-2	Spill Prevention, Training, and Response	24-hr emergency response hotline and online reporting for illicit spills or activities contaminating stormwater.	N	No Change.			N	• Spill response within the public right-of-way is handled by the City's Public Works staff or the Tualatin Valley Fire and Rescue Hazardous Materials Team. • Select City staff are trained to the OSHA First Responder Operations level						

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
								and can respond to spills with releases or potential releases of hazardous substances. Annual refresher courses are provided to City staff to maintain OSHA certifications. • Maintain a record of all spills both reported and responded to and follow up/mitigation measures.						
ILL-3	MS4 Mapping	Continually maintain the online GIS mapping and digital inventory.	Y	• Continually maintain the online GIS mapping for public viewing. • Add municipal structural stormwater controls within 1 year of receiving the as-builts. • As necessary, create a tracking system for repeat illicit discharges. Assume 24-hr/year for updates.	1	24 hr/yr	N	N/A – new requirement.	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)	24 hrs (0.015 FTE)
ILL-4	Dry Weather Field Screening	Conduct illicit discharge inspections, monitoring, and investigations annually during dry-weather conditions at 6 high priority field screening locations.	Y	By Dec. 1, 2023, review and update high priority locations and criteria, as necessary, based on outcomes from inspections and other public reporting. Update locations on mapping and in the IDDE SOP (assume 10 hours for review).	1	10 hrs by Dec. 2023	N	• Track dry weather field screening locations inspected annually and any additional outfalls inspected during routine maintenance. • Summarize dry weather inspection results and indicate locations requiring monitoring (i.e., sampling) and/or investigations. • Indicate the outcome and resolution of any dry weather investigation activities conducted.	10 hrs (0.006 FTE)	--	--	--	--	2 hrs (0.001 FTE)
EC-1	Erosion Control and Construction Site Management	The City implements an ESC program in accordance with City Code and Public Works Standards for proposed construction applications.	Y	Report any updates or modifications to the 2020 Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual (assume 20 hrs for review).	1	20 hrs by Dec. 2024	N	• Track the number of approved erosion and sediment control plans for new and redevelopment >500 SF. • Track the number of 1200-CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.	10 hrs (0.006 FTE)	10 hrs (0.006 FTE)	--	--	--	4 hrs (0.002 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
EC-2	Erosion Control Inspections and Enforcement	Implement, inspection, and maintain ESC prevention measures during and following construction.	N	• Conduct a minimum of 3 erosion control inspections on all construction sites issued an ECS Permit. • As necessary, enforce appropriate erosion and sediment control in conjunction with the progressive enforcement procedures as outlined in the City Code.			N	• Track the number of erosion and sediment control plans approved. • Track the number of 1200- CN and 1200-C permits issued. • Track the number and frequency of erosion control inspections conducted. • Track the number and type of enforcement actions taken by the City or DEQ.						
		Update enforcement response procedures and escalating enforcement language.	Y	By Dec. 1, 2023, review and, if necessary, update enforcement response procedures and escalating enforcement specific to erosion and sediment control in City Code and Public Works Standards (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
PC-1	Stormwater Planning and Development Review	The City provides land use and planning review to meet goals related to the management of natural resources, transportation, housing, public facilities and services, and open spaces and parks.	N	Continue to require all new and redevelopment projects that add or replace 5,000 SF or more of impervious surface to implement the City's Stormwater and Surface Water Design and Construction Standards Review plans for compliance with stormwater requirements.			N	• Track number of development applications reviewed for compliance with the City's stormwater requirements. • Track new and redeveloped impervious surface in conjunction with annual reporting requirements.						
			Y	By Dec. 1, 2023, as necessary, review and document updates to the City's LID Guidebook and Public Works Standards to refine preferred LID/GI approaches and strategies for development within the ROW (assume 20-hrs for review). Consultant will support update.	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
			Y	By Dec. 1, 2024, as necessary, update Section 3 of the Public Works Standards to include reference to either the Numeric Stormwater Retention Requirement (NSSR) or Alternative Site Performance Standards (assume 100-hrs for review). Consultant will support update.	2	100 hrs by Dec. 2024	N	N/A	50 hrs (0.03 FTE)	50 hrs (0.03 FTE)	--	--	--	20 hrs (0.012 FTE)
OM-1	Municipal Stormwater Pollution Prevention	Implement activities to promote stormwater pollution prevention per SWPPP.	N	No Change.			N	Implement BMPs outlined in the City's SWPPS on an ongoing basis.						
			Y	Ensure litter control language is included in new event contracts and facility rental agreements (assume 8-hr for language draft and inclusion).	1	8 hrs (immediate update)	N	N/A – New requirement.	8 hrs (0.005 FTE)	--	--	--	--	1.6 hrs (0.001 FTE)
			Y	By Dec. 1, 2024, review and update the SWPPP for consistency with current use, practices, and new facility installations (assume 40-hr for review and 8-hr per year for updates). Consultant will support update.	1	40 hrs by Dec. 2024 + 8 hrs/yr	N	N/A	28 hrs (0.017 FTE)	28 hrs (0.017 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	16 hrs (0.010 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment													
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)				
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
OM-6	Public Structural Facility Operation and Maintenance	Tracks, inspect, maintain, and repairs City-owned structural control components of the stormwater system, specifically, water quality manholes, swales, proprietary treatment systems, raingardens, planters, and detention ponds.	N	No Change.			N	• Inspect public structural controls annually and maintain and repair as needed. • Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS “atlas” for both public and private.						
			Y	In conjunction with updates to post-construction standards, by Dec. 1, 2024, update the City’s internal inspection guidelines and Vegetated Stormwater Facility SOP to include all active stormwater facilities (including proprietary controls) being used in the City (assume 120-hr for review).	1	120 hrs by Dec. 2024	N	N/A	60 hrs (0.036 FTE)	60 hrs (0.036 FTE)	--	--	--	24 hrs (0.015 FTE)
OM-7	Private Structural Facility Operation and Maintenance	The City requires maintenance of private structural stormwater controls through implementation of the Stormwater Maintenance and Access Easement agreements and submittal of a Stormwater Operations and Maintenance Plan.	N	No Change.			N	• Track agreements on file for private structural control facilities. • Track number of private annual inspection and maintenance reports received annually. • Maintain GIS database for private structural facilities.						
			N	No change, but as additional development and new facilities are added, additional time will be needed for tracking and inspection documentation (assume 8-hr/year for additional facility tracking).	1	8 hrs/yr	N	• Ensure maintenance of new private structural stormwater facilities serving 5,000 square feet of area or greater through the tracking of Stormwater Maintenance and Access Easement agreements. • Maintain GIS “atlas” for both public and private.	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)	8 hrs (0.005 FTE)
OM-8	Develop Planning Documents in Support of Water Quality	The City assesses flood control, transportation, and other infrastructure projects during planning stages to identify and mitigate potential negative impacts and/or enhance benefits for the water quality of receiving water bodies.	Y	• By Dec. 1, 2023, complete public outreach related to the updated 2023 Stormwater Master Plan (assume 30-hr for outreach).	1	30 hrs by Dec. 2023	N	N/A	30 hrs (0.018 FTE)	--	--	--	--	6 hrs (0.004 FTE)
			Y	• Implement water quality, flood control, and natural resource CIPs in accordance with the effective Stormwater Master Plan. • Track the status of the City’s Stormwater Master Planning efforts. • Track the number of CIP/retrofit projects implemented each year and discuss the added benefit (water quality,	1	40 hrs/yr	N	N/A	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)	40 hrs (0.024 FTE)

NPDES MS4 Permit Driven Activities - Community Development/Engineering Staffing Assessment														
Stormwater program implementation (post-2022)								Pre-2022 activities	Annual Community Development/Engineering Staff Cost Schedule (Hours and FTE)					
BMP Number	BMP name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost assumptions	Implementation Need		Material costs (Y/N)	Activity description	2023	2024	2025	2026	2027	Annual Average
					Number of City Staff	Total Staff Time								
				hydromodification, habitat restoration, etc.) of each. • Map the location and drainage area of water quality CIPs/retrofits as they are constructed. Assume 40-hrs/year for CIP implementation and tracking.										
			Y	By Dec. 1, 2023, document and submit a summary of outcomes the City's 2015 Retrofit Strategy and 2015 Hydromodification Assessment, in accordance with the 2023 Stormwater Master Plan (assume 20-hrs for review).	1	20 hrs by Dec. 2023	N	N/A	20 hrs (0.012 FTE)	--	--	--	--	4 hrs (0.002 FTE)
IND-1	Industrial and Commercial Inspection Program	Maintain and annually update a database of identified potential high pollutant source facilities (HPSF).	N	No Change.			N	• Annually conduct windshield surveys of identified HPSF. • Annually conduct formal site inspections on up to 5 HPSF. • During permit term, review business license applications to see if NPDES permit is required.						
		Industrial and Commercial Facilities staff training.	Y	• Training once in permit term. Internal training based on the Industrial and Commercial Facilities Strategy, and joint agency workshop. • Assume 1 training meeting (2 hrs) and 1 joint agency workshop (4 hrs) over permit term. • Assume 6-hrs annually for engineer.	1	6 hrs/yr	N	N/A	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)	6 hrs (0.004 FTE)
NPDES MS4 Permit Driven Activities Subtotal of Community Development/Engineering Staff Cost								Annual Staff Time (Hours*)	430	322	182	182	182	260
								Annual Staff Time (FTE)	0.26	0.19	0.11	0.11	0.11	0.16

**Summary values rounded to nearest whole hour.*

Note: No staffing contingency includes for Community Development/Engineering NPDES MS4 Permit Driven Activities .

NPDES MS4 Permit Driven Activities (per 2022 SWMP) Summary

NPDES MS4 Permit Driven Activities – Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Annual NPDES MS4 Activities Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	Public Works/Maintenance Annual Staff Time	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for Public Works/Maintenance (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	Community Development/Engineering	0.26	0.19	0.11	0.11	0.11	0.16
	Total Staff Time (NPDES MS4 Activities)	2.73	2.66	2.57	2.57	2.57	2.62

Stormwater Master Plan Implementation

Master Plan implementation staffing timing varies based on CP implementation schedule and prioritization. Staffing assessment tables averages projects over 20-year planning period.

Public Works/Maintenance Staffing Assessment

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
BC-1	Library Pond Retrofit	Clear, regrade, and replant 0.7-acre detention pond.	Y	M	16 .0	2	32.0	Y	33.0	0.02
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 70 LF of new perforated pipe.	N	F						
		Replace 70 LF of pipe.		Q						
		Install driveway for maintenance access.		R						
BC-2	Ash Meadows Flow Mitigation	Clear, regrade, and replant 1.3-acres of drainageway.	Y	M	16.0	2	32.0	Y	33.0	0.02
		Install 1 inlet.		L	0.5	2	1.0			
		Replace 175 LF of pipe.		Q						
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	Clear, regrade, and replant 1.6-acres of storage facility (detention pond).	Y	M	16.0	2	32.0	Y	115.3	0.07
		Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes).		I	40.0	2	80.0			
		Install 1 new outlet structure.		L	0.5	2	1.0			
		Install 350 LF of pipe.		F	0.6	2	1.3			
		Install 1 new manhole.		G	0.5	2	1.0			
BC-4	Boeckman Creek Stabilization at Colvin Lane	Install 70 LF of new pipe.	Y	F	0.1	2	0.2	Y	16.2	0.01
		Reconstruct 150 LF of vegetated swale.		I	8.0	2	16.0			
		Install planting and bioengineered restoration of 600 LF of stream corridor.	N	P						
		Remove 30 LF of existing outfall pipe.		Q						
BC-5	Memorial Park Swale Retrofit	Install 2,400 SF vegetated water quality swale.	Y	I	8.0	2	16.0	Y	21.2	0.013
		Install 50 LF of new pipe.		F	0.1	2	0.2			
		Install 1 swale inflow spreader.		L	0.5	2	1.0			
		Install 1 overflow structure.		L	0.5	2	1.0			
		Install 1 new outfall.		K	0.5	2	1.0			
		Replace 1 manhole with a flow splitting/WQ manhole.		G	1.0	2	2.0			
		Replace 110 LF of pipe.	N	Q						
		Install 140 LF of perforated pipe.		F						
		Replace 2 manholes.		Q						
		Fill existing 1,500 SF swale and revegetate area.		P						

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Remove 210 LF of existing pipe.		Q						
		Remove 1 manhole.		Q						
		Remove 1 swale inlet structure.		Q						
		Remove 1 outlet structure.		Q						
BC-6	Gesellschaft Water Well Channel Restoration	Install 480 LF of new pipe.	Y	F	0.9	2	1.7	Y	4.7	0.003
		Install 2 new manholes.		G	1.0	2	2.0			
		Install 1 outfall.		K	0.5	2	1.0			
		Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	N	P						
CLC-1	Day Road Stormwater Improvements	Install 200 LF of open-bottom or box culverts (4 total).	Y	N	8.0	2	16.0	Y	27.1	0.016
		Install 180 LF of culverts (1 total).		N	2.0	2	4.0			
		Install 600 LF of pipe.		F	1.1	2	2.2			
		Install 2 manholes.		G	0.5	2	2.0			
		Install 3 trash racks at pipe inlets.		L	0.5	2	3.0			
		Regrade and reconstruct approx. 4,500 feet of open channel.	N	P						
		Replace 1,800 LF of pipe with 600 LF of pipe.		Q						
		Replace 7 manholes.		Q						
		Remove 50 LF of existing culvert.		Q						
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	Replace 70 LF of box culvert.	N	N				Y	0.0	0.0
		Install 70 LF of planting and bioengineered restoration/stabilization measures along path.		P						
		Repave 600 SF of pedestrian path.		R						
CLC-3	Garden Acres Pond Retrofit	Install 1 flow diversion structure.	Y	L	0.5	2	1.0	Y	35.0	0.021
		Install 250 LF of new pipe.		F	0.5	2	1.0			
		Install 1 outlet control structure.		L	0.5	2	1.0			
		Clear, regrade, and replant 0.9-acres of pond.		M	16.0	2	32.0			
		Remove 25,600 CY of fill from existing pond.	N	Q						
		Install 50 LF of perforated pipe.		F						
NC-1	Frog Pond East and South Conveyance Pipe Installation	Install 2,360 LF of new pipe.	Y	F	4.2	2	8.5	Y	10.5	0.006
		Install 1 outfall.		K	0.5	2	1.0			
		Install 7 manholes.		G	0.5	2	1.0			
WR-1	SW Willamette Way/ Morey's Landing Stormwater Improvements	Clear, grade, and replant 0.12-acres of raingarden.	Y	I	8.0	2	16.0	Y	18.4	0.011
		Install 1 flow control diversion structure.		L	0.5	2	1.0			
		Install 120 LF of new pipe.		F	0.2	2	0.4			

SMP Implementation - Public Works/Maintenance Staffing Assessment										
Stormwater program implementation (post-2022)										
CP No.	CP Name	Description (New and replaced assets)	Increase in effort from pre-2022 activities (Y/N)	Cost Assumptions [E]		Implementation Need		Material costs (Y/N)	Annual Public Works/Maintenance Staff Schedule	
				Assumption Note	Hours/Year	Number of City Staff	Total Hours		Annual Average (hrs)	Annual Average (FTE)
		Install 1 manhole.		G	0.5	2	1.0			
		Replace 1,330 LF of pipe.	N	Q						
		Remove existing bubbler.		Q						
		Replace 7 manholes.		Q						
		Replace field inlet.		Q						
WR-2	Miley Road Stormwater Improvements	Install 4,195 of new pipe.	Y	F	7.6	2	15.1	Y	30.1	0.018
		Install 15 manholes.		G	7.5	2	15.0			
		Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert.	N	P						
		Replace 400 LF of pipe.		Q						
		Replace 1 manhole.		Q						
		Replace 1 area drain.		Q						
		Extend 240 LF of existing main connections to the new pipe alignment.		F						
		Reconnect 13 existing curb inlets.		F						
WR-3	Rose Lane Culvert Replacement	Install 80 LF of new pipe.	Y	F	0.1	2	0.2	Y	2.2	0.001
		Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch.		J	1.0	2	2.0			
		Remove 25 LF of pipe.	N	Q						
WR-4	Charbonneau East Stormwater Improvements	Replace 3,765 LF of pipe.	N	Q				Y	0.0	0.0
		Replace 18 manholes.		Q						
		Replace 1 outfall.		Q						
WR-5	Charbonneau West Stormwater Improvements	Install 4 manholes.	Y	G	2.0	2	4.0	Y	4.0	0.002
		Replace 34 manholes.	N	Q						
		Replace 6,770 LF of pipe.		Q						
		Replace 2 outfalls.		Q						
City-1	Flow Monitoring and Rain Gauge Installation Hydromodification Assessment and Stream Survey	Install 1 rain gauge.	Y	Consultant Support				Y	Consultant Support	
		Install 3+ flow meters.								
City-2	Porous Pavement Pilot Study	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	Consultant Support				Y	Consultant Support	
City-3	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
City-4	Flow Monitoring and Rain Gauge Installation	Project still being scoped.	Y	Consultant Support				Y	Consultant Support	
						SMP Implementation Subtotal of Public Works/Maintenance Staff Cost		Average Annual Staff Time (hours)	350.7	
								Average Annual Staff Time (FTE)	0.21	

Community Development/Engineering Staffing Assessment

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
BC-1	Library Pond Retrofit	• Clear, regrade, and replant 0.7-acre detention pond. • Install 1 new outlet structure. • Install 70 LF of new perforated pipe. • Replace 70 LF of pipe. • Install driveway for maintenance access.	Y	$1,880,000	$190,000	0.95	0.048	1,567.5	78.4
BC-2	Ash Meadows Flow Mitigation	• Clear, regrade, and replant 1.3-acres of drainageway. • Install 1 inlet. • Replace175 LF of pipe.	Y	$2,940,000	$234,000	1.17	0.059	1,930.5	96.5
BC-3	Wiedemann Ditch and Canyon Creek Park Retrofit	• Clear, regrade, and replant 1.6-acres of storage facility (detention pond). • Clear, regrade, and replant 2.1-acres along the existing ditch alignment to install 5 swales (tiered wetland complexes). • Install 1 new outlet structure. • Install 350 LF of pipe. • Install 1 new manhole.	Y	Ph 1: $4,860,000	Ph 1: $322,000	1.61	0.081	2,656.5	132.8
				Ph 2: $7,210,000	Ph 2: $384,000	1.92	0.096	3,168.0	158.4
BC-4	Boeckman Creek Stabilization at Colvin Lane	• Install 70 LF of new pipe. • Reconstruct 150 LF of vegetated swale. • Install planting and bioengineered restoration of 600 LF of stream corridor. • Remove 30 LF of existing outfall pipe.	Y	$410,000	$38,000	0.19	0.010	313.5	15.7
BC-5	Memorial Park Swale Retrofit	• Install 2,400 SF vegetated water quality swale. • Install 50 LF of new pipe. • Install 1 swale inflow spreader, 1 overflow structure and 1 new outfall. • Replace 1 manhole with a flow splitting/WQ manhole. • Replace 110 LF of pipe. • Install 140 LF of perforated pipe. • Replace 2 manholes. • Fill existing 1,500 SF swale and revegetate area. • Remove 210 LF of existing pipe. • Remove 1 manhole, 1 swale inlet structure, and 1 outlet structure.	Y	$910,000	$85,000	0.43	0.021	701.3	35.1
BC-6	Gesellschaft Water Well Channel Restoration	• Install 480 LF of new pipe. • Install 2 new manholes. • Install 1 outfall. • Restore 310 LF of existing channel and re-vegetating with native trees and shrubs.	Y	$400,000	$38,000	0.19	0.010	313.5	15.7

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
CLC-1	Day Road Stormwater Improvements	• Install 200 LF of open-bottom or box culverts (4 total). • Install 180 LF of culverts (1 total). • Install 600 LF of pipe. • Install 2 manholes. • Install 3 trash racks at pipe inlets. • Regrade and reconstruct approx. 4,500 feet of open channel. • Replace 1,800 LF of pipe with 600 LF of pipe. • Replace 7 manholes. • Remove 50 LF of existing culvert.	Y	Ph 1: $8,020,000	Ph 1: $405,000	2.03	0.101	3,341.3	167.1
				Ph 2: $3,930,000	Ph 2: $370,000	1.85	0.093	3,052.5	152.6
CLC-2	Arrowhead Creek Culvert Replacement at Arrowhead Creek Trail	• Replace 70 LF of box culvert. • Install 70 LF of planting and bioengineered restoration/stabilization measures along path. • Repave 600 SF of pedestrian path.	Y	$290,000	$35,000	0.18	0.009	288.8	14.4
CLC-3	Garden Acres Pond Retrofit	• Install 1 flow diversion structure. • Install 250 LF of new pipe. • Install 1 outlet control structure. • Install 50 LF of perforated pipe. • Clear, regrade, and replant 0.9-acres of pond. • Remove 26,500 CY of fill from existing pond.	Y	$3,780,000	$302,000	1.51	0.076	2,491.5	124.6
NC-1	Frog Pond East and South Conveyance Pipe Installation	• Install 2,360 LF of new pipe. • Install 1 outfalls. • Install 7 manholes.	Y	$4,090,000	$414,000	2.07	0.104	3,415.5	170.8
WR-1	SW Willamette Way / Morey's Landing Stormwater Improvements	• Clear, grade, and replant 0.12-acres of raingarden. • Install 1 flow control diversion structure. • Install 120 LF of new pipe. • Install 1 manhole. • Replace 1,330 LF of pipe. • Remove existing bubbler. • Replace 7 manholes. • Replace field inlet.	Y	Ph 1: $2,310,000	Ph 1: $233,000	1.17	0.058	1,922.3	96.1
				Ph 2: $1,080,000	Ph 2: $109,000	0.55	0.027	899.3	45.0

SMP Implementation - Community Development/Engineering Staffing Assessment									
Stormwater program implementation (post-2022)									
CP No.	CP Name	Description	Increase in effort from pre-2022 activities (Y/N)	Cost Calculations		Community Development/Engineering Schedule			
				Total Cost ($)	Design/Construction Administration (13.5% of total cost [A]) ($)	Total Staff Time (FTE)	Annual Average Staff Time (FTE)	Total Staff Time (Hr)	Annual Average Staff Time (Hr)
WR-2	Miley Road Stormwater Improvements	• Install 4,195 of new pipe. • Install 15 manholes. • Install 25 LF of planting and bioengineered restoration/stabilization measures after replacement of the culvert. • Replace 400 LF of pipe. • Replace 1 manhole. • Replace 1 area drain. • Extend 240 LF of existing main connections to the new pipe alignment. • Reconnect 13 existing curb inlets.	Y	Ph 1: $820,000	Ph 1: $77,000	0.39	0.019	635.3	31.8
				Ph 2: $10,510,000	Ph 2: $470,000	2.35	0.118	3,877.5	193.9
WR-3	Rose Lane Culvert Replacement	• Install 80 LF of new pipe. • Reinforce 100 LF of stormwater conveyance around property near culvert to move water into ditch. • Remove 25 LF of pipe.	Y	$200,000	$35,000	0.18	0.009	288.8	14.4
WR-4	Charbonneau East Stormwater Improvements	• Replace 3,765 LF of pipe. • Replace 18 manholes. • Replace 1 outfall.	Y	Ph1: $600,000	Ph 1: $50,000	0.25	0.013	412.5	20.6
				Ph 2: $4,440,000	Ph 2: $449,000	2.25	0.112	3,704.3	185.2
WR-5	Charbonneau West Stormwater Improvements	• Install 4 manholes. • Replace 34 manholes. • Replace 6,770 LF of pipe. • Replace 2 outfalls.	Y	$10,370,000	$488,000	2.44	0.122	4,026.0	201.3
P-4[E]	Charbonneau Repair/ Replacement Program	• Replace 30,620 LF of pipe. • Replace 153 manholes.	Y	$38,360,000	$3,879,000	19.40	0.970	32,001.8	1,600.1
City-1	Flow Monitoring and Rain Gauge Installation	• Install 1 rain gauge. • Install 3+ flow meters.	Y	TBD, project will vary		Consultant Support			
City-2	Hydromodification Assessment and Stream Survey	Follow-up monitoring related to the 2022 geomorphic assessment, targeting select stream reaches.	Y	TBD, project will vary		Consultant Support			
City-3	Porous Pavement Pilot Study	Project still being scoped.	Y	TBD, project will vary		Consultant Support			
City-4	Boeckman Creek Geotechnical Evaluation	Project still being scoped.	Y	TBD, project will vary		Consultant Support			

SMP Implementation Subtotal of Community Development/Engineering Staff Cost	Total Staff Time	43.04 FTE / (71,008 hrs)
	Annual Average Staff Time [B]	2.15 FTE / (3,550 hrs)
	City Engineering Staff already designated for Capital Project work [C]	*1.0 FTE*
	Additional Annual Average Community Development/Engineering Staff Time Needed [D]	**1.15 FTE**

[A] *Most projects use a 13.5% multiplier for Design/Construction Administration, but a select group of projects were designated by the City to use a 3.5% + $200K value instead to better represent anticipated conditions.*

The projects with the adjusted multiplier include BC-3 Phases 1 & 2, CLC-1 Phase 1, CLC-3, WR-2 Phase 2, and WR-5.

WR-4 Phase 1 was designated by the City to use a 25% multiplier for Design/Construction Administration.

[B] *Summary values rounded to nearest whole hour.*

[C] *The City already has 1.0 FTE designated to work on Capital Projects, this amount was subtracted from the total calculated staff time.*

[D] *This value represents the additional annual average Community Development/Engineering staffing need of the City to complete the Capital Projects.*

[E] *Proposed program efforts are generally anticipated to be conducted using existing staffing resources or within allocated annual budgets. The Charbonneau R/R Program (P-4) will require dedicated City Engineering resources to schedule and manage specific contracts to adhere to the anticipated 20-year program duration. As such, Design/ Construction Administration costs were specifically calculated for this program and used to inform the required staffing needs.*

Stormwater Master Plan Staffing Summary

SMP Implementation - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary						
	Annual SMP Implementation Staff Cost Schedule (FTE)					
	2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance	0.21	0.21	0.21	0.21	0.21	0.21
Community Development/Engineering	1.15	1.15	1.15	1.15	1.15	1.15
Total Staff Time	1.36	1.36	1.36	1.36	1.36	1.36

Combined Staffing Assessment Summary

Combined - Public Works/Maintenance and Community Development/Engineering Staffing Assessment Summary							
		Combined Annual Staff Cost Schedule (FTE)					
		2023	2024	2025	2026	2027	Annual Average
Public Works/Maintenance Staff Cost Schedule	NPDES MS4 Permit Driven Activities	2.06	2.06	2.05	2.05	2.05	2.05
	Staffing contingency for NPDES MS4 Driven Activities (estimated at 20% to account unscheduled maintenance and response)	0.41	0.41	0.41	0.41	0.41	0.41
	SMP Implementation	0.21	0.21	0.21	0.21	0.21	0.21
	Public Works/Maintenance Staffing Summary (FTE)	2.68	2.68	2.67	2.67	2.67	2.67
Community Development/Engineering Staff Cost Schedule	NPDES MS4 Permit Driven Activities	0.26	0.19	0.11	0.11	0.11	0.16
	SMP Implementation	1.15	1.15	1.15	1.15	1.15	1.15
	Community Development/Engineering Staffing Summary (FTE)	1.41	1.34	1.26	1.26	1.26	1.31

Appendix H: Comprehensive Plan Review

Brown AND Caldwell

Comment Log

6500 SW Macadam Avenue, Suite 200
Portland, OR 97239-3552

T: 503.244.7005

Prepared for: City of Wilsonville
Project Title: Stormwater Master Plan
Project No.: 156157
Subject: Review of Wilsonville Comprehensive Plan
Date: December 16, 2021

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
1	K. Reininga	C-8	Storm Drainage Plan Paragraph 2, Line 2	Add other parameters here [currently includes temperature and turbidity] like metals, toxics, nutrients…
2	K. Reininga	C-8	Storm Drainage Plan Paragraph 3, Line 2	Remove word 'detention.'
3	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 2	Include mention of water quality.
4	K. Reininga	C-8	Storm Drainage Plan Paragraph 4, Line 3	Add "Prepared in X and updated in X" after Stormwater Master Plan.
5	K. Reininga	C-8	Policy 3.1.7	The need to prioritize green infrastructure and infiltration should be reflected in the policy statement. It may be preferred to keep language general and say compliance with the City's standards is required and then those priorities reside there. Or, an implementation measure could be added to address the new permit requirements for LID and retention. Numbering appears to be incorrect, as this should be Policy 3.1.9.
6	K. Reininga	C-8	Policy 3.1.7 Paragraph 1, Line 6	Add "peak rate" after "volume".
7	K. Reininga	C-9	Implementation Measure 3.1.7.b, Line 3	Add Municipal Separate Storm Sewer System (MS4) before the word permit as there are other types of NPDES permits.
8	K. Reininga	C-9	Implementation Measure 3.1.7.c, Line 9	Remove word 'detention.'
9	K. Reininga	C-9	Implementation Measure 3.1.7.e	City to confirm this implementation measure is still applicable.
10	K. Reininga	C-9	Implementation Measure 3.1.7.f, Line 3	Clarification need. It is not clear what Option A is referring to.
11	K. Reininga	C-10	Implementation Measure 3.1.7.h, Line 3	"Development Review Board" - Is this still the appropriate reference?

Comment Log Public Facilities and Services Section				
No.	Reviewer	Page	Section	Comment
12	K. Reininga	C-10	Implementation Measure 3.1.7.k, Line 5	Has this now been done? Reference: "For that area along Coffee Lake Creek, a hydrology study to establish the 100-year flood elevation will be required prior to development approval."
13	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 1	Insert word "peak" in single-storm drainage runoff.
14	K. Reininga	C-10	Implementation Measure 3.1.7.n, Line 5	Revise to say stormwater management facilities here instead of detention or retention facilities.
15	K. Reininga	C-11	Implementation Measure 3.1.7.n, Line 7	Has this been done? "The appropriate criteria will be established and implemented through the City's Public Works Standards."
16	K. Reininga	C-11	Implementation Measure 3.1.7.r, Line 3	Replace "detention/retention basin" with the term stormwater management facility.

CITY COUNCIL MEETING
STAFF REPORT

Meeting Date: April 15, 2024	**Subject: Order on Appeal: DRB Resolution No. 429** **Staff Member:** Miranda Bateschell, Planning Director; Stephanie Davidson, Assistant City Attorney **Department:** Community Development, Legal
Action Required	**Advisory Board/Commission Recommendation**
☒ Motion ☐ Public Hearing Date: ☐ Ordinance 1st Reading Date: ☐ Ordinance 2nd Reading Date: ☐ Resolution ☐ Information or Direction ☐ Information Only ☐ Council Direction ☐ Consent Agenda	☐ Approval ☐ Denial ☐ None Forwarded ☐ Not Applicable **Comments:** Development Review Board Resolution No. 429 issued a decision of non-conformance in Case File No. DB24-0002 (appeal of ADMN23-0029) that the Applicant has appealed to City Council.
Staff Recommendation: Staff recommends Council affirm the decision of the Development Review Board Resolution No. 429.	
Recommended Language for Motion: I move to adopt an Order on the Appeal of Development Review Board Resolution No. 429 affirming the decision in DRB Resolution No. 429.	
Project / Issue Relates To:	

☐Council Goals/Priorities:	☒Adopted Master Plan(s): Comprehensive Plan, Town Center Plan	☐Not Applicable

ISSUE BEFORE COUNCIL:
An appeal of the Development Review Board (DRB) Resolution No. 429 dated March 14, 2024, issuing a decision of non-conformance in Case File No. DB24-0002 affirming the Planning Director's Determination of Non-Conformance (ADMN23-0029).

EXECUTIVE SUMMARY:
The DRB held a special meeting on March 14, 2024, to consider all evidence timely submitted regarding DB24-0002. Following deliberation on the matter, the DRB approved Resolution No. 429 affirming the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023. The Notice of Decision for Case File No. DB24-0002 was issued on March 15, 2024. On March 27, 2024, the Applicant filed an Appeal with the City Recorder noting the following issues being appealed:

1. Finding that the legally established non-conforming use at the Location is "a 159,400 square-foot electronics-related retail store"; and,
2. Rejection of certain materials and information from the record on March 14, 2024; and,
3. Adoption of the staff report presented to it in preparation for the February 26, 2024 meeting.

Thus, the primary question before City Council is the scope of the recognized legally established non-conforming use at the Location. The DRB recognized this scope to be "a 159,400 square-foot electronics-related retail store." Additionally, the Appellant challenged two actions taken by the DRB as part of their decision, which are discussed in more detail in Attachment 1.

FACTUAL BACKGROUND:
This Staff Report provides a factual summary of the proceedings and summary of the evidence in the record that was considered in reaching the decision under review. It includes a statement of relevant facts, including important procedural background related to the appeal.

Given the nature of the issue under review, this staff report is supplemented by a legal memorandum (Attachment 1). Determination of non-conforming uses is very specific and there is a significant amount of relevant Oregon case law that provides guidance for the City Council in making its determination on this appeal. The attached memo describes the issue before City Council, the issues not appealed, and issues beyond the scope of this appeal; the burden of proof; the law regarding non-conforming uses, including the definition of non-conforming use, scope of non-conforming use, required evidence, and local government discretion; City staff's response to other arguments raised by the Appellant at DRB; and finally, the staff recommendation.

The property that is the subject of this appeal is located at 29400 SW Town Center Loop West (the "Location") within the Wilsonville Town Center. The Location is developed with a 159,400 square-foot electronics-related retail store. As Council is aware, the community engaged in a two-year planning process with City staff to establish a new vision for the Wilsonville Town Center. This culminated in Council's adoption of Ordinance No. 835, the Town Center Plan and new Town Center (TC) zoning designation, which went into effect on June 5, 2019.

At that time, several buildings and sites in Town Center, including the Location, became non-conforming (use, structure, and/or site conditions) to the new TC zoning and development standards. While established legally under a prior zoning designation and therefore allowed to continue as-is, the developed sites are not consistent, and therefore, non-conforming with the new vision, plan, and zoning standards for Town Center. Pages 49-54 of Attachment 3 detail the determination of non-conformance for use, structure, and site conditions. The Appellant does not challenge the fact of non-conformance for use, structure, and site conditions. However, it does challenge the nature and extent of the non-conforming use at the Location.

The City's non-conforming development standards (Sections 4.189 through 4.192 of the Development Code) intentionally encourage future uses and developments that become more in line with the vision and standards of the Town Center Plan and ensure ongoing and future uses of these locations and buildings are no more non-conforming with the TC Zone than the use, structure, or site conditions existing at the time the new regulations went into effect. This is consistent with best practices and supported by the Land Use Board of Appeals, as non-conforming uses inherently detract from the effectiveness of the new comprehensive plan. As further detailed in Attachment 1, local governments do not consider a property's original zoning or the prior land use approvals in establishing the nature and extent of the legally established non-conforming use at the point in time it becomes non-conforming, but rather what use preexisted and has continued after adoption of the new regulations.

As of June 5, 2019, the effective date for the new Town Center development regulations, a Fry's Electronics store existed on the site; thus, the actual use of the Location was an electronics retail store with a total interior square-footage of 159,400 square feet. This became the recognized, legally established non-conforming use at the Location on that date. As shown in Attachment 3, pages 24-25, the Appellant does not dispute this point. The DRB recognized a non-conforming use in its Notice of Decision for Case File No. DB24-0002, which was issued on March 15, 2024; it defined the nature and extent of this non-conforming use to be "a 159,400 square-foot electronics-related retail store." Attachment 2, pp. 3-4 of 20.

Thus, Staff recommends that City Council affirm the DRB decision in Resolution No. 429, affirming the Planning Director's Determination of Non-Conformance (ADMN23-0029) determining that the scope of the legally established non-conforming use at the Location is "a 159,400 square-foot electronics-related retail store."

PROCEDURAL BACKGROUND:

On October 30, 2023, the City received an application for Class I Review (ADMN23-0029) to confirm the status of the existing use and structure at 29400 SW Town Center Loop West (respectively, the "Class I Review Application" and the "Location"). The Location was previously occupied by Fry's Electronics, an electronics retail store and has been vacant since 2021. In its submittal, the Appellant requested a Class I Review to confirm the status of the existing non-conforming use at the Location, but included information regarding a potential determination of a continuation of use by another party. A determination of a continuation of use is not subject to

a Class I Review.

As a result of the issues with Appellant's initial Class I Review Application, on November 28, 2023, City staff contacted the Appellant by email providing options for processing the application and requesting that they notify staff of its preference by December 8, 2023 (Attachment 3, pp. 438-439 of 660). Appellant did not contact the City to withdraw the Class I Review Application, so the City deemed the application complete on November 29, 2023 and processed the request as a Class I Planning Director Determination per Subsection 4.030 (.01) A. 7. of the Development Code. Since Appellant did not notify staff of its preference, staff's review only covered the portion of the Class I Review Application that qualified under the Class I Review. On December 28, 2023, the City's Planning Director issued a Notice of Planning Director Determination, which provided the Planning Director's decision on the Class I Review Application (the "Planning Director's Determination").

The Appellant submitted a notice of appeal of the Planning Director's Determination on January 10, 2024. A public hearing before the Development Review Board regarding this appeal (DB24-0002) was held on February 26, 2024 (see written transcript, Attachment 4). During the public hearing, Appellant requested that the record be kept open for seven days pursuant to ORS 197.797 to allow it to respond to testimony entered into the record. The DRB closed the public hearing and unanimously approved the request to keep the written record open for Resolution No. 429 until March 4, 2024, at 5:00 pm. On March 4, 2024, Appellant filed a first written submittal, and on March 11, 2024, filed its final arguments to the record. The Development Review Board held a special meeting on March 14, 2024, to consider all evidence timely submitted regarding DB24-0002 (see record, Attachment 3). Following deliberation on the matter, the Development Review Board approved Resolution No. 429 affirming the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

The Notice of Decision for Case File No. DB24-0002 was issued on March 15, 2024. For the purpose of applying the applicable 120-day time limit, a final decision on the Class I Application, including any appeals, must be rendered by April 11, 2024.

The City is currently processing a separate but related Class II Review application, which was filed by Appellant on December 15, 2023 (AR23-0031) (the "Class II Review Application"). The central issue in the Class II Review Application proceeding is whether the Appellant's proposed use of the Location constitutes a continuation of the non-conforming use that has been recognized by the DRB. This application has been referred by the Planning Director to the Development Review Board for review as Case File No. DB24-0003. The Development Review Board public hearing is

scheduled for April 8, 2024.

TIMELINE:
The decision made by the City Council shall become effective immediately. There is a 21-day appeal period during which the Appellant could file an appeal with the Land Use Board of Appeals.

EXPECTED RESULTS:
City Council will issue an order on the appeal to affirm, reverse or modify in whole or part the determination of non-conformance by the DRB in Resolution No. 429.

CURRENT YEAR BUDGET IMPACTS:
Cost is covered partially by fees paid by appellant, otherwise Staff time is non billable within existing department budgets.

COMMUNITY INVOLVEMENT PROCESS:
Proper noticing was followed for the Development Review Board public hearing on the appeal of the Class I application. This included mailing the public hearing notice to property owners within 250 feet of the subject property, on-site posting, and publication in the Wilsonville Spokesman. All were provided an opportunity to submit testimony in advance of and at the public hearing. Further, the Town Center Plan, as well as the drafting and review process for the Town Center zoning, included comprehensive community involvement to gather input, which was integral in establishing the vision, goals, guiding principles, and design elements of the Town Center Plan.

POTENTIAL IMPACTS OR BENEFIT TO THE COMMUNITY:
The Town Center Plan and TC Zone regulations are intended to promote development that fulfills the community's vision for a more commercially vibrant, walkable, mixed-use Town Center. To support this vision, the community and policymakers established new standards that would limit new single-user retail uses to a scale (30,000 square feet footprint or less) more appropriate for pedestrians. As a result, several buildings in Town Center became non-conforming (use, structure, and/or site conditions) when the TC Plan and Zone became effective (June 5, 2019). While the uses may continue, the non-conforming provisions both ensure future uses of these locations and buildings become no more non-conforming with the TC Zone and also encourage the future uses to become more in line with the vision and standards of Town Center.

ALTERNATIVES:
The Council shall by order, affirm, reverse or modify in whole or part a determination or requirement of the decision that is under review. When the Council modifies or renders a decision that reverses a decision of the Commission or Board, the Council, in its order, shall set forth its findings and state its reasons for taking the action. When the Council elects to remand the matter back to the lower review body for such further consideration as it deems necessary, it shall include a statement explaining the error to have materially affected the outcome of the original decision and the action necessary to rectify such. It should be noted that there is not sufficient time to remand the decision without the Appellant extending the 120-day period in

which final action needs to occur on this application as required by ORS 227.178.

CITY MANAGER COMMENT:

ATTACHMENTS:

1. Legal Memorandum dated April 2, 2024
2. Development Review Board Panel B Decision – Resolution No. 429
3. Development Review Board Panel B Record – Case File DB24-0002 (ADMN23-0029)
4. Development Review Board Panel B Verbatim Minutes Excerpt dated February 26, 2024
5. Development Review Board Panel B Verbatim Minutes Excerpt dated March 14, 2024

WILSONVILLE OREGON

Legal Memorandum

TO: City Council

FROM: Stephanie Davidson, Assistant City Attorney

DATE: April 2, 2024

RE: Appeal of DRB decision in DB24-0002 (ADMN23-0029)

I. OVERVIEW

The City Council should deny Appellant's appeal of the Development Review Board ("*DRB*") decision in DB24-0002. Appellant has failed to meet its burden of proof, and has not supplied any relevant evidence to support its request that the City recognize a relatively broad non-conforming use. Appellant also ignores and misconstrues applicable law regarding the record in this matter in an attempt to undermine the authority of the hearings body (the DRB). On close inspection, Appellant's appeal has no basis in law or fact. Thus, the City Council's denial of Appellant's appeal is appropriate.

II. STATEMENT OF FACTS

A. Description of the Property that Is the Subject of this Appeal

The property that is the subject of this Appeal is located at 29400 SW Town Center Loop West (the "*Location*"). The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. The Location is developed with a 159,400 square-foot electronics-related retail store in a single story with a partial mezzanine.[1]

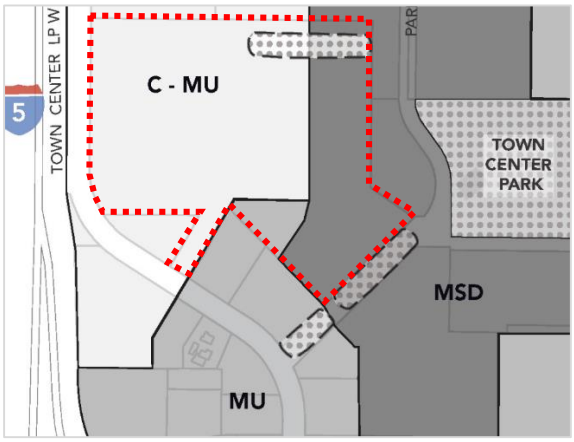
B. Change of Zoning in Town Center in 2019

In 2019 the City adopted the Town Center Plan (Ordinance No. 835), a long-term, community-driven vision to transform Wilsonville's Town Center into a vibrant, walkable destination that inspires people to come together and socialize, shop, live, and work. As part of this work, a new zoning designation, the Town Center ("*TC*") zone, and associated Wilsonville Development Code ("*WC*") Section 4.132 were adopted for the entire Town Center Area to implement the Town Center Plan's recommendations. These standards support the creation of a walkable Town Center and main street, with design standards regulating building placement,

[1] *See* Attachment 3 to Staff Report, p. 98 of 660 (first page of Planning Department Staff Report dated December 9, 1991).

building height, parking location, and drive through facilities. The plan and associated Zone Map and Development Code amendments went into effect on June 5, 2019.

The Location is currently in the TC Zone, and more specifically, the following three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU).



The C-MU sub-district applies to roughly half of the Location. Permitted uses within this sub-district include retail sales and service of retail products, under a footprint of 30,000 square feet per use; office; personal and professional services; and single-user commercial or retail, such as a grocery store or retail establishment, that may exceed 30,000 square feet if located on more than one (1) story of a multi-story building, provided the footprint of the building does not exceed 30,000 square feet.[2]

The existing structure at the Location has a total square-footage of 159,400 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per user and footprint limitation that is allowed in the TC Zone.[3]

Appellant agrees that use of the Location is non-conforming under the City's current Code provisions, and that the Location was rendered non-conforming on June 5, 2019.[4]

C. Summary of DRB Decision

The Development Review Board approved Resolution No. 429 affirming the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, (the "*Planning Director's Determination*"), and determined that:

[2] *See* WC 4.132 (.02) F. and (.03) A. 1.
[3] *See* Attachment 3 to Staff Report, p. 98 of 660 (first page of Planning Department Staff Report dated December 9, 1991).
[4] *See* Applicant's Notice of Appeal submitted on March 27, 2024 (hereinafter, the "*Notice of Appeal*"), p. 4. Appellant took the same position before DRB. *See* Attachment 3 to Staff Report, pp. 24-25 (Appellant stated in its March 11 submission to DRB, providing legal argument, that the Location became non-conforming on June 5, 2019).

1. There is a legally established non-conforming use at the Location; specifically, the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

The DRB issued its Notice of Decision for Case File No. DB24-0002 on March 15, 2024 (the "*DRB Decision*").[5]

D. Separate Class II Proceeding

The City is currently processing a separate, but related, Class II Review application, which was filed by Appellant on December 15, 2023 (AR23-0031) (the "*Class II Review Application*"). The central issue in the Class II Review Application proceeding is whether the Appellant's proposed use of the Location constitutes a continuation of the non-conforming use that has been recognized by the DRB. The Class II Review Application has been referred by the Planning Director to the Development Review Board for review as Case File No. DB24-0003. The Development Review Board public hearing is scheduled for April 8, 2024.

III. ISSUES PRESENTED

A. Issue Before City Council

Appellant challenges the following DRB actions in this appeal:

1. Finding that the legally established non-conforming use at the Location is "a 159,400 square-foot electronics-related retail store;"
2. Rejection of certain materials and information from the record on March 14, 2024; and
3. Adoption of the staff report presented to it in preparation for the February 26, 2024 meeting.[6]

Because City Council has decided to review an unredacted record, which includes all evidence submitted by any party, including Appellant, to the DRB, this memorandum addresses only City Council's ability to reject certain materials and information from the record in this appeal.

City Council's decision in this matter must be supported by substantial evidence in the whole record.[7] The "substantial evidence" standard means the governing body (City Council) decision must be a conclusion a reasonable person could make. This standard disallows LUBA from overturning a local government decision even if a reasonable person could draw a different conclusion from the same evidence so long as another reasonable person could draw the same conclusion as the local government.[8]

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[5] *See* Attachment 2 to Staff Report, pp. 3-4 of 20 (Resolution no. 429).
[6] Notice of Appeal, p. 2.
[7] *See* ORS 197.835(9)(a)(C).
[8] *See Adler v. City of Portland*, 25 Or LUBA 546, 1993 WL 1473299 at *6 (1993); *Fraley*, 32 Or LUBA 27, 31-32 (1996), *aff'd*, 145 Or App 484 (1996).

B. Issues Not Appealed

The following DRB decisions are not being challenged by Appellant (i.e., they are not being appealed and are not referenced in the Notice of Appeal):

1. There is a legally established non-conforming use at the Location
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

City Council has decided that these issues are not necessary for a proper resolution of this matter.

C. Issues Beyond the Scope of this Appeal

The issues being addressed in the Class II Review Application are beyond the scope of this proceeding. In particular, City Council should not address the Appellant's proposed use of the Location or whether such proposed use constitutes a continuation of the non-conforming use that has been recognized by the DRB. The City Council should disregard any argument about proposed use(s) of the Location and reject any evidence outside the scope of this Appeal that may be more appropriate in the Class II Review.

ISSUE NO. 1
DRB'S RECOGNITION OF A NON-CONFORMING USE FOR "A 159,400 SQUARE-FOOT ELECTRONICS-RELATED RETAIL STORE"

The DRB recognized a non-conforming use for "a 159,400 square-foot electronics-related retail store."[9] Appellant requests recognition of a non-conforming use for "a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use)."[10]

IV. BURDEN OF PROOF

Appellant has the burden to prove the existence of a non-conforming use to the City in these proceedings.[11] Appellant's burden to establish the existence of a non-conforming use is not affected by the fact that the inquiry calls for production of evidence of what occurred at the Location almost five years ago. In *Fraley v. Deschutes Cnty*., the Land Use Board of Appeals ("*LUBA*") reiterated the applicant's requirement to establish the existing use, even from 20 years prior, stating, "[a]lthough it may be more difficult in most cases to establish the nature and extent

[9] *See* Attachment 2 to Staff Report, p. 4 of 20 (Resolution no. 429).
[10] *See* Notice of Appeal, p. 7; *see also* Attachment 3 to Staff Report, p. 28 (Appellant's March 11, 2024 submission of evidence to DRB).
[11] *See* Subsection 4.014 of the Development Code ("The burden of proving that the necessary findings of fact can be made for approval of any land use or development application rests with the applicant in the case. In the case of an appeal, the burden of proof rests with the appellant."); *ODOT v. City of Mosier*, 36 Or LUBA 666, 671 (1999) (explaining that in ODOT, which was arguing for its right to continue a use, had the burden of showing the nature and extent of its use (citing *Lane Cnty. v. Bessett*, 46 Or App 319 (1980))); *Sabin*, 20 Or LUBA at 30 (1990) ("The proponent of a nonconforming use bears the burden of establishing whether a nonconforming use has been lawfully established." (citing *Webber v. Clackamas Cnty.*, 42 Or App 151, *rev den*, 288 Or 81 (1979))).

of a use that existed years ago, the requirement is not reduced in proportion to the difficulty one has in satisfying it."[12]

In this matter, Appellant has the burden of proof, and City Council's decision is subject to the "substantial evidence" standard.[13] *River City Disposal and Recycling v. City of Portland*, also a case regarding non-conforming uses, illustrates how these concepts should be applied together.[14] In *River City Disposal and Recycling*, LUBA found that the City hearings officer's decision satisfied the "substantial evidence" standard.[15] It was enough that the hearings officer found that evidence presented in an affidavit (aerial photographs) was not persuasive.[16] LUBA also clarified that the City of Portland was not obligated to present contrary evidence to counter the applicant's evidence, and the "substantial evidence" standard was satisfied because the hearings officer found that the applicant failed to satisfy its burden of proof.[17]

City Council must be sure that its decision – whether in favor of or against the Appellant's position – makes sense in light of all evidence in the record. Because Applicant has the burden of proof, City Council may decide that not enough evidence has been provided by Appellant to satisfy its burden of proof. The City is not obligated to produce evidence to counter Appellant's evidence in order for City Council to affirm the DRB's decision, or to otherwise recognize a more narrow scope of use than the Applicant would like. Further, City Council may determine the credibility of evidence in the record; in particular, when conflicting evidence exists, City Council may decide that some evidence is credible and persuasive, and other evidence is not.

V. LEGAL AUTHORITIES

This section outlines the legal authorities relevant to City Council's determination on this first issue.

A. Non-Conforming Use Defined

Generally, a non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance."[18] Wilsonville's own City Code defines "non-conforming use" as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform."[19]

[12] 32 Or LUBA at 31-32.
[13] *See* Section III.A.
[14] *See* 35 Or LUBA 360 (1998).
[15] *Id.*
[16] *Id.* at 367-71.
[17] *Id.*
[18] *Morgan v. Jackson Cnty*., 290 Or App 111, 114 (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev dismissed*, 362 Or 269, 407 (2017)).
[19] S*ee* WC 4.001 (196.).

Appellant and the City agree that the use of the Location became non-conforming on June 5, 2019 (we will refer to the use of the Location on this date as the "Current Use").[20] This is the effective date of the Town Center Plan and related adopted zoning regulations. As of this date, the Current Use would not have been permitted under then-current applicable zoning regulations for a multitude of reasons. For purposes of this appeal, the Current Use would not be permitted due to the limitations of either: (1) 30,000 square feet per user for single-story buildings; or (2) for uses in multi-story buildings, a building footprint limitation of 30,000 square feet, as stated in WC 4.132 (.02) F. and (.03) A. 1.

B. City Council Must Examine the Actual Use of the Location as of June 5, 2019 to Define the Scope of that Non-Conforming Use

The DRB has recognized that a non-conforming use exists at the Location, and Appellant agrees. The only controversy of the non-conforming use raised by Appellant regards the scope of that non-conforming use. City Council must determine the nature and extent of this non-conforming use as of June 5, 2019.[21] City Council's decision in this matter should be based on a determination of how the Location was actually used as of June 5, 2019.[22] Doing so is required under applicable law[23] and critical to establishing a standard for what non-conforming use(s) may continue at the Location. Contrary to Appellant's argument in its appeal (which finds no support under Oregon law), the City Council must determine the non-conforming use as of June 5, 2019, not what use(s) may have been approved in 1991, over 30 years ago.

C. Evidence Relevant to Establishing Nature and Extent of Non-Conforming Use

Prior Oregon cases that address non-conforming uses provide some examples of the evidence that is considered by local governments in this type of matter: testimony and affidavits regarding what activities occurred on the subject property, contemporaneous records such as advertisements and tax returns, and photographic evidence.[24] None of the many cases reviewed by

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[20] *See* Section II.B; Notice of Appeal, p. 4. Appellant took the same position before DRB. *See* Attachment 3 to Staff Report, pp. 24-25 (Appellant stated in its March 11 submission to DRB, providing legal argument, that the Location became non-conforming on June 5, 2019).

[21] *See Sabin v. Clackamas Cnty.*, 20 Or LUBA 23 (1990) (citing *Polk County v. Martin*, 292 Or 69 (1981)) ("It is the nature and extent of the lawful use in existence at the time the use became nonconforming, which is the reference point for determining the scope of permissible continued use."); *Spurgin v. Josephine Cnty.*, 28 Or LUBA 383 (1994) ("After it is determined that a nonconforming use exists, the nature and extent of the nonconforming use must be identified. . . . This requirement is important because the protected right to continue a nonconforming use is a right to continue the nature and scope of use that existed at the time the use became nonconforming.").

[22] *See Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995) ("The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied."). Appellant agrees that June 5, 2019 is the relevant point in time. *See* Notice of Appeal, p. 4; Attachment 3 to Staff Report, pp. 24-25 (Appellant stated in its March 11 submission to DRB, providing legal argument, that the Location became non-conforming on June 5, 2019).

[23] *See, e.g., Marquam Farms Corp. v. Multnomah Cnty.*, 35 Or LUBA 392, 396 (1999) (explaining that a local government that recognizes a non-conforming use must define the nature and extent of that use).

[24] *See Larson v. City of Warrenton*, 29 Or LUBA 86 (1995) (considered evidence included testimony that log trucking began in 1993, the fact that the petitioner advertised for truck drivers in 1993, and the fact that the petitioner obtained a state license in 1992 that allowed the hauling of logs); *Fraley v. Deschutes Cnty*., 32 Or LUBA 27 (1996), *aff'd*, 145 Or App 484 (1996) (considered evidence included tax records, affidavits and interviews of previous site occupants, and photographic evidence); *Crook v. Curry County*, 38 Or LUBA 677 (2000) (considered

staff in this matter provide even one example of a local government that considered either (1) what would have been allowed under a property's original zoning, or even (2) what was written in the subject property's original land use approvals. Further, LUBA does not consider these factors when reviewing local jurisdictions' decisions regarding non-conforming uses.

Appellant's position is that the City should recognize a non-conforming use based on the Location's original land use approvals, secured by Capital Realty Corporation, the property owner, in 1991 (Appellant refers to this as the "1991 Decision").[25] Appellant makes a few related arguments:

1. "The 1991 Decision is the controlling authority for determining the nature and extent of the non-conforming [use] at the [Location] because the 1991 Decision lawfully established the non-conforming use in the first instance."[26]
2. "[B]oth the Planning Director and DRB have abjectly failed to so much as even *address* the 1991 Decision."[27]

Based on an extensive review of applicable case law (and without any contradictory case law presented by Appellant), the original land use approvals (and the zoning regulations that applied prior to 2019) are irrelevant to a determination of what use existed at the Location as of June 5, 2019. This is the analysis that the case law cited in this memorandum requires. Appellant has not cited any legal authorities to support its assertion that the original land use approvals are the "controlling authority" in this matter, nor has it provided any relevant evidence that local governments typically review in these types of matters.

Appellant interprets the definition of "non-conforming use" provided in *Morgan* and WC 4.001 (196.) to compel the City to recognize its desired scope of non-conforming use. These are mere definitions, and do not address how a local government determines the scope of a non-conforming use, which is the central issue in this matter. Appellant's reading of these definitions focuses on the part that requires a non-conforming use to be legally established – but completely ignores the part that recognizes a use may change over time or may be rendered non-conforming by subsequent zoning regulations. Appellant's focus on these definitions also completely ignores the legal authorities outlined in the next section, Section V.D. These legal authorities are the law in Oregon, and control the discretion a local government has to determine the scope of a non-conforming use.

D. Non-Conforming Uses Are Disfavored and Local Government Has Discretion to Establish Extremely Narrow Scope of Use

If the City recognizes a non-conforming use in this matter, it has significant discretion to define a narrow scope. "Nonconforming uses are not favored because, by definition, they detract from the effectiveness of a comprehensive zoning plan. . . . Accordingly, provisions for the continuation of nonconforming uses are strictly construed against continuation of the use, and,

evidence included photogrammetric evidence, testimony from site visitors, the age of certain building materials, and the fact that the county's assessor's office had no record of a structure on the subject site).

[25] *See* Attachment 3 to Staff Report, pp. 20-28 of 660 (Appellant's March 11 legal argument to DRB).

[26] *See* Notice of Appeal, p. 3.

[27] *See* source cited *supra* note 26.

conversely, provisions for limiting nonconforming uses are liberally construed to prevent the continuation or expansion of nonconforming uses as much as possible."[28] Further, "the law of nonconforming uses is based on the concept, logical or not, that uses which contravene zoning requirements may be continued only to the extent of the least intensive variations—both in scope and location—that preexisted and have been continued after the adoption of the restrictions."[29]

There are many examples in the case law of local governments defining a non-conforming use in extremely narrow terms:

- In *Smith v. Lane County*, a county hearings officer recognized a limited non-conforming use: "The use of horses and cattle to practice equine/bovine eventing is verified as to the participation of up to ten individuals during any one session."[30] On appeal to LUBA, LUBA applied the substantial evidence standard and declined to "disturb the county's choice" (i.e., LUBA allowed the county's recognized scope of non-conforming use).[31] Not only did the hearings officer recognize a specific use (using horses and cattle to practice equine/bovine eventing), the hearings officer also recognized a narrow scope of the specific use – participation of up to only ten individuals during one session.
- In *Larson v. City of Warrenton*, the City of Warrenton determined the following scope of non-conforming use: " . . . storing and repairing marine construction equipment and as a base of operations for his construction company. Equipment typically seen at the site included trucks, cranes and other earth moving equipment used in marine and land construction."[32]
- In *Senkovich v. Lane County*, the county recognized as nonconforming uses "agricultural and forestry uses, counseling, educational uses, seminars, conferences, retreats, religious uses, and residential uses," but limited the nonconforming use to "150 resident students, 35 staff members and families, and 3,000 annual guests."[33]

As is clear from these examples, local governments may define non-conforming uses in extremely narrow terms. Under Appellant's theory of non-conforming use, the above-described cases would have uses described as "agricultural use" in *Smith*, "industrial use" in *Larson*, and "recreational, educational, agricultural and forestry uses" in *Senkovich*. Not only is such an interpretation contrary to Oregon law, the purpose of non-conforming uses is to ensure only the particular, current use is continued, rather than allowing a broad category of non-conforming uses to occur on a property.

As of June 5, 2019, it is undisputed that the actual use of the Location was a Fry's Electronics store: an electronics retail store with a total interior square-footage of 159,400 square feet.[34] Appellant offers no evidence that the use as of June 5, 2019 is anything more than or

[28] *Parks v. Bd. of Cnty. Comm'rs of Tillamook Cnty.*, 11 Or App 177, 196–97 (1972) (internal citation omitted).
[29] *Clackamas Cnty. v. Gay*, 133 Or App 131, 135 (1995), *rev den*, 321 Or 137 (1995), *aff'd*, 146 Or App 706 (1997).
[30] 25 Or LUBA 1, 2 (1993) (emphasis added).
[31] *Id.*
[32] 29 Or LUBA 86, 1995 WL 1773182 at *1 (emphasis added).
[33] LUBA No. 2017-064, 2023 WL 6955255 at *1 (Sept. 18, 2023) (emphasis added).
[34] *See* Attachment 3 to Staff Report, p. 98 of 660 (first page of Planning Department Staff Report dated December 9, 1991, which characterized the use as "a retail business with the anonymous name 'Project Thunder' . . . a 159,400 square foot electronics-related retail store").

different from this use. The DRB Decision recognized a non-conforming use for "a 159,400 square-foot electronics-related retail store."[35] This scope is appropriate and comports with applicable case law such as *Parks* and *Gay*, which allow local governments to narrowly limit and resist expansion of the scope of non-conforming uses in order to resist the erosion of zoning regulations.

In fact, the term "electronics-related retail store" is broader than what is strictly necessary under applicable case-law – especially when this term is compared to the extremely narrow uses that were approved in *Smith*, *Larson*, and *Senkovich*. And, although not relevant to this inquiry, "electronics-related retail store" is language found in the 1991 land use approval that Appellant inaccurately states should be the sole basis for determining the non-conforming use.[36]

As stated in Section IV, Appellant has the burden of proof to establish the existence of a non-conforming use. In other words, Appellant must prove that uses beyond those described above were occurring at the Location on June 5, 2019. Furthermore, the City is not obligated to present evidence if it desires to define a more narrow non-conforming use than Appellant would like – Appellant must provide sufficient evidence to compel the City to recognize the broader "retail, office, warehouse, manufacturing, and service store" use that it argues for in its briefing.[37]

If the City elects to recognize this scope of non-conforming use, virtually *any* business could operate at the Location under this non-conforming use; this is an absurd result that totally undermines City's land use planning. Exceptions to broad regulations, such as regulating non-conforming uses, should not be interpreted to "swallow the rule."[38] Appellant's unsupported and overly broad classification of non-conforming use would do just that. To reiterate, Appellant has not provided or referred to any relevant evidence to establish the scope of the non-conforming use of the Location as of June 5, 2019.

VI. APPELLANT HAS NO TAKINGS CLAIM

Appellant advances an argument that the DRB Decision represents an unconstitutional regulatory taking that is prohibited under Article I, section 18 of the Oregon Constitution and the Fifth Amendment (made applicable through the Fourteenth Amendment) of the United States Constitution.[39] These state and federal "takings" principles provide that private property cannot be taken for a public purpose without just compensation to the property owner. A typical example of this requirement is when a city needs to build a new road and acquire property from a private property owner for the road, the city must pay the property owner "just compensation" for the property being acquired.

[35] *See* Attachment 2 to Staff Report, pp. 3-4 of 20 (Resolution no. 429).
[36] *See* Attachment 3 to Staff Report, p. 98 of 660 (first page of Planning Department Staff Report dated December 9, 1991, which characterized the use as "a retail business with the anonymous name 'Project Thunder' . . . a 159,400 square foot electronics-related retail store").
[37] *See* Notice of Appeal, p. 7; *see also* Attachment 3 to Staff Report, p. 28 of 660 (Appellant's March 11, 2024 legal argument to DRB).
[38] *See, e.g., 1000 Friends of Oregon v. LCDC (Tillamook Co.)*, 303 Or 430, 441 (1987).
[39] *See* Notice of Appeal, p. 5; *see also* Attachment 3 to Staff Report, pp. 5-6 (Appellant's March 4, 2024 submission of evidence to DRB), p. 27 (Appellant's March 11, 2024 legal argument to DRB).

A. Regulatory Taking Defined

The United States Supreme Court and the Oregon Supreme Court have also recognized that regulations can also constitute a taking of private property, generally when the property owner is deprived of all economically feasible use of the property.[40]

Prior to determining whether a regulatory taking has occurred, a precursor to these tests is establishing who is entitled to allege that a regulatory taking has occurred. Only persons or entities that hold a current, not prospective, interest in the real property at the time the alleged taking occurred, and who can allege a loss of economically feasible use of the property, may assert a takings claim. Possessing a current, not prospective, property interest is necessary because the person or entity that is allegedly being deprived their interest in the property without just compensation must actually have been deprived.

B. Appellant Cannot Claim a Regulatory Taking Occurred

Here, Appellant, the party advancing the takings argument, did not own the subject real property when the City adopted the Town Center zone, nor does Appellant now own the subject real property. Appellant may have a prospective, future right to purchase the real property (though such evidence is not in the record), but it is not the current property owner, a tenant, or lender with a security interest in the real property. Appellant has no standing to assert a takings claim nor to allege it is being denied a property right because Appellant does not own the subject real property.

The United States Supreme Court has held that a property owner who purchases property from another may assert a regulatory takings claim after transfer of ownership, but only in the case where the prior owner could not have made such a claim because the claim was not ripe at the time.[41] Again, Appellant does not currently own the subject property, and, as such, does not have standing to make a takings claim against the City.

ISSUE NO. 2
REJECTION OF CERTAIN MATERIALS AND INFORMATION FROM THE RECORD

The DRB rejected certain materials and information from the record during its March 14, 2024 meeting.[42] Appellant objects to this.[43] City Council has decided to review an unredacted record, which includes all evidence submitted by any party, including Appellant, to the DRB, this section addresses only City Council's ability to reject certain materials and information from the record in this appeal.

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[40] *See Lucas v. S.C. Coastal Council*, 505 US 1003 (1992); *Fifth Ave. Corp. v. Washington County*, 282 Or 591 (1978); *but see Penn Central Transp. Co. v. New York City*, 438 US 104 (1978) (under federal takings analysis, when not all economically feasible use has been deprived, courts will engage in a three-factor test to determine whether a regulatory taking has occurred).
[41] *See Palazzo v. Rhode Island*, 533 US 606, 626-28 (2001).
[42] *See* Attachment 5 to Staff Report, p. 2 of 5 (verbatim transcription of motion made during March 14, 2024 DRB meeting); *also see* Attachment 3 to Staff Report (the unredacted record).
[43] *See* Notice of Appeal, pp. 5-7.

VII. CITY COUNCIL IS ENTITLED TO REJECT EVIDENCE FROM THE RECORD

City Council is entitled to reject evidence from the record pursuant to OAR 661-010-0025(1)(b).[44] This administrative rule states that in an appeal to LUBA, LUBA may review, "[a]ll written testimony and all exhibits, maps, documents or other materials specifically incorporated into the record or placed before, and not rejected by, the final decision maker, during the course of the proceedings before the final decision maker." It is a well-established rule of statutory interpretation that one must not insert language that has been omitted – or omit language that has been inserted.[45] This administrative rule expressly states that LUBA reviews evidence "not rejected by" the decision maker, thus indicating a local government may reject evidence from the record. Appellant cites no accurate authority to support its position that the City must accept any evidence submitted by Appellant.

If City Council decides that evidence is not relevant to this appeal proceeding, City Council should reject such evidence from the record in this Appeal, as DRB did.

VIII. ORS 197.797 DOES NOT PROHIBIT A LOCAL GOVERNMENT FROM REJECTING EVIDENCE FROM THE RECORD

Appellant cites portions of ORS 197.797 to argue that a local government may not reject certain materials and evidence from the record.[46] Appellant misrepresents and misunderstands this statute.

ORS 197.797(4)(a) requires only that documents or evidence that is supplied to the local government by Appellant "be made available to the public." A local government's obligation to create a record for its ultimate decision (and possible appeal) is entirely distinct from its obligation to make materials and information available to the public.

With respect to DRB's proceedings in this matter, all of Appellant's documents and evidence were included in the packet of materials that was published and made available to the public. Appellant was not restricted from discussing certain topics or issues during oral testimony at the DRB hearing, nor was Appellant denied the ability to provide a PowerPoint presentation during the DRB hearing. Thus, all of Appellant's documents, evidence, and argument were made available to the public.

However, ORS 197.797(4)(a) is not the relevant part of ORS 197.797 regarding the record created by a local government in a quasi-judicial land use hearing. ORS 197.797(9) provides definitions of the terms "evidence" and "argument" because other parts of this statute differentiate between these categories of information. ORS 197.797(9)(a), defining "Argument," expressly states that it does not include facts; rather, argument includes assertions and analysis of the applicable legal standards or policy that Appellant believes is relevant to the decision to be made. The only place in ORS 197.797 that explicitly states something must be made part of the record is

[44] *See* OAR 661-010-0025(1)(b) (emphasis added).
[45] *See* ORS 174.010.
[46] *See* source cited *supra* note **Error! Bookmark not defined.**.

found in ORS 197.797(6)(e), which allows an applicant to submit final written argument. However, that subsection also states that the applicant cannot submit new evidence in the final argument. In other words, the only document that the local government may not reject is Appellant's final written argument, which could not contain new evidence.

With respect to DRB's proceedings in this matter, DRB did not reject Appellant's argument. DRB only rejected certain evidence that was not relevant to the Class I Review.[47] No part of ORS 197.797 even addresses – let alone prohibits – a local government from rejecting "written testimony and all exhibits, maps, documents or other materials" from the record.

If City Council decides that evidence is not relevant to this appeal proceeding, City Council should reject such evidence from the record in this Appeal, as DRB did.

IX. THE PROPER FORUM FOR AN OBJECTION TO REJECTION OF EVIDENCE FROM THE RECORD IS LUBA

If Appellant disagrees with the DRB's (or City Council's) determination of what should be rejected from the record, that argument is properly addressed through a procedural assignment of error at LUBA.[48]

X. A MOTION TO REJECT EVIDENCE FROM THE RECORD IS NOT REQUIRED TO BE INCLUDED IN THE DRB DECISION

Appellant argues that the DRB's motion to reject certain materials and evidence from the record was deficient because it was not included in the DRB Decision.[49] Appellant does not cite any legal authority for this proposition.

ISSUE NO. 3
DRB'S ADOPTION OF THE STAFF REPORT

The DRB adopted the staff report dated February 15, 2024.[50] Appellant objects to this.[51]

XI. THE DRB WAS ENTITLED TO ADOPT THE STAFF REPORT

Appellant does not cite any legal authority for this proposition, and does not provide any substantive argument on this point in the Notice of Appeal.

[47] In fact, the vast majority of the evidence excluded would be more appropriate in the Class II Review since it largely involved a discussion of the proposed use of the Location, rather than the existing use.
[48] *See Port of Umatilla v. City of Umatilla*, LUBA No. 2014-062 (2014).
[49] *See* Notice of Appeal, p. 6.
[50] *See* Attachment 5 to Staff Report, p. 3 of 5 (verbatim transcription of motion made during March 14, 2024 DRB meeting); *see also* Attachment 2 to Staff Report, pp. 5-20 of 20 (the staff report, as attached to Resolution no. 429).
[51] *See* Notice of Appeal, p. 2.

CONCLUSION TO ISSUES APPEALED

Appellant has not presented any case law or other legal authority that contradicts City staff's summary of relevant authorities in this memorandum. Further, Appellant has not satisfied its burden of proof: it has presented no relevant evidence to support its position regarding the proper scope of non-conforming use.

City staff recommend that City Council find, pursuant to WC 4.022(.07):

1. DRB followed correct procedures, and in particular, the DRB did not err when it adopted the staff report dated February 15, 2024, and rejected certain materials and evidence from the record; and,
2. Affirm the Development Review Board decision in Resolution No. 429, determining that the scope of the legally established non-conforming use at the Location is "a 159,400 square-foot electronics-related retail store," and further, that this was the correct and appropriate decision made based on applicable laws, policies, and standards.

Further, City staff recommend that City Council reject any irrelevant evidence from the record pursuant to OAR 661-010-0025(1)(b) because in an appeal of this matter to LUBA, LUBA will review any evidence not rejected by City Council.

OTHER ARGUMENTS PRESENTED IN THE APPEAL

XII. BIFURCATION OF CLASS I AND CLASS II PROCEEDINGS

Appellant mentions in its Notice of Appeal, and in its briefing to DRB, that the City required Applicant to file separate Class I and Class II applications; it implies procedural deficiencies.[52]

City staff did determine that a Class II application was necessary to address at least one of the questions that were posed in Appellant's Class I application. The City invited Appellant to submit a Class II application and withdraw its Class I application, both in writing on November 28, 2023,[53] at the DRB hearing on February 26, 2024,[54] and in the days following the DRB hearing on February 26, 2024. The City offered to withdraw the Planning Director's Determination if Appellant wanted to withdraw the Class I application. The City's goal in making this offer was to allow the City to address all issues pertinent to both the Class I and Class II proceedings in one combined proceeding. Appellant declined this offer.

Appellant misunderstands the City's reason for requiring a separate Class II application. Appellant's briefing seems to suggest that the City required a Class II process in order to determine the scope of the recognized non-conforming use.[55] That is not accurate. The City required a Class II application to address Appellant's request for confirmation that the Home Depot may continue to operate at the Location (i.e., a determination of continuation of non-conforming use by a new proposed user); this question requires a Class II process under the City's policies and procedures.[56] When Appellant failed to respond to the City in November 2023 and rejected the City's offer in February 2024, the City was forced to process the question that is subject to a Class I review (the determination whether the current use is legally non-conforming) since Appellant requested a Class I review. The DRB determined the nature and extent of the recognized non-conforming use because that is what case law requires; a local government may not recognize a non-conforming use but neglect to determine its nature and extent (i.e., scope).[57] Therefore, the DRB Decision did not "prejudge" the issues subject to the Class II Review as Appellant asserts in its Notice of Appeal.

XIII. APPELLANT'S READING OF CITY ZONING REGULATIONS

Appellant states in its Notice of Appeal that it "has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Applicant is also not aware of any state law that makes such a distinction; nor has the

[52] *See* Notice of Appeal, p. 3; Attachment 3 to Staff Report, p. 21 of 660 (portion of Appellant's March 11, 2024 legal argument regarding this point) and p. 463 of 660 (portion of Appellant's Notice of Appeal to DRB regarding this point).
[53] *See* Attachment 3 to Staff Report, p. 469 of 660 (email from Cindy Luxhoj to Appellant stating that Class II application is necessary and offering an option to withdraw the Class I application).
[54] *See* Attachment 4 to Staff Report, pp. 14-15 of 24 (discussion before DRB regarding this point).
[55] *See* sources cited *supra* note 52.
[56] *See* source cited *supra* note 53.
[57] *See, e.g., Marquam Farms Corp. v. Multnomah Cnty.*, 35 Or LUBA 392, 396 (1999) (explaining that a local government that recognizes a non-conforming use must define the nature and extent of that use).

City pointed to any state law or code provision applicable at the time."[58] This statement reflects an incomplete understanding of Wilsonville's zoning code, as it existed in 1991.

Included within the 1991 Decision record submitted by the Appellant is a memorandum from City staff to the Design Review Board regarding a land use application for the Les Schwab Tire Center. This memorandum provides background on Wilsonville's zoning code as it applied to the Town Center at that time, noting that "The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas." [59]

The Stage I Master Plan implemented the Wilsonville Town Center Plan (Ordinance No. 55) under the Planned Development Commercial zoning designation. The Stage I Master Plan modification in 91PC43 reclassified the overlay designation of the Location to Central Commercial to allow an electronics-related retail store consistent with this overlay designation.[60] Finding 40 of the 1991 Decision states "Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassified uses and reconfigured open space."[61] Therefore, it is inaccurate to state that the Wilsonville Development Code in effect in 1991 did not further classify uses within the Planned Development Commercial zone.

[58] *See* Notice of Appeal, pp. 4.
[59] *See* Attachment 3 to Staff Report, pp. 161-162 of 660 (memorandum from Michael E. Kohlhoff, City Attorney to the Design Review Board dated October 9, 1990 explaining background and purpose of Planned Development Commercial Zoning as it applied to Town Center).
[60] *See* Attachment 3 to Staff Report, pp. 238-239 of 660 (revised Stage I Master Plan)
[61] *See* Attachment 3 to Staff Report, p. 113 of 660 (Case File 91PC43 Staff Report explaining process for modifying overlay zones)

ATTACHMENT 2

VIA: Certified Mail, Return Receipt Requested

March 15, 2024

Dan Zoldak
Lars Andersen & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Re: Determination of Non-Conformance
29400 SW Town Center Loop West

Case File: DB24-0002 Appeal of Administrative Decision
- Appeal (APPL24-0001)

The Development Review Board's Decision and Resolution No. 429 are attached, affirming the Planning Director Determination in Case File ADMN23-0029 and denying the Appeal in Case File DB24-0002.

Thank you.

Mandi Simmons
Planning Administrative Assistant

CC: David Fry, Lumberjack LP

CC via e-mail: Kenneth Katzaroff, KKatzaroff@schwabe.com
Keenan Ordon-Bakalian, Kordon-bakalian@schwabe.com
Barry Simmons, barry_simmons@homedepot.com
Patrick Donaldson, pfdforbes@aol.com

March 15, 2024

DEVELOPMENT REVIEW BOARD PANEL B

NOTICE OF DECISION

Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.

On March 15, 2024, at the meeting of the Development Review Board the following action was granted on the above-referenced subject:

The Development Review Board affirmed the Planning Director Determination in Case File ADMN23-0029, and denied the Appeal in Case File DB24-0002.

Any appeals by anyone who has participated in this hearing, orally or in writing, must be filed with the City Recorder within fourteen (14) calendar days of the mailing of the Notice of Decision. *WC Sec. 4.022 (.02).*

This decision has been finalized in written form and placed on file in the City records at Wilsonville City Hall this **15th day of March 2024** and is available for public inspection. This decision shall become effective on the fifteenth (15th) calendar day after the postmarked date of the written Notice of Decision, unless appealed or called up for review by the Council in accordance with this Section. *WC Sec. 4.022 (.09).*

Written decision is attached

For further information, please contact the Wilsonville Planning Division at Wilsonville City Hall, 29799 SW Town Center Loop E, Wilsonville Oregon 97070 or phone 503-682-4960.

Attachments: DRB Resolution No. 429

DEVELOPMENT REVIEW BOARD
RESOLUTION NO. 429

A RESOLUTION AFFIRMING THE PLANNING DIRECTOR'S DETERMINATION OF NON-CONFORMANCE IN CASE FILE ADMN23-0029 AND DENYING THE APPLICANT'S APPEAL DB24-0002.

WHEREAS, an application for Class 1 Administrative Review (ADMN23-0029), together with planning exhibits, has been submitted by Dan Zoldak of Lars Andersen & Associates, Inc. – Applicant, on behalf of David Fry of Lumberjack LP – Owner, in accordance with the procedures set forth in Section 4.008 of the Wilsonville Code; and

WHEREAS, the subject property is located at 29400 SW Town Center Loop West on Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon ("the Location"); and

WHEREAS, the subject of the Class 1 Administrative Review was a Planning Director's Determination of non-conformance per Subsection 4.030 (.01) A. 7. of the Wilsonville Development Code; and

WHEREAS, the City issued the Planning Director's Determination, on the above-captioned subject, that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone, dated December 28, 2023; and

WHEREAS, within the prescribed appeal period, the Administrative Decision was appealed by Dan Zoldak of Lars Andersen & Associates, Inc. – Appellant/Applicant, dated January 10, 2024; and

WHEREAS, specifically, the filed appeal grounds were stated: *"An APPEAL of Planning Director Determination ADMN20-0029 [sic] determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West"*; and

WHEREAS, per Code Section 4.022 (.01), a decision by the Planning Director on issuance of an Administrative Decision may be appealed, and such appeals shall be heard by the Development Review Board for all quasi-judicial land use matters; and

WHEREAS, the matter at issue will be a determination of the appropriateness of the action or interpretation of the requirements of the Code; and

WHEREAS, the Planning Staff mailed the Notice of Public Hearing for the Appeal on February 6, 2024, in advance of the Public Hearing; and

WHEREAS, the Planning Staff has prepared the staff report on the above-captioned subject dated February 15, 2024, for consideration by the Development Review Board in hearing the appeal; and

WHEREAS, said planning exhibits and staff report were duly considered by the Development Review Board Panel B at a scheduled meeting conducted on February 26, 2024, at which time exhibits, together with findings and public testimony were entered into the public record; and

WHEREAS, interested parties, if any, have had an opportunity to be heard on the subject; and

WHEREAS, during the February 26, 2024 public hearing, the Applicant requested that the record be kept open for seven days to allow it to respond to testimony entered into the record; and

WHEREAS, the Development Review Board Panel B closed the public hearing and unanimously approved the request to keep the record open for Resolution No. 429 until March 4, 2024 at 5:00 pm; and

WHEREAS, on March 4, 2024, the Applicant filed a first written submittal, which has been marked as Exhibit B2, forwarded by Planning Staff to the Development Review Board on March 7, 2024; and

WHEREAS, on March 11, 2024, the Applicant filed a final arguments submittal, which has been marked as Exhibit B3, forwarded by Planning Staff to the Development Review Board on March 12, 2024; and

WHEREAS, on March 14, 2024, commencing at 4:30 pm, the Development Review Board Panel B held a special meeting to consider all evidence timely submitted to, and not rejected by, the Development Review Board regarding Case File No. DB24-0002; and

WHEREAS, the Development Review Board considered all evidence placed before, and not rejected by, the Development Review Board on the record for Resolution No. 429, and, thereafter, deliberated.

NOW, THEREFORE, BE IT RESOLVED that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, attached hereto, with findings and recommendations contained therein, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

ADOPTED by the Development Review Board of the City of Wilsonville this 14th day of March 2024, and filed with the Planning Administrative Assistant on 3/14/24. This resolution is final on the 15th calendar day after the postmarked date of the written notice of decision per *WC Sec 4.022 (.09)* unless appealed per *WC Sec 4.022 (.02)* or called up for review by the Council in accordance with *WC Sec 4.022 (.03)*.

Rachelle Barrett, Chair - Panel B
Wilsonville Development Review Board

Attest:

Mandi Simmons, Planning Administrative Assistant

WILSONVILLE
OREGON

Exhibit A1
Staff Report
Wilsonville Planning Division
Appeal of Administrative Decision
29400 SW Town Center Loop West

Development Review Board Panel 'B'
Quasi-Judicial Public Hearing
Amended and Adopted March 14, 2024
Added language ***bold italics underline***
Removed language ~~struck through~~

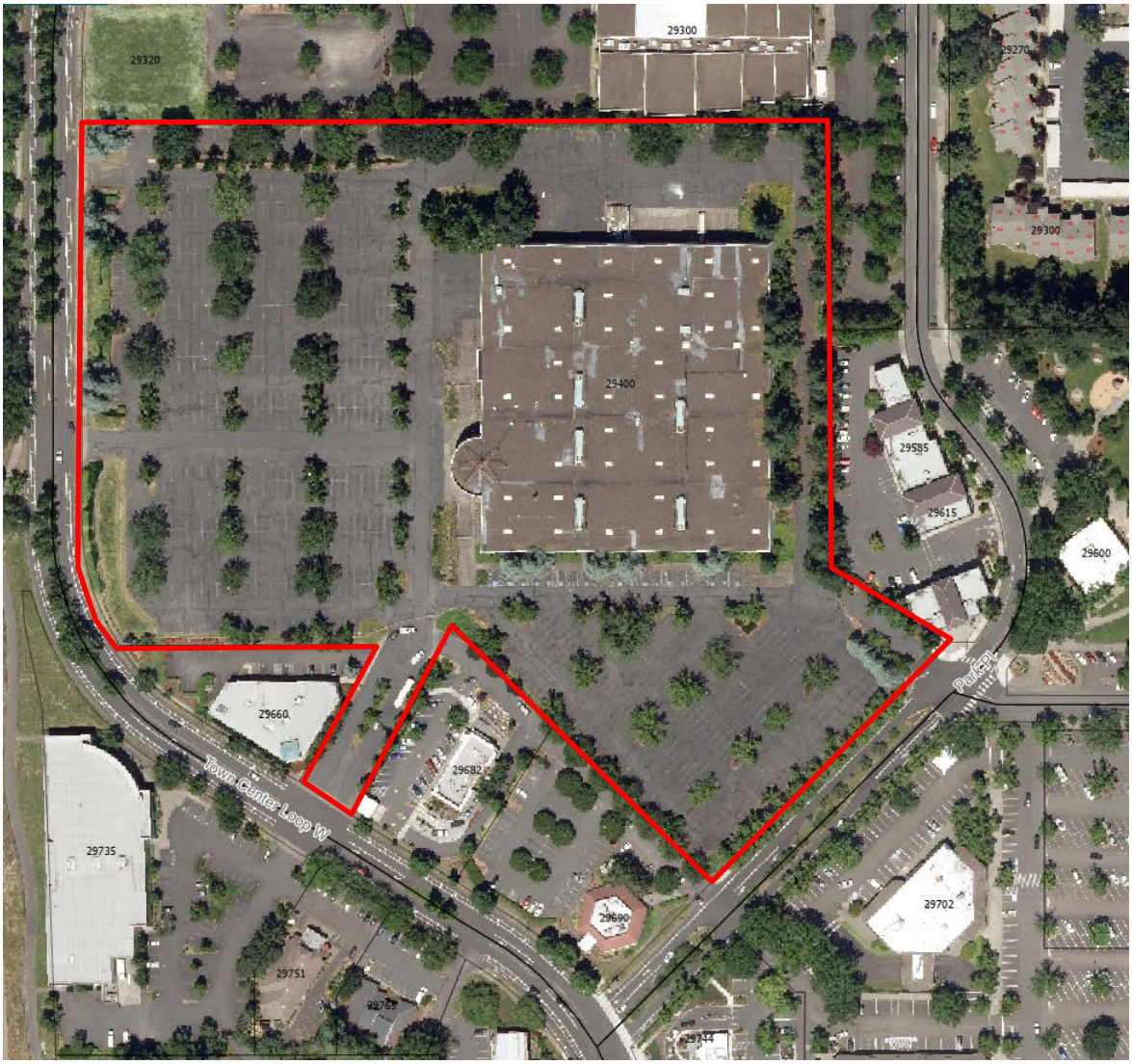
Hearing Date:	February 26, 2024
Special Meeting Date:	***March 14, 2024***
Date of Report:	February 15, 2024
Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Comprehensive Plan Designation:	Town Center
Zone Map Classification:	Town Center (TC); Sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), Main Street District (MSD)
Staff Reviewers:	Cindy Luxhoj AICP, Associate Planner Miranda Bateschell, Planning Director

Staff Recommendation: **Affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029).

Applicable Review Criteria:

DB24-0002 Appeal of Administrative Decision	
Development Code:	
Section 4.022	Appeal and Call-up Procedures
ADMN23-0029 Class 1 Review Request	
Development Code:	
Section 4.001	Definitions
Section 4.008	Application Procedures-In General
Section 4.009	Who May Initiate Application
Section 4.010	How to Apply
Section 4.011	How Applications are Processed
Section 4.014	Burden of Proof
Section 4.030	Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.031	Authority of the Development Review Board
Section 4.034	Application Requirements
Subsection 4.035 (.05)	Complete Submittal Requirement
Section 4.102	Official Zoning Map
Section 4.110	Zones
Section 4.132	Town Center (TC) Zone
Section 4.189	Non-Conforming Uses
Section 4.190	Non-Conforming Structures
Section 4.191	Non-Conforming Site Conditions
Other Planning Documents:	
Previous Land Use Approvals	

Site Location:



Existing Development:

Procedural Background:

On October 30, 2023, the City received an application for Class 1 Review (ADMN23-0029) to confirm the status of the existing use and structure at 29400 SW Town Center Loop West (respectively, the "Class 1 Review Application" and the "Location"). The Location was previously occupied by Fry's Electronics, an electronics retail store and has been vacant since 2021. In their submittal, the Applicant requested a Class 1 Review to confirm the status of the existing non-conforming use at the Location.

On November 28, 2023, City staff contacted the applicant by email providing options for processing the application and requesting that they notify staff of their preference by December 8, 2023 (Exhibit A3). Applicant did not contact the City to withdraw the Class 1 Review Application, so the City deemed the application complete on November 29, 2023 and processed the request as a Class 1 Planning Director Determination per Subsection 4.030 (.01) A. 7. of the Development Code. On December 28, 2023, the City's Planning Director issued a Notice of Planning Director Determination, which provided the Planning Director's decision on the Class 1 Review Application that Fry's Electronics located on the subject property is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone (Exhibit A4) (the "Planning Director's Decision").

The Appellant submitted a notice of appeal of the Planning Director's Decision on January 10, 2024 (the "Notice of Appeal").

The City is currently processing a separate but related Class 2 Review application per Subsection 4.030 (.01) B. 3, which was filed by the Applicant on December 15, 2023 (AR23-0031) (the "Class 2 Review Application").

Scope of Review:

This appeal is a *de novo* review of the Class 1 Review Application under Subsection 4.022 (.01) of the Wilsonville Development Code. "De novo," is Latin for "from the beginning;" the Development Review Board must review the Class 1 Review Application as if the action had not been previously heard and as if no decision had been rendered by the Planning Director. The Development Review Board should base its decision on the testimony, evidence and other material submitted by Applicant to the City in the Class 1 Review Application, as stated in Subsection 4.022 (.07) B. of the Wilsonville Development Code. Further, it shall, by order, affirm, reverse, or modify, in whole or part, a decision that is under review; in this proceeding the decision under review is the Planning Director's Decision. Subsection 4.022 (.08) A. of the Wilsonville Development Code.

For the purpose of applying the applicable 120-day time limit, a final decision on the Class 1 Application, including any appeals, must be rendered by March 28, 2024.

The Class 2 Review Application, and any issues that are subject to the Class 2 Review – such as the scope of what non-conforming use may be continued – are beyond the scope of this appeal proceeding.

Questions Presented:

On the cover page of the Class 1 Review Application, Applicant requests "non conforming use confirmation." See Exhibit B1. Reviewing this document with the portion of the Class 1 Review Application titled, "Applicant's Narrative and Exhibits Demonstrating Compliance with the Relevant Approval Criteria," City staff believe that Applicant requests an answer to the following questions:

1. Is the Location a non-conforming use?
2. Does the Location contain a non-conforming structure?
3. Does the Location contain non-conforming site conditions?

Considering that this is a *de novo* review of the Class 1 Review Application, the Development Review Board should address all three questions listed above. However, the Notice of Appeal does not challenge the Planning Director's Decision on the second and third questions listed above. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these points. The main point of disagreement between the Applicant and the City is the Planning Director's Decision regarding the first question listed above.

This staff report addresses each question in order, outlining the legal standard that applies to the question, then highlighting facts that staff believe are relevant to the question, and finally, quoting the determination of the question as stated in the Planning Director's Decision.

Non-Conforming Use Inquiry:

1. Applicable Legal Standard

Before a use can be deemed "non-conforming" it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty.*, 290 Or App 111, 114, (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Subsection 4.001 (196.) of the Development Code (defining a non-conforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform"). As is outlined in greater detail below, the Location's existing use would not be permitted by the City due to the Town Center Plan, which was adopted effective June 5, 2019.

"Nonconforming uses are not favored because, by definition, they detract from the effectiveness of a comprehensive zoning plan. . . . Accordingly, provisions for the continuation of nonconforming uses are strictly construed against continuation of the use, and, conversely, provisions for limiting nonconforming uses are liberally construed to prevent the continuation or expansion of nonconforming uses as much as possible." *Parks v. Bd. of Cnty. Comm'rs of Tillamook Cnty.*, 11 Or App 177, 196–97 (1972) (internal citation omitted).

Once a use is determined to be impermissible under a current land use ordinance, the question becomes: may the use continue because it is legally protectable as "non-conforming"? "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995).

Appellant has the burden of establishing that a non-conforming use exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal); *ODOT v. City of Mosier*, 36 Or LUBA 666, 671 (1999) (citing *Lane Cnty. v. Bessett*, 46 Or App 319 (1980)); *Sabin v. Clackamas Cnty.*, 20 Or LUBA 23, 30 (1990) (citing *Webber v. Clackamas Cnty.*, 42 Or App 151, *rev. den.*, 288 Or 81 (1979)). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

The only portion of the City's code that is relevant to this inquiry is Subsection 4.189(.01)A., which states that "[a] non-conforming use may be continued subject to the requirements of this Section." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

The identity of the party that engaged in the use is irrelevant to this inquiry. *See City of Mosier* at 678 (stating that focus of the inquiry is the nonconforming activities themselves, not whether the entity performing the activity is a landowner, permittee, or licensee). In other words, it is not relevant that the party that engaged in the use at issue was Fry's Electronics – rather than Applicant.

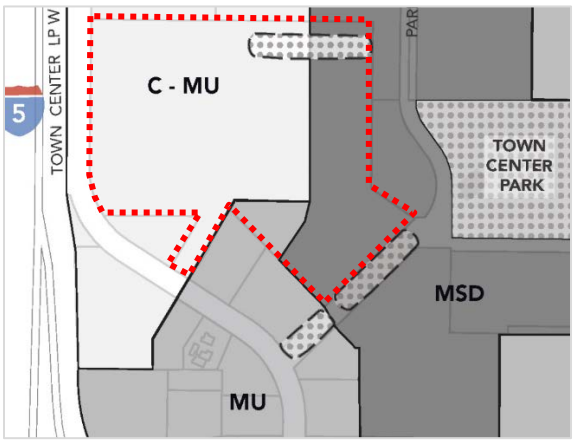
To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the current use of the Location impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," what was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

2. Relevant Facts

A. Is the current use of the Location impermissible under a current land use ordinance?

The Location is currently in the TC Zone, and more specifically, the following three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU).



The C-MU sub-district applies to roughly two-thirds of the Location. Permitted uses within this sub-district include retail sales and service of retail products, under a footprint of 30,000 square feet per use, office, personal and professional services, and single-user commercial or retail, such as a grocery store or retail establishment, that may exceed 30,000 square feet if located on more than one (1) story of a multi-story building, provided the footprint of the building does not exceed 30,000 square feet.

The existing structure at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone.

Applicant appears to concede that use of the Location is impermissible under the City's current Code provisions. *See* Exhibit B1, pages 4-5 and page 15 (referring to the use of the Location as non-conforming).

B. What was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

As of June 5, 2019, the actual use of the Location was a Fry's Electronics store, an electronics retail store with a total interior square-footage of 159,400 square feet and a footprint of 124,215 square feet.

To the extent that the Development Review Board finds it is relevant to this review, the original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store." *See* Exhibit B1, page 31.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he use is a legally established Non-Conforming Use in the TC zone."

Non-Conforming Structure Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that a non-conforming structure exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located." The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements[.]" Subsection 4.190 (.01) further states that "[a] non-conforming structure that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the Location's structure impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," was the structure legally established and may it continue to be used?

2. Relevant Facts

A. Is the Location's structure impermissible under a current land use ordinance?

The structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted.

B. Was the structure legally established and may it continue to be used?

The Planning Director has conceded that the structure was legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore may continue to be used in its current state.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he structure is a legally established Non-Conforming Structure in the TC zone."

Non-Conforming Site Condition Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that non-conforming site conditions exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of

the zone in which it is located." The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements[.]" Subsection 4.191 (.01) further states that "[a] property with non-conforming site conditions that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Are the Location's site conditions impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," were the site conditions legally established, and may the Location continue to be used?

2. Relevant Facts

A. Are the Location's site conditions impermissible under a current land use ordinance?

The existing site conditions do not comply with at least two City code sections:

- Subsection 4.132 (.04) A. requires that "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". Existing site conditions do not conform with this requirement as they do not include the proposed streets, a multi-use path, and bicycle facilities shown in the Network within or immediately adjacent to the subject property.

- Subsection 4.132 (.05) A. requires that "all development will be consistent with the Open Space Network, shown in Figure 4". The existing site conditions do not include the proposed open spaces shown in the northeast corner and along the southeast boundary of the subject property and, therefore, are non-conforming with this requirement.

Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas.

Existing site conditions do not comply with these applicable standards.

B. Were the site conditions legally established, and may the Location continue to be used?

The Planning Director has conceded that the site conditions at the Location were legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore the Location may continue to be used.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he existing site conditions are legally established Non-Conforming Site Conditions in the TC zone."

Neighborhood and Public Comments:

No public comments were received during the public comment period for the appeal.

Conclusion:

Staff recommends that the Development Review Board **affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029) determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

Master Exhibit List:

Entry of the following exhibits into the public record by the Development Review Board confirms its consideration of the application as submitted. The list below includes exhibits for Planning Case File No. DB24-0002 and reflects the electronic record posted on the City's website and retained as part of the City's permanent electronic record. Any inconsistencies between printed or other electronic versions of the same exhibits are inadvertent and the version on the City's website and retained as part of the City's permanent electronic record shall be controlling for all purposes.

Planning Staff Materials

A1. Staff report and Findings (this document)
A2. Staff's Presentation Slides for Public Hearing (to be presented at Public Hearing)
A3. Staff Email Correspondence with Applicant regarding ADMN23-0029, Dated November 28, 2023
A4. ADMN23-0029 Class 1 Planning Director Determination of Non-Conformance, Issued December 28, 2023

Materials from Applicant

B1. **Applicant's Materials –** *Available Under Separate Cover*
Signed Application Form
Applicant's Notice of Appeal
B2. ***Applicant's First Open Record Submittal Dated March 4, 2024***
B3. ***Applicant's Final Arguments Dated March 11, 2024***

Public Comments

C1. ***Homebuilding Association of Greater Portland Comment Dated February 26, 2024***

Findings:

NOTE: Pursuant to Section 4.014 the burden of proving that the necessary findings of fact can be made for approval of any land use or development application rests with the applicant in the case.

General Information

Application Procedures - In General
Section 4.008

The application is being processed in accordance with the applicable general procedures of this Section.

Initiating Application
Section 4.009

The application for Class 1 Review (ADMN23-0029) has the signatures of David Fry of Lumberjack LP, owner, and Dan Zoldak of Lars Andersen & Associates, Inc., applicant and authorized representative.

Pre-Application Conference
Subsection 4.010 (.02)

A pre-application conference (PA22-0004) for the subject property was held on March 24, 2022.

Lien Payment before Approval
Subsection 4.011 (.02) B.

No applicable liens exist for the subject property. The application can thus move forward.

General Submission Requirements
Subsections 4.035 (.04) A. and 4.035 (.05)

The applicant has provided all of the applicable general submission requirements contained in this subsection. The following documents/testimony within Exhibit B1 are hereby deemed rejected and are excluded from the record as being beyond the scope of this Class I Review and/or not relevant to the Class I Review:

- Page 6 of 184: 3rd Paragraph – entire paragraph (parking calculations are irrelevant)
- Pages 18-19 of 184: Photographs (not Wilsonville, irrelevant)
- Page 19 of 184: 2nd Paragraph – 1st, 2nd, and 3rd sentences (continuing on page 20) (relates to Class II)
- Page 20 of 184: 1st Full paragraph – entire paragraph (relates to Class II)
- Page 20 of 184: Response to WDC 4.189.02 Change of Use – 2nd sentence (relates to Class II)
- Page 21 of 184: Response to WDC 4.190.05 Non-Conforming Structures – entire paragraph (relates to Class II)

- Page 184 of 184: Proposed site plan for Home Depot – entire page (irrelevant, relates to Class II)

Zoning - Generally
Section 4.110

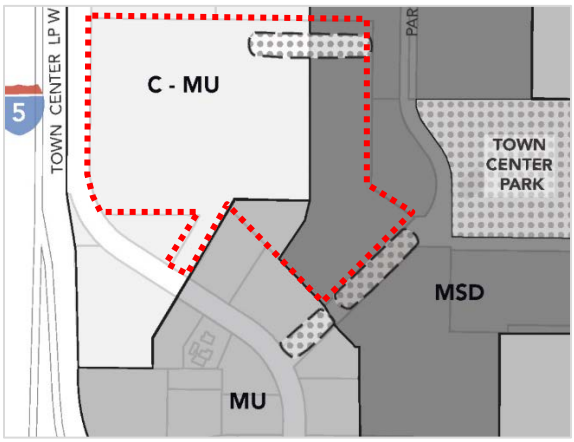
The subject property is located in the Town Center (TC) zone, in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. Applicable zoning district and general development regulations, as appropriate, have been applied in accordance with this Section, as discussed in more detail in the Findings in this staff report.

Request: ADMN23-0029 Class 1 Review Request

Town Center (TC) Zone

Purpose of Town Center Zone
Subsection 4.132 (.01)

A1. The TC Zone in which the subject property is located is divided into four sub-districts that contain recommendations for building form and use to achieve the vision set forth in the Town Center Plan. The subject property is located in three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. All adjacent property is also zoned TC.



Allowed Uses in TC Zone
Subsection 4.132 (.02) F.

A2. With regard to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Although the existing use on the subject property is a retail store and, thus, consistent with allowed use in the TC zone, its footprint of 124,215 square feet exceeds the 30,000 square feet per use limitation of the TC zone.

Permitted and Prohibited Uses in Specific Sub-districts in TC Zone
Subsection 4.132 (.03) A. 1.

A3. Per Subsection 4.132 (.03) A. 1., single-user commercial or retail (e.g. grocery store or retail establishment) that exceeds 30,000 square feet if located on more than one story of a multi-story building is an additional permitted use allowed in the C-MU sub-district. The current use on the subject property does not meet this additional permitted use standard due to its large format footprint of 124,215 square feet square feet in a single story, exceeding the maximum footprint of 30,000 square feet.

Consistency with Street Network and Multi-modal Network
Subsection 4.132 (.04) A.

A4. With regard to site conditions, per Subsection 4.132 (.04) A., "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Site conditions as they currently exist on the subject property do not comply with these applicable standards.

Consistency with Open Space Network
Subsection 4.132 (.05) A.

A5. Per Subsection 4.132 (.05) A., "all development [in the TC zone] will be consistent with the Open Space Network, shown in Figure 4". Proposed open spaces are shown in the northeast corner and along the southeast boundary of the subject property; however, these are not included in the existing development. Therefore, existing site conditions do not comply with these applicable standards

Consistency with Design and Development Standards of TC Zone
Subsection 4.132 (.06)

A6. With regard to structures and site design, per Subsection 4.132 (.06), all developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building, as it currently exists on the subject property, does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted. Therefore, the existing structure does not comply with these applicable standards.

Other Development Standards

Non-Conforming Uses
Subsection 4.001 (196.) and 4.189

A7. A Non-Conforming Use is defined as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform" (Subsection 4.001 (196.)). As noted elsewhere in this report, the existing use at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone. The use is a legally established Non-Conforming Use in the TC zone.

Non-Conforming Structures
Subsection 4.001 (195.) and Section 4.190

A8. Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located". The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, the structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. The structure is a legally established Non-Conforming Structure in the TC zone.

Non-Conforming Site Conditions
Subsection 4.001 (194.) and Section 4.191

A9. Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located". The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, existing site conditions do not conform TC zone requirements including planned streets, a multi-use path, bicycle facilities, open spaces, parking location, landscape design, and plaza areas. The existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

ORDER ON APPEAL:
DRB RESOLUTION NO. 429
ATTACHMENT 3

Development Review Board Panel B Record – Case File DB24-0002 (ADMN23-0029)

Link:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/128079/03._order_on_appeal_drb_resolution_no._429_staff_report_attachment_3_-_drb_record_-_not_redacted.pdf

DEVELOPMENT REVIEW BOARD MEETING

THURSDAY, MARCH 14, 2024
4:30 PM

Continuing Business:

1. **Resolution No. 429. Appeal of Administrative Decision.** The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

   Case File:
   DB24-0002 Appeal of Administrative Decision

   On February 26, 2024, the Development Review Board closed the public hearing and moved to keep the record open until March 4, 2024. This item will be for deliberation and decision only based on the evidence in the record. No further testimony or written comments will be accepted.

DEVELOPMENT REVIEW BOARD
RESOLUTION NO. 429

A RESOLUTION AFFIRMING THE PLANNING DIRECTOR'S DETERMINATION OF NON-CONFORMANCE IN CASE FILE ADMN23-0029 AND DENYING THE APPLICANT'S APPEAL DB24-0002.

WHEREAS, an application for Class 1 Administrative Review (ADMN23-0029), together with planning exhibits, has been submitted by Dan Zoldak of Lars Andersen & Associates, Inc. – Applicant, on behalf of David Fry of Lumberjack LP – Owner, in accordance with the procedures set forth in Section 4.008 of the Wilsonville Code; and

WHEREAS, the subject property is located at 29400 SW Town Center Loop West on Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon ("the Location"); and

WHEREAS, the subject of the Class 1 Administrative Review was a Planning Director's Determination of non-conformance per Subsection 4.030 (.01) A. 7. of the Wilsonville Development Code; and

WHEREAS, the City issued the Planning Director's Determination, on the above-captioned subject, that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone, dated December 28, 2023; and

WHEREAS, within the prescribed appeal period, the Administrative Decision was appealed by Dan Zoldak of Lars Andersen & Associates, Inc. – Appellant/Applicant, dated January 10, 2024; and

WHEREAS, specifically, the filed appeal grounds were stated: "*An APPEAL of Planning Director Determination ADMN20-0029 [sic] determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West"*; and

WHEREAS, per Code Section 4.022 (.01), a decision by the Planning Director on issuance of an Administrative Decision may be appealed, and such appeals shall be heard by the Development Review Board for all quasi-judicial land use matters; and

WHEREAS, the matter at issue will be a determination of the appropriateness of the action or interpretation of the requirements of the Code; and

WHEREAS, the Planning Staff mailed the Notice of Public Hearing for the Appeal on February 6, 2024, in advance of the Public Hearing; and

WHEREAS, the Planning Staff has prepared the staff report on the above-captioned subject dated February 15, 2024, for consideration by the Development Review Board in hearing the appeal; and

WHEREAS, said planning exhibits and staff report were duly considered by the Development Review Board Panel B at a scheduled meeting conducted on February 26, 2024, at which time exhibits, together with findings and public testimony were entered into the public record; and

WHEREAS, interested parties, if any, have had an opportunity to be heard on the subject; and

WHEREAS, during the February 26, 2024 public hearing, the Applicant requested that the record be kept open for seven days to allow it to respond to testimony entered into the record; and

WHEREAS, the Development Review Board Panel B closed the public hearing and unanimously approved the request to keep the record open for Resolution No. 429 until March 4, 2024 at 5:00 pm; and

WHEREAS, on March 4, 2024, the Applicant filed a first written submittal, which has been marked as Exhibit B2, forwarded by Planning Staff to the Development Review Board on March 7, 2024; and

WHEREAS, on March 11, 2024, the Applicant filed a final arguments submittal, which has been marked as Exhibit B3, forwarded by Planning Staff to the Development Review Board on March 12, 2024; and

WHEREAS, on March 14, 2024, commencing at 4:30 pm, the Development Review Board Panel B held a special meeting to consider all evidence timely submitted to, and not rejected by, the Development Review Board regarding Case File No. DB24-0002; and

WHEREAS, the Development Review Board considered all evidence placed before, and not rejected by, the Development Review Board on the record for Resolution No. 429, and, thereafter, deliberated.

NOW, THEREFORE, BE IT RESOLVED that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, attached hereto, with findings and recommendations contained therein, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

ADOPTED by the Development Review Board of the City of Wilsonville this 14th day of March 2024, and filed with the Planning Administrative Assistant on _____. This resolution is final on the 15th calendar day after the postmarked date of the written notice of decision per *WC Sec 4.022 (.09)* unless appealed per *WC Sec 4.022 (.02)* or called up for review by the Council in accordance with *WC Sec 4.022 (.03).*

_____,
Rachelle Barrett, Chair - Panel B
Wilsonville Development Review Board

Attest:

_____
Mandi Simmons, Planning Administrative Assistant

Schwabe

March 4, 2024

Keenan Ordon-Bakalian
Admitted in Oregon and Washington
D: 503-796-2470
kordon-bakalian@schwabe.com

Kenneth Katzaroff
Admitted in Washington and Oregon
D: 206-405-1985
C: 206-755-2011
KKatzaroff@schwabe.com

VIA EMAIL

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
luxhoj@ci.wilsonville.or.us
29799 Town Center Loop E
Wilsonville, OR 97070

RE: ***In the Matter of an appeal of Planning Director Determination ADMN23-0029 (DB24-0002/APPL24-0001)***

Dear Members of the Development Review Board:

This firm represents The Home Depot, Inc. ("**Home Depot**") in the above-referenced casefiles (the "**Appeal**"). On February 26, 2024, the Development Review Board (the "**DRB**") held a public hearing on the Appeal. Home Depot testified orally during the hearing. At the conclusion of the hearing, the DRB closed the record to further oral testimony but allowed the written record to remain open until 5:00 PM on March 4th for any party to submit any evidence or testimony. Home Depot is also entitled to at least seven days after the record is closed to all other parties (March 11, 2024) to submit final written argument, pursuant to ORS 197.797(6)(e).

This letter addressees several themes and questions that were raised during the February 26 public hearing. It is timely submitted prior to the close of the open record period. This letter does not contain significant legal argument, but rather summarizes Home Depot's responsive evidence and testimony, which is enclosed.

I. Summary of Enclosures and Testimony

A. Home Depot's Operations at the Subject Property will be Less Significant than Fry's Electronics Prior Impacts

During the February 27 public hearing, members of the DRB raised questions regarding the scope of Home Depot's impact on the subject property and surrounding area – in relation to that of Fry's Electronics. City Staff has also suggested that operating a Home Depot at the subject property may constitute an expansion of a lawfully established nonconforming use. In response,

Home Depot provides analysis from Lars Anderson & Associates that details the potential development impacts of Home Depot, in relation to Fry's Electronics. **Exhibit A.**

This letter also encloses a Trip Generation Memorandum for Home Depot's use of the subject property, prepared by Transportation Engineering Northwest ("**TENW**"). **Exhibit B**. TENW's memo demonstrates that Home Depot's use of the subject property will result in less average daily trips than the trips previously generated by Fry's Electronics.

B. The Decision Effects a Taking on Home Depot

It is clear from the facts of this Appeal that the City's desire to prevent any development of the subject property that is inconsistent with the City's adopted Town Center Plan[1] led the Planning Director to intentionally make an nonconforming use determination of such limited scope so as to prevent any valid nonconforming use of the subject property.

The Decision has effected a compensable regulatory "taking" under Article I, section 18, of the Oregon Constitution,[2] and the Fifth and Fourteenth Amendments to the United States Constitution.[3] Here, the City's arbitrarily narrow determination that the nonconforming use at the subject property is a "Fry's Electronics" denies Home Depot (or any other party) any economic use of the lawfully established nonconforming use at the property. Looking past the impracticality of the forthcoming hypothetical, we note that Fry's Electronics is no longer in business,[4] therefore, it would be impossible for Home Depot to operate a Fry's Electronics at the property even if Home Depot had such an interest – which it does not. Moreover, the restriction

[1] Wilsonville Town Center Plan (May 6, 2019). Adopted Ord. No. 835; Amended October 18, 2021 per Ord. No. 850.
[2] Article I, section 18, of the Oregon Constitution provides, in part: "Private property shall not be taken for public use, nor the particular services of any man be demanded, without just compensation[.]"
[3] The Takings Clause of the Fifth Amendment to the United States Constitution, made applicable to the states through the Fourteenth Amendment, *see Chicago, B. & Q.R. Co. v. Chicago*, 166 U.S. 226, 17 S.Ct. 581, 41 L.Ed. 979 (1897), provides that "private property" shall not "be taken for public use, without just compensation."
[4] *Fry's Electronics suddenly went out of business*, CNN, https://www.cnn.com/2021/02/24/business/frys-electronics-closure/index.html (last accessed Oct. 9, 2023); *Fry's Electronics closes, leaving Wilsonville store barren*, Portland Tribune, https://www.portlandtribune.com/news/frys-electronics-closes-leaving-wilsonville-store-barren/article_cde50d46-de09-5ce3-a647-9f54ce7d4bb1.html (last accessed Oct. 9, 2023).

essentially precludes use of the structure as the current zoning limits retail uses to less than 30,000 square feet. As such, the City's decision has deprived Home Depot of all economically productive use of the subject property or the existing structure.

As will be discussed further in Home Depot's final written argument, the Appellant respectfully requests that the DRB modify the Decision to find that the lawfully established nonconforming use at the subject property is a commercial retail use, not a "Fry's Electronics" or "single-user electronics retail store." Alternatively, the DRB may reverse the Decision, or remand the Decision back to the Planning Director to make a decision consistent with Oregon's nonconforming use caselaw. Otherwise, the City risks effecting a regulatory taking on Home Depot.

C. *Gould* Citation Correction

Home Depot would like to correct the record regarding the citation to *Gould v. Deschutes County*, 79 Or LUBA 561 (2019) (*Gould VIII*), *aff'd without opinion*, 310 Or App 868, 484 P.3d 1073 (2021) that was contained on slide 7 of the Appellant's PowerPoint presentation. Home Depot cited *Gould VIII* for the proposition that the City is not entitled to deference in interpreting the 1991 Decision, pursuant to ORS 197.829(1). Home Depot intended to cite *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095).

As stated on the record during the hearing for this matter, ORS 197.829(1) generally[5] does not require LUBA to affirm a local government's interpretation of a prior land use decision or conditions of approval attached to a prior land use decision. *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095, at 17, Jun. 11, 2021); *see also M & T Partners, Inc. v. City of Salem*,_ Or LUBA_,_ (LUBA No 2018-143, Aug .14, 2019) (slip op at 14), *aff'd sub nom M & T Partners, Inc. v. Miller*, 302 Or App 159, 170, 460 P3d 117 (2020). In the event this appeal proceeds to LUBA, the City's interpretation of the 1991 Decision will not be entitled to deference. Therefore, the City's interpretation that the 1991 Decision approved a "Fry's Electronics" will be reviewed by LUBA for legal error. ORS 197.835(9)(a)(D); *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095, at 17).

[5] To a "limited extent," LUBA will defer to plausible interpretations of county land use regulations that the governing body made in the course of interpreting a condition of approval. *Kuhn v. Deschutes County*, 74 Or LUBA 190, 194 (2016). It is Home Depot's position that this exception to the general rule that LUBA does not defer to local government interpretations of prior land use decisions is *not relevant* to the subject appeal.

Seeing as the words "Fry's Electronics" are not contained anywhere within the 1991 Decision, the City's nonconforming use Decision is likely to be reversed or remanded by LUBA. As such, Home Depot requests that the DRB to find that the 1991 Decision approved a commercial retail use, which is consistent with Oregon nonconforming use caselaw. Such a finding will prevent the unnecessary expenditure of time and resources on the part of both Home Depot and the City that will inevitably result from a LUBA appeal.

D. Objection to City's Attempted Exclusion of Home Depot's Documents and Testimony

Home Depot formally objects to the City's attempt to exclude from the record certain documents and testimony submitted by Home Depot as part of its Class I application. *See* Staff Report for APPL24-0001, Exhibit A1, at 13. The documents and testimony submitted by Home Depot as part of its application are within the record before the DRB on appeal. The documents and testimony that the City seeks to exclude constitute "argument" and "evidence" as defined in ORS 197.797(9):

> (a) "Argument" means assertions and analysis regarding the satisfaction or violation of legal standards or policy believed relevant by the proponent to a decision. "Argument" does not include facts.
>
> (b) "Evidence" means facts, documents, data or other information offered to demonstrate compliance or noncompliance with the standards believed by the proponent to be relevant to the decision. [Formerly 197.763]

The City cannot exclude certain documents and testimony within Home Depot's Class I application because the documents and testimony that the City seeks to exclude are "argument" and "evidence" that the Appellant believes to be relevant to the satisfaction of the applicable approval criteria for the subject application, as well as Home Depot's appeal of the Decision. ORS 197.797(9). In addition, the City's attempt to omit certain documents and testimony that were submitted by Home Depot as part of its Class I application runs afoul ORS 197.797(4)(a)'s requirement that "[a]documents or evidence relied upon by the applicant shall be submitted to the local government and be made available to the public." ORS 197.797 prohibits the City from excluding portions of Home Depot's Class I application materials from the record.

Furthermore, Home Depot must respectfully object to the DRB's premature motion to exclude certain documents and testimony from the record that were offered by the Appellant during the February 26 public hearing. Home Depot believes that all of the argument and evidence that

City of Wilsonville Development Review Board B
March 4, 2024

Home Depot offered during the February 26 hearing was relevant to the DRB's decision on the appeal, and must be held within the record pursuant to ORS 197.797(9).

II. Conclusion

As noted above and will be discussed further in Home Depot's final written argument, Home Depot's operations at the subject property will not be an expansion of the lawfully established commercial retail nonconforming use at the subject property. Moreover, the Decision's conclusion that the nonconforming use at the property is a "Fry's Electronics" effects a regulatory taking on Home Depot.

Thank you for your consideration of this letter. We look forward to providing additional testimony in Home Depot's final written argument.

Sincerely,

KOB:jmhi
Enclosures

cc: Client
Miranda Bateschell, bateschell@ci.wilsonville.or.us
Amanda Guile-Hinman, guile@ci.wilsonville.or.us
Shelley White, swhite@ci.wilsonville.or.us

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TEXAS REGISTERED ENGINEERING FIRM F-18450

SCOTT A. MOMMER, PE,
PRESIDENT

DANIEL J. ZOLDAK, PE, PLS
CASp, LEED AP, QSD/P
VICE PRESIDENT

March 4, 2024

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
luxhoj@ci.wilsonville.or.us
29799 Town Center Loop E
Wilsonville, OR 97070
Re: Home Depot, Wilsonville, OR – ADMN23-0029 (DB24-0002/APPL24-0001)

The purpose of this letter is to provide an overview of the reduced scale of development impacts that will be associated with Home Depot's proposed operations at 29400 Town Center Loop W. Wilsonville, OR 97070 (the "subject property").

Consistent with Planning Commission Resolution No. 91PC43 (the "1991 Decision"), Home Depot intends to operate at the subject property. Operations will include reoccupying the existing commercial retail building on the property. The structure currently has an existing 166,494 SF associated with it. Of this existing square footage, Home Depot intends to demolish portions of the existing mezzanine which will result in a reduced commercial square foot for a total proposed square footage of 129,069 square foot.

Home Depot operates stores across the United States, and typical operations require approximately 400 parking stalls. There are currently 838 parking stalls at the subject property. In the future, should other development be interested in developing on the property, Home Depot will be able to reduce the current count by over 400 stalls allowing for this future development while still retaining sufficient parking capacity for Home Depot operations.

Finally, as detailed in the Transportation Northwest ("TENW") Trip Generation Memorandum that is submitted under separate cover, Home Depot's operations at the subject property will result in a reduction of average daily trips to and from the property, as well as a potential reduction in peak hour trips.

Should you have any questions or comments, please feel free to contact me at (559) 276-2790 Ext. 117

Sincerely,
LARS ANDERSEN & ASSOCIATES, INC.

Daniel J. Zoldak PE, PLS, CASp, LEED AP, QSD/P
Vice President

TENW
Transportation Engineering NorthWest

MEMORANDUM

DATE: March 4, 2024

TO: City of Wilsonville

FROM: Amy Wasserman / Chris Forster, P.E.
TENW

SUBJECT: Trip Generation Memorandum
Home Depot Wilsonville
TENW Project No. 2023-264

This memorandum summarizes the preliminary traffic information for the proposed Home Depot Wilsonville project located at 29400 Town Center Loop West in Wilsonville, Oregon. This memo includes a project description and project trip generation estimate. Upon your review of this information, we would like to confirm if any additional traffic analysis is required for this project.

Project Description

The proposed Home Depot Wilsonville project is located at 29400 Town Center Loop West in Wilsonville, Oregon as illustrated in the Attachment A site vicinity map. The proposed project would consist of up to 129,100 square feet (SF) of building area for a home improvement superstore. The Home Depot will replace an existing building consisting of 166,495 SF that was previously occupied by an electronics superstore (Fry's). Buildout and occupancy of the Home Depot project is expected in 2025.

Vehicular access to the site is proposed to remain the same as existing with one (1) full access driveway on Park Place, and three (3) access driveways on Town Center Loop West; two (2) of which are full access and one of which is right-in right-out only. A preliminary site plan is shown in Attachment B.

Trip Generation

Trip generation estimates for the proposed project were based on methodology documented in the Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 11th Edition for Code 862 (Home Improvement Superstore) and Code 863 (Electronic Superstore). Adjustments to the trip generation estimates were made to account for pass-by trips.

Pass-by trips are trips that are made by vehicles that are already on the adjacent streets and make intermediate stops at commercial uses on route to a primary destination (i.e., on the way from work to home). Pass-by trips were based on studies included in the appendices of the ITE *Trip Generation Manual*, 11th Edition, 2021.

The resulting net new weekday daily, AM peak hour, and PM peak hour trip generation for the proposed Home Depot project is summarized in Table 1. The detailed trip generation estimates are included in Attachment C.

Table 1
Project Trip Generation Summary

	Net New Trips Generated		
Weekday Time Period	In	Out	Total
Daily	-900	-800	-1,799
AM Peak Hour	22	34	56
PM Peak Hour	-129	-124	-253

Next Steps

Upon your review of this information, we would like to confirm if any additional traffic analysis is required for this project.

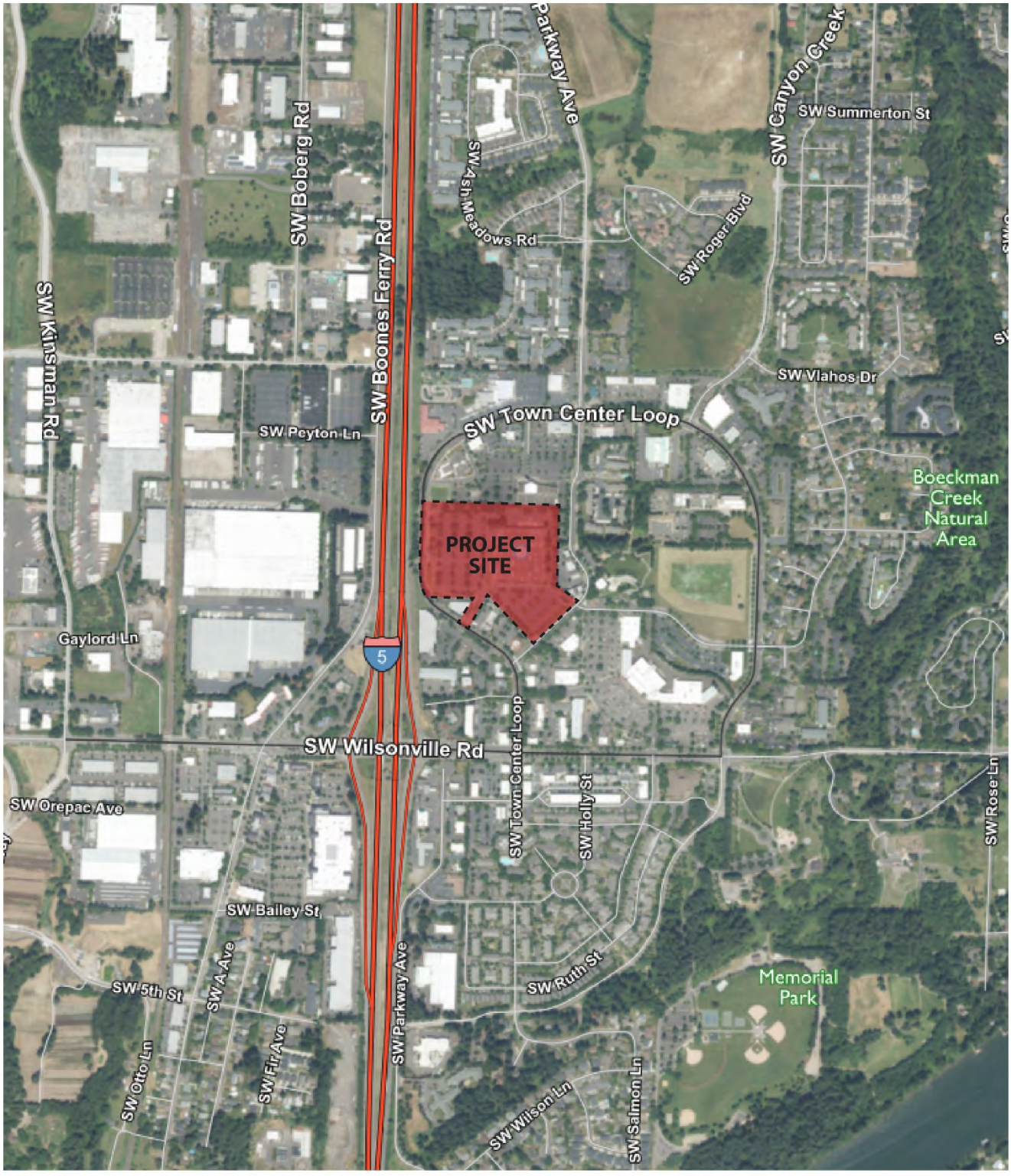
If you have any questions regarding the information presented in this memo, please contact me at (425) 466-7072 or amy@tenw.com.

cc: Dan Zoldak, Lars Andersen & Associates

Attachments: A. Project Site Vicinity
B. Preliminary Site Plan
C. Trip Generation Calculations

ATTACHMENT A

Project Site Vicinity

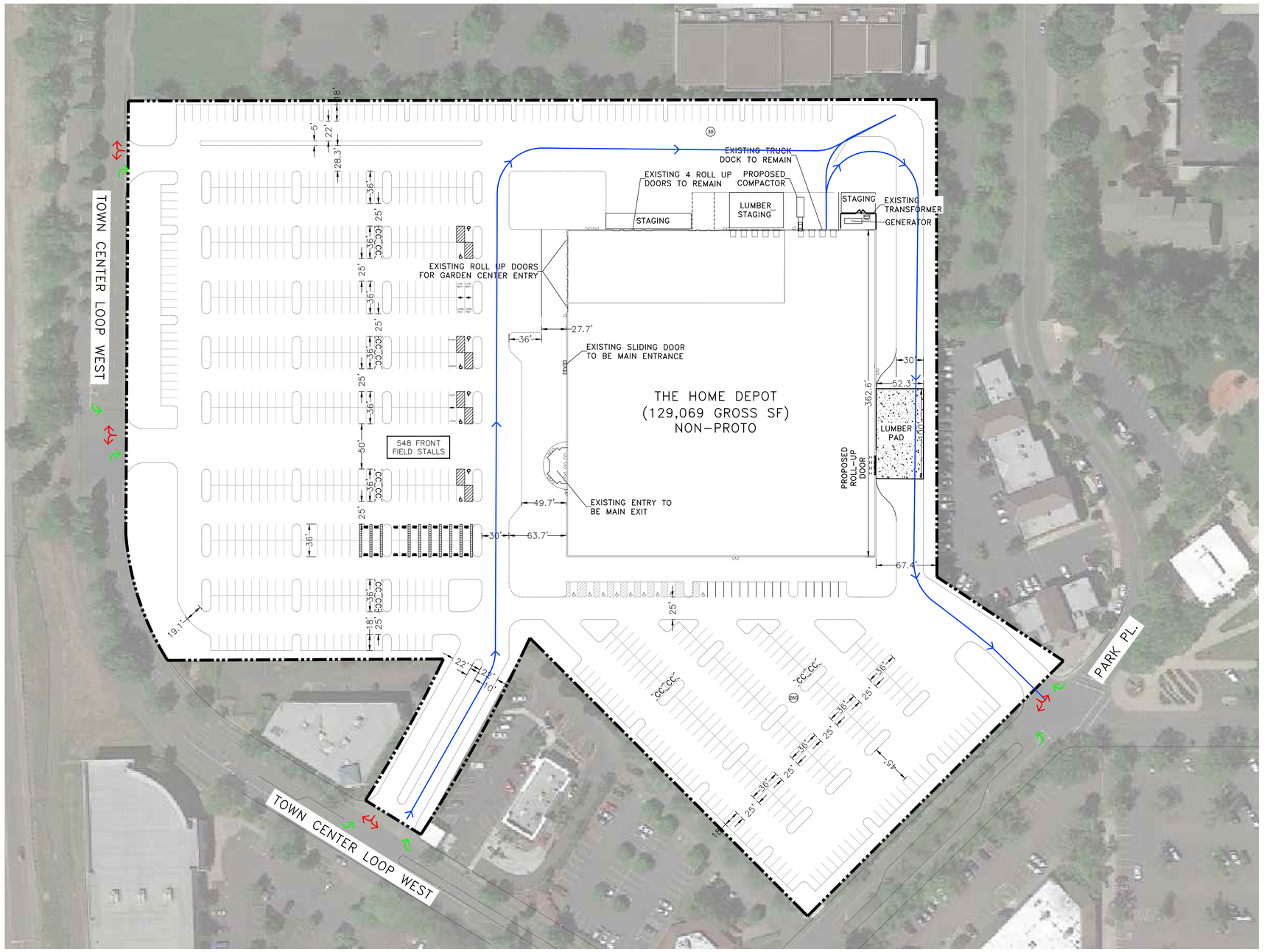


Attachment A: Project Site Vicinity

N
NOT TO SCALE

ATTACHMENT B

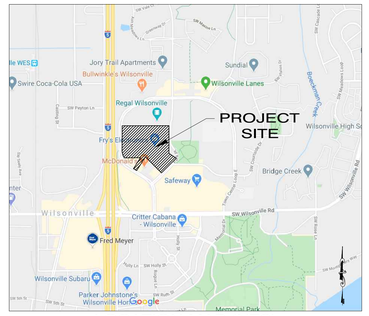
Site Plan



NOTES
1. PLAN BOUNDARY IS BASED OFF AVAILABLE APN MAPS; AN ALTA SHOULD BE COMPLETED FOR ACCURACY.

LARS ANDERSEN & ASSOCIATES, INC.
CIVIL ENGINEERS - LAND SURVEYORS - PLANNERS
4694 WEST JACQUELYN AVENUE – FRESNO CALIFORNIA 93722
TEL: 559 276-2790 FAX: 559 276-0850 WWW.LARSANDERSEN.COM

LA PROJECT NO. 20042.00



LOCATION MAP (NTS)

SITE AREA

THE HOME DEPOT PARCEL	15.01 AC	653,836 SF

BUILDING AREA

THE HOME DEPOT	125,176 SF
MEZZANINE	3,893 SF
SUBTOTAL	129,069 SF
TOTAL BUILDING AREA	129,069 SF

PARKING REQUIRED

THE HOME DEPOT	4.1 / 1,000 SF	529 STALLS
TOTAL PARKING REQUIRED		529 STALLS

PARKING PROVIDED

FRONT FIELD	548 STALLS
SIDE FIELD / REAR	290 STALLS
TOTAL PARKING PROVIDED	838 STALLS

INCLUDED IN PARKING PROVIDED

ACCESSIBLE STALLS (17 REQ. @ 2%)	17 STALLS

NOT INCLUDED IN PARKING PROVIDED

CART CORRALS	12 STALLS
ACCESSORY PARKING NOT INCLUDED	12 STALLS
TOTAL THD PARKING PROVIDED	838 STALLS

ZONING CLASSIFICATION

JURISDICTION	CITY OF WILSONVILLE
ZONING CLASSIFICATION	PLANNED DEVELOPMENT COMMERCIAL TOWN CENTER (PDC-TC)
THD USE PERMITTED BY RIGHT	YES

THE HOME DEPOT WILSONVILLE, OR

29400 TOWN CENTER LOOP W
WILSONVILLE, OR 97070

DRAWING ISSUE DATE 03.04.2024
HD SITE SELECTION NUMBER SS-02804.2001

SCALE: 1"=50'-0"

25 0 25 50 100 150 200

OR - SITE PLAN 10

ATTACHMENT C

Trip Generation Calculations

Home Depot Wilsonville
Weekday Daily Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY DAILY								
Proposed:								
Home Improvement Superstore	129,100 SF	862	50%	50%	30.74	1,985	1,984	3,969
Passby Trips[3]	*42%*					*-834*	*-833*	*-1,667*
					Subtotal (less passby) =	1,151	1,151	2,302
Less Existing:								
Electronics Superstore	166,495 SF	863	50%	50%	41.05	3,418	3,417	6,835
Passby Trips[3]	*40%*					*-1,367*	*-1,367*	*-2,734*
					Subtotal (less passby) =	2,051	2,050	4,101
					Net New Daily Trips =	**-900**	**-899**	**-1,799**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition. The pass-by rate was assumed to be equal to the PM peak hour rate for LUC 862 and 863.

Home Depot Wilsonville
Weekday AM Peak Hour Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY AM PEAK HOUR								
Proposed:								
Home Improvement Superstore	129,100 SF	862	57%	43%	1.51	111	84	195
Passby Trips[3]	*42%*					*-47*	*-35*	*-82*
					Subtotal (less passby) =	64	49	113
Less Existing:								
Electronics Superstore	166,495 SF	863	73%	27%	0.34	42	15	57
Passby Trips[3]	*0%*					*0*	*0*	*0*
					Subtotal (less passby) =	42	15	57
					Net New AM Peak Hour Trips =	**22**	**34**	**56**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition. The pass-by rate was assumed to be equal to the PM peak hour rate for LUC 862 and was assumed to be 0% for LUC 863.

Home Depot Wilsonville
Weekday PM Peak Hour Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY PM PEAK HOUR								
Proposed:								
Home Improvement Superstore	129,100 SF	862	49%	51%	2.29	145	151	296
Passby Trips[3]	*42%*					*-61*	*-63*	*-124*
					Subtotal (less passby) =	84	88	172
Less Existing:								
Electronics Superstore	166,495 SF	863	50%	50%	4.25	354	354	708
Passby Trips[3]	*40%*					*-141*	*-142*	*-283*
					Subtotal (less passby) =	213	212	425
					Net New PM Peak Hour Trips =	**-129**	**-124**	**-253**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

Schwabe

March 11, 2024

Keenan Ordon-Bakalian
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Admitted in Oregon and Washington
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kkatzaroff@schwabe.com

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
29799 Town Center Loop E
Wilsonville, OR 97070

RE: ***Applicant's Final Written Argument for ADMN23-0029 (DB24-0002/APPL24-0001)***

Dear Members of the Development Review Board:

This office represents Home Depot, Inc. ("**Home Depot**" or the "**Applicant**"). On February 26, 2024, the Development Review Board (the "**DRB**") held a public hearing on the Appeal. Home Depot testified orally during the hearing. At the conclusion of the hearing, the DRB closed the record to further oral testimony but allowed the written record to remain open until 5:00 PM on March 4th for any party to submit any evidence or testimony. Home Depot is also entitled to at least seven days after the record is closed to all other parties (March 11, 2024) to submit final written argument, pursuant to ORS 197.797(6)(e).

This letter constitutes Home Depot's final written argument in this matter, and is respectfully submitted prior to the end of the final written argument period at 5:00 p.m. on Monday, March 11, 2024. The Applicant has also attached as **Exhibit A** a redline version of the Class I Planning Director Determination ADMN20-0029 (the "**Decision**") that is presently on appeal. The Applicant believes that Exhibit A will assist the DRB in understanding the portions of the Decision that the Home Depot takes issue with, as well as Home Depot's recommended changes.[1]

Home Depot respectfully requests that the DRB modify the Decision to find that the lawfully established nonconforming use at the subject property is a commercial retail use, not a "Fry's Electronics" or "single-user electronics retail store." Alternatively, the DRB may reverse the

[1] Within Exhibit A, the Applicant has also included a clean copy of the Decision with Home Depot's recommended changes incorporated.

Decision, or remand the Decision back to the Planning Director to make a decision consistent with Oregon's nonconforming use caselaw.

I. INTRODUCTION AND OVERVIEW

The Applicant proposes to operate a Home Depot within the existing structure at 29400 SW Town Center Loop West (the "**subject property**").To this end, the Applicant sought a Class I director's determination that the commercial retail use that was established as a result of a 1991 development approval[2] (the "**1991 Decision**") remained a lawfully established non-conforming use at the subject property. The Applicant's Class I application was submitted on October 30, 2023, and deemed complete by the City of Wilsonville (the "**City**") on November 29, 2023. *See attached*, DB24-0002 Staff Report, at 4 (**Exhibit B**).

As detailed in Home Depot's Notice of Appeal, the City requested that the Applicant bifurcate its request to confirm the legality of a nonconforming use at the subject property and Applicant's request for a determination to establish the scope of use at the property. To this end, the City required the Home Depot to submit two applications – a Class I application to confirm the legality of the nonconforming use, and a Class II application to establish the *actual* nature and extent of use at the subject property. Home Depot's Class II application was submitted to the City on December 15, 2023 and remains under review. However, based on many of the findings contained within the City's Decision for the Class I application, the City appears to have prejudged Applicant's Class II application for a use determination. Moreover, the current Class 1 decision makes specific findings regarding the scope of use, as described below. This is the reason that the Applicant appealed; to request the DRB to remove these scope-of-use findings that the City itself was purporting to avoid by requesting Applicant to submit its Class II application.

On December 28, 2023, the City issued its Notice of Decision for Home Depot's Class I application, finding that "it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use". *See attached*, **Exhibit C**, at 4. However, the City's Decision for the Class I contains contradictory findings that "[t]he existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, *single-user electronics retail store*" but also that "the primary use of the site was considered *commercial retail or retail store*." Exhibit C, at 3-4 (emphasis added). Furthermore, the Decision contains a finding that "nothing in this Class 1 decision shall be construed to

[2] Case File Nos. 91PC43 and 91DR29.

provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.)." Exhibit C, at 4.

From the outset, it has been extremely difficult for the Applicant to discern *what* lawfully established nonconforming use the Planning Director has determined is present at the subject property, due to the City's internally inconsistent Decision. Home Depot's position on the matter has been clear from the beginning – the lawfully established nonconforming use at the subject property is the *commercial retail use* that was originally approved by the 1991 Decision. *See attached*, **Exhibit D**. The 1991 Decision is rife with findings and references to the commercial retail use that the decision was approving, including the plain language used by the City to describe the request subject to review – "Stage II Phase II Site Development review for a 159,400 square foot *retail commercial* building." Exhibit D, at 9. The 1991 Decision also contains the following findings demonstrating that the 1991 Decision approved a commercial retail use at the subject property:

- "It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot *commercial retail store*."
- "application for Stage II Phase II site development of Thunder Project, a 159,400 square foot *retail commercial building*."
- "That the location, design and uses are such that the *retail commercial center* will be adequately served by existing or immediately planned facilities and services."
- "The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed *commercial/office uses* are permitted in overlay zones as part of the Town Center Master Plan."

4. Building Use	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	

Exhibit D, at 9, 12-13, 18, 24 (emphasis added).

In contrast, the City's Decision simply refers to a generalized analysis of "the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations" as the basis for the determination that Fry's Electronics is a legally established nonconforming use. Exhibit C, at 3. The Decision does not address the scope of the 1991 Decision in any detail, lacks specificity and clarity, and is unsupported by the evidence in the record. Similarly, the Staff Report for this appeal merely refers to generalized principles of Oregon nonconforming use caselaw, without applying the principals of the cited cases to the appeal before the DRB. Moreover, the Staff Report's recommendation that the DRB affirm the Planning Director's Decision that "[t]here is a legally established non-conforming use at the Location; specifically, that the protected use is 'a 159,400 square-foot electronics-related retail store'"[3] is inconsistent with the Class I Decision itself because the Planning Director found that Fry's Electronics was the nonconforming use at the subject property.

II. ARGUMENT

A. Standard of review.

The DRB's decision must be supported by substantial evidence in the whole record. ORS 197.835(9)(a)(C). Substantial evidence is evidence a reasonable person would rely upon to reach a conclusion, notwithstanding that different reasonable people could draw different conclusions from the evidence. *Adler v. City of Portland*, 25 Or LUBA 546 (1993) In making its decision, the

[3] Exhibit D, at 11.

DRB must also take care not to improperly construe applicable law, which includes Oregon's nonconforming use caselaw. *See* ORS 197.835(9)(a)(D).

B. The nonconforming use at the subject property is the commercial retail use that was approved within the 1991 Decision.

The 1991 Decision is the controlling authority for determining the nature and extent of the nonconforming commercial retail use at the property because the 1991 Decision lawfully established the nonconforming use in the first instance. "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995). A non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty.*, 290 Or App 111, 114 (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Wilsonville Development Code ("**WDC**") 4.001.196 (defining a nonconforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform").

The commercial retail use at subject property is a lawfully established nonconforming use pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018). As explained in Home Depot's application materials and throughout this appeal proceeding, the City approved a commercial retail use at the subject property on December 9, 1991 with the adoption of Planning Commission Resolution No. 91PC43 (the 1991 Decision). Exhibit D, at 3.[4] Specifically, the 1991 Decision approved a 159,400 retail commercial building and associated commercial retail activities on the 14.75 acre subject property. Exhibit D, at 9. At the time, the subject property's Planned Development Commercial ("**PDC**") zoning allowed commercial retail uses of the nature and extent that was approved by the 1991 Decision. Exhibit D, at 9.

The commercial retail use approved by the 1991 Decision was rendered nonconforming on June 5, 2019, when the City adopted its Town Center Plan and rezoned the property Town Center ("**TC**"). This is because the property's present TC zoning prohibits commercial retail uses that exceed 30,000 square feet, unless the commercial retail use is located on more than one story of a multi-story building, and the 1991 Decision approved a 159,400 retail commercial building.

[4] The Planning Commission's adopting resolution includes findings of fact and conditions of approval, and incorporates all application materials, staff reports, and associated planning exhibits. Exhibit D, at 3.

WDC 4.132.03(A)(1); Exhibit D, at 9. Although the City's application of the TC zone to the property rendered the ongoing commercial retail use nonconforming, the use approved in the 1991 Decision is allowed to continue pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018).

The City's determination that the nonconforming use allowed to continue at the subject property is a "Fry's Electronics" or "single-user electronics retail store" is contrary to the express language of the 1991 Decision, which is the controlling substantial evidence for the City's nonconforming use analysis. Furthermore, the Applicant has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Applicant is also not aware of any state law that makes such a distinction; nor has the City pointed to any state law or code provision applicable at the time. As such, the Decision must be reversed or modified to reject the limitation of the use approved by the 1991 Decision to either a "Fry's Electronics" or "single-user electronics retail store."

C. The identity of Fry's Electronics is not relevant to the DRB's determination of the nature and extent of the nonconforming use at the subject property.

The Decision's determination that the nonconforming use at the subject property is a "Fry's Electronics" violates a key tenet of Oregon nonconforming use law. Determining the nature and extent of a nonconforming use does not depend on the identity of the entity performing the use, but rather on the nature and extent of the nonconforming activities themselves. *ODOT v. City of Mosier*, 36 Or LUBA 666, 678 (1999). City staff recognize this principle within the Staff Report for this appeal (but not within the Class I Decision), stating that "[t]he identity of the party that engaged in the use is irrelevant to this inquiry." Exhibit B, at 7. Nonetheless, the Decision found that *Fry's Electronics* is a legally established nonconforming use at the subject property, even though Fry's Electronics was not the use approved by the 1991 Decision. Exhibit C, at 3-4.

The Class I Decision erroneously focuses on the identity of the entity performing the nonconforming use at the property – Fry's Electronics – instead of the *nature and extent* of the nonconforming activities themselves. *See City of Mosier*, 36 Or LUBA, at 678. In this case, Fry's Electronics (operating under the anonymous name "Project Thunder") achieved land use approval for a commercial retail use at the subject property. Exhibit D. As demonstrated by the 1991 Decision's findings and conditions of approval – as well as the application materials in the record for that decision – the *nature and extent of the use* approved within the 1991 Decision is a commercial retail use, not a "Fry's Electronics." The 1991 Decision is the controlling substantial evidence for determining the nature and extent of the legally established nonconforming use at

the subject property, and the 1991 Decision didn't approve "Fry's Electronics" as a use, but rather the commercial retail use mentioned throughout the Decision.[5] The Decision's arbitrarily narrow nonconforming use determination is inconsistent with *City of Mosier* and must be reversed or modified.

D. The Applicant may continue the commercial retail use approved by the 1991 Decision.

In this case, Home Depot is proposing to continue the same use that Fry's Electronics was employing the subject property for – commercial retail. WDC 4.001.344 defines "use" as "the purpose for which land or a building is arranged, designed or intended, or for which either land or a building is or may be occupied." The "purpose" of the use at the subject property as approved in the 1991 Decision was commercial retail, including the construction and occupancy of the existing structure at the property. As set forth in the 1991 Decision, the existing structure at the property was approved for office, warehouse, manufacturing, service, and retail use. Exhibit D, at 12. Therefore, the commercial retail purpose of the existing structure and subject property will continue through any change in the characteristic of the owner of the property, i.e., whether it is Home Depot or Fry's that operates at the property.

This position is consistent with Oregon's nonconforming use caselaw. In *Vanspeybroeck v. Tillamook County Camden Inns, LLC*, 221 Or App 677 (2008) petitioners challenged a decision of the Tillamook Board of County Commissioners ("Board") that approved alterations to a second floor residence through a minor nonconforming use review. Petitioners argued that the nonconforming use had been abandoned due to a change in the type of occupancy from an owner-occupied unit to non-owner occupied unit. *Id.* at 684. The court examined the definition of "use" in the Tillamook County Land Use Ordinance, which is defined as the "purpose…for which a unit of land is developed, occupied or maintained" and concluded that "the single-family residential purpose of the second-floor occupancy continued through any change in the characteristic of the occupant as owner or renter, and the nonconforming use was not abandoned or discontinued by that change." *Id.* at 686.

Similarly, in *Hendgen v. Clackamas County*, 15 Or App 117 (1992), the court considered whether a proposed business warehouse, which would store produce of an off-site business, was a continuation of a nonconforming use that used the same buildings to store supplies and

[5] The Applicant notes that the City's 1991 zoning code does not list "Fry's Electronics" as an allowed use in the PDC zone – the subject property's zoning designation at the time the 1991 Decision was made.

inventory with a business located on the same property. The court concluded that the "common nucleus of both activities *is* storage." *Id.* at 120 (emphasis in original). The court went on to state that "LUBA regarded the nature of the businesses that employed the structures to be the decisive inquiry. We think that the more relevant question is whether there is a common use that the various operations share." *Id.* at 121.

Here, the common nucleus in activities for both Home Depot and Fry's Electronics *is commercial retail use*. Just like in *Vanspeybroeck* and *Hendgen*, both Fry's and Home Depot purpose and intent for operating the subject property is the same – commercial retail use. The City's nonconforming use determination for this matter misapplies the well-established nonconforming use principles in *City of Mosier*, *Vanspeybroeck*, and *Hendgen* and is nothing more than a thinly veiled attempt to prevent any development of the subject property that is inconsistent with the City's adopted Town Center Plan. The City's arbitrarily narrow determination that the nonconforming use at the property is a "Fry's Electronics" or "single-user electronics retail store" must be reversed or modified.

E. The Decision effects a taking on Home Depot.

As explained in the Applicant's open record submittal, the Decision has effected a compensable regulatory "taking" under Article I, section 18, of the Oregon Constitution, and the Fifth and Fourteenth Amendments to the United States Constitution. The City's overly-restrictive "use" determination is unsupported by the City's own code and Oregon law. If left to stand, the Decision will deny Home Depot (or any other party) any economic use of the lawfully established nonconforming use at the property. This is because the determination that "Fry's Electronics" is the lawfully established nonconforming "use" for the property essentially precludes use of the structure as the current zoning limits retail uses to less than 30,000 square feet. As such, the City's decision has deprived Home Depot of all economically productive use of the subject property or the existing structure.

For the foregoing reasons in this section and above, the DRB should reverse or modify the Decision to avoid effecting a regulatory taking on Home Depot.

III. CONCLUSION

Home Depot requests that the DRB impose the relief requested by the Appellant in the above argument. Specifically, the Applicant respectfully requests that the DRB adopt the Decision as modified by Home Depot and submitted within Exhibit A. In the alternative, the Applicant requests that the DRB take all necessary steps to modify Decision to find that the legally established nonconforming use at the subject property is the use approved in the 1991 Decision,

a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use); not a "Fry's Electronics" or "single-user electronics retail store" and to not provide additional restriction as to the type of commercial retail because no such limitation existed in the 1991 zoning code or the 1991 Decision itself.

Sincerely,

Keenan Ordon-Bakalian

KOB:

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

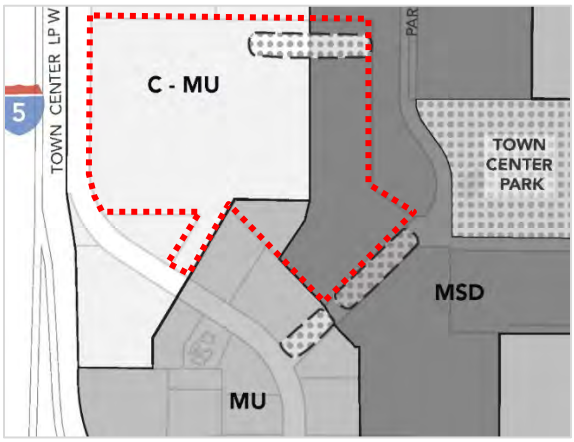
On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No

UGB (Urban Growth Boundary): Yes

1. The most relevant previous Planning approvals for the property include:
   - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
   - 91DR29 Site Design (Architectural, Landscaping) and Signage
   - 01AR01 Minor Architectural Revisions
   - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
   - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is ~~Fry's Electronics,~~commercial retail, characterized by a large format (159,400 square feet)~~, electronics~~ retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" ~~"~~and the application having been submitted for "Stage II Phase II site development of Thunder Project, a 159,400 square foot ~~electronics related~~ retail ~~store~~commercial building". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-

Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user ~~electronics~~commercial warehouse retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that

~~Fry's Electronics~~the commercial warehouse retail use approved under Case File Nos. 91PC43 and 91DR29, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a commercial retail store[1] within the existing structure that was previously occupied by Fry's Electronics. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application ~~is currently in the 30-day completeness review period, which expires~~was deemed complete on January ~~14~~12, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at ~~bateschell@ci.wilsonville.or.us.~~ bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, ~~dave@rdjdevelopment.com~~dave@rdjdevelopment.com
Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

[1] The commercial retail use approved by Case File Nos. 91PC43 and 91DR29 includes, but is not limited to, warehouse-style commercial retail stores.

Summary report: Litera Compare for Word 11.4.0.111 Document comparison done on 3/11/2024 3:47:30 PM	
Style name: Default Style	
Intelligent Table Comparison: Active	
Original filename: ADMN23-0029 Determination Letter - Final (without signature) original.docx	
Modified filename: Exhibit A- Redline ADMN23-0029 Determination Letter Clean.docx	
Changes:	
Add	19
~~Delete~~	12
~~Move From~~	0
Move To	0
Table Insert	0
~~Table Delete~~	0
Table moves to	0
~~Table moves from~~	0
Embedded Graphics (Visio, ChemDraw, Images etc.)	0
Embedded Excel	0
Format changes	0
Total Changes:	31

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

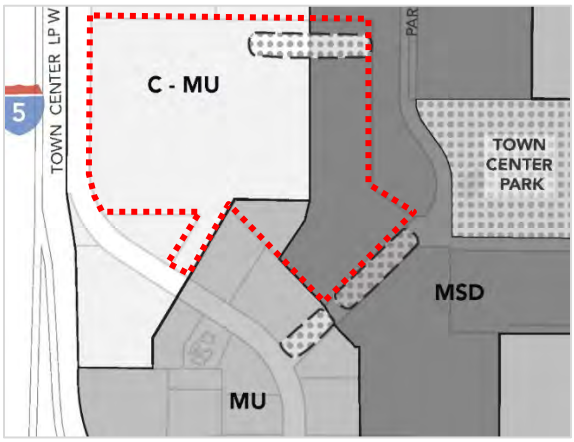
On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No

UGB (Urban Growth Boundary): Yes

1. The most relevant previous Planning approvals for the property include:
   - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
   - 91DR29 Site Design (Architectural, Landscaping) and Signage
   - 01AR01 Minor Architectural Revisions
   - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
   - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is commercial retail, characterized by a large format (159,400 square feet) retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" and the application having been submitted for "Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-

Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

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7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that the

commercial warehouse retail use approved under Case File Nos. 91PC43 and 91DR29, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a commercial retail store[1] within the existing structure that was previously occupied by Fry's Electronics. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application was deemed complete on January 12, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com
Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

[1] The commercial retail use approved by Case File Nos. 91PC43 and 91DR29 includes, but is not limited to, warehouse-style commercial retail stores.

DEVELOPMENT REVIEW BOARD PANEL B AGENDA

February 26, 2024 at 6:30 PM

Wilsonville City Hall & Remote Video Conferencing

PARTICIPANTS MAY ATTEND THE MEETING AT:
City Hall, 29799 SW Town Center Loop East, Wilsonville, Oregon
Zoom: *https://us02web.zoom.us/j/81495007189*

TO PROVIDE PUBLIC TESTIMONY:
Individuals must submit a testimony card online:
https://www.ci.wilsonville.or.us/DRB-SpeakerCard

Email testimony regarding Resolution No. 428
to Georgia McAlister, Associate Planner at
gmcalister@ci.wilsonville.or.us
by 2:00 PM on February 26, 2024.

Email testimony regarding Resolution No. 429
to Cindy Luxhoj, AICP, Associate Planner at
luxhoj@ci.wilsonville.or.us
by 2:00 PM on February 26, 2024.

CALL TO ORDER

CHAIR'S REMARKS

ROLL CALL

John Andrews
Megan Chuinard
Kamran Mesbah
Rachelle Barrett
Alice Galloway

CITIZEN INPUT

This is an opportunity for visitors to address the Development Review Board on items not on the agenda. Staff and the Board will make every effort to respond to questions raised during citizens input before tonight's meeting ends or as quickly as possible thereafter.

CONSENT AGENDA

1. Approval of minutes of the January 22, 2024 DRB Panel B meeting

PUBLIC HEARINGS

2. **Resolution No. 428. PGE Memorial Substation.** The applicant is requesting approval of a Conditional Use Permit and Site Design Review for development of the PGE Memorial Substation adjacent to SW Parkway Avenue and the I-5 Freeway.

   Case Files:
   DB23-0012 PGE Memorial Substation
   -Site Design Review (SDR23-0005)
   -Conditional Use Permit (CUP23-0001)

3. **Resolution No. 429. Appeal of Administrative Decision.** The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

   Case File:
   DB24-0002 Appeal of Administrative Decision

BOARD MEMBER COMMUNICATIONS

4. Results of the February 12, 2024 DRB Panel A meeting

5. Recent City Council Action Minutes

STAFF COMMUNICATIONS

ADJOURN

The City will endeavor to provide the following services, without cost, if requested at least 48 hours prior to the meeting by contacting Shelley White, Administrative Assistant at 503-682-4960: assistive listening devices (ALD), sign language interpreter, and/or bilingual interpreter. Those who need accessibility assistance can contact the City by phone through the Federal Information Relay Service at 1-800-877-8339 for TTY/Voice communication.

Habrá intérpretes disponibles para aquéllas personas que no hablan Inglés, previo acuerdo. Comuníquese al 503-682-4960.

DEVELOPMENT REVIEW BOARD MEETING

MONDAY, FEBRUARY 26, 2024
6:30 PM

Public Hearing:

3. **Resolution No. 429. Appeal of Administrative Decision.** The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

   Case File:
   DB24-0002 Appeal of Administrative Decision

DEVELOPMENT REVIEW BOARD
RESOLUTION NO. 429

A RESOLUTION AFFIRMING THE PLANNING DIRECTOR'S DETERMINATION OF NON-CONFORMANCE IN CASE FILE ADMN23-0029 AND DENYING THE APPLICANT'S APPEAL DB24-0002.

WHEREAS, an application for Class 1 Administrative Review (ADMN23-0029), together with planning exhibits, has been submitted by Dan Zoldak of Lars Andersen & Associates, Inc. – Applicant, on behalf of David Fry of Lumberjack LP – Owner, in accordance with the procedures set forth in Section 4.008 of the Wilsonville Code; and

WHEREAS, the subject property is located at 29400 SW Town Center Loop West on Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon; and

WHEREAS, the subject of the Class 1 Administrative Review was a Planning Director Determination on non-conformance per Subsection 4.030 (.01) A. 7. of the Wilsonville Development Code; and

WHEREAS, the City issued the Planning Director Determination, on the above-captioned subject, that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone, dated December 28, 2023; and

WHEREAS, within the prescribed appeal period, the Administrative Decision was appealed by Dan Zoldak of Lars Andersen & Associates, Inc. – Appellant/Applicant, dated January 10, 2024; and

WHEREAS, specifically, the filed appeal grounds were stated: "*An APPEAL of Planning Director Determination ADMN20-0029 [sic] determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West"*; and

WHEREAS, per Code Section 4.022 (.01), a decision by the Planning Director on issuance of an Administrative Decision may be appealed, and such appeals shall be heard by the Development Review Board for all quasi-judicial land use matters; and

WHEREAS, the matter at issue will be a determination of the appropriateness of the action or interpretation of the requirements of the Code; and

WHEREAS, the Planning Staff mailed the Notice of Public Hearing for the Appeal on February 6, 2024, in advance of the Public Hearing; and

WHEREAS, the Planning Staff has prepared the staff report on the above-captioned subject dated February 15, 2024, for consideration by the Development Review Board in hearing the appeal; and

WHEREAS, said planning exhibits and staff report were duly considered by the Development Review Board Panel B at a scheduled meeting conducted on February 26, 2024, at which time exhibits, together with findings and public testimony were entered into the public record; and

WHEREAS, interested parties, if any, have had an opportunity to be heard on the subject; and

WHEREAS, the Development Review Board considered all evidence and testimony on the record and, thereafter, deliberated.

NOW, THEREFORE, BE IT RESOLVED that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, attached hereto, with findings and recommendations contained therein, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

ADOPTED by the Development Review Board of the City of Wilsonville this 26th day of February 2024, and filed with the Planning Administrative Assistant on _____. This resolution is final on the 15th calendar day after the postmarked date of the written notice of decision per *WC Sec 4.022 (.09)* unless appealed per *WC Sec 4.022 (.02)* or called up for review by the Council in accordance with *WC Sec 4.022 (.03).*

_____,
Rachelle Barrett, Chair - Panel B
Wilsonville Development Review Board

Attest:

_____
Shelley White, Planning Administrative Assistant

WILSONVILLE
OREGON

Exhibit A1
Staff Report
Wilsonville Planning Division
Appeal of Administrative Decision
29400 SW Town Center Loop West

Development Review Board Panel 'B'
Quasi-Judicial Public Hearing

Hearing Date:	February 26, 2024
Date of Report:	February 15, 2024
Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Comprehensive Plan Designation:	Town Center
Zone Map Classification:	Town Center (TC); Sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), Main Street District (MSD)
Staff Reviewers:	Cindy Luxhoj AICP, Associate Planner Miranda Bateschell, Planning Director

Staff Recommendation: **Affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029).

Applicable Review Criteria:

DB24-0002 Appeal of Administrative Decision	
Development Code:	
Section 4.022	Appeal and Call-up Procedures
ADMN23-0029 Class 1 Review Request	
Development Code:	
Section 4.001	Definitions
Section 4.008	Application Procedures-In General
Section 4.009	Who May Initiate Application
Section 4.010	How to Apply
Section 4.011	How Applications are Processed
Section 4.014	Burden of Proof
Section 4.030	Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.031	Authority of the Development Review Board
Section 4.034	Application Requirements
Subsection 4.035 (.05)	Complete Submittal Requirement
Section 4.102	Official Zoning Map
Section 4.110	Zones
Section 4.132	Town Center (TC) Zone
Section 4.189	Non-Conforming Uses
Section 4.190	Non-Conforming Structures
Section 4.191	Non-Conforming Site Conditions
Other Planning Documents:	
Previous Land Use Approvals	

Site Location:

Existing Development:

Procedural Background:

On October 30, 2023, the City received an application for Class 1 Review (ADMN23-0029) to confirm the status of the existing use and structure at 29400 SW Town Center Loop West (respectively, the "Class 1 Review Application" and the "Location"). The Location was previously occupied by Fry's Electronics, an electronics retail store and has been vacant since 2021. In their submittal, the Applicant requested a Class 1 Review to confirm the status of the existing non-conforming use at the Location.

On November 28, 2023, City staff contacted the applicant by email providing options for processing the application and requesting that they notify staff of their preference by December 8, 2023 (Exhibit A3). Applicant did not contact the City to withdraw the Class 1 Review Application, so the City deemed the application complete on November 29, 2023 and processed the request as a Class 1 Planning Director Determination per Subsection 4.030 (.01) A. 7. of the Development Code. On December 28, 2023, the City's Planning Director issued a Notice of Planning Director Determination, which provided the Planning Director's decision on the Class 1 Review Application that Fry's Electronics located on the subject property is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone (Exhibit A4) (the "Planning Director's Decision").

The Appellant submitted a notice of appeal of the Planning Director's Decision on January 10, 2024 (the "Notice of Appeal").

The City is currently processing a separate but related Class 2 Review application per Subsection 4.030 (.01) B. 3, which was filed by the Applicant on December 15, 2023 (AR23-0031) (the "Class 2 Review Application").

Scope of Review:

This appeal is a *de novo* review of the Class 1 Review Application under Subsection 4.022 (.01) of the Wilsonville Development Code. "De novo," is Latin for "from the beginning;" the Development Review Board must review the Class 1 Review Application as if the action had not been previously heard and as if no decision had been rendered by the Planning Director. The Development Review Board should base its decision on the testimony, evidence and other material submitted by Applicant to the City in the Class 1 Review Application, as stated in Subsection 4.022 (.07) B. of the Wilsonville Development Code. Further, it shall, by order, affirm, reverse, or modify, in whole or part, a decision that is under review; in this proceeding the decision under review is the Planning Director's Decision. Subsection 4.022 (.08) A. of the Wilsonville Development Code.

For the purpose of applying the applicable 120-day time limit, a final decision on the Class 1 Application, including any appeals, must be rendered by March 28, 2024.

The Class 2 Review Application, and any issues that are subject to the Class 2 Review – such as the scope of what non-conforming use may be continued – are beyond the scope of this appeal proceeding.

Questions Presented:

On the cover page of the Class 1 Review Application, Applicant requests "non conforming use confirmation." See Exhibit B1. Reviewing this document with the portion of the Class 1 Review Application titled, "Applicant's Narrative and Exhibits Demonstrating Compliance with the Relevant Approval Criteria," City staff believe that Applicant requests an answer to the following questions:

1. Is the Location a non-conforming use?
2. Does the Location contain a non-conforming structure?
3. Does the Location contain non-conforming site conditions?

Considering that this is a *de novo* review of the Class 1 Review Application, the Development Review Board should address all three questions listed above. However, the Notice of Appeal does not challenge the Planning Director's Decision on the second and third questions listed above. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these points. The main point of disagreement between the Applicant and the City is the Planning Director's Decision regarding the first question listed above.

This staff report addresses each question in order, outlining the legal standard that applies to the question, then highlighting facts that staff believe are relevant to the question, and finally, quoting the determination of the question as stated in the Planning Director's Decision.

Non-Conforming Use Inquiry:

1. Applicable Legal Standard

Before a use can be deemed "non-conforming" it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty*., 290 Or App 111, 114, (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty*., 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Subsection 4.001 (196.) of the Development Code (defining a non-conforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform"). As is outlined in greater detail below, the Location's existing use would not be permitted by the City due to the Town Center Plan, which was adopted effective June 5, 2019.

"Nonconforming uses are not favored because, by definition, they detract from the effectiveness of a comprehensive zoning plan. . . . Accordingly, provisions for the continuation of nonconforming uses are strictly construed against continuation of the use, and, conversely, provisions for limiting nonconforming uses are liberally construed to prevent the continuation or expansion of nonconforming uses as much as possible." *Parks v. Bd. of Cnty. Comm'rs of Tillamook Cnty.*, 11 Or App 177, 196–97 (1972) (internal citation omitted).

Once a use is determined to be impermissible under a current land use ordinance, the question becomes: may the use continue because it is legally protectable as "non-conforming"? "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995).

Appellant has the burden of establishing that a non-conforming use exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal); *ODOT v. City of Mosier*, 36 Or LUBA 666, 671 (1999) (citing *Lane Cnty. v. Bessett*, 46 Or App 319 (1980)); *Sabin v. Clackamas Cnty*., 20 Or LUBA 23, 30 (1990) (citing *Webber v. Clackamas Cnty*., 42 Or App 151, *rev. den*., 288 Or 81 (1979)). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

The only portion of the City's code that is relevant to this inquiry is Subsection 4.189(.01)A., which states that "[a] non-conforming use may be continued subject to the requirements of this Section." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

The identity of the party that engaged in the use is irrelevant to this inquiry. *See City of Mosier* at 678 (stating that focus of the inquiry is the nonconforming activities themselves, not whether the entity performing the activity is a landowner, permittee, or licensee). In other words, it is not relevant that the party that engaged in the use at issue was Fry's Electronics – rather than Applicant.

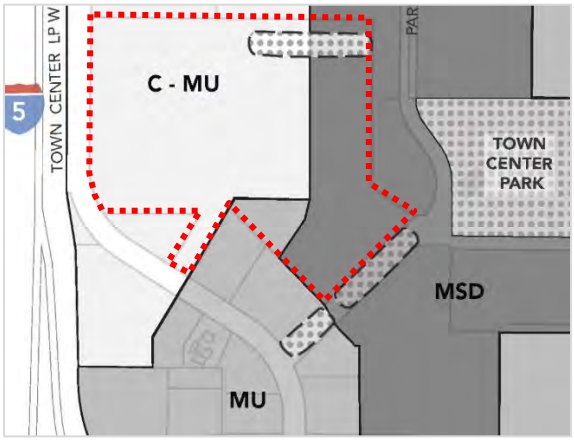
To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the current use of the Location impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," what was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

2. Relevant Facts

A. Is the current use of the Location impermissible under a current land use ordinance?

The Location is currently in the TC Zone, and more specifically, the following three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU).



The C-MU sub-district applies to roughly two-thirds of the Location. Permitted uses within this sub-district include retail sales and service of retail products, under a footprint of 30,000 square feet per use, office, personal and professional services, and single-user commercial or retail, such as a grocery store or retail establishment, that may exceed 30,000 square feet if located on more than one (1) story of a multi-story building, provided the footprint of the building does not exceed 30,000 square feet.

The existing structure at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone.

Applicant appears to concede that use of the Location is impermissible under the City's current Code provisions. *See* Exhibit B1, pages 4-5 and page 15 (referring to the use of the Location as non-conforming).

B. What was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

As of June 5, 2019, the actual use of the Location was a Fry's Electronics store, an electronics retail store with a total interior square-footage of 159,400 square feet and a footprint of 124,215 square feet.

To the extent that the Development Review Board finds it is relevant to this review, the original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store." *See* Exhibit B1, page 31.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he use is a legally established Non-Conforming Use in the TC zone."

Non-Conforming Structure Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that a non-conforming structure exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located." The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements[.]" Subsection 4.190 (.01) further states that "[a] non-conforming structure that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the Location's structure impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," was the structure legally established and may it continue to be used?

2. Relevant Facts

A. Is the Location's structure impermissible under a current land use ordinance?

The structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted.

B. Was the structure legally established and may it continue to be used?

The Planning Director has conceded that the structure was legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore may continue to be used in its current state.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he structure is a legally established Non-Conforming Structure in the TC zone."

Non-Conforming Site Condition Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that non-conforming site conditions exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located." The definition further states that "a site may be rendered non-

conforming to development standards through a change in zoning requirements[.]" Subsection 4.191 (.01) further states that "[a] property with non-conforming site conditions that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Are the Location's site conditions impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," were the site conditions legally established, and may the Location continue to be used?

2. Relevant Facts

A. Are the Location's site conditions impermissible under a current land use ordinance?

The existing site conditions do not comply with at least two City code sections:

- Subsection 4.132 (.04) A. requires that "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". Existing site conditions do not conform with this requirement as they do not include the proposed streets, a multi-use path, and bicycle facilities shown in the Network within or immediately adjacent to the subject property.

- Subsection 4.132 (.05) A. requires that "all development will be consistent with the Open Space Network, shown in Figure 4". The existing site conditions do not include the proposed open spaces shown in the northeast corner and along the southeast boundary of the subject property and, therefore, are non-conforming with this requirement.

Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas.

Existing site conditions do not comply with these applicable standards.

B. Were the site conditions legally established, and may the Location continue to be used?

The Planning Director has conceded that the site conditions at the Location were legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore the Location may continue to be used.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he existing site conditions are legally established Non-Conforming Site Conditions in the TC zone."

Neighborhood and Public Comments:

No public comments were received during the public comment period for the appeal.

Conclusion:

Staff recommends that the Development Review Board **affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029) determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

Master Exhibit List:

Entry of the following exhibits into the public record by the Development Review Board confirms its consideration of the application as submitted. The list below includes exhibits for Planning Case File No. DB24-0002 and reflects the electronic record posted on the City's website and retained as part of the City's permanent electronic record. Any inconsistencies between printed or other electronic versions of the same exhibits are inadvertent and the version on the City's website and retained as part of the City's permanent electronic record shall be controlling for all purposes.

Planning staff Materials

A1. Staff report and Findings (this document)
A2. Staff's Presentation Slides for Public Hearing (to be presented at Public Hearing)
A3. Staff Email Correspondence with Applicant regarding ADMN23-0029, Dated November 28, 2023
A4. ADMN23-0029 Class 1 Planning Director Determination of Non-Conformance, Issued December 28, 2023

Materials from Applicant

B1. **Applicant's Materials –** *Available Under Separate Cover*
Signed Application Form
Applicant's Notice of Appeal

Findings:

NOTE: Pursuant to Section 4.014 the burden of proving that the necessary findings of fact can be made for approval of any land use or development application rests with the applicant in the case.

General Information

Application Procedures - In General
Section 4.008

The application is being processed in accordance with the applicable general procedures of this Section.

Initiating Application
Section 4.009

The application for Class 1 Review (ADMN23-0029) has the signatures of David Fry of Lumberjack LP, owner, and Dan Zoldak of Lars Andersen & Associates, Inc., applicant and authorized representative.

Pre-Application Conference
Subsection 4.010 (.02)

A pre-application conference (PA22-0004) for the subject property was held on March 24, 2022.

Lien Payment before Approval
Subsection 4.011 (.02) B.

No applicable liens exist for the subject property. The application can thus move forward.

General Submission Requirements
Subsections 4.035 (.04) A. and 4.035 (.05)

The applicant has provided all of the applicable general submission requirements contained in this subsection. The following documents/testimony within Exhibit B1 are hereby deemed rejected and are excluded from the record as being beyond the scope of this Class I Review and/or not relevant to the Class I Review:

- Page 6 of 184: 3rd Paragraph – entire paragraph (parking calculations are irrelevant)
- Pages 18-19 of 184: Photographs (not Wilsonville, irrelevant)
- Page 19 of 184: 2nd Paragraph – 1st, 2nd, and 3rd sentences (continuing on page 20) (relates to Class II)
- Page 20 of 184: 1st Full paragraph – entire paragraph (relates to Class II)
- Page 20 of 184: Response to WDC 4.189.02 Change of Use – 2nd sentence (relates to Class II)
- Page 21 of 184: Response to WDC 4.190.05 Non-Conforming Structures – entire paragraph (relates to Class II)

- Page 184 of 184: Proposed site plan for Home Depot – entire page (irrelevant, relates to Class II)

Zoning - Generally
Section 4.110

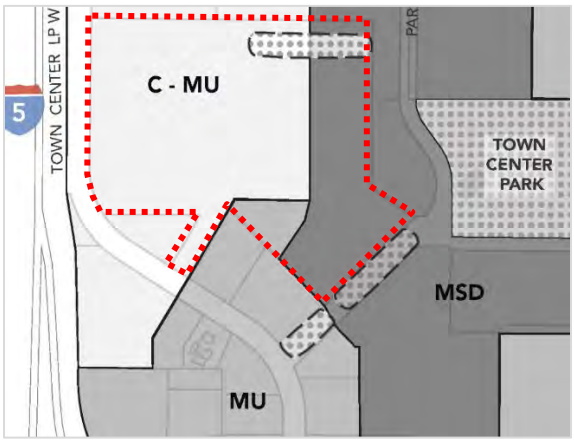
The subject property is located in the Town Center (TC) zone, in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. Applicable zoning district and general development regulations, as appropriate, have been applied in accordance with this Section, as discussed in more detail in the Findings in this staff report.

Request: ADMN23-0029 Class 1 Review Request

Town Center (TC) Zone

Purpose of Town Center Zone
Subsection 4.132 (.01)

A1. The TC Zone in which the subject property is located is divided into four sub-districts that contain recommendations for building form and use to achieve the vision set forth in the Town Center Plan. The subject property is located in three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. All adjacent property is also zoned TC.



Allowed Uses in TC Zone
Subsection 4.132 (.02) F.

A2. With regard to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Although the existing use on the subject property is a retail store and, thus, consistent with allowed use in the TC zone, its footprint of 124,215 square feet exceeds the 30,000 square feet per use limitation of the TC zone.

Permitted and Prohibited Uses in Specific Sub-districts in TC Zone
Subsection 4.132 (.03) A. 1.

A3. Per Subsection 4.132 (.03) A. 1., single-user commercial or retail (e.g. grocery store or retail establishment) that exceeds 30,000 square feet if located on more than one story of a multi-story building is an additional permitted use allowed in the C-MU sub-district. The current use on the subject property does not meet this additional permitted use standard due to its large format footprint of 124,215 square feet square feet in a single story, exceeding the maximum footprint of 30,000 square feet.

Consistency with Street Network and Multi-modal Network
Subsection 4.132 (.04) A.

A4. With regard to site conditions, per Subsection 4.132 (.04) A., "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Site conditions as they currently exist on the subject property do not comply with these applicable standards.

Consistency with Open Space Network
Subsection 4.132 (.05) A.

A5. Per Subsection 4.132 (.05) A., "all development [in the TC zone] will be consistent with the Open Space Network, shown in Figure 4". Proposed open spaces are shown in the northeast corner and along the southeast boundary of the subject property; however, these are not included in the existing development. Therefore, existing site conditions do not comply with these applicable standards

Consistency with Design and Development Standards of TC Zone
Subsection 4.132 (.06)

A6. With regard to structures and site design, per Subsection 4.132 (.06), all developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building, as it currently exists on the subject property, does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted. Therefore, the existing structure does not comply with these applicable standards.

Other Development Standards

Non-Conforming Uses
Subsection 4.001 (196.) and 4.189

A7. A Non-Conforming Use is defined as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform" (Subsection 4.001 (196.)). As noted elsewhere in this report, the existing use at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone. The use is a legally established Non-Conforming Use in the TC zone.

Non-Conforming Structures
Subsection 4.001 (195.) and Section 4.190

A8. Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located". The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, the structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. The structure is a legally established Non-Conforming Structure in the TC zone.

Non-Conforming Site Conditions
Subsection 4.001 (194.) and Section 4.191

A9. Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located". The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, existing site conditions do not conform TC zone requirements including planned streets, a multi-use path, bicycle facilities, open spaces, parking location, landscape design, and plaza areas. The existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville
Exhibit A3 DB24-0002

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

WILSONVILLE
OREGON

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

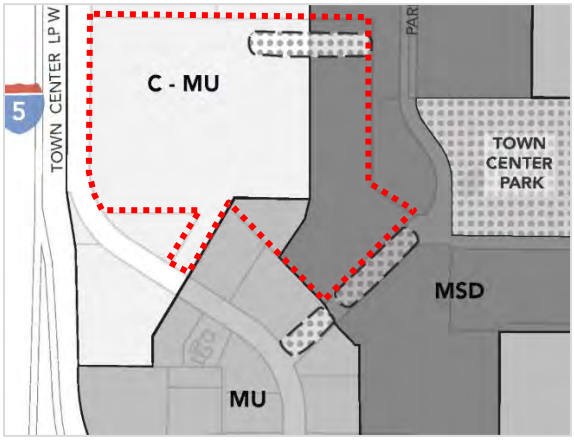
On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

City of Wilsonville
Exhibit A4 DB24-0002

1. The most relevant previous Planning approvals for the property include:
   - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
   - 91DR29 Site Design (Architectural, Landscaping) and Signage
   - 01AR01 Minor Architectural Revisions
   - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
   - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

Updated 1/11/2019 all previous version of this form are obsolete

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OREGON

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Planning Division
Development Permit Application

Final action on development application or zone change is required within 120 days per ORS 227.175 or as otherwise required by state or federal law for specific application types.

A pre application conference may be required.

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The City will not schedule incomplete applications for public hearing or send administrative public notice until all of the required materials are submitted.

Applicant:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Authorized Representative:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Property Owner:
Name: David A. Fry
Company: Lumberjack LP
Mailing Address: 600 E Brokaw RD
City, State, Zip: San Jose, CA 95112
Phone: Fax:
E-mail: dave@rdjdevelopment.com

Property Owner's Signature:
Printed Name: David A. Fry Date: 9/19/2023

Applicant's Signature: (if different from Property Owner)
Printed Name: Date:

Site Location and Description:
Project Address if Available: 29400 Town Center Loop W Wilsonville, OR 97070 Suite/Unit
Project Location: 29400 Town Center Loop W Wilsonville, OR 97070
Tax Map #(s): 01507257 Tax Lot #(s): County: ☐ Washington ☐ Clackamas

Request:
An APPEAL of Planning Director Determination ADMN20-0029 determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West

Project Type: **Class I** ◉ **Class II** ☐ **Class III** ☐

☐ Residential ■ Commercial ☐ Industrial ☐ Other:

Application Type(s):

☐ Annexation	◉ Appeal	☐ Comp Plan Map Amend	☐ Parks Plan Review
☐ Final Plat	☐ Major Partition	☐ Minor Partition	☐ Request to Modify Conditions
☐ Plan Amendment	☐ Planned Development	☐ Preliminary Plat	
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☐ SROZ/SRIR Review	☐ Staff Interpretation	☐ Stage I Master Plan	☐ Stage II Final Plan
☐ Type C Tree Removal Plan	☐ Tree Permit (B or C)	☐ Temporary Use	☐ Variance
☐ Villebois SAP	☐ Villebois PDP	☐ Villebois FDP	☐ Other (describe) Non conforming use application (NCU)
☐ Zone Map Amendment	☐ Waiver(s)	☐ Conditional Use	

Daniel J Zoldak

VIA E-MAIL

BEFORE THE DEVELOPMENT REVIEW BOARD FOR THE CITY OF WILSONVILLE, OREGON

An APPEAL of Planning Director Determination ADMN20-0029 determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West	APPLICANT'S NOTICE OF APPEAL

This is a notice of appeal of the Class I Planning Director Determination ADMN20-0029 (the "**Decision**") finding that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West (the "**subject property**"). *See attached*, **Exhibit A** This appeal is timely submitted, in writing, prior to January 11, 2024, the deadline that *may* be established by Wilsonville Development Code ("**WDC**") 4.022.01.[1]

1. STANDING

Kenneth Katzaroff and Keenan Ordon-Bakalian are legal counsel for the Applicant, and as such, are the Applicant's authorized agents. As the project proponent, the Applicant prepared and filed the Class I application upon which the Decision was issued. "Only the applicant may appeal a Class I decision unless otherwise specified in Section 4.030." WDC 4.022.01. Therefore, the Applicant has standing to file this appeal.

2. FILING REQUIREMENTS

a. Name and Address of Appellant.

Lars Andersen & Associates, Inc.
c/o Kenneth Katzaroff & Keenan Ordon-Bakalian
1211 SW 5th Ave., Suite 1900
Portland, OR 97204

[1] This is Notice of Appeal for a Class I decision. The Notice of Decision for ADMN 23-0029 was issued on December 28, 2023. WDC 4.022.01 does not specify a deadline for appeals of Class I decisions, however, WDC 4.022.01 does state that appeals of Class II decisions must be filed within "14 calendar days of notice of the decision." Out of an abundance of caution, the Appellant is submitting this Notice of Appeal *early*, prior to the January 11, 2024 deadline that would constitute 14 calendar days from the issuance of the Notice of Decision.

KKatzaroff@SCHWABE.com
Kordon-bakalian@schwabe.com

b. Reference to the Subject Development and Case Number.

The decision being appealed is Planning Director Determination ADMN23-0029 finding that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at the subject property. Exhibit A. On October 30, Appellant submitted an application for a Class I application to confirm the legality of a nonconforming use at the subject property. *See attached*, **Exhibit B**. The City of Wilsonville (the "**City**") issued its Notice of Decision on December 28, 2023. Exhibit A.

c. Statement of the Basis for Appeal.

The Appellant hereby files this appeal to challenge several findings within the Decision related to the status of the existing use and structure at the subject property. Specifically, the Appellant appeals the following findings:

- "The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021." Decision, at 2.
- "Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store." Decision, at 2.
- "The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet." Decision, at 3.
- "it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone." Decision, at 3-4.
- "nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.)." Decision, at 4.

Exhibit A.

The Appellant intends to operate a Home Depot within the existing structure at the subject property. To this end, the Appellant sought a Class I director's determination that the warehouse retail use that was established as a result of the 1991 development approval (Case File

Nos. 91PC43 and 91DR29)[2] remained a lawfully established non-conforming use at the subject property.

Upon receipt of the Appellant's application, the City attempted to bifurcate Appellant's request to confirm the legality of a nonconforming use at the subject property from Appellant's request for a determination to establish the scope of use at the property. Exhibit A, Enclosure.[3] To this end, the City has required the Appellant to submit two applications – a Class I application to confirm the legality of the nonconforming use, and a Class II application to establish the *actual* nature and scope of use at the subject property. Appellant's Class II application was submitted to the City on December 15, 2023 and is currently in the 30-day completeness review period. Exhibit A, at 4. However, based on many of the findings contained within the Decision, the City appears to have prejudged Appellant's Class II application for a use determination. Specifically, within the Decision subject to this appeal, the City has determined that the lawfully established non-conforming use at the subject property is a "Fry's Electronics." Exhibit A, at 3-4.

The City's nonconforming use determination is contrary to the express language of the 1991 Decision, in addition to well-established principles of Oregon nonconforming use case law. A nonconforming use is one that " 'lawfully existed prior to enactment of a zoning ordinance, and which is maintained after the effective date of the ordinance although it does not comply with the use restrictions applicable to the area * * *.' " *Clackamas County v. Portland City Temple*, 13 Or.App. 459, 461 n. 1, 511 P.2d 412 (1973) (quoting 1 Anderson, *American Law of Zoning* 306, § 6.01 (1968)). The *use and structure* approved by the 1991 Decision was a "commercial retail store," specifically a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store, *not a* "Fry's Electronics." Exhibit C, at 12, 14. A "Fry's Electronics" use is not mentioned or approved *anywhere* in the 1991 Decision, and the 1991 Decision is the controlling authority for determining the scope and nature of the legally established nonconforming use present at the subject property – a commercial retail use without additional restriction. The City's findings within the Decision abrogate the plain language of the 1991 Decision and impermissibly narrow the scope and nature of the lawfully established nonconforming use at the property. As such, the City's findings that the legally established non-conforming use and structure at the subject property is a "Fry's Electronics" must be reversed.

[2] Attached hereto as **Exhibit C** (the "**1991 Decision**").

[3] "You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision." Exhibit A, Enclosure, at 1.

The Decision also finds that "[t]he existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store." Exhibit A, at 3. This finding renders the Decision internally inconsistent because – as stated above – the City also included findings that the legally established nonconforming use is a "Fry's Electronics," which is a narrower use than a "single-user electronics retail store." *Id.* Moreover, the City's finding that the nonconforming use at the property is a "single-user electronics retail store" is still in contravention with the use approved in the 1991 Decision, which is a "commercial retail store" that includes retail, office, warehouse, manufacturing, and service offerings. Exhibit C, at 12, 14. Again, the Decision disregards the controlling authority of the 1991 Decision and adopts an overly narrow finding regarding the scope and nature of the nonconforming use at the subject property. The Appellant respectfully requests that the Decision's finding that the nonconforming use at the property is a "single-user electronics retail store" be reversed.

Furthermore, the Appellant has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Appellant is also not aware of any state law that makes such a distinction. As such, the Decision must be reversed or modified to reject the limitation of the use approved by the 1991 Decision to either a "Fry's Electronics" or "single-user electronics retail store."

Finally, the Appellant challenges the Decision's finding that the retail, office, warehouse, manufacturing, and service uses approved by the 1991 Decision relate only to "minimum parking requirements for the site." Decision, at 2; *see also* Exhibit C, at 12 (approving retail, office, warehouse, manufacturing, and service uses within the 159,400 commercial retail structure). The City's finding on this point is unsupported by any authority and again represents an attempt to narrow the scope and nature of the legally established nonconforming use at the property. The Appellant requests that this finding be struck from the Decision.

3. REQUESTED RELIEF

The Appellant requests that the Development Review Board impose the relief requested by the Appellant in the above argument. Specifically, Appellant respectfully requests that the Development Review Board find that the legally established nonconforming use at the subject property is the use approved in the 1991 Decision, a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use); not a "Fry's Electronics" or "single-user electronics retail store" and to not provide additional restriction as to the type of commercial retail because no such limitation existed in the 1991 zoning code or the 1991 Decision itself.

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

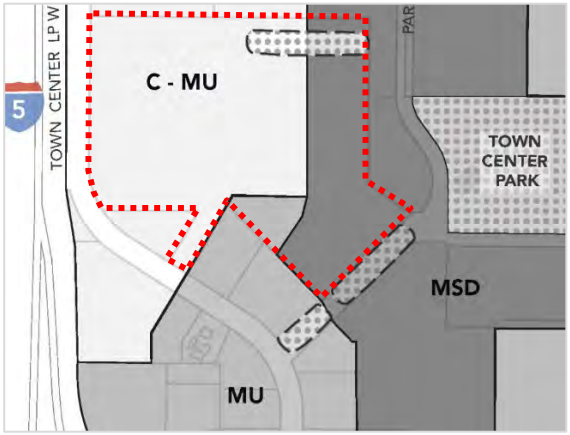
The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

1. The most relevant previous Planning approvals for the property include:
    - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
    - 91DR29 Site Design (Architectural, Landscaping) and Signage
    - 01AR01 Minor Architectural Revisions
    - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
    - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

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From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
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Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

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Updated 1/11/2019 all previous version of this form are obsolete

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OREGON

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Planning Division
Development Permit Application

Final action on development application or zone change is required within 120 days per ORS 227.175 or as otherwise required by state or federal law for specific application types.

A pre application conference may be required.

The City will not accept applications for wireless communication facilities or similar facilities without a completed copy of a Wireless Facility Review Worksheet.

The City will not schedule incomplete applications for public hearing or send administrative public notice until all of the required materials are submitted.

Applicant:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Authorized Representative:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Property Owner:
Name: David A. Fry
Company: Lumberjack LP
Mailing Address: 600 E Brokaw RD
City, State, Zip: San Jose, CA 95112
Phone: Fax:
E-mail: dave@rdjdevelopment.com

Property Owner's Signature:
Printed Name: David A. Fry Date: 9/19/2023

Applicant's Signature: (If different from Property Owner)
Printed Name: Date:

Site Location and Description:
Project Address if Available: 29400 Town Center Loop W Wilsonville, OR 97070 Suite/Unit
Project Location: 29400 Town Center Loop W Wilsonville, OR 97070
Tax Map #(s): 01507257 Tax Lot #(s): County: ☐ Washington ☐ Clackamas

Request:
Applicant proposes a Home Improvement store within the footprint of the existing structure. Need non conforming use confirmation (NCU) for TI Permit

Project Type: Class I ☐ Class II ☐ Class III ☐
☐ Residential ■ Commercial ☐ Industrial ☐ Other:

Application Type(s):

☐ Annexation	☐ Appeal	☐ Comp Plan Map Amend	☐ Parks Plan Review
☐ Final Plat	☐ Major Partition	☐ Minor Partition	☐ Request to Modify Conditions
☐ Plan Amendment	☐ Planned Development	☐ Preliminary Plat	☐ Site Design Review
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☐ SROZ/SRIR Review	☐ Staff Interpretation	☐ Stage I Master Plan	☐ Variance
☐ Type C Tree Removal Plan	☐ Tree Permit (B or C)	☐ Temporary Use	■ Other (describe)
☐ Villebois SAP	☐ Villebois PDP	☐ Villebois FDP	Non conforming use application (NCU)
☐ Zone Map Amendment	☐ Waiver(s)	☐ Conditional Use	

WILSONVILLE
OREGON

PROPERTY OWNER ACKNOWLEDGEMENT FORM

By signing below, I certify that I am the property owner for the application in question and that the applicant, Lars Andersen & Associates, Inc., has my permission to submit this application for the property located at:

Site Address: 29400 Town Center Loop W, Wilsonville, OR 97070

Tax Lot(s): 01507257 Section: _____

I understand the application will not be deemed complete without this documentation. I understand that submittal of this application does not entitle the applicant to engage in the work applied for until such an application is approved, the plan approval is issued, and the specified appeal period has passed. I also understand that all work must be performed in compliance with all applicable state, federal, and local laws, ordinances and regulations.

Property Owner's Signature:

Printed Name: David A. Fry Date: 9/18/2023

Property Owner Contact Information:

Company (if applicable): Lumberjack LP

Mailing Address: 600 E. Brokaw Rd.

City, State, Zip: San Jose, CA 95112

Phone: _____ E-mail: dave@rdjdevelopment.com

BEFORE THE PLANNING DIRECTOR FOR THE CITY OF WILSONVILLE

In the Matter of an application to confirm the legality of a nonconforming use at 29400 Town Center Loop W, Wilsonville, OR 97070	APPLICANT'S NARRATIVE AND EXHIBITS DEMONSTRATING COMPLIANCE WITH THE RELEVANT APPROVAL CRITERIA

SUBJECT PROPERTY: 29400 Town Center Loop W,
Wilsonville, OR 97070
TL ID: 31W14D 00220

APPLICANT: Lars Andersen & Associates, Inc.
4694 W. Jacquelyn Ave.,
Fresno, CA 93722
Attn: Dan Zoldak
Phone: 559-276-0850
E-Mail: dzoldak@larsandersen.com

APPLICANT REPRESENTATIVE: J. Kenneth Katzaroff
Keenan Ordon-Bakalian
Schwabe, Williamson & Wyatt, P.C.
1211 SW 5th Avenue, Suite 1900
Portland, Oregon 97204
Phone: 206-405-1985
E-Mail: KKatzaroff@SCHWABE.com
E-Mail: Kordon-bakalian@schwabe.com

PROPERTY OWNER: Lumberjack LP
600 E Brokaw Rd.
San Jose, CA 95112

REQUEST: A Class I review and determination verifying the status of an existing non-conforming office, warehouse, manufacturing, service and retail use.

I. APPLICABLE STANDARDS AND CRITERIA

The applicant has identified the following code provisions that the City of Wilsonville (hereinafter, the "**City**") may apply to its review of this application:

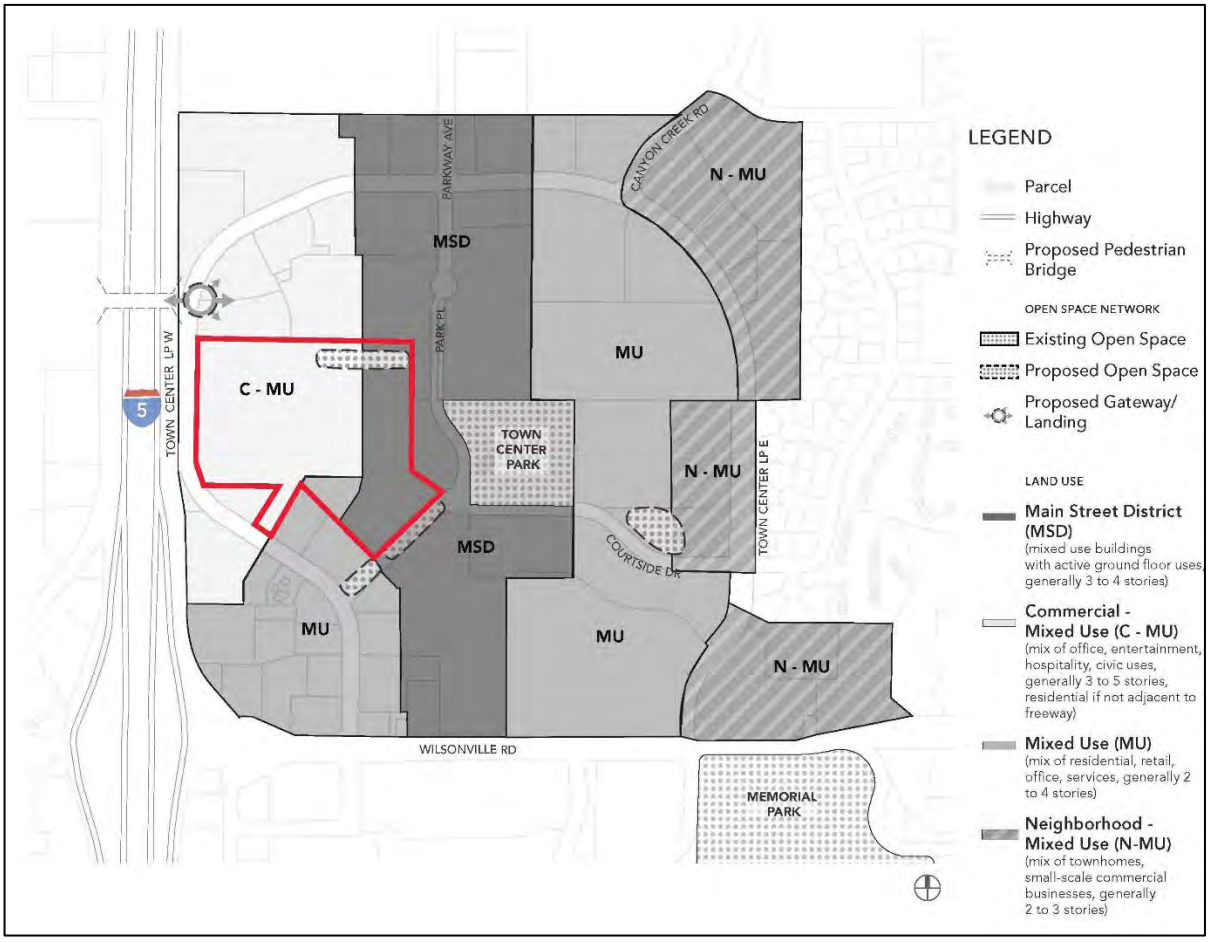
Title 4 – the Wilsonville Development Code ("**WDC**")

Section 4.000-4.035 – Administration
Section 4.001 – Definitions

Section 4.030 – Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.132 – Town Center Zone
Section 4.189-4.192 – Non-Conforming Uses, Structures, Site Conditions, and Lots

II. INTRODUCTION AND BACKGROUND

Lars Andersen & Associates, Inc. (the "**applicant**") is seeking a Class I review to confirm the status of the existing non-conforming office, warehouse, manufacturing, service and retail use (the "**subject use**") at 29400 SW Town Center Loop W, Wilsonville, OR 97070[1] (the "**property**"). The 15.01-acre property is located within the City of Wilsonville (the "**City**") and is zoned Planned Development Commercial – Town Center ("**TC**"). The property is designated with three Town Center Sub-Districts – Commercial-Mixed Use ("**C-MU**"), Mixed Use ("**MU**"), and Main Street District ("**MSD**").



[1] TL 31W14D 00220.

As pictured below, the property is located in a relatively flat, developed commercial area within the City's Town Center District. There is an existing structure at the property that was operated as a Fry's Electronics ("**Fry's"**) from 1991 to 2021.

In 1991 the City approved a Modification to the Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plan (the "**1991 Decision**") to allow the development of a 159,400 square foot ("**SF**") retail, office, warehouse, manufacturing, and service store at the property. *See attached,* **Exhibit A**. The property was zoned Planned Development Commercial ("**PDC**") and designated commercial in the City's Comprehensive Plan when the City approved the subject use of the property. *Id.*, at 14. Subsequent to the City's land use approval, Fry's began operating a retail, office, warehouse, manufacturing, and service store at the property.

Fry's was a large electronics warehouse store that retailed software, consumer electronics, household appliances, cosmetics, tools, toys, accessories, magazines, technical books, snack foods, electronic components, and computer hardware. Fry's also had in-store computer repair and custom computer building services, and offered technical support to customers. The Fry's model was unique for electronics retail outlets of the time, in that Fry's was an electronics warehouse that offered customers a variety of retail, manufacturing and service offerings that exceeded the offerings of Fry's competitors. Because Fry's stocked a wide range of electronics products, they were popular with electronics and computer hobbyists, as well as professionals.

Image Credit: Alamy, https://www.alamy.com/las-vegas-sep-7-2020-interior-view-of-the-frys-electronics-image375519870.html?imageid=595679EA-E5D6-4FAA-8BDE-4437A0B5DF19&p=283543&pn=1&searchId=9fd62e6ba47e6193d28e3b42e316bc4e&searchtype=0 (last accessed Oct. 20, 2023).

Image Credit: PC Magazine, https://www.pcmag.com/opinions/to-all-the-frys-i-loved-before-an-elegy-for-the-best-electronics-chain (last accessed Oct. 20, 2023).

In February 2021, Fry's suddenly went out of business, closing all 31 stores across the United States including the Wilsonville Fry's that was operating at the property.[2] Since the closure of the Fry's in 2021, the owner of the property has been actively marketing the site and making other plans for its use. The owner has also continued to make utility payments for city services. *See attached*, **Exhibit B.**

The Home Depot, Inc. ("**HD**") intends to operate a store within the existing structure that was previously occupied by Fry's, and therefore seeks confirmation from the City that a warehouse retail store can continue operating at the property. *See attached*, **Exhibit C**. HD operates home improvement warehouse stores that retail tools, construction products, appliances, and services, including transportation and equipment rentals. HD's Home Services division also offers technical expertise for home improvement projects, and both onsite and offsite install, repair, and

[2] *Fry's Electronics suddenly went out of business*, CNN, https://www.cnn.com/2021/02/24/business/frys-electronics-closure/index.html (last accessed Oct. 9, 2023); *Fry's Electronics closes, leaving Wilsonville store barren*, Portland Tribune, https://www.portlandtribune.com/news/frys-electronics-closes-leaving-wilsonville-store-barren/article_cde50d46-de09-5ce3-a647-9f54ce7d4bb1.html (last accessed Oct. 9, 2023).

remodel services. Although the vast majority of HD customers are private individuals, contractors and other professionals account for close to half of HD's annual sales.[3]

Fry's and HD stores are retail, office, warehouse, manufacturing, and service uses allowed at the subject property pursuant to the 1991 Decision and the property's historic PDC zoning. Both Fry's and HD stores are [were] organized warehouse-style, stock a large range of supplies available for retail, cater to retail consumers and professionals, and offer onsite services and technical support. As both Fry's and HD are warehouse retailers that fall within the subject use approved in the 1991 Decision, the applicant is seeking a non-conforming use determination to verify the status of the property's existing non-conforming use rights.

The applicant requests that the Planning Director process this application through the City's Class I review procedures because there no uncertainty as to the history of the property due to the existence of the 1991 Decision. WDC 4.030.01(A)(7); *see also* Exhibit A.

III. APPROVAL CRITERIA

WDC 4.189.01 –Continuation of Use

> *A. A non-conforming use may be continued subject to the requirements of this Section.*

RESPONSE: In compliance with WDC 4.189.03, the lawfully established non-conforming subject use at the property has not been discontinued or abandoned. The ongoing non-conforming use complies with the criteria of WDC 4.189 and is therefore permitted to continue.

WDC 4.189.02 – Change of Use

> *A. A non-conforming use may not be changed unless the change or replacement is to a use that is determined by the Planning Director to be no less conforming to the regulations for the zone district in which the use is located than the existing use.*

RESPONSE: The purpose of this provision is to consider the impacts of potential changes in use for lawfully established non-conforming uses. In this case, the applicant is not proposing to change the established non-conforming use of the property. Rather, the applicant is seeking a non-conforming use determination to confirm the status of the existing non-conforming use of the property. Therefore, this criterion is not applicable.

WDC 4.189.03 – Abandoned Use.

> *If a non-conforming use is abandoned for a period of 18 consecutive months, the use shall not be re-established without fully complying with the use requirements of the zone. Mere vacancy of a site or building while it is being marketed or other plans for its use are being*

[3] *Home Depot CEO Says Contractor Spend Remains Strongest Business Line*, PYMNTS, https://www.pymnts.com/earnings/2023/home-depot-ceo-says-contractor-spend-remains-strongest-business-line/ (last accessed Oct. 25, 2023).

readied, does not constitute abandonment. In order to be considered abandoned, a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale. These standards concerning abandonment do not in any way affect the City's processes for the abatement of nuisances as delineated in Chapter 6 of the Wilsonville Code.

RESPONSE: The existing non-conforming subject use at the property has not been abandoned. For a non-conforming use to be abandoned, "a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale." WDC 4.189.03. Here, the subject property is actively being marketed for rent, lease, or sale, and is currently receiving, and paying for, City utilities. *See* **Exhibit B**. Therefore, the non-conforming use of the property has not been abandoned. This criterion is met.

WDC 4.190.02 – Non-Conforming Structures

If a non-conforming structure is abandoned, as defined herein, for a period of 18 months, it may not again be used unless brought into conformity with the requirements of this ordinance. Except, however, that an abandoned non-conforming structure may be re-occupied if a Variance is approved per the requirements of Section 4.196.

RESPONSE: The existing structure at the property is not non-conforming per the definition set forth in WDC 4.001.195 because it conforms to the standards for structures within the TC zone. Therefore this criterion is not applicable.

WDC 4.190.05 – Non-Conforming Structures

A non-conforming structure may be expanded or enlarged, provided that the portion of the structure being enlarged meets zoning requirements in terms of setbacks, height, and lot coverage.

RESPONSE: The existing structure at the property is not non-conforming because it meets the setback, height, and lot coverage requirements for the TC zone. The applicant's plans involve alterations to the Fry's building and the subsequent operation of a Home Depot at the property. *See attached*, **Exhibit C**. The proposed project would consist of up to 124,215 SF of building area, previously occupied by Fry's. The reduction in square footage will result from interior renovations, specifically the removal of the existing mezzanine within the structure. **Exhibit C**. Exterior alterations include changes to the parking lot, including curbs and the approach to the building. The concept plan demonstrates that the applicant's proposed alterations are not an expansion. Therefore, this criterion is not applicable.

IV. CONCLUSION

For the reasons stated above, the Planning Director can find that all applicable criteria are met and approve the subject application.

Enclosed with this application are the following exhibits:

A. 1991 Decision
B. Proof of Utility Payments
C. Concept Plan

Unique Serial Number: (assigned by dbase) 4808

Department: Planning

Case No: 91PC43 File Creation Date:

Request: Modified Stage I Master Plan and Stage II Phase II site development plans, reconsideration of Condition ofApproval #8 of 90PC15

Action: Approved with conditions

Project Expiration Date:

Property Description: TL 500, 600, 601, 604 Sec. 13 County: C
TL 101, 200, 201, 300, 405 Sec. 14D County: C

Location: Wilsonville Town Center

Street Address:

Project Name(s): **Project Thunder**

Applicant: Capital Realty Corporation

Retention Schedule: Permanent

Location of Microfilm: City Hall Vault

Hard Copies of drawings/plans available? Yes

Physical copy of file retained? No

See also Case Files: 89PC50, 90PC15, 90PC15EX, 91DR29, 92DR21

Other name(s) on file:

MAP

SW 10/5/06 Initial/Date

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

NOTICE OF DECISION

Project Name: PROJECT THUNDER File No: 91PC43

Applicant / Owner: Capital Realty Corp.

Proposed Action: Modified Stage I Master Plan, Phase II Stage II Site Development Plans and Amending Condition of Approval 8 of Resolution 90PC5

Property Description:

Map No: 13 & 14D Tax Lot No: 101,102,200,201, 300 and 500 Site Size: _____

Address: _____

Location: Wilsonville Town Center - east of Town Center Loop West and northwest of shopping center

On December 9, 1991, at the meeting of the Planning Commission the following decision was made on the above-referenced Proposed Development Action:

_____Approval XX Approval with Conditions _____Denied

This decision has been finalized in written form and placed on file in the City records at the Wilsonville City Hall this 16th day of December, 1991, and is available for public inspection. The date of filing is the date of the decision. Any appeal(s) must be filed with the Planning Department by 5:00 p.m. on December 30, 1991.

XX Written decision is attached

_____ Written decision is on file and available for inspection and/or copying.

This action, if approved, will expire on December 9, 1993 unless development commences prior to the expiration date.

For further information, please contact the Wilsonville Planning Department at City Hall, Community Development, or phone 682-4960.

FILED 12-16

PLANNING COMMISSION
RESOLUTION NO. 91PC43

A RESOLUTION ADOPTING FINDINGS AND CONDITIONS OF APPROVAL FOR A MODIFIED STAGE I MASTER PLAN, PHASE II STAGE II SITE DEVELOPMENT PLANS AND AMENDING CONDITION OF APPROVAL 8 OF RESOLUTION 90PC5 - CAPITAL REALTY CORP., APPLICANT. THE PROPERTY IS IDENTIFIED AS WILSONVILLE TOWN CENTER AND IS LOCATED ON TAX LOTS 101, 102, 200, 201, 300 AND 500, T3S-R1W, SECTIONS 13 AND 14D, CLACKAMAS COUNTY, OREGON

WHEREAS, an application, together with planning exhibits for the above-captioned development, has been submitted in accordance with the procedures set forth in Sections 4.008(4) and 4.139(1), (2) and (3) of the Wilsonville Code, and .

WHEREAS, the Planning staff has prepared a report on the above-captioned subject which is attached hereto as Exhibit A, and

WHEREAS, said planning exhibits and staff report were duly considered by the Planning Commission at a regularly scheduled meeting conducted on December 9, 1991, at which time all exhibits, together with findings and public testimony, were entered into the public record, and

WHEREAS, the Commission has duly considered the subject and the recommendations contained in the staff report, and

WHEREAS, all interested parties have been afforded an opportunity to be heard on the subject.

NOW, THEREFORE, BE IT RESOLVED that the Wilsonville Planning Commission does hereby adopt the staff report attached hereto as Exhibit A, along with the findings, recommendations and Conditions of Approval contained therein. The Wilsonville Planning Director is hereby authorized to issue a Stage I Master Plan and Stage II Site Development Permit for Phase II and a Revised Condition of Approval 8 -Resolution 90PC5 once the prescribed appeal period has expired.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 9th day of December, 1991, and filed with the Planning Secretary this same day.

Richard D. Wilson
Chairman, Planning Commission

Attest:
Judee Emison
Judee Emison, Planning Secretary

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

Chairman Mike Williams moved to accept the staff report with the following amendments:

Revise Condition of Approval Number 10 to provide that instead of at the time building permits are issued at the Phase II Stage II site development, to provide that at the time the Certificate of Occupancy is issued the applicant/property owner shall dedicate 5.1 acres. And to provide another sentence at the end, that the City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

Provide an additional condition of approval that at the time that the Design Review Board specifically reviews the applicants plans, regarding the east wall of the large structure on Phase II, to insure its compatibility with the proposed park. And to also have the DRB look at the pathway and sidewalk circulation plan. And an additional condition of approval that the applicant consider on-site detention in its submittal to the city. That the applicant coordinate with the engineering department the storm drainage plans with some consideration toward whether or not an on-site detention is feasible and meets the engineering standards of the city. And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

An additional Condition of approval is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the property across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to the Project Thunder.

(Mike Kohlhoff - Add the phrase, "unless the project owner and the city council reach other agreement")

Condition 10 will read that dedication of 5.1 acres for a public park will be required before issuance of the Certificate of Occupancy unless the applicant and the City Council reach an agreement for a later date.

Motion was seconded by Lew Hendershott and carried 4-2.

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

SUMMARY

Capital Realty Corporation is representing a retail business with the anonymous name "Project Thunder". The Project Thunder people desire to develop 14.75 acres (Phase II of Wilsonville Town Center) for a 159,400 square foot electronics-related retail store.

The proposed Project Thunder Stage II Site Development Plans has caused Capital Realty Corp. to modify and re-submit the Stage I Wilsonville Town Center Master Plan to reflect an expanded master plan area, reclassify overlay zones associated with Ordinance 55, resdesignate the phasing sequence and to establish approximately 5.4 acres for open space.

Capital Realty Corp. is also seeking reconsideration of Condition 8 of Planning Commission Resolution 90PC15 which imposed certain design and development requirements for the development of the 5.4 acre open space.

All Comprehensive Plan and Zoning Code requirements that apply to this Stage I review are satisfied or can be met. Parking issues, building height and setback, final design, utility placement, and other site specific development requirements are further considered in this application for Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building. The applicant has also submitted conceptual plans showing Project Thunder's architecture, landscaping and a signage program. The Design Review Board is the City's review authority of the project's architecture, landscaping and signage program.

The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. The proposed findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

Project Thunder can be adequately served by existing or immediately planned public facilities and services.

RECOMMENDATION: **Approve the modified Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plans with Conditions of Approval attached herein. This recommendation acknowledges the conceptual configuration of a 5.1 acre open space as proposed by the developer.**

FINDINGS: PDC & PDI

The following findings are hereby adopted by the PLANNING COMMISSION and entered into the public record in consideration of the application as submitted in conformance with the City's Comprehensive Plan and Zoning Regulations. "PROJECT THUNDER" STAGE II

NA = NOT APPLICABLE
DRB = DESIGN REVIEW BOARD

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
A. Land Use					
Zoning	PDC	PDC	●	○	1 to 7
Comprehensive Plan Designation	COMMERCIAL TOWN CENTER		●	○	1 to 7, 32 to 36
B. Land and Building Improvements	ORD # 55				
1. Lot Size					
a. Total site area (acreage)	NOT SPECIFIED	652,687 SF	●	○	
b. Lot sizes (subdivision)	NA		○	○	NA
Acreage lot size	NA		○	○	NA
2. Lot Coverage					
a. All buildings	NOT SPECIFIED	24% 159,400 SF	●	○	
b. Parking/paved	↓	61% 395,242 SF	●	○	
c. Landscaping					
1. total size area (%)	MINIMUM. 15%	15% 98,045 SF	○	○	DRB
2. parking area (%)	10%	-	○	○	↓
3. screening/buffering	REQ'D	-	○	●	42, 43
4. irrigation system	↓	-	○	○	DRB
3. Building Setbacks					
Front / TOWN CENTER LOOP WEST	0'	445'	●	○	
Right side / NORTH	0'	160'	●	○	
Left side / SOUTH	0'	85'	●	○	
Rear side / EAST	0'	70'	●	○	

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
4. Building Use					
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	
5. Building Specifications					
a. Building Height	35'	-	●	○	44
b. (Sun Exposure Plane)	NA		○	○	NA.
c. Gross Floor area of Building	NO LIMIT	150,406 SF	●	○	
6. Number of Off-Street Parking					
a. Standard 9' X 18'	472	858	●	○	44
b. Compact 8 1/2' X 17' (30% 10 allowed)	OPTIONAL	NOT SHOWN.	●	○	
c. Handicapped 12' X 18' (1 to 50 required)	11	16	●	○	UBC TABLE 31-A
Total	483	872	●	○	46 to 48
d. Truck load berths	2	26	●	○	
7. Access/Egress					
a. Direct access to street	-	3	○	●	17.18
b. Access provided by easement	NA		○	○	NA
c. Rail Access	NA		○	○	NA.
8. Open Space Slope Protection					
a. Existing vegetation protected	NA		○	○	NA
b. Slopes over 20% to 30% impervious coverage	NA		○	○	NA
c. River and stream corridors protected	NA		○	○	NA
d. Adequate erosion control provided			●	○	EXHIBIT G.4
e. Within greenway	NA		○	○	NA

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
C. Other Planning Considerations					
1. Outside storage area provided/ screening	—	—	○	○	DRB
2. Adequate screenage of mechanical equipment	—	—	○	○	DRB
3. Safety/crime prevention					
a. Location of addressing	—	—	○	○	DRB
b. Natural surveillance	—	—	○	○	
c. Type of exterior lighting	—	—	○	○	
D. Bike Paths, Pedestrian Trails, & Equestrian Trails					
1. Pathway Standards					
a. Pathways are provided consistent with pathway master plan and design standards (Section 4.168 W.C.)	REQ'D	NOT SHOWN	○	●	28 & 31

E. Previous Approval actions and applicable conditions or approvals

1. City Council	Yes	No	File No.	See finding	ORD 55
2. DRB	Yes	No	File No.	See finding	90-15 & 90-50
3. P.C.	Yes	No	File No.	See finding	
4. Other	Yes	No	File No.	See finding	

Inter-agency review comments

Yes	No	See Exhibit No.	

Inter-agency review comments (Written Only)

City Engineer	Yes	No	See Exhibit No.	D
Parks & Recreat.	Yes	No	See Exhibit No.	
Traffic Safety	Yes	No	See Exhibit No.	
Building Dept.	Yes	No	See Exhibit No.	E
Tualatin Fire Dept.	Yes	No	See Exhibit No.	
Sheriff	Yes	No	See Exhibit No.	

91PC43

MODIFIED STAGE I MASTER PLAN AND STAGE II PHASE II SITE DEVELOPMENT PLANS AND RECONSIDERATION OF CONDITION OF APPROVAL 8 OF 90PC15
PLANNING COMMISSION FINDINGS

Property Owner:	Capitol Realty Corporation
Project:	Project Thunder
Developer:	Project Thunder
Architects:	Stage I Master Plan revision - JKS Architects Stage II Phase II - Design Forum Architects
Traffic Engineer:	Kittelson & Associates, Inc.

Property Description:

The subject master plan area comprises 59.79 acres for retail commercial/office development more specifically described as Tax Lots 500, 600, 601 and 604 of Section 13 and Tax Lots 101, 200, 201, 300 and 405 of Section 14D, T3S-R1W, Clackamas County, Wilsonville Oregon. Approximately 114 acres comprise the Town Center Master Plan as recognized in Ordinance No. 55. Wilsonville Town Center, the name of Capital Realty Corporation's commercial retail development, has the same name of a retail district identified in Ordinance No. 55. For clarification, the applicant's Stage I Master Plan will be identified as the Wilsonville Town Center and the City's Master Plan of the district will be identified as Ordinance No. 55.

For years the interior area of Town Center Loop was in agricultural use with farm exemption tax status. It wasn't until the last eight years that the area experienced rapid residential and commercial growth with the development of Park Center Apartments, Town Center Mercantile, Wilsonville Market Place, Phase I Wilsonville Town Center, Clackamas Community College and various office and retail developments. It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot commercial retail store. Capital Realty forecasted commercial growth trends in Town Center and have subsequently purchased additional property to accommodate their plans to develop the Wilsonville Town Center Master Plan. Thus, the overall master plan area will increase from 53.39 acres to 59.79 acres. This adjustment will also create a new development phase in the overall Master Plan. With respect to Project Thunder, the relatively level site is easily accessible to Town Center Loop, Parkway Court and Wilsonville Road. The proposed Project Thunder site is also highly visible to I-5 and Town Center Loop West.

LAND USE

Project Data
Stage I - 89PC50

1. Building Area

Phase I	24.08 acres	170,900 square feet
Phase II	6.52 acres	61,000 square feet
Phase III	22.79 acres	179,000 square feet
Total	53.39 acres	

Building Area

Phase I	207,130 square feet
Open Space	5.62 acres

Project Data
Stage I Modification:

2.

Phase I	22.96 acres (Existing Wilsonville Town Center commercial dev.)
Phase II	14.75 acres (Proposed Project Thunder)
Phase III	22.08 acres (Undeveloped property)
Total	59.79 acres

Building Area

Phase I	207, 130 sq.ft.
Phase II	159, 400 sq.ft.

3. The Master Plan amendment also seeks to amend the current overlay zones in Ordinance No. 55 to reflect modifications proposed in Stage I Wilsonville Town Center. Essentially, the amendments would replace the Motor Hotel (MH), Office Professional (OP), Service Commercial (SC) and Residential (R) use designations with Central Commercial (CC).

Plan Designation and Zoning

4. The subject site is designated "Commercial" on the Comprehensive Plan map and zoned "Planned Development Commercial" (PDC) on the zoning map. The site is also situated within an area identified as Town Center Master Plan area (Ordinance No. 254). Ordinance No. 254 identifies the property in the following overlay zones; Service Commercial (SC), Office Professional (OP), Central Commercial (CC), Motor Hotel (MH), Residential (R) and within an area designated for a Lake or Open Space.

5. Within the Comprehensive Plan, a number of goal and policy statements address the commercial planning designation and development review which apply to the subject property. The applicable criteria for Stage I Master Plan review is found in Section 4.139(2) of the Wilsonville Code. Recommended uses for development within the Town Center Master Plan are embodied in Chapter 4 of the Wilsonville Code. In brief, the combined review criteria are the following:

The Most Applicable Comprehensive Plan Goals, Policies and Objectives

Goal 1.1	Citizen Involvement Goal
Objective 3.1	Public Facilities Availability
Policy 3.3.1	Street System Master Plan
Policy 3.3.1(b)	Street System Master Plan
Policy 3.3.1(c)	Street System Master Plan
Policy 3.3.2(a)	Arterial and Collector Streets
Policy 3.3.5(b)	Private Owner Responsibility to Build Streets
Policy 3.3.8(a)	Transportation Impact Analysis
Policy 3.3.8(c)	Traffic Trip Reduction
Policy 3.3.8(d)	Consolidation of Vehicle Trips
Policy 3.3.8(e)	Mass Transit
Policy 3.3.14	Major Street Improvements Required
Policy 3.3.3	Street Standard and Dedication
Policy 3.3.11	Bikeways and Pathways
Policy 3.3.12	Pathway Construction
Policy 3.8.3	Open Space
Policy 4.2.3	Site Plan Information Requirements
Policy 4.2.5	Development Coincide with Public Facilities

Applicable Zoning Ordinance Provisions

Section 4.123	This Section provides the requirements of the PDC zone which are governed by Section 4.130 to 4.140.
Section 4.138(4)	Stage I Master Plan compliance
Section 4.139(4)	Criteria for approval of a planned development including subsections a, b and c

Town Center Master Plan

Ordinance Nos. 55 and 254.

Goal 1.1 - Citizen Involvement

6. The Planning Commission will be conducting the Stage I Master Plan as a public hearing and all notification requirements have been met.

CONCLUSIONARY FINDING

7. The proposed uses, both separtely and as a whole, are consistent with the Comprehensive Plan and can be made consistent with Ordinance No. 55.

PUBLIC FACILITIES

Objective 3.1

8. The City Engineering Department has provided detailed comments regarding public facilities improvements required to serve the site. These findings and recommendations are listed on Exhibit D.

Sanitary Sewer

9. Three sanitary sewer lines serve the site. An eight-inch line is located on the west side of the site which extends south through Citizens Drive to a trunkline in Wilsonville Road. A 15-inch line is located in the center of the site and a 10-inch line traverses the site originating from the Courtside Estates subdivision. This line was relocated to accommodate Phase I development. Approximately 1,500 linear feet of a sanitary sewer line was constructed along the northerly right-of-way of Wilsonville Road. This finding is also applicable to Stage II site development.

Storm Drainage

10. The subject site is located within two storm drainage basins. Phase I site grading recontoured the site Master Plan to divert storm water to a piped system in the easterly basin that out falls to an existing 48-inch pipe on the southeast corner of Phase I site. This diversion helps relieve the westerly storm basin from the storm drainage system that out falls to constricted culvert under I-5. Phase II development will remove the existing storm detention pond located on the west side of the site and be replaced with storm pipes to connect with the improved Phase I storm system. The City requires detailed storm drainage plans designed to pass a 25-year storm frequency. The detention pond has not been investigated with the Oregon Division of State Lands for wetlands status.

Water

11. Existing 12-inch waterlines located in Wilsonville Road and Town Center Loop East and West have adequate flow to serve full buildout of the site. This finding is also applicable to Stage II site developement.

Police

12. Police protection is provided to the City by the Clackamas County Sheriff's Department. This department has a headquarters in Wilsonville City Hall which is near the subject property.

Fire/Emergency

13. The Tualatin Valley Consolidated Fire and Rescue District provides fire protection to this site. The City is served by two fire stations strategically located in the City that can provide adequate fire protection services to the proposed development.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

STREETS and TRAFFIC

Policy 3.3.1(a) - Street System Master Plan

15. The Street System Master Plan identifies design standards and conceptual locations for arterials and major collectors. Wilsonville Road and Town Center Loop are classified as major arterial streets. The Master Street System and Functional Classification Map does not identify or classify any internal streets within the Town Center Loop. In the case of the proposed retail development, private drives will be constructed and connected to an internal drive/road system. This finding is also applicable to Phase II Stage II site development.

16. The design standards for Wilsonville Road show an approximate 94-foot right-of-way with a median planter island. The standards for the Town Center Loop show a 72-foot right-of-way with a median planter island. This finding is also applicable to Stage II site development.

17. The proposed development will construct driveway connections within Town Center Loop, but not in the same alignments as shown on the pictorial map representing the Town Center Master Plan. This finding is also applicable to Stage II site development.

18. Though the proposed access drive located near the northwest corner of the site is shown at a location supported by the Town Center Master Plan, this access is situated along a radius of Town Center Loop West that may position it in an unsafe location for egress and ingress.

Policy 3.3.2(a) - Dedication of Arterial and Collector Streets and Control or Consolidation of Access Drives.

19. The dedication of additional right-of-way and half-street improvements along Wilsonville Road and Town Center Loop East were accomplished in Phase I Stage II site development. This finding is also applicable to Stage II site development.

20. The Wilsonville Town Center Master Plan shows ten access drives at arterials. The full access drive shown near the northwest corner of Phase III at Town Center Loop West should be analyzed for safe vision clearance.

21. The proposed access drive to Project Thunder, shown at the southwest corner of the site, does not align with the location of the existing curb cut approved to the site in Local Improvement District No. 5. This access drive would further create a staggered intersection with access drives constructed on the opposite side of Town Center Loop West. This access drive also deviates from the access drive shown on the Town Center Master Plan approved in 89PC50. The Planning Commission cannot change the locations of access drives approved in LID No. 5 without first obtaining approval from the City Council. This finding is also applicable to Stage II site Development.

22. It appears from the re-submitted Stage I Master Plan that access is not proposed at Parkway Court which would have encouraged through traffic from Wilsonville Road and Town Center Loop to the Parkway Court.

Policy 3.3.3

23. Policy 3.3.3 requires the City to establish minimum street standards and dedication of adequate right-of-way prior to actual site development. It further provides that if proposed development exceeds minimum service capacity, then appropriate improvements shall be required prior to occupancy of the completed development. With respect to Project Thunder, the arterials servicing the site, Town Center Loop West and Wilsonville Road are already constructed to the Public Works standards. Phase I of Wilsonville Town Center is required to install a traffic signal to comply with minimum service capacity levels.

24. Section 4.139(4) stipulates that a Planned Development Permit may be granted by the Planning Commission only if it is found that the development conforms to subsections 4.139(4)(a),(b) and (c) and Sections 4.130 to 4.140. Section 4.139(4)(b) states:

> "That the location, design, size and uses are such that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on existing or immediately planned arterial or collector streets and will, in the case of commercial or industrial developments, avoid traversing local streets."

25. The applicant has provided an updated transportation analysis prepared by Kittelson & Associates, Inc. for Project Thunder. Wayne Kittelson's updated report is labeled Exhibit G-7. The report recommends that a traffic signal be installed at the intersection of Town Center Loop West with Wilsonville Road at the time of occupancy of Phase II. However, Capital Realty was conditioned in Phase I Stage II development (Resolution 90PC15) to install the subject traffic signal as determined by the City Engineering Department. This requires that the State of Oregon Department of Transportation warrant the signal. This finding is also applicable to Stage II site development.

- All of the intersections within the study area, with the exception of Wilsonville Road/Parkway Avenue, are currently operating within acceptable level of service limits.

- Under projected 1991 total traffic conditions and with the addition of site-generated Phase I traffic, the minor street left-turn movements at the Town Center Loop West/Wilsonville Road intersection are projected to experience an "E" Level of Service. While a traffic signal would improve the level of service for the 45 vehicles making this movement, it would also cause an overall increase in intersection delay and is not considered appropriate in view of the surrounding street system, the traffic circulation patterns and the projected operational characteristics of this intersection.

- By 1995, the projected background traffic volume conditions, without Phases II and III, will warrant the installation of a traffic signal at the intersections of Wilsonville Road/Town Center Loop West and Wilsonville Road/Town Center Loop East. It is therefore recommended that traffic operations at both the Town Center Loop intersections with Wilsonville Road be monitored on a regular basis. Traffic signals should be installed only when one or more MUTCD signal warrants are met and the operational and/or safety characteristics dictate a need for a traffic signal.

- The number of access drives included in the Site Plan will be adequate to serve the proposed retail development. These access drives will disperse the site-generated traffic sufficiently to minimize the overall effect of the retail center on the capacity and quality of service provided by the adjacent arterial street system. At the same time, they are sufficiently separated from each other and from adjacent intersections to avoid significant operational, stacking and safety problems.

- By 1995, the projected background traffic volume will, by itself, exceed the existing capacity of Wilsonville Road in the vicinity of the Wilsonville Road/I-5 interchange. The proposed ODOT improvement project at the interchange would add sufficient capacity to accommodate both the 1995 background traffic, as well as the additional traffic from Phases II and III of the proposed development.

Kittleson and Associates has also provided additional findings and recommendations found in their letter of October 16, 1991, labeled Exhibit G, which are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Policies 3.3.8(a)-(e)

26. These policies address traffic impacts and congestion.

As noted in the previous findings responding to Policy 3.3.3, the applicant has provided a detailed traffic analysis that responds to Policies 3.3.8(a)-(e) and Section 4.139(4) of the Wilsonville Code.

CONCLUSIONARY FINDING

27. The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West, and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. These findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

TRANSIT FEATURES, SIDEWALKS AND BIKEWAYS

28. Specific transit features such as transit stop locations and right-of-way fixtures for transit uses should be provided in the Stage II Site Development Plan. These findings are also applicable to Stage II site development.

Policies 3.3.11, 3.3.12, 3.3.13 and 3.3.13(b)

29. These policies addresses pathways and bikeways. Written comments received by Myers/Kroker (the architectural firm responsible for master planning Town Center) in case file 90PC15, have the following observations concerning pedestrian pathways:

> "There will need to be a landscape design study of the public right-of-way system defining the nature of plant materials, berm forms, ground cover, public walk systems and street light systems. Design definition of pedestrian overpasses would be developed within the recommended 'Design Review Parameter Study'."

30. The modified Stage I Master Plan shows a bikeway through Phase I to extend through Phase III and connect with the future park. A shoulder-side bikeway is required on the Comprehensive Plan to occur on the south side of Wilsonville Road.

31. The Phase II Stage II submittal plans do not indicate sidewalks along Town Center Loop West as required by Ordinance No. 55 and by Section 4.168 and Subsection 4.167(1)(b) of the Wilsonville Code. Regarding Project Thunder, a five-foot wide concrete sidewalk is required along Town Center Loop West to be off-set five feet from the curb. In order to provide for safe pedestrian access around and on the Phase II site, pedestrian walkways should be extended from Town Center Loop West via the central access drives up to Project Thunder's storefront. It also appears that the applicant has not considered pedestrian sidewalks to link the site with the future park and adjoining businesses.

OPEN SPACE

Policy 3.8.3

32. This policy addresses open space. The proposal, as presented, will have a major impact on the location, size and configuration of the area designated by Ordinance No. 55 shown as lake or open space. Approximately 8.5 acres of lake or open space is conceptually shown on the Town Center Master Plan. The open space depicted on the modified Town Center Master Plan or Ordinance No. 55 does not have the same configuration as shown for the Primary Open Space area depicted on the Comprehensive Plan Map.

33. The modified Stage I Master Plan shows 5.1 acres in open space to be reconfigured to satisfy Capital Realty's site development program, and hopefully, for the City's benefit to develop the property as a public park. The application does not propose a specific open space plan with uses, nor is the applicant proposing a development development schedule. In this regard, the Planning Commission had previously conditioned the applicant in Resolution 90PC15 to perform the following:

Condition No. 8:

> "At Phase II Stage II site development, which shall be the next phase presented, applicant shall submit to the Planning Commission and the Design Review Board a detailed open space plan and development schedule for the development of the 5.4 acre open space shown on the Stage I Master Plan."

With respect to the above issues, the applicant is requesting the Planning Commission to reconsider Condition No. 8 as follows:

"1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions.

2. To formulate a development plan and time frame consistent with the development of Phases II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto."

34. Ordinance No. 55 depicts an open space or lake with a centralized location in Town Center with surrounding development to be oriented and related with it. One can compare this relationship to be similar with the concept of a public square of a small European city or even with an Early American town square. Those kind of public spaces create a sense of place and encourage a community gathering place within an urban context. It also creates a city center environment that involves the pedestrian in its function and design that is not found in retail strip developments designed around automobiles.

35. The proposal, as presented, shows approximately 5.1 acres in open space. The City will require that the open space be dedicated for development of a City park. At issue is the proposed configuration of the open space. In this regard, the proposed open space has a spacial composition that positively responds to the open space concept in Ordinance No. 55. The proposed Master Plan is an assembly of properties that make up a reasonable configuration for future park development. Conversely, the surrounding development plan represents an augmentation of the more traditional strip retail commercial center showing buildings oriented to major collectors and arterials together with large storefront parking areas. Truck delivery activities are then generally found on the sides or at the rear of the stores which attract outside storage of palettes, boxes etc. The applicant has modified the original submittal drawings designed to lessen the impact of Project Thunder's building mass on the proposed open space. Buffering can be accomplished by reducing the mass of Project Thunder with siting a smaller intervening building between Project Thunder and the open space. The revised plan also re-positioned potential building sites to open up the view of the open space to Town Center Loop West.

36. The proposed 5.1 acre open space, combined with approximately 3 acres in open space created for Town Center Park Apartments and Clackamas Community College, will provide a generous area for a future public park.

Policy 4.2.3 and Section 4.139(2)(a) and (b)

37. This policy and zoning section identify the information which must be included in the Site Plan. The information set forth has been submitted in compliance with the Comprehensive Plan and Zoning Ordinance. Landscape and Architectural Plans will be reviewed by the Design Review Board.

Policy 4.2.5

38. This policy requires that development coincide with the provision of public streets, water, sanitary sewer and storm drainage facilities. Such facilities are currently available at the site. Sewer and water are located within the abutting roads. Storm drainage is provided at the eastern portion of the site. The extension of these services will be coordinated with site construction and facilities and will be designed to meet City public works standards.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

40. Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassifed uses and reconfigured open space.

41. Condition No. 2 of the Stage I Master Plan approval requires separate Stage II land development applications for review of each pad. Therefore, the buildings proposed on the pads are not part of this application.

BUFFERING and SCREENING

42. Section 4.163 of the Wilsonville Code requires:

A. All outdoor storage and garbage collection areas shall be screened from off-site view with fencing and/or landscaping.

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. Multi-family developments shall be screened and buffered from single-family areas.

43. The Site Plan illustrates an area between the truck loading area and proposed open space. This site arrangement orientes the massive and mundane backside of Project Thunder to Parkway Court and the proposed open space. The impact can be lessened, as proposed in Finding No. 35, together with innovative design utilizing landscaping, screenage, murals etc.

BUILDING HEIGHT

44. Definition no. 12 of Chapter 4 of the Wilsonville Code (Building of Structural Height) is defined by the following:

> "The term 'height of building' shall be deemed to mean the perpendicular distance from the average elevation of the adjoining ground to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the middle height gable between the eaves and ridge of a pitch or hip roof. If a building is divided into units by means of masonry division walls, each unit shall be considered separately in calculation for height of building."

45. In order to distinguish Project Thunder to the public, the applicant proposes to construct a dome and flag pole atop the main entrance of the store. Section 4.172(1) exempts domes and flag poles from the height limits of the PDC zone. However, the flag pole can only fly the United States and the State of Oregon flags. Just for general information, the top of the dome is shown approximately 55 feet above grade level. The top of the flag pole is approximately 81 feet above grade level.

PARKING ANALYSIS

46. Section 4.150WC:

"Commercial:

Commercial retail, 1,501 square feet or more	1 space/200 sq.ft. @ 63,914 sq. ft. of floor area
Service or repair shops	1 space/200 sq.ft. @ 17,276 sq. ft. of floor area
Eating or drinking establishments	1 space/200 sq.ft. @ 6,096 sq. ft. of floor area
Storage warehouse, wholesale establishment, rail or trucking freight terminal	1 space/2,000 sq.ft. @ 39,336 sq.ft. of floor area up to 40,000 sq.ft.; 1 space/4,000 sq. ft. thereafter
Office	1 space/250 sq.ft. @ 9,117 sq.ft.

These calculations do not include employee lunch rooms, restrooms, HVAC roooms, cat walks, etc.

Building Area - Phase II **Minimum Parking Required:**

Project Thunder approximate floor areas:

Retail Commercial	63,914 / 200 = 320 spaces
Service	17,276 / 200 = 86 spaces
Office	9,117 / 250 = 36 spaces
Restaurant	6,096 / 200 = 31 spaces
Storage	39,336 / 4000 = 10 spaces
Mimimum parking :	**483 spaces**

47. Though the proposed off-street parking count shows 16 handicapped and 856 standard parking spaces for a total of 872 parking spaces, the proposed parking is almost twice the minimum requirement of the Code. This figure does not include parking for the future pads. Those parking areas will not be constructed until each pad is developed.

48. The parking plan specifies dimensions for a typical standard parking space at 9' x 18' with 25'-0" drive aisles. The Zoning Code has a minimum 9' x 18' standard parking space dimension. Compact parking spaces are not proposed and are optional by the Zoning Code.

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

EXHIBITS

The following Exhibits are hereby entered into the public record by the Planning Commission as confirmation of its consideration of the application as submitted.

A. Findings and Conditions of Approval
B. City of Wilsonville Comprehensive Plan
C. Chapter 4 of the Wilsonville Code
D. City Engineering Department Report
E. City Building Official's Report
F. Town Center Master Plan
G. Applicant's submittal documents:
   1. Revised Stage I Master Plan and Master Utilities Plan
   2. Phase II Site Plan
   3. Phase II Exterior Elevations
   4. Phase II Grading Plan and Erosion Control Plan
   5. Phase II Utilities Plan
   6. Phase II Preliminary Landscape Plan
   7. Traffic Report by Wayne Kittelson and addendum letter
   8. Request for Modification of Condition No. 8 of 90PC15
   9. Stage I Master Plan Re-submittal
   10. Phase II Stage II narrative
   11. Alternative Open Space Concept

H. Original Stage I Master Plan - 89PC50.

I. Ordinance no. 55

City of
WILSONVILLE
in OREGON

30000 SW Town Cente
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

August 16, 1999

Gary M. Graumann
Lumberjack, L.P.
PO Box 7458
Menlo Park, California 94026

Re: 29400 SW Town Center Loop

Dear Mr. Graumann:

Mr. Lashbrook, Wilsonville Planning Director, has asked me to answer your request for a zoning compliance letter. You will find the information you requested as follows:

1. Zoning Classification Code:
   Planned Development Commercial (PDC) (Town Center)

2. Property Owner's Name and Lender's Name
   Lumberjack, L.P. (owner)
   PO Box 7458
   Menlo Park, CA 94026

   GE Capital Business Asset Funding Corp.
   10900 NE 4th St., Suite 500
   Bellevue WA 98004

3. Address of the Property:
   29400 SW Town Center Loop, Wilsonville, Oregon

4. Type of Permitted Use:
   Commercial (Planned Development)

5. Expiration Dated Copy of Conditions or Restrictions of Use:
   Case File 91PC43 approved 12/9/91
   Case File 91DR29 approved 1/27/92
   Case File 92DR21 motion revising condition

N:\annex\plng\hoffman\bh81699graumann\sh

I have researched our records and find that in receiving final occupancy the city found that the development had complied with all plan proposals and conditions of approval. However, the project is now almost seven years old and is beginning to show some wear and deferred maintenance. About a year ago, Mr. Blaise Edmonds wrote you about broken curbs and destroyed landscaping where vehicles have driven over the curb. This is at a major entrance area (Southwest entry drive, between the rug dealer and McDonalds.) This problem area still requires attention.

Sincerely,

Robert G. Hoffman AICP

Robert G. Hoffman AICP
Manager of Current Planning

Attachment: Decision and Conditions of Approval
98PC43
91DR29

RGH:sh

N:annex\plng\hoffman\bh81699graumann\sh

LUMBERJACK, L.P.
P.O. BOX 7458
MENLO PARK, CALIFORNIA 94026
(650)813-9100 FAX(650)813-9190

August 5, 1999

Mr. Stephan Lashbrook
Planning Director
CITY OF WILSONVILLE
30000 SW Town Center Loop E
Wilsonville, OR 97070

Dear Mr. Lashbrook:

Thank you very much for returning my call with respect to revisions to the Development Codes. I look forward to reviewing the changes and will provide any comments that I may have.

We also discussed the following outline that my lender has requested that I obtain from the city. I have provided the information for items 2) and 3). If you could have someone on your staff complete the rest of the requirements requested by the lender it would be greatly appreciated.

I would like to receive a compliance letter from your office within the next 10 days. Should you have any questions please feel free to call me at the number listed above.

Once again, thank you for your attention to this matter.

Sincerely,

Gary M. Graumann

ZONING COMPLIANCE LETTER REQUIREMENTS

This item should be obtained from the City Planner's, County Clerk's, or Zoning Department's office and should contain the following information:

1) Zoning Classification Code — Planning Development Commercial (PDC (Town Center)

2) Property Owner's Name and Lender's Name

3) Address of the Property

4) Type of Permitted Use. — Commercial (Planned Development)

5) Expiration Dated Copy of Conditions or Restrictions of Use.

91PC43 - Appr. 12-9-91
91DR29 - Appr 1-27-92
92DR21 - Appr 6-22-92

2) Lumberjack, L.P. (owner)
P.O. Box 7458
MENLO PARK, CA 94026

GE Capital Business Asset Funding Corp.
10900 NE 4th St., Suite 500
Bellevue, Wa 98004

3) 29400 SW Town Center Loop
Wilsonville, Or.

Incredible Universe

Aetna's local presence shrinks after loss of key large clients

Continued from page 1

er away from the Portland market.

Despite a strong national presence, Aetna's local client base has eroded as

market is already dominated by strong HMO players that have left little room for carriers like Aetna.

Stone said the downsizing was planned a national restructuring effort, and not nply because of the lost clients in Portid. Many who watch insurance activis nationally agree. The change reflects nilar strategies by nationwide carriers. tna wants to consolidate offices, rece overhead and gain efficiencies in increasingly competitive health inrance market.

'It is definitely consistent with the nd that we've seen in this industry," id Post. Improvements in electronic tims handling and standardization ross offices have made such changes ssible and even advantageous, he said, gain efficiencies.

'Insurance in general has become more d more of a commodity market," said iss Poll, an insurance analyst with The licago Corp., a Chicago-based investent bank that tracks insurance companies. "Insurance companies, especially the big guys, have a big expense burden. They tend to be big and clumsy."

In Aetna's case, said Poll, the national carrier's life and health business has been its strongest asset. Hartford, Conn.-based Aetna is the third-largest U.S.-based property and casualty insurer, according to Value Line's December 1993 investment survey. Aetna, a public company traded on the New York Stock Exchange, also has been subject to large market fluctuations.

Aetna "peaked" on Nov. 1, 1993, with a per-share price of $60.75, said Poll. The stock closed at $47.75 per share on Oct. 18.

Aetna Health Plans reported $4.5 million in insurance premiums in Oregon during 1993, down from $12.7 million in premiums it wrote in 1991, according to reports filed with the state. It covers an estimated 40,000 enrollees.

Aetna handles about 4.9 million Medicare claims representing some $250 million annually out of the Portland office.

Blaise
Pam
Sally

Incredible Universe building sold, leased

Tandy Corp. has sold off its Incredible Universe building in Wilsonville and leased back the facility from the new owner.

Tandy sold the 166,495-square-foot retail property to Pier Set Inc., a Delaware corporation, for $13.5 million, according to a Clackamas County sale deed.

Pier Set is a subsidiary of London-based NatWest bank, said Bill Bousquette, chief financial officer of Fort Worth, Texas-based Tandy.

Tandy also sold three other Incredible Universe buildings to the bank. The four properties sold for about $60 million, Bousquette said.

Selling off store facilities to outside investors is common among large retailers. "We have no interest in tying up our capital in real estate," Bousquette said.

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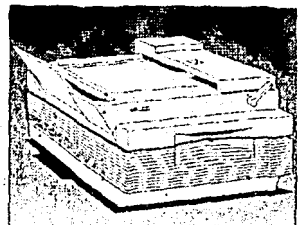

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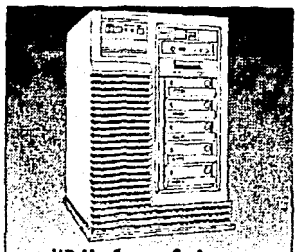

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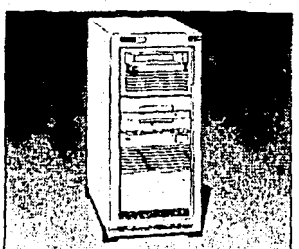

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City of Wilsonville
Community Development Department
30000 S.W. Town Center Loop East
Wilsonville, Oregon 97070
(503) 682-4960
Fax 682-7025

FAX COVER SHEET

DATE: 11-29-93

TO: Mark Whitlow FAX: 721-3666

FROM: Mike Kohlhoff / Wayne Lorenson

SUBJECT: Project - Thunder

NUMBER OF PAGES IN THIS TRANSMITTAL (INCLUDING COVER SHEET) 20

COMMENTS:

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

September 29, 1993

Mr. Bryan L. Spain, CSM
Assistant Director State/Local Taxation
Tandy Tax Service
Tandy Corporation
P.O. Box 1643
Fort Worth TX 76101

91PC43

Re: Systems Development Credit - Wilsonville Incredible Universe

Dear Mr. Spain:

The purpose of this letter is to formally close action on an appeal of the discretionary decision concerning the amount of the street systems development charge for the Incredible Universe. Prior to his departure from Tandy Tax Service, Mr. Bryan L. Spain, CSM, had formally appealed the discretionary decision.

On December 7, 1992, I provided an interim response in which we provided a comparison of a number of different calculations of the street systems development charge and in all cases they came very close to the amount that was charged based on the number of employees. Subsequently, on March 2, 1992, I extended the time for submission of any additional data concerning the street systems development charge to April 15, 1993.

Later telephone conversations indicated that you were not going to submit any additional data. Based on the information that has been received, your appeal of the discretionary decision has not been favorably considered. I would like to inform you that we will be using most of the systems development charge for streets that you paid to install an asphalt overlay on Town Center Loop West to increase the structural strength of the road. This should significantly delay deterioration of the street.

I apologize for the delay in providing a formal response; however, other higher priority projects have interfered with a more timely response. Your understanding is appreciated.

Sincerely,

Eldon R. Johansen
Community Development Director

pc: Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Tom Jowaiszas, Finance Director
Wayne Sorensen, Planning Director
Mike Stone, City Engineer
Martin Brown, Building Official

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

Info —
Pam
Blaise
Sally
file
91PC43

December 4, 1992

Mr. Wayne Kittelson
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland OR 97205

Re: Incredible Universe Traffic Issues

Dear Mr. Kittelson:

You provided me with a copy of your letter dated October 27, 1992, to Mr. Wayne Sorensen, Planning Director, concerning the above subject. I appreciate receiving a copy of your letter since it provides an excellent background from the consultant and the developer's perspective.

Your letter addresses several transportation topics which are of current interest to staff and council. Your letter included a copy to Councilor Carter and copies have also been provided to the Mayor and other Councilors to ensure that they all have the same background concerning this topic.

Your letter indicated that you are troubled by several comments in the October 22 issue of the Oregonian, entitled "Traffic Count Zooms at Electronic Store". I also am troubled by several of the statements in your letter of October 27, 1992, and would like to explain my concerns with your letter. Prior to explaining my concerns, I will review the overall traffic information that was provided to the Planning Commission prior to its decision. The Transportation Impact Analysis for the Wilsonville Town Center, dated April, 1990, was submitted to the Planning Commission as background for approval of the Master Plans for Phase I, Phase II and Phase III of the Wilsonville Town Center. Subsequently, the letter dated October 16, 1991, subject Traffic Analysis for Wilsonville Town Center - Phase II was submitted to the Planning Commission prior to approval of the plan for Project Thunder, which subsequently was changed in name to the Incredible Universe. When Project Thunder was approved, the Traffic Impact Analysis Report for the Wilsonville Town Center, dated April, 1990, was not provided to the Planning Commission at the time of the hearing.

Specific sections of your letter which are troublesome to me as well as comments on these sections are as follows:

"Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersection of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted, (April 1990), our engineers pointed out to city staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak-hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> 'As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersection, are anticipated to operate at an acceptable level of service [under projected 1995 peak-hour conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition.'"

The April 1990 Traffic Impact Analysis for Wilsonville Town Center has several tables which give the existing and predicted level of services for the southbound and northbound I-5/Wilsonville Road interchanges. Table 5 on Page 16 gives an existing level of service for both intersections of "B". Table 8 indicates level of service "C" for both intersections for the 1991 total traffic level of service results. These levels of service do not support your statement that the intersections were already operating near peak capacity.

The Project Thunder update, which was included in your October 16, 1991 letter concerning traffic analysis for Wilsonville Town Center Phase II, could be read as you state, "that this update included the I-5 northbound and southbound intersections with Wilsonville Road". If I read it that way, then I concur that the significant findings and recommendations of the October 16, 1991 report state: "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period." This would be contrary to your dire predictions of intersection failure.

On the other hand, I have looked at the October 16, 1991 letter and have found no specific updates for the traffic analysis for Wilsonville Town Center Phase II concerning the I-5 intersections with Wilsonville Road. It was this lack of any data concerning the I-5 northbound and southbound intersections with Wilsonville Road that led me to conclude that the traffic impact analysis for the Incredible Universe did not include information on the I-5 intersections with Wilsonville Road. If I had read the October 16, 1991 report to accept at face value the statement that "the key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period", then I would have concluded that you covered the interchange; however, I would have also felt that your coverage was inaccurate.

"Initial planning for the Incredible Universe Store began in late 1991 and was completed in 1992. It is important to note that throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our

engineers knew only that it was to be a retail development. By their own choice, city staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of city staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that city staff made this decision; for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion."

The April 1990 Traffic Impact Analysis includes three pages to describe the site-generated traffic volume and also a special study by Kittelson & Associates, Inc. to better define the probable breakdown of site-generated vehicle trips among the category of drop-in trips, diverted trips and new trips. There is nothing in the April 1990 report or the October 16, 1991 update to forewarn staff, the Planning Commission or Council that there could be unusual special event nature retail activities which could have a different impact on traffic volumes than is predicted by the transportation impact analysis and the October 16, 1991 update for Wilsonville Town Center Phase II. This lack of information concerning a potential problem area leaves the city staff responsible for prediction of traffic problems which should be left to traffic experts. I also would think that a plan for a commercial building with 160,000 square feet of floor space in a city with less than 10,000 residents would at least cause a question in the mind of the traffic engineer concerning drop-ins of 40%.

"Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the city's transportation system in order to mitigate the traffic impacts we identified. Further, the Incredible Universe store contributed $250,000 in system development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments; it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs."

The newspaper article states in reference to the I-5 and Wilsonville Road interchange "It was that intersection that clogged up at the Incredible Universe opening, September 17, 1992, and caused traffic to back up for miles in both directions." The expenditures by Capital Realty did nothing to improve the intersection of Wilsonville Road and Parkway, and the improvements proved inadequate to handle the traffic at the intersection of Wilsonville Road and Town Center Loop West. The city had county sheriff's deputies available and Tandy Corporation had private security guards. These individuals directed traffic at the Town Center Loop West and Wilsonville Road intersection as well as at the intersection of Wilsonville Road and Parkway during much of the Grand Opening weekend so that traffic was able to get through these intersections. By no stretch of anyone's imagination could the expenditures and improvements by Capital Realty be

considered to be adequate to allow the traffic to freely flow through these intersections at level of service D or better.

"Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering."

Upon reflection, this comment contains a good suggestion in that the city should require a traffic control plan to minimize vehicle disruption and delay during the initial opening of a new store of significant size. We will incorporate this in to our plans review efforts and into our recommended conditions of development for future stores with a major traffic impact.

"In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to city staff since early 1990 at least."

Your October 16, 1991 letter deleted the concerns for the I-5/Wilsonville Road interchange in the third subparagraph under the significant findings and recommendations which reads as follows:

> "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period."

Based on my reading of a level of service "C" for 1991, and this particular paragraph, I had assumed that we, initially, on the opening of the Incredible Universe would not have any major problems with the I-5 and Wilsonville Road interchange and would not anticipate problems until later. In summary on this particular item, it appears that your April 1990 report did indicate that by 1995 there would be problems; however, the October 16, 1991 report alleviated the concern for these problems.

"Since that time and through all subsequent development reviews, city staff, planning official, and policy makers have had three options available to them:

a) **Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;**

b) **Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or**

c) **Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.**

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision."

It may well be a viable option to consider your suggestion of placing a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5; however, staff feels that it would be premature to present this option to Council at this time. In addition with the October 16, 1991 letter from your organization, subject: Traffic Analysis for Wilsonville Town Center Phase II, including the following significant finding and recommendation:

"Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.".

The record does not reflect a conscious adoption of option c). It reflects that intersections will operate within an acceptable level of service limits.

"We value our reputation for honest, objective, and technically valid analysis very highly, and so it is important to us that this matter be resolved to everyone's satisfaction."

In the comments which staff made at the council meeting, and also in subsequent responses to questions from newspaper reporters, we were careful not to be judgmental concerning particular consulting firms and kept from placing blame on any of the consultants which were involved. I have reread the article which you quoted and still feel that we adhered to the above and avoided incorrectly placing blame.

"If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter."

Your letter very eloquently describes your position with regard to the impact of the Incredible Universe on traffic. I have come to a somewhat different conclusion from reading the applicable reports. Although I would be very happy to meet with you to discuss this issue, it appears that this may be one subject in which we probably will continue to have different opinions which may never be fully resolved. If you do desire

Mr. Wayne Kittels
Re: Incredible Universe Traffic Issues
December 4, 1992 - Page 6

to meet with myself or other members of the Community Development staff on this subject, please contact the undersigned.

Sincerely,

Eldon R. Johansen
Community Development Director

erj:mld

pc: Kim Beach, Capital Realty
Mayor & City Council
Transportation Advisory Commission
Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Mike Stone, City Engineer
Wayne Sorensen, Planning Director
Steve Starner, Public Works Director

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

STAFF
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Blaise
Sally
Project file
11/PC 4/3

OCT 29

October 27, 1992

Project No.: P10.00

Mr. Wayne Sorensen
Planning Director
City of Wilsonville
P.O. Box 220
Wilsonville, Oregon 97070

SUBJECT: Incredible Universe Traffic Issues

Dear Wayne,

I read with some concern an article in the October 22 issue of *The Oregonian* titled, "Traffic Count Zooms at Electronic Store". I am enclosing a copy of the article for your information in case you missed it.

I was troubled by several comments in the article which seemed to suggest that, in the eyes of some high-level City officials, our traffic analysis had misled City officials:

> "The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts", said Arlene Loble, city manager.
>
> The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5...If the study were being done today, the city would insist that engineers look at one more intersection down the road, [Eldon Johansen] said.
>
> [Eldon Johansen] said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built. Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic...Finally, the traffic study did not account for the success of the store's marketing effort.

I would like to take this opportunity to clarify the analytic process we followed and the directions we received. Hopefully, this clarification will allow you, Ms. Loble, Mr. Johansen, and other City staff to more confidently and accurately respond should this issue arise again.

The transportation impact analysis that we performed for Capital Realty was begun in 1990 and completed in 1991. The site development plans called for construction of a shopping center containing 450,000 gross square feet of floor area. Given this information, the trip generation rates that we used were entirely appropriate, as was the estimate that 40 percent of the site-generated trips would be drop-in traffic. This is evidenced by the fact that the first phase of the shopping center development, which has already been completed, operates very close to the estimates that we provided.

Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersections of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted (April 1990), our engineers pointed out to City staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> "As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersections, are anticipated to operate at an acceptable level of service [under projected 1995 peak our conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition."

The current best estimate, by the way, is that these improvements will not be completed before 1996. Further, it should be noted that, even at this early date, City staff did not rely solely upon the findings of Kittelson & Associates, who were retained by the applicant. Instead, the City retained its own independent traffic engineering consultant to review the traffic impact analysis report and to critique the analysis assumptions, methodology, and findings. This independent traffic engineering consultant performed the requested review and confirmed every essential element of the report, including the projected capacity deficiency at the I-5/Wilsonville interchange area.

In personal discussions, City staff were informed of this finding of a future capacity deficiency, and were asked to interpret the City's requirement that a level of service equal to or better than "D" be provided at all intersections. City staff informed our engineers that, because the I-5/Wilsonville Road intersections are actually controlled by ODOT and, further, because ODOT has already established plans to improve the interchange and increase the capacity of these intersections, the finding of a capacity deficiency at the interchange would not be considered a fatal flaw. This conclusion by City staff is confirmed by the fact that the project was ultimately recommended for approval, even with the report's recognition of capacity deficiencies on Wilsonville Road near I-5 as noted above. It should also be pointed out that City staff's position was not unique to this project, but has also been recently applied to projects in the vicinity of the Stafford Road interchange.

On this basis, the transportation impact analysis was completed, all other on-site and off-site traffic-related deficiencies were identified, considerable mitigation projects were undertaken, and the necessary approvals were obtained.

Initial planning for the Incredible Universe store began in late 1991, and was completed in 1992. It is important to note that, throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our engineers knew only that it was to be a retail development. By their own choice, City staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of City staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that City staff made this decision: for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion.

Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the City's transportation system in order to mitigate the traffic impacts we

identified. Further, the Incredible Universe store contributed $250,000 in System Development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments: it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs.

Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering.

In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to City staff since early 1990 at least. Since that time and through all subsequent development reviews, City staff, planning officials, and policy makers have had three options available to them:

a) Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;

b) Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision. These

effects were temporary in that they will most likely die away after the Christmas season and as the store's novelty begins to fade. Additionally, these effects were exaggerated by the special event nature of the Grand Opening, which did not give patrons a chance to adjust their arrival time or choice of route. Therefore, it is unlikely that the City will again experience extended periods of mile-plus queues caused by the failure of the I-5/Wilsonville Road interchange. Even so, City staff and policy makers should recognize that less visible daily failures of the interchange are already programmed to occur: several already-approved residential and commercial projects have not yet been completed, and the combined future traffic effects of these projects virtually assure periods of peak-hour failure of the interchange during most typical weekdays. Thus, the City no longer has control over *whether* peak hour congestion and failures will occur at the interchange (they will), although future land use decisions can still affect the *duration* of these failures.

We have no quarrel with the prudence of the City's conscious decision to adopt option c) above. We are, however, disappointed that the City would suggest to the public, through articles such as the one published on October 22, that the congestion was not anticipated and that the fault for this lies with the traffic impact analysis process.

If you have any questions, please call me. We value our reputation for honest, objective, and technically valid analyses very highly, and so it is important to us that this matter be resolved to everyone's satisfaction. If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter.

Sincerely,

Wayne K. Kittelson

Wayne K. Kittelson, P.E.
Principal

cc: Arlene Loble
Eldon Johansen
Greg Carter
Kim Beach

CITY OF WILSONVILLE
P.O. Box 220
30000 S.W. Town Center Loop East
WILSONVILLE, OREGON 97070

(503) 682-1011

LETTER OF TRANSMITTAL

EXHIBIT C
Resolution No. 2293

Item 16.

TO _____

DATE	JOB NO.
10/1/92	
ATTENTION: Arlene Loble	
RE: Frog Pond Universe	
Copy of Letter or Decision, and attachments	
One copy of Transportation Impact Analysis prepared by Kittelson & Assoc	

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Wayne Sherrod

2293

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

May 28, 1992

Mr. Rich Hollander
Vice President
Tandy Name Brands
P.O. Box 1643
Fort Worth, TX 76101

Ms. Kim Beach
Capital Realty
101 S.W. Main St. Ste. 905
Portland, OR 97204

Re: Tandy Name Brands dba Project Thunder

Dear Mr. Hollander & Ms. Beach:

The purpose of this letter is to summarize the current status of ongoing actions which must be completed prior to opening the facilities which were previously known as Project Thunder and currently known as the Incredible Universe. An additional purpose is to solicit your continuing assistance in resolving the remaining points of difference so that when the construction is completed, there will be no outstanding actions which would preclude issuance of the Certificate of Occupancy.

Primary items of concern are as follows:

Street Systems Development Charge

On March 2, 1992, Council adopted Resolution No. 902 authorizing deferral of the Systems Development Charges for streets from time of issuance of building permit to time of issuance of occupancy permit for Tandy Name Brand Retail Group. Resolution No. 902 contained an estimate for the Street Systems Development Charges in the amount of approximately $370,880.00. This was based on a total of 160 employees at the site. On March 6, 1992, Mr. Brian L. Spain, Assistant Tax Manager, for Tandy Tax Service, forwarded a check in the amount of $124,592.15 for the Street Systems Development charge. I am concerned that use of peak hour employees is irrelevant to peak hour traffic generation and will correspond directly with Mr. Spain to resolve differences.

Traffic Signal - Town Center Loop West and Wilsonville Road

One of the conditions that was placed on this development was that the signal at the intersection of Wilsonville Road and Town Center Loop West must be installed prior to the occupancy of the Project Thunder site. Plans have recently been received at the Community Development Department for a second review.

Kim Beach, Capital Realty, is pushing to insure that the signal is in place prior to occupancy of the Project Thunder site.

Detention Facility

The Project Thunder site was conditioned to be designed for the 25 year storm. Detailed calculations indicate detention could be deferred until development of the property just north of the Project Thunder site. The condition would appear not to allow staff to administratively transfer the detention requirement to another property. Staff is again working with Capitol Realty to insure that this is resolved.

Construction as Included in the Public Works Permit

The City requires that the Punch List for Public Works items be completed prior to issuance of a Temporary Occupancy Permit.

Maintenance Bond

The City will require a 10% Maintenance Bond for twelve months following acceptance of the work included in the Public Works Permit.

Repair of Town Center Loop West Road

The City has contacted S.D. Deacon, General Contractor, concerning the street repairs to Town Center Loop West Road. Mr. Art L. Bush, Project Manager, has informed the City that S.D. Deacon Corporation will not be held responsible for any road repairs or replacement to existing condition of either north or southbound lanes of Town Center Loop West Road at the conclusion of this project. The contractor has removed the curb along the east side of Town Center Loop West and the asphalt has substantially failed wherever the curb has been removed. The City has no intention of accepting the project until such time as damages caused by the contractor are repaired.

Modification of Median - Town Center Loop West

We have received construction plans for modification of the median. We will be submitting those plans to Council for approval. It appears that this work is necessary prior to having adequate access to parking.

Abandonment of Right-of-Way

The City has received documentation requesting abandonment of right-of-way that was part of the former Parkway Avenue. This is being processed to insure abandonment by August 1, 1992.

As you no doubt realize, I did not begin work in Wilsonville until April 6, 1992, after this project was well under way. My concern is that if we do not keep our attentions focused on resolving all outstanding issues, we will reach a point where the building will have been completed and you will have hired employees to open the facility and will be unable to issue a Certificate of Occupancy because of failure to resolve the above items. Your continued assistance and cooperation will be appreciated.

Sincerely,

Eldon R. Johansen

Eldon R. Johansen
Community Development Director

ej/js

pc: Arlene Loble, City Manager
Michael Kohlhoff, City Attorney
Steve Starner, Public Works Director
Martin Brown, Building Official
Wayne Sorensen, Planning Director

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

Creative Solutions ... Superior Service

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• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment

Copied To:
KIM BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Margo 5/7
Orig to Angel Thunder file
Copy to Wayne myself
Eldon

Comments

ELDON,
JIM LENGKEEK HAS PREPARED ADD'TL STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

Signed Rick Martin

W&H PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

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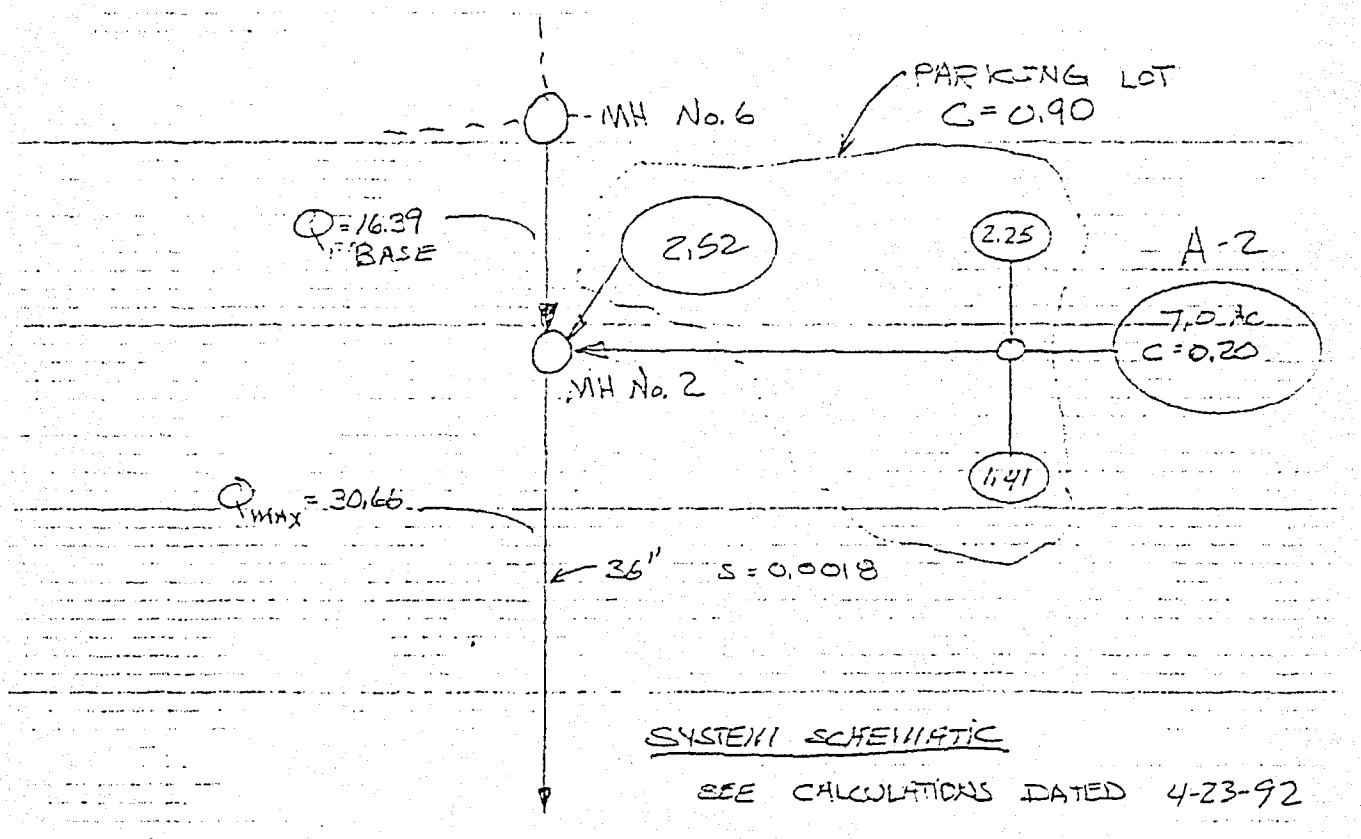
DETENTION REQUIREMENTS FOR A-2 IN HN UNDEVELOPED CONDITION.



SYSTEM SCHEMATIC

SEE CALCULATIONS DATED 4-23-92

ASSUME WORST CASE SCENARIO

1.) FLOW FROM MH. No 6 TO MH No 2 is MAXIMUM DUE TO UPSTREAM STORAGE, Q_{BASE} = 16.39 CFS

2.) ASSUME GRASSED AREA FOR A-2 with C = 0.20

3.) ASSUME 650 FEET OVERLAND TRAVEL FROM A-2

1ST 200 FEET = 20 MINUTES
REMAINDER 250' = 4 MINUTES. (SLOPE = 1%)
(IN CHANNEL)

t_c = 24 MINUTES

Project: DETENTION MANAGER Date: 5-5-92 Sheet No. 1 of 2

Prepared by: [illegible] Checked by: [illegible] Job No. [illegible]

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W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

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- 3 Number Of Pages Including Cover
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These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment
- ☐

Copied To:
KARL BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Comments

ELDON,

THIS LETTER HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

PARKING DETENTION IS POSSIBLE IN PIT III OR EITHER PROPERTY NORTH OF TANDY.

Signed Rick Martin

PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

i_{25} @ 24 MINUTES = 1.6 in/hour.

$Q_{PEAK} = i \Sigma CA_i = (0.2)(7.0\ AC)(1.6) = 2.24$

$(0.9)(6.18)(1.6) = 11.33$

13.57 CFS.

$Q_{ALLOWABLE\ IN\ PIPE} = Q_{MAX} - Q_{BASE} = 30.66 - 16.39$

$Q_{ALLOWABLE} = 14.27$ CFS.

SINCE Q_{PEAK} (13.57) < $Q_{allowable}$

NO DETENTION IS REQUIRED

NOTE! THIS CALCULATION IS FOR UNDEVELOPED CONDITIONS ONLY.

Project: PROJECT THUNDER Date: 5-5-92

Prepared by: [illegible] Checked by:

Sheet No. 7 of 2

Job No. 92-0 [illegible]-11

2300

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: William L. Parks
Division of State Lands
1600 State Street
Salem, OR 97310

Date: 12-16-91
Project Number: 4-755-0202
Project Name: Project Thunder
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
[X] Attached	[ ] For Your Info/File	
[ ] Facsimile	[ ] As Requested	
Number Of Pages Including Cover	[X] For Review And Comment	
[ ]		

Copies	Description
1	Vicinity Map 8½x11
1	Site Map 11x17

X No Jurisdiction 10 YR 5/4
A/O Hydrology - Area Defined by Plenary

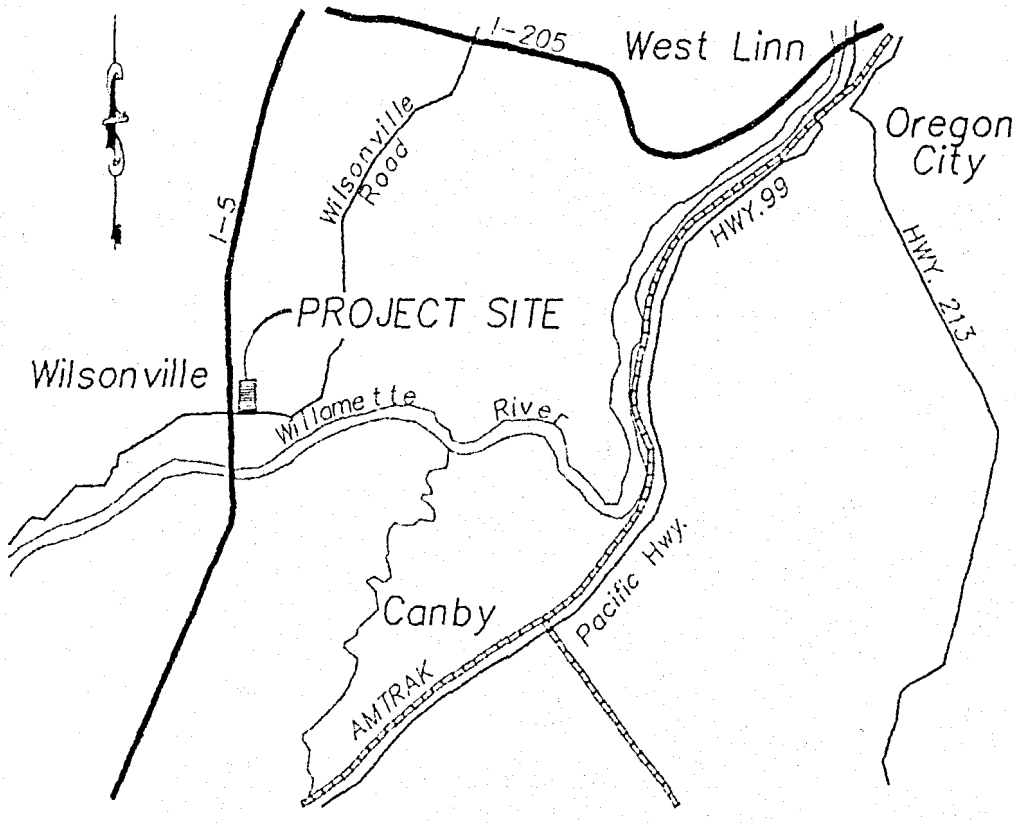
Comments

Bill,

Please make a determination whether or not the existing detention pond is a "wetland" as defined by DSL.

I prefer a response as soon as possible, but no later than January 3, 1992. If this presents a problem, please call me at your earliest.

Signed Thanks, Rick Martin



VICINITY MAP

NTS

- EXIT I-5 NORTH @ WILSONVILLE RD
- TURN LEFT @ TOWN CENTER LOOP RD WEST (PORTLANDIA PIZZA ON CORNER)
- SITE IS ± 1/4 MILE NORTH OR RIGHT.

CAPITAL REALTY CORPORATION

December 30, 1991

Mr. Mike Kohlhoff
City Attorney
City of Wilsonville
30000 S.W. Town Ctr. Loop E.
Wilsonville, OR 97070

Please submit the following language for approval by the City Council at the January 6, 1992 regularly scheduled meeting, to clarify Condition #10 of Resolution 91PC43:

The 5.1 acre public park dedication will be required the earlier of the issuance of a builiding permit for Phase III or May 31, 1994. The City and the applicant will work toward resolving the related access issues prior to the land dedication. The applicant will be involved in the Town Center park development planning in an advisory capacity but will not be required to make any financial outlay for the park planning process or its actual development.

For your information I have also enclosed a master site plan, color coded by original ownership. If you have any questions or require additional information please contact me. Thank you in advance for your prompt attention to this matter as we need to resolve this issue by January 7, 1992 to proceed with our contract with Thunder.

Very truly yours,

Kim Beach

Kimberly J. Beach
Vice President

cc. Ms. Arlene Loble (with enclosure)
Mr. Wayne Sorenson (with enclosure)

DIVISION OF STATE LANDS
Environmental Planning and Permits
775 Summer Street, NE
Salem, OR 97310
503/378-3805

RECEIVED
DEC 30 1991
CITY OF WILSONVILLE ANNEX

WETLAND DETERMINATION REPORT

At the request of the landowner or agent, Division staff have conducted an offsite or onsite wetland determination on the property described below.

COUNTY Clac CITY
LOCATION Exit I-5 @ Wilsonville TR. left @ Centaloop R West ¼ mile
T 3S R 1W S 23 TAX LOT(S)
OWNER/AGENT: Rick Martin W&H Pacific
ADDRESS: 1099 S.W. Columbia St. Portland, OR
DATE OF ONSITE INVESTIGATION: 12-19-91

☒ There are no jurisdictional wetlands or waterways on the property. Therefore, no removal-fill permit is required.
Notes: No Hydrology present - soil 10YR 3/4

☐ There are wetlands and/or waterways on the property. Those areas are subject to the State Removal-Fill Law. A permit is required for 50 cubic yards or more of fill, removal, or alteration of substrate.
Notes:

☐ A wetland delineation will be needed to locate and stake the wetland/non-wetland boundary. A list of consultants can be obtained from the Division.
Notes:

☐ A removal-fill permit will be required for

☐ No removal-fill permit will be required for _____ because/if

☐ A permit may be required by the Army Corps of Engineers (326-6995)

Comments:

Determination by: William Parks Date: 12-23-91

Response Copy To:
☒ Owner/Applicant ☒ Enclosures: Request, Site Plan Map
☒ City of Wilsonville Planning Department
☐ _____, Corps of Engineers
☒ DSL file copy
☒ Reading file copy – TO LORNA no Tus.

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • ~~PO Box 220~~
Wilsonville, OR 97070
(503) 682-1011

December 30, 1991

Mr. Jim Faulkner
Design Forum Architects
3484 Far Hills Avenue
Dayton, OH 45429

Dear Jim:

I appreciated you, Rich Hollander and Jared Chaney taking the time to meet with Blaise and me regarding Project Thunder. I hope that we will be able to find an acceptable compromise in the design of the Incredible Universe project.

Enclosed is a copy of my notes which generally outline the basic issues we discussed at the December 23rd meeting. I am also enclosing material to provide additional insight into our planning process for the Town Center:

1. A copy of the legal opinion prepared by Michael Kohlhoff, City Attorney, that was furnished to the Wilsonville Design Review Board during the hearings on the Les Schwab Tire Center which will also be located in Town Center;

2. Variance criteria contained in our City Code which must be fully met before the DRB can approve a variance request.

I want to assure you that the City will do everything we can to accommodate your schedule, but I want to be sure you understand the legal limitations to fast tracking the review process.

Once again, it was a pleasure to meet with you. I appreciate your cooperation in finding an acceptable design alternative that will do justice to the Town Center, including the future Town Center Park, and still meet your client's needs. If you have any questions, please feel free to contact either Blaise or me at (503) 682-4960.

Sincerely,

Wayne C. Sorensen

Wayne C. Sorensen
Planning Director

wcs:dp
Enclosure

TO: Honorable Mayor and City Council

FROM: Arlene Loble
City Manager

RE: City Manager's Business

DATE: December 12, 1991

SUBJECT: PROJECT THUNDER DEDICATION OF PARK LAND

Project Thunder, which is Phase II of the Town Center development, was approved by the Planning Commission and now goes before the Design Review Board. I have attached a copy of their proposed design and their request for variances from the sign code. I bring it to your attention because it seems so entirely inconsistent with what has been previously approved in Town Center and the architectural proposal was not before Planning Commission for review. They have not seen the design proposals that dealt solely with the land use issues.

There are a couple conditions of approval that need to be brought to Council's attention. One of the conditions of approval requires the dedication of a 5.4 acre public park. The dedication would be required at the time occupancy permits are issued unless the City Council and the applicant agree to a later date. The value of the property to be dedicated is at least $1,000,000, and the developers would like to be involved in the planning for park development but because of the value of the land are not willing to pay for any of the associated development costs. It is my understanding that at Phase I approval one of the conditions included not only the land dedication but financial responsibility for development of the park. That condition has now been removed because of the cost of the park land.

Leaving aside for the moment the inappropriateness of the design of the project, you can see from the attached exhibit that shows the location of the open space and the proposed building pads. This $1,000,000 park is really located in the backyard of the proposed development. Because of the type of business which is some sort of high tech retail, the rear of the building, which faces the park, doesn't even include any windows - just a large expansive blank wall. To help offset that, a smaller building to be developed at a future Phase III has been placed on the property in such a way that it could front into the city park. The development that has already occurred in Phase I, the shopping center, also faces its least attractive areas into the proposed park site. If the open space actually is worth $1,000,000, it will take at least that, in terms of the City's financial commitment, to improve the park. To put that kind of money into something that is really more of an after thought than a planned part of the development seems to me to be a big mistake. This is a

good example of something coming to Council's attention so late in the planning process that you have not had any meaningful input and yet now the City will be asked to make a substantial financial commitment. If the land is to be dedicated the developers justifiably want to know that the property will be developed in the future. What should be a wonderful design feature is really just an after thought. I don't know what, if anything, can be done at this stage, but I wanted to bring it to your attention as we will need to begin negotiations over the actual dedication of the property. Do you want a park in this location under these circumstances?

Another condition of approval that I would like to bring to your attention deals with the handling of storm drainage. Once again, this looks like we could be creating future problems because we have not had an engineer on staff and the project has probably not received the level of review from an engineering perspective that is necessary. So, the Planning Commission has added a requirement that storm sewer plans need to be coordinated with the City Engineer with a possibility of exploring the feasibility of onsight retention. As proposed by the developer, they would be eliminating the existing detention area and paving it over for additional parking. I don't know how this impact as a wetland but the staff report also brings that issue to your attention. Since the detailed engineering won't be done until or unless the plan is approved, we won't know until we get further into it how the developer's engineer plans to handle storm drainage. It is possible that they will actually need to relocate water and sewer lines that have been installed in Phase I in order to accommodate the proposed storm drainage plans for Phase II. Again, this is an area where we truly need the assistance of a City Engineer.

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

MEMORANDUM

TO: Wayne Sorensen, Planning Director
FROM: Steve Starner, Community Development Director
DATE: December 9, 1991
RE: Project Thunder

In keeping with our usual land use process, the engineers associated with the development team for this project have submitted detailed studies to quantify the impacts of traffic volume and storm sewer capacities. Although their conclusions demonstrate compliance with Wilsovnille's development criteria, I am concerned about some of the practical issues raised in the staff report.

A. Traffic - Wilsonville Road/Parkway Avenue intersection

The Wilsonville Code does not require Project Thunder to demonstrate compliance with level of service "D" at the above-referenced intersection. However, for any motorist currently using the intersection during peak hours, it is obvious vehicle congestion is reducing existing traffic management functions to an unacceptable quality. Especially for motorists attempting to enter Wilsonville Road from Parkway Avenue, the City is exploring the following:

1. Increasing the visability of the "Do Not Block Intersection" signage.

2. Placing a pavement stop bar on Wilsonville Road which corresponds with the intersection signage.

3. Controlling ingress and egress to Parkway Avenue north of Wilsonville Road.

4. Investigate the installation of an intersection traffic signal which would operate in sequence with the interchange traffic controls.

5. Investigate the construction elements involved with a new roadway joining Parkway Avenue and Town Center Loop West.

Ultimately, traffic congestion adjacent to the Wilsonville interchange (from Town Center Loop West to Kinsman Road) will only be relieved when ODOT completes the construction of the expanded interchange design.

B. Storm Sewer - Memorial Part

As I understand it, Project Thunder storm drainage will flow into the I-5 storm sewer system. At peak flows, excess water will be diverted into the Phase I (Thriftway/Payless development) storm sewer which flows past the Library and into Memorial Park. In order to accommodate the anti-cipated flows, the following park storm drainage improvements are underway:

November - December, 1991	Surge basin, stilling basin and water quality swale design
January - February, 1992	Complete design
March	Construction bidding
April	Award construction contract
May	Begin construction
September	Complete construction

The estimated cost of this project is $124,420 and is scheduled to be funded in conjunction with Memorial Park improvements. Approximately 52 per cent of the total project cost may be recovered from a payback when the Teufel and Boozier properties develop.

Also, the City will soon be undertaking a City-wide storm sewer Master Plan study in order to identify and plan for infrastructure needs. Under the current storm sewer SDC program, Project Thunder will generate approximately $16,640 to be applied directly against the cost of the new Storm Sewer Master Plan.

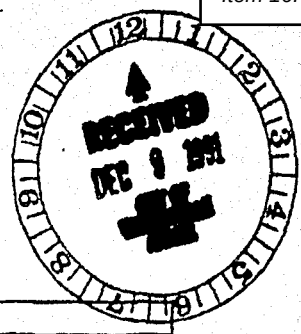
I hope this information is helpful.

ss:jme

PROJECT THUNDER

PEOPLE IN ATTENDANCE

MEETING: PLANNING COMMISSION
DATE: 9 DEC 91



NAME	ADDRESS
Ron Lentz	233 SE Washington St Hillsboro OR 97123
Lloyd L Crabbs	JRS ARCHITECT 1611 SW Taylor Portland 97205
JIM FAULKNER	3484 FAIRHILLS AV DAYTON, OH 45429 DESIGN FORUM ARCHITECTS
Chris Tope	29025 S.W. town center Loop Wilsonville OR
TOM JONES	1099 SW COLUMBIA PDX 97201
RICK MARTIN	1099 SW COLUMBIA PDX 97201
Kim Beach	101 SW Main Suite 1500 Portland OR 97204
DON MALIN	8755 SW CITIZENS DRIVE WILSONVILLE
VADIC VANDEHEY	610 SW Alder Suite 700 PDX 97205
BOB LAMB	13890 SW BULL MT ROAD TIGARD OR 97224

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
City of Wilsonville Annex
30470 SW Parkway
Wilsonville, OR.

Date: Dec. 2, 1991
Project Number: 467-0301
Project Name: Wilsonville Town Center
Regarding: Open Space Alternative Concept Plan

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
X Attached	For Your Info/File	KIM BEACH
Facsimile	X As Requested	LOGAN CRAVEN
Number Of Pages Including Cover	For Review And Comment	

Copies	Description
10	FOLDED FULL SIZE REVISED MASTER PLAN (SHT. #1)
1	PMT (8½"x11") OF ABOVE
1	ORIGINAL (8½"x11"): ALTERNATIVE OPEN SPACE CONCEPT.

Comments

Blaise:

Please enclose the attached materials w/in your staff report.

s - again for all your help !!!

Yours,

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

November 26, 1991

Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 SW Elligsen Road
Wilsonville, Oregon 97070

RE: PROJECT THUNDER
DESIGN REVIEW SUBMITTAL
JOB NO. 4-755-0102

Dear Blaise:

Thank you again for taking time this morning to discuss Project Thunder. As per our discussion, the following items were discussed and agreed upon:

1. Approval of Drawing Scales:

   A. Design Review Submittal at 50 scale.

   B. Construction Document Submittal at 30 scale.

2. Approval to omit irrigation design for Design Review Submittal. Notes will be provided.

3. Design Review Submittal will be 50 scale landscape plan showing tree, plant and lawn layout. Plant lists and details will be provided as per City of Wilsonville's Design Review Criteria.

4. W&H Pacific will have 100% complete construction documents by December 27, 1991. We will submit to the City a set of complete drawings for additional information. These drawings will include complete landscape and irrigation plans and can be included for the January 27, 1992 Design Review meeting.

If you have any questions or comments, please give me a call.

Sincerely,

W&H PACIFIC

Matthew P. Simpson, A.S.L.A.
Project Landscape Architect

MPS/kal

STORAGE
6208
9600
22,892
420
216
39,336

SERVICE
4700
900
1020
640
1952
5016
2048
1008
17,276

RETAIL
47,879
2,240
5,880
7,920
63,914

REST
572
1024
4500
6,096

OFFICE
18156
200
50
5,294
288
912
240
149
128
9,117

EXHIBIT "A"

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

ADMINISTRATION DEPARTMENT
MEMORANDUM

DATE: OCTOBER 9, 1990

TO: DESIGN REVIEW BOARD

THROUGH: WAYNE SORENSEN, PLANNING DIRECTOR

FROM: MICHAEL E. KOHLHOFF, CITY ATTORNEY

SUBJECT: REQUESTED OPINION FOR LES SCHWAB TIRE CENTER

INTRODUCTION

At the City of Wilsonville's Design Review Board meeting of September 24, 1990, applicant, Les Schwab Tire Centers (Les Schwab), filed three legal objections to the planning staff's recommendations for revisions to the Les Schwab site plan applications as conditions of approval: violation of U.S. Constitution and Oregon Constitution free speech rights, lack of authority, and arbitrariness. The Design Review Board has requested my review of these objections, which are discussed below. The application was continued for decision only until the next regularly scheduled meeting in October.

The recommended revisions were to proposed material and color to the exterior of the tire center building. The site plan submitted by Les Schwab called for the building to be constructed of concrete block, with a metal roof and metal mansard. The proposed exterior colors of the building were red and white. The revisions recommend the use of red-colored brick instead of the red painted block on the south, east and west elevations, with the north elevation to be painted white. Also, the metal roof trim and mansard were recommended to be repainted with an earth tone color.

BACKGROUND

The City of Wilsonville was incorporated in 1969. Pursuant to state statute it adopted and had acknowledgment by the state its city-wide Comprehensive Land Use Plan and implementing Zoning Ordinance in 1982. As a newly developing city it has placed its emphasis on planning in the form of "planned development" for commercial, industrial and residential uses. In the area of commercial development, the City's Zoning Code provides:

"4.136 (1) (c). Planned Development Commercial shall be planned in the form of centers or complexes as follows:

a. The Town Center
b. Service Centers
c. Office complexes.
d. Commercial recreation.
e. Neighborhood commercial."

The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas.

The purpose of this zone is stated under 4.136 (l) (c) (12) (a).

> "Purpose: (i) The purpose of this zoning is to permit and encourage a City Center, adhering to planned commercial and planned development concepts, including provision for commercial services, sales of goods and wares, business and professional offices, department stores, shopping centers and other customer-oriented uses to meet the needs of the Wilsonville community as well as to meet the general shopping and service needs of an area-wide basis, together with such multiple family residential facilities, open space, recreational and park areas, and public uses facilities as may be approved as part of the City Center compatible with the Comprehensive Plan of the City."

The location of the Les Schwab property application is in the northwest corner of the Town Center commercial area adjacent to Interstate 5. The Town Center is planned as the City's focal center. The property's location is a major viewing point of the City's focal center and identity. Development has occurred in the area with appropriate uses, high quality materials and design, which has provided the city center with uniform and harmonious developments with an aesthetically pleasing visual environment. This development has been and is overseen by the City's Planning Commission and its Design Review Board, pursuant to the city's zoning code.

The Les Schwab application has duly gone through the Planning Commission Planned Development Approval process and is located appropriately in the service commercial area of Town Center Master Plan. Its use approval adheres to the planned commercial/planned development concepts for Town Center. It comes before the Design Review Board for site development approval.

LEGAL REVIEW

"Comprehensive planning is clearly recognized as a proper exercise of municipal police power, often seen as a safeguarding of property values on a broad public basis. The conservation of property values is a very common consideration in comprehensive zoning, ordinarily required by state zoning acts, incorporated in ordinances and sustained by the courts (footnote omitted). Likewise, regulations as to the height and mode of construction

of buildings have been sustained on the ground of the 'safety, comfort and convenience of the people and for the benefit of property owners generally'" (footnote omitted). McQuillan Mun. Corp., § 24.14 (3rd. Ed.)

As also stated in McQuillan Mun. Corp., § 24.10:

"It is well said that the police power is based chiefly on the Latin maxums, salus populi suprema est lex - the welfare of the people is the first law (footnote omitted) and sic utere tuo ut alienum non laedas - so use your property as not to injure the rights of another (footnote omitted). As stated by the United States Supreme Court, the police power 'has its foundation in the maxim of all well-ordered society which requires everyone to use his own property so as not to injure the equal enjoyment of others having equal rights of property'". (*Slaughter House Cases, 16 Wall 36, 21 L. Ed. 394).

However, the power of municipal government in this respect is not unlimited. It is limited by federal and state constitutional guarantees.

Applicant raises issues pertaining to federal and state constitutional rights to free speech, arguing that the proposed color revisions invade its rights to advertise as it chooses. Applicant also raises due process issues which prohibit the unreasonable, arbitrary use of such powers claiming the Design Review Board does not have the authority to limit materials and colors (unreasonable) and is without standards and criteria (arbitrary) to do so.

As previously stated, public necessity and protection of the public welfare forms the basis for the exercise of police power; that every person ought to so use his or her property so as to not injure one's neighbors. The unavoidable consequence of the need to exercise the police power in this regard results in the restriction on the use of property. It should also be noted that the police power is of a dynamic nature. McQuillan Mun. Corp., § 24.08 (3rd ed.) states, "Like equity jurisprudence, the police power has a dynamic or progressive capacity to be applied to new subjects or to be exercised by new or revised measures as economic and social changes require."

Wilsonville adopted its zoning code as an exercise of its police power. The presence of its Design Review Board is an example of the progressive capacity which was brought about by the public necessity and modern day quality of life concerns. Wilsonville as part of its general zoning regulations provides in 4.151 General regulations - signs for signage regulation.

The public necessity to regulate signage in terms of time, place and manner so that the signage chosen is not abusive of the rights of others is clearly recognized. See cases cited in McQuillan Mun. Corp., § 24.384 (footnotes 1-10). Within these general regulations, 4.151 (3) applies to commercial use within the Wilsonville Town Center as follows:

> "(a) The Wilsonville Town Center, as designated in the Wilsonville Code, Section 4.136 et seq., is well suited for the institution of a coordinated signing program because of its geographic unity, focal location, and the fact that it is in the early stage of development. The purpose of Section 4.151(3) of this chapter is to provide the Town Center with a program of coordinated signing which is both functional and aesthetic, and to provide a method of administration which will insure continuity and enforcement. In this manner, the framework will be provided for a comprehensive balanced system of street graphics which provide a clear and pleasant communication between people and their environment..."

"In regulating the use of street graphics and building signage, the following design criteria shall be applied in conjunction with the provisions of this Code: That street graphics and building signage be:

1. Appropriate to the type of activity to which they pertain.

2. Expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole.

3. Legible in the circumstances in which they are seen.

4. Functional as they relate to other graphics and signage."

Wilsonville Code 4.001 (70) defines "sign" as "***painting...or other device that is designed, used or intended for advertising purposes, or to inform or to attract the attention of the public, and includes where applicable...display surfaces and all components of the sign***".

Wilsonville Code 4.151 (3) (b) (2) provides the following definition: "Building Graphics. Signs that are not located within the first 15 feet of a property line that abut a public right-of-way. Building graphics are signs that include building-mounted and roof-mounted signs."

Wilsonville Code 4.151 (3) (d) (3) a. provides for Building Graphics Signage: "The total square foot of all signs except the single address sign and the street graphics sign shall not exceed the width of the building occupied by the use advertised. The width of a building is to be measured as the longest dimension of the width or depth of the building."

Wilsonville Code 4.151 (3) (c) (2) a. provides authority of the Design Review Board "...to administer and enforce all the provisions in Section 4.151(3) as they affect the design function and appearance of the sign."

Therefore, assuming that the applicant painted color schemes are as it proposes "an important element of the company's advertising" that "aid instant customer recognition", then the painted color scheme is a sign under Wilsonville Code 4.001 (70) whose display surface is violative of the size limitations for building graphics under 4.151 (3) (d) 3.a.

The specific criteria of size rationally limits a building by virtue of the amount and color it's painted from becoming a massive, garish sign incompatible with its neighbors. This is a reasonable time, place and manner prohibition to prevent an abusive medium, and is context neutral. The thrust of Art. 1, Section 8 of the Oregon Constitution is that free speech is not to be restricted unless it becomes abusive. See Ackerly v. Multnomah County, 72 Or. App. 617, 696 P2d 1140 (1985). The maxums involved in the police power cited above to not injure the property of others are found in the design criteria also cited that building signage not only be appropriate to the type of activity to which they pertain, but also be expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole. There is an obvious need to protect the aesthetic nature and character of other properties and the identity of the Town Center. There is no less need to preserve the property values of peaceful and harmonious use from loud and offensive noise than from loud and massive signage. Each is equally abusive.

As referenced above, comprehensive planning is widely recognized as a legitimate exercise of police power to preserve property values. Because of geographic unity, focal location and its early stage of development there is a rational basis to provide for a

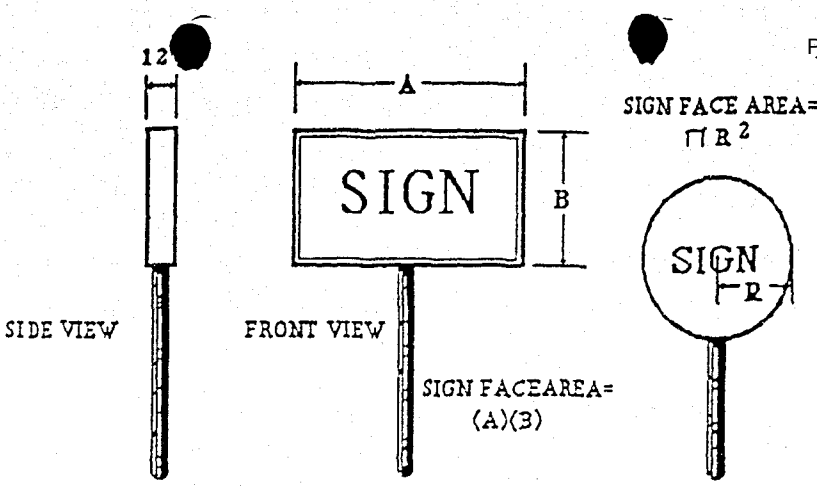
coordinated signage program which is both functional and aesthetic and to provide a method of administration through a Design Review Board for Town Center development. Clearly, this is in keeping with the multiple and often interrelated purposes set forth in 4.440 of the City's Code for Design Review Board. General criteria and standards are set forth to review site development in section 4.421, including color and material and as it relates to advertising medium that they "shall not detract from the design of proposed buildings and structures and the surrounding properties." Aesthetic sensibilities are also recognized as a sole ground and a proper subject for support of zoning regulation. See Oregon City v. Hartke, 240 Or 35, 400 Ord. 255.(1965); Naegele Outdoor Advertising v. City of Waynesville, 833 F.2d 43 (CA4 1987); Don's Porta Signs Inc. v. City of Clearwater, 829 F2d 1051 (CA11 1987).

The dynamic nature of police power is clearly seen in the contemporary, community trends to view aesthetic considerations as valid subjects for the exercise of police power. The very exercise of police power is based upon need. Modern, contemporary society has recognized that advertising in the commercial setting has historically been poorly constructed, grossly disproportionate in size or height, aesthetically disharmonious, located in manners detrimental to traffic safety, and has even obscured the rights of others to be seen, creating a need to establish reasonable time, place and manner restrictions.

On the other hand, such necessity has not risen to the same level of need to regulate the use of homes as signs. The business entrepreneurs who are willing to advertise their commercial product by virtue of using gross advertising structures in commercial areas have not historically turned their private homes into such uses. In short, the need to protect other homeowners from the detrimental effects of having the color schemes of homes turned into speech of a loud and abusive nature has not presented a public need to regulate. (Often, developers have instituted self regulation through homeowners associations in residential subdivisions). Thus, single family dwelling units are exempt from initial Design Review Board development approval. They are not exempt if and when the use involves signage. There are specific regulations which the Design Review Board has authority to govern addressing normal and typical signage within a residential use area, namely residential name plates, 4.151 (l)(a), bulletin boards, 4.151 (l)(b); real estate signs advertising individual lots, 4.151 (l)(c); subdivision signage, 4.151 (l)(d) and home occupation signage, 4.151 (l)(d). Nor is the applicant's comparison of industrial Planned Developments with the commercial developments a justification for not distinguishing the differences in the nature of uses. What may be appropriate to locate and identify industrial users and be harmonious with other surrounding industrial properties may, in fact, not be compatible with commercial uses. That basic recognition between different uses is what allows for zoning districts in the first instance.

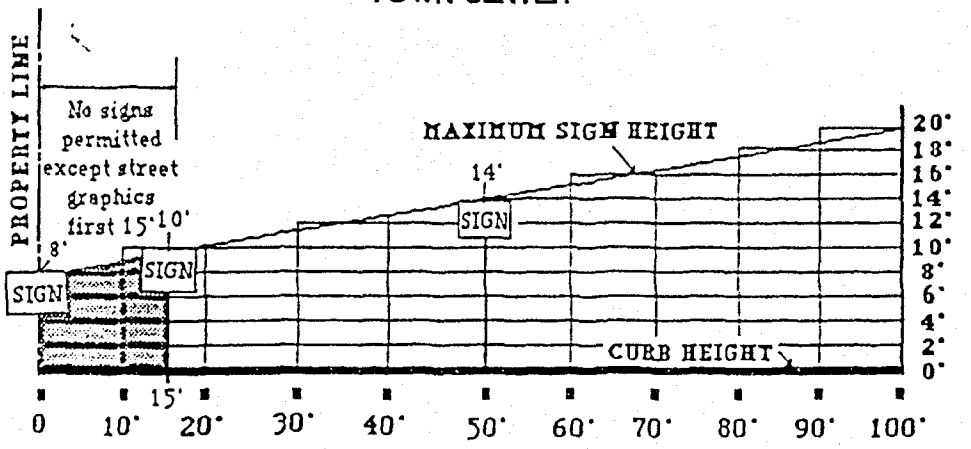
Therefore, I am of the opinion that the recommended revisions submitted by staff are reasonable time, place and manner restrictions, to prevent the use of a building as a grossly, large sign offensive to aesthetic sensibilities, coupled with the use of materials which are not harmonious with existing properties and the focal nature of Town Center to the detriment of the property of others. The regulations provide authority in the Design Review Board to act and neither as set forth or applied, are they arbitrary.

mek:pjm



SIGN FACE MEASUREMENT

TOWN CENTER



The maximum height of a sign is measured from a point 8 feet above the curb at the property line, to a point 20 feet in height or 4 feet above the roof, which ever is less.

MAXIMUM SIGN HEIGHT

EaE1aE1a
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRST
UVWXYZ
123456780&?!$(.,,.)^^><

FIG. 2

CHAPTER 4, ZONING COTT
TOWN CENTER SIGNAGE CODE
EXHIBIT B

City of Wilsonville
COMMUNITY DEVELOPMENT DEPARTMENT
Memorandum

November 7, 1991

TO: Blaise Edmonds, Planning
FROM: Martin Brown, Building Official
SUBJECT: DEVELOPMENT REVIEW TEAM

The following is a list of concerns for the proposed Project Thunder and the proposed Liberty Organization office/warehouse. Actual working drawings may expose additional code concerns.

THUNDER PROJECT

1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

LIBERTY ORGANIZATION OFFICE/WAREHOUSE

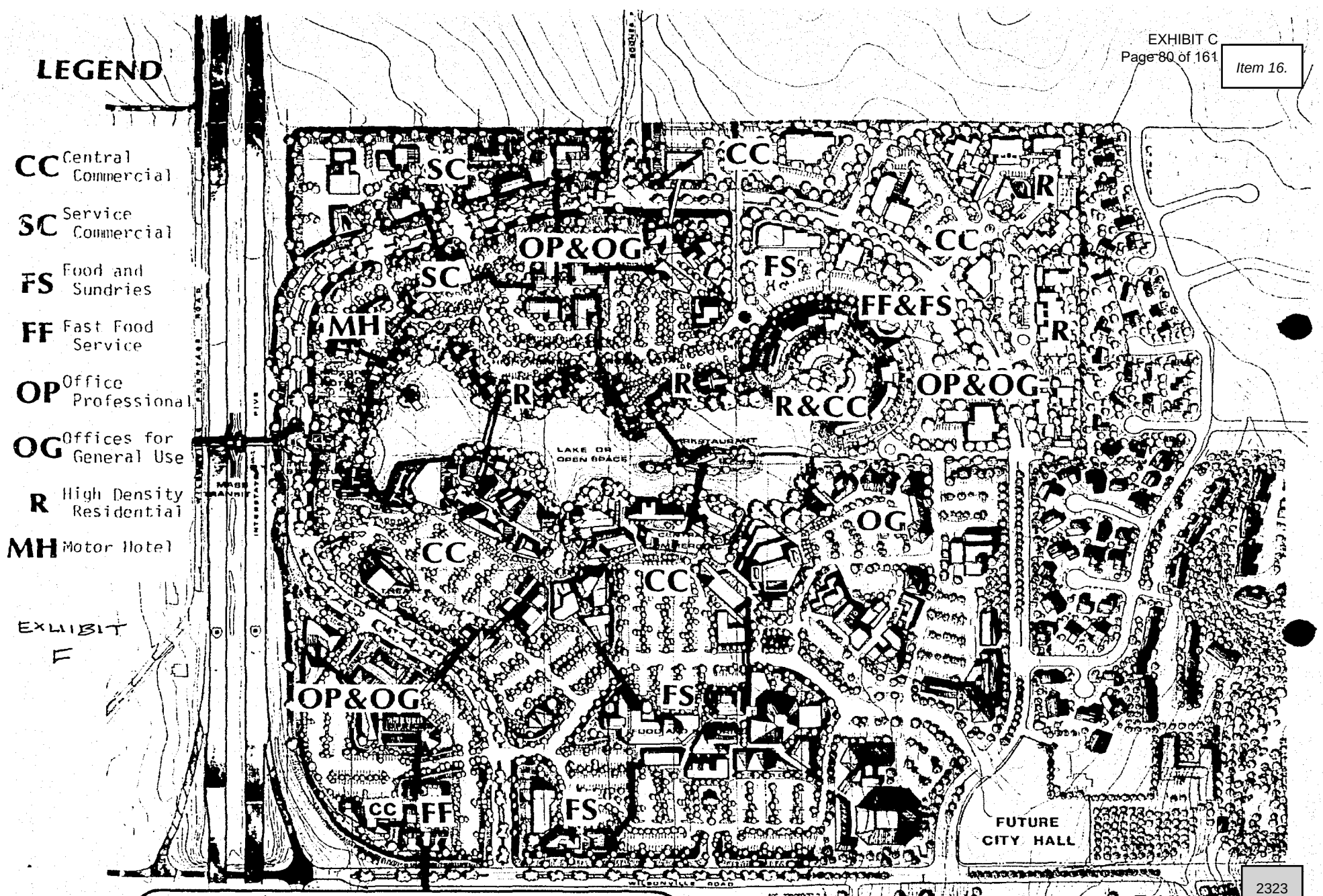
1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

2. Proposed building shall comply with the A.D.A.

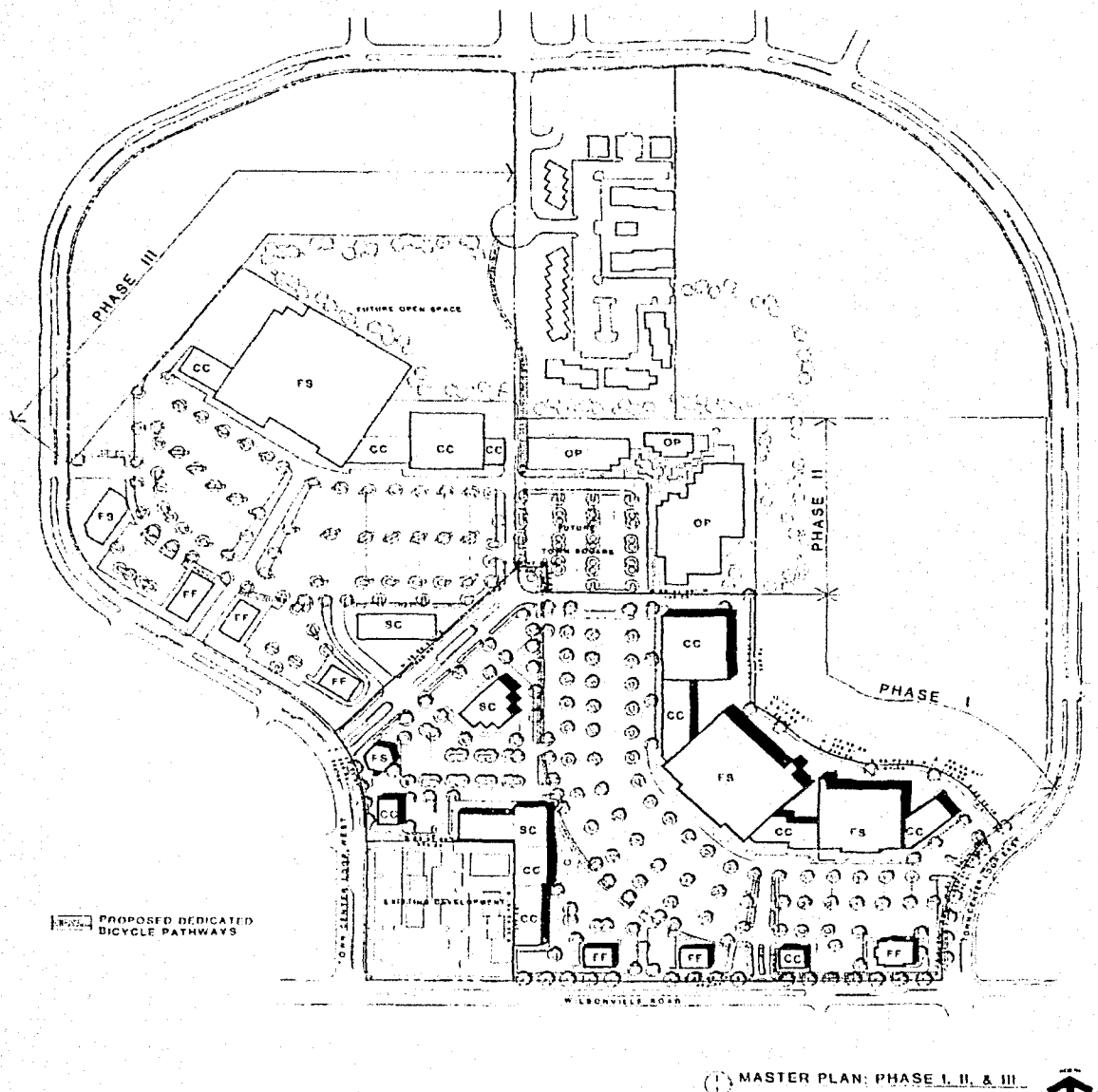
/sf

EXHIBIT E

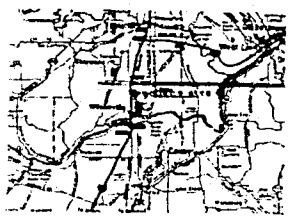
DEFECTS IN ORIGINAL DOCUMENT



Wilsonville City Center Plan



MASTER PLAN: PHASE I, II, & III



VICINITY MAP

ACREAGE

PHASE I	23.17 ACRES
PHASE II	5.41 ACRES
PHASE III	22.02 ACRES
TOTAL	50.60 ACRES

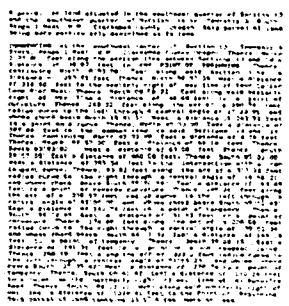


EXHIBIT H

JKS Architects PC

WILSONVILLE MARKETPLACE

1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OREGON 97205 • (503) 228-5230 • FAX (503) 273-8169

October 16, 1991

Ms. Kim Beach
Capital Realty Corporation
101 SW Main, Suite 1500
Portland, OR 97204

RE: Traffic Analysis for Wilsonville Town Center Phase II

Dear Ms. Beach:

The purpose of this letter is to discuss the results of an update to the April 1990 Traffic Impact Analysis we conducted for the Wilsonville Town Center relative to the current phase II development proposal. Some of the specific issues that this letter addresses include:

- the level of development proposed in the current phase II submittal,
- the level of development analyzed in the April 1990 Traffic Impact Analysis,
- an update of current conditions within the vicinity of the site
- an assessment of projected conditions upon completion of the current development proposal
- an assessment of the need for a traffic signal at the Wilsonville Road/Town Center Loop West intersection upon completion of the proposed development

Based on the results of both the previous and updated analysis, the proposed development can occur while still maintaining acceptable levels of traffic operations and safety at site driveways and nearby key intersections. The significant findings and recommendations are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

EXHIBIT G-7 SUPPLEMENTAL EXHIBIT

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Current Phase II Development Plans

The current phase II development plans call for the construction of a retail facility consisting of approximately 159,000 gross square feet of floor area. This development level (and substantially more) has already been accounted for in the previous traffic impact analysis. The traffic impact analysis conducted in April 1990 considered a Phase I development level of approximately 211,000 gross square feet of floor area, and a combined Phase II and III development level of approximately 451,000 gross square feet of retail space and 40,000 gross square feet of commercial office space. Therefore, the original traffic impact analysis, which evaluated conditions through the year 1995 is considered to be more than adequate in terms of its assessment of traffic impacts of the proposed development for the four year horizon. Included with this letter are 10 copies of the April 1990 Traffic Impact Analysis.

Update of Existing Conditions

Within the last week, Kittelson & Associates, Inc. obtained weekday p.m. peak hour turning movement counts at the intersections of Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East. The results of those counts revealed that compared to the counts conducted in conjunction with the April 1990 study, traffic volumes have increased by approximately 70 percent on Wilsonville Road, by approximately 80 percent on Town Center Loop East, and have remained essentially the same on Town Center Loop West. The growth in traffic on Wilsonville Road and Town Center Loop East is due primarily to the substantial amount of residential development that has occurred within the vicinity of the site (particularly to the east of Town Center Loop East) within the past year, as well as to the development associated with Phase I of the Wilsonville Town Center.

The reason traffic volumes have remained basically the same on Town Center Loop West is likely due to the fact that the majority site-generated traffic associated with Phase I of the Wilsonville Town Center, as well as some of the site-generated traffic from the retail/office development located in the southwest corner of Town Center Loop are using the Wilsonville Town Center access drives on Wilsonville Road and Town Center Loop East. Another contributing factor may be that traffic volumes within the Wilsonville area have re-distributed somewhat since 1990. Table 1 displays a comparison of the 1990 and the current 1991 volumes.

TABLE 1
COMPARISON OF PEAK HOUR VOLUMES

Intersection	Approach	1990 Volume (Veh/Hr)	1991 Volume (Veh/Hr)
Wilsonville Rd./ Town Center Loop W.	Westbound	165	410
	Eastbound	530	785
	Southbound	295	270
Wilsonville Rd./ Town Center Loop E.	Westbound	155	300
	Eastbound	280	435
	Southbound	80	145

Based on the results of the recent p.m. peak hour traffic counts, Level of Service analyses were conducted at each of the intersections following the analytical techniques described in the *1985 Highway Capacity Manual*. Table 2 displays the results of that analysis. As indicated in the table, both intersections are currently operating at Level of Service "D" or better, which is considered acceptable by standards.

Projected 1992 Conditions

The current site plan indicates that three access driveways on Town Center Loop West will serve the proposed retail development, consisting of a main access drive, a secondary access drive, and a service drive on the north end of the development which will be limited to right-turns only. This access scheme is consistent with what was assumed in the 1990 Traffic Impact Analysis, with the exception of the north service drive. In the previous analysis, the two primary access drives were projected to operate at Level of Service "D" or better through the year 1995. Given that traffic volumes will be substantially lower in 1992 than the projected 1995 levels, all three driveways serving

TABLE 2
PM PEAK HOUR LOS
EXISTING TRAFFIC VOLUMES

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	113	D
Wilsonville Rd./ Town Center Loop E.	PM	299	C

the development are anticipated to operate at Level of Service "D" or better upon completion development.

Estimates of site-generated traffic for the Phase II development proposal were added to the existing traffic volumes at the intersections of Wilsonville Road/Town Center Loop W. and Wilsonville Road/Town Center Loop E. Based on that assignment, additional analyses were conducted to assess the level of service at these two intersections upon completion of the development. Table 3 displays the results of that analysis. As shown in the table, the intersection of Wilsonville Road/Town Center Loop West is anticipated to experience an "F" Level of Service, which is considered unacceptable by City standards. An examination of signal warrants contained in the *Manual on Uniform Traffic Control Devices* indicates that at least two warrants for a traffic signal will be met under projected 1992 conditions.

Based on these results, and given that background traffic volumes on Wilsonville Road are likely to continue to increase somewhat, it is recommended that a traffic signal be installed at the Wilsonville Road/Town Center Loop West intersection coinciding with the completion of the current Phase II development proposal. Based on this recommendation officials at Capital Realty Corporation have retained Kittelson & Associates, Inc. to begin the preliminary design of a traffic signal at the Wilsonville Road/Town Center Loop West intersection.

TABLE 3
PM PEAK HOUR LOS
PROJECTED 1992 EXISTING + SITE TRAFFIC

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	-29	F
Wilsonville Rd./ Town Center Loop E.	PM	113	D

I trust that this letter adequately addresses City staff's traffic related concerns with respect to this development proposal. If in the meantime you have any questions or comments please do not hesitate to contact me.

Sincerely,

Mark A. Vandehey

Mark A. Vandehey
Associate

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Request for Modification of Condition of Approval No. 90PC15

On behalf of the Owner, Capital Realty Corp., we request a reconsideration of Condition No. 8 of Planning Commission Resolution No. 90PC15 to provide the opportunity for Capital Realty to work with the City to accomplish the following:

1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions,

2. To formulate a development plan and time frame consistent with the development of Phase II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto.

Concurrently submitted to you are Stage I Master Plan Re-submittal and Stage II, Phase II of the Center. We feel that they have a bearing on this condition and warrant review.

Thank you for your consideration, if you have any questions, please call.

Very truly yours,

Richard S. Brooks, AIA
Project Manager

bc

C:\BC\RSB\WTC-1017.PM

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT G-8

2330

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bavinger AIA • Gerald H. Williams AIA • Of Counsel: John F. Jensen AIA, Emeritus
Associates: Richard S. Brooks AIA • Robert C. Hastings AIA • Warren A. Tyler AIA

Stage I Master Plan Re-submittal
Wilsonville Town Center—Wilsonville, Oregon

1. Nature of Application:

This is a re-submittal for Stage I Master Plan approval for a proposed retail development of 59.79 acres, to be located adjacent to, and north of Wilsonville Road spanning from the southeast portion of Town Center Loop East, the inner portion of Town Center Loop West, north to the intersection of the Loop West and Parkway in that area previously designated as The Wilsonville Town Centre.

The Applicant:

Seeks to develop the site as a community shopping center. The center, at full build out would consist of approximately five larger retail commercial anchor stores, infill retail commercial space and pads located independently from the central retail complex for commercial retail development.

The proposed development includes a total building area of approximately 500,000 square feet constructed in three phases.

Phase I

The existing development of Phase I will include retail commercial space of approximately 207,130 square feet oriented primarily to Wilsonville Road. The Phase I Center consists of three anchor tenants, including major grocery and drugstore tenants, with infill commercial retail shop space and several pads at the periphery for retail uses. Parking for Phase I is 1,063 spaces at a ratio in excess of five spaces per 1,000 square feet of gross leasable area. The third anchor and several of the pads are as yet un-built.

The initial development provides two full-turning accesses along Town Center Loop; one at the eastern end of the development near Wilsonville Road, and the other off Town Center Loop West, which is a heavily landscaped entry boulevard, that in later phases will become the central identified main entry to the fully built-out center. Further, a secondary full turn access is proposed at Town Center Loop West and the Northern boundary of the existing retail center; and finally in Phase I, a right-in-right-out access at mid-site on Wilsonville Road, which is temporarily a full access entry until development to the south of Wilsonville Road completes construction of the final road design.

1. Nature of Application: (cont'd)

Phase II:

The proposed Phase II development is one retail user of approximately 159,400 square feet located on 14.75 acres primarily fronting Loop Road West. Phase II is to be built and developed by a separate owner other than Capital Realty Corp. Capital Realty, however, maintains its right of review for compliance with the concept and intent of the Town Center retail development. Approximately 872 parking spaces are provided (see Stage II Submittal attached).

Phase III:

The proposed development of Phase III includes retail commercial space of approximately 143,568 square feet completing the connection to Phases I and II. The Phase III development would consist of one large retail anchor tenant, retail pad tenants, and a two-story professional office building oriented at the end of the main entrance boulevard.

The parking development for Phase III, approximately 980 spaces, brings the total parking count to 2,915 spaces, serving the proposed 510,000 square feet of gross building area.

2. Property Description:

The property is located north of Wilsonville Road, east of Interstate 5, and west of City Hall. The property is located on the following parcels:

Parcel 1: 19.73 acres
Tax Lots 600 and 601, Section 13, Township 3 south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

Parcel 2: 4.37 acres
Tax Lot 500, Section 13, Township 3, south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

2. Description (cont'd)

Parcel 3: 25.96 acres
Tax Lots 200, 300, and 405, Clackamas County Map 3-1W-14D and ownership interests in a triangle of land approximately 6,381 square feet on the west of Tax Lot 200.

Parcel 4: 9.73 acres
Tax Lots 101, 201, and 102 Clackamas County Map 3-1W-14D

3. Plan Designation and Zoning:

The subject site is designated commercial on the comprehensive plan map and zoned Planned Development Commercial on the zoning map. The site, being situated within the Wilsonville Town Center master Plan map, has underlying use designations indicating CC Central Commercial, FS Food and Sundries, OP Office Professional, FF Fast Food Restaurant, R high density residential, and open space.

The intent of our proposal is to accomplish the mix of other desired and designated uses within the boundaries of our development. We feel our plan as submitted is consistent with the comprehensive plan goals and with the Town Center Master Plan.

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: **Stage I Re-submittal Master Plan Approval Wilsonville Town Center**
Stage II, Phase II Submittal

On behalf of Capital Realty Corp., and the owners of properties so designated as comprising the development area, we are re-submitting this application for a Stage I Master Plan Approval for a 59.79 acre commercial center and Stage II approval for the Phase II 14.75 acre site.

As you may be well aware, Phase I of this plan has been completed in part. The economics of the region and the country have impacted the nature of the project as originally planned. This re-submittal represents those pressures, and at the same time expands the size of the project while maintaining the original intent of mixed uses as outlined in the Wilsonville City Center Plan.

Capital Realty has the opportunity to bring to the Town Center project a major, innovative retail anchor which will comprise all of Phase II. This parcel will be sold to a separate user for which application for Stage II, Phase II is attached. Their progress and subsequent design submittals will be reviewed and monitored by Capital Realty.

The addition of this anchor, at this time will serve as a catalyst for the completion of Phase I buildings as well as increase the desirability of Phase III tenants. This, in effect, will improve the success of the entire City Center Plan to the benefit of Wilsonville as a whole.

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT 6-90

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bassinger AIA • Gerard H. Williams AIA • Of Counsel: John F. Jensen • Associates: Richard S. Beyer AIA • Warren A. Tyler AIA

We are always available to answer questions to aid you in your analysis of this re-submission and its compliance with the current conditions of approval. This project represents a long-term commitment on the part of Capital Realty in the development of a strong, successful center for Wilsonville which will serve the needs of all its citizens. Thank you for your's and the City Staff's time, energy and cooperation towards the realization of this project.

Sincerely,

Richard S. Brooks, AIA
Project Manager

bc

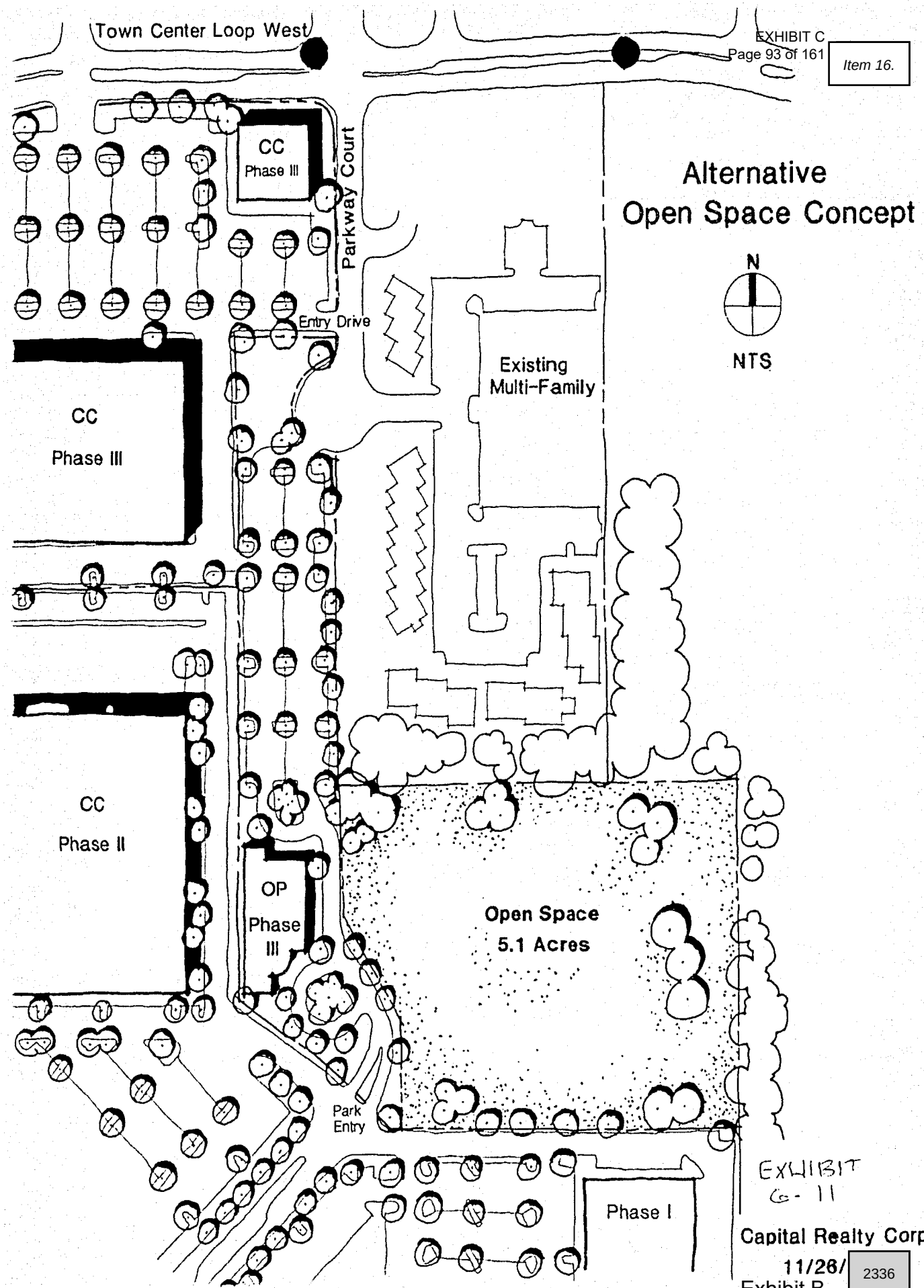


EXHIBIT
G-11

Capital Realty Corp.

11/26/ 2336

AS REVISED
11/7/92

DesignForum
ARCHITECTS

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 1R
REVISED GENERAL COMMENTARY:

Project Thunder is a single story building with mezzanine, 166,495 GSF retail sales building, with accessary storage areas. Project Thunder is a new concept in merchandising with this location selected for the pilot program.

Enclosed is data that we believe supports the design concepts expressed, outlines the project exterior signage program; building architecture, materials and colors. The project exterior lighting program, the project landscaping and site improvements information is shown on the revised drawings included with this additional submittal.

As per phone conversations with Blaise Edmonds, Associate Planner, the materials and colors sample board will be presented at the evening of the actual meeting. It will not be forgotten. We will provide a sample board of wall elements, as requested, as soon as we receive material samples from the manufacturers involved.

Enclosed within this booklet are color photocopies of the revised color scheme, two views, plus the proposed parking lot light standards with the directory signage of aisle indicators. Also enclosed is a new drawing titled "View Corridor Concept." Submitted separately are revised drawings DRBC1, DRBC2, DRB1, DRB2, DRB3, and DRBL1.

We believe we meet all known City of Wilsonville ordinances in regards to architecture, landscaping and site improvements. There are no signage variances required. We do request a deviation from the Phase I signage program as explained following. Since our reconsideration of the signage program has eliminated all variances we request reimbursement of the variance fees previously paid.

We request the Design Review Boards consideration of Project Thunder, as resubmitted.

Sincerely,

James L. Faulkner, AIA
Senior Vice President, Architecture

JLF:dr

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 2R
MATERIALS/COLORS DIALOGUE:

The general concept of the project design aesthetic is to create a vibrant and lively shopping environment, having this a "fun place to be". This concept is visualized to the shopper by the dynamic main facade of the building by three means: building form, materials selected and colors used.

The basic building background material is an "Exterior Insulation and Finish System", common name used Dryvit. While proprietary, we will use this term in this discussion. The Dryvit will be in a field color of light beige (neutral) with dark green color Dryvit used as a horizontal accent band on the North and West elevations. Dark green will also be used at the curved wall element of the primary building entry and exit points on the West elevation. The Dryvit will be on all sides of the building, scored in the patterns indicated on the elevations. Use of the dark green color relates this project to the Phase I buildings.

To compliment the Dryvit field, and to help to reduce the scale of this building, a horizontal band of metal siding, in a light bronze color with 50% reflectivity is expressed on the West, North and South elevations. This metal siding is a vertical pattern with vertical "grooves" 6" o.c. On the East elevation, the color and position of the metal siding is simulated by use of Dryvit accent band.

To accent and provide visitor orientation to the entry area, an open "dome" of steel framing, painted red, is mounted on the roof. Coupled with the curved element wall, this designates the building entry area. At grade the curved element concept is carried forward with curved concrete curbs, radial lined concrete walkways and flagpoles/bollards in a circular centerline aligning with the curved wall element at entry. The flagpoles are 25'-0" high, natural aluminum color, and will fly solid color flags or nylon banners. The non-illuminated bollards are 42" high, 10" diameter pipe painted light beige. Bollards around entry points will be internally lighted, and be painted red.

To further designate entry points, clear glass in natural aluminum storefront framing is located adjacent to the curved element entry area, and also occurs at the building service entrance and other secondary entrance points.

The overhead doors will be solid, insulating units without windows, painted light beige. Other secondary doors will be hollow metal painted to match adjacent wall color. Miscellaneous site items such as handrails will be painted black.

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PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 3R

The following are our calculations of area for the Project Thunder Signage Program:

Wall Graphics:

Single face, backlit signs:

Store Name Sign*:	1 Each at 224 SF	=	224 SF
Fascia Sign: "Service":	1 Each at 12 SF	=	12 SF
Fascia Sign: "Customer Pickup":	1 Each at 28.5 SF	=	28.5 SF
Fascia Sign: "Car Stereo Installation":	1 Each at 40.5 SF	=	40.5 SF
TOTAL WALL GRAPHICS AREA			305 SF

* This sign of channelume construction with individual letters for the word "UNIVERSE"; the word "INCREDIBLE" is in script neon.

There are miscellaneous directional signs on site, i.e. stop signs, that are under 2' x 2' in size, single face, non-illuminated and pole mounted. These include the Parking Lot Aisle Indicator Signs: 12 each at 8 SF = 96 SF. These are shown on sheet DRBC1, but are not included in signage area calculations.

DesignForum
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PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting **4R**

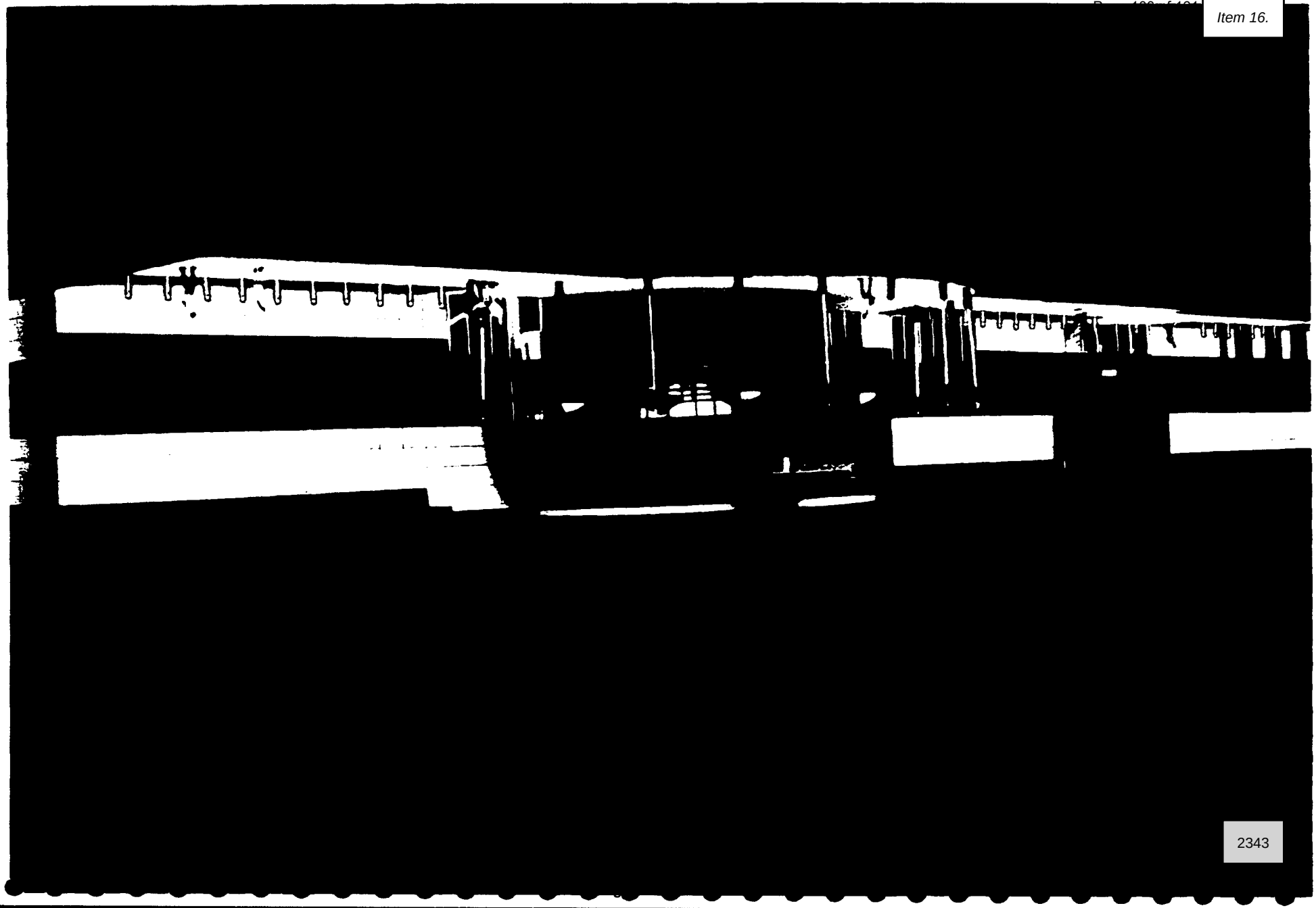
We request the consideration of the Design Review Board for a deviation from the Phase I, Wilsonville Town Center Signage program, as follows:

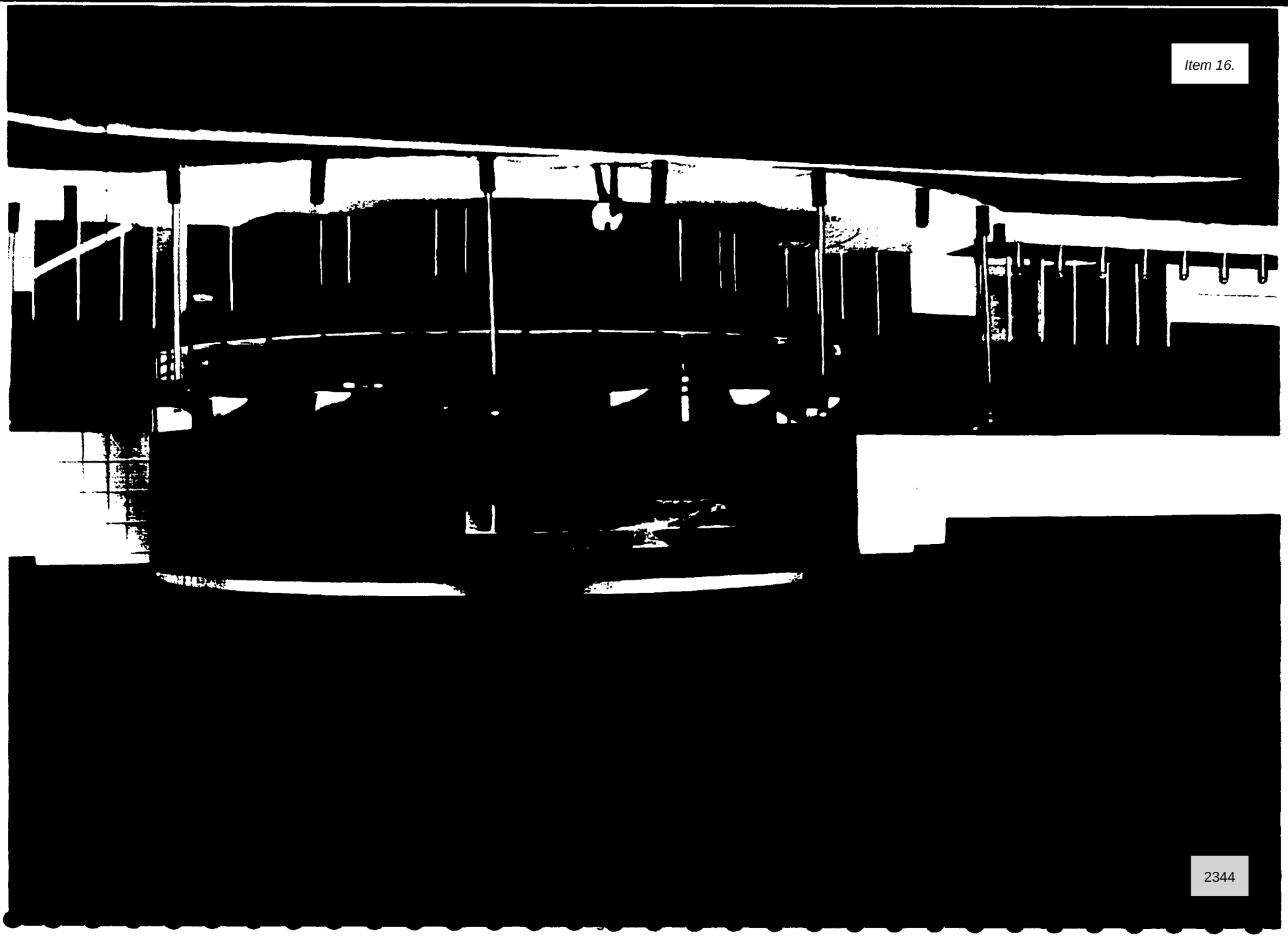
- Deviation #1 from Phase I signage program for sign construction method

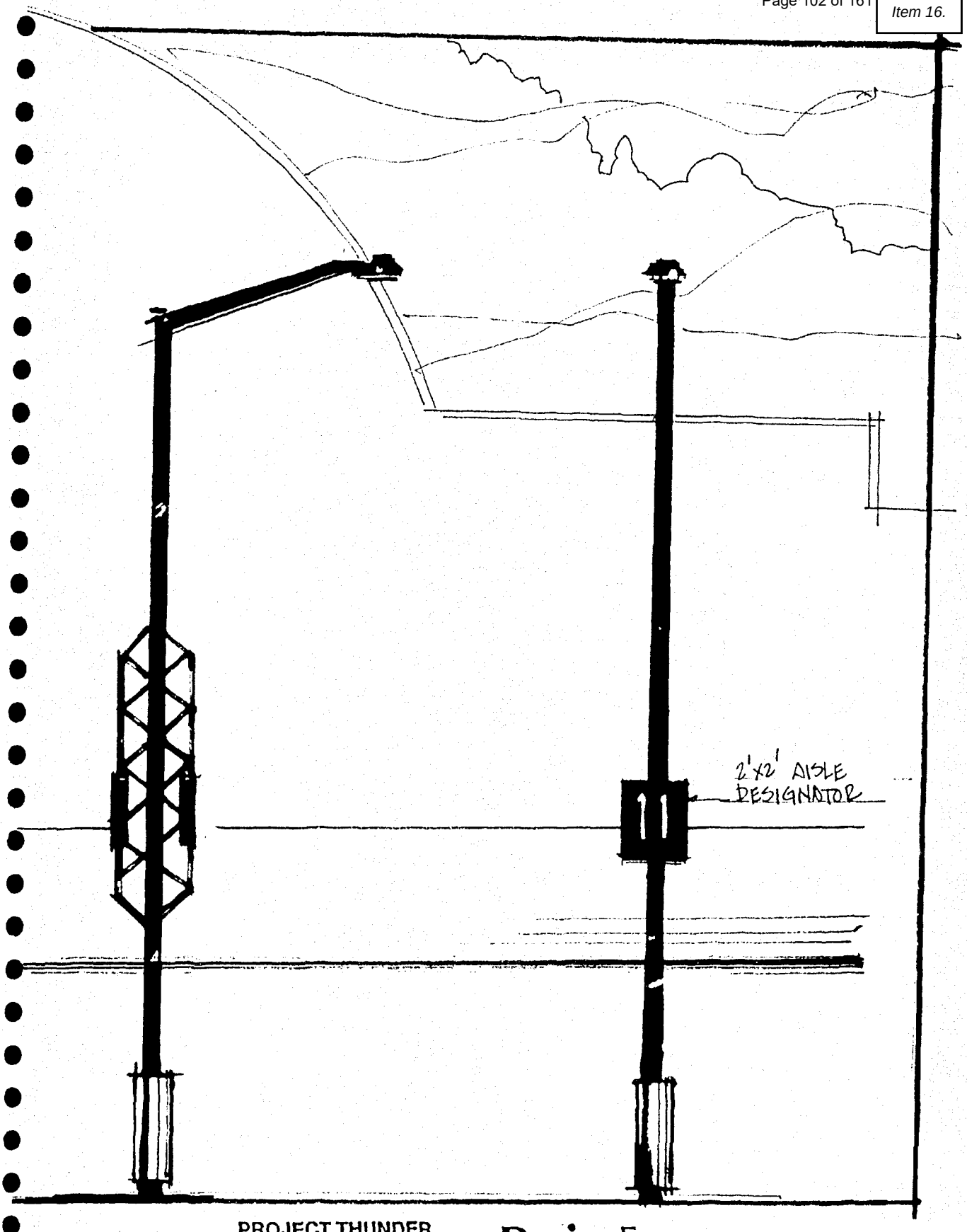
Deviation #1 from Phase I signage program for Wilsonville Town Center

We request this deviation from the approved program for the purpose of changing the method of construction for the 3 fascia signs (aggregate area approximate 81 SF) to be consistent with our design idiom. We feel our approach of a fascia panel type sign, back lit, cutout individual letters, appearing to be in a larger horizontal band to be of more benefit to this architectural design. Individual channel construction is not an appropriate usage in this application.

DEFECTS IN ORIGINAL DOCUMENT

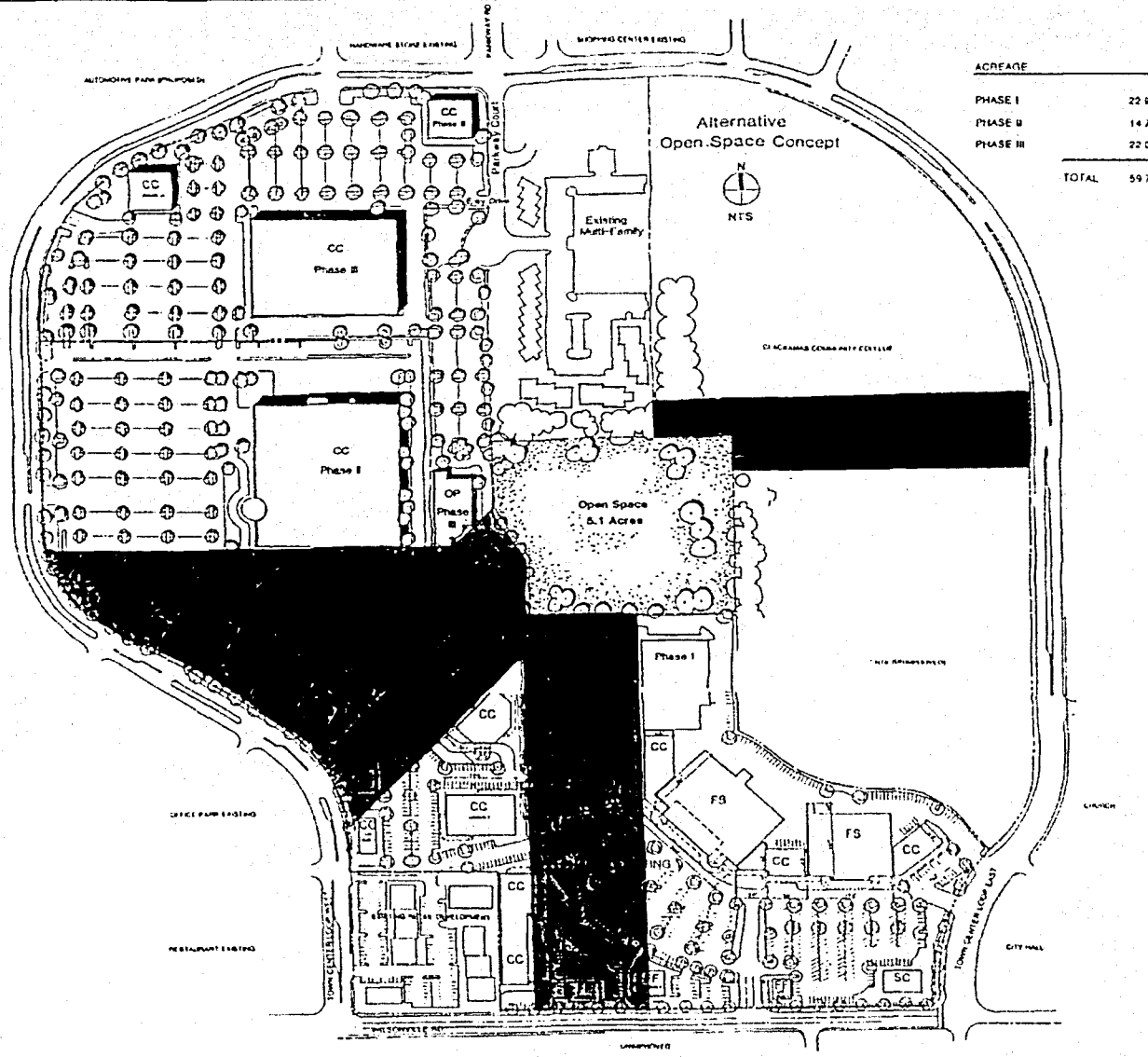




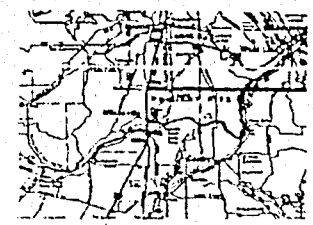


PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting

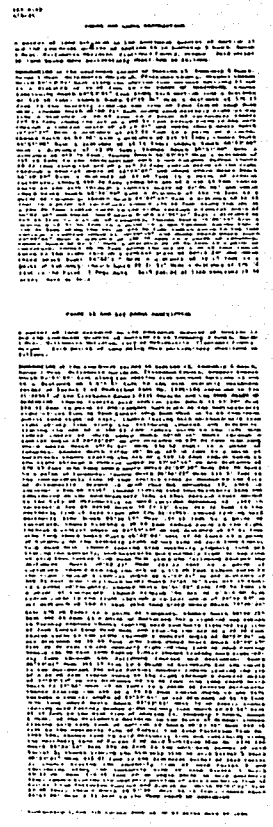
DesignForum
ARCHITECTS



ACREAGE	
PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



VICINITY MAP



SITE MASTER PLAN: PHASE I, II, & III

VIEW CORRIDOR CONCEPT

1-6-92

JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

1

2346

DesignForum

LETTER OF TRANSMITTAL

From: William F. Bergman, AIA
Design Forum
3484 Far Hills Avenue
Dayton, OH 45429

To: Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 S.W. Elligsen Road
Wilsonville, OR 97070

We are sending you:

- [ ] Prints
- [ ] Plans
- [ ] Estimates
- [ ] Shop Drawings
- [ ] Copy of letter
- [ ] Samples
- [ ] Comps Prototypes
- [ ] Photography
- [ ] Specifications
- [ ] Keylines
- [ ] Layouts

COPIES	DATE OR NO.	DESCRIPTION
2	10/28/91	Preliminary Prints of First Floor and Mezzanine Floor Plans

- [X] For your use
- [ ] For approval
- [X] As requested
- [ ] For review & comment
- [ ] Approved & noted
- [ ] Construction approval
- [ ] Returned for corrections
- [ ] Returned after loaned to us
- [ ] Return ____ corrected prints
- [ ] Submit ____ copies for ____
- [ ] Resubmit ____ copies for ____
- [ ] For bids due ____
- [ ] ____

Remarks:

Signed: William F. Bergman
William F. Bergman, AIA
Project Architect

Date: 10/28/91

cc: Rich Hollander
Marla

MEMORANDUM

TO: Development Review Team DATE: October 21, 1991

FROM: Blaise Edmonds, Associate Planner, City of Wilsonville.

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).
2. Office and warehouse, Liberty Organization, applicant.
3. Comprehensive plan amendment, Mr. Marvin Wagner, applicant.

Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

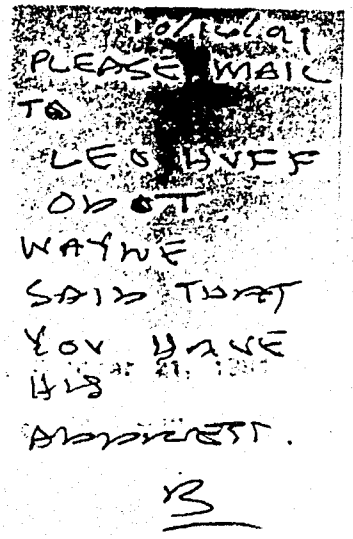
DATE: October 18, 1991

RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

Blaze—
I understand W&H says 150 cfs for Town Center to go into 48" culvert — is there more from other properties? If so how does that affect park drainage — if not I think we need to make sure all info is available before abandoning on site retention — could keep a pond as a water feature for Town Center.
Mike.
cc. Steve Shaner



MEMORANDUM

TO: Development Review Team DATE

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W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

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FROM: Rick Martin, P.E.
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Creative Solutions ... Superior Service

W&H PACIFIC

1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: Blaise Edmonds
Pam Ennemoser
City of Wilsonville, Annex
30000 SW Town Center Loop East
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 467-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	☒ For Your Info/File	
☒ Facsimile 682-7025	☐ As Requested	
3 Number Of Pages Including Cover	☒ For Review And Comment	
☐	☐	

Copies	Description
1 ea.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Ennemoser

2352

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

October 15, 1991

TO: Kim Beach, Capital Realty Corp.
Bill Bergman, Design Form Architects
All in Attendance

FROM: Tom Jones

RE: MINUTES OF MEETING WITH THE CITY OF WILSONVILLE
OCTOBER 14, 1991, 4:00 P.M. TO 5:05 P.M.
PROJECT THUNDER
4-467-0301; 4-755-0101

ATTENDEES: Tom Jones, W&H Pacific
Rick Martin, W&H Pacific
Pat Marquis, W&H Pacific
Logan Cravens, JKS Architects
Blaise Edmonds, City Planner
Pam Emmons, Planning Assistant

The following was discussed regarding the project in preparation for the Friday, October 18th submittal.

STAGE ONE SUBMITTAL

1. The site plan prepared by JKS should show:
   a. Revised project phasing
   b. Open space area as previously shown as a condition of approval from initial submittal.
   c. Specific "Town Center" land use designations must be shown for the northerly portion of the site not previously included and for any changed designations from the original submittal for Phases II and III.

2. Submit ten (10) copies of the original Traffic Report and provide an Executive Summary outlining any revisions to the initial projections and provide a summary that addresses the level of service "D" or better at surrounding intersections. Review the Parkway/Loop Road intersection.

3. Show existing adjacent land uses (i.e., vacant or improved) and the names of key surrounding developments for the Planning Commission orientation. Show only existing improvements not proposed.

4. Capital Realty must provide an updated list of addresses and property owners within 250 feet from the project.

W&H PACIFIC

October 15, 1991
Page 2

5. Capital Realty must submit the Certification of Assessments and Liens form with the application. This is to determine if the tax lots included owe money to the City. Contact Atta Curser for clarification.

6. All property owners must sign the application.

7. Application fees:
   a. Stage One Submittal: $500.00
   b. Stage Two Submittal: $250.00 plus $25 per acre (Project Thunder is 14.98 acres)
   c. Application fee for Friday: ($500 + $250 + $375 = $1,125)
   d. Design Review: $250 plus a fee for the master signage plan review.

STAGE TWO SUBMITTAL

1. Design of site signs are not required to be submitted until Design Review submittal of December 6th.

2. Landscape design needs to show planting areas, significant trees and plaza areas. Plant list is optional.

3. Grading calculations and storm drainage calculations are not required for Friday's submiual according to Blaise. Grading plan should show existing contours and general grading concept.

4. Utilities design should be kept schematic. Graphically illustrate the utility alignments that will require easement vacations and relocation.

5. Architectural elevations can be conceptual in detail. Planning Commission is only concerned with general massing and quality of appearance. Materials and color board to be submitted at Design Review.

6. If waivers to the City development standards are anticipated, be specific with your request and how it would be consistent with other surrounding project development standards.

GENERAL COMMENT

The two issues that will be of the most interest to the Planning Commission will be traffic and the implementation of the open space. We should develop a clear strategy to present to the Commission prior to the December 9th hearing addressing these two issues.

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

FAXED 10/17/91

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop ~~EAST~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 967-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- X Facsimile 682-7025
- 3 Number Of Pages Including Cover

These Are Transmitted:
- X For Your Info/File
- As Requested
- X For Review And Comment

Copied To:

Copies	Description
1es.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

2355

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

In Attendance:

Pam Emmons	City of Wilsonville, Associate Planner	WSV	503-682-4960
Martin Brown	City of Wilsonville, Building Official	WSV	503-682-4960
Steven Starner	City of Wilsonville, Community Development Dir.	WSV	503-682-4960
Jim Long	City of Wilsonville, Design & Survey Technician	WSV	503-682-4960
Doug Seely	Real Estate Investment and Sales	REI	503-655-7631
Jim Parsons	Grubb & Ellis	GEI	503-241-1155
Jim Faulkner	Design Forum Architects	DFA	800-835-4401

Item No.	Action	Item
1.10	CAP/WHP	Storm drainage is an issue. Calculations and 25 year storm design for Phase II master plan must be submitted with application by October 18, 1991 deadline. The connection for metered release to interstate highway from existing retention pond and the retention pond itself will be eliminated. According to Wayne Bauer of Wilsey & Ham Pacific, Civil Engineers for Phase I development of the site, the new storm sewer system was designed to accommodate this. The city would like to see calculations supporting this.
1.2	CAP/KAI	According to the city, a traffic light at Wilsonville Road and Town Center Loop West is now warranted. The north intersection at Town Center Loop East and West at Parkway Avenue needs to be addressed in traffic study.
1.3	DFA	The currently approved master plan calls for "Food and Sundries" (FS) and "Central Commercial" (CC). These zoned uses are compatible with the desired development of Project Thunder. No rezoning is necessary, however, currently approved uses will have to be redistributed on the site.

3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400 Fax: (513) 291-2842

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.4	ALL	The Stage I and Stage II planning review applications will be made simultaneously on October 8, 1991, and be reviewed simultaneously at the Planning Commission on December 9, 1991.
1.5	GEI	Hearing notification list for all property owners of record within 250 foot of any point on property (not including street widths) must be presented with October 18, 1991 submittal. Notification does not have to cross interstate highway. The city will send the notices. Jim Parsons will obtain list from assessors office or from a title company.
1.6	DFA	The signage theme from Phase I should be carried through Phase II. Sign issues are handled by the Design Review Board. Setback issues are handled by the Planning Commission.
1.7	DFA/WHP	The building is designed utilizing the "unlimited area" provision of the code. A sixty (60) foot minimum distance from all property lines and an approved automatic sprinkler system throughout will be provided to accommodate this provision.
1.8	TNB	There is a ten (10) day appeal period following design review approval. Normal procedure is such that no work should be commenced during the appeal period. Due to the tight schedule for this project and the need to utilize every available good weather period for site escavation, an option for work during the appeal period was discussed. A "hold harmless" agreement from owner in favor of the City of Wilsonville, enabling work to start immediately after design review approval during the appeal period at the sole risk of the owner has been used in the past to facilitate an early start.

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.9	WHP	For any construction to begin, fire hydrants must be installed to within 250 feet of any point of the exterior wall of the building. Work should begin immediately to obtain Public Works approval and have installation complete by scheduled start of construction, February 1, 1992.
1.10	ALL	The required completion date of construction necessitates a start date for construction of February 1, 1992. For this to happen, working drawings and specifications would have to be accomplished prior to design review hearing date of January 27, 1992. To minimize risk of changes to completed documents, a partial permit (foundation permit) can be applied for at a cost of $250.00. This would allow work to begin while balance of documents are being prepared. The review time for foundation and underground utilities permit is approximately three weeks, so documents should be submitted by January 10, 1992 for a February 1, 1992 start of construction.
1.11	DFA	The zoning height limitation for any point of the building is 35'-0". Design Forum will check with Blaise Edmonds regarding height of dome feature with center pole.
1.12	DFA	Elevations and material, color and finish boards must be submitted with Design Review Board application by December 6, 1991 deadline for hearing date of January 27, 1992.

DesignForum
ARCHITECTS

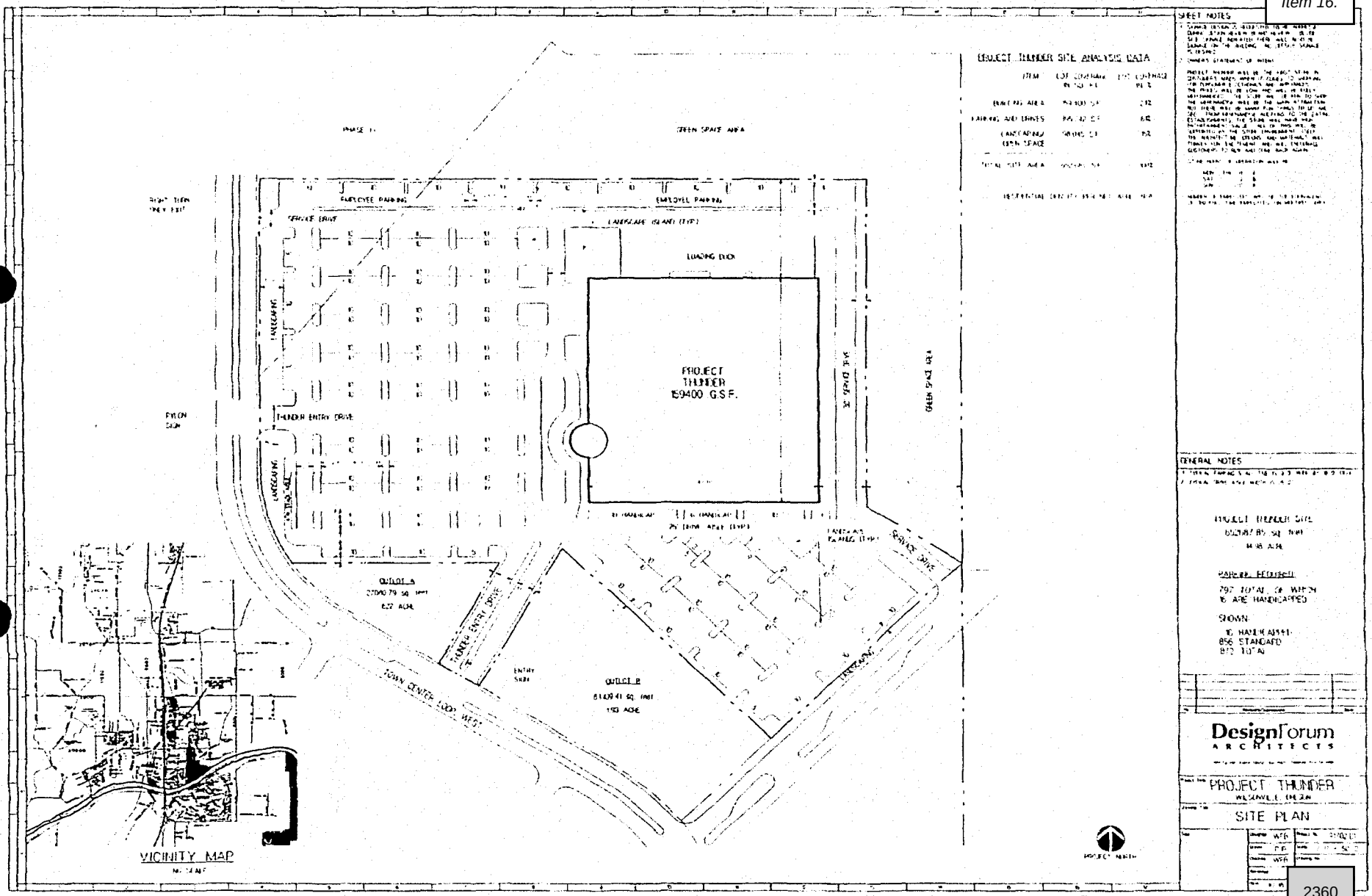
Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

Respectfully submitted,

James L. Faulkner, AIA
Vice President, Architecture

cc: All in Attendance
Rich Hollander, Tandy Name Brand (TNB)
Blaise Edmonds, City of Wilsonville, Associate Planner (WSV)
Kimberly Beach, Capital Realty Corporation (CAP)
Tom Jones, Wilsy & Ham Pacific (WHP)
Wayne Kittelson, Kittelson & Associates, Inc. (KAI)
D. Lee Carpenter, Design Forum
Bruce Dybvad, Design Forum
Marla Halley, Design Forum
Bill Bergman, Design Forum Architects

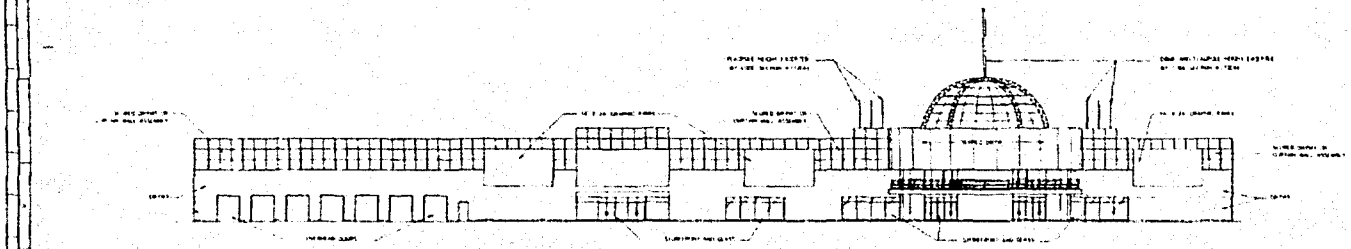


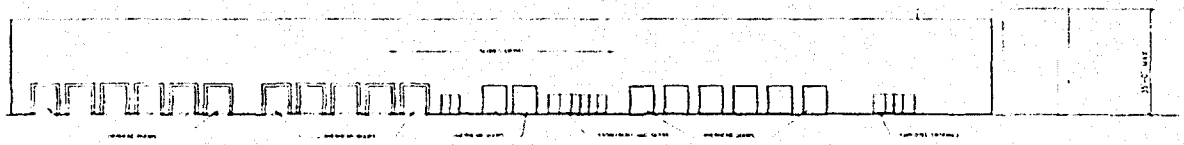
DesignForum ARCHITECTS

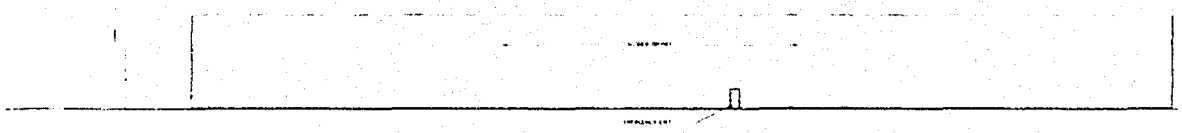
PROJECT THUNDER
WILSONVILLE, OREGON

SITE PLAN

2360





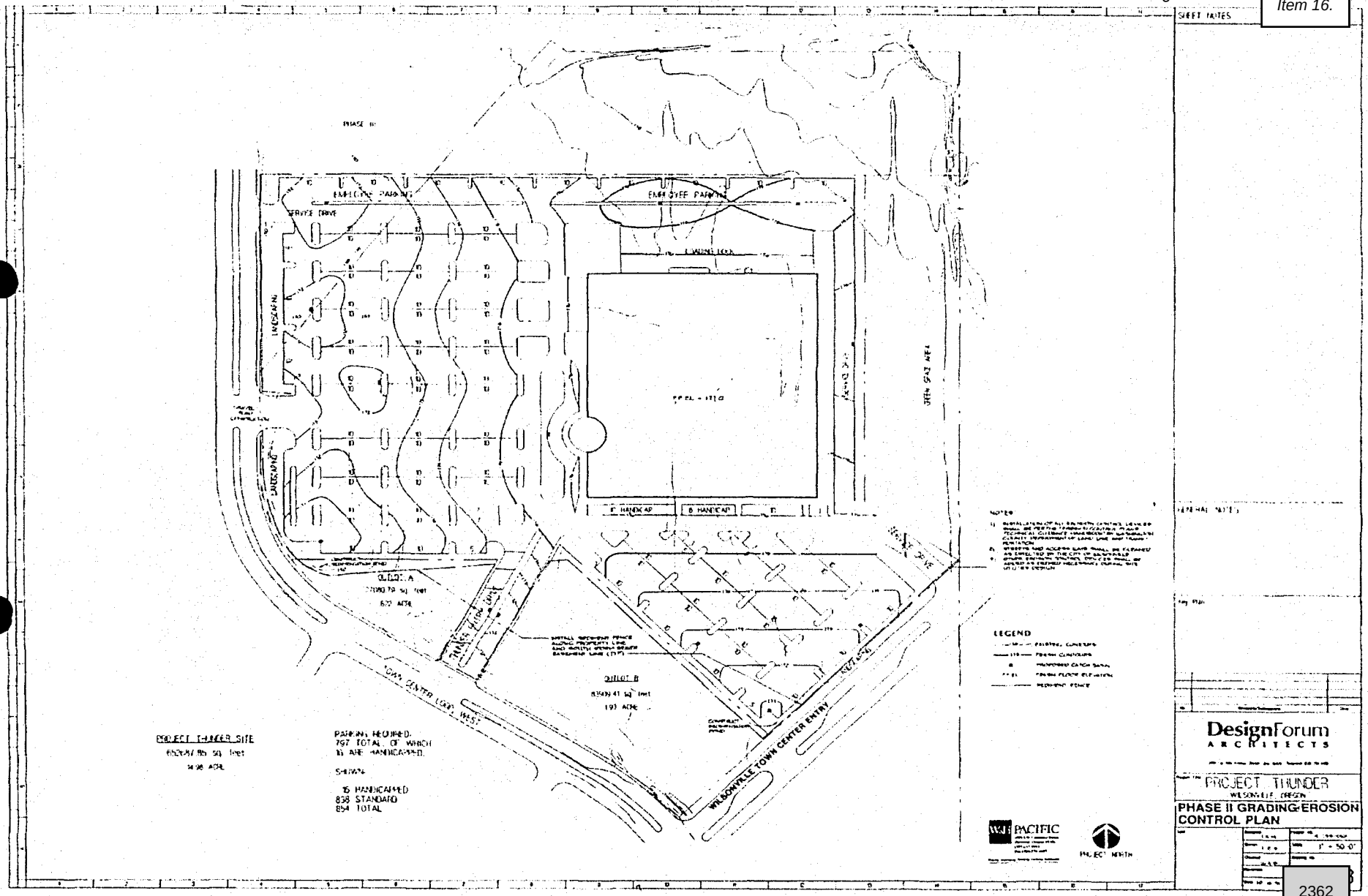


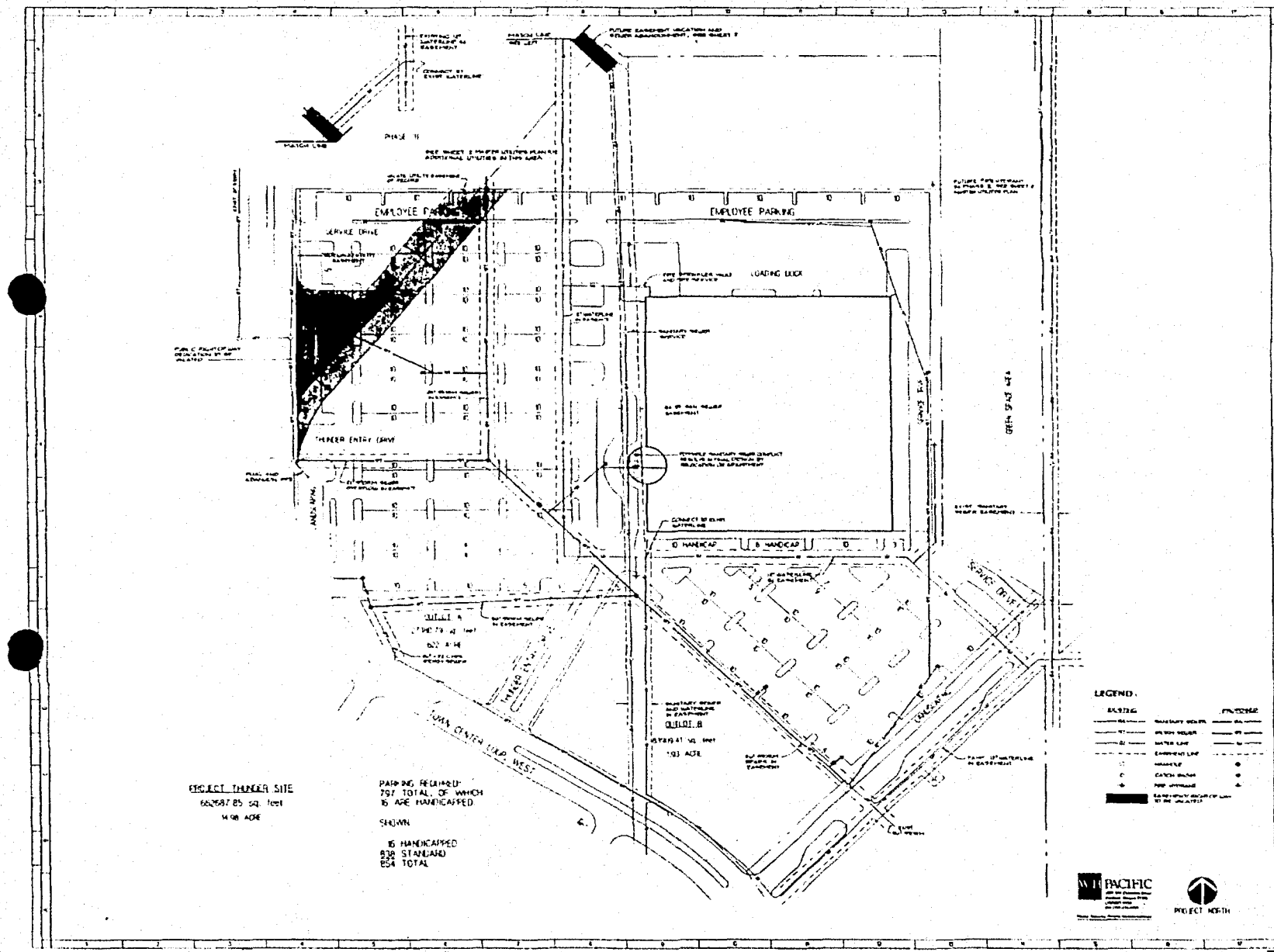
DesignForum
ARCHITECTS

PROJECT THUNDER
HILLSBORO, OREGON

EXTERIOR ELEVATIONS

2361


SHEET NOTES
EMPLOYEE PARKING
EMPLOYEE PARKING
SERVICE DRIVE
LANDSCAPING
LANDSCAPING
E HANDICAP
E HANDICAP
OUTLOT A
OUTLOT B
TOWN CENTER LOOP WEST
WILSONVILLE TOWN CENTER ENTRY
PROJECT TRACER SITE
PARKING REQUIRED:
797 TOTAL OF WHICH
16 ARE HANDICAPPED
SHOWN:
16 HANDICAPPED
838 STANDARD
854 TOTAL
LEGEND
GENERAL NOTES
DesignForum
ARCHITECTS
PROJECT THUNDER
WILSONVILLE, OREGON
PHASE II GRADING/EROSION CONTROL PLAN
PACIFIC
PROJECT NORTH
2362



SHEET NOTES

GENERAL NOTES

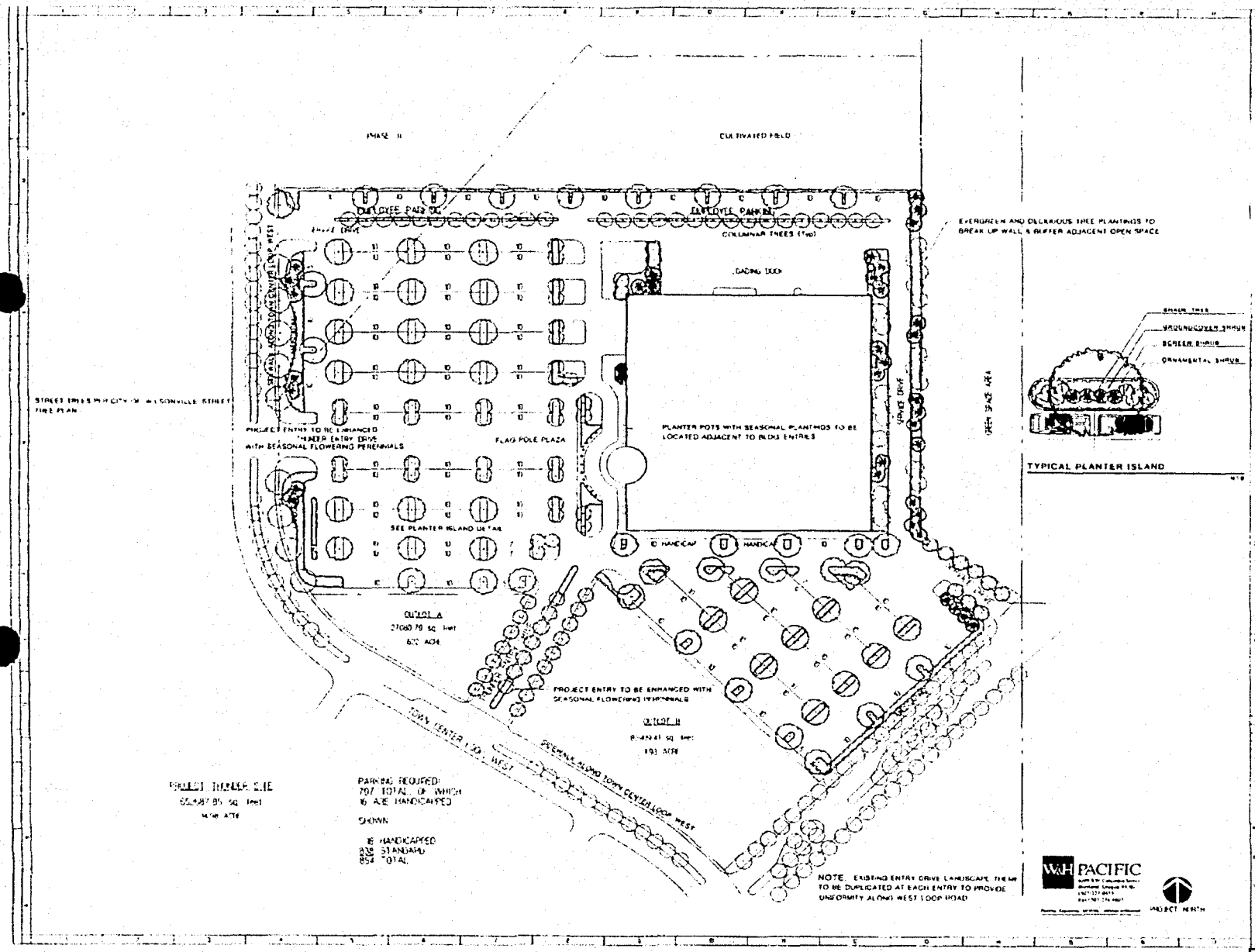
Key Plan

DesignForum
ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II UTILITIES PLAN

2363


PHASE II
CULTIVATED FIELD
EMPLOYEE PARKING
EMPLOYEE PARKING
COLUMNAR TREES (Typ)
EVERGREEN AND DECIDUOUS TREE PLANTINGS TO BREAK UP WALL & BUFFER ADJACENT OPEN SPACE
LOADING DOCK
SPACE DRIVE
PLANTER POTS WITH SEASONAL PLANTINGS TO BE LOCATED ADJACENT TO BLDG ENTRIES
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
FLAG POLE PLAZA
SEE PLANTER ISLAND DETAIL
HANDICAP
HANDICAP
OUTLOT A
OUTLOT B
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
TOWN CENTER LOOP - WEST
PROJECT SITE
PARKING REQUIRED:
PARKING PROVIDED:
SHOWN
16 HANDICAPPED
STANDARD
TOTAL
NOTE: EXISTING ENTRY DRIVE LANDSCAPE THEME TO BE DUPLICATED AT EACH ENTRY TO PROVIDE UNIFORMITY ALONG WEST LOOP ROAD
PROJECT NORTH
SHADE TREES
GROUNDCOVER SHRUBS
SCREEN SHRUBS
ORNAMENTAL SHRUBS
TYPICAL PLANTER ISLAND
LEGEND
SHADE TREES
FLOWERING TREES
EVERGREEN CONIFER TREES
ORNAMENTAL LANDSCAPE SHRUBS & GROUNDCOVER
LAWN
EXISTING STREET TREES
GENERAL NOTES
AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED
W&H PACIFIC
DesignForum ARCHITECTS
PROJECT TUNNEL
WILSONVILLE, OREGON
PHASE II LANDSCAPE PLAN

ASSIGNMENT

FOR VALUABLE CONSIDERATION, receipt and sufficiency of which are hereby acknowledged, SFS INVESTMENT CORP., an Oregon corporation (Assignor), hereby assigns, transfers and conveys to CAPITAL REALTY CORP., an Oregon corporation (Assignee), all of Assignor's right, title and interest in each option agreement, offer and other document described in Exhibit A attached hereto, the real property described in any such option agreement or offer, and all rights which Assignor now has or may hereafter acquire with respect thereto.

February 1, 1990.

SFS INVESTMENT CORP.

By _____
President

STATE OF OREGON)
) ss.
County of Multnomah)

On this 1st day of February, 1990, before me personally appeared Steven F. Stiles who, being duly sworn, did say that he is the president of SFS INVESTMENT CORP., an Oregon corporation, and acknowledged that the foregoing instrument was executed on behalf of the corporation by authority of its board of directors as its voluntary act and deed.

Before me:

_____
NOTARY PUBLIC for Oregon
My Commission Expires 10/31/92

AGREEMENT AND OPTION

THIS AGREEMENT AND OPTION is between E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as Marlene A. Young Rifai, the Estate of Harold J. Laswell, Deceased, and FRED A. ANDERSON, hereinafter collectively referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-14D, are E. Jean Young, Sherilyn J. Young, David S. Young, Marlene A. Young, also known as Marlene A. Young Rifai, and Jack L. Lozo.

B. The owner of Parcel II, i.e. tax lot 300, MAP 3-1W-14D is Jack L. Lozo.

C. Grantee has options to purchase Parcel I and II by documents respectively dated August 17, 1989 and August 23, 1989; said options are valid through December 21, 1989.

D. Grantor's offer to option Parcel III is contingent upon Grantee's obtaining extensions of the options to purchase Parcel I and II.

E. Grantors own Parcel III, i.e. Tax Lot 200, 300 & 401, Clackamas County MAP 3-1W-14D and ownership interests in a triangle of land approximately 6381 square feet on the west of Tax Lot 200 , described in Exhibit A. Parcel III shall refer to the

be made in full upon closing and a statutory warrenty deed provided at that time.

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

~~ion.~~ The Option to purchase Phase 2 in its enti er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel III unless Grantees pay to Grantors $50,000 for an extension of the Option for one year. Payment for such extension is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or be[illegible]vember 2, 1992, at the purchase price of ent on an additional $50,000, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantor's name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors prior to formal application to the City of Wilsonville. Grantors shall retain the right of review during the planning process with the City,

Grantee may not agree to any request to increase the Open Space requirements on any Phase of any Parcel.

11. Real Property Taxes. The Option Property has been specifically assessed as Farm Use Land. Therefore, portions of the annual taxes are deferred until the Option Property becomes disqualified for that purpose. If Grantee exercises the Option as

preliminary agreements. This Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 31 day of October, 1989.

E. Jean Young
E. JEAN YOUNG

SFS INVESTMENT CORP.

11-8-89

By _____
SFS President
Steven F. Styles

SHERILYNN J. YOUNG

David S. Young
DAVID S. YOUNG

SFS INVESTMENT CORP.

Marlene A. Young
by _____, attorney in fact
MARLENE A. YOUNG

By _____
SFS Officer

ESTATE OF HAROLD J. LASWELL
DECEASED

GRANTEES

By Emma D. Laswell
Emma D. Laswell
Personal Representative

By _____
Eugene L. Deffler
Personal Representative

Fred A. Anderson
FRED A. ANDERSON

GRANTORS

ST IVES PROPERTIES LTD.
by _____

EXHIBIT A

I
Wilsonville Property

Option dated November 16, 1989 granted by Jack L. Lozo for property generally known as Tax Lot 500, Map 3-1W-13, Clackamas County, Oregon.

Agreement and Option dated October 31, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Estate of Harold J. Laswell, Deceased, and Fred A. Anderson for property generally known as Tax Lots 200, 300 and 405, Map 3-1W-14D, Clackamas County, Oregon, togther with a triangular parcel containing approximately 6,381 square feet on the westerly side of Tax Lot 200.

Option dated November 15, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Jack L. Lozo, and Anne S. Lozo, Trustee for Claude F. Smith Trust, for property generally known as Tax Lots 600 and 601, Map 3-1W-13, Clackamas County, Oregon.

Attached hereto is a plot map showing the general location of the three parcels.

II
Gresham Property

Earnest Money Agreement dated August 1, 1989, amended by Memorandum of Agreement dated September 20, 1989, with Leonard P. Holfman and Kenneth G. Holfman, Trustees of the Olive H. Holfman 1979 Trust dated May 7, 1979, for the purchase of a tract of land in the Robert P. Wilmot DLC and being Sections 19 and 30, Township 1 North, Range 3 East of the Willamette Meridian, Multnomah County, Oregon (Tax Lot #32), containing approximately 21.3 acres on the north side of N. E. Sandy Boulevard west of Northeast 181st Avenue.

III
Salem Property

Offer dated November 1, 1989, accepted by Anita Hager Conley, Trustee, on November 29, 1989, for a parcel containing approximately 9.38 acres in the southwest quarter of Section 31, Township 7 South, Range 2 West, known as Tax Lot 200, Salem, Marion County, Oregon.

AGREEMENT AND OPTION

PARCEL II

THIS AGREEMENT AND OPTION is between JACK L. LOZO, hereinafter referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-13, are E. JEAN YOUNG, SHERILYN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, JACK L. LOZO, and the CLAUDE F. SMITH TRUST, ANN S. LOZO Trustee.

B. The owner of Parcel III, i.e. tax lot 200, 300 & 405, Clackamas County MAP 3-1W-14D and a triangle of land approximately 6,381 square feet on the west of tax lot 200 are E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, the estate of HAROLD J. LASWELL, Deceased, and FRED A. ANDERSON.

C. Grantors own Parcel II, i.e. Tax Lot 500, MAP 3-1W-13. Parcel II shall also be referred to as the Option property.

D. Grantee has options to purchase Parcel I & II by documents dated August 17, 1989 and August 23, 1989, said options are valid through December 31, 1989.

E. Grantors' offer to option Parcel II is contingent upon Grantee's obtaining an extension of the option to purchase Parcel

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

4. Extension. The Option to purchase Phase 1b and 2 in its ent er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel II unless Grantee pays to Grantors $5,000 for an extension of the Option to purchase Phase 1b property, ~~and pays to Grantor an additional $5,000 for an extension of the Option to purchase Phase 2 property if owned by Grantors~~. Payment for such extension shall be for one year, is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or before November 2, 199 at the purchase price of payment on an additional $5,000, s, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

authority to grant the Option and to sell their interest in the Option Property in accordance herewith.

7. Reciprocal Easements: Grantors and Grantee agree that each will enter into reciprocal easements with the owners of Parcels I and III as agreed upon by the parties.

8. Right of Entry. Grantee may, at its risk and expense during the term of the Option, enter upon the Option Property at any time to make engineering tests, soil tests and for any other lawful purpose in pursuit of the purchase and development of said property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantors' name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors

the entire agreement among the parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. This Agreement and Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 11 day of November, 1989.

JACK L. LOZO

AND S. LOZO, Trustee for
CLAUDE F. SMITH TRUST

GRANTORS

SFS INVESTMENT CORP.

By
SFS President
Steven F. Stiles

SFS INVESTMENT CORP.

By
SFS Officer

GRANTEES

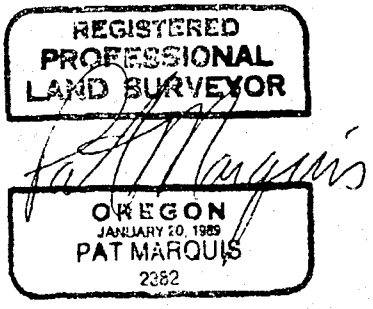
PROJECT THUNDER LEGAL DESCRIPTION

A parcel of land situated in the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southeast corner of Section 14, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon: thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**: thence leaving said section line and tracing the following courses and distances: South 45°03'00" West 400.00 feet; thence North 44°57'00" West 435.01 feet to a point of non-tangent curvature; thence tracing the arc of a 2,000.00 foot radius curve to the right (the radial center of which bears North 65°07'50" West) through a central angle of 07°23'12" an arc distance of 257.84 feet (the long chord bears South 28°33'46" West 257.66 feet) to the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line North 57°44'38" West 72.00 feet to a point of radial intersection with a 1,928.00 foot radius curve; thence leaving said northeasterly right-of-way line and tracing the arc of a 1,928.00 foot radius curve to the left through a central angle of 05°32'12" an arc distance of 186.31 feet (the long chord bears North 29°29'16" East 186.23 feet); thence South 89°52'55" West 304.91 feet to a point of non-tangent curvature on the said northeasterly right-of-way line of Town Center Loop Road West; thence tracing said right-of-way line along a 268.16 foot radius curve to the right (the radial center bears North 56°01'43" East) through a central angle of 33°55'55" an arc distance of 158.81 feet (the long chord bears North 17°00'19" West 156.50 feet) to a point of tangency; thence continuing along said right-of-way line North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing said right-of-way line North 00°02'22" West 121.76 feet; thence leaving said right-of way line and tracing the following

courses and distances: North 89°52'55" East 894.39 feet to a line being parallel with and 140.00 feet westerly of the said section line common to sections 13 and 14; thence tracing said parallel line South 00°03'01" West 528.73 feet; thence South 56°23'33" East 168.00 feet to the **TRUE POINT OF BEGINNING**. Said parcel contains 642,427 square feet or 14.75 acres more or less.

755-0101
10/16/91



Jim Parsons
Jim Faulkner
Doug Seely

Phase
Stage I, II, III → Cap. Realty will submit

Phase II →
Cap. Realty Δ master plan modification
Site plan I, II

Lindy - Thunder 120+ thou ☐ footprint
Electronics +

Parkway / TC (E) + (W)

Park → Open Space.

Submit Stage I + II Simultaneously

Blaise
what else?

* Gave Stage I + II + application x2
250' radius map owners

Topo - 1' intervals - (map has readings)

~~Blaise - 50' top dirt~~

Ø phase

100 - 1

CITY

100 - 120 DWELLING UNITS.

- DOUG SEELY TALKED TO BOB DANT -
- ABOUT DENSITY TRANSFER TO BRIDGE CREEK,
- P.O.S.

- CONTOUR SURVEY - >20'
- TREE SURVEY >6" caliper
- MAJOR DRAINAGEWAY.

STAKE THE PROPERTY - SITE VISIT TO VERIFY P.O.S LINE - AMBIGUITY - GO TO P.L TO C.C. FOR INTERPRETATION.

~~CALL MIKE - 720-~~

CITY of WILSONVILLE
PLANNING COMMISSION
SITE MASTER PLAN (STAGE I)
GENERAL SUBMISSION REQUIREMENTS

1. Completed application form, with appropriate fee, signed by property owner.
2. Set forth the professional coordinator and professional design team.
3. State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.
4. The application shall include conceptual and quantitatively accurate representation of the entire development sufficient to judge the scope, size and impact of the development on the community; and, in addition, shall be accommodated be the following information:

   13 FOLDED copies of Site Master Plan dimensioned at a scale of 1" = 20 ft. (or as determined by the Planning Director) showing the following:

   a. Vicinity map.
   b. The entire lot as described by the legal description.
   c. Location and size if all public facilities, utilities and easements.
   d. Location and dimension of site improvements such as roads, buildings, driveways, parking, loading and landscaping.
   e. All adjacent rights-of-way and improvements.
   f. Any surrounding development, i.e., existing buildings, property lines, driveways, etc.
   g. Development phasing. A stage development schedule demonstrating that the developer intends to commence construction within (1) One year after the approval of the development plan, and will proceed diligently to completion.
   h. Topographic information at one-foot intervals up to 5% slope; two-foot intervals, 6% - 12%; five-foot intervals. 12% - 20%; ten-foot intervals, 20% and above.

5. One copy of Site Plan reduced to 8-1/2" x 11". This must be a legible photo-mechanical transfer (PMT).
6. Site Analysis Data.

Item	Lot Coverage in sq. ft.	Lot Coverage in %.
Building area	458,771 sq. ft.	.18 %
Parking and Drives	1,394,390 sq. ft.	.53 %
Landscaping/Open Space	751,291.4 sq. ft.	.29 %
Residential density per net acreage.		
TOTAL SITE AREA	2,604,452.4 sq. ft. 59.79 ACRES	100 %

Planning Department 682-4960

INCOMPLETE SUBMITTALS WILL NOT BE SCHEDULED FOR A PUBLIC MEETING !

10 ■ 4M-MSO 10-22-90 Oregonian

Traffic count zooms at electronic store

■ Wilsonville's projections for vehicle flow at the Incredible Universe fall woefully short

By JOHN M. GRUND
Correspondent, The Oregonian

WILSONVILLE — When it comes to predicting how much traffic a new development will bring, Wilsonville officials always have gone by the book.

But going by the book has not worked for some recently opened projects — in particular the Incredible Universe electronics store. In some cases, traffic is already at levels predicted for 2010.

Now city officials are looking at ways to refine the city's traffic projections.

Eldon Johansen, community development director, told the City Council early this month that traffic on Town Center Loop West near the new electronics store is averaging 1,227 vehicles an hour northbound at 2 p.m. That's 550 more vehicles per hour than anticipated in projections for 1995, he said.

"As far as the traffic counts go, we've had a real eye-opener on our traffic projections. We're already up past (the year) 2010 on some of our traffic projections," Johansen said.

"The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts," said Arlene Loble, city manager.

The city has changed its procedure for getting traffic analysis done on proposed developments. This fall, it switched from having a developer hire a traffic engineering firm to requiring applicants to pay for a study by D.K.S. Associates, the firm chosen by the city to handle all of its traffic analysis.

Planning Director Wayne Sorensen said the move should not be interpreted as a criticism of the firms that have done studies in the past. All of them, in fact, bid on the city contract, he said.

"I think we feel better now (that) the traffic engineer is working for the city," he said. "When the applicant hires the engineer, they're working for the client, and the city's not the client."

Johansen said the city also would expand the scope of some studies.

The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5.

It was that intersection that clogged up at the Incredible Universe opening Sept. 17 and caused traffic to back up for miles in both directions.

If the study were being done today, the city would insist that engineers look at one more intersection down the road, Johansen said.

City Councilor Greg Carter asked if the traffic effects of some recent developments meant that the city should consider a moratorium on some new construction.

"I'm not willing to say that yet," Johansen said.

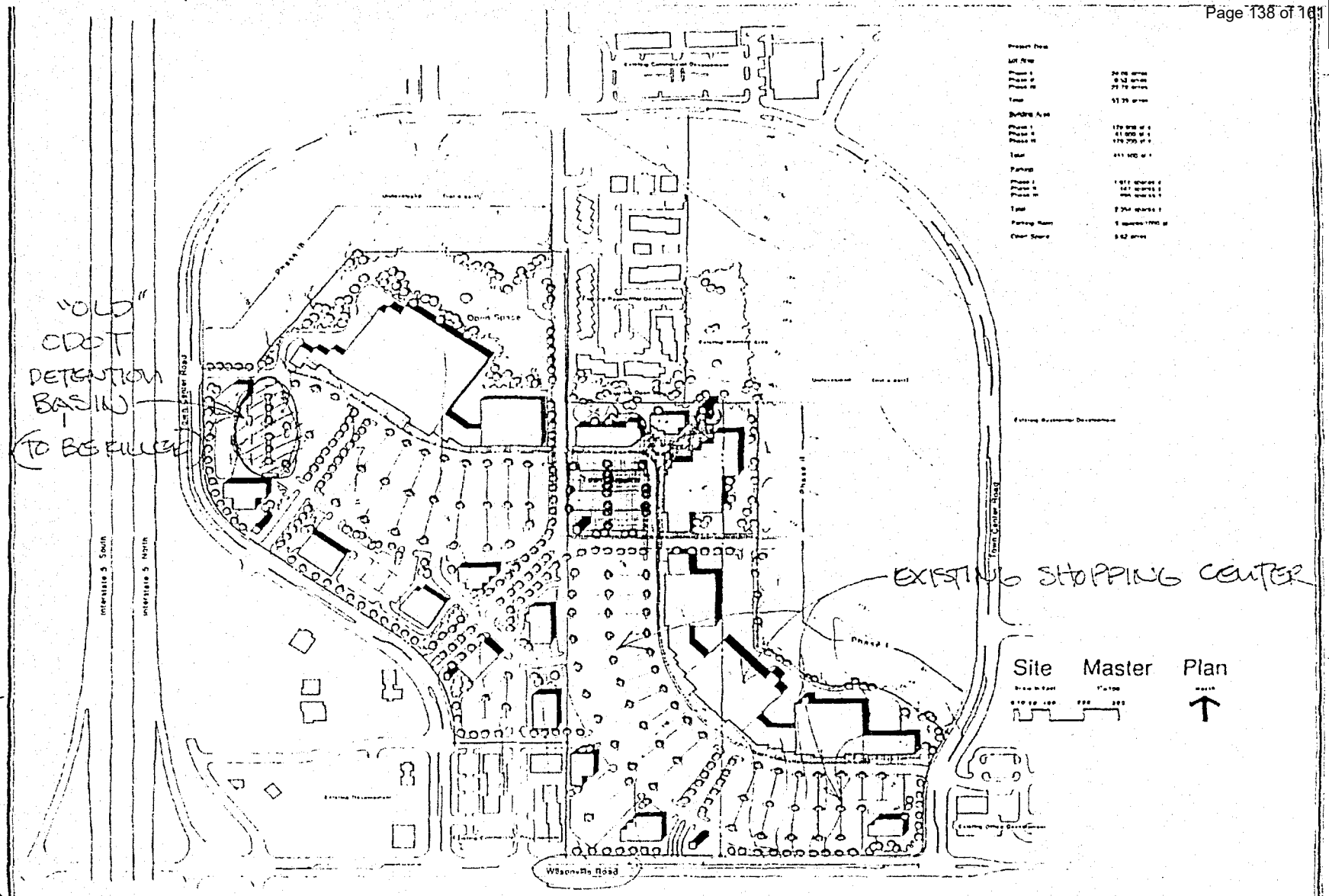
He said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built.

Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic — that is, traffic already on the streets for other reasons. But the store has become a regional draw, and "drop-in" traffic is a tiny percentage of traffic it attracts. Finally, the traffic study did not account for the success of the store's marketing effort.

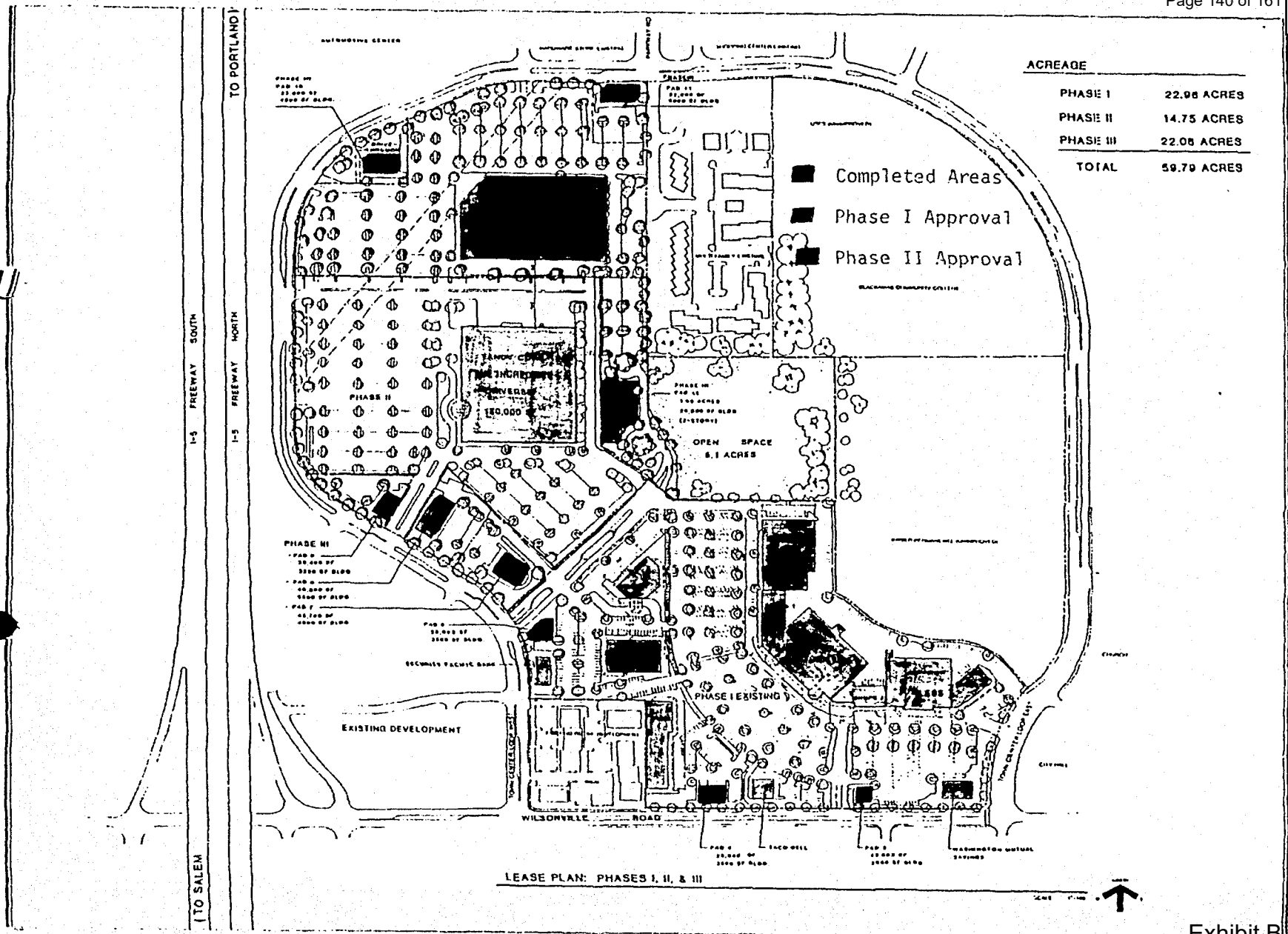
"At a minimum, we need to be broadening the assumptions on which decisions are made," Loble said. "We've recognized that the traffic situation is beyond anything anticipated in the rational decision-making model."

Sorensen, however, later said there are no plans to tinker with the engineering manual — he called it "the bible" — that predicts how many new trips will be generated by a particular use.

Sorensen would not hazard a guess about whether any of the changes will mean that developments will have a tougher time getting planning approval in Wilsonville. But he said that at least one major development was turned down as long as two years ago because it would have brought too much traffic to an overburdened street.



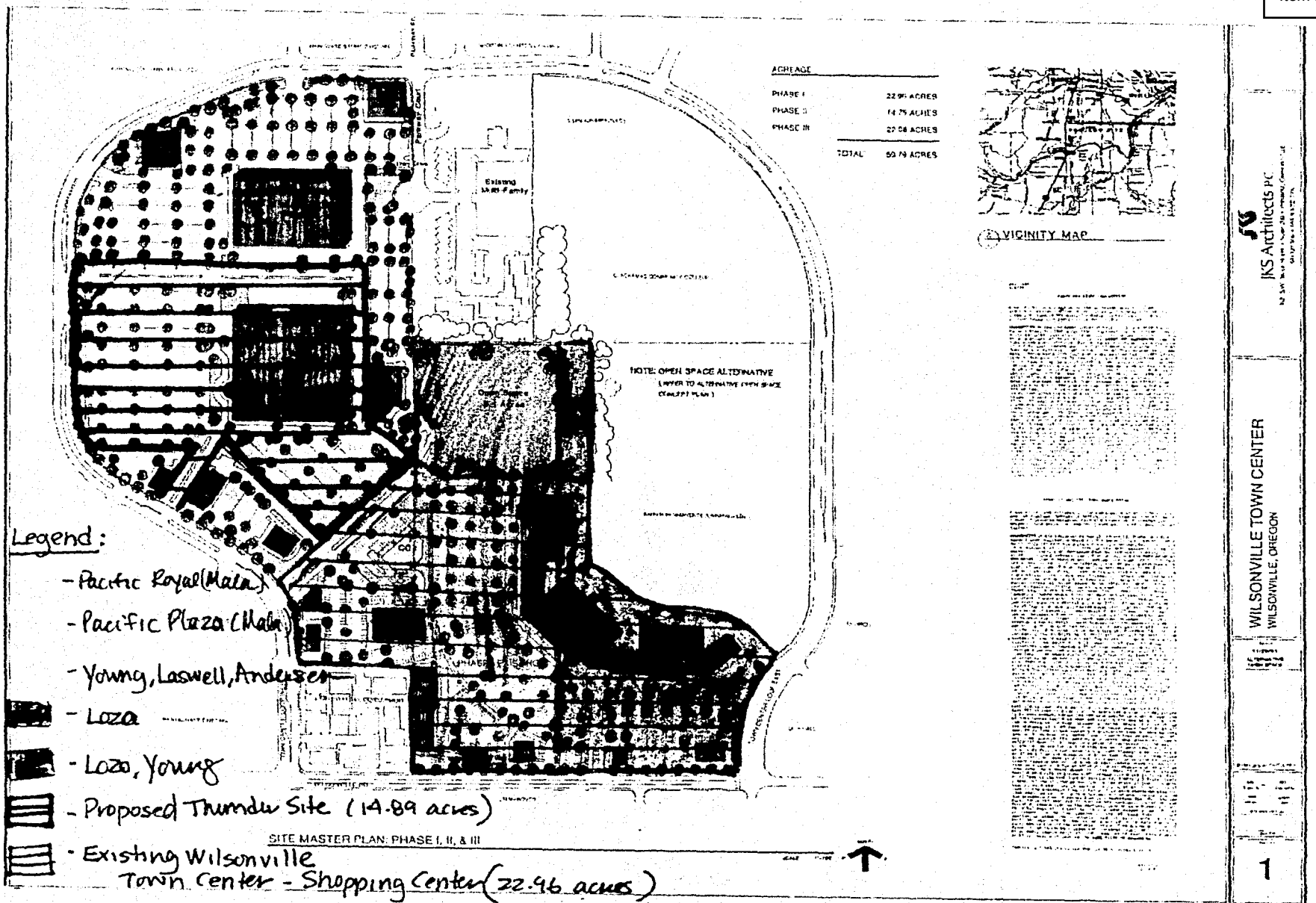
STAGE III A : CC



JKS Architects PC

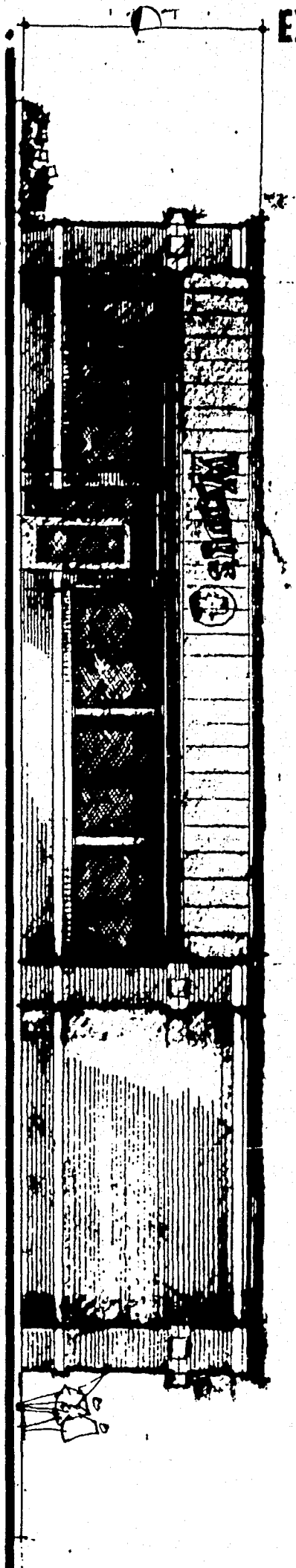
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

2383

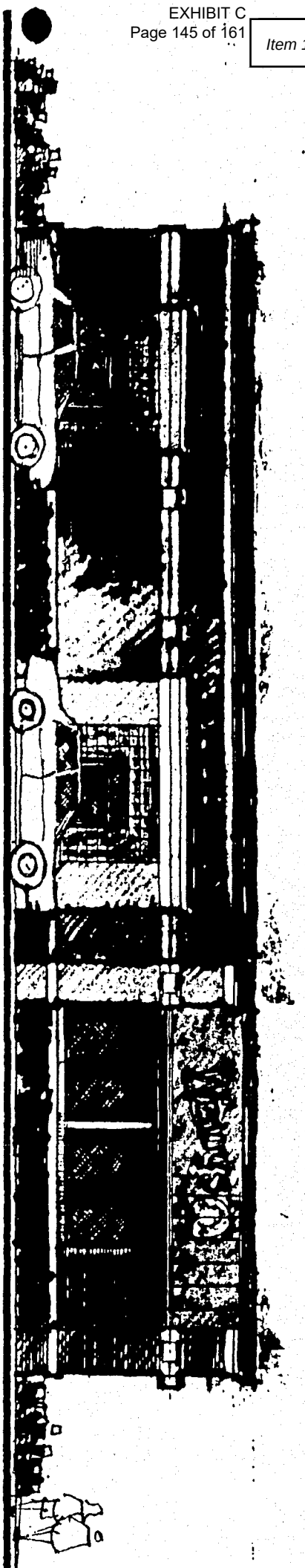

ACREAGE
PHASE I 22.96 ACRES
PHASE II 14.75 ACRES
PHASE III 22.08 ACRES
TOTAL 59.79 ACRES
NOTE: OPEN SPACE ALTERNATIVE
VICINITY MAP
JKS Architects PC
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON
1
Legend:
- Pacific Royal (Main)
- Pacific Plaza (Main)
- Young, Laswell, Andersen
- Loza
- Loza, Young
- Proposed Thunder Site (14.89 acres)
- Existing Wilsonville Town Center - Shopping Center (22.96 acres)
SITE MASTER PLAN: PHASE I, II, & III

DEFECTS IN ORIGINAL DOCUMENT

EXHIBIT F



NORTH ELEVATION
1/8" = 1'-0"

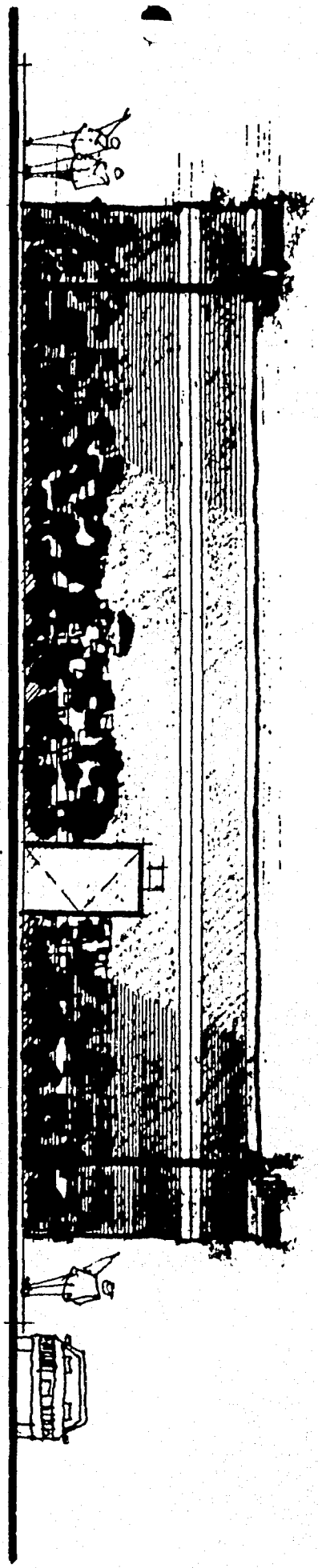


SOUTH ELEVATION
1/8" = 1'-0"

DRAWING NO:	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

WEST ELEVATION

1/8" = 1'-0"



EAST ELEVATION

1/8" = 1'-0"

DRAWING NO:	PROJECT NAME:	DATE:
2	**Wendy's Restaurant**	**2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

CITY OF WILSONVILLE

30445 S.W. Boones Ferry Road
P.O. Box 220 Wilsonville, OR 97070-0220
(503) 682-4960

PLANNING DEPARTMENT
SITE DEVELOPMENT APPLICATION A

File No. 91 PC 43 1/4 Sec.

Final action on application or zone change is required within 120 days in accordance with provisions of ORS 227.178.

Pre-App. ____ No. ____ Day ____ Yr.

A preapplication conference normally is required prior to submittal of an application. Please contact the Planning Department at 682-4960 for an appointment.

APPLICANT - COMPLETE

Owner's Name CAPITAL REALTY CORP. Contact Person Kim Beach

Address 101 S.W. MAIN SUITE 1500 Address ____

Portland OR. 97204

Phone 223-1200 Phone SAME

Owner's Signature Kimberlin J. Beach, Vice President Capital Realty Corp
Plaza Royal Officially Designated Representative

Property Description: T 3 R ____ Map 3 1 5 1 9 1 2 Tax Lot(s) 200, 201, 701 See ON 13 102, 300

Request STAGE I MASTER PLAN REVISION
STAGE II PHASE II WILSONVILLE Town Center
SITE PLAN - MOBILEY CONDITION #8 OF 90 PC 15

Please attach a plot plan (scale: 1"=40') and any other documents to this application. Please review the Planning Department submittal requirements to ensure that your application is complete.

—OFFICE USE ONLY—

Complete Application Accepted: Date 10/18/91 Public Hearing Date 12/9/91

Staff Signature Blair Edwards

Class I ☐ Class II ☒ Class III

☐ PLAN AMENDMENT	☐ MAJOR PARTITION	☐ DESIGN REVIEW
☐ ZONE CHANGE	☐ MINOR PARTITION	☐ TEXT AMENDMENT
☐ PRELIMINARY PLAT	☐ CONDITIONAL USE	☐ SIGN REVIEW
☐ FINAL PLAT	☐ VARIANCE	☐ TEMPORARY USE
☒ PLANNED DEVELOPMENT	☒ OTHER REGNSIDER CONDITION OF 90 PC 15	

SITE FINDINGS

1. Zoning: PDC / TOWN CENTER
2. Area of Lot: SEE FILE
3. Building or Sign Height: (Max) ____
4. Zoning Code Minimum Setbacks: Front ____ Side ____ Rear ____
5. Building Area ____
6. Access to Property TOWN CENTER LOOP WEST
7. Other: ____

☐ Approved ☐ Denied ☐ Approved with Conditions (see attached)

Conditions of Development ____

Approval of this development permit is based on information submitted by the applicant as called out above. Any change of plans or incorrect information when discovered will void this permit. This decision may be appealed in accordance with the provisions of the Wilsonville Code and ORS 227.180.

Fee Amount Paid $1315.00 Check No. SEE ⇨ Cash 1205 PAY $ SEE ... FEE - I
1206 PAY $625.00 II
1207 PAY $315.00 - CASH 4

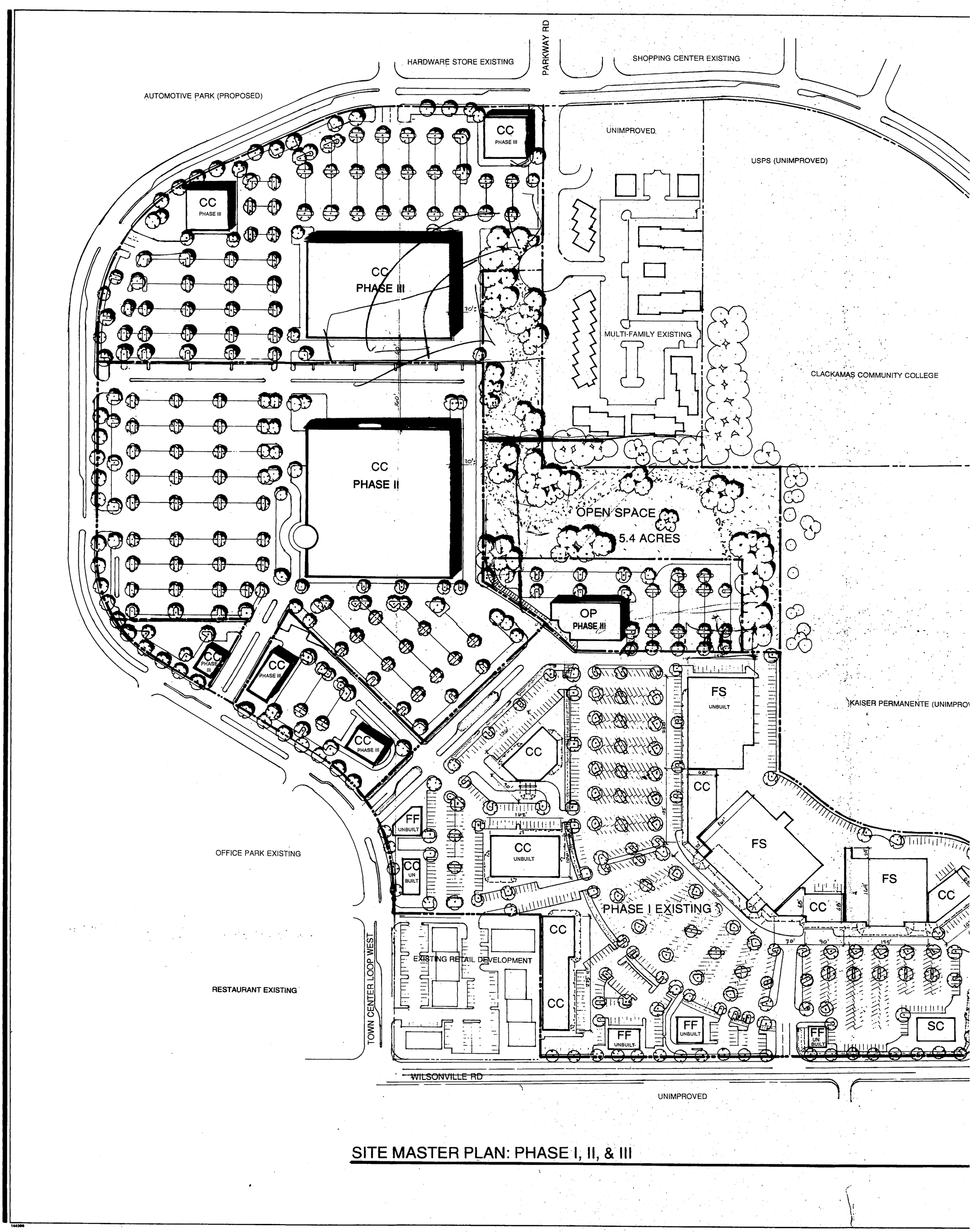
Permit Approval: Planner's Signature ____ Date: ____

City Council or Planning Commission Approval ☐ Yes ☐ No

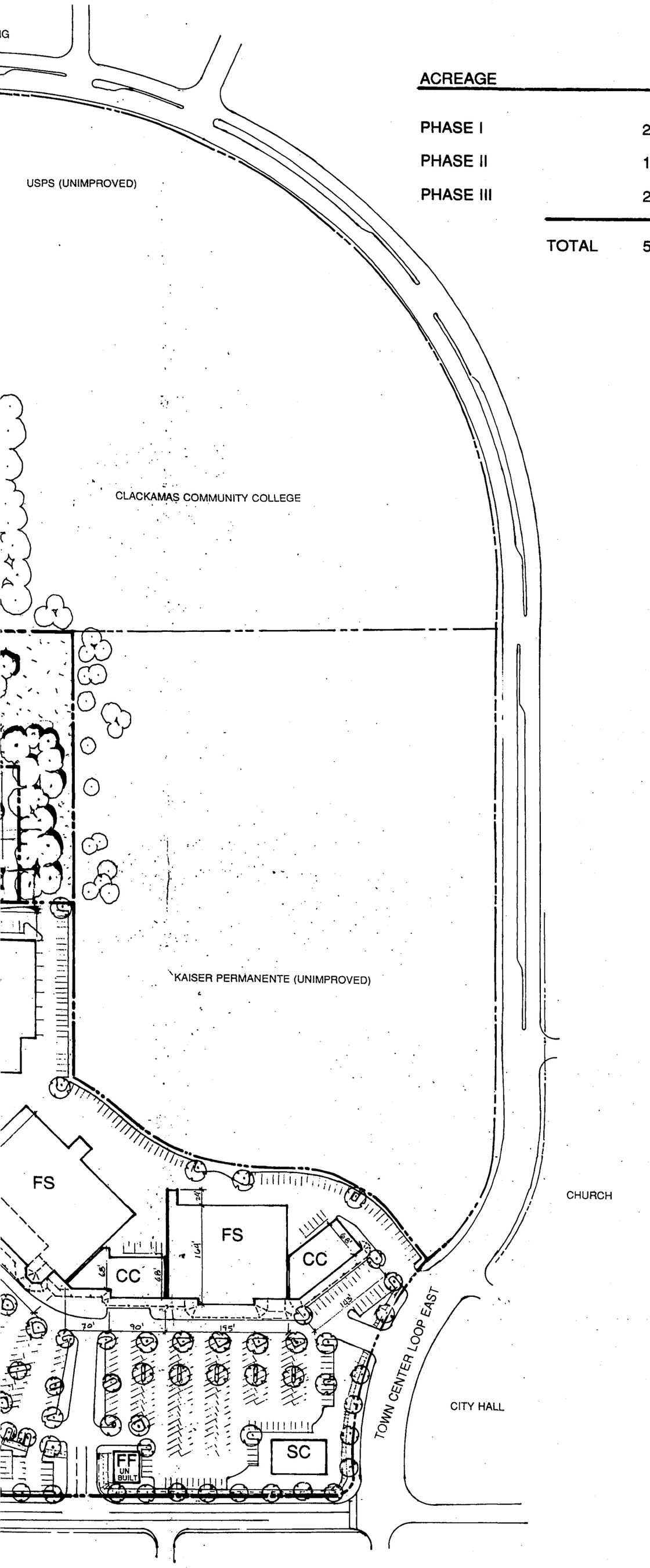
Order / Resolution ____

2390

White — Applicant's Receipt Yellow — File Pink — Applicant's Receipt



SITE MASTER PLAN: PHASE I, II, & III



ACREAGE

PHASE I	22.96 ACRES
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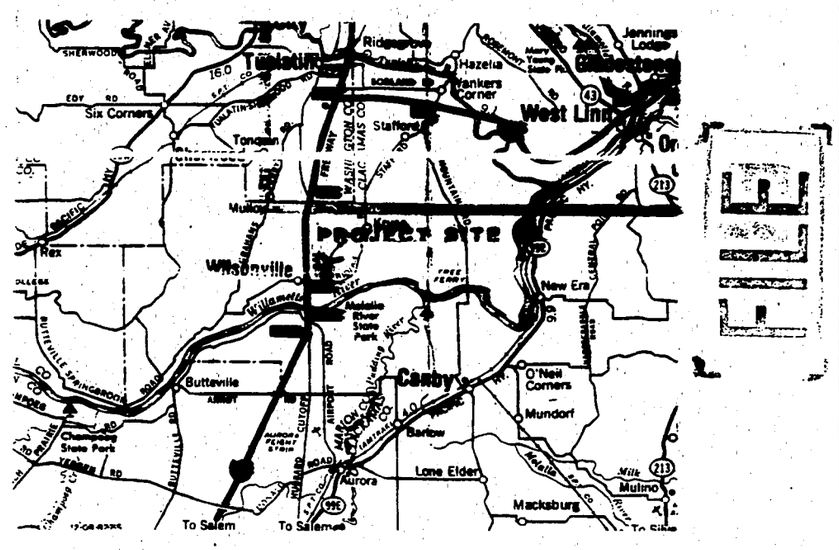
TOTAL	59.79 ACRES



(2/1) VICINITY MAP

467-0102
5/6/91

PHASE ONE LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'31" East along the section line between Sections 13 and 14 a distance of 44.00 feet to the **POINT OF BEGINNING**; thence continuing North 00°03'01" East along said section line a distance of 339.50 feet; thence South 89°59'30" West a distance of 338.63 feet to the easterly right-of-way line of Town Center Loop Road West; thence North 00°00'22" East along said easterly right-of-way line a distance of 44.55 feet to a point of curvature; thence 247.91 feet along the arc of a 360.54 foot radius curve to the left through a central angle of 39°23'57" and whose chord bears North 18°39'27" West a distance of 243.05 feet to a point on a curve; thence North 46°03'00" East a distance of 594.01 feet; thence South 89°57'00" East a distance of 66.14 feet; thence South 00°03'00" West a distance of 63.00 feet; thence South 89°57'00" East a distance of 479.78 feet; thence South 00°03'01" West a distance of 285.68 feet to the intersection with a non-tangent curve; thence 93.82 feet along the arc of a 317.33 foot radius curve to the right through a central angle of 16°56'21" and whose chord bears South 55°30'59" East a distance of 93.48 feet to a point of reverse curvature; thence 348.26 feet along the arc of a 336.67 foot radius curve to the left through a central angle of 42°03'00" and whose chord bears South 68°02'49" East a distance of 242.74 feet to a point of tangency; thence South 89°02'49" East a distance of 51.65 feet to a point of curvature; thence 174.68 feet along the arc of a 200.00 foot radius curve to the right through a central angle of 50°02'34" and whose chord bears South 64°01'32" East a distance of 169.15 feet to a point of tangency; thence South 39°00'15" East a distance of 97.50 feet to a point on a non-tangent curve; thence 328.21 feet along the arc of 494.00 foot radius curve to the left through a central angle of 38°04'18" and whose chord bears South 19°42'06" West a distance of 331.74 feet to a point of tangency; thence South 00°42'57" West a distance of 99.46 feet to a point of curvature; thence 48.14 feet along the arc of a 30.00 foot radius curve to the right through a central angle of 91°56'29" and whose chord bears South 44°40'11" West a distance of 43.17 feet to a point of tangency; thence South 89°21'26" West a distance of 375.16 feet to the Point of Beginning. Said parcel of land contains 22.96 acres, more or less.

PHASE II AND III LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**; thence leaving said section line South 45°03'00" West 589.42 feet to point of non-tangent curvature on the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line along the following courses and distances: tracing the arc of a 360.54 foot radius curve to the left (the radial center of which bears South 53°40'44" West) through a central angle of 20°25'22" an arc distance of 135.64 feet (the long chord bears North 47°31'56" West 134.92 feet) to a point of tangency; thence North 57°44'38" West 463.30 feet to a point of curvature; thence tracing the arc of a 258.16 foot radius curve to the right through a central angle of 57°42'16" an arc distance of 270.07 feet (the long chord bears North 28°53'30" West 258.80 feet) to a point of tangency; thence North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing the easterly, southeasterly and southerly right-of-way line of said Town Center Loop Road West along the following courses and distances: North 00°02'22" West 211.31 feet to a point of curvature; thence tracing the arc of a 444.00 foot radius curve to the right through a central angle of 64°15'44" an arc distance of 498.01 feet (the long chord bears North 32°24'30" East 444.85 feet) to a point of tangency; thence North 64°32'22" East 286.54 feet to a point of curvature; thence tracing the arc of a 414.00 foot radius curve to the right through a central angle of 24°58'03" an arc distance of 180.41 feet (the long chord bears North 77°20'24" East 178.96 feet) to a point of tangency; thence North 89°49'25" East 300.93 feet to a point of curvature for a right-of-way return to Parkway Avenue; thence leaving said southerly right-of way line of Town Center Loop Road West and tracing the arc of a 20.00 foot radius curve to the right through a central angle of 90°13'35" an arc distance of 31.49 feet (the long chord bears South 45°03'47" East 28.34 feet to the westerly right-of-way line of said Parkway Avenue (31.00 feet from center line); thence tracing said right-of-way line through the following courses and distances: South 00°03'01" West 311.17 feet to a point of curvature for the return to the cul-de-sac for said Parkway Avenue; thence tracing the arc of a 20.00 foot radius curve to the right through a central angle of 47°09'23" an arc distance of 16.46 feet (the long chord bears South 23°37'42" West 16.00 feet) to a point of reverse curvature; thence tracing the arc of a 55.00 foot radius curve to the left through a central angle of 87°59'01" an arc distance of 84.46 feet (the long chord bears South 03°12'53" West 76.40 feet); thence leaving said Parkway Avenue right-of-way line North 89°52'55" East 41.62 feet to the east line of section 14, Township 3 South, Range 1 West, of the Willamette Meridian in the State of Oregon; thence tracing said east line of section 14 South 00°03'01" West 446.55 feet to the northerly line of Parcel 3 of said **Partition Plat No. 1991-164**; thence tracing said northerly line and continuing along the northerly line of Parcel 2 of said **Partition Plat No. 1991-164** North 89°26'52" East 549.20 feet to the northeast corner of said Parcel 2; thence tracing the easterly line of said Parcel 2 South 00°03'01" West 440.61 feet to the southeast corner of said Parcel 2; thence tracing the southerly line of said Parcel 2 and continuing along the southerly line of said Parcel 3 North 89°57'00" West 479.78 feet to an angle point in said southerly line; thence tracing the westerly portion of said southerly line of Parcel 3 the following courses and distances: North 00°03'01" East 63.00 feet; thence North 89°57'00" West 66.14 feet; thence South 45°03'00' West 4.59 feet to the **TRUE POINT OF BEGINNING.**

Containing 1,604,349 square feet or 36.83 acres more or less.

467-0301
10/16/91

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

Revisions

KJD	RSB
Drawn By	Checked By
8963	10/18/91
Job No.	Date

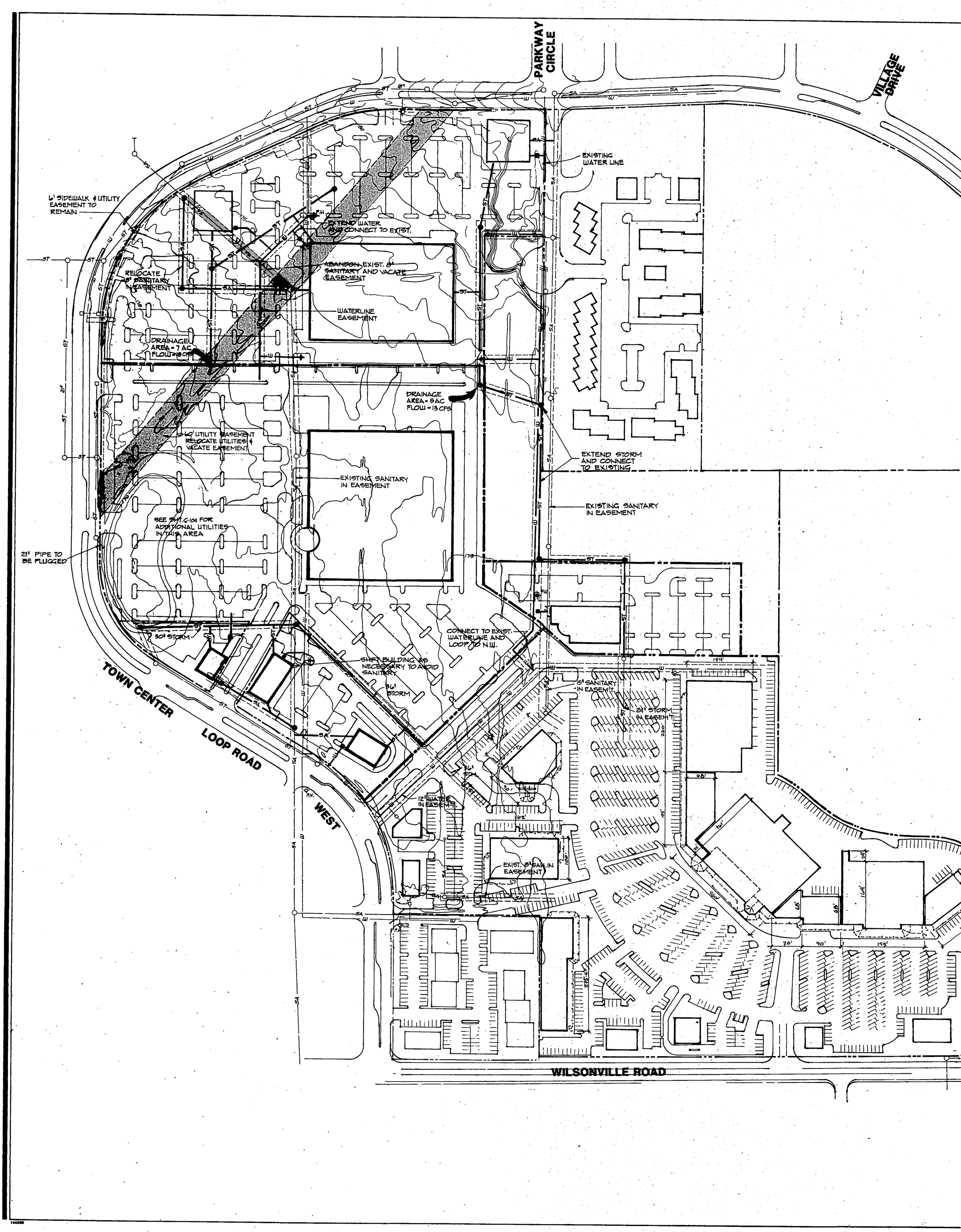
SITE MASTER PLAN

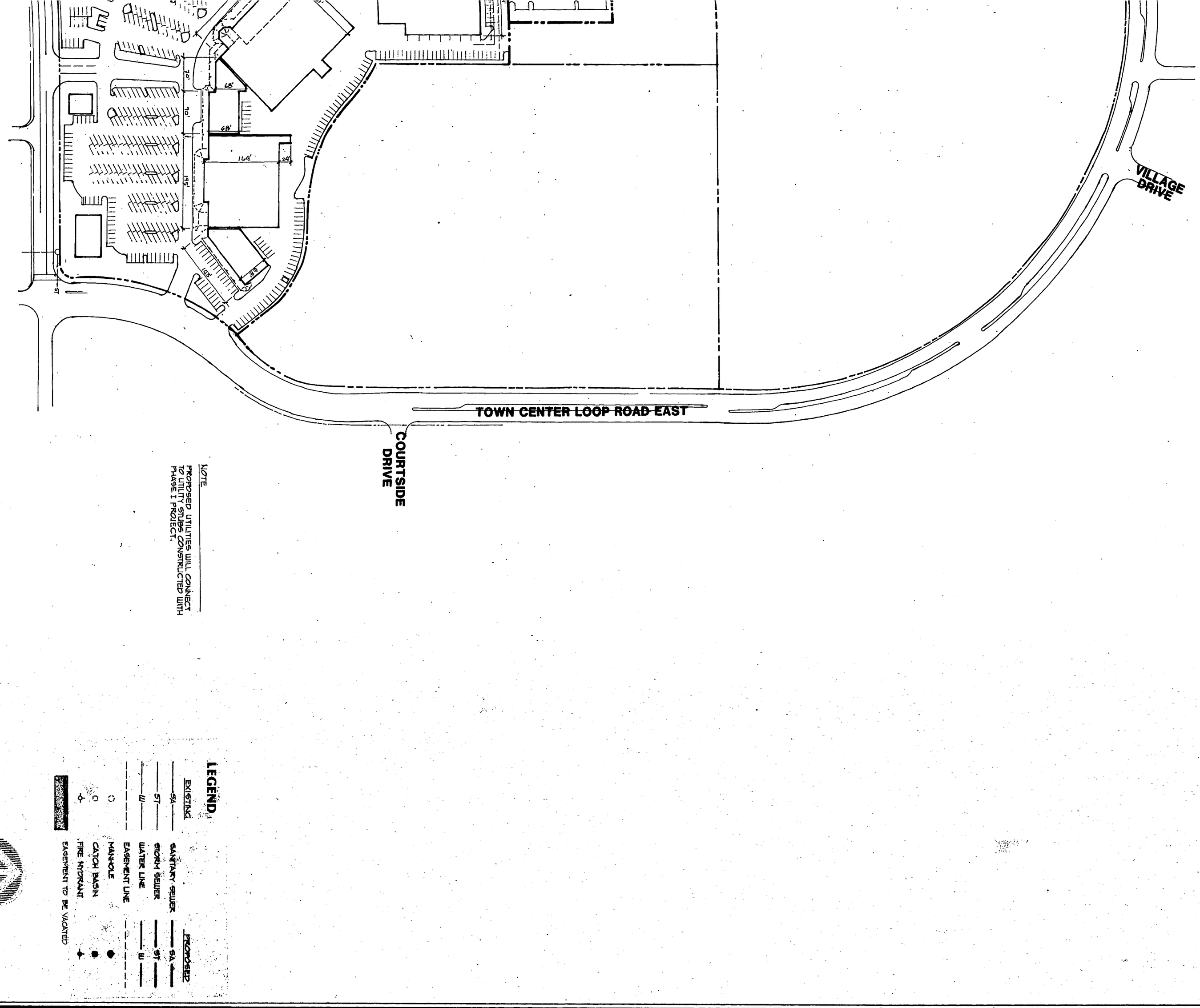
Sheet Title

Sheet No.

1

of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER AND CONNECT TO EXIST.
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA = 7 AC FLOW = 18 CFS
DRAINAGE AREA = 5 AC FLOW = 13 CFS
60' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEMT.
15" SANITARY IN EASEMT
24" STORM IN EASEMT
EXIST. 8" SAN. IN EASEMENT
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE I PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
◇	FIRE HYDRANT	◆
	EASEMENT TO BE VACATED	

1" = 100'

Revisions

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
(503)227-0455
Fax (503)274-6607
Planning • Engineering • Surveying • Landscape Architecture

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

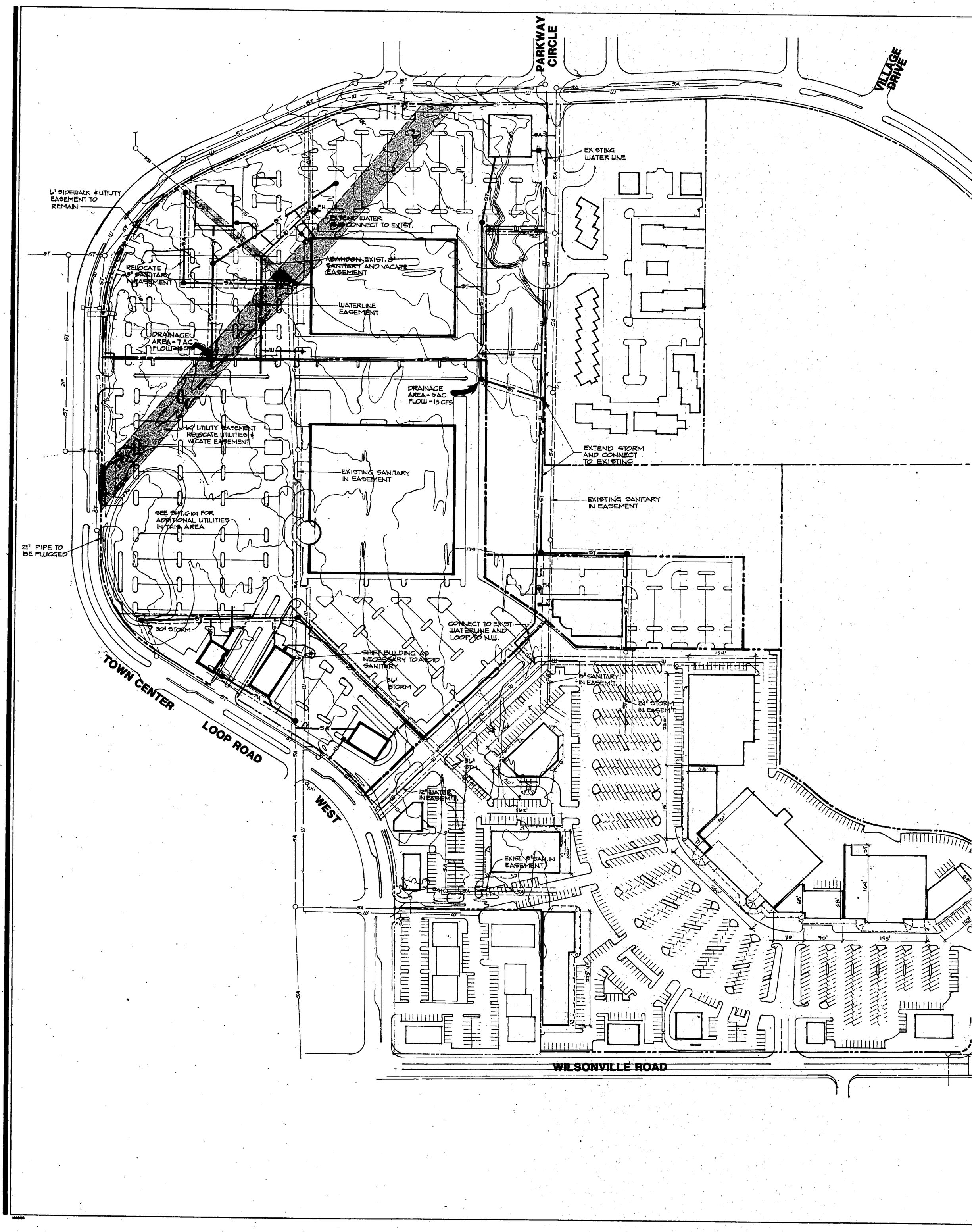
Drawn By _____ Checked By _____

Job No. 4-440-0201 Date 10-29-91

MASTER UTILITIES PLAN

Sheet Title

Sheet No. **2** of


PARKWAY CIRCLE
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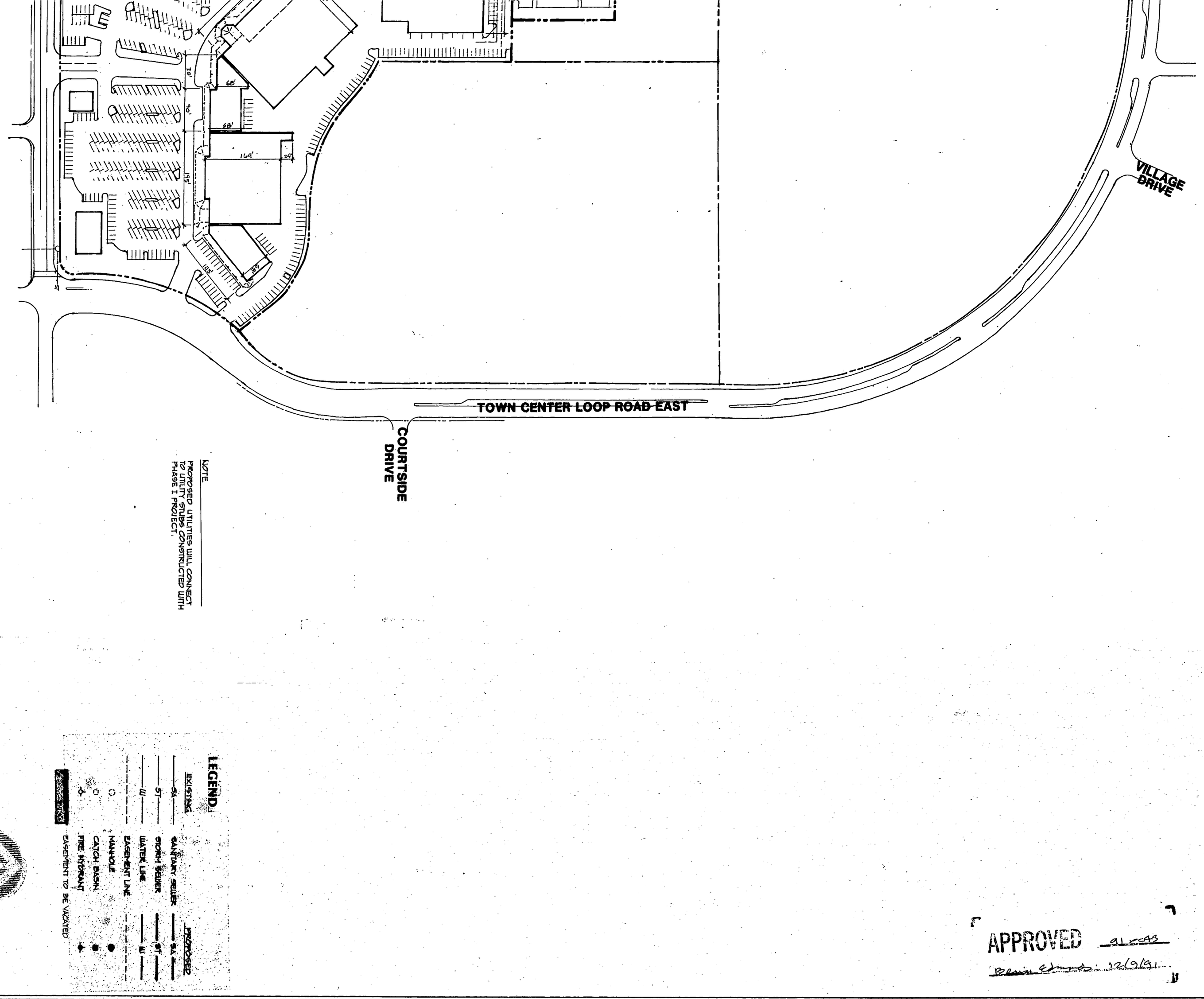
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA - 7 AC FLOW = 18 CFS
DRAINAGE AREA - 5 AC FLOW - 13 CFS
10' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30' STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36' STORM
15" SANITARY IN EASEM'T
24" STORM IN EASEM'T
12" WATER IN EASEMENT
EXIST. 8" SAN. IN EASEMENT
TOWN CENTER LOOP ROAD
WEST
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE 1 PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
	FIRE HYDRANT	●
	EASEMENT TO BE VACATED	

1" = 100'

APPROVED 12/9/91

Revisions

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

W.H. PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
(503)227-0455
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Planning • Engineering • Surveying • Landscape Architecture

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

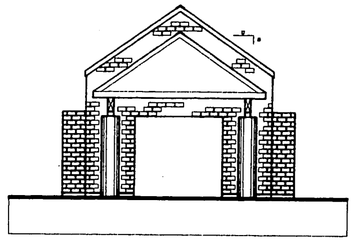
Drawn By: Checked By:

Date: 4/30/91 Rev 11/20/91
MASTER UTILITIES PLAN
Sheet Title

Sheet No. 2 of

NICOLI ENGINEERING
and Construction Services Inc
9025 S.W. Center Street • P.O. Box 23784
Tigard, Oregon 97223
Phone: (503) 620-2086
FAX: (503) 684-3636

WILSONVILLE TOWN CENTER
PROPOSED CAR WASH
WILSONVILLE, OREGON



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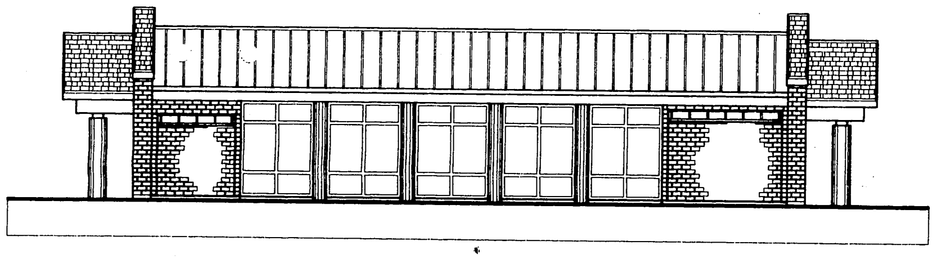
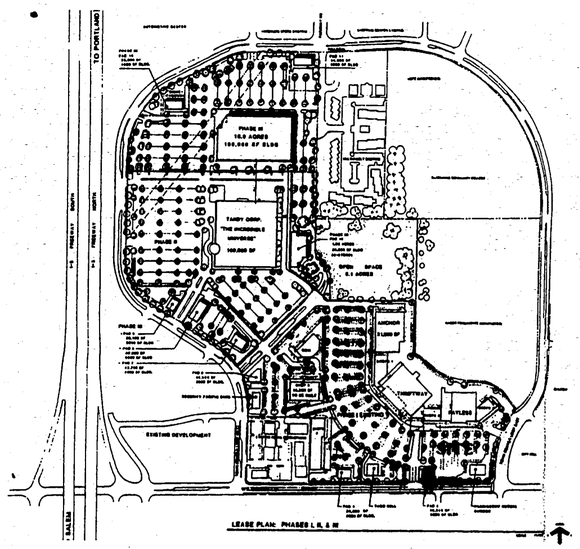


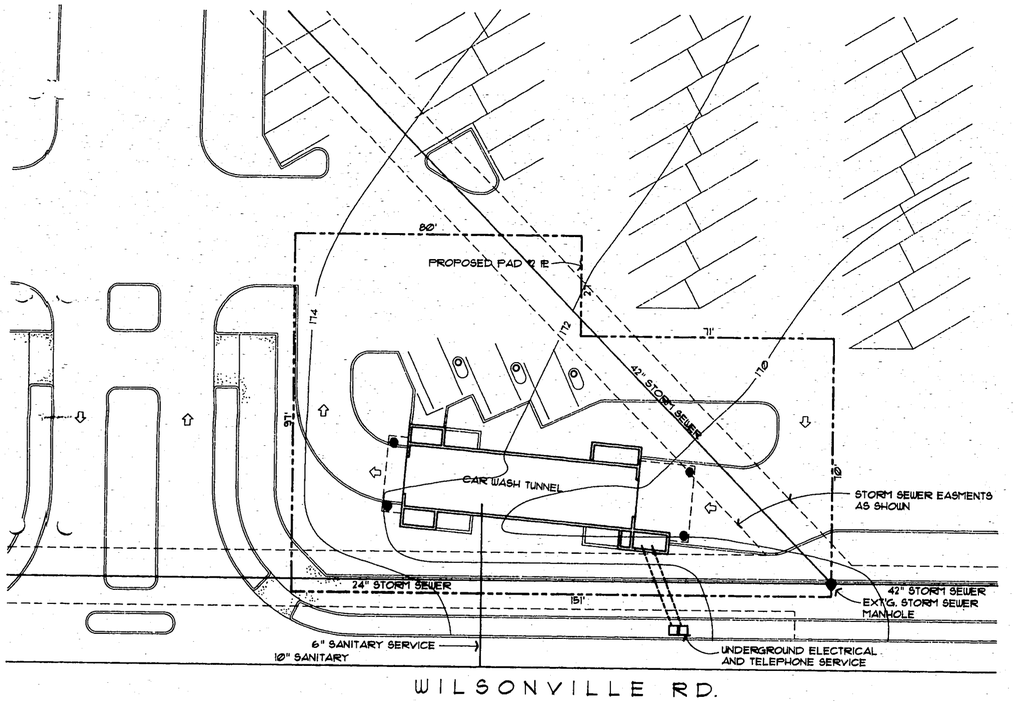
FRONT ELEVATION
1/8" = 1'-0"



VICINITY MAP

SITE DATA

	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA	1,500±	12%
PARKING & DRIVES	8,293±	65%
LANDSCAPING/OPEN SPACE	2,937±	23%
TOTAL SITE AREA	12,730±	100%



NORTH

PRELIMINARY SITE PLAN
1" = 20'

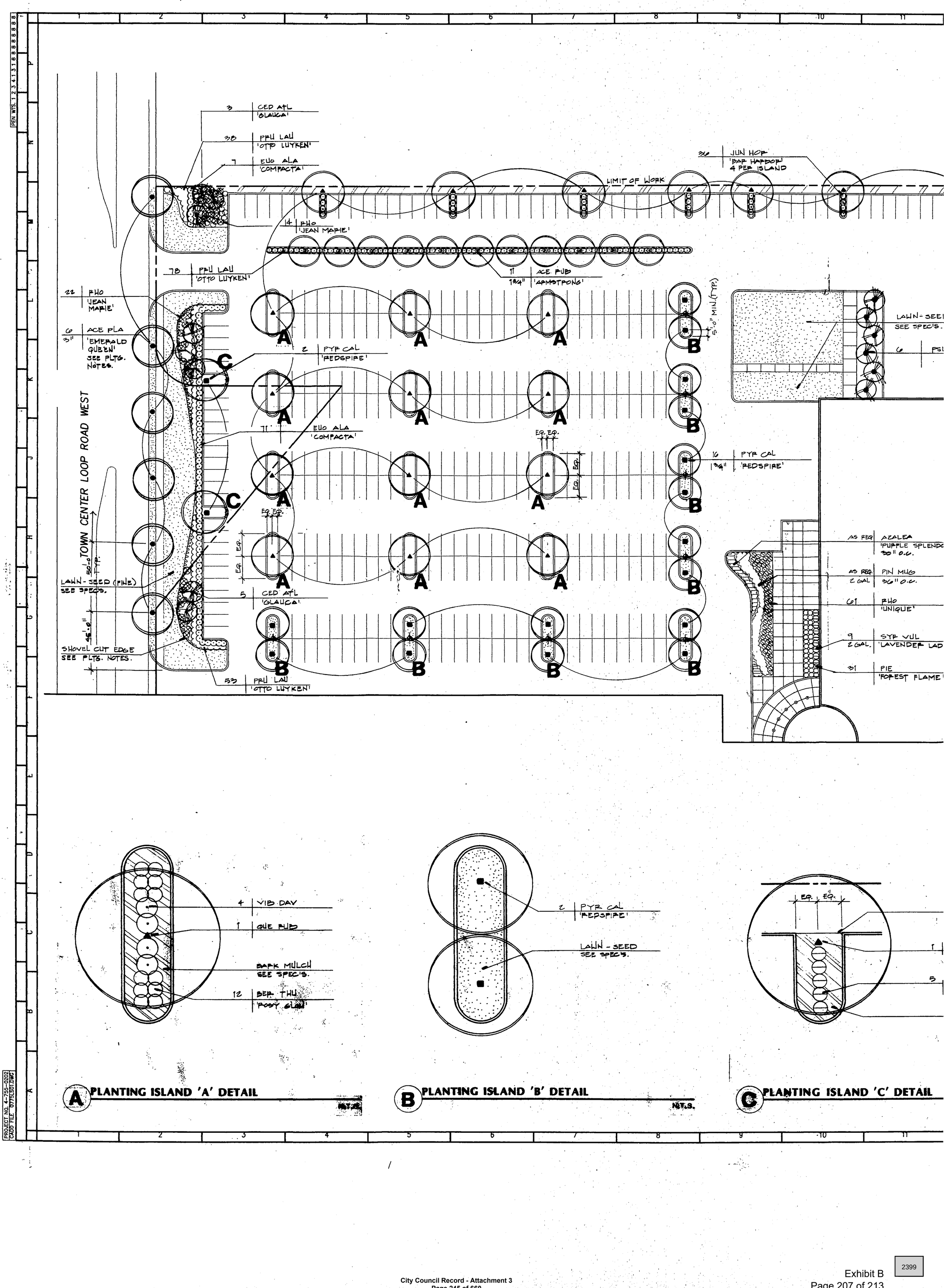
CLIENT:
DENNIS THOMPSON

REVISIONS:

Date:	11-20-92
Scale:	AS SHOWN
Drawn by:	SET
Checked by:	JDA
Job No.:	2023
Drawing No.:	2023TITL

SHEET 1 of 1

2398

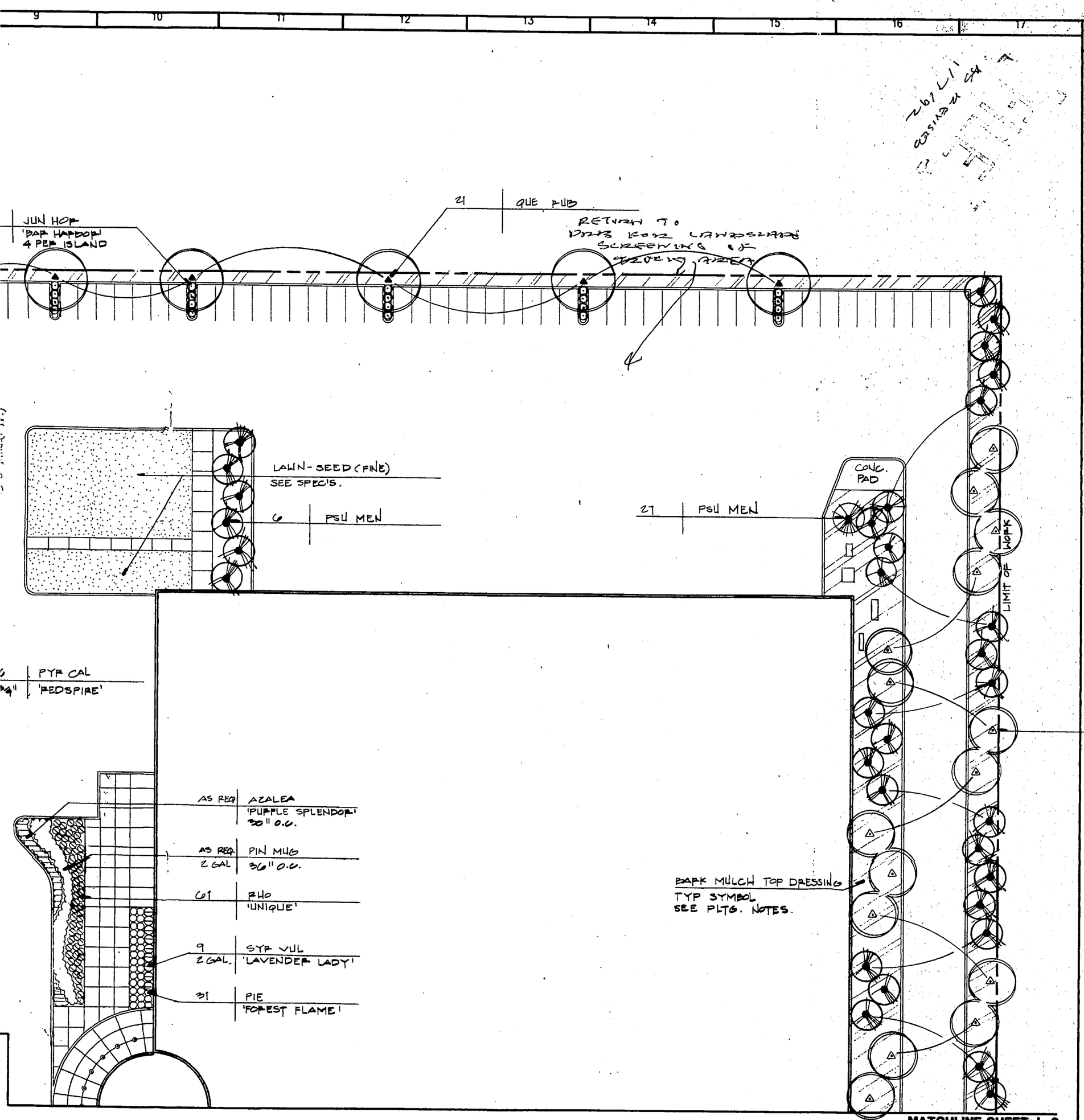


A PLANTING ISLAND 'A' DETAIL N.T.S.

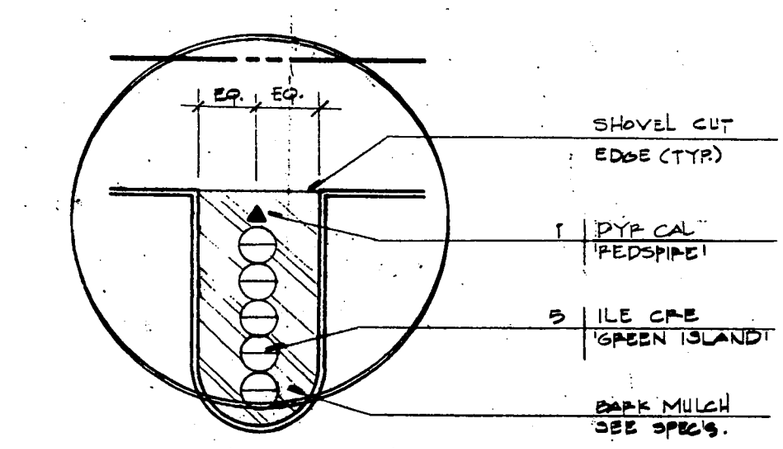
B PLANTING ISLAND 'B' DETAIL N.T.S.

C PLANTING ISLAND 'C' DETAIL

PROJECT NO. 4-755-0202
CADD FILE '0775LS01.DWG'



MATCHLINE SHEET: L-2



C PLANTING ISLAND 'C' DETAIL N.T.S.

SHEET NOTES

PLANTING GENERAL NOTES:

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES IN PLANTING AREAS PRIOR TO PLANTING. CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES 48 HOURS PRIOR TO BEGINNING EXCAVATION WORK FOR UTILITY LOCATION INFORMATION:

TELEPHONE:	503 246 6699	
GAS:	503 246 6699	
ELECTRIC:	503 246 6699	
SEWER:	503 682 4960	ATTN: MARTIN BROWN
WATER:	503 682 4960	ATTN: MARTIN BROWN

LIGHT STANDARDS ARE SHOWN FOR REFERENCE ONLY. REFER TO DRAWING NUMBER DRBC2 FOR ADDITIONAL LIGHTING INFORMATION.

PLANTING IN PARKING LOT ISLANDS AS SHOWN IN ENLARGEMENTS ON SHEET L-1.0.

ALL SHRUB AND GROUNDCOVER PLANTING AREAS TO RECIEVE MINIMUM 2" DEPTH OF BARK MULCH. SEE SPECIFICATIONS 02950.

REFER TO CIVIL'S FOR FINISH GRADES IN PLANTING AREAS.

STREET TREES ON TOWN CENTER LOOP ROAD WEST SHALL BE PLANTED PER CITY OF WILSONVILLE STANDARD PLAN. IF NONE EXISTS, INSTALL PER DETAIL 1, L-2.0.

ALL LAWN EDGES AT SHRUB PLANTING AREAS SHALL BE SHOVEL CUT. CONTRACTOR SHALL MAINTAIN ALL SHOVEL CUT EDGES IN A SMOOTH AND EVEN CONDITION UNTIL FINAL ACCEPTANCE.

CONTRACTOR SHALL SUPPLY AND INSTALL ANNUAL COLOR, 4" POT SIZE AT 10" O.C.. COLOR MATERIALS TO BE SELECTED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO PLANTING. ANNUAL COLOR MATERIAL SHALL BE IN SEASON (FULL BLOOM) AT TIME OF INSTALLATION.

NOT FOR CONSTRUCTION

PRINTED JAN 06 1992 W & H PACIFIC

APPROVED

PROJECT NORTH

W&H PACIFIC
1299 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title: PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title: LANDSCAPE PLAN

Seal: REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L1.0
Reviewed MH	
Date 12-27-91	

c 1991 DESIGN FORUM ARCHITECTS

PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8

MATCHLINE SHEET: L-1

TOWN CENTER LOOP ROAD WEST

4" POT | ANNUAL COLOR | SEE PLTG. NOTES

3 | 3" | ACE CIP

20 | RHO 'JEAN MARIE'

SHOVEL CUT EDGE (TYP.) SEE PLTG. NOTES.

EQ. EQ.

5'-0" MIN.

30 | VIB DAV

5 | CED ATL. 'GLAUCA'

10 | ILE CRE 'GREEN ISLAND'

61 | PRU LAU 'OTTO LUYKEN'

56 | EUO ALA 'COMPACTA'

11'-0" TYP.

4 | 3" | ACE PLA 'EMERALD QUEEN' SEE PLTG. NOTES

LAWN - SEED (FINE) SEE SPEC'S.

6 | 2" CAL | QUE PUB

ROUGH SEEDED AREA
See Grading Plans for Limits

15 | 1 3/4" | PPY CAL 'REDSPIRE'

AS REQ. | AZALEA 'PURPLE SPL.' 30" O.C.

AS REQ. | 2 GAL. | PIN MUG 30" O.C.

61 | RHO 'UNIQUE'

31 | PIE 'FOREST FLAME'

9 | 2 GAL | SYR VUL 'LAVENDER LADY'

25 | VIB DAV

13 | AZA 'PURPLE SPL.'

42 | AZA 'PURPLE SPL.'

AS REQ. | 4" POT | HED HEL 'GLACIER'

6 | ACE CIP

SIDEWALK N.I.C.

9 | 2" CAL | QUE PUB

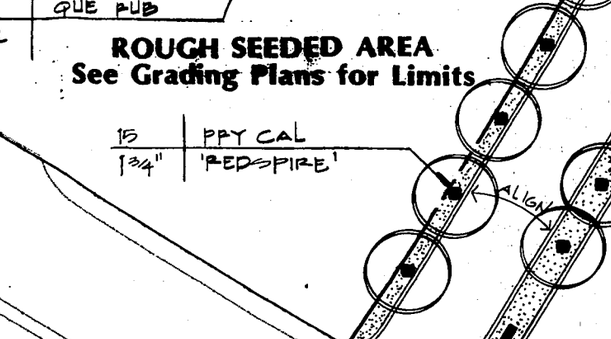
ROUGH SEEDED AREA
See Grading Plans for Limits

LAWN - SE
SEE SPEC'

PLANT LEGEND

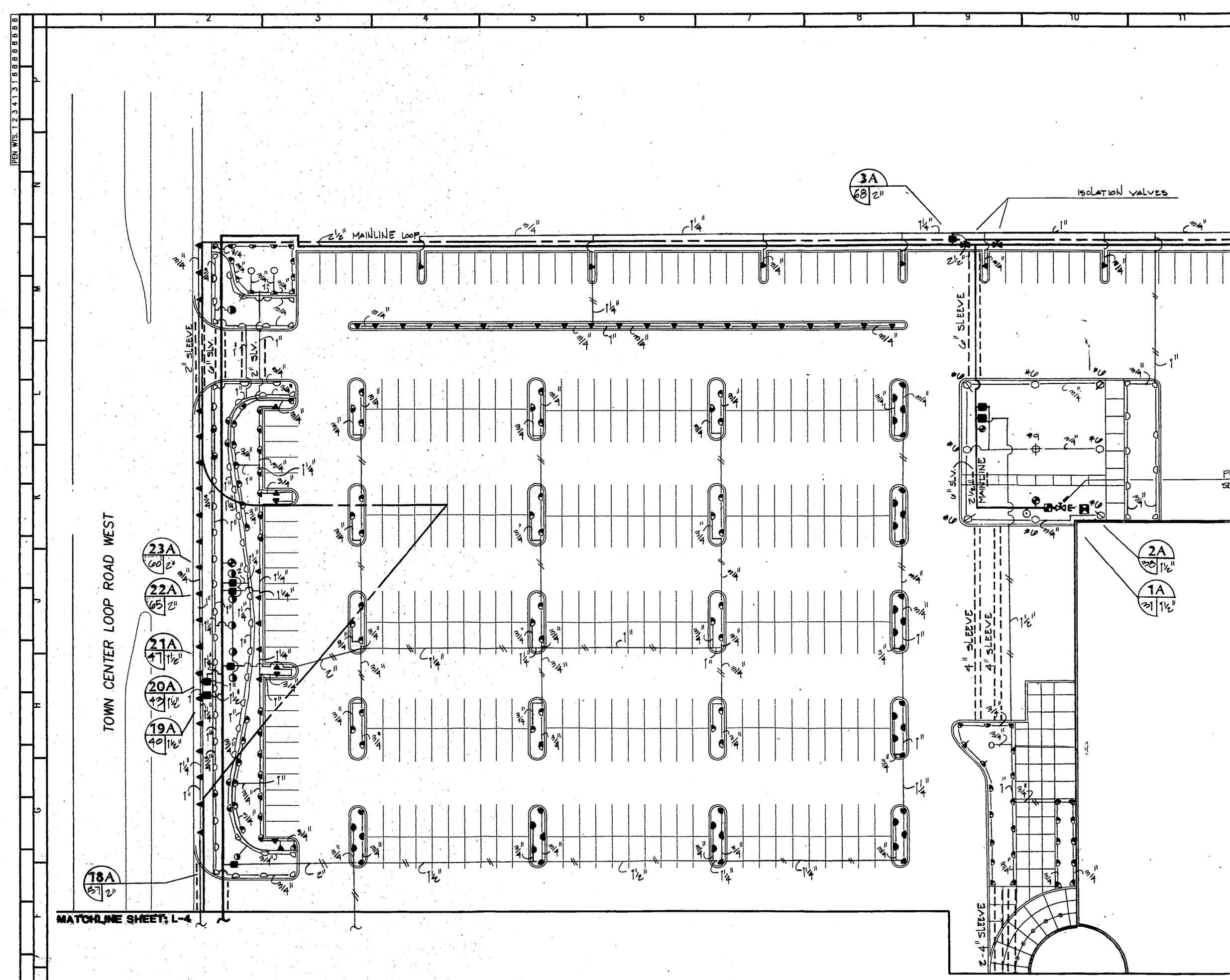
QTY	CODE	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
9	Ace Cir	Acer circinatum	Vine Maple	7'- 8'
30	Ace pla	Acer platanoides 'Emerald Queen'	Emerald Queen Maple	3" Cal.
11	Ace rub	Acer rubrum 'Armstrong'	Armstrong Columnar Maple	1-3/4" Ca
18	Ced atl	Cedrus atlantica 'Glauca'	Blue Atlas Cedar	8'- 10'
19	Pyr cal	Pyrus calleryana 'Chanticleer'	Chanticleer Pear	1-3/4" Ca
40	Pse men	Pseudotsuga menziesii	Douglas Fir	8'- 10'
36	Que rub	Quercus rubra	Red Oak	2" Cal.
70	Pyr cal	Pyrus calleryana 'Redspire'	Redspire Pear	1 3/4" C
SHRUBS				
210	Aza	Azalea 'Purple Splendor'	Purple Splendor Azalea	12-15"
12	Ber thu	Berberris thunbergii 'Rosy Glow'	Rosy Glow Japanese Barberry	2 Gal.
184	Euo ala	Euonymous alata 'Compacta'	Compact Winged Euonymous	12-15"
53	I le cre	Ilex crenata 'Green Island'	Japanese Holly	2 Gal.
62	Pie	Pieris 'Forest Flame'	Forest Flame Pieris	12-15"
151	Pin mug	Pinus mugo Pumilio	Dwarf Mugo Pine	2 Gal.
240	Pru lau	Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	12-15"
56	Rho	Rhododendron 'Jean Marie'	Rhododendron	12-15"
122	Rho	Rhododendron 'Unique'	Rhododendron	12-15"
18	Syr vul	Syringa vulgaris 'Lavender Lady'	Lavender Lilac	2 Gal.
53	Vib dav	Viburnum davidii	David Viburnum	12-15"
GROUNDCOVER				
2,230	Hed hel	Hedera helix 'Glacier'	Glacier Ivy	4" Pots
66	Jun hor	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Juniper	1 Gal.
216		Annual Color		4" Pots

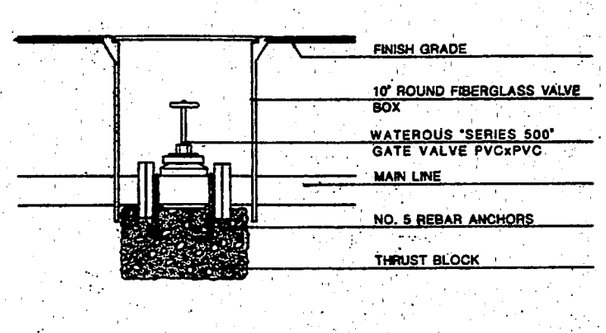
1 TREE PLANTING DETAIL N.T.S.



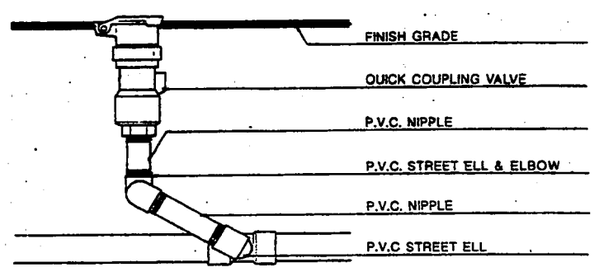
2 CONIFER PLANTING DETAIL N.T.S.

PROJECT NO. 4-755-0202
CADD FILE 0775L502.DWG

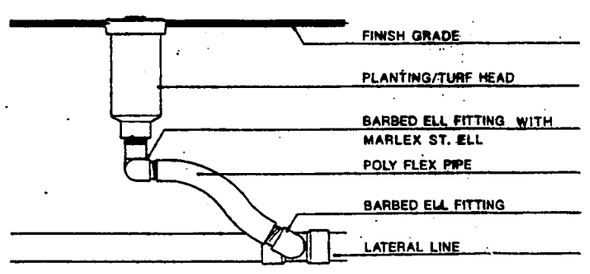




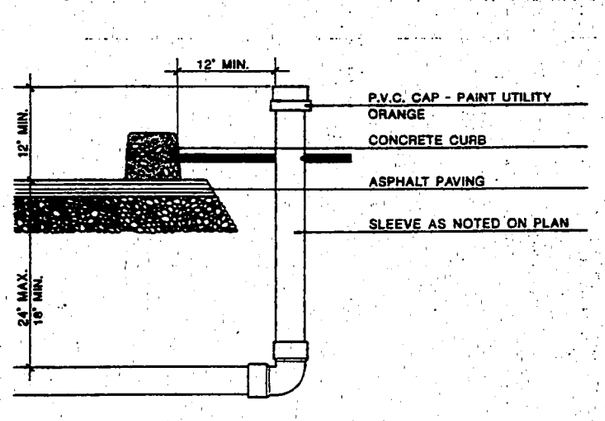
MAINLINE GATE VALVE



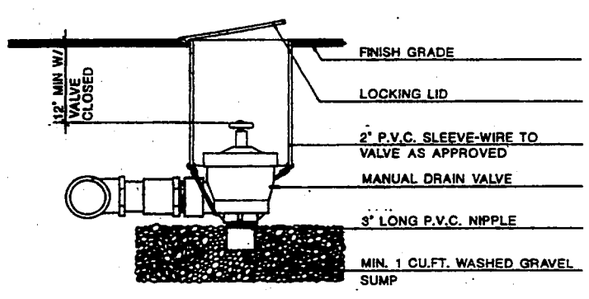
QUICK COUPLING VALVE DETAIL



POLY FLEX RISER DETAIL



SLEEVING DETAIL



MANUAL DRAIN VALVE DETAIL

PROJECT NO. 4-755-0202
CADD FILE 0775IR01.DWG

PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8 8

MATCHLINE SHEET: C-3

TOWN CENTER LOOP ROAD WEST

2½" MAINLINE LOOP

6" SLEEVE

2-4" SLV's.

4" SLV.

ISOLATION VALVE

17A 44 1½"

16A 26 1½"

15A 42 1½"

14A 50

12A 32 1½"

13A 54 1½"

11A 48 1½"

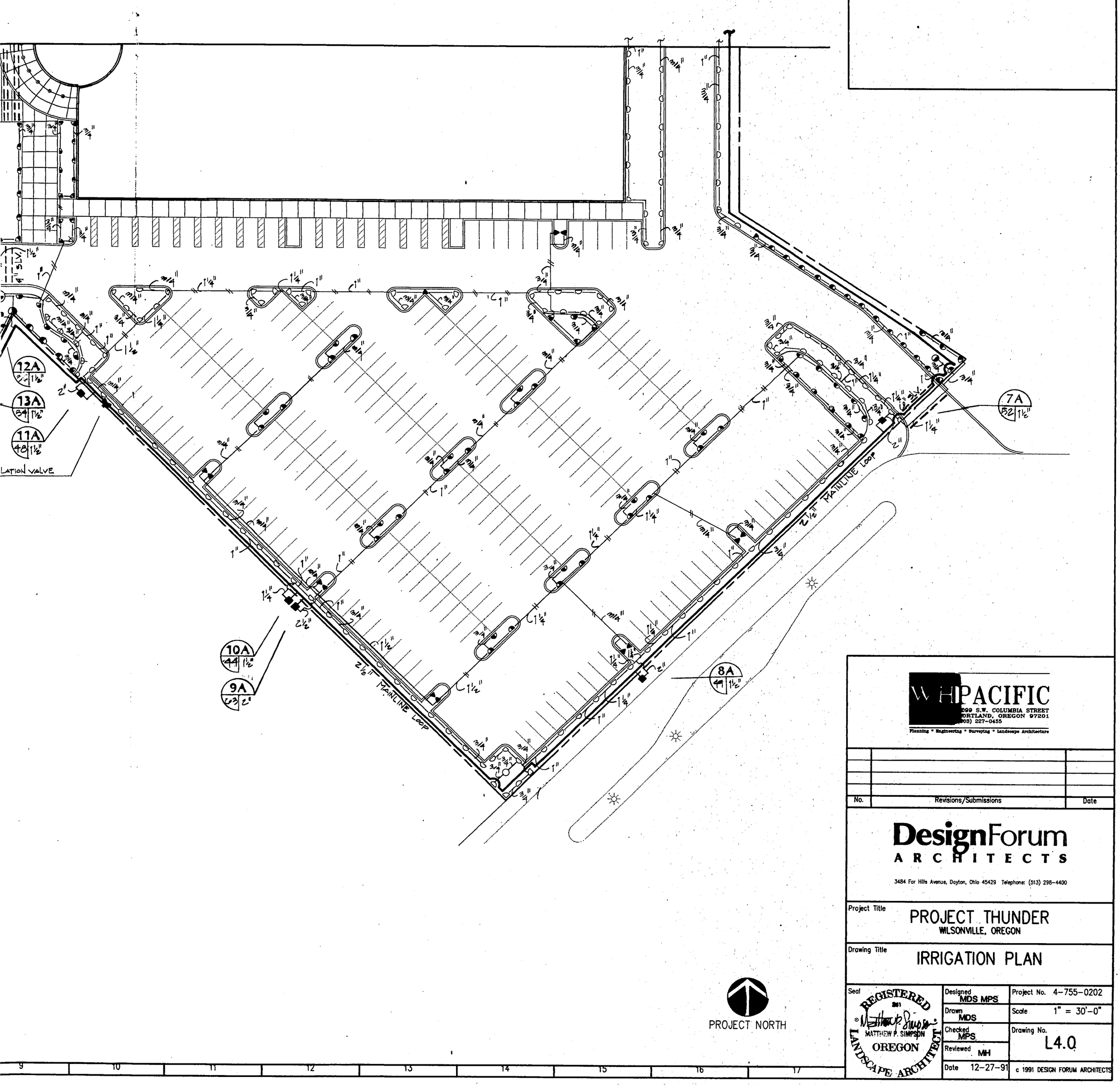
10A 44 1½"

9A 43 2"

PROJECT NO. 4-755-0202
CADD FILE 0775IR02.DWG

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

SHEET NOTES



WHPACIFIC
1099 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

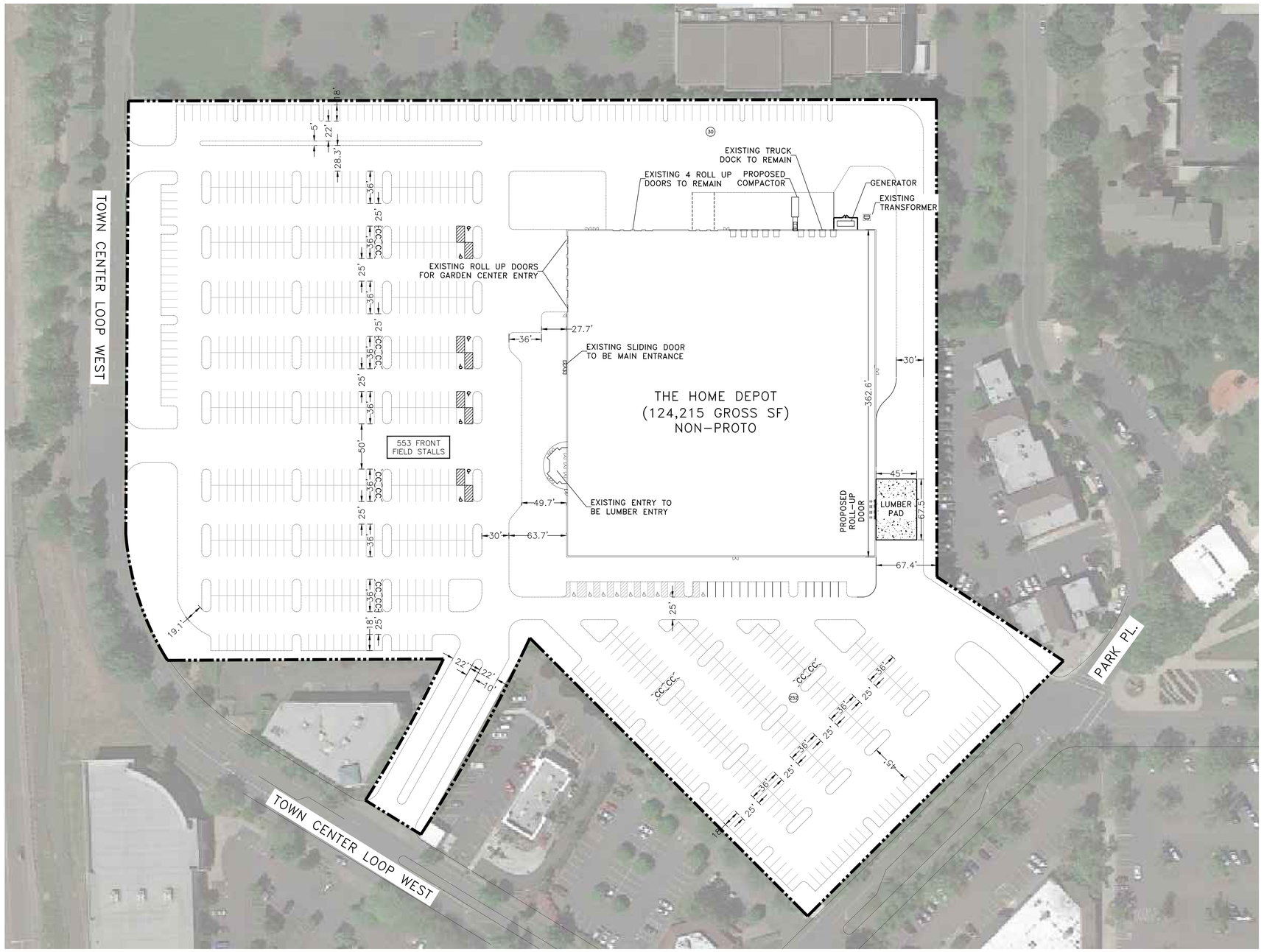
Project Title
PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title
IRRIGATION PLAN

Seal
REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202	
Drawn MDS	Scale 1" = 30'-0"	
Checked MPS	Drawing No. L4.0	
Reviewed MH		
Date 12-27-91	© 1991 DESIGN FORUM ARCHITECTS	

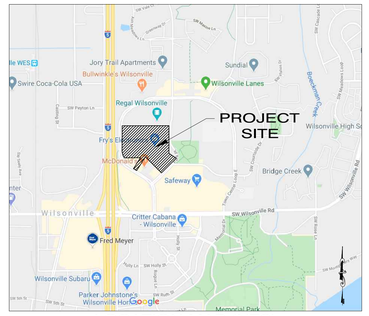
9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17



NOTES
1. PLAN BOUNDARY IS BASED OFF AVAILABLE APN MAPS; AN ALTA SHOULD BE COMPLETED FOR ACCURACY.

LARS ANDERSEN & ASSOCIATES, INC.
CIVIL ENGINEERS - LAND SURVEYORS - PLANNERS
4694 WEST JACQUELYN AVENUE – FRESNO CALIFORNIA 93722
TEL: 559 276-2790 FAX: 559 276-0850 WWW.LARSANDERSEN.COM

LA PROJECT NO. 20042.00



LOCATION MAP (NTS)

SITE AREA

THE HOME DEPOT PARCEL	15.01 AC	653,836 SF

BUILDING AREA

THE HOME DEPOT	124,215 SF
MEZZANINE	0 SF
SUBTOTAL	124,215 SF
TOTAL BUILDING AREA	124,215 SF

PARKING REQUIRED

THE HOME DEPOT	4.1 / 1,000 SF	509 STALLS
TOTAL PARKING REQUIRED		509 STALLS

PARKING PROVIDED

FRONT FIELD	553 STALLS
SIDE FIELD / REAR	282 STALLS
TOTAL PARKING PROVIDED	839 STALLS

INCLUDED IN PARKING PROVIDED

ACCESSIBLE STALLS (17 REQ. @ 2%)	17 STALLS

NOT INCLUDED IN PARKING PROVIDED

CART CORRALS	10 STALLS
ACCESSORY PARKING NOT INCLUDED	10 STALLS
TOTAL THD PARKING PROVIDED	839 STALLS

ZONING CLASSIFICATION

JURISDICTION	CITY OF WILSONVILLE
ZONING CLASSIFICATION	PLANNED DEVELOPMENT COMMERCIAL TOWN CENTER (PDC-TC)
THD USE PERMITTED BY RIGHT	YES

THE HOME DEPOT
WILSONVILLE, OR
29400 TOWN CENTER LOOP W
WILSONVILLE, OR 97070

DRAWING ISSUE DATE 10.19.2023
HD SITE SELECTION NUMBER SS-02804.2001

SCALE: 1"=50'-0"
25 0 25 50 100 150 200

OR - SITE PLAN 10

2405

WILSONVILLE
OREGON

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

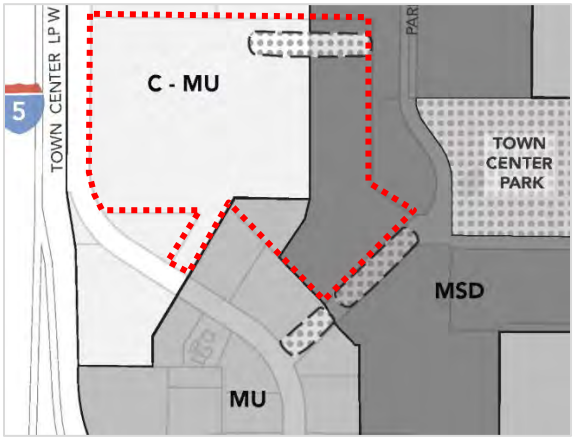
The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

1. The most relevant previous Planning approvals for the property include:
   - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
   - 91DR29 Site Design (Architectural, Landscaping) and Signage
   - 01AR01 Minor Architectural Revisions
   - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
   - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

Unique Serial Number: (assigned by dbase) 4808

Department: Planning

Case No: 91PC43 File Creation Date:

Request: Modified Stage I Master Plan and Stage II Phase II site development plans, reconsideration of Condition ofApproval #8 of 90PC15

Action: Approved with conditions

Project Expiration Date:

Property Description: TL 500, 600, 601, 604 Sec. 13 County: C
TL 101, 200, 201, 300, 405 Sec. 14D County: C

Location: Wilsonville Town Center

Street Address:

Project Name(s): **Project Thunder**

Applicant: Capital Realty Corporation

Retention Schedule: Permanent

Location of Microfilm: City Hall Vault

Hard Copies of drawings/plans available? Yes

Physical copy of file retained? No

See also Case Files: 89PC50, 90PC15, 90PC15EX, 91DR29, 92DR21

Other name(s) on file:

MAP

SW 10/5/06 Initial/Date

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

NOTICE OF DECISION

Project Name: PROJECT THUNDER File No: 91PC43

Applicant / Owner: Capital Realty Corp.

Proposed Action: Modified Stage I Master Plan, Phase II Stage II Site Development Plans and Amending Condition of Approval 8 of Resolution 90PC5

Property Description:

Map No: 13 & 14D Tax Lot No: 101,102,200,201, 300 and 500 Site Size: _____

Address: _____

Location: Wilsonville Town Center - east of Town Center Loop West and northwest of shopping center

On December 9, 1991, at the meeting of the Planning Commission the following decision was made on the above-referenced Proposed Development Action:

_____Approval XX Approval with Conditions _____Denied

This decision has been finalized in written form and placed on file in the City records at the Wilsonville City Hall this 16th day of December, 1991, and is available for public inspection. The date of filing is the date of the decision. Any appeal(s) must be filed with the Planning Department by 5:00 p.m. on December 30, 1991.

XX Written decision is attached

_____ Written decision is on file and available for inspection and/or copying.

This action, if approved, will expire on December 9, 1993 unless development commences prior to the expiration date.

For further information, please contact the Wilsonville Planning Department at City Hall, Community Development, or phone 682-4960.

FILED 12-16

Exhibit D

PLANNING COMMISSION
RESOLUTION NO. 91PC43

A RESOLUTION ADOPTING FINDINGS AND CONDITIONS OF APPROVAL FOR A MODIFIED STAGE I MASTER PLAN, PHASE II STAGE II SITE DEVELOPMENT PLANS AND AMENDING CONDITION OF APPROVAL 8 OF RESOLUTION 90PC5 - CAPITAL REALTY CORP., APPLICANT. THE PROPERTY IS IDENTIFIED AS WILSONVILLE TOWN CENTER AND IS LOCATED ON TAX LOTS 101, 102, 200, 201, 300 AND 500, T3S-R1W, SECTIONS 13 AND 14D, CLACKAMAS COUNTY, OREGON

WHEREAS, an application, together with planning exhibits for the above-captioned development, has been submitted in accordance with the procedures set forth in Sections 4.008(4) and 4.139(1), (2) and (3) of the Wilsonville Code, and .

WHEREAS, the Planning staff has prepared a report on the above-captioned subject which is attached hereto as Exhibit A, and

WHEREAS, said planning exhibits and staff report were duly considered by the Planning Commission at a regularly scheduled meeting conducted on December 9, 1991, at which time all exhibits, together with findings and public testimony, were entered into the public record, and

WHEREAS, the Commission has duly considered the subject and the recommendations contained in the staff report, and

WHEREAS, all interested parties have been afforded an opportunity to be heard on the subject.

NOW, THEREFORE, BE IT RESOLVED that the Wilsonville Planning Commission does hereby adopt the staff report attached hereto as Exhibit A, along with the findings, recommendations and Conditions of Approval contained therein. The Wilsonville Planning Director is hereby authorized to issue a Stage I Master Plan and Stage II Site Development Permit for Phase II and a Revised Condition of Approval 8 -Resolution 90PC5 once the prescribed appeal period has expired.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 9th day of December, 1991, and filed with the Planning Secretary this same day.

Richard D. Wilson
Chairman, Planning Commission

Attest:
Judee Emison, Planning Secretary

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

Chairman Mike Williams moved to accept the staff report with the following amendments:

Revise Condition of Approval Number 10 to provide that instead of at the time building permits are issued at the Phase II Stage II site development, to provide that at the time the Certificate of Occupancy is issued the applicant/property owner shall dedicate 5.1 acres. And to provide another sentence at the end, that the City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

Provide an additional condition of approval that at the time that the Design Review Board specifically reviews the applicants plans, regarding the east wall of the large structure on Phase II, to insure its compatibility with the proposed park. And to also have the DRB look at the pathway and sidewalk circulation plan. And an additional condition of approval that the applicant consider on-site detention in its submittal to the city. That the applicant coordinate with the engineering department the storm drainage plans with some consideration toward whether or not an on-site detention is feasible and meets the engineering standards of the city. And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

An additional Condition of approval is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the property across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to the Project Thunder.

(Mike Kohlhoff - Add the phrase, "unless the project owner and the city council reach other agreement")

Condition 10 will read that dedication of 5.1 acres for a public park will be required before issuance of the Certificate of Occupancy unless the applicant and the City Council reach an agreement for a later date.

Motion was seconded by Lew Hendershott and carried 4-2.

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

SUMMARY

Capital Realty Corporation is representing a retail business with the anonymous name "Project Thunder". The Project Thunder people desire to develop 14.75 acres (Phase II of Wilsonville Town Center) for a 159,400 square foot electronics-related retail store.

The proposed Project Thunder Stage II Site Development Plans has caused Capital Realty Corp. to modify and re-submit the Stage I Wilsonville Town Center Master Plan to reflect an expanded master plan area, reclassify overlay zones associated with Ordinance 55, resdesignate the phasing sequence and to establish approximately 5.4 acres for open space.

Capital Realty Corp. is also seeking reconsideration of Condition 8 of Planning Commission Resolution 90PC15 which imposed certain design and development requirements for the development of the 5.4 acre open space.

All Comprehensive Plan and Zoning Code requirements that apply to this Stage I review are satisfied or can be met. Parking issues, building height and setback, final design, utility placement, and other site specific development requirements are further considered in this application for Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building. The applicant has also submitted conceptual plans showing Project Thunder's architecture, landscaping and a signage program. The Design Review Board is the City's review authority of the project's architecture, landscaping and signage program.

The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. The proposed findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

Project Thunder can be adequately served by existing or immediately planned public facilities and services.

RECOMMENDATION: **Approve the modified Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plans with Conditions of Approval attached herein. This recommendation acknowledges the conceptual configuration of a 5.1 acre open space as proposed by the developer.**

FINDINGS: PDC & PDI

The following findings are hereby adopted by the PLANNING COMMISSION and entered into the public record in consideration of the application as submitted in conformance with the City's Comprehensive Plan and Zoning Regulations. "PROJECT THUNDER" STAGE II

NA = NOT APPLICABLE
DRB = DESIGN REVIEW BOARD

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
A. Land Use					
Zoning	PDC	PDC	●	○	1 to 7
Comprehensive Plan Designation	COMMERCIAL TOWN CENTER		●	○	1 to 7, 32 to 36
B. Land and Building Improvements	ORD # 55				
1. Lot Size					
a. Total site area (acreage)	NOT SPECIFIED	652,687 SF	●	○	
b. Lot sizes (subdivision)	NA		○	○	NA
Acreage lot size	NA		○	○	NA
2. Lot Coverage					
a. All buildings	NOT SPECIFIED	24% 159,400 SF	●	○	
b. Parking/paved	↓	61% 395,242 SF	●	○	
c. Landscaping	MINIMUM.	15%			
1. total size area (%)	15%	98,045 SF	○	○	DRB
2. parking area (%)	10%	-	○	○	↓
3. screening/buffering	REQ'D	-	○	●	42, 43
4. irrigation system	↓	-	○	○	DRB
3. Building Setbacks					
Front / TOWN CENTER LOOP WEST	0'	445'	●	○	
Right side / NORTH	0'	160'	●	○	
Left side / SOUTH	0'	85'	●	○	
Rear side / EAST	0'	70'	●	○	

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
4. Building Use					
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	
5. Building Specifications					
a. Building Height	35'	-	●	○	44
b. (Sun Exposure Plane)	NA		○	○	NA.
c. Gross Floor area of Building	NO LIMIT	150,400 SF	●	○	
6. Number of Off-Street Parking					
a. Standard 9' X 18'	472	858	●	○	42
b. Compact 8 1/2' X 17' (30% 10 allowed)	OPTIONAL	NOT SHOWN.	●	○	
c. Handicapped 12' X 18' (1 to 50 required)	11	16	●	○	UBC TABLE 31-A
Total	483	872	●	○	46 to 48
d. Truck load berths	2	26	●	○	
7. Access/Egress					
a. Direct access to street	-	3	○	●	17.18
b. Access provided by easement	NA		○	○	NA
c. Rail Access	NA		○	○	NA.
8. Open Space Slope Protection					
a. Existing vegetation protected	NA		○	○	NA
b. Slopes over 20% to 30% impervious coverage	NA		○	○	NA
c. River and stream corridors protected	NA		○	○	NA
d. Adequate erosion control provided			●	○	EXHIBIT G.4
e. Within greenway	NA		○	○	NA

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
C. Other Planning Considerations					
1. Outside storage area provided/ screening	-	-	○	○	DRB
2. Adequate screenage of mechanical equipment	-	-	○	○	DRB
3. Safety/crime prevention					
a. Location of addressing	-	-	○	○	DRB
b. Natural surveillance	-	-	○	○	
c. Type of exterior lighting	-	-	○	○	
D. Bike Paths, Pedestrian Trails, & Equestrian Trails					
1. Pathway Standards					
a. Pathways are provided consistent with pathway master plan and design standards (Section 4.168 W.C.)	REQ'D	HOT SHOWN	○	●	28 10 31

E. Previous Approval actions and applicable conditions or approvals

1. City Council	Yes	No	File No.	See finding	ORD 55
2. DRB	Yes	No	File No.	See finding	90 PC 15 89 RE 50
3. P.C.	Yes	No	File No.	See finding	
4. Other	Yes	No	File No.	See finding	

Inter-agency review comments

Yes	No	See Exhibit No.	

Inter-agency review comments (Written Only)

City Engineer	Yes	No	See Exhibit No.	D
Parks & Recreat.	Yes	No	See Exhibit No.	
Traffic Safety	Yes	No	See Exhibit No.	
Building Dept.	Yes	No	See Exhibit No.	E
Tualatin Fire Dept.	Yes	No	See Exhibit No.	
Sheriff	Yes	No	See Exhibit No.	

91PC43

MODIFIED STAGE I MASTER PLAN AND STAGE II PHASE II SITE DEVELOPMENT PLANS AND RECONSIDERATION OF CONDITION OF APPROVAL 8 OF 90PC15
PLANNING COMMISSION FINDINGS

Property Owner:	Capitol Realty Corporation
Project:	Project Thunder
Developer:	Project Thunder
Architects:	Stage I Master Plan revision - JKS Architects Stage II Phase II - Design Forum Architects
Traffic Engineer:	Kittelson & Associates, Inc.

Property Description:

The subject master plan area comprises 59.79 acres for retail commercial/office development more specifically described as Tax Lots 500, 600, 601 and 604 of Section 13 and Tax Lots 101, 200, 201, 300 and 405 of Section 14D, T3S-R1W, Clackamas County, Wilsonville Oregon. Approximately 114 acres comprise the Town Center Master Plan as recognized in Ordinance No. 55. Wilsonville Town Center, the name of Capital Realty Corporation's commercial retail development, has the same name of a retail district identified in Ordinance No. 55. For clarification, the applicant's Stage I Master Plan will be identified as the Wilsonville Town Center and the City's Master Plan of the district will be identified as Ordinance No. 55.

For years the interior area of Town Center Loop was in agricultural use with farm exemption tax status. It wasn't until the last eight years that the area experienced rapid residential and commercial growth with the development of Park Center Apartments, Town Center Mercantile, Wilsonville Market Place, Phase I Wilsonville Town Center, Clackamas Community College and various office and retail developments. It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot commercial retail store. Capital Realty forecasted commercial growth trends in Town Center and have subsequently purchased additional property to accommodate their plans to develop the Wilsonville Town Center Master Plan. Thus, the overall master plan area will increase from 53.39 acres to 59.79 acres. This adjustment will also create a new development phase in the overall Master Plan. With respect to Project Thunder, the relatively level site is easily accessible to Town Center Loop, Parkway Court and Wilsonville Road. The proposed Project Thunder site is also highly visible to I-5 and Town Center Loop West.

LAND USE

Project Data
Stage I - 89PC50

1. Building Area

Phase I	24.08 acres	170,900 square feet
Phase II	6.52 acres	61,000 square feet
Phase III	22.79 acres	179,000 square feet
Total	53.39 acres	

Building Area

Phase I	207,130 square feet
Open Space	5.62 acres

Project Data
Stage I Modification:

2.

Phase I	22.96 acres (Existing Wilsonville Town Center commercial dev.)
Phase II	14.75 acres (Proposed Project Thunder)
Phase III	22.08 acres (Undeveloped property)
Total	59.79 acres

Building Area

Phase I	207, 130 sq.ft.
Phase II	159, 400 sq.ft.

3. The Master Plan amendment also seeks to amend the current overlay zones in Ordinance No. 55 to reflect modifications proposed in Stage I Wilsonville Town Center. Essentially, the amendments would replace the Motor Hotel (MH), Office Professional (OP), Service Commercial (SC) and Residential (R) use designations with Central Commercial (CC).

Plan Designation and Zoning

4. The subject site is designated "Commercial" on the Comprehensive Plan map and zoned "Planned Development Commercial" (PDC) on the zoning map. The site is also situated within an area identified as Town Center Master Plan area (Ordinance No. 254). Ordinance No. 254 identifies the property in the following overlay zones; Service Commercial (SC), Office Professional (OP), Central Commercial (CC), Motor Hotel (MH), Residential (R) and within an area designated for a Lake or Open Space.

5. Within the Comprehensive Plan, a number of goal and policy statements address the commercial planning designation and development review which apply to the subject property. The applicable criteria for Stage I Master Plan review is found in Section 4.139(2) of the Wilsonville Code. Recommended uses for development within the Town Center Master Plan are embodied in Chapter 4 of the Wilsonville Code. In brief, the combined review criteria are the following:

The Most Applicable Comprehensive Plan Goals, Policies and Objectives

Goal 1.1	Citizen Involvement Goal
Objective 3.1	Public Facilities Availability
Policy 3.3.1	Street System Master Plan
Policy 3.3.1(b)	Street System Master Plan
Policy 3.3.1(c)	Street System Master Plan
Policy 3.3.2(a)	Arterial and Collector Streets
Policy 3.3.5(b)	Private Owner Responsibility to Build Streets
Policy 3.3.8(a)	Transportation Impact Analysis
Policy 3.3.8(c)	Traffic Trip Reduction
Policy 3.3.8(d)	Consolidation of Vehicle Trips
Policy 3.3.8(e)	Mass Transit
Policy 3.3.14	Major Street Improvements Required
Policy 3.3.3	Street Standard and Dedication
Policy 3.3.11	Bikeways and Pathways
Policy 3.3.12	Pathway Construction
Policy 3.8.3	Open Space
Policy 4.2.3	Site Plan Information Requirements
Policy 4.2.5	Development Coincide with Public Facilities

Applicable Zoning Ordinance Provisions

Section 4.123	This Section provides the requirements of the PDC zone which are governed by Section 4.130 to 4.140.
Section 4.138(4)	Stage I Master Plan compliance
Section 4.139(4)	Criteria for approval of a planned development including subsections a, b and c

Town Center Master Plan

Ordinance Nos. 55 and 254.

Goal 1.1 - Citizen Involvement

6. The Planning Commission will be conducting the Stage I Master Plan as a public hearing and all notification requirements have been met.

CONCLUSIONARY FINDING

7. The proposed uses, both separtely and as a whole, are consistent with the Comprehensive Plan and can be made consistent with Ordinance No. 55.

PUBLIC FACILITIES

Objective 3.1

8. The City Engineering Department has provided detailed comments regarding public facilities improvements required to serve the site. These findings and recommendations are listed on Exhibit D.

Sanitary Sewer

9. Three sanitary sewer lines serve the site. An eight-inch line is located on the west side of the site which extends south through Citizens Drive to a trunkline in Wilsonville Road. A 15-inch line is located in the center of the site and a 10-inch line traverses the site originating from the Courtside Estates subdivision. This line was relocated to accommodate Phase I development. Approximately 1,500 linear feet of a sanitary sewer line was constructed along the northerly right-of-way of Wilsonville Road. This finding is also applicable to Stage II site development.

Storm Drainage

10. The subject site is located within two storm drainage basins. Phase I site grading recontoured the site Master Plan to divert storm water to a piped system in the easterly basin that out falls to an existing 48-inch pipe on the southeast corner of Phase I site. This diversion helps relieve the westerly storm basin from the storm drainage system that out falls to constricted culvert under I-5. Phase II development will remove the existing storm detention pond located on the west side of the site and be replaced with storm pipes to connect with the improved Phase I storm system. The City requires detailed storm drainage plans designed to pass a 25-year storm frequency. The detention pond has not been investigated with the Oregon Division of State Lands for wetlands status.

Water

11. Existing 12-inch waterlines located in Wilsonville Road and Town Center Loop East and West have adequate flow to serve full buildout of the site. This finding is also applicable to Stage II site developement.

Police

12. Police protection is provided to the City by the Clackamas County Sheriff's Department. This department has a headquarters in Wilsonville City Hall which is near the subject property.

Fire/Emergency

13. The Tualatin Valley Consolidated Fire and Rescue District provides fire protection to this site. The City is served by two fire stations strategically located in the City that can provide adequate fire protection services to the proposed development.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

STREETS and TRAFFIC

Policy 3.3.1(a) - Street System Master Plan

15. The Street System Master Plan identifies design standards and conceptual locations for arterials and major collectors. Wilsonville Road and Town Center Loop are classified as major arterial streets. The Master Street System and Functional Classification Map does not identify or classify any internal streets within the Town Center Loop. In the case of the proposed retail development, private drives will be constructed and connected to an internal drive/road system. This finding is also applicable to Phase II Stage II site development.

16. The design standards for Wilsonville Road show an approximate 94-foot right-of-way with a median planter island. The standards for the Town Center Loop show a 72-foot right-of-way with a median planter island. This finding is also applicable to Stage II site development.

17. The proposed development will construct driveway connections within Town Center Loop, but not in the same alignments as shown on the pictorial map representing the Town Center Master Plan. This finding is also applicable to Stage II site development.

18. Though the proposed access drive located near the northwest corner of the site is shown at a location supported by the Town Center Master Plan, this access is situated along a radius of Town Center Loop West that may position it in an unsafe location for egress and ingress.

Policy 3.3.2(a) - Dedication of Arterial and Collector Streets and Control or Consolidation of Access Drives.

19. The dedication of additional right-of-way and half-street improvements along Wilsonville Road and Town Center Loop East were accomplished in Phase I Stage II site development. This finding is also applicable to Stage II site development.

20. The Wilsonville Town Center Master Plan shows ten access drives at arterials. The full access drive shown near the northwest corner of Phase III at Town Center Loop West should be analyzed for safe vision clearance.

21. The proposed access drive to Project Thunder, shown at the southwest corner of the site, does not align with the location of the existing curb cut approved to the site in Local Improvement District No. 5. This access drive would further create a staggered intersection with access drives constructed on the opposite side of Town Center Loop West. This access drive also deviates from the access drive shown on the Town Center Master Plan approved in 89PC50. The Planning Commission cannot change the locations of access drives approved in LID No. 5 without first obtaining approval from the City Council. This finding is also applicable to Stage II site Development.

22. It appears from the re-submitted Stage I Master Plan that access is not proposed at Parkway Court which would have encouraged through traffic from Wilsonville Road and Town Center Loop to the Parkway Court.

Policy 3.3.3

23. Policy 3.3.3 requires the City to establish minimum street standards and dedication of adequate right-of-way prior to actual site development. It further provides that if proposed development exceeds minimum service capacity, then appropriate improvements shall be required prior to occupancy of the completed development. With respect to Project Thunder, the arterials servicing the site, Town Center Loop West and Wilsonville Road are already constructed to the Public Works standards. Phase I of Wilsonville Town Center is required to install a traffic signal to comply with minimum service capacity levels.

24. Section 4.139(4) stipulates that a Planned Development Permit may be granted by the Planning Commission only if it is found that the development conforms to subsections 4.139(4)(a),(b) and (c) and Sections 4.130 to 4.140. Section 4.139(4)(b) states:

> "That the location, design, size and uses are such that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on existing or immediately planned arterial or collector streets and will, in the case of commercial or industrial developments, avoid traversing local streets."

25. The applicant has provided an updated transportation analysis prepared by Kittelson & Associates, Inc. for Project Thunder. Wayne Kittelson's updated report is labeled Exhibit G-7. The report recommends that a traffic signal be installed at the intersection of Town Center Loop West with Wilsonville Road at the time of occupancy of Phase II. However, Capital Realty was conditioned in Phase I Stage II development (Resolution 90PC15) to install the subject traffic signal as determined by the City Engineering Department. This requires that the State of Oregon Department of Transportation warrant the signal. This finding is also applicable to Stage II site development.

- All of the intersections within the study area, with the exception of Wilsonville Road/Parkway Avenue, are currently operating within acceptable level of service limits.

- Under projected 1991 total traffic conditions and with the addition of site-generated Phase I traffic, the minor street left-turn movements at the Town Center Loop West/Wilsonville Road intersection are projected to experience an "E" Level of Service. While a traffic signal would improve the level of service for the 45 vehicles making this movement, it would also cause an overall increase in intersection delay and is not considered appropriate in view of the surrounding street system, the traffic circulation patterns and the projected operational characteristics of this intersection.

- By 1995, the projected background traffic volume conditions, without Phases II and III, will warrant the installation of a traffic signal at the intersections of Wilsonville Road/Town Center Loop West and Wilsonville Road/Town Center Loop East. It is therefore recommended that traffic operations at both the Town Center Loop intersections with Wilsonville Road be monitored on a regular basis. Traffic signals should be installed only when one or more MUTCD signal warrants are met and the operational and/or safety characteristics dictate a need for a traffic signal.

- The number of access drives included in the Site Plan will be adequate to serve the proposed retail development. These access drives will disperse the site-generated traffic sufficiently to minimize the overall effect of the retail center on the capacity and quality of service provided by the adjacent arterial street system. At the same time, they are sufficiently separated from each other and from adjacent intersections to avoid significant operational, stacking and safety problems.

- By 1995, the projected background traffic volume will, by itself, exceed the existing capacity of Wilsonville Road in the vicinity of the Wilsonville Road/I-5 interchange. The proposed ODOT improvement project at the interchange would add sufficient capacity to accommodate both the 1995 background traffic, as well as the additional traffic from Phases II and III of the proposed development.

Kittleson and Associates has also provided additional findings and recommendations found in their letter of October 16, 1991, labeled Exhibit G, which are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Policies 3.3.8(a)-(e)

26. These policies address traffic impacts and congestion.

As noted in the previous findings responding to Policy 3.3.3, the applicant has provided a detailed traffic analysis that responds to Policies 3.3.8(a)-(e) and Section 4.139(4) of the Wilsonville Code.

CONCLUSIONARY FINDING

27. The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West, and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. These findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

TRANSIT FEATURES, SIDEWALKS AND BIKEWAYS

28. Specific transit features such as transit stop locations and right-of-way fixtures for transit uses should be provided in the Stage II Site Development Plan. These findings are also applicable to Stage II site development.

Policies 3.3.11, 3.3.12, 3.3.13 and 3.3.13(b)

29. These policies addresses pathways and bikeways. Written comments received by Myers/Kroker (the architectural firm responsible for master planning Town Center) in case file 90PC15, have the following observations concerning pedestrian pathways:

> "There will need to be a landscape design study of the public right-of-way system defining the nature of plant materials, berm forms, ground cover, public walk systems and street light systems. Design definition of pedestrian overpasses would be developed within the recommended 'Design Review Parameter Study'."

30. The modified Stage I Master Plan shows a bikeway through Phase I to extend through Phase III and connect with the future park. A shoulder-side bikeway is required on the Comprehensive Plan to occur on the south side of Wilsonville Road.

31. The Phase II Stage II submittal plans do not indicate sidewalks along Town Center Loop West as required by Ordinance No. 55 and by Section 4.168 and Subsection 4.167(1)(b) of the Wilsonville Code. Regarding Project Thunder, a five-foot wide concrete sidewalk is required along Town Center Loop West to be off-set five feet from the curb. In order to provide for safe pedestrian access around and on the Phase II site, pedestrian walkways should be extended from Town Center Loop West via the central access drives up to Project Thunder's storefront. It also appears that the applicant has not considered pedestrian sidewalks to link the site with the future park and adjoining businesses.

OPEN SPACE

Policy 3.8.3

32. This policy addresses open space. The proposal, as presented, will have a major impact on the location, size and configuration of the area designated by Ordinance No. 55 shown as lake or open space. Approximately 8.5 acres of lake or open space is conceptually shown on the Town Center Master Plan. The open space depicted on the modified Town Center Master Plan or Ordinance No. 55 does not have the same configuration as shown for the Primary Open Space area depicted on the Comprehensive Plan Map.

33. The modified Stage I Master Plan shows 5.1 acres in open space to be reconfigured to satisfy Capital Realty's site development program, and hopefully, for the City's benefit to develop the property as a public park. The application does not propose a specific open space plan with uses, nor is the applicant proposing a development development schedule. In this regard, the Planning Commission had previously conditioned the applicant in Resolution 90PC15 to perform the following:

Condition No. 8:

> "At Phase II Stage II site development, which shall be the next phase presented, applicant shall submit to the Planning Commission and the Design Review Board a detailed open space plan and development schedule for the development of the 5.4 acre open space shown on the Stage I Master Plan."

With respect to the above issues, the applicant is requesting the Planning Commission to reconsider Condition No. 8 as follows:

"1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions.

2. To formulate a development plan and time frame consistent with the development of Phases II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto."

34. Ordinance No. 55 depicts an open space or lake with a centralized location in Town Center with surrounding development to be oriented and related with it. One can compare this relationship to be similar with the concept of a public square of a small European city or even with an Early American town square. Those kind of public spaces create a sense of place and encourage a community gathering place within an urban context. It also creates a city center environment that involves the pedestrian in its function and design that is not found in retail strip developments designed around automobiles.

35. The proposal, as presented, shows approximately 5.1 acres in open space. The City will require that the open space be dedicated for development of a City park. At issue is the proposed configuration of the open space. In this regard, the proposed open space has a spacial composition that positively responds to the open space concept in Ordinance No. 55. The proposed Master Plan is an assembly of properties that make up a reasonable configuration for future park development. Conversely, the surrounding development plan represents an augmentation of the more traditional strip retail commercial center showing buildings oriented to major collectors and arterials together with large storefront parking areas. Truck delivery activities are then generally found on the sides or at the rear of the stores which attract outside storage of palettes, boxes etc. The applicant has modified the original submittal drawings designed to lessen the impact of Project Thunder's building mass on the proposed open space. Buffering can be accomplished by reducing the mass of Project Thunder with siting a smaller intervening building between Project Thunder and the open space. The revised plan also re-positioned potential building sites to open up the view of the open space to Town Center Loop West.

36. The proposed 5.1 acre open space, combined with approximately 3 acres in open space created for Town Center Park Apartments and Clackamas Community College, will provide a generous area for a future public park.

Policy 4.2.3 and Section 4.139(2)(a) and (b)

37. This policy and zoning section identify the information which must be included in the Site Plan. The information set forth has been submitted in compliance with the Comprehensive Plan and Zoning Ordinance. Landscape and Architectural Plans will be reviewed by the Design Review Board.

Policy 4.2.5

38. This policy requires that development coincide with the provision of public streets, water, sanitary sewer and storm drainage facilities. Such facilities are currently available at the site. Sewer and water are located within the abutting roads. Storm drainage is provided at the eastern portion of the site. The extension of these services will be coordinated with site construction and facilities and will be designed to meet City public works standards.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

40. Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassifed uses and reconfigured open space.

41. Condition No. 2 of the Stage I Master Plan approval requires separate Stage II land development applications for review of each pad. Therefore, the buildings proposed on the pads are not part of this application.

BUFFERING and SCREENING

42. Section 4.163 of the Wilsonville Code requires:

A. All outdoor storage and garbage collection areas shall be screened from off-site view with fencing and/or landscaping.

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. Multi-family developments shall be screened and buffered from single-family areas.

43. The Site Plan illustrates an area between the truck loading area and proposed open space. This site arrangement orientes the massive and mundane backside of Project Thunder to Parkway Court and the proposed open space. The impact can be lessened, as proposed in Finding No. 35, together with innovative design utilizing landscaping, screenage, murals etc.

BUILDING HEIGHT

44. Definition no. 12 of Chapter 4 of the Wilsonville Code (Building of Structural Height) is defined by the following:

> "The term 'height of building' shall be deemed to mean the perpendicular distance from the average elevation of the adjoining ground to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the middle height gable between the eaves and ridge of a pitch or hip roof. If a building is divided into units by means of masonry division walls, each unit shall be considered separately in calculation for height of building."

45. In order to distinguish Project Thunder to the public, the applicant proposes to construct a dome and flag pole atop the main entrance of the store. Section 4.172(1) exempts domes and flag poles from the height limits of the PDC zone. However, the flag pole can only fly the United States and the State of Oregon flags. Just for general information, the top of the dome is shown approximately 55 feet above grade level. The top of the flag pole is approximately 81 feet above grade level.

PARKING ANALYSIS

46. Section 4.150WC:

"Commercial:

Commercial retail, 1,501 square feet or more	1 space/200 sq.ft. @ 63,914 sq. ft. of floor area
Service or repair shops	1 space/200 sq.ft. @ 17,276 sq. ft. of floor area
Eating or drinking establishments	1 space/200 sq.ft. @ 6,096 sq. ft. of floor area
Storage warehouse, wholesale establishment, rail or trucking freight terminal	1 space/2,000 sq.ft. @ 39,336 sq.ft. of floor area up to 40,000 sq.ft.; 1 space/4,000 sq. ft. thereafter
Office	1 space/250 sq.ft. @ 9,117 sq.ft.

These calculations do not include employee lunch rooms, restrooms, HVAC roooms, cat walks, etc.

Building Area - Phase II **Minimum Parking Required:**

Project Thunder approximate floor areas:

Retail Commercial	63,914 / 200 = 320 spaces
Service	17,276 / 200 = 86 spaces
Office	9,117 / 250 = 36 spaces
Restaurant	6,096 / 200 = 31 spaces
Storage	39,336 / 4000 = 10 spaces
Mimimum parking :	**483 spaces**

47. Though the proposed off-street parking count shows 16 handicapped and 856 standard parking spaces for a total of 872 parking spaces, the proposed parking is almost twice the minimum requirement of the Code. This figure does not include parking for the future pads. Those parking areas will not be constructed until each pad is developed.

48. The parking plan specifies dimensions for a typical standard parking space at 9' x 18' with 25'-0" drive aisles. The Zoning Code has a minimum 9' x 18' standard parking space dimension. Compact parking spaces are not proposed and are optional by the Zoning Code.

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

EXHIBITS

The following Exhibits are hereby entered into the public record by the Planning Commission as confirmation of its consideration of the application as submitted.

A. Findings and Conditions of Approval
B. City of Wilsonville Comprehensive Plan
C. Chapter 4 of the Wilsonville Code
D. City Engineering Department Report
E. City Building Official's Report
F. Town Center Master Plan
G. Applicant's submittal documents:
    1. Revised Stage I Master Plan and Master Utilities Plan
    2. Phase II Site Plan
    3. Phase II Exterior Elevations
    4. Phase II Grading Plan and Erosion Control Plan
    5. Phase II Utilities Plan
    6. Phase II Preliminary Landscape Plan
    7. Traffic Report by Wayne Kittelson and addendum letter
    8. Request for Modification of Condition No. 8 of 90PC15
    9. Stage I Master Plan Re-submittal
    10. Phase II Stage II narrative
    11. Alternative Open Space Concept

H. Original Stage I Master Plan - 89PC50.

I. Ordinance no. 55

91PC 43

Item 16.

City of WILSONVILLE in OREGON

30000 SW Town Cente
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

August 16, 1999

Gary M. Graumann
Lumberjack, L.P.
PO Box 7458
Menlo Park, California 94026

Re: 29400 SW Town Center Loop

Dear Mr. Graumann:

Mr. Lashbrook, Wilsonville Planning Director, has asked me to answer your request for a zoning compliance letter. You will find the information you requested as follows:

1. Zoning Classification Code:
   Planned Development Commercial (PDC) (Town Center)

2. Property Owner's Name and Lender's Name
   Lumberjack, L.P. (owner)
   PO Box 7458
   Menlo Park, CA 94026

   GE Capital Business Asset Funding Corp.
   10900 NE 4th St., Suite 500
   Bellevue WA 98004

3. Address of the Property:
   29400 SW Town Center Loop, Wilsonville, Oregon

4. Type of Permitted Use:
   Commercial (Planned Development)

5. Expiration Dated Copy of Conditions or Restrictions of Use:
   Case File 91PC43 approved 12/9/91
   Case File 91DR29 approved 1/27/92
   Case File 92DR21 motion revising condition

N:\annex\plng\hoffman\bh81699graumann\sh

I have researched our records and find that in receiving final occupancy the city found that the development had complied with all plan proposals and conditions of approval. However, the project is now almost seven years old and is beginning to show some wear and deferred maintenance. About a year ago, Mr. Blaise Edmonds wrote you about broken curbs and destroyed landscaping where vehicles have driven over the curb. This is at a major entrance area (Southwest entry drive, between the rug dealer and McDonalds.) This problem area still requires attention.

Sincerely,

Robert G. Hoffman AICP

Robert G. Hoffman AICP
Manager of Current Planning

Attachment: Decision and Conditions of Approval
98PC43
91DR29

RGH:sh

N:annex\plng\hoffman\bh81699graumann\sh

LUMBERJACK, L.P.
P.O. BOX 7458
MENLO PARK, CALIFORNIA 94026
(650)813-9100 FAX(650)813-9190

August 5, 1999

Mr. Stephan Lashbrook
Planning Director
CITY OF WILSONVILLE
30000 SW Town Center Loop E
Wilsonville, OR 97070

Dear Mr. Lashbrook:

Thank you very much for returning my call with respect to revisions to the Development Codes. I look forward to reviewing the changes and will provide any comments that I may have.

We also discussed the following outline that my lender has requested that I obtain from the city. I have provided the information for items 2) and 3). If you could have someone on your staff complete the rest of the requirements requested by the lender it would be greatly appreciated.

I would like to receive a compliance letter from your office within the next 10 days. Should you have any questions please feel free to call me at the number listed above.

Once again, thank you for your attention to this matter.

Sincerely,

Gary M. Graumann

ZONING COMPLIANCE LETTER REQUIREMENTS

This item should be obtained from the City Planner's, County Clerk's, or Zoning Department's office and should contain the following information:

1) Zoning Classification Code — Planning Development Commercial (PDC (Town Center)

2) Property Owner's Name and Lender's Name

3) Address of the Property

4) Type of Permitted Use. — Commercial (Planned Development)

5) Expiration Dated Copy of Conditions or Restrictions of Use.

91PC43 - Appr. 12-9-91
91DR29 - Appr 1-27-92
92DR21 - Appr 6-22-92

2) Lumberjack, L.P. (owner)
P.O. Box 7458
MENLO PARK, CA 94026

GE Capital Business Asset Funding Corp.
10900 NE 4th St., Suite 500
Bellevue, Wa 98004

3) 29400 SW Town Center Loop
Wilsonville, Or.

Aetna's local presence shrinks after loss of key large clients

Continued from page 1

er away from the Portland market.

Despite a strong national presence, Aetna's local client base has eroded as [illegible] market is already dominated by strong HMO players that have left little room for carriers like Aetna.

Stone said the downsizing was planned a national restructuring effort, and not nply because of the lost clients in Portid. Many who watch insurance activis nationally agree. The change reflects nilar strategies by nationwide carriers. tna wants to consolidate offices, rece overhead and gain efficiencies in increasingly competitive health inrance market.

'It is definitely consistent with the nd that we've seen in this industry," id Post. Improvements in electronic tims handling and standardization ross offices have made such changes ssible and even advantageous, he said, gain efficiencies.

'Insurance in general has become more d more of a commodity market," said iss Poll, an insurance analyst with The licago Corp., a Chicago-based investent bank that tracks insurance companies. "Insurance companies, especially the big guys, have a big expense burden. They tend to be big and clumsy."

In Aetna's case, said Poll, the national carrier's life and health business has been its strongest asset. Hartford, Conn.-based Aetna is the third-largest U.S.-based property and casualty insurer, according to Value Line's December 1993 investment survey. Aetna, a public company traded on the New York Stock Exchange, also has been subject to large market fluctuations.

Aetna "peaked" on Nov. 1, 1993, with a per-share price of $60.75, said Poll. The stock closed at $47.75 per share on Oct. 18.

Aetna Health Plans reported $4.5 million in insurance premiums in Oregon during 1993, down from $12.7 million in premiums it wrote in 1991, according to reports filed with the state. It covers an estimated 40,000 enrollees.

Aetna handles about 4.9 million Medicare claims representing some $250 million annually out of the Portland office.

Incredible Universe building sold, leased

Tandy Corp. has sold off its Incredible Universe building in Wilsonville and leased back the facility from the new owner.

Tandy sold the 166,495-square-foot retail property to Pier Set Inc., a Delaware corporation, for $13.5 million, according to a Clackamas County sale deed.

Pier Set is a subsidiary of London-based NatWest bank, said Bill Bousquette, chief financial officer of Fort Worth, Texas-based Tandy.

Tandy also sold three other Incredible Universe buildings to the bank. The four properties sold for about $60 million, Bousquette said.

Selling off store facilities to outside investors is common among large retailers. "We have no interest in tying up our capital in real estate," Bousquette said.

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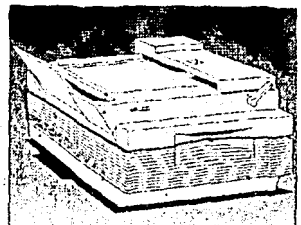

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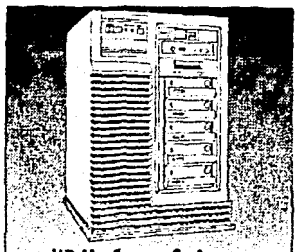

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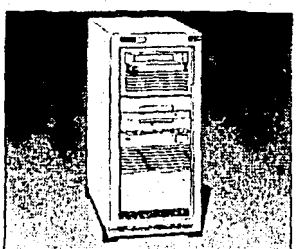

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City of Wilsonville
Community Development Department
30000 S.W. Town Center Loop East
Wilsonville, Oregon 97070
(503) 682-4960
Fax 682-7025

FAX COVER SHEET

DATE: 11-29-93

TO: Mark Whitlow FAX: 721-3666

FROM: Mike Kohlhoff / Wayne Lorenson

SUBJECT: Project - Thunder

NUMBER OF PAGES IN THIS TRANSMITTAL (INCLUDING COVER SHEET) 20

COMMENTS:

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

September 29, 1993

Mr. Bryan L. Spain, CSM
Assistant Director State/Local Taxation
Tandy Tax Service
Tandy Corporation
P.O. Box 1643
Fort Worth TX 76101

91PC43

Re: Systems Development Credit - Wilsonville Incredible Universe

Dear Mr. Spain:

The purpose of this letter is to formally close action on an appeal of the discretionary decision concerning the amount of the street systems development charge for the Incredible Universe. Prior to his departure from Tandy Tax Service, Mr. Bryan L. Spain, CSM, had formally appealed the discretionary decision.

On December 7, 1992, I provided an interim response in which we provided a comparison of a number of different calculations of the street systems development charge and in all cases they came very close to the amount that was charged based on the number of employees. Subsequently, on March 2, 1992, I extended the time for submission of any additional data concerning the street systems development charge to April 15, 1993.

Later telephone conversations indicated that you were not going to submit any additional data. Based on the information that has been received, your appeal of the discretionary decision has not been favorably considered. I would like to inform you that we will be using most of the systems development charge for streets that you paid to install an asphalt overlay on Town Center Loop West to increase the structural strength of the road. This should significantly delay deterioration of the street.

I apologize for the delay in providing a formal response; however, other higher priority projects have interfered with a more timely response. Your understanding is appreciated.

Sincerely,

Eldon R. Johansen
Community Development Director

pc: Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Tom Jowaiszas, Finance Director
Wayne Sorensen, Planning Director
Mike Stone, City Engineer
Martin Brown, Building Official

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

Info —
Pam
Blaise
Sally
file
91PC43

December 4, 1992

Mr. Wayne Kittelson
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland OR 97205

Re: Incredible Universe Traffic Issues

Dear Mr. Kittelson:

You provided me with a copy of your letter dated October 27, 1992, to Mr. Wayne Sorensen, Planning Director, concerning the above subject. I appreciate receiving a copy of your letter since it provides an excellent background from the consultant and the developer's perspective.

Your letter addresses several transportation topics which are of current interest to staff and council. Your letter included a copy to Councilor Carter and copies have also been provided to the Mayor and other Councilors to ensure that they all have the same background concerning this topic.

Your letter indicated that you are troubled by several comments in the October 22 issue of the Oregonian, entitled "Traffic Count Zooms at Electronic Store". I also am troubled by several of the statements in your letter of October 27, 1992, and would like to explain my concerns with your letter. Prior to explaining my concerns, I will review the overall traffic information that was provided to the Planning Commission prior to its decision. The Transportation Impact Analysis for the Wilsonville Town Center, dated April, 1990, was submitted to the Planning Commission as background for approval of the Master Plans for Phase I, Phase II and Phase III of the Wilsonville Town Center. Subsequently, the letter dated October 16, 1991, subject Traffic Analysis for Wilsonville Town Center - Phase II was submitted to the Planning Commission prior to approval of the plan for Project Thunder, which subsequently was changed in name to the Incredible Universe. When Project Thunder was approved, the Traffic Impact Analysis Report for the Wilsonville Town Center, dated April, 1990, was not provided to the Planning Commission at the time of the hearing.

Specific sections of your letter which are troublesome to me as well as comments on these sections are as follows:

"Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersection of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted, (April 1990), our engineers pointed out to city staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak-hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> 'As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersection, are anticipated to operate at an acceptable level of service [under projected 1995 peak-hour conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition.'"

The April 1990 Traffic Impact Analysis for Wilsonville Town Center has several tables which give the existing and predicted level of services for the southbound and northbound I-5/Wilsonville Road interchanges. Table 5 on Page 16 gives an existing level of service for both intersections of "B". Table 8 indicates level of service "C" for both intersections for the 1991 total traffic level of service results. These levels of service do not support your statement that the intersections were already operating near peak capacity.

The Project Thunder update, which was included in your October 16, 1991 letter concerning traffic analysis for Wilsonville Town Center Phase II, could be read as you state, "that this update included the I-5 northbound and southbound intersections with Wilsonville Road". If I read it that way, then I concur that the significant findings and recommendations of the October 16, 1991 report state: "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period." This would be contrary to your dire predictions of intersection failure.

On the other hand, I have looked at the October 16, 1991 letter and have found no specific updates for the traffic analysis for Wilsonville Town Center Phase II concerning the I-5 intersections with Wilsonville Road. It was this lack of any data concerning the I-5 northbound and southbound intersections with Wilsonville Road that led me to conclude that the traffic impact analysis for the Incredible Universe did not include information on the I-5 intersections with Wilsonville Road. If I had read the October 16, 1991 report to accept at face value the statement that "the key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period", then I would have concluded that you covered the interchange; however, I would have also felt that your coverage was inaccurate.

"Initial planning for the Incredible Universe Store began in late 1991 and was completed in 1992. It is important to note that throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our

engineers knew only that it was to be a retail development. By their own choice, city staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of city staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that city staff made this decision; for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion."

The April 1990 Traffic Impact Analysis includes three pages to describe the site-generated traffic volume and also a special study by Kittelson & Associates, Inc. to better define the probable breakdown of site-generated vehicle trips among the category of drop-in trips, diverted trips and new trips. There is nothing in the April 1990 report or the October 16, 1991 update to forewarn staff, the Planning Commission or Council that there could be unusual special event nature retail activities which could have a different impact on traffic volumes than is predicted by the transportation impact analysis and the October 16, 1991 update for Wilsonville Town Center Phase II. This lack of information concerning a potential problem area leaves the city staff responsible for prediction of traffic problems which should be left to traffic experts. I also would think that a plan for a commercial building with 160,000 square feet of floor space in a city with less than 10,000 residents would at least cause a question in the mind of the traffic engineer concerning drop-ins of 40%.

"Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the city's transportation system in order to mitigate the traffic impacts we identified. Further, the Incredible Universe store contributed $250,000 in system development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments; it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs."

The newspaper article states in reference to the I-5 and Wilsonville Road interchange "It was that intersection that clogged up at the Incredible Universe opening, September 17, 1992, and caused traffic to back up for miles in both directions." The expenditures by Capital Realty did nothing to improve the intersection of Wilsonville Road and Parkway, and the improvements proved inadequate to handle the traffic at the intersection of Wilsonville Road and Town Center Loop West. The city had county sheriff's deputies available and Tandy Corporation had private security guards. These individuals directed traffic at the Town Center Loop West and Wilsonville Road intersection as well as at the intersection of Wilsonville Road and Parkway during much of the Grand Opening weekend so that traffic was able to get through these intersections. By no stretch of anyone's imagination could the expenditures and improvements by Capital Realty be

considered to be adequate to allow the traffic to freely flow through these intersections at level of service D or better.

"Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering."

Upon reflection, this comment contains a good suggestion in that the city should require a traffic control plan to minimize vehicle disruption and delay during the initial opening of a new store of significant size. We will incorporate this in to our plans review efforts and into our recommended conditions of development for future stores with a major traffic impact.

"In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to city staff since early 1990 at least."

Your October 16, 1991 letter deleted the concerns for the I-5/Wilsonville Road interchange in the third subparagraph under the significant findings and recommendations which reads as follows:

> "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period."

Based on my reading of a level of service "C" for 1991, and this particular paragraph, I had assumed that we, initially, on the opening of the Incredible Universe would not have any major problems with the I-5 and Wilsonville Road interchange and would not anticipate problems until later. In summary on this particular item, it appears that your April 1990 report did indicate that by 1995 there would be problems; however, the October 16, 1991 report alleviated the concern for these problems.

"Since that time and through all subsequent development reviews, city staff, planning official, and policy makers have had three options available to them:

a) **Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;**

b) **Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or**

c) **Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.**

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision."

It may well be a viable option to consider your suggestion of placing a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5; however, staff feels that it would be premature to present this option to Council at this time. In addition with the October 16, 1991 letter from your organization, subject: Traffic Analysis for Wilsonville Town Center Phase II, including the following significant finding and recommendation:

"Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.".

The record does not reflect a conscious adoption of option c). It reflects that intersections will operate within an acceptable level of service limits.

"We value our reputation for honest, objective, and technically valid analysis very highly, and so it is important to us that this matter be resolved to everyone's satisfaction."

In the comments which staff made at the council meeting, and also in subsequent responses to questions from newspaper reporters, we were careful not to be judgmental concerning particular consulting firms and kept from placing blame on any of the consultants which were involved. I have reread the article which you quoted and still feel that we adhered to the above and avoided incorrectly placing blame.

"If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter."

Your letter very eloquently describes your position with regard to the impact of the Incredible Universe on traffic. I have come to a somewhat different conclusion from reading the applicable reports. Although I would be very happy to meet with you to discuss this issue, it appears that this may be one subject in which we probably will continue to have different opinions which may never be fully resolved. If you do desire

to meet with myself or other members of the Community Development staff on this subject, please contact the undersigned.

Sincerely,

Eldon R. Johansen
Community Development Director

erj:mld

pc: Kim Beach, Capital Realty
Mayor & City Council
Transportation Advisory Commission
Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Mike Stone, City Engineer
Wayne Sorensen, Planning Director
Steve Starner, Public Works Director

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

STAFF
Pam
Blaise
Sally
Project file
11/PC 4/3

OCT 29

October 27, 1992

Project No.: P10.00

Mr. Wayne Sorensen
Planning Director
City of Wilsonville
P.O. Box 220
Wilsonville, Oregon 97070

SUBJECT: Incredible Universe Traffic Issues

Dear Wayne,

I read with some concern an article in the October 22 issue of *The Oregonian* titled, "Traffic Count Zooms at Electronic Store". I am enclosing a copy of the article for your information in case you missed it.

I was troubled by several comments in the article which seemed to suggest that, in the eyes of some high-level City officials, our traffic analysis had misled City officials:

> "The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts", said Arlene Loble, city manager.
>
> The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5...If the study were being done today, the city would insist that engineers look at one more intersection down the road, [Eldon Johansen] said.
>
> [Eldon Johansen] said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built. Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic...Finally, the traffic study did not account for the success of the store's marketing effort.

I would like to take this opportunity to clarify the analytic process we followed and the directions we received. Hopefully, this clarification will allow you, Ms. Loble, Mr. Johansen, and other City staff to more confidently and accurately respond should this issue arise again.

The transportation impact analysis that we performed for Capital Realty was begun in 1990 and completed in 1991. The site development plans called for construction of a shopping center containing 450,000 gross square feet of floor area. Given this information, the trip generation rates that we used were entirely appropriate, as was the estimate that 40 percent of the site-generated trips would be drop-in traffic. This is evidenced by the fact that the first phase of the shopping center development, which has already been completed, operates very close to the estimates that we provided.

Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersections of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted (April 1990), our engineers pointed out to City staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> "As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersections, are anticipated to operate at an acceptable level of service [under projected 1995 peak our conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition."

The current best estimate, by the way, is that these improvements will not be completed before 1996. Further, it should be noted that, even at this early date, City staff did not rely solely upon the findings of Kittelson & Associates, who were retained by the applicant. Instead, the City retained its own independent traffic engineering consultant to review the traffic impact analysis report and to critique the analysis assumptions, methodology, and findings. This independent traffic engineering consultant performed the requested review and confirmed every essential element of the report, including the projected capacity deficiency at the I-5/Wilsonville interchange area.

In personal discussions, City staff were informed of this finding of a future capacity deficiency, and were asked to interpret the City's requirement that a level of service equal to or better than "D" be provided at all intersections. City staff informed our engineers that, because the I-5/Wilsonville Road intersections are actually controlled by ODOT and, further, because ODOT has already established plans to improve the interchange and increase the capacity of these intersections, the finding of a capacity deficiency at the interchange would not be considered a fatal flaw. This conclusion by City staff is confirmed by the fact that the project was ultimately recommended for approval, even with the report's recognition of capacity deficiencies on Wilsonville Road near I-5 as noted above. It should also be pointed out that City staff's position was not unique to this project, but has also been recently applied to projects in the vicinity of the Stafford Road interchange.

On this basis, the transportation impact analysis was completed, all other on-site and off-site traffic-related deficiencies were identified, considerable mitigation projects were undertaken, and the necessary approvals were obtained.

Initial planning for the Incredible Universe store began in late 1991, and was completed in 1992. It is important to note that, throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our engineers knew only that it was to be a retail development. By their own choice, City staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of City staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that City staff made this decision: for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion.

Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the City's transportation system in order to mitigate the traffic impacts we

identified. Further, the Incredible Universe store contributed $250,000 in System Development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments: it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs.

Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering.

In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to City staff since early 1990 at least. Since that time and through all subsequent development reviews, City staff, planning officials, and policy makers have had three options available to them:

a) Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;

b) Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision. These

effects were temporary in that they will most likely die away after the Christmas season and as the store's novelty begins to fade. Additionally, these effects were exaggerated by the special event nature of the Grand Opening, which did not give patrons a chance to adjust their arrival time or choice of route. Therefore, it is unlikely that the City will again experience extended periods of mile-plus queues caused by the failure of the I-5/Wilsonville Road interchange. Even so, City staff and policy makers should recognize that less visible daily failures of the interchange are already programmed to occur: several already-approved residential and commercial projects have not yet been completed, and the combined future traffic effects of these projects virtually assure periods of peak-hour failure of the interchange during most typical weekdays. Thus, the City no longer has control over *whether* peak hour congestion and failures will occur at the interchange (they will), although future land use decisions can still affect the *duration* of these failures.

We have no quarrel with the prudence of the City's conscious decision to adopt option c) above. We are, however, disappointed that the City would suggest to the public, through articles such as the one published on October 22, that the congestion was not anticipated and that the fault for this lies with the traffic impact analysis process.

If you have any questions, please call me. We value our reputation for honest, objective, and technically valid analyses very highly, and so it is important to us that this matter be resolved to everyone's satisfaction. If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter.

Sincerely,

Wayne K. Kittelson

Wayne K. Kittelson, P.E.
Principal

cc: Arlene Loble
Eldon Johansen
Greg Carter
Kim Beach

CITY OF WILSONVILLE
P.O. Box 220
30000 S.W. Town Center Loop East
WILSONVILLE, OREGON 97070

(503) 682-1011

LETTER OF TRANSMITTAL

TO _____

DATE	JOB NO.
10/1/92	
ATTENTION: Arlene Loble	
RE: Immaculate Conception	
Copy of letter or decision, and attachments	
One copy of Transportation Impact Analysis prepared by Kittelson & Assoc	

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Wayne Sorensen

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

May 28, 1992

Mr. Rich Hollander
Vice President
Tandy Name Brands
P.O. Box 1643
Fort Worth, TX 76101

Ms. Kim Beach
Capital Realty
101 S.W. Main St. Ste. 905
Portland, OR 97204

Re: Tandy Name Brands dba Project Thunder

Dear Mr. Hollander & Ms. Beach:

The purpose of this letter is to summarize the current status of ongoing actions which must be completed prior to opening the facilities which were previously known as Project Thunder and currently known as the Incredible Universe. An additional purpose is to solicit your continuing assistance in resolving the remaining points of difference so that when the construction is completed, there will be no outstanding actions which would preclude issuance of the Certificate of Occupancy.

Primary items of concern are as follows:

Street Systems Development Charge

On March 2, 1992, Council adopted Resolution No. 902 authorizing deferral of the Systems Development Charges for streets from time of issuance of building permit to time of issuance of occupancy permit for Tandy Name Brand Retail Group. Resolution No. 902 contained an estimate for the Street Systems Development Charges in the amount of approximately $370,880.00. This was based on a total of 160 employees at the site. On March 6, 1992, Mr. Brian L. Spain, Assistant Tax Manager, for Tandy Tax Service, forwarded a check in the amount of $124,592.15 for the Street Systems Development charge. I am concerned that use of peak hour employees is irrelevant to peak hour traffic generation and will correspond directly with Mr. Spain to resolve differences.

Traffic Signal - Town Center Loop West and Wilsonville Road

One of the conditions that was placed on this development was that the signal at the intersection of Wilsonville Road and Town Center Loop West must be installed prior to the occupancy of the Project Thunder site. Plans have recently been received at the Community Development Department for a second review.

Kim Beach, Capital Realty, is pushing to insure that the signal is in place prior to occupancy of the Project Thunder site.

Detention Facility

The Project Thunder site was conditioned to be designed for the 25 year storm. Detailed calculations indicate detention could be deferred until development of the property just north of the Project Thunder site. The condition would appear not to allow staff to administratively transfer the detention requirement to another property. Staff is again working with Capitol Realty to insure that this is resolved.

Construction as Included in the Public Works Permit

The City requires that the Punch List for Public Works items be completed prior to issuance of a Temporary Occupancy Permit.

Maintenance Bond

The City will require a 10% Maintenance Bond for twelve months following acceptance of the work included in the Public Works Permit.

Repair of Town Center Loop West Road

The City has contacted S.D. Deacon, General Contractor, concerning the street repairs to Town Center Loop West Road. Mr. Art L. Bush, Project Manager, has informed the City that S.D. Deacon Corporation will not be held responsible for any road repairs or replacement to existing condition of either north or southbound lanes of Town Center Loop West Road at the conclusion of this project. The contractor has removed the curb along the east side of Town Center Loop West and the asphalt has substantially failed wherever the curb has been removed. The City has no intention of accepting the project until such time as damages caused by the contractor are repaired.

Modification of Median - Town Center Loop West

We have received construction plans for modification of the median. We will be submitting those plans to Council for approval. It appears that this work is necessary prior to having adequate access to parking.

Abandonment of Right-of-Way

The City has received documentation requesting abandonment of right-of-way that was part of the former Parkway Avenue. This is being processed to insure abandonment by August 1, 1992.

As you no doubt realize, I did not begin work in Wilsonville until April 6, 1992, after this project was well under way. My concern is that if we do not keep our attentions focused on resolving all outstanding issues, we will reach a point where the building will have been completed and you will have hired employees to open the facility and will be unable to issue a Certificate of Occupancy because of failure to resolve the above items. Your continued assistance and cooperation will be appreciated.

Sincerely,

Eldon R. Johansen

Eldon R. Johansen
Community Development Director

ej/js

pc: Arlene Loble, City Manager
Michael Kohlhoff, City Attorney
Steve Starner, Public Works Director
Martin Brown, Building Official
Wayne Sorensen, Planning Director

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

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Fax (503) 526-0775

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• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment

Copied To:
KIRK BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Margo 5/7
Orig to Angel Thunder file
Copy to Wayne myself
Eldon

Comments

ELDON,
JIM LENHART HAS PREPARED ADD'TL STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

Signed Rick Martin

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8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

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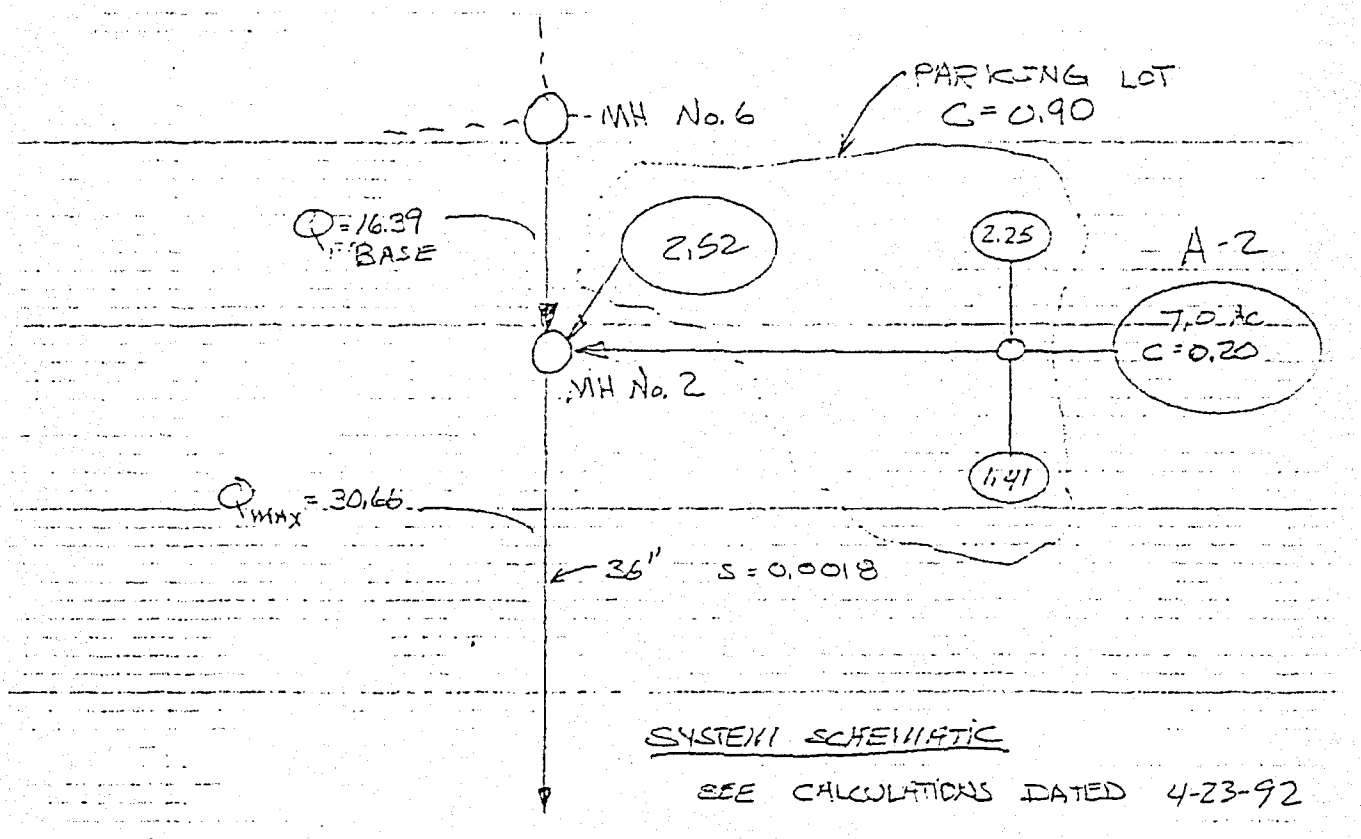
DETENTION REQUIREMENTS FOR A-2 IN HN UNDEVELOPED CONDITION.



SYSTEM SCHEMATIC

SEE CALCULATIONS DATED 4-23-92

ASSUME WORST CASE SCENARIO

1.) FLOW FROM MH. No 6 TO MH No 2 is MAXIMUM DUE TO UPSTREAM STORAGE, Q_{BASE} = 16.39 CFS

2.) ASSUME GRASSED AREA FOR A-2 with C = 0.20

3.) ASSUME 550 FEET OVERLAND TRAVEL FROM A-2

1ST 200 FEET = 20 MINUTES
REMAINDER 350' = 4 MINUTES. (SLOPE = 1%)
(IN CHANNEL)

t_c = 24 MINUTES

Project: DETENTION MANAGER Date: 5-5-92 Sheet No. 1 of 2

Prepared by: [illegible] Job No. [illegible]

Creative Solutions ... Superior Service

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment
- ☐

Copied To:
KARL BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Comments

ELDON,

THIS LETTER HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

PARKING DETENTION IS POSSIBLE IN PIT III OR EITHER PROPERTY NORTH OF TANDY.

Signed Rick Martin

PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775
• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

i_{25} @ 24 MINUTES = 1.6 in/hour.

$Q_{PEAK} = i \Sigma CA_i = (0.2)(7.0\ AC)(1.6) = 2.24$

$(0.9)(6.18)(1.6) = 11.33$

13.57 CFS.

$Q_{ALLOWABLE\ IN\ PIPE} = Q_{MAX} - Q_{BASE} = 30.66 - 16.39$

$Q_{ALLOWABLE} = 14.27$ CFS.

SINCE Q_{PEAK} (13.57) < $Q_{allowable}$

NO DETENTION IS REQUIRED

NOTE! THIS CALCULATION IS FOR UNDEVELOPED CONDITIONS ONLY.

Project: PROJECT THUNDER Date: 5-5-92 Sheet No. 7 of 2

Prepared by: [illegible] Job No. 1657.03-94-11

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: William L. Parks
Division of State Lands
1600 State Street
Salem, OR 97310

Date: 12-16-91
Project Number: 4-755-0202
Project Name: Project Thunder
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
[X] Attached	[ ] For Your Info/File	
[ ] Facsimile	[ ] As Requested	
[ ] Number Of Pages Including Cover	[X] For Review And Comment	
[ ]		

Copies	Description
1	Vicinity Map 8½x11
1	Site Map 11x17

X No Jurisdiction 10 YR 5/4
A/O Hydrology - Ann Dittel
by Phone

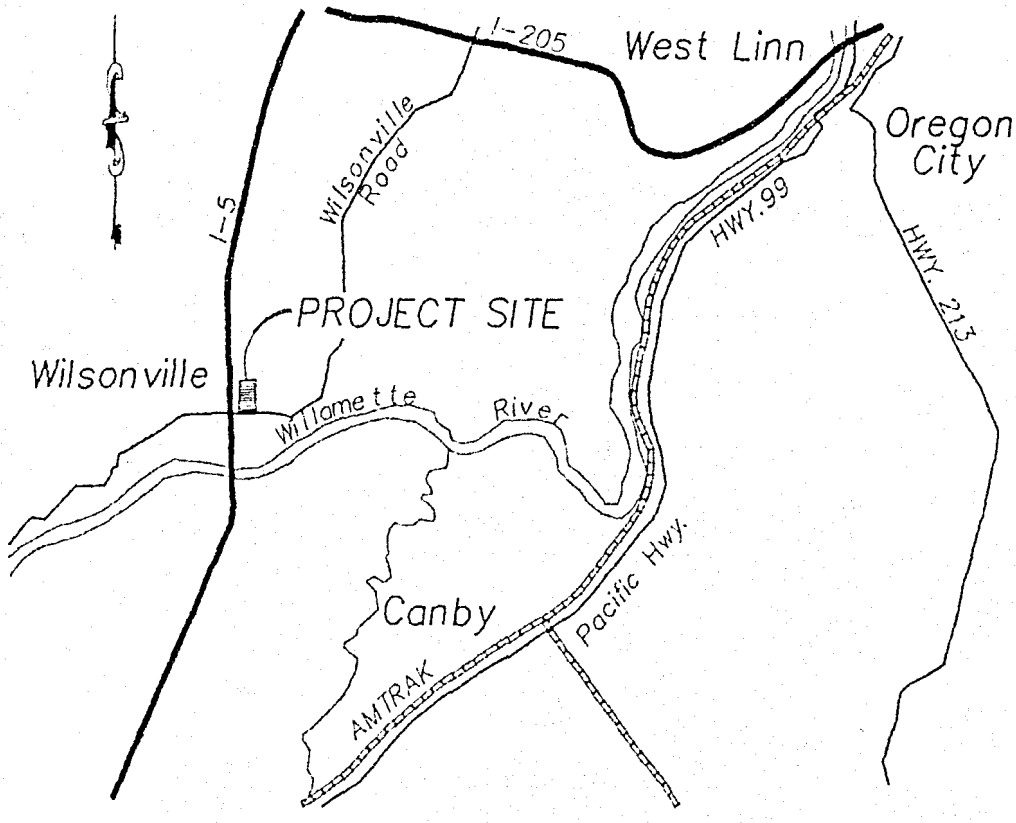
Comments

Bill,

Please make a determination whether or not the existing detention pond is a "wetland" as defined by DSL.

I prefer a response as soon as possible, but no later than January 3, 1992. If this presents a problem, please call me at your earliest.

Signed Thanks, Rick Martin



VICINITY MAP

NTS

- EXIT I-5 NORTH @ WILSONVILLE RD
- TURN LEFT @ TOWN CENTER LOOP RD WEST (PORTLANDIA PIZZA ON CORNER)
- SITE IS ± 1/4 MILE NORTH OR RIGHT.

CAPITAL REALTY CORPORATION

December 30, 1991

Mr. Mike Kohlhoff
City Attorney
City of Wilsonville
30000 S.W. Town Ctr. Loop E.
Wilsonville, OR 97070

Please submit the following language for approval by the City Council at the January 6, 1992 regularly scheduled meeting, to clarify Condition #10 of Resolution 91PC43:

The 5.1 acre public park dedication will be required the earlier of the issuance of a builiding permit for Phase III or May 31, 1994. The City and the applicant will work toward resolving the related access issues prior to the land dedication. The applicant will be involved in the Town Center park development planning in an advisory capacity but will not be required to make any financial outlay for the park planning process or its actual development.

For your information I have also enclosed a master site plan, color coded by original ownership. If you have any questions or require additional information please contact me. Thank you in advance for your prompt attention to this matter as we need to resolve this issue by January 7, 1992 to proceed with our contract with Thunder.

Very truly yours,

Kim Beach

Kimberly J. Beach
Vice President

cc. Ms. Arlene Loble (with enclosure)
Mr. Wayne Sorenson (with enclosure)

DIVISION OF STATE LANDS
Environmental Planning and Permits
775 Summer Street, NE
Salem, OR 97310
503/378-3805

RECEIVED
DEC 30 1991
CITY OF WILSONVILLE ANNEX

WETLAND DETERMINATION REPORT

At the request of the landowner or agent, Division staff have conducted an offsite or onsite wetland determination on the property described below.

COUNTY Clac CITY
LOCATION Exit I-5 @ Wilsonville TR. left @ Centa loop R West ¼ mile
T 3S R 1W S 23 TAX LOT(S)
OWNER/AGENT: Rick Martin W&H Pacific
ADDRESS: 1099 S.W. Columbia St. Portland, OR
DATE OF ONSITE INVESTIGATION: 12-19-91

☒ There are no jurisdictional wetlands or waterways on the property. Therefore, no removal-fill permit is required.
Notes: No Hydrology present - soil 10YR 3/4

☐ There are wetlands and/or waterways on the property. Those areas are subject to the State Removal-Fill Law. A permit is required for 50 cubic yards or more of fill, removal, or alteration of substrate.
Notes:

☐ A wetland delineation will be needed to locate and stake the wetland/non-wetland boundary. A list of consultants can be obtained from the Division.
Notes:

☐ A removal-fill permit will be required for

☐ No removal-fill permit will be required for _____ because/if

☐ A permit may be required by the Army Corps of Engineers (326-6995)

Comments:

Determination by: William Parks Date: 12-23-91

Response Copy To:
☒ Owner/Applicant ☒ Enclosures: Request, Site Plan Map
☒ City of Wilsonville Planning Department
☐ _____, Corps of Engineers
☒ DSL file copy
☒ Reading file copy – TO LORNA no Tvs.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • ~~PO Box 220~~
Wilsonville, OR 97070
(503) 682-1011

December 30, 1991

Mr. Jim Faulkner
Design Forum Architects
3484 Far Hills Avenue
Dayton, OH 45429

Dear Jim:

I appreciated you, Rich Hollander and Jared Chaney taking the time to meet with Blaise and me regarding Project Thunder. I hope that we will be able to find an acceptable compromise in the design of the Incredible Universe project.

Enclosed is a copy of my notes which generally outline the basic issues we discussed at the December 23rd meeting. I am also enclosing material to provide additional insight into our planning process for the Town Center:

1. A copy of the legal opinion prepared by Michael Kohlhoff, City Attorney, that was furnished to the Wilsonville Design Review Board during the hearings on the Les Schwab Tire Center which will also be located in Town Center;

2. Variance criteria contained in our City Code which must be fully met before the DRB can approve a variance request.

I want to assure you that the City will do everything we can to accommodate your schedule, but I want to be sure you understand the legal limitations to fast tracking the review process.

Once again, it was a pleasure to meet with you. I appreciate your cooperation in finding an acceptable design alternative that will do justice to the Town Center, including the future Town Center Park, and still meet your client's needs. If you have any questions, please feel free to contact either Blaise or me at (503) 682-4960.

Sincerely,

Wayne C. Sorensen

Wayne C. Sorensen
Planning Director

wcs:dp
Enclosure

TO: Honorable Mayor and City Council

FROM: Arlene Loble
City Manager

RE: City Manager's Business

DATE: December 12, 1991

SUBJECT: PROJECT THUNDER DEDICATION OF PARK LAND

Project Thunder, which is Phase II of the Town Center development, was approved by the Planning Commission and now goes before the Design Review Board. I have attached a copy of their proposed design and their request for variances from the sign code. I bring it to your attention because it seems so entirely inconsistent with what has been previously approved in Town Center and the architectural proposal was not before Planning Commission for review. They have not seen the design proposals that dealt solely with the land use issues.

There are a couple conditions of approval that need to be brought to Council's attention. One of the conditions of approval requires the dedication of a 5.4 acre public park. The dedication would be required at the time occupancy permits are issued unless the City Council and the applicant agree to a later date. The value of the property to be dedicated is at least $1,000,000, and the developers would like to be involved in the planning for park development but because of the value of the land are not willing to pay for any of the associated development costs. It is my understanding that at Phase I approval one of the conditions included not only the land dedication but financial responsibility for development of the park. That condition has now been removed because of the cost of the park land.

Leaving aside for the moment the inappropriateness of the design of the project, you can see from the attached exhibit that shows the location of the open space and the proposed building pads. This $1,000,000 park is really located in the backyard of the proposed development. Because of the type of business which is some sort of high tech retail, the rear of the building, which faces the park, doesn't even include any windows - just a large expansive blank wall. To help offset that, a smaller building to be developed at a future Phase III has been placed on the property in such a way that it could front into the city park. The development that has already occurred in Phase I, the shopping center, also faces its least attractive areas into the proposed park site. If the open space actually is worth $1,000,000, it will take at least that, in terms of the City's financial commitment, to improve the park. To put that kind of money into something that is really more of an after thought than a planned part of the development seems to me to be a big mistake. This is a

good example of something coming to Council's attention so late in the planning process that you have not had any meaningful input and yet now the City will be asked to make a substantial financial commitment. If the land is to be dedicated the developers justifiably want to know that the property will be developed in the future. What should be a wonderful design feature is really just an after thought. I don't know what, if anything, can be done at this stage, but I wanted to bring it to your attention as we will need to begin negotiations over the actual dedication of the property. Do you want a park in this location under these circumstances?

Another condition of approval that I would like to bring to your attention deals with the handling of storm drainage. Once again, this looks like we could be creating future problems because we have not had an engineer on staff and the project has probably not received the level of review from an engineering perspective that is necessary. So, the Planning Commission has added a requirement that storm sewer plans need to be coordinated with the City Engineer with a possibility of exploring the feasibility of onsight retention. As proposed by the developer, they would be eliminating the existing detention area and paving it over for additional parking. I don't know how this impact as a wetland but the staff report also brings that issue to your attention. Since the detailed engineering won't be done until or unless the plan is approved, we won't know until we get further into it how the developer's engineer plans to handle storm drainage. It is possible that they will actually need to relocate water and sewer lines that have been installed in Phase I in order to accommodate the proposed storm drainage plans for Phase II. Again, this is an area where we truly need the assistance of a City Engineer.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

MEMORANDUM

TO: Wayne Sorensen, Planning Director
FROM: Steve Starner, Community Development Director
DATE: December 9, 1991
RE: Project Thunder

In keeping with our usual land use process, the engineers associated with the development team for this project have submitted detailed studies to quantify the impacts of traffic volume and storm sewer capacities. Although their conclusions demonstrate compliance with Wilsovnille's development criteria, I am concerned about some of the practical issues raised in the staff report.

A. Traffic - Wilsonville Road/Parkway Avenue intersection

The Wilsonville Code does not require Project Thunder to demonstrate compliance with level of service "D" at the above-referenced intersection. However, for any motorist currently using the intersection during peak hours, it is obvious vehicle congestion is reducing existing traffic management functions to an unacceptable quality. Especially for motorists attempting to enter Wilsonville Road from Parkway Avenue, the City is exploring the following:

1. Increasing the visability of the "Do Not Block Intersection" signage.

2. Placing a pavement stop bar on Wilsonville Road which corresponds with the intersection signage.

3. Controlling ingress and egress to Parkway Avenue north of Wilsonville Road.

4. Investigate the installation of an intersection traffic signal which would operate in sequence with the interchange traffic controls.

5. Investigate the construction elements involved with a new roadway joining Parkway Avenue and Town Center Loop West.

Ultimately, traffic congestion adjacent to the Wilsonville interchange (from Town Center Loop West to Kinsman Road) will only be relieved when ODOT completes the construction of the expanded interchange design.

B. Storm Sewer - Memorial Part

As I understand it, Project Thunder storm drainage will flow into the I-5 storm sewer system. At peak flows, excess water will be diverted into the Phase I (Thriftway/Payless development) storm sewer which flows past the Library and into Memorial Park. In order to accommodate the anti-cipated flows, the following park storm drainage improvements are underway:

November - December, 1991	Surge basin, stilling basin and water quality swale design
January - February, 1992	Complete design
March	Construction bidding
April	Award construction contract
May	Begin construction
September	Complete construction

The estimated cost of this project is $124,420 and is scheduled to be funded in conjunction with Memorial Park improvements. Approximately 52 per cent of the total project cost may be recovered from a payback when the Teufel and Boozier properties develop.

Also, the City will soon be undertaking a City-wide storm sewer Master Plan study in order to identify and plan for infrastructure needs. Under the current storm sewer SDC program, Project Thunder will generate approximately $16,640 to be applied directly against the cost of the new Storm Sewer Master Plan.

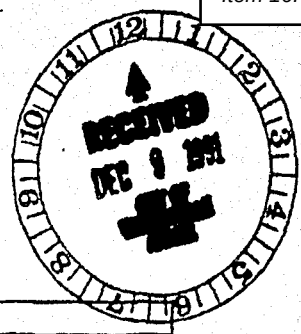
I hope this information is helpful.

ss:jme

PROJECT THUNDER

PEOPLE IN ATTENDANCE

MEETING: PLANNING COMMISSION
DATE: 9 DEC 91



NAME	ADDRESS
Ian Leitz	233 SE Washington St Hillsboro OR 97123
Loyal L Craven	JRS ARCHITECT 1611 SW Taylor Portland 97205
Jim Faulkner	3484 Far Hills Av Dayton, OH 45429 Design Forum Architects
Chris Tope	29025 S.W. Town Center Loop Wilsonville OR
Tom Jones	1099 SW Columbia PDX 97201
Rick Martin	1099 SW Columbia PDX 97201
Kim Beach	101 SW Main Suite 1500 Portland OR 97204
Don Main	8755 SW Citizens Drive Wilsonville
Mark Vandehey	610 SW Alder Suite 700 PDX 97205
Bob Lamb	13890 SW Bull Mt Road Tigard OR 97224

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
City of Wilsonville Annex
30470 SW Parkway
Wilsonville, OR.

Date: Dec. 2, 1991
Project Number: 467-0301
Project Name: Wilsonville Town Center
Regarding: Open Space Alternative Concept Plan

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
X Attached	For Your Info/File	KIM BEACH
Facsimile	X As Requested	LOGAN CRAVEN
Number Of Pages Including Cover	For Review And Comment	

Copies	Description
10	FOLDED FULL SIZE REVISED MASTER PLAN (SHT. #1)
1	PMT (8½"x11") OF ABOVE
1	ORIGINAL (8½"x11"): ALTERNATIVE OPEN SPACE CONCEPT.

Comments

Blaise:

Please enclose the attached materials w/in your staff report.

s - again for all your help !!!

Yours,

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

November 26, 1991

Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 SW Elligsen Road
Wilsonville, Oregon 97070

RE: PROJECT THUNDER
DESIGN REVIEW SUBMITTAL
JOB NO. 4-755-0102

Dear Blaise:

Thank you again for taking time this morning to discuss Project Thunder. As per our discussion, the following items were discussed and agreed upon:

1. Approval of Drawing Scales:

   A. Design Review Submittal at 50 scale.

   B. Construction Document Submittal at 30 scale.

2. Approval to omit irrigation design for Design Review Submittal. Notes will be provided.

3. Design Review Submittal will be 50 scale landscape plan showing tree, plant and lawn layout. Plant lists and details will be provided as per City of Wilsonville's Design Review Criteria.

4. W&H Pacific will have 100% complete construction documents by December 27, 1991. We will submit to the City a set of complete drawings for additional information. These drawings will include complete landscape and irrigation plans and can be included for the January 27, 1992 Design Review meeting.

If you have any questions or comments, please give me a call.

Sincerely,

W&H PACIFIC

Matthew P. Simpson, A.S.L.A.
Project Landscape Architect

MPS/kal

STORAGE	SERVICE	RETAIL	REST
6208	4700	47,879	572
9600	900	2,240	1024
22,892	1020	5,880	4500
420	640	7,920	6096
216	1952	63,919	
39,336	5016		
	2048		
	1008		
	17,276		

OFFICE
18156
200
50
5,294
288
912
240
149
128
9,117

EXHIBIT "A"

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

ADMINISTRATION DEPARTMENT
MEMORANDUM

DATE: OCTOBER 9, 1990

TO: DESIGN REVIEW BOARD

THROUGH: WAYNE SORENSEN, PLANNING DIRECTOR

FROM: MICHAEL E. KOHLHOFF, CITY ATTORNEY

SUBJECT: REQUESTED OPINION FOR LES SCHWAB TIRE CENTER

INTRODUCTION

At the City of Wilsonville's Design Review Board meeting of September 24, 1990, applicant, Les Schwab Tire Centers (Les Schwab), filed three legal objections to the planning staff's recommendations for revisions to the Les Schwab site plan applications as conditions of approval: violation of U.S. Constitution and Oregon Constitution free speech rights, lack of authority, and arbitrariness. The Design Review Board has requested my review of these objections, which are discussed below. The application was continued for decision only until the next regularly scheduled meeting in October.

The recommended revisions were to proposed material and color to the exterior of the tire center building. The site plan submitted by Les Schwab called for the building to be constructed of concrete block, with a metal roof and metal mansard. The proposed exterior colors of the building were red and white. The revisions recommend the use of red-colored brick instead of the red painted block on the south, east and west elevations, with the north elevation to be painted white. Also, the metal roof trim and mansard were recommended to be repainted with an earth tone color.

BACKGROUND

The City of Wilsonville was incorporated in 1969. Pursuant to state statute it adopted and had acknowledgment by the state its city-wide Comprehensive Land Use Plan and implementing Zoning Ordinance in 1982. As a newly developing city it has placed its emphasis on planning in the form of "planned development" for commercial, industrial and residential uses. In the area of commercial development, the City's Zoning Code provides:

"4.136 (1) (c). Planned Development Commercial shall be planned in the form of centers or complexes as follows:

a. The Town Center
b. Service Centers
c. Office complexes.
d. Commercial recreation.
e. Neighborhood commercial."

The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas.

The purpose of this zone is stated under 4.136 (l) (c) (12) (a).

> "Purpose: (i) The purpose of this zoning is to permit and encourage a City Center, adhering to planned commercial and planned development concepts, including provision for commercial services, sales of goods and wares, business and professional offices, department stores, shopping centers and other customer-oriented uses to meet the needs of the Wilsonville community as well as to meet the general shopping and service needs of an area-wide basis, together with such multiple family residential facilities, open space, recreational and park areas, and public uses facilities as may be approved as part of the City Center compatible with the Comprehensive Plan of the City."

The location of the Les Schwab property application is in the northwest corner of the Town Center commercial area adjacent to Interstate 5. The Town Center is planned as the City's focal center. The property's location is a major viewing point of the City's focal center and identity. Development has occurred in the area with appropriate uses, high quality materials and design, which has provided the city center with uniform and harmonious developments with an aesthetically pleasing visual environment. This development has been and is overseen by the City's Planning Commission and its Design Review Board, pursuant to the city's zoning code.

The Les Schwab application has duly gone through the Planning Commission Planned Development Approval process and is located appropriately in the service commercial area of Town Center Master Plan. Its use approval adheres to the planned commercial/planned development concepts for Town Center. It comes before the Design Review Board for site development approval.

LEGAL REVIEW

"Comprehensive planning is clearly recognized as a proper exercise of municipal police power, often seen as a safeguarding of property values on a broad public basis. The conservation of property values is a very common consideration in comprehensive zoning, ordinarily required by state zoning acts, incorporated in ordinances and sustained by the courts (footnote omitted). Likewise, regulations as to the height and mode of construction

of buildings have been sustained on the ground of the 'safety, comfort and convenience of the people and for the benefit of property owners generally'" (footnote omitted). McQuillan Mun. Corp., § 24.14 (3rd. Ed.)

As also stated in McQuillan Mun. Corp., § 24.10:

"It is well said that the police power is based chiefly on the Latin maxums, salus populi suprema est lex - the welfare of the people is the first law (footnote omitted) and sic utere tuo ut alienum non laedas - so use your property as not to injure the rights of another (footnote omitted). As stated by the United States Supreme Court, the police power 'has its foundation in the maxim of all well-ordered society which requires everyone to use his own property so as not to injure the equal enjoyment of others having equal rights of property'". (*Slaughter House Cases, 16 Wall 36, 21 L. Ed. 394).

However, the power of municipal government in this respect is not unlimited. It is limited by federal and state constitutional guarantees.

Applicant raises issues pertaining to federal and state constitutional rights to free speech, arguing that the proposed color revisions invade its rights to advertise as it chooses. Applicant also raises due process issues which prohibit the unreasonable, arbitrary use of such powers claiming the Design Review Board does not have the authority to limit materials and colors (unreasonable) and is without standards and criteria (arbitrary) to do so.

As previously stated, public necessity and protection of the public welfare forms the basis for the exercise of police power; that every person ought to so use his or her property so as to not injure one's neighbors. The unavoidable consequence of the need to exercise the police power in this regard results in the restriction on the use of property. It should also be noted that the police power is of a dynamic nature. McQuillan Mun. Corp., § 24.08 (3rd ed.) states, "Like equity jurisprudence, the police power has a dynamic or progressive capacity to be applied to new subjects or to be exercised by new or revised measures as economic and social changes require."

Wilsonville adopted its zoning code as an exercise of its police power. The presence of its Design Review Board is an example of the progressive capacity which was brought about by the public necessity and modern day quality of life concerns. Wilsonville as part of its general zoning regulations provides in 4.151 General regulations - signs for signage regulation.

The public necessity to regulate signage in terms of time, place and manner so that the signage chosen is not abusive of the rights of others is clearly recognized. See cases cited in McQuillan Mun. Corp., § 24.384 (footnotes 1-10). Within these general regulations, 4.151 (3) applies to commercial use within the Wilsonville Town Center as follows:

> "(a) The Wilsonville Town Center, as designated in the Wilsonville Code, Section 4.136 et seq., is well suited for the institution of a coordinated signing program because of its geographic unity, focal location, and the fact that it is in the early stage of development. The purpose of Section 4.151(3) of this chapter is to provide the Town Center with a program of coordinated signing which is both functional and aesthetic, and to provide a method of administration which will insure continuity and enforcement. In this manner, the framework will be provided for a comprehensive balanced system of street graphics which provide a clear and pleasant communication between people and their environment..."

"In regulating the use of street graphics and building signage, the following design criteria shall be applied in conjunction with the provisions of this Code: That street graphics and building signage be:

1. Appropriate to the type of activity to which they pertain.

2. Expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole.

3. Legible in the circumstances in which they are seen.

4. Functional as they relate to other graphics and signage."

Wilsonville Code 4.001 (70) defines "sign" as "***painting...or other device that is designed, used or intended for advertising purposes, or to inform or to attract the attention of the public, and includes where applicable...display surfaces and all components of the sign***".

Wilsonville Code 4.151 (3) (b) (2) provides the following definition: "Building Graphics. Signs that are not located within the first 15 feet of a property line that abut a public right-of-way. Building graphics are signs that include building-mounted and roof-mounted signs."

Wilsonville Code 4.151 (3) (d) (3) a. provides for Building Graphics Signage: "The total square foot of all signs except the single address sign and the street graphics sign shall not exceed the width of the building occupied by the use advertised. The width of a building is to be measured as the longest dimension of the width or depth of the building."

Wilsonville Code 4.151 (3) (c) (2) a. provides authority of the Design Review Board "...to administer and enforce all the provisions in Section 4.151(3) as they affect the design function and appearance of the sign."

Therefore, assuming that the applicant painted color schemes are as it proposes "an important element of the company's advertising" that "aid instant customer recognition", then the painted color scheme is a sign under Wilsonville Code 4.001 (70) whose display surface is violative of the size limitations for building graphics under 4.151 (3) (d) 3.a.

The specific criteria of size rationally limits a building by virtue of the amount and color it's painted from becoming a massive, garish sign incompatible with its neighbors. This is a reasonable time, place and manner prohibition to prevent an abusive medium, and is context neutral. The thrust of Art. 1, Section 8 of the Oregon Constitution is that free speech is not to be restricted unless it becomes abusive. See Ackerly v. Multnomah County, 72 Or. App. 617, 696 P2d 1140 (1985). The maxums involved in the police power cited above to not injure the property of others are found in the design criteria also cited that building signage not only be appropriate to the type of activity to which they pertain, but also be expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole. There is an obvious need to protect the aesthetic nature and character of other properties and the identity of the Town Center. There is no less need to preserve the property values of peaceful and harmonious use from loud and offensive noise than from loud and massive signage. Each is equally abusive.

As referenced above, comprehensive planning is widely recognized as a legitimate exercise of police power to preserve property values. Because of geographic unity, focal location and its early stage of development there is a rational basis to provide for a

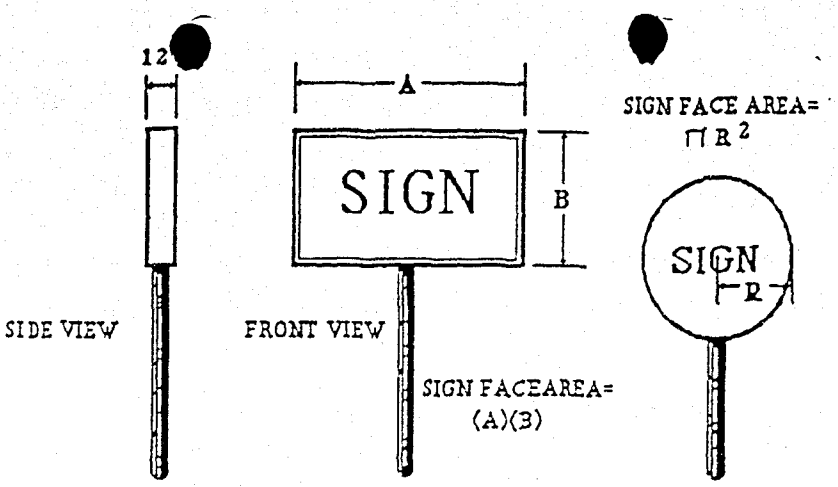
coordinated signage program which is both functional and aesthetic and to provide a method of administration through a Design Review Board for Town Center development. Clearly, this is in keeping with the multiple and often interrelated purposes set forth in 4.440 of the City's Code for Design Review Board. General criteria and standards are set forth to review site development in section 4.421, including color and material and as it relates to advertising medium that they "shall not detract from the design of proposed buildings and structures and the surrounding properties." Aesthetic sensibilities are also recognized as a sole ground and a proper subject for support of zoning regulation. See Oregon City v. Hartke, 240 Or 35, 400 Ord. 255.(1965); Naegele Outdoor Advertising v. City of Waynesville, 833 F.2d 43 (CA4 1987); Don's Porta Signs Inc. v. City of Clearwater, 829 F2d 1051 (CA11 1987).

The dynamic nature of police power is clearly seen in the contemporary, community trends to view aesthetic considerations as valid subjects for the exercise of police power. The very exercise of police power is based upon need. Modern, contemporary society has recognized that advertising in the commercial setting has historically been poorly constructed, grossly disproportionate in size or height, aesthetically disharmonious, located in manners detrimental to traffic safety, and has even obscured the rights of others to be seen, creating a need to establish reasonable time, place and manner restrictions.

On the other hand, such necessity has not risen to the same level of need to regulate the use of homes as signs. The business entrepreneurs who are willing to advertise their commercial product by virtue of using gross advertising structures in commercial areas have not historically turned their private homes into such uses. In short, the need to protect other homeowners from the detrimental effects of having the color schemes of homes turned into speech of a loud and abusive nature has not presented a public need to regulate. (Often, developers have instituted self regulation through homeowners associations in residential subdivisions). Thus, single family dwelling units are exempt from initial Design Review Board development approval. They are not exempt if and when the use involves signage. There are specific regulations which the Design Review Board has authority to govern addressing normal and typical signage within a residential use area, namely residential name plates, 4.151 (l)(a), bulletin boards, 4.151 (l)(b); real estate signs advertising individual lots, 4.151 (l)(c); subdivision signage, 4.151 (l)(d) and home occupation signage, 4.151 (l)(d). Nor is the applicant's comparison of industrial Planned Developments with the commercial developments a justification for not distinguishing the differences in the nature of uses. What may be appropriate to locate and identify industrial users and be harmonious with other surrounding industrial properties may, in fact, not be compatible with commercial uses. That basic recognition between different uses is what allows for zoning districts in the first instance.

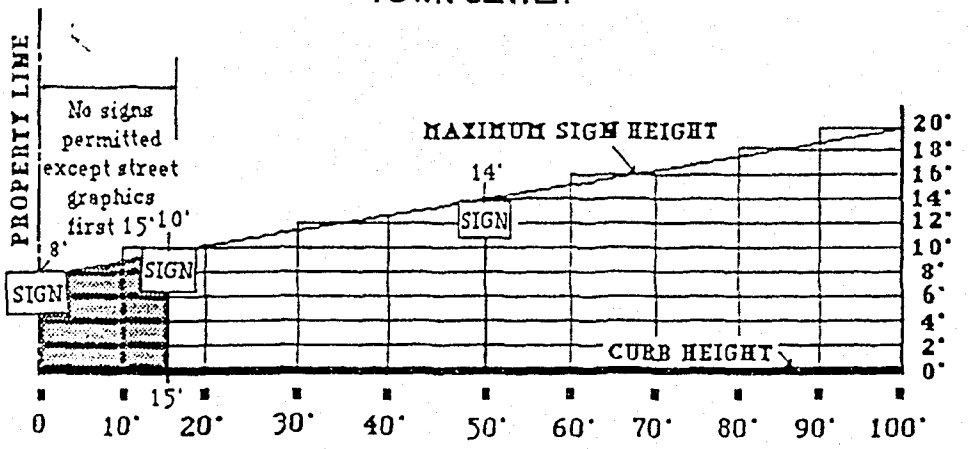
Therefore, I am of the opinion that the recommended revisions submitted by staff are reasonable time, place and manner restrictions, to prevent the use of a building as a grossly, large sign offensive to aesthetic sensibilities, coupled with the use of materials which are not harmonious with existing properties and the focal nature of Town Center to the detriment of the property of others. The regulations provide authority in the Design Review Board to act and neither as set forth or applied, are they arbitrary.

mek:pjm



SIGN FACE MEASUREMENT

TOWN CENTER



The maximum height of a sign is measured from a point 8 feet above the curb at the property line, to a point 20 feet in height or 4 feet above the roof, which ever is less.

MAXIMUM SIGN HEIGHT

EaE1aE1a
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRST
UVWXYZ
123456780&?!$(.,,.)^^><

FIG. 2

CHAPTER 4, ZONING CODE
TOWN CENTER SIGNAGE CODE
EXHIBIT "D"

City of Wilsonville
COMMUNITY DEVELOPMENT DEPARTMENT
Memorandum

November 7, 1991

TO: Blaise Edmonds, Planning
FROM: Martin Brown, Building Official
SUBJECT: DEVELOPMENT REVIEW TEAM

The following is a list of concerns for the proposed Project Thunder and the proposed Liberty Organization office/warehouse. Actual working drawings may expose additional code concerns.

THUNDER PROJECT

1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

LIBERTY ORGANIZATION OFFICE/WAREHOUSE

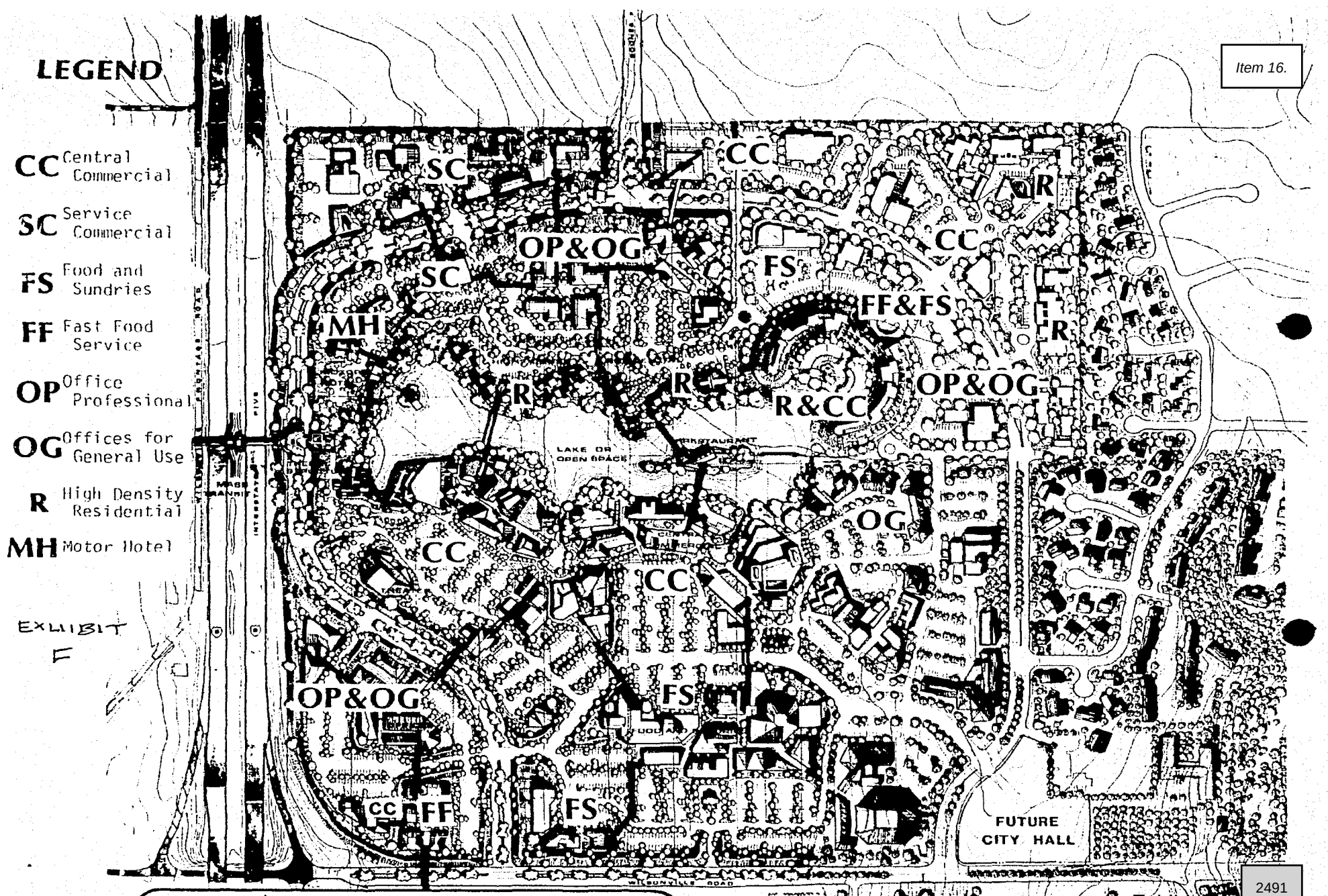
1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

2. Proposed building shall comply with the A.D.A.

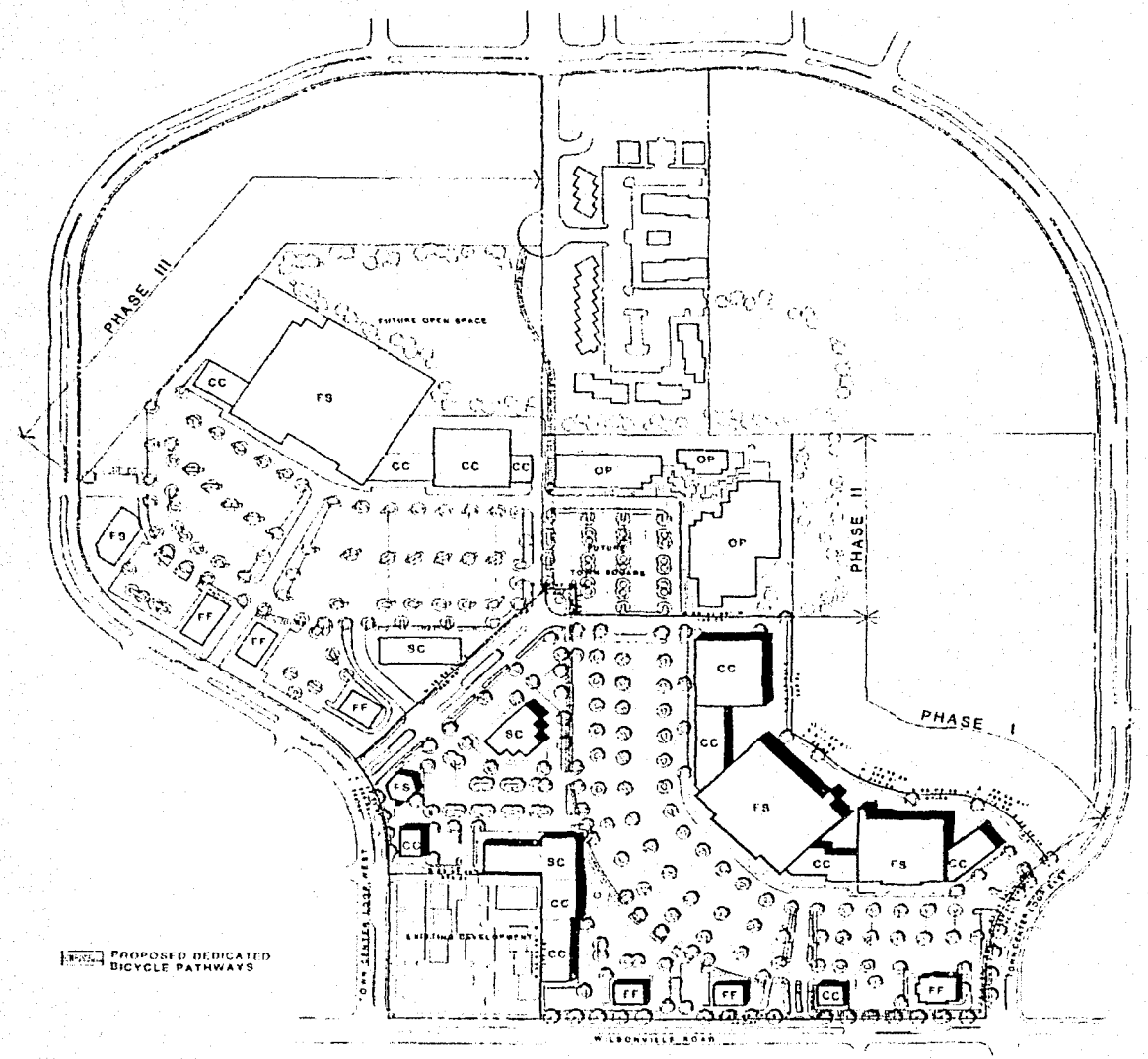
/s f

EXHIBIT E

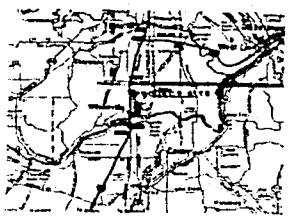
DEFECTS IN ORIGINAL DOCUMENT



Wilsonville City Center Plan



MASTER PLAN: PHASE I, II, & III



VICINITY MAP

ACREAGE

PHASE I	23.17 ACRES
PHASE II	5.41 ACRES
PHASE III	22.02 ACRES
TOTAL	50.60 ACRES

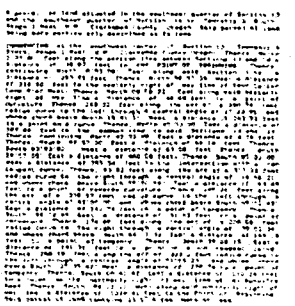


EXHIBIT H

JKS Architects PC

WILSONVILLE MARKETPLACE

1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OREGON 97205 • (503) 228-5230 • FAX (503) 273-8169

October 16, 1991

Ms. Kim Beach
Capital Realty Corporation
101 SW Main, Suite 1500
Portland, OR 97204

RE: Traffic Analysis for Wilsonville Town Center Phase II

Dear Ms. Beach:

The purpose of this letter is to discuss the results of an update to the April 1990 Traffic Impact Analysis we conducted for the Wilsonville Town Center relative to the current phase II development proposal. Some of the specific issues that this letter addresses include:

- the level of development proposed in the current phase II submittal,
- the level of development analyzed in the April 1990 Traffic Impact Analysis,
- an update of current conditions within the vicinity of the site
- an assessment of projected conditions upon completion of the current development proposal
- an assessment of the need for a traffic signal at the Wilsonville Road/Town Center Loop West intersection upon completion of the proposed development

Based on the results of both the previous and updated analysis, the proposed development can occur while still maintaining acceptable levels of traffic operations and safety at site driveways and nearby key intersections. The significant findings and recommendations are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

EXHIBIT G-7 SUPPLEMENTAL

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Current Phase II Development Plans

The current phase II development plans call for the construction of a retail facility consisting of approximately 159,000 gross square feet of floor area. This development level (and substantially more) has already been accounted for in the previous traffic impact analysis. The traffic impact analysis conducted in April 1990 considered a Phase I development level of approximately 211,000 gross square feet of floor area, and a combined Phase II and III development level of approximately 451,000 gross square feet of retail space and 40,000 gross square feet of commercial office space. Therefore, the original traffic impact analysis, which evaluated conditions through the year 1995 is considered to be more than adequate in terms of its assessment of traffic impacts of the proposed development for the four year horizon. Included with this letter are 10 copies of the April 1990 Traffic Impact Analysis.

Update of Existing Conditions

Within the last week, Kittelson & Associates, Inc. obtained weekday p.m. peak hour turning movement counts at the intersections of Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East. The results of those counts revealed that compared to the counts conducted in conjunction with the April 1990 study, traffic volumes have increased by approximately 70 percent on Wilsonville Road, by approximately 80 percent on Town Center Loop East, and have remained essentially the same on Town Center Loop West. The growth in traffic on Wilsonville Road and Town Center Loop East is due primarily to the substantial amount of residential development that has occurred within the vicinity of the site (particularly to the east of Town Center Loop East) within the past year, as well as to the development associated with Phase I of the Wilsonville Town Center.

The reason traffic volumes have remained basically the same on Town Center Loop West is likely due to the fact that the majority site-generated traffic associated with Phase I of the Wilsonville Town Center, as well as some of the site-generated traffic from the retail/office development located in the southwest corner of Town Center Loop are using the Wilsonville Town Center access drives on Wilsonville Road and Town Center Loop East. Another contributing factor may be that traffic volumes within the Wilsonville area have re-distributed somewhat since 1990. Table 1 displays a comparison of the 1990 and the current 1991 volumes.

TABLE 1
COMPARISON OF PEAK HOUR VOLUMES

Intersection	Approach	1990 Volume (Veh/Hr)	1991 Volume (Veh/Hr)
Wilsonville Rd./ Town Center Loop W.	Westbound	165	410
	Eastbound	530	785
	Southbound	295	270
Wilsonville Rd./ Town Center Loop E.	Westbound	155	300
	Eastbound	280	435
	Southbound	80	145

Based on the results of the recent p.m. peak hour traffic counts, Level of Service analyses were conducted at each of the intersections following the analytical techniques described in the *1985 Highway Capacity Manual*. Table 2 displays the results of that analysis. As indicated in the table, both intersections are currently operating at Level of Service "D" or better, which is considered acceptable by standards.

Projected 1992 Conditions

The current site plan indicates that three access driveways on Town Center Loop West will serve the proposed retail development, consisting of a main access drive, a secondary access drive, and a service drive on the north end of the development which will be limited to right-turns only. This access scheme is consistent with what was assumed in the 1990 Traffic Impact Analysis, with the exception of the north service drive. In the previous analysis, the two primary access drives were projected to operate at Level of Service "D" or better through the year 1995. Given that traffic volumes will be substantially lower in 1992 than the projected 1995 levels, all three driveways serving

TABLE 2
PM PEAK HOUR LOS
EXISTING TRAFFIC VOLUMES

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	113	D
Wilsonville Rd./ Town Center Loop E.	PM	299	C

the development are anticipated to operate at Level of Service "D" or better upon completion development.

Estimates of site-generated traffic for the Phase II development proposal were added to the existing traffic volumes at the intersections of Wilsonville Road/Town Center Loop W. and Wilsonville Road/Town Center Loop E. Based on that assignment, additional analyses were conducted to assess the level of service at these two intersections upon completion of the development. Table 3 displays the results of that analysis. As shown in the table, the intersection of Wilsonville Road/Town Center Loop West is anticipated to experience an "F" Level of Service, which is considered unacceptable by City standards. An examination of signal warrants contained in the *Manual on Uniform Traffic Control Devices* indicates that at least two warrants for a traffic signal will be met under projected 1992 conditions.

Based on these results, and given that background traffic volumes on Wilsonville Road are likely to continue to increase somewhat, it is recommended that a traffic signal be installed at the Wilsonville Road/Town Center Loop West intersection coinciding with the completion of the current Phase II development proposal. Based on this recommendation officials at Capital Realty Corporation have retained Kittelson & Associates, Inc. to begin the preliminary design of a traffic signal at the Wilsonville Road/Town Center Loop West intersection.

TABLE 3
PM PEAK HOUR LOS
PROJECTED 1992 EXISTING + SITE TRAFFIC

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	-29	F
Wilsonville Rd./ Town Center Loop E.	PM	113	D

I trust that this letter adequately addresses City staff's traffic related concerns with respect to this development proposal. If in the meantime you have any questions or comments please do not hesitate to contact me.

Sincerely,

Mark A. Vandehey

Mark A. Vandehey
Associate

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Request for Modification of Condition of Approval No. 90PC15

On behalf of the Owner, Capital Realty Corp., we request a reconsideration of Condition No. 8 of Planning Commission Resolution No. 90PC15 to provide the opportunity for Capital Realty to work with the City to accomplish the following:

1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions,

2. To formulate a development plan and time frame consistent with the development of Phase II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto.

Concurrently submitted to you are Stage I Master Plan Re-submittal and Stage II, Phase II of the Center. We feel that they have a bearing on this condition and warrant review.

Thank you for your consideration, if you have any questions, please call.

Very truly yours,

Richard S. Brooks, AIA
Project Manager

bc

C:\BC\RSB\WTC-1017.PM

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT G-8

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bavinger AIA • Gerald H. Williams AIA • Of Counsel: John E. Jensen AIA • Charles
Associates: Richard S. Brooks AIA • [illegible] AIA • Warren A. Tyler AIA

Stage I Master Plan Re-submittal
Wilsonville Town Center—Wilsonville, Oregon

1. Nature of Application:

This is a re-submittal for Stage I Master Plan approval for a proposed retail development of 59.79 acres, to be located adjacent to, and north of Wilsonville Road spanning from the southeast portion of Town Center Loop East, the inner portion of Town Center Loop West, north to the intersection of the Loop West and Parkway in that area previously designated as The Wilsonville Town Centre.

The Applicant:

Seeks to develop the site as a community shopping center. The center, at full build out would consist of approximately five larger retail commercial anchor stores, infill retail commercial space and pads located independently from the central retail complex for commercial retail development.

The proposed development includes a total building area of approximately 500,000 square feet constructed in three phases.

Phase I

The existing development of Phase I will include retail commercial space of approximately 207,130 square feet oriented primarily to Wilsonville Road. The Phase I Center consists of three anchor tenants, including major grocery and drugstore tenants, with infill commercial retail shop space and several pads at the periphery for retail uses. Parking for Phase I is 1,063 spaces at a ratio in excess of five spaces per 1,000 square feet of gross leasable area. The third anchor and several of the pads are as yet un-built.

The initial development provides two full-turning accesses along Town Center Loop; one at the eastern end of the development near Wilsonville Road, and the other off Town Center Loop West, which is a heavily landscaped entry boulevard, that in later phases will become the central identified main entry to the fully built-out center. Further, a secondary full turn access is proposed at Town Center Loop West and the Northern boundary of the existing retail center; and finally in Phase I, a right-in-right-out access at mid-site on Wilsonville Road, which is temporarily a full access entry until development to the south of Wilsonville Road completes construction of the final road design.

EXHIBIT 69

1. Nature of Application: (cont'd)

Phase II:

The proposed Phase II development is one retail user of approximately 159,400 square feet located on 14.75 acres primarily fronting Loop Road West. Phase II is to be built and developed by a separate owner other than Capital Realty Corp. Capital Realty, however, maintains its right of review for compliance with the concept and intent of the Town Center retail development. Approximately 872 parking spaces are provided (see Stage II Submittal attached).

Phase III:

The proposed development of Phase III includes retail commercial space of approximately 143,568 square feet completing the connection to Phases I and II. The Phase III development would consist of one large retail anchor tenant, retail pad tenants, and a two-story professional office building oriented at the end of the main entrance boulevard.

The parking development for Phase III, approximately 980 spaces, brings the total parking count to 2,915 spaces, serving the proposed 510,000 square feet of gross building area.

2. Property Description:

The property is located north of Wilsonville Road, east of Interstate 5, and west of City Hall. The property is located on the following parcels:

Parcel 1: 19.73 acres
Tax Lots 600 and 601, Section 13, Township 3 south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

Parcel 2: 4.37 acres
Tax Lot 500, Section 13, Township 3, south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

2. Description (cont'd)

Parcel 3: 25.96 acres
Tax Lots 200, 300, and 405, Clackamas County Map 3-1W-14D and ownership interests in a triangle of land approximately 6,381 square feet on the west of Tax Lot 200.

Parcel 4: 9.73 acres
Tax Lots 101, 201, and 102 Clackamas County Map 3-1W-14D

3. Plan Designation and Zoning:

The subject site is designated commercial on the comprehensive plan map and zoned Planned Development Commercial on the zoning map. The site, being situated within the Wilsonville Town Center master Plan map, has underlying use designations indicating CC Central Commercial, FS Food and Sundries, OP Office Professional, FF Fast Food Restaurant, R high density residential, and open space.

The intent of our proposal is to accomplish the mix of other desired and designated uses within the boundaries of our development. We feel our plan as submitted is consistent with the comprehensive plan goals and with the Town Center Master Plan.

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: **Stage I Re-submittal Master Plan Approval Wilsonville Town Center**
Stage II, Phase II Submittal

On behalf of Capital Realty Corp., and the owners of properties so designated as comprising the development area, we are re-submitting this application for a Stage I Master Plan Approval for a 59.79 acre commercial center and Stage II approval for the Phase II 14.75 acre site.

As you may be well aware, Phase I of this plan has been completed in part. The economics of the region and the country have impacted the nature of the project as originally planned. This re-submittal represents those pressures, and at the same time expands the size of the project while maintaining the original intent of mixed uses as outlined in the Wilsonville City Center Plan.

Capital Realty has the opportunity to bring to the Town Center project a major, innovative retail anchor which will comprise all of Phase II. This parcel will be sold to a separate user for which application for Stage II, Phase II is attached. Their progress and subsequent design submittals will be reviewed and monitored by Capital Realty.

The addition of this anchor, at this time will serve as a catalyst for the completion of Phase I buildings as well as increase the desirability of Phase III tenants. This, in effect, will improve the success of the entire City Center Plan to the benefit of Wilsonville as a whole.

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT 6-90

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bassinger AIA • Gerard H. Williams AIA • Of Counsel: John F. Jensen AIA, Edward Silvius
Associates: Richard S. Beyer AIA • Andrew R. Jacobson AIA • Robert L. Palmer AIA • Warren A. Tyler AIA

We are always available to answer questions to aid you in your analysis of this re-submission and its compliance with the current conditions of approval. This project represents a long-term commitment on the part of Capital Realty in the development of a strong, successful center for Wilsonville which will serve the needs of all its citizens. Thank you for your's and the City Staff's time, energy and cooperation towards the realization of this project.

Sincerely,

Richard S. Brooks, AIA
Project Manager

bc

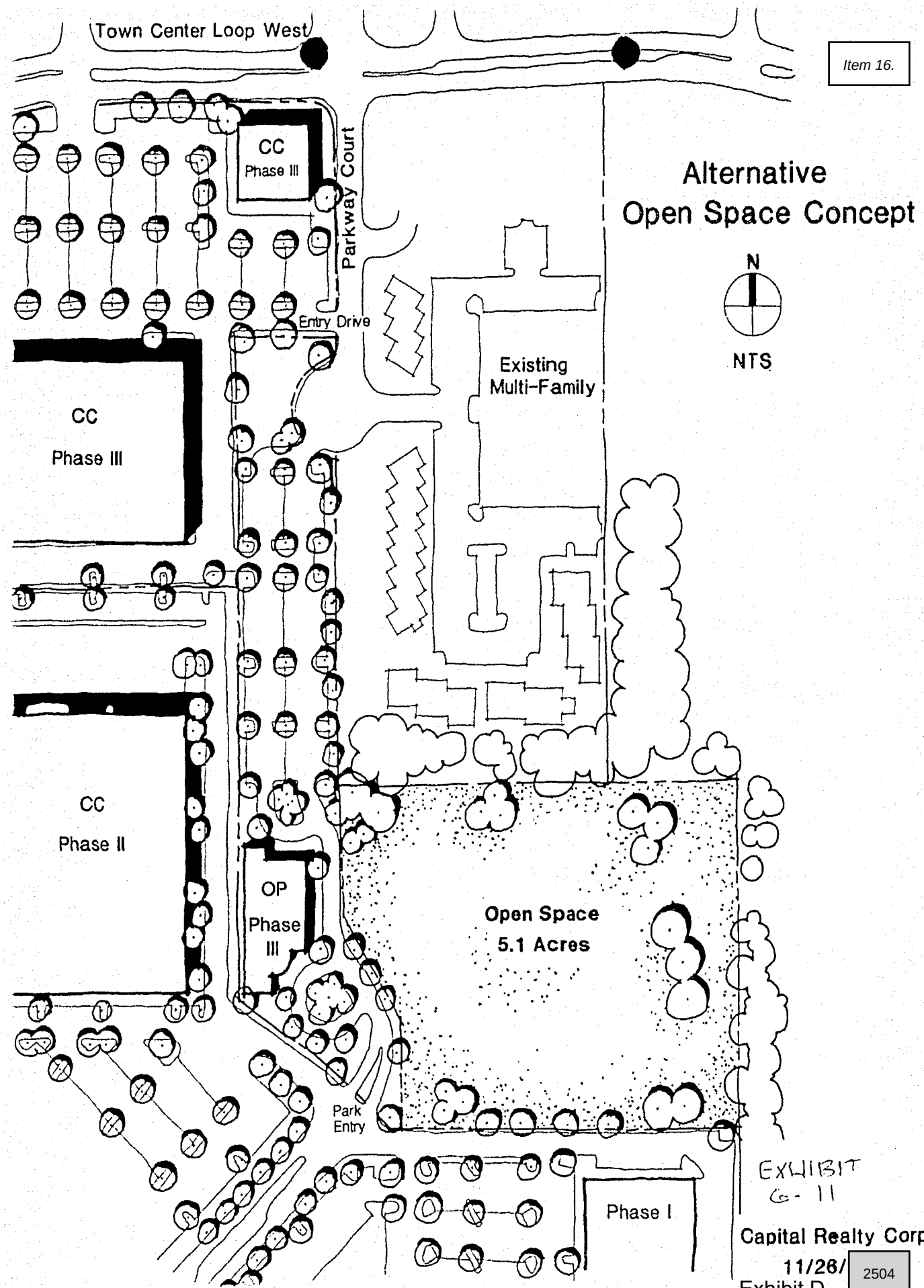


EXHIBIT
G-11

Capital Realty Corp.

11/26/ 2504

Exhibit D

AS REVISED
11/19/2

DesignForum
ARCHITECTS

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 1R
REVISED GENERAL COMMENTARY:

Project Thunder is a single story building with mezzanine, 166,495 GSF retail sales building, with accessary storage areas. Project Thunder is a new concept in merchandising with this location selected for the pilot program.

Enclosed is data that we believe supports the design concepts expressed, outlines the project exterior signage program; building architecture, materials and colors. The project exterior lighting program, the project landscaping and site improvements information is shown on the revised drawings included with this additional submittal.

As per phone conversations with Blaise Edmonds, Associate Planner, the materials and colors sample board will be presented at the evening of the actual meeting. It will not be forgotten. We will provide a sample board of wall elements, as requested, as soon as we receive material samples from the manufacturers involved.

Enclosed within this booklet are color photocopies of the revised color scheme, two views, plus the proposed parking lot light standards with the directory signage of aisle indicators. Also enclosed is a new drawing titled "View Corridor Concept." Submitted separately are revised drawings DRBC1, DRBC2, DRB1, DRB2, DRB3, and DRBL1.

We believe we meet all known City of Wilsonville ordinances in regards to architecture, landscaping and site improvements. There are no signage variances required. We do request a deviation from the Phase I signage program as explained following. Since our reconsideration of the signage program has eliminated all variances we request reimbursement of the variance fees previously paid.

We request the Design Review Boards consideration of Project Thunder, as resubmitted.

Sincerely,

James L. Faulkner, AIA
Senior Vice President, Architecture

JLF:dr

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 2R
MATERIALS/COLORS DIALOGUE:

The general concept of the project design aesthetic is to create a vibrant and lively shopping environment, having this a "fun place to be". This concept is visualized to the shopper by the dynamic main facade of the building by three means: building form, materials selected and colors used.

The basic building background material is an "Exterior Insulation and Finish System", common name used Dryvit. While proprietary, we will use this term in this discussion. The Dryvit will be in a field color of light beige (neutral) with dark green color Dryvit used as a horizontal accent band on the North and West elevations. Dark green will also be used at the curved wall element of the primary building entry and exit points on the West elevation. The Dryvit will be on all sides of the building, scored in the patterns indicated on the elevations. Use of the dark green color relates this project to the Phase I buildings.

To compliment the Dryvit field, and to help to reduce the scale of this building, a horizontal band of metal siding, in a light bronze color with 50% reflectivity is expressed on the West, North and South elevations. This metal siding is a vertical pattern with vertical "grooves" 6" o.c. On the East elevation, the color and position of the metal siding is simulated by use of Dryvit accent band.

To accent and provide visitor orientation to the entry area, an open "dome" of steel framing, painted red, is mounted on the roof. Coupled with the curved element wall, this designates the building entry area. At grade the curved element concept is carried forward with curved concrete curbs, radial lined concrete walkways and flagpoles/bollards in a circular centerline aligning with the curved wall element at entry. The flagpoles are 25'-0" high, natural aluminum color, and will fly solid color flags or nylon banners. The non-illuminated bollards are 42" high, 10" diameter pipe painted light beige. Bollards around entry points will be internally lighted, and be painted red.

To further designate entry points, clear glass in natural aluminum storefront framing is located adjacent to the curved element entry area, and also occurs at the building service entrance and other secondary entrance points.

The overhead doors will be solid, insulating units without windows, painted light beige. Other secondary doors will be hollow metal painted to match adjacent wall color. Miscellaneous site items such as handrails will be painted black.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 3R

The following are our calculations of area for the Project Thunder Signage Program:

Wall Graphics:

Single face, backlit signs:

Store Name Sign*:	1 Each at 224 SF	=	224 SF
Fascia Sign: "Service":	1 Each at 12 SF	=	12 SF
Fascia Sign: "Customer Pickup":	1 Each at 28.5 SF	=	28.5 SF
Fascia Sign: "Car Stereo Installation":	1 Each at 40.5 SF	=	40.5 SF
TOTAL WALL GRAPHICS AREA			305 SF

* This sign of channelume construction with individual letters for the word "UNIVERSE"; the word "INCREDIBLE" is in script neon.

There are miscellaneous directional signs on site, i.e. stop signs, that are under 2' x 2' in size, single face, non-illuminated and pole mounted. These include the Parking Lot Aisle Indicator Signs: 12 each at 8 SF = 96 SF. These are shown on sheet DRBC1, but are not included in signage area calculations.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 4R

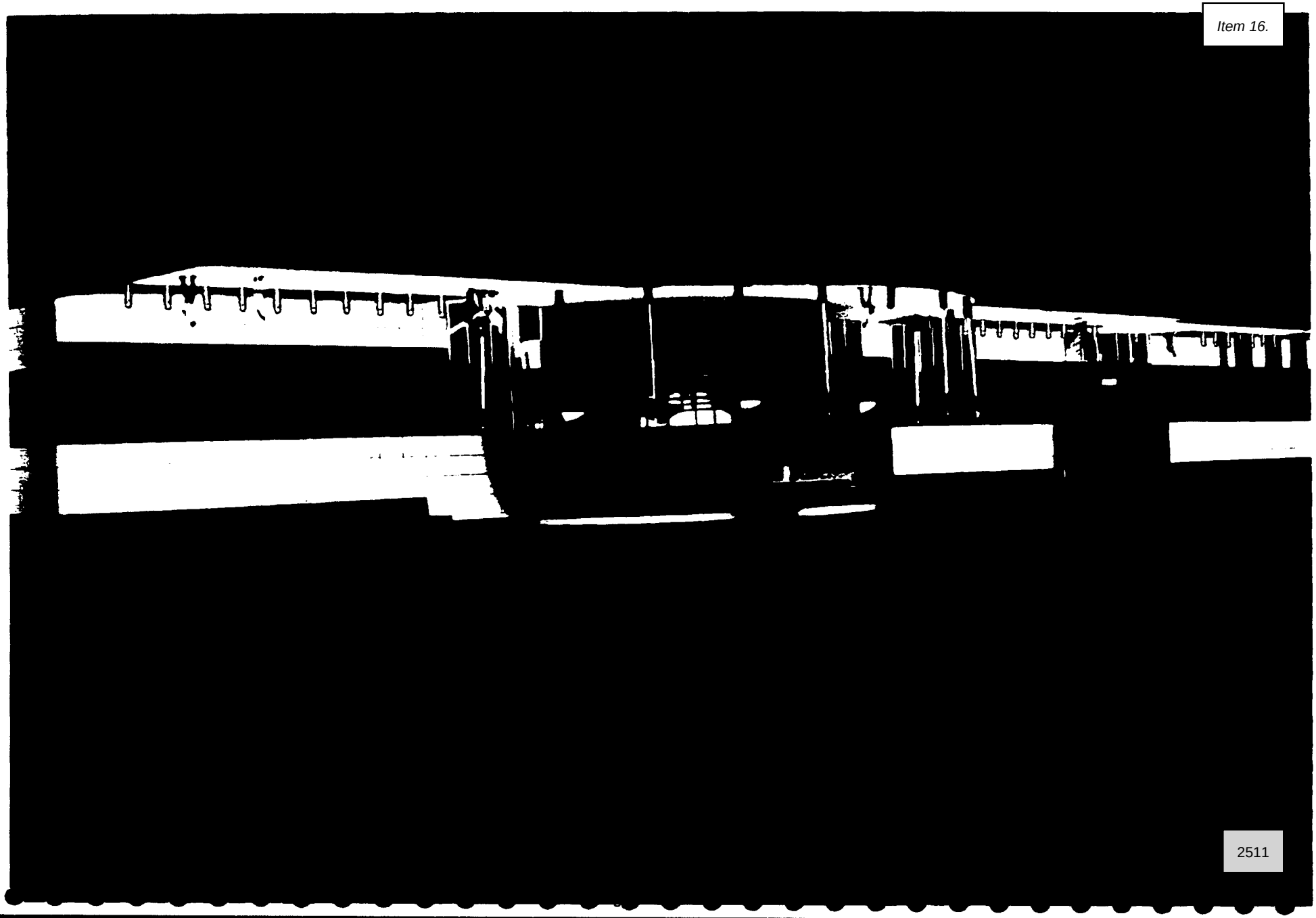
We request the consideration of the Design Review Board for a deviation from the Phase I, Wilsonville Town Center Signage program, as follows:

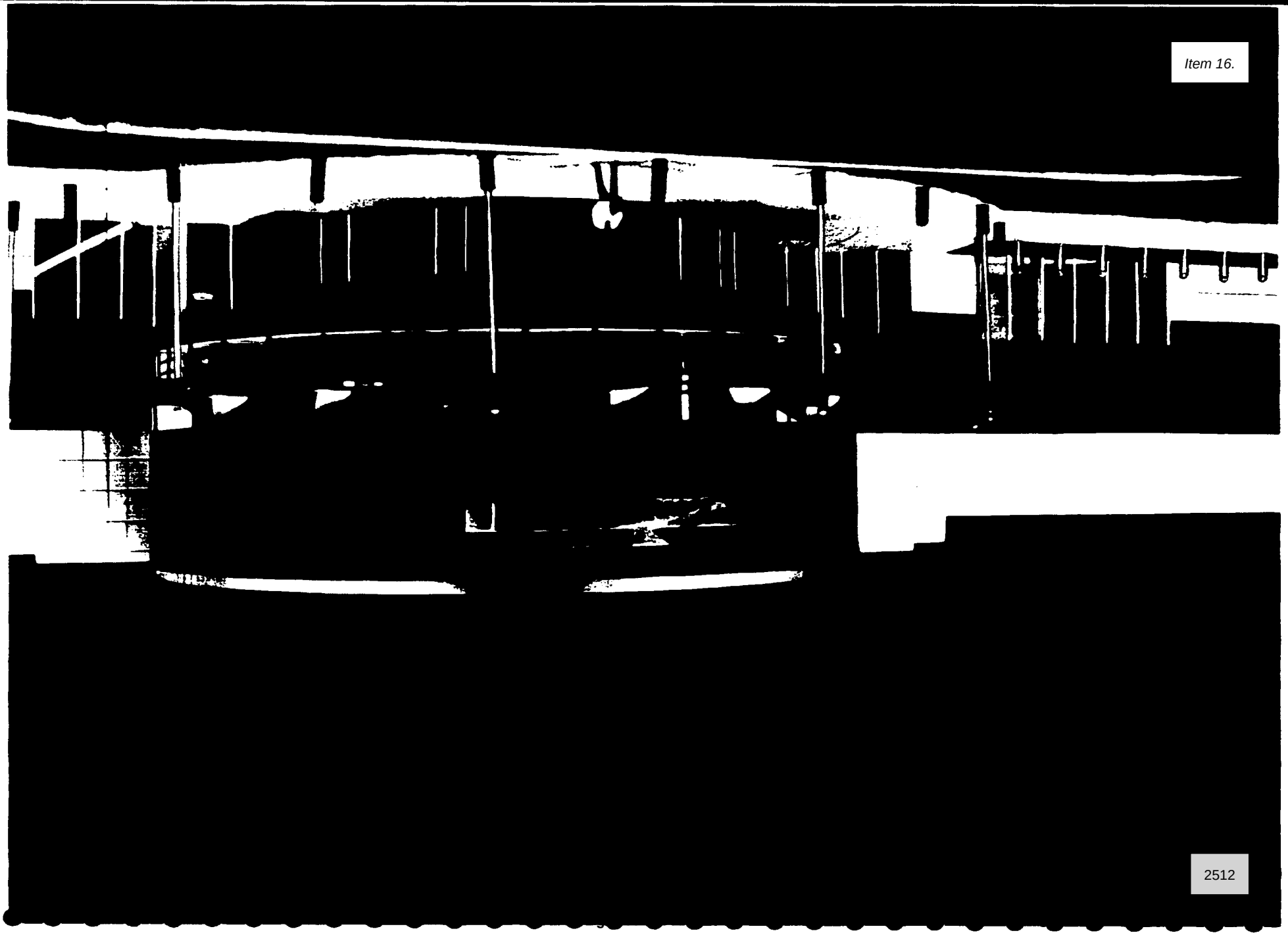
- Deviation #1 from Phase I signage program for sign construction method

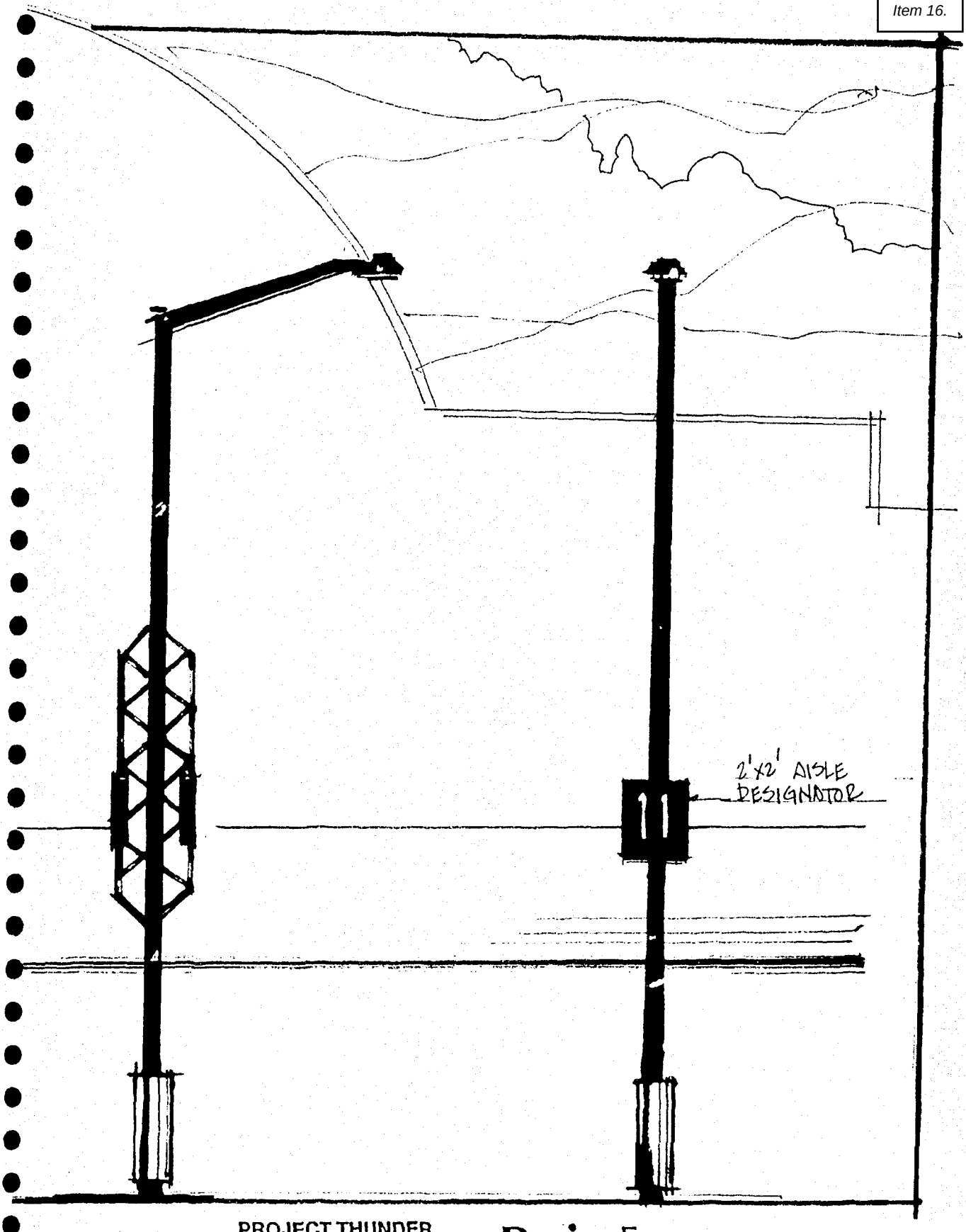
Deviation #1 from Phase I signage program for Wilsonville Town Center

We request this deviation from the approved program for the purpose of changing the method of construction for the 3 fascia signs (aggregate area approximate 81 SF) to be consistent with our design idiom. We feel our approach of a fascia panel type sign, back lit, cutout individual letters, appearing to be in a larger horizontal band to be of more benefit to this architectural design. Individual channel construction is not an appropriate usage in this application.

DEFECTS IN ORIGINAL DOCUMENT

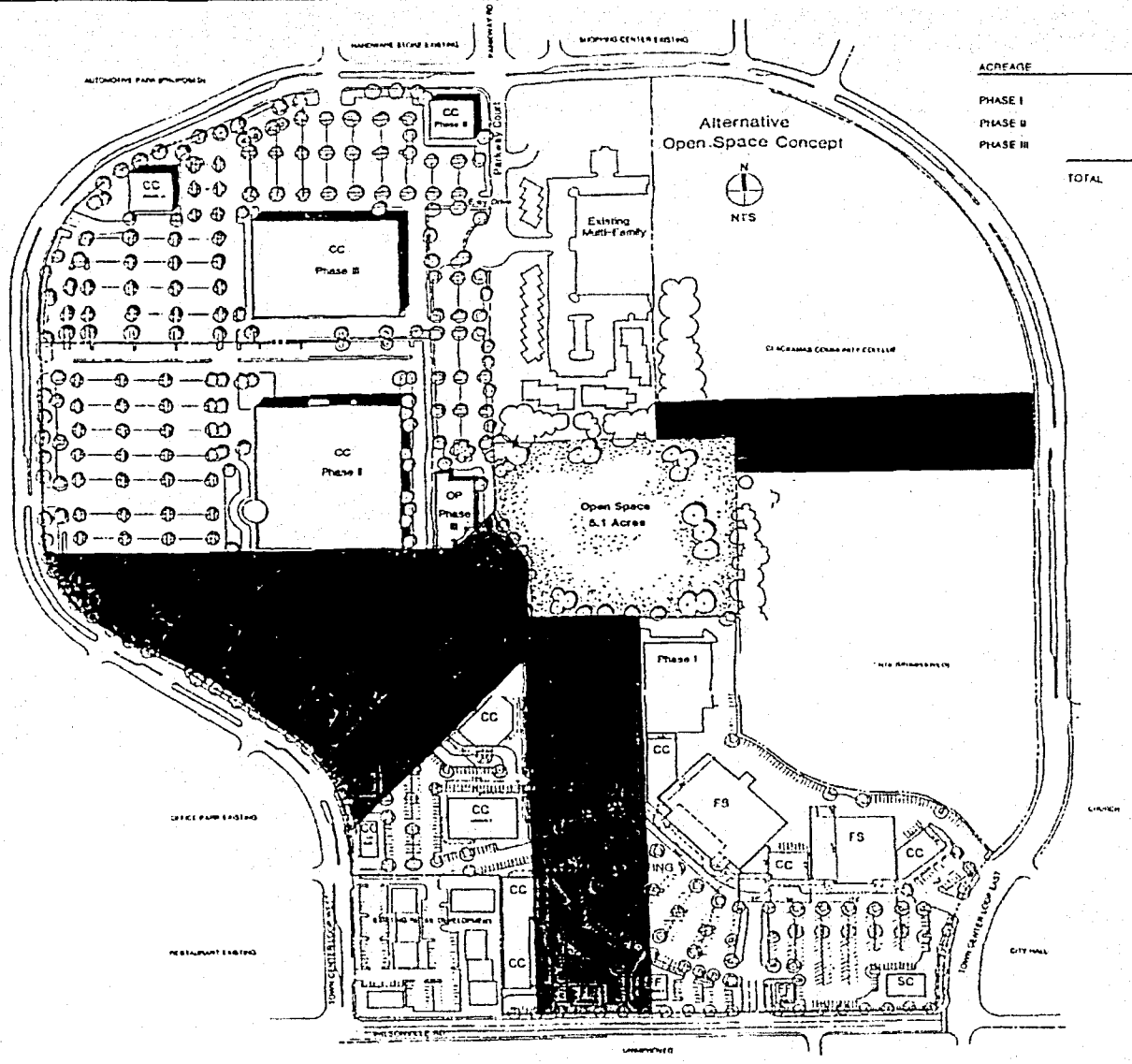




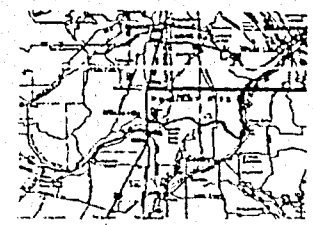


PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting

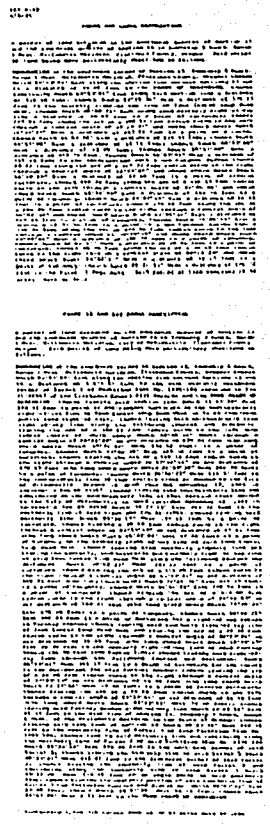
DesignForum
ARCHITECTS



ACREAGE	
PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



VICINITY MAP



SITE MASTER PLAN: PHASE I, II, & III

VIEW CORRIDOR CONCEPT

1-6-92

JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

1

2514

DesignForum

LETTER OF TRANSMITTAL

From: William F. Bergman, AIA
Design Forum
3484 Far Hills Avenue
Dayton, OH 45429

To: Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 S.W. Elligsen Road
Wilsonville, OR 97070

We are sending you:
- [ ] Prints
- [ ] Plans
- [ ] Estimates
- [ ] Shop Drawings
- [ ] Copy of letter
- [ ] Samples
- [ ] Comps Prototypes
- [ ] Photography
- [ ] Specifications
- [ ] Keylines
- [ ] Layouts

COPIES	DATE OR NO.	DESCRIPTION
2	10/28/91	Preliminary Prints of First Floor and Mezzanine Floor Plans

- [X] For your use
- [ ] For approval
- [X] As requested
- [ ] For review & comment
- [ ] Approved & noted
- [ ] Construction approval
- [ ] Returned for corrections
- [ ] Returned after loaned to us
- [ ] Return _____ corrected prints
- [ ] Submit _____ copies for _____
- [ ] Resubmit _____ copies for _____
- [ ] For bids due _____
- [ ] _____

Remarks:

Signed: William F. Bergman
William F. Bergman, AIA
Project Architect

Date: 10/28/91

cc: Rich Hollander
Marla

MEMORANDUM

TO: Development Review Team DATE: October 21, 1991

FROM: Blaise Edmonds, Associate Planner, City of Wilsonville.

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).
2. Office and warehouse, Liberty Organization, applicant.
3. Comprehensive plan amendment, Mr. Marvin Wagner, applicant.

Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

Blai

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

DATE: October 18, 1991

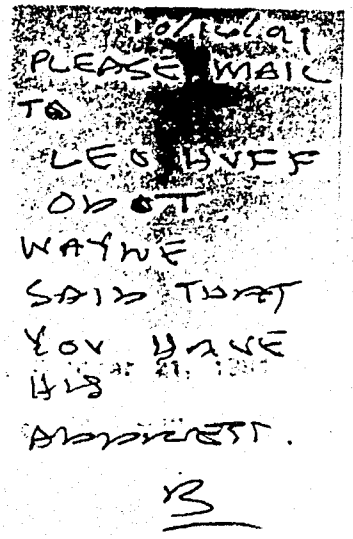
RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

Blaze—
I understand
W&H says 150 cfs
for Town Center to 90 with
48" culvert — is there
more from other properties
if so how does that affect
park drainage — if yes
need to make sure adequate
info is available before
abandoning on site retention —
could keel a plus as a water
feature for Town Center
Mike.
cc. Steve Shaner

(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services



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TO: Development Review Team DATE

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W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

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City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

DATE: October 18, 1991

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Creative Solutions ... Superior Service

W&H PACIFIC

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Portland, Oregon 97201

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Fax (503) 274-4607

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop East
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 467-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	☒ For Your Info/File	
☒ Facsimile 682-7025	☐ As Requested	
3 Number Of Pages Including Cover	☒ For Review And Comment	
☐	☐	

Copies	Description
1 ea.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

2520

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

October 15, 1991

TO: Kim Beach, Capital Realty Corp.
Bill Bergman, Design Form Architects
All in Attendance

FROM: Tom Jones

RE: MINUTES OF MEETING WITH THE CITY OF WILSONVILLE
OCTOBER 14, 1991, 4:00 P.M. TO 5:05 P.M.
PROJECT THUNDER
4-467-0301; 4-755-0101

ATTENDEES: Tom Jones, W&H Pacific
Rick Martin, W&H Pacific
Pat Marquis, W&H Pacific
Logan Cravens, JKS Architects
Blaise Edmonds, City Planner
Pam Emmons, Planning Assistant

The following was discussed regarding the project in preparation for the Friday, October 18th submittal.

STAGE ONE SUBMITTAL

1. The site plan prepared by JKS should show:
   a. Revised project phasing
   b. Open space area as previously shown as a condition of approval from initial submittal.
   c. Specific "Town Center" land use designations must be shown for the northerly portion of the site not previously included and for any changed designations from the original submittal for Phases II and III.

2. Submit ten (10) copies of the original Traffic Report and provide an Executive Summary outlining any revisions to the initial projections and provide a summary that addresses the level of service "D" or better at surrounding intersections. Review the Parkway/Loop Road intersection.

3. Show existing adjacent land uses (i.e., vacant or improved) and the names of key surrounding developments for the Planning Commission orientation. Show only existing improvements not proposed.

4. Capital Realty must provide an updated list of addresses and property owners within 250 feet from the project.

5. Capital Realty must submit the Certification of Assessments and Liens form with the application. This is to determine if the tax lots included owe money to the City. Contact Atta Curser for clarification.

6. All property owners must sign the application.

7. Application fees:
   a. Stage One Submittal: $500.00
   b. Stage Two Submittal: $250.00 plus $25 per acre (Project Thunder is 14.98 acres)
   c. Application fee for Friday: ($500 + $250 + $375 = $1,125)
   d. Design Review: $250 plus a fee for the master signage plan review.

STAGE TWO SUBMITTAL

1. Design of site signs are not required to be submitted until Design Review submittal of December 6th.

2. Landscape design needs to show planting areas, significant trees and plaza areas. Plant list is optional.

3. Grading calculations and storm drainage calculations are not required for Friday's submiual according to Blaise. Grading plan should show existing contours and general grading concept.

4. Utilities design should be kept schematic. Graphically illustrate the utility alignments that will require easement vacations and relocation.

5. Architectural elevations can be conceptual in detail. Planning Commission is only concerned with general massing and quality of appearance. Materials and color board to be submitted at Design Review.

6. If waivers to the City development standards are anticipated, be specific with your request and how it would be consistent with other surrounding project development standards.

GENERAL COMMENT

The two issues that will be of the most interest to the Planning Commission will be traffic and the implementation of the open space. We should develop a clear strategy to present to the Commission prior to the December 9th hearing addressing these two issues.

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

W&H PACIFIC
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Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

FAXED 10/17/91

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop ~~EAST~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 967-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile 682-7025
- 3 Number Of Pages Including Cover

These Are Transmitted:
- ☒ For Your Info/File
- As Requested
- ☒ For Review And Comment

Copied To:

Copies	Description
1es.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

2523

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

In Attendance:

Pam Emmons	City of Wilsonville, Associate Planner	WSV	503-682-4960
Martin Brown	City of Wilsonville, Building Official	WSV	503-682-4960
Steven Starner	City of Wilsonville, Community Development Dir.	WSV	503-682-4960
Jim Long	City of Wilsonville, Design & Survey Technician	WSV	503-682-4960
Doug Seely	Real Estate Investment and Sales	REI	503-655-7631
Jim Parsons	Grubb & Ellis	GEI	503-241-1155
Jim Faulkner	Design Forum Architects	DFA	800-835-4401

Item No.	Action	Item
1.10	CAP/WHP	Storm drainage is an issue. Calculations and 25 year storm design for Phase II master plan must be submitted with application by October 18, 1991 deadline. The connection for metered release to interstate highway from existing retention pond and the retention pond itself will be eliminated. According to Wayne Bauer of Wilsey & Ham Pacific, Civil Engineers for Phase I development of the site, the new storm sewer system was designed to accommodate this. The city would like to see calculations supporting this.
1.2	CAP/KAI	According to the city, a traffic light at Wilsonville Road and Town Center Loop West is now warranted. The north intersection at Town Center Loop East and West at Parkway Avenue needs to be addressed in traffic study.
1.3	DFA	The currently approved master plan calls for "Food and Sundries" (FS) and "Central Commercial" (CC). These zoned uses are compatible with the desired development of Project Thunder. No rezoning is necessary, however, currently approved uses will have to be redistributed on the site.

3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400 Fax: (513) 294-2842

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.4	ALL	The Stage I and Stage II planning review applications will be made simultaneously on October 8, 1991, and be reviewed simultaneously at the Planning Commission on December 9, 1991.
1.5	GEI	Hearing notification list for all property owners of record within 250 foot of any point on property (not including street widths) must be presented with October 18, 1991 submittal. Notification does not have to cross interstate highway. The city will send the notices. Jim Parsons will obtain list from assessors office or from a title company.
1.6	DFA	The signage theme from Phase I should be carried through Phase II. Sign issues are handled by the Design Review Board. Setback issues are handled by the Planning Commission.
1.7	DFA/WHP	The building is designed utilizing the "unlimited area" provision of the code. A sixty (60) foot minimum distance from all property lines and an approved automatic sprinkler system throughout will be provided to accommodate this provision.
1.8	TNB	There is a ten (10) day appeal period following design review approval. Normal procedure is such that no work should be commenced during the appeal period. Due to the tight schedule for this project and the need to utilize every available good weather period for site escavation, an option for work during the appeal period was discussed. A "hold harmless" agreement from owner in favor of the City of Wilsonville, enabling work to start immediately after design review approval during the appeal period at the sole risk of the owner has been used in the past to facilitate an early start.

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.9	WHP	For any construction to begin, fire hydrants must be installed to within 250 feet of any point of the exterior wall of the building. Work should begin immediately to obtain Public Works approval and have installation complete by scheduled start of construction, February 1, 1992.
1.10	ALL	The required completion date of construction necessitates a start date for construction of February 1, 1992. For this to happen, working drawings and specifications would have to be accomplished prior to design review hearing date of January 27, 1992. To minimize risk of changes to completed documents, a partial permit (foundation permit) can be applied for at a cost of $250.00. This would allow work to begin while balance of documents are being prepared. The review time for foundation and underground utilities permit is approximately three weeks, so documents should be submitted by January 10, 1992 for a February 1, 1992 start of construction.
1.11	DFA	The zoning height limitation for any point of the building is 35'-0". Design Forum will check with Blaise Edmonds regarding height of dome feature with center pole.
1.12	DFA	Elevations and material, color and finish boards must be submitted with Design Review Board application by December 6, 1991 deadline for hearing date of January 27, 1992.

DesignForum
ARCHITECTS

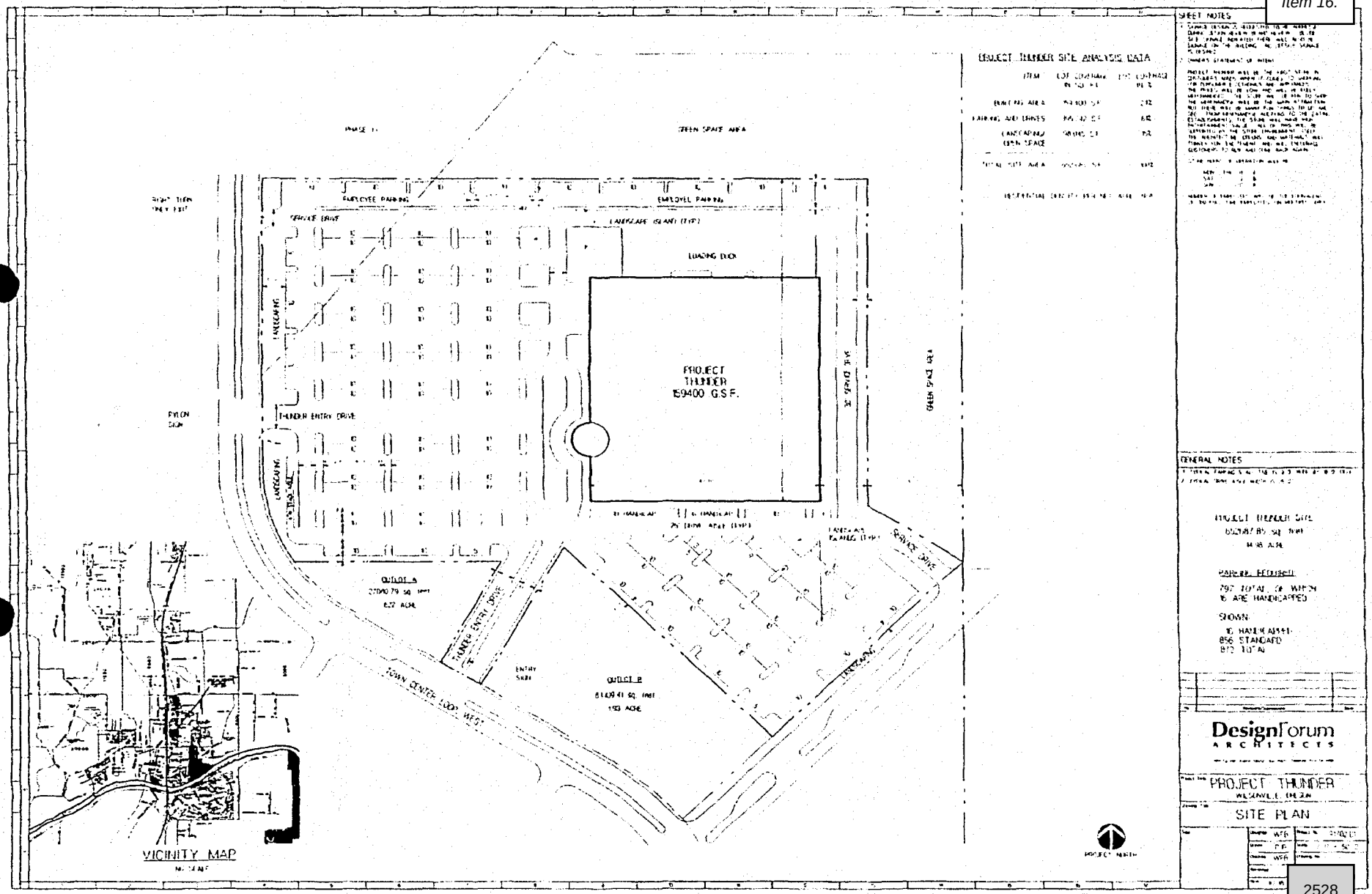
Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

Respectfully submitted,

James L. Faulkner, AIA
Vice President, Architecture

cc: All in Attendance
Rich Hollander, Tandy Name Brand (TNB)
Blaise Edmonds, City of Wilsonville, Associate Planner (WSV)
Kimberly Beach, Capital Realty Corporation (CAP)
Tom Jones, Wilsy & Ham Pacific (WHP)
Wayne Kittelson, Kittelson & Associates, Inc. (KAI)
D. Lee Carpenter, Design Forum
Bruce Dybvad, Design Forum
Marla Halley, Design Forum
Bill Bergman, Design Forum Architects



PROJECT THUNDER SITE ANALYSIS DATA

ITEM	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA		
PARKING AND DRIVES		
LANDSCAPING/ OPEN SPACE		
TOTAL SITE AREA		

SHEET NOTES

GENERAL NOTES

PROJECT THUNDER SITE

PARKING REQUIRED

797 TOTAL OF WHICH 16 ARE HANDICAPPED

SHOWN:

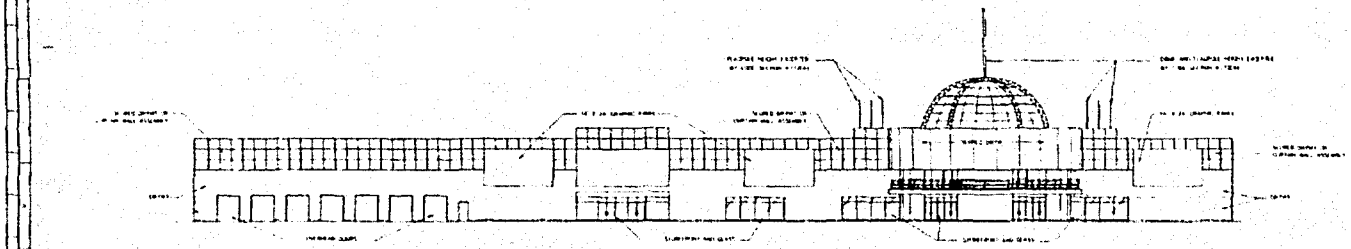
16 HANDICAPPED
856 STANDARD
872 TOTAL

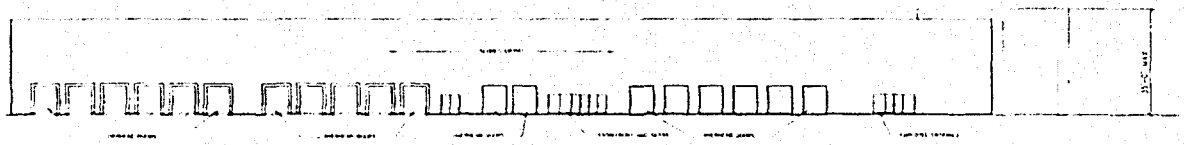
VICINITY MAP

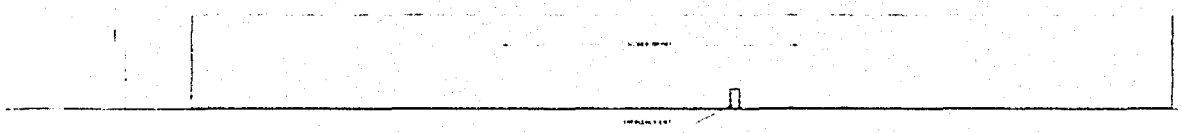
DesignForum ARCHITECTS

PROJECT THUNDER
WESTERVILLE, OHIO

SITE PLAN





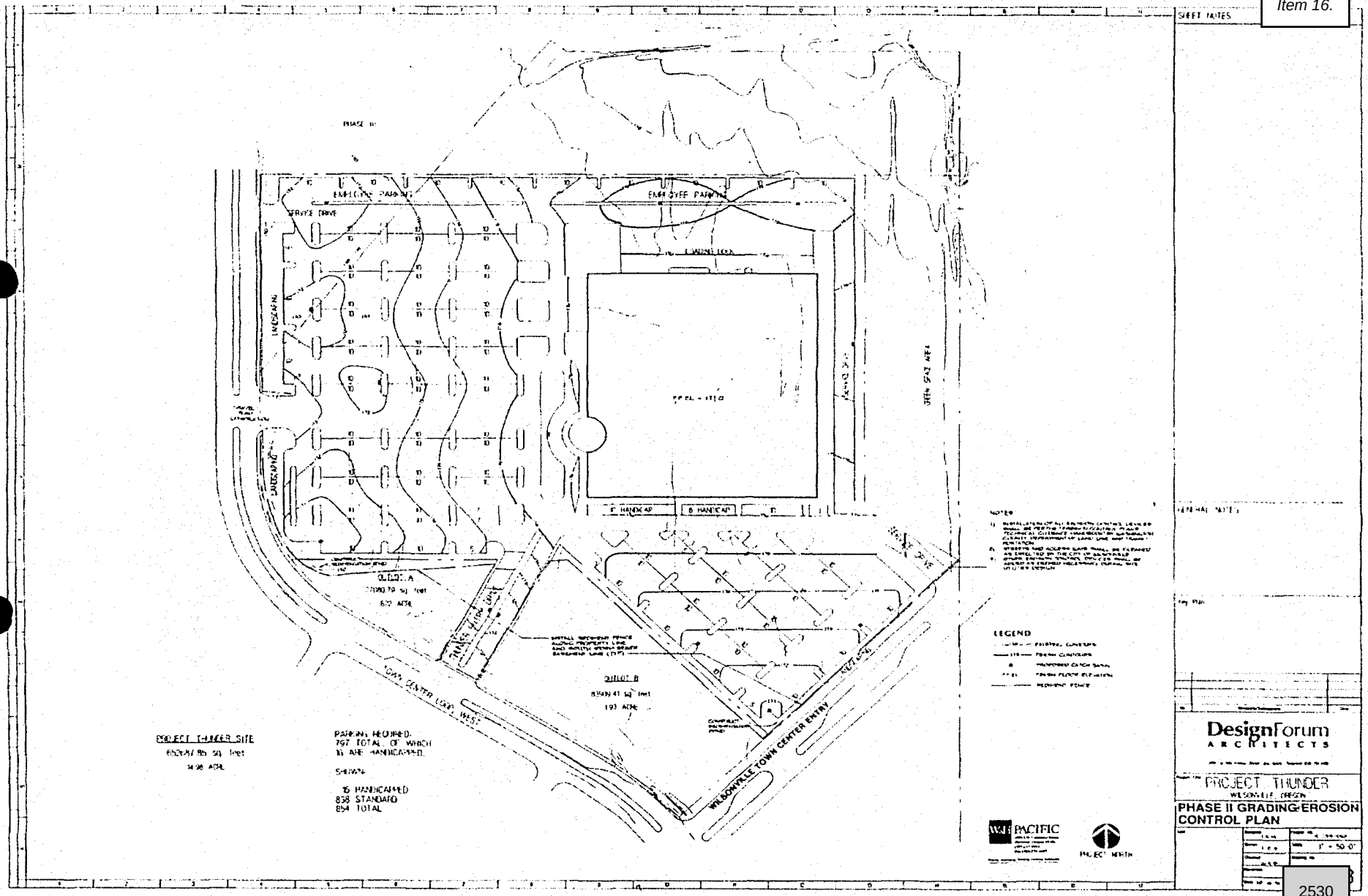


DesignForum
ARCHITECTS

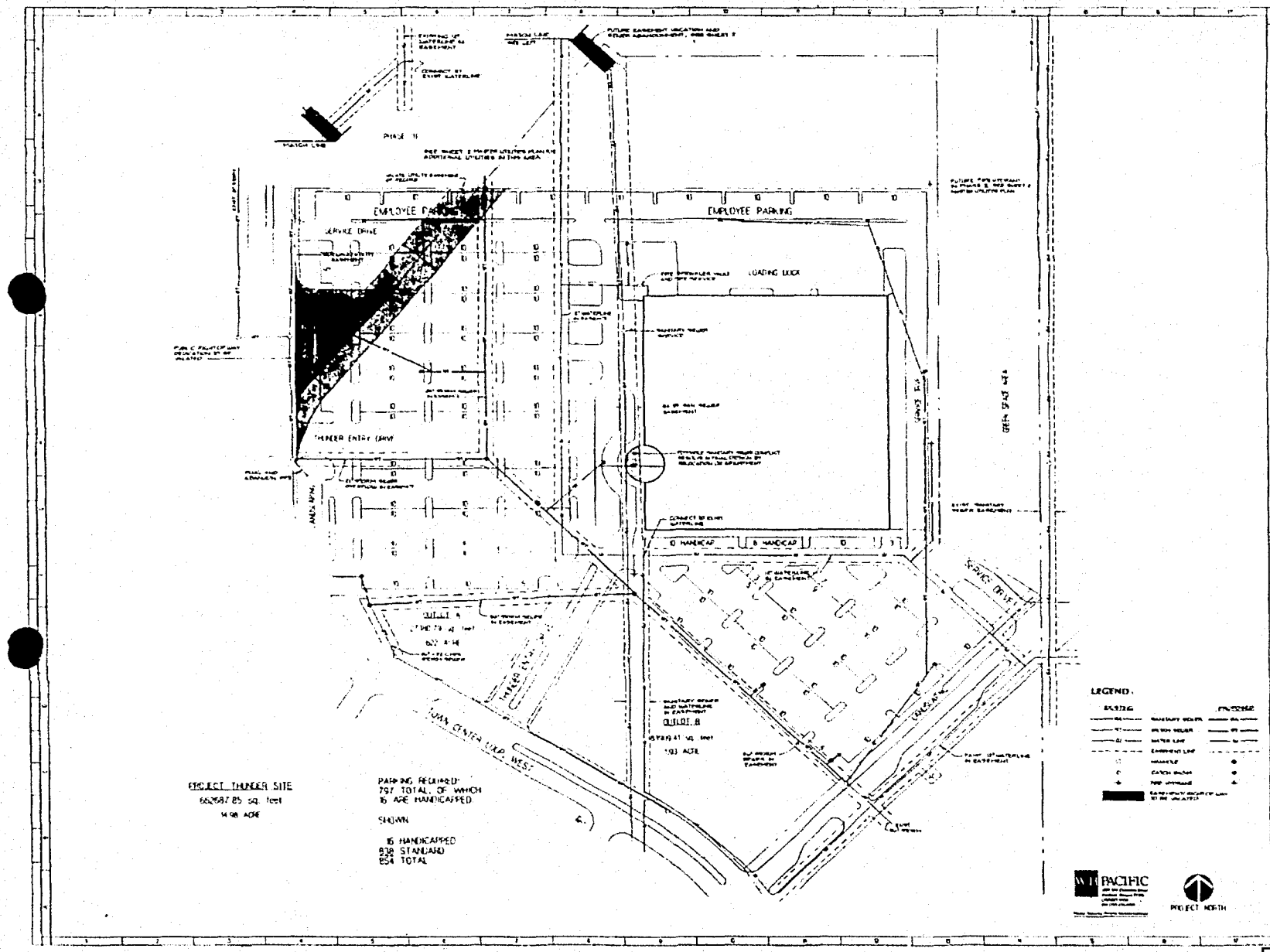
PROJECT THUNDER
HILLSBORO, OREGON

EXTERIOR ELEVATIONS

2529


SHEET NOTES
PHASE III
EMPLOYEE PARKING
EMPLOYEE PARKING
SERVICE DRIVE
LANDSCAPING
LANDSCAPING
OPEN SPACE AREA
8' HANDICAP
8' HANDICAP
OUTLOT A
OUTLOT B
TOWN CENTER LOOP WEST
WILSONVILLE TOWN CENTER ENTRY
PROJECT TRACER SITE
PARKING REQUIRED:
797 TOTAL OF WHICH
16 ARE HANDICAPPED
SHOWN:
16 HANDICAPPED
838 STANDARD
854 TOTAL
LEGEND
PROJECT NORTH
DesignForum
ARCHITECTS
PROJECT THUNDER
WILSONVILLE, OREGON
PHASE II GRADING/EROSION CONTROL PLAN
1" = 50'-0"

2530



SHEET NOTES

GENERAL NOTES

Key Plan

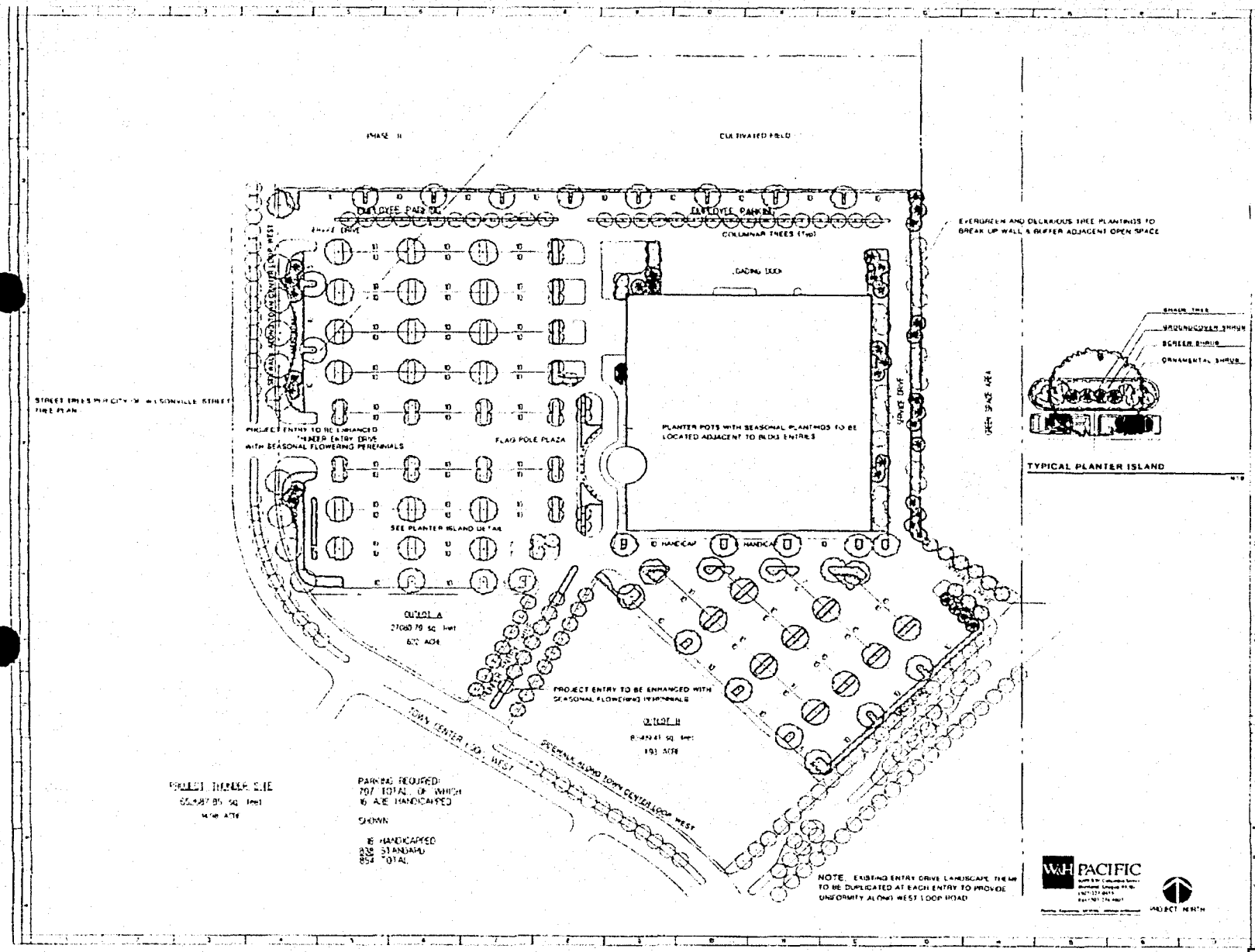
DesignForum ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II UTILITIES PLAN

1" = 50'-0"

2531


PHASE II
CULTIVATED FIELD
EMPLOYEE PARKING
EMPLOYEE PARKING
COLUMNAR TREES (Typ)
EVERGREEN AND DECIDUOUS TREE PLANTINGS TO BREAK UP WALL & BUFFER ADJACENT OPEN SPACE
LOADING DOCK
SPACE DRIVE
PLANTER POTS WITH SEASONAL PLANTINGS TO BE LOCATED ADJACENT TO BLDG ENTRIES
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
FLAG POLE PLAZA
SEE PLANTER ISLAND DETAIL
HANDICAP
OUTLOT A
OUTLOT B
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
TOWN CENTER LOOP - WEST
PROJECT SITE
PARKING REQUIRED:
PARKING PROVIDED:
STANDARD
TOTAL
NOTE: EXISTING ENTRY DRIVE LANDSCAPE THEME TO BE DUPLICATED AT EACH ENTRY TO PROVIDE UNIFORMITY ALONG WEST LOOP ROAD
PROJECT NORTH
LEGEND
SHADE TREES
FLOWERING TREES
EVERGREEN CONIFER TREES
ORNAMENTAL LANDSCAPE SHRUBS & GROUNDCOVER
LAWN
EXISTING STREET TREES
TYPICAL PLANTER ISLAND
GENERAL NOTES
AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED
DesignForum ARCHITECTS
PHASE II LANDSCAPE PLAN

ASSIGNMENT

FOR VALUABLE CONSIDERATION, receipt and sufficiency of which are hereby acknowledged, SFS INVESTMENT CORP., an Oregon corporation (Assignor), hereby assigns, transfers and conveys to CAPITAL REALTY CORP., an Oregon corporation (Assignee), all of Assignor's right, title and interest in each option agreement, offer and other document described in Exhibit A attached hereto, the real property described in any such option agreement or offer, and all rights which Assignor now has or may hereafter acquire with respect thereto.

February 1, 1990.

SFS INVESTMENT CORP.

By _____
President

STATE OF OREGON)
) ss.
County of Multnomah)

On this 1st day of February, 1990, before me personally appeared Steven F. Stiles who, being duly sworn, did say that he is the president of SFS INVESTMENT CORP., an Oregon corporation, and acknowledged that the foregoing instrument was executed on behalf of the corporation by authority of its board of directors as its voluntary act and deed.

Before me:

_____
NOTARY PUBLIC for Oregon
My Commission Expires 10/31/92

AGREEMENT AND OPTION

THIS AGREEMENT AND OPTION is between E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as Marlene A. Young Rifai, the Estate of Harold J. Laswell, Deceased, and FRED A. ANDERSON, hereinafter collectively referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-14D, are E. Jean Young, Sherilyn J. Young, David S. Young, Marlene A. Young, also known as Marlene A. Young Rifai, and Jack L. Lozo.

B. The owner of Parcel II, i.e. tax lot 300, MAP 3-1W-14D is Jack L. Lozo.

C. Grantee has options to purchase Parcel I and II by documents respectively dated August 17, 1989 and August 23, 1989; said options are valid through December 21, 1989.

D. Grantor's offer to option Parcel III is contingent upon Grantee's obtaining extensions of the options to purchase Parcel I and II.

E. Grantors own Parcel III, i.e. Tax Lot 200, 300 & 401, Clackamas County MAP 3-1W-14D and ownership interests in a triangle of land approximately 6381 square feet on the west of Tax Lot 200 , described in Exhibit A. Parcel III shall refer to the

be made in full upon closing and a statutory warrenty deed provided at that time.

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

~~ion.~~ The Option to purchase Phase 2 in its enti er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel III unless Grantees pay to Grantors $50,000 for an extension of the Option for one year. Payment for such extension is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or be[illegible]vember 2, 1992, at the purchase price of ent on an additional $50,000, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantor's name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors prior to formal application to the City of Wilsonville. Grantors shall retain the right of review during the planning process with the City,

Grantee may not agree to any request to increase the Open Space requirements on any Phase of any Parcel.

11. Real Property Taxes. The Option Property has been specifically assessed as Farm Use Land. Therefore, portions of the annual taxes are deferred until the Option Property becomes disqualified for that purpose. If Grantee exercises the Option as

preliminary agreements. This Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 31 day of October, 1989.

E. Jean Young
E. JEAN YOUNG

SFS INVESTMENT CORP.

11-8-89

SHERILYNN J. YOUNG

By _____
SFS President
Steven F. Styles

David S. Young
DAVID S. YOUNG

SFS INVESTMENT CORP.

Marlene A. Young
by D. Young, attorney in fact
MARLENE A. YOUNG

By _____
SFS Officer

ESTATE OF HAROLD J. LASWELL
DECEASED

GRANTEES

By Emma D. Laswell
Emma D. Laswell
Personal Representative

By _____
Eugene L. Deffler
Personal Representative

Fred A. Anderson
FRED A. ANDERSON

GRANTORS

ST IVES PROPERTIES LTD.
by Elden E Eckhardt

EXHIBIT A

I
Wilsonville Property

Option dated November 16, 1989 granted by Jack L. Lozo for property generally known as Tax Lot 500, Map 3-1W-13, Clackamas County, Oregon.

Agreement and Option dated October 31, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Estate of Harold J. Laswell, Deceased, and Fred A. Anderson for property generally known as Tax Lots 200, 300 and 405, Map 3-1W-14D, Clackamas County, Oregon, togther with a triangular parcel containing approximately 6,381 square feet on the westerly side of Tax Lot 200.

Option dated November 15, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Jack L. Lozo, and Anne S. Lozo, Trustee for Claude F. Smith Trust, for property generally known as Tax Lots 600 and 601, Map 3-1W-13, Clackamas County, Oregon.

Attached hereto is a plot map showing the general location of the three parcels.

II
Gresham Property

Earnest Money Agreement dated August 1, 1989, amended by Memorandum of Agreement dated September 20, 1989, with Leonard P. Holfman and Kenneth G. Holfman, Trustees of the Olive H. Holfman 1979 Trust dated May 7, 1979, for the purchase of a tract of land in the Robert P. Wilmot DLC and being Sections 19 and 30, Township 1 North, Range 3 East of the Willamette Meridian, Multnomah County, Oregon (Tax Lot #32), containing approximately 21.3 acres on the north side of N. E. Sandy Boulevard west of Northeast 181st Avenue.

III
Salem Property

Offer dated November 1, 1989, accepted by Anita Hager Conley, Trustee, on November 29, 1989, for a parcel containing approximately 9.38 acres in the southwest quarter of Section 31, Township 7 South, Range 2 West, known as Tax Lot 200, Salem, Marion County, Oregon.

AGREEMENT AND OPTION

PARCEL II

THIS AGREEMENT AND OPTION is between JACK L. LOZO, hereinafter referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-13, are E. JEAN YOUNG, SHERILYN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, JACK L. LOZO, and the CLAUDE F. SMITH TRUST, ANN S. LOZO Trustee.

B. The owner of Parcel III, i.e. tax lot 200, 300 & 405, Clackamas County MAP 3-1W-14D and a triangle of land approximately 6,381 square feet on the west of tax lot 200 are E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, the estate of HAROLD J. LASWELL, Deceased, and FRED A. ANDERSON.

C. Grantors own Parcel II, i.e. Tax Lot 500, MAP 3-1W-13. Parcel II shall also be referred to as the Option property.

D. Grantee has options to purchase Parcel I & II by documents dated August 17, 1989 and August 23, 1989, said options are valid through December 31, 1989.

E. Grantors' offer to option Parcel II is contingent upon Grantee's obtaining an extension of the option to purchase Parcel

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

4. Extension. The Option to purchase Phase 1b and 2 in its entirety at ~~$.50~~ per square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel II unless Grantee pays to Grantors $5,000 for an extension of the Option to purchase Phase 1b property, ~~and pays to Grantor an additional $5,000 for an extension of the Option to purchase Phase 2 property if owned by Grantors~~. Payment for such extension shall be for one year, is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or before November 2, 1991 at the purchase price of payment on an additional $5,000, s, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

authority to grant the Option and to sell their interest in the Option Property in accordance herewith.

7. Reciprocal Easements: Grantors and Grantee agree that each will enter into reciprocal easements with the owners of Parcels I and III as agreed upon by the parties.

8. Right of Entry. Grantee may, at its risk and expense during the term of the Option, enter upon the Option Property at any time to make engineering tests, soil tests and for any other lawful purpose in pursuit of the purchase and development of said property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantors' name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors

the entire agreement among the parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. This Agreement and Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 11th day of November, 1989.

JACK L. LOZO

ANN S. LOZO, Trustee for
CLAUDE F. SMITH TRUST

GRANTORS

SFS INVESTMENT CORP.

By
SFS President
Steven F. Stiles

SFS INVESTMENT CORP.

By
SFS Officer

GRANTEES

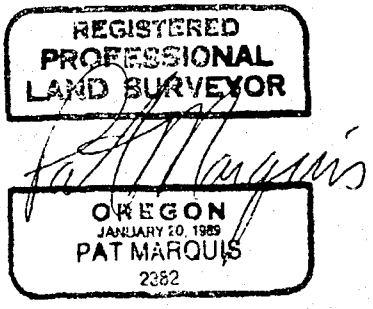
PROJECT THUNDER LEGAL DESCRIPTION

A parcel of land situated in the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southeast corner of Section 14, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon: thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**: thence leaving said section line and tracing the following courses and distances: South 45°03'00" West 400.00 feet; thence North 44°57'00" West 435.01 feet to a point of non-tangent curvature; thence tracing the arc of a 2,000.00 foot radius curve to the right (the radial center of which bears North 65°07'50" West) through a central angle of 07°23'12" an arc distance of 257.84 feet (the long chord bears South 28°33'46" West 257.66 feet) to the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line North 57°44'38" West 72.00 feet to a point of radial intersection with a 1,928.00 foot radius curve; thence leaving said northeasterly right-of-way line and tracing the arc of a 1,928.00 foot radius curve to the left through a central angle of 05°32'12" an arc distance of 186.31 feet (the long chord bears North 29°29'16" East 186.23 feet); thence South 89°52'55" West 304.91 feet to a point of non-tangent curvature on the said northeasterly right-of-way line of Town Center Loop Road West; thence tracing said right-of-way line along a 268.16 foot radius curve to the right (the radial center bears North 56°01'43" East) through a central angle of 33°55'55" an arc distance of 158.81 feet (the long chord bears North 17°00'19" West 156.50 feet) to a point of tangency; thence continuing along said right-of-way line North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing said right-of-way line North 00°02'22" West 121.76 feet; thence leaving said right-of way line and tracing the following

courses and distances: North 89°52'55" East 894.39 feet to a line being parallel with and 140.00 feet westerly of the said section line common to sections 13 and 14; thence tracing said parallel line South 00°03'01" West 528.73 feet; thence South 56°23'33" East 168.00 feet to the **TRUE POINT OF BEGINNING**. Said parcel contains 642,427 square feet or 14.75 acres more or less.

755-0101
10/16/91



Jim Parsons
Jim Faulkner
Doug Seely

Phase
Stage I, II, III → Cap. Realty will submit

Phase II →
Cap. Realty △ master plan modification
Site plan I, II

Landy - Thunder 120# thou footprint
Electronics +

Parkway / TC (E) + (W)

Park → Open Space.

Submit Stage I + II Simultaneously

Please what else?

* Gave Stage I + II + application x2
250' radius map owners

Topo - 1' intervals - (map has readings)

~~Blaise - 50' top soil~~

Ø phase

100 - 1

CITY

100 - 120 DWELLING UNITS.

- DOUG SEELY TALKED TO BOB DANT -
- ABOUT DENSITY TRANSFER TO BRIDGE CREEK.
- P.O.S.

- CONTOUR SURVEY - >20'
- TREE SURVEY >6" caliper
- MAJOR DRAINAGEWAY.

STAKE THE PROPERTY - SITE VISIT TO VERIFY P.O.S LINE - AMBIGUITY - GO TO P.L TO C.C. FOR INTERPRETATION.

~~CALL MIKE - 420-2424~~

CITY of WILSONVILLE
PLANNING COMMISSION
SITE MASTER PLAN (STAGE I)
GENERAL SUBMISSION REQUIREMENTS

1. Completed application form, with appropriate fee, signed by property owner.
2. Set forth the professional coordinator and professional design team.
3. State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.
4. The application shall include conceptual and quantitatively accurate representation of the entire development sufficient to judge the scope, size and impact of the development on the community; and, in addition, shall be accommodated be the following information:

   13 FOLDED copies of Site Master Plan dimensioned at a scale of 1" = 20 ft. (or as determined by the Planning Director) showing the following:

   a. Vicinity map.
   b. The entire lot as described by the legal description.
   c. Location and size if all public facilities, utilities and easements.
   d. Location and dimension of site improvements such as roads, buildings, driveways, parking, loading and landscaping.
   e. All adjacent rights-of-way and improvements.
   f. Any surrounding development, i.e., existing buildings, property lines, driveways, etc.
   g. Development phasing. A stage development schedule demonstrating that the developer intends to commence construction within (1) One year after the approval of the development plan, and will proceed diligently to completion.
   h. Topographic information at one-foot intervals up to 5% slope; two-foot intervals, 6% - 12%; five-foot intervals. 12% - 20%; ten-foot intervals, 20% and above.

5. One copy of Site Plan reduced to 8-1/2" x 11". This must be a legible photo-mechanical transfer (PMT).
6. Site Analysis Data.

Item	Lot Coverage in sq. ft.	Lot Coverage in %.
Building area	458,771 sq. ft.	.18 %
Parking and Drives	1,394,390 sq. ft.	.53 %
Landscaping/Open Space	751,291.4 sq. ft.	.29 %
Residential density per net acreage.		
TOTAL SITE AREA	2,604,452.4 sq. ft. 59.79 ACRES	100 %

Planning Department 682-4960

INCOMPLETE SUBMITTALS WILL NOT BE SCHEDULED FOR A PUBLIC MEETING !

Traffic count zooms at electronic store

■ Wilsonville's projections for vehicle flow at the Incredible Universe fall woefully short

By JOHN M. GRUND
Correspondent, The Oregonian

WILSONVILLE — When it comes to predicting how much traffic a new development will bring, Wilsonville officials always have gone by the book.

But going by the book has not worked for some recently opened projects — in particular the Incredible Universe electronics store. In some cases, traffic is already at levels predicted for 2010.

Now city officials are looking at ways to refine the city's traffic projections.

Eldon Johansen, community development director, told the City Council early this month that traffic on Town Center Loop West near the new electronics store is averaging 1,227 vehicles an hour northbound at 2 p.m. That's 550 more vehicles per hour than anticipated in projections for 1995, he said.

"As far as the traffic counts go, we've had a real eye-opener on our traffic projections. We're already up past (the year) 2010 on some of our traffic projections," Johansen said.

"The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts," said Arlene Loble, city manager.

The city has changed its procedure for getting traffic analysis done on proposed developments. This fall, it switched from having a developer hire a traffic engineering firm to requiring applicants to pay for a study by D.K.S. Associates, the firm chosen by the city to handle all of its traffic analysis.

Planning Director Wayne Sorensen said the move should not be interpreted as a criticism of the firms that have done studies in the past. All of them, in fact, bid on the city contract, he said.

"I think we feel better now (that) the traffic engineer is working for the city," he said. "When the applicant hires the engineer, they're working for the client, and the city's not the client."

Johansen said the city also would expand the scope of some studies.

The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5.

It was that intersection that clogged up at the Incredible Universe opening Sept. 17 and caused traffic to back up for miles in both directions.

If the study were being done today, the city would insist that engineers look at one more intersection down the road, Johansen said.

City Councilor Greg Carter asked if the traffic effects of some recent developments meant that the city should consider a moratorium on some new construction.

"I'm not willing to say that yet," Johansen said.

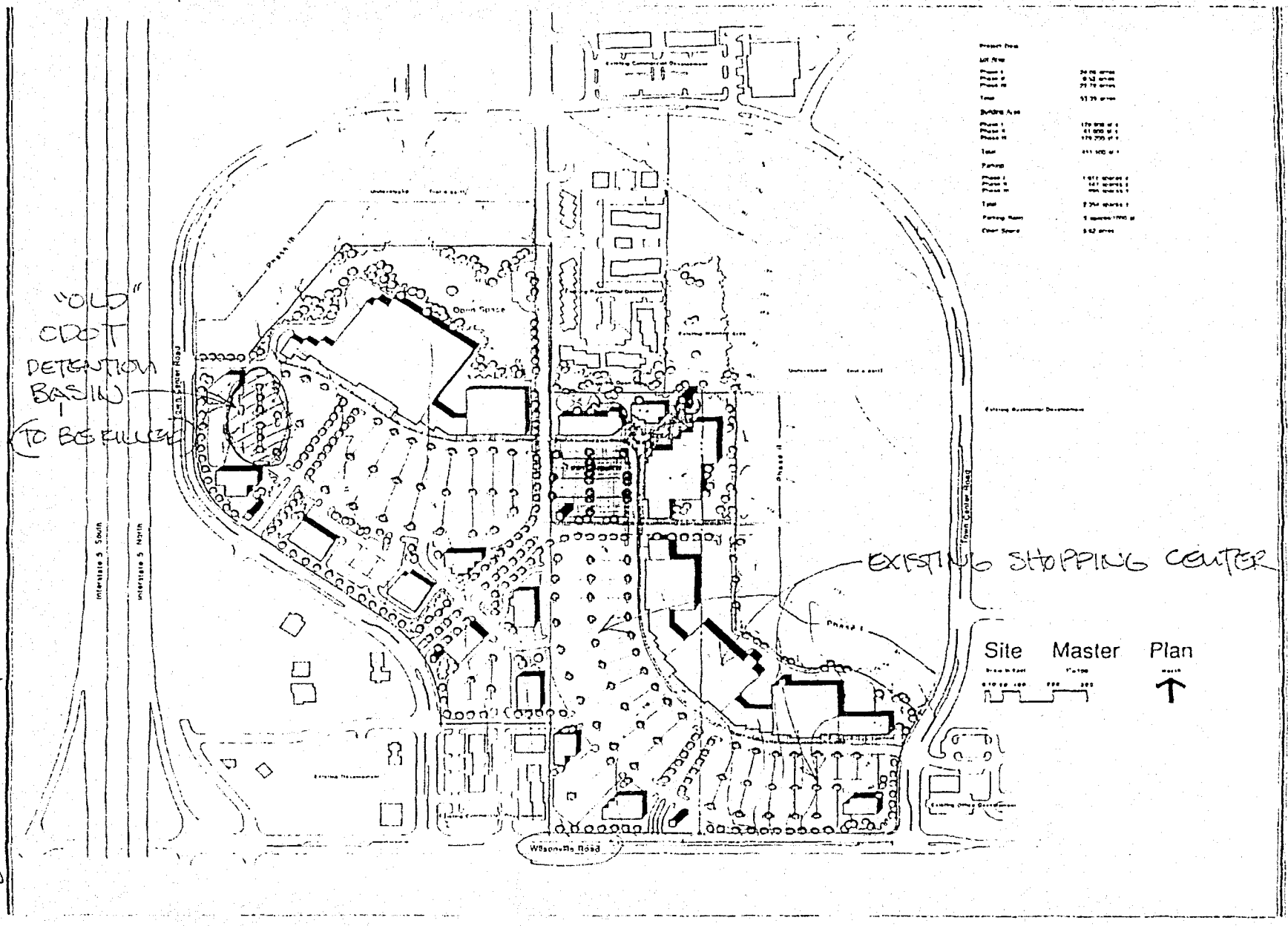
He said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built.

Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic — that is, traffic already on the streets for other reasons. But the store has become a regional draw, and "drop-in" traffic is a tiny percentage of traffic it attracts. Finally, the traffic study did not account for the success of the store's marketing effort.

"At a minimum, we need to be broadening the assumptions on which decisions are made," Loble said. "We've recognized that the traffic situation is beyond anything anticipated in the rational decision-making model."

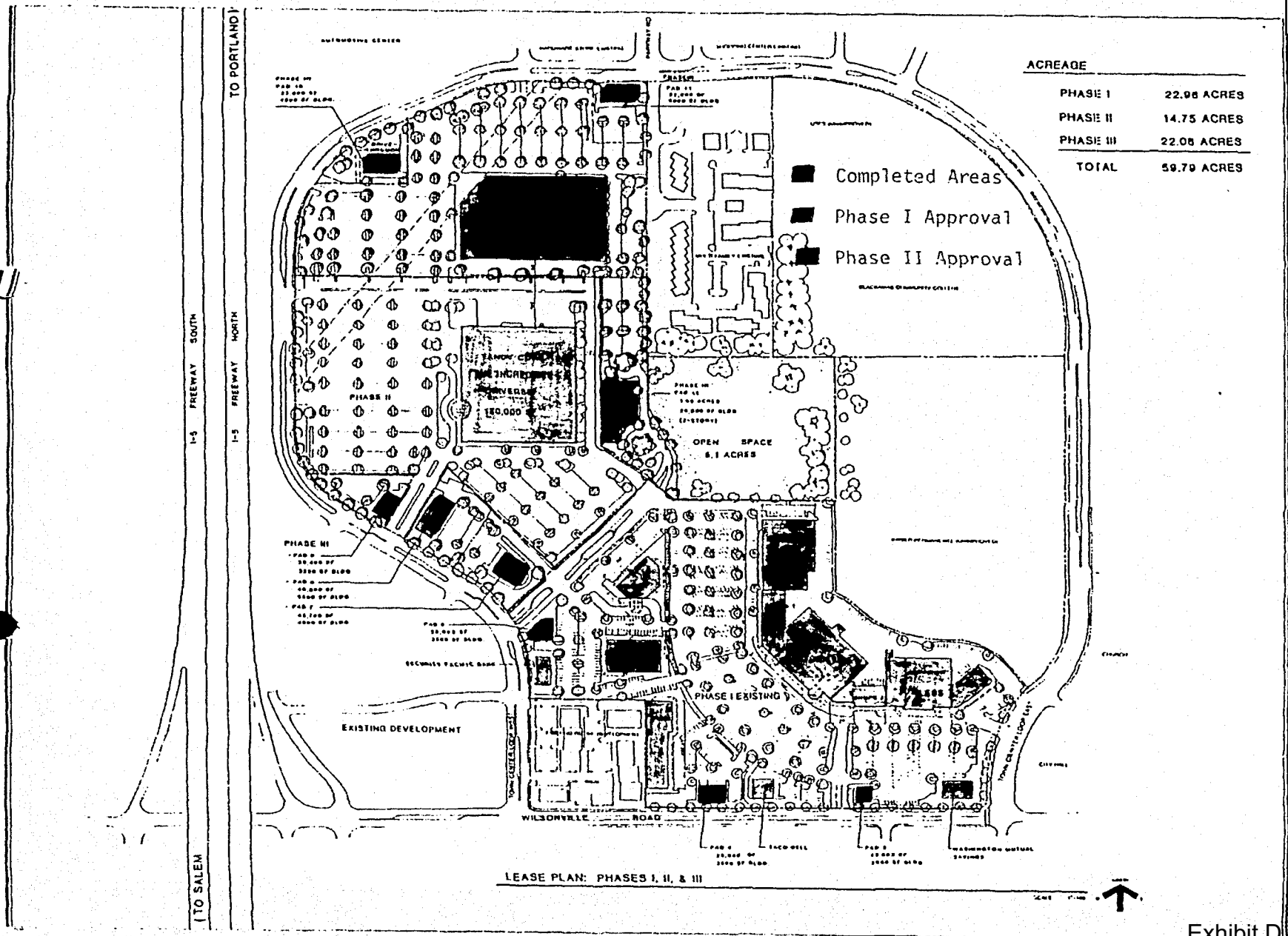
Sorensen, however, later said there are no plans to tinker with the engineering manual — he called it "the bible" — that predicts how many new trips will be generated by a particular use.

Sorensen would not hazard a guess about whether any of the changes will mean that developments will have a tougher time getting planning approval in Wilsonville. But he said that at least one major development was turned down as long as two years ago because it would have brought too much traffic to an overburdened street.



STAFF'S RIV : CC

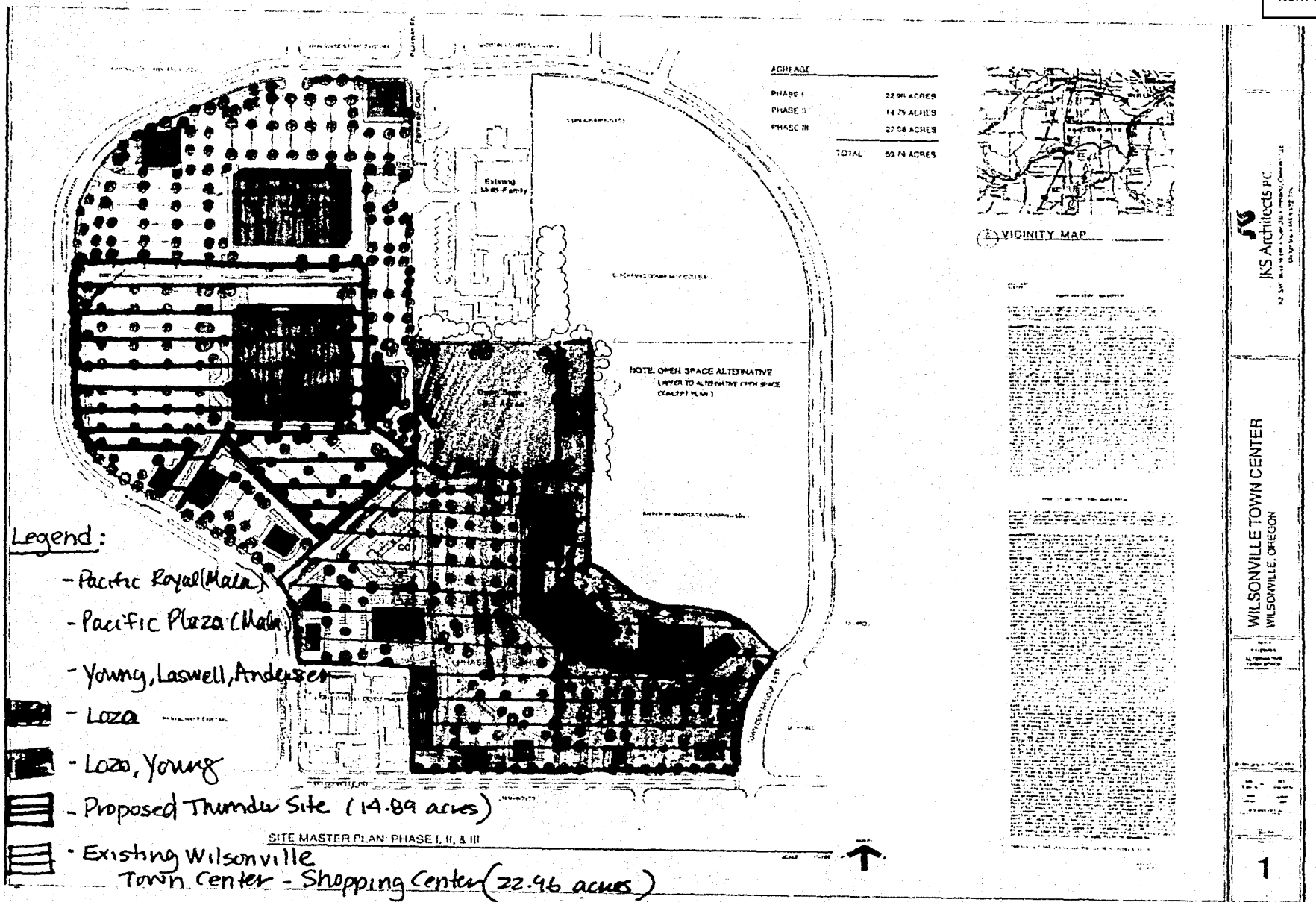
2549



JKS Architects PC

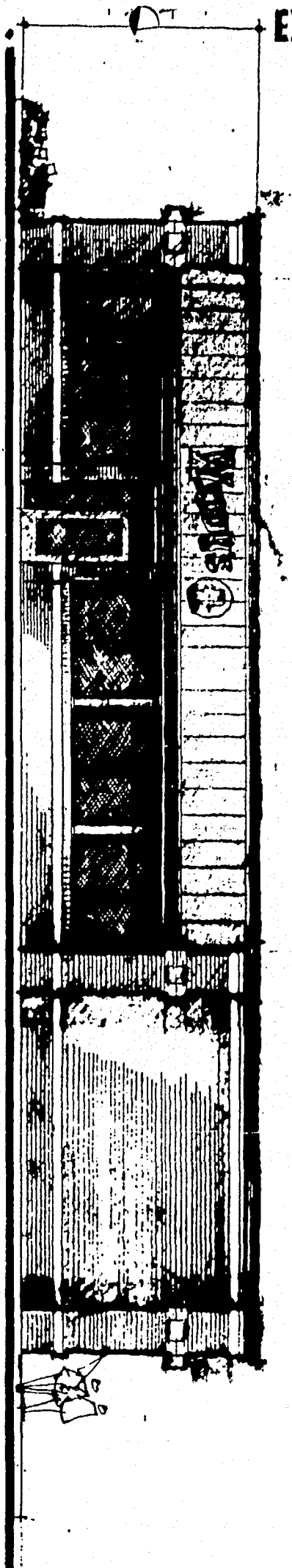
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

2551


ACREAGE
PHASE I 22.96 ACRES
PHASE II 14.75 ACRES
PHASE III 22.08 ACRES
TOTAL 59.79 ACRES
NOTE: OPEN SPACE ALTERNATIVE
VICINITY MAP
Legend:
- Pacific Royal (Mall)
- Pacific Plaza (Mall)
- Young, Laswell, Andersen
- Loza
- Loza, Young
- Proposed Thunder Site (14.89 acres)
- Existing Wilsonville Town Center - Shopping Center (22.96 acres)
SITE MASTER PLAN: PHASE I, II, & III
JKS Architects PC
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON
1

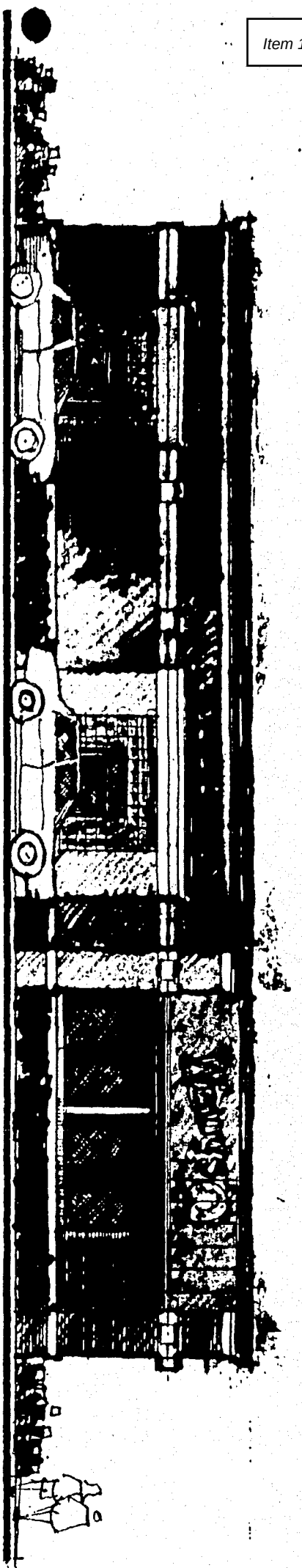
DEFECTS IN ORIGINAL DOCUMENT

EXHIBIT F



NORTH ELEVATION

1/8" = 1'-0"



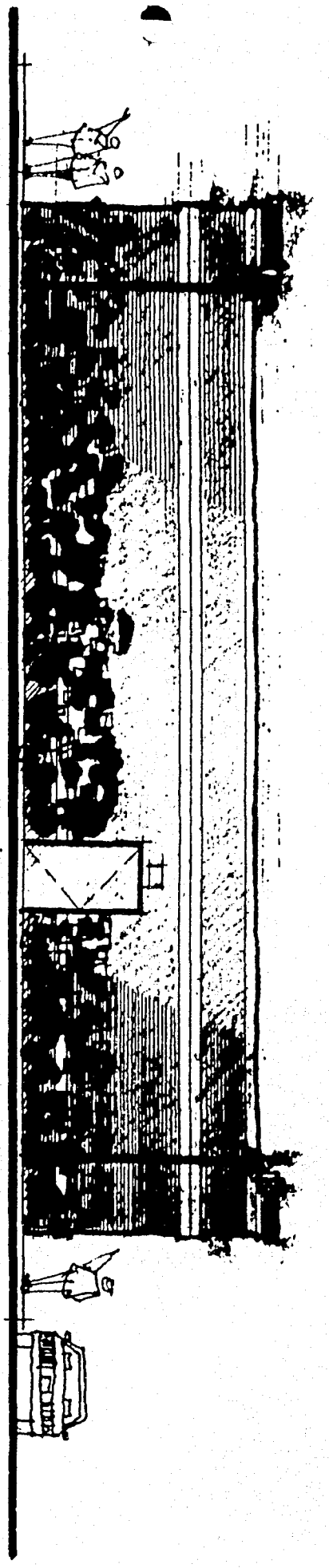
SOUTH ELEVATION

1/8" = 1'-0"

DRAWING NO: 1	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

WEST ELEVATION

1/8" = 1'-0"



EAST ELEVATION

1/8" = 1'-0"

DRAWING NO:	PROJECT NAME:	DATE:	
2	**Wendy's Restaurant**	**2/5/93**	
	DRAWING TITLE: **Elevations**	REVISION:	

Item 16.

CITY OF WILSONVILLE

30445 S.W. Boones Ferry Road
P.O. Box 220 Wilsonville, OR 97070-0220
(503) 682-4960

PLANNING DEPARTMENT
SITE DEVELOPMENT APPLICATION

File No. 91 PC 43 1/4 Sec.

Final action on application or zone change is required within 120 days in accordance with provisions of ORS 227.178.

Pre-App. ____ No. ____ Day ____ Yr.

A preapplication conference normally is required prior to submittal of an application. Please contact the Planning Department at 682-4960 for an appointment.

APPLICANT - COMPLETE

Owner's Name CAPITAL REALTY CORP. Contact Person Kim Beach

Address 101 S.W. MAIN SUITE 1500 Address ____

Portland OR. 97204

Phone 223-1200 Phone SAME

Owner's Signature Kimberlin J. Beach, Vice President Capital Realty Corp
Plaza Royal Officials Certifying Representative

Property Description: T 3 R ____ Map 3 1 5 1 2 Tax Lot(s) 200, 201, 101, 102, 300 See ON 13

Request STAGE I MASTER PLAN REVISION
STAGE II PHASE II WILSONVILLE Town Center
SITE PLAN - MOBILEY CONDITION #8 OF 90 PC 15

Please attach a plot plan (scale: 1"=40') and any other documents to this application. Please review the Planning Department submittal requirements to ensure that your application is complete.

—OFFICE USE ONLY—

Complete Application Accepted: Date 10/18/91 Public Hearing Date 12/9/91

Staff Signature Blair Edwards

☐ Class I ☐ Class II ☒ Class III

☐ PLAN AMENDMENT	☐ MAJOR PARTITION	☐ DESIGN REVIEW
☐ ZONE CHANGE	☐ MINOR PARTITION	☐ TEXT AMENDMENT
☐ PRELIMINARY PLAT	☐ CONDITIONAL USE	☐ SIGN REVIEW
☐ FINAL PLAT	☐ VARIANCE	☐ TEMPORARY USE
☒ PLANNED DEVELOPMENT	☒ OTHER REGNSIDER CONDITION OF 90 PC 15	

SITE FINDINGS

1. Zoning: PDC Town Center
2. Area of Lot: SEE FILE
3. Building or Sign Height: (Max) ____
4. Zoning Code Minimum Setbacks: Front ____ Side ____ Rear ____
5. Building Area ____
6. Access to Property TOWN CENTER LOOP WEST
7. Other: ____

☐ Approved ☐ Denied ☐ Approved with Conditions (see attached)

Conditions of Development ____

Approval of this development permit is based on information submitted by the applicant as called out above. Any change of plans or incorrect information when discovered will cause revocation of permit. This decision may be appealed in accordance with the provisions of the Wilsonville Code and ORS 227.180.

Fee Amount Paid $1315.00 Check No. SEE ⇨ Cash 1205 PAY $ See ... FEE - I
1206 PAY $625.00 II
1207 PAY $315.00 - CASH 4

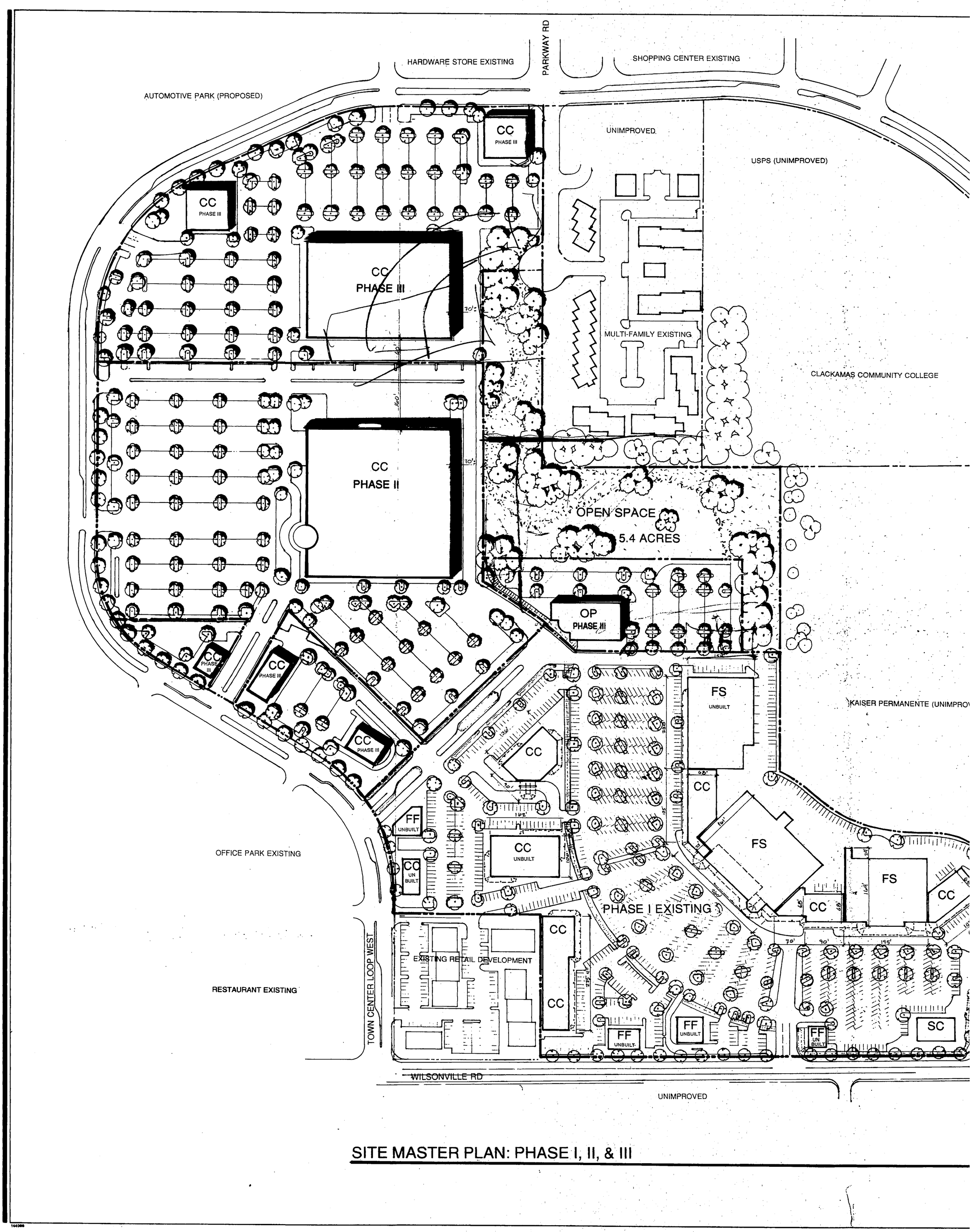
Permit Approval: Planner's Signature ____ Date: ____

City Council or Planning Commission Approval ☐ Yes ☐ No

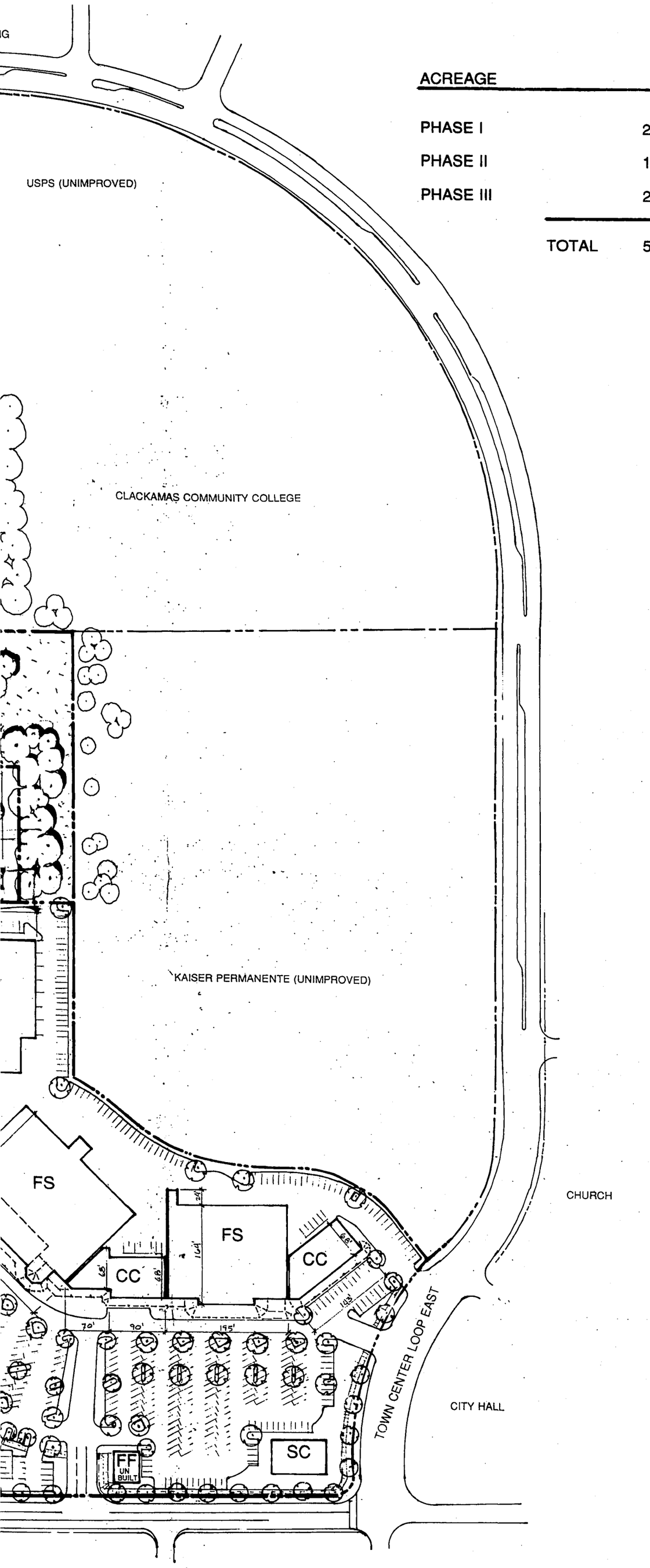
Order/Resolution ____

2558

White — Applicant's Receipt Yellow — File Pink — Applicant's Receipt Goldenrod — Applicant's Receipt

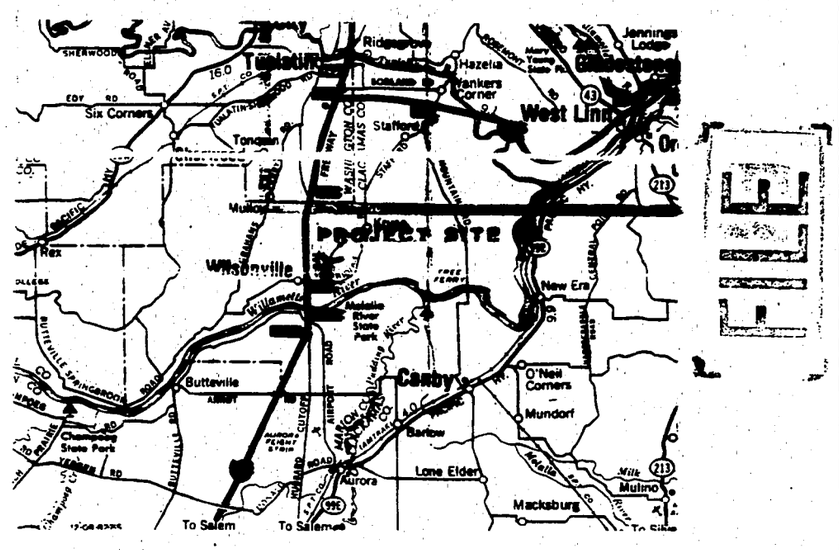


SITE MASTER PLAN: PHASE I, II, & III



ACREAGE

PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



(2/1) VICINITY MAP

467-0102
5/6/91

PHASE ONE LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'31" East along the section line between Sections 13 and 14 a distance of 44.00 feet to the **POINT OF BEGINNING**; thence continuing North 00°03'01" East along said section line a distance of 339.50 feet; thence South 89°59'30" West a distance of 338.63 feet to the easterly right-of-way line of Town Center Loop Road West; thence North 00°00'22" East along said easterly right-of-way line a distance of 44.55 feet to a point of curvature; thence 247.91 feet along the arc of a 360.54 foot radius curve to the left through a central angle of 39°23'37" and whose chord bears North 18°39'27" West a distance of 243.05 feet to a point on a curve; thence North 46°03'00" East a distance of 594.01 feet; thence South 89°57'00" East a distance of 66.14 feet; thence South 00°03'00" West a distance of 63.00 feet; thence South 89°57'00" East a distance of 479.78 feet; thence South 00°03'01" West a distance of 285.68 feet to the intersection with a non-tangent curve; thence 93.82 feet along the arc of a 317.33 foot radius curve to the right through a central angle of 16°56'21" and whose chord bears South 55°30'59" East a distance of 93.48 feet to a point of reverse curvature; thence 348.26 feet along the arc of a 336.67 foot radius curve to the left through a central angle of 42°03'00" and whose chord bears South 68°02'49" East a distance of 242.74 feet to a point of tangency; thence South 89°02'49" East a distance of 51.65 feet to a point of curvature; thence 174.68 feet along the arc of a 200.00 foot radius curve to the right through a central angle of 50°02'34" and whose chord bears South 64°01'32" East a distance of 169.15 feet to a point of tangency; thence South 39°00'15" East a distance of 97.50 feet to a point on a non-tangent curve; thence 328.21 feet along the arc of 494.00 foot radius curve to the left through a central angle of 38°04'18" and whose chord bears South 19°42'06" West a distance of 331.74 feet to a point of tangency; thence South 00°42'57" West a distance of 99.46 feet to a point of curvature; thence 48.14 feet along the arc of a 30.00 foot radius curve to the right through a central angle of 91°56'29" and whose chord bears South 44°40'11" West a distance of 43.17 feet to a point of tangency; thence South 89°21'26" West a distance of 375.16 feet to the Point of Beginning. Said parcel of land contains 22.96 acres, more or less.

PHASE II AND III LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**; thence leaving said section line South 45°03'00" West 589.42 feet to point of non-tangent curvature on the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line along the following courses and distances: tracing the arc of a 360.54 foot radius curve to the left (the radial center of which bears South 53°40'44" West) through a central angle of 20°25'22" an arc distance of 135.64 feet (the long chord bears North 47°31'56" West 134.92 feet) to a point of tangency; thence North 57°44'38" West 463.30 feet to a point of curvature; thence tracing the arc of a 258.16 foot radius curve to the right through a central angle of 57°42'16" an arc distance of 270.07 feet (the long chord bears North 28°53'30" West 258.80 feet) to a point of tangency; thence North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing the easterly, southeasterly and southerly right-of-way line of said Town Center Loop Road West along the following courses and distances: North 00°02'22" West 211.31 feet to a point of curvature; thence tracing the arc of a 444.00 foot radius curve to the right through a central angle of 64°15'44" an arc distance of 498.01 feet (the long chord bears North 32°24'30" East 444.85 feet) to a point of tangency; thence North 64°32'22" East 286.54 feet to a point of curvature; thence tracing the arc of a 414.00 foot radius curve to the right through a central angle of 24°58'03" an arc distance of 180.41 feet (the long chord bears North 77°20'24" East 178.96 feet) to a point of tangency; thence North 89°49'25" East 300.93 feet to a point of curvature for a right-of-way return to Parkway Avenue; thence leaving said southerly right-of way line of Town Center Loop Road West and tracing the arc of a 20.00 foot radius curve to the right through a central angle of 90°13'35" an arc distance of 31.49 feet (the long chord bears South 45°03'47" East 28.34 feet to the westerly right-of-way line of said Parkway Avenue (31.00 feet from center line); thence tracing said right-of-way line through the following courses and distances: South 00°03'01" West 311.17 feet to a point of curvature for the return to the cul-de-sac for said Parkway Avenue; thence tracing the arc of a 20.00 foot radius curve to the right through a central angle of 47°09'23" an arc distance of 16.46 feet (the long chord bears South 23°37'42" West 16.00 feet) to a point of reverse curvature; thence tracing the arc of a 55.00 foot radius curve to the left through a central angle of 87°59'01" an arc distance of 84.46 feet (the long chord bears South 03°12'53" West 76.40 feet); thence leaving said Parkway Avenue right-of-way line North 89°52'55" East 41.62 feet to the east line of section 14, Township 3 South, Range 1 West, of the Willamette Meridian in the State of Oregon; thence tracing said east line of section 14 South 00°03'01" West 446.55 feet to the northerly line of Parcel 3 of said **Partition Plat No. 1991-164**; thence tracing said northerly line and continuing along the northerly line of Parcel 2 of said **Partition Plat No. 1991-164** North 89°26'52" East 549.20 feet to the northeast corner of said Parcel 2; thence tracing the easterly line of said Parcel 2 South 00°03'01" West 440.61 feet to the southeast corner of said Parcel 2; thence tracing the southerly line of said Parcel 2 and continuing along the southerly line of said Parcel 3 North 89°57'00" West 479.78 feet to an angle point in said southerly line; thence tracing the westerly portion of said southerly line of Parcel 3 the following courses and distances: North 00°03'01" East 63.00 feet; thence North 89°57'00" West 66.14 feet; thence South 45°03'00' West 4.59 feet to the **TRUE POINT OF BEGINNING.**

Containing 1,604,349 square feet or 36.83 acres more or less.

467-0301
10/16/91

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

Revisions

KJD	RSB
Drawn By	Checked By
8963	10/18/91
Job No.	Date

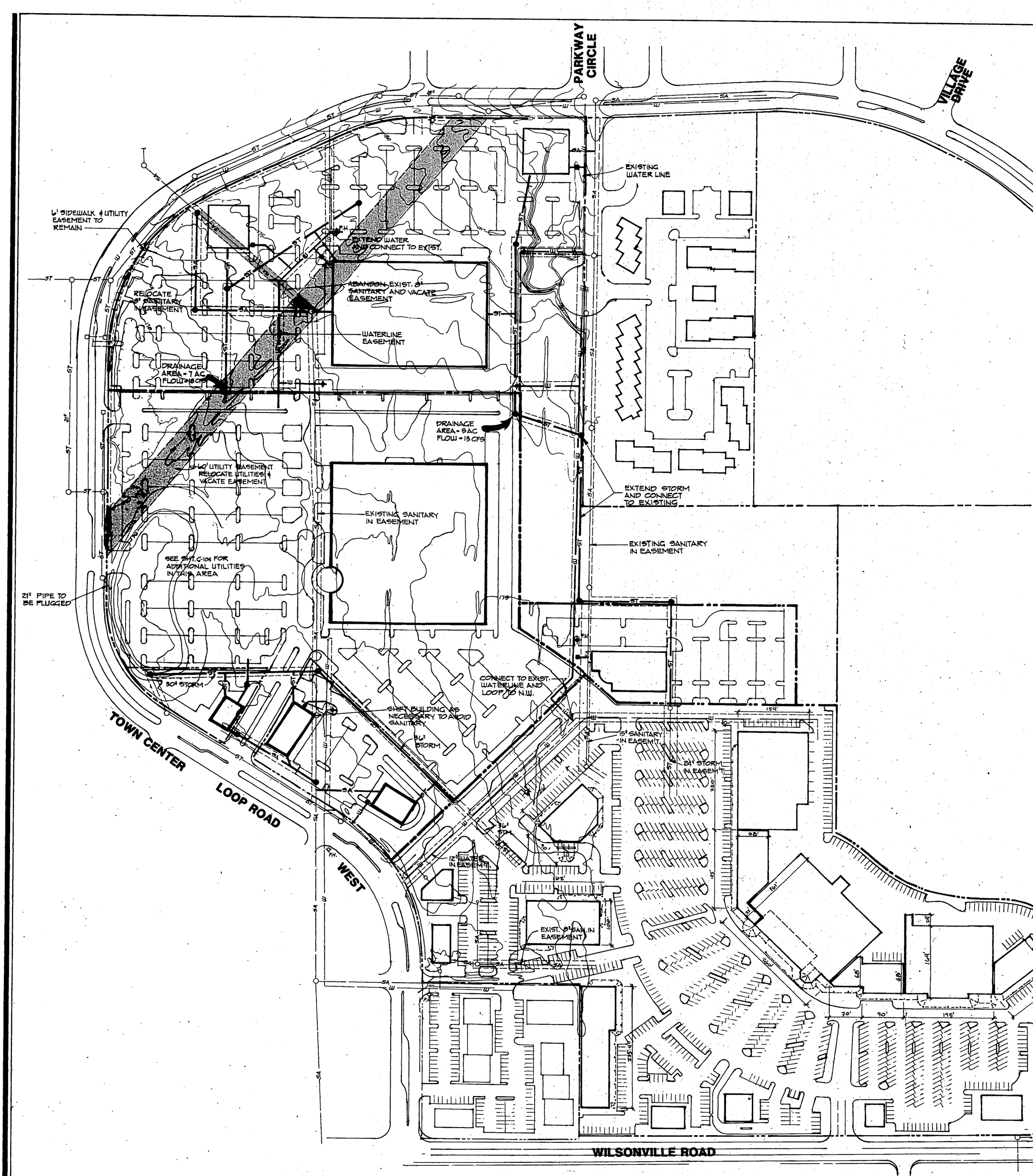
SITE MASTER PLAN

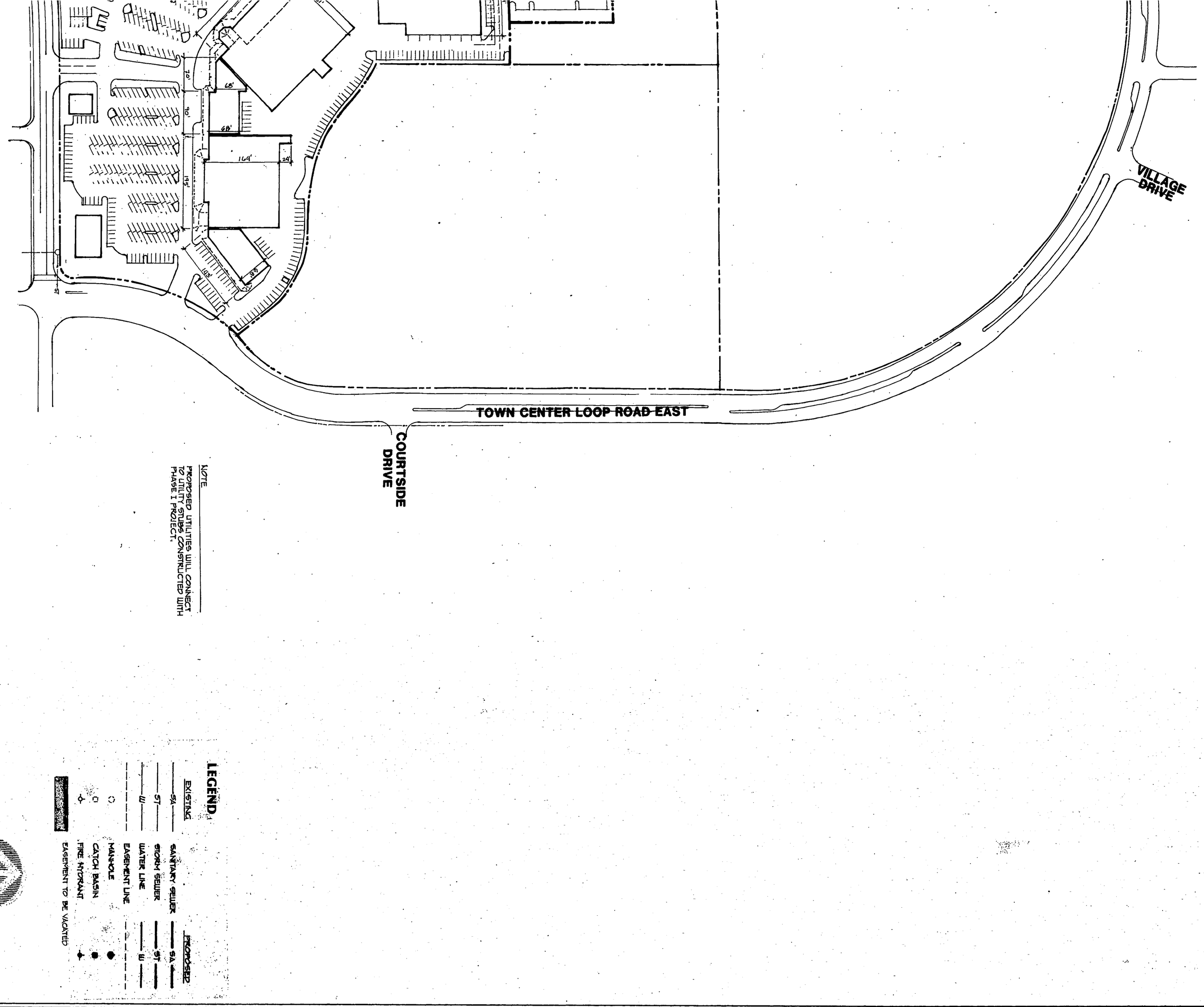
Sheet Title

Sheet No.

1

of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER AND CONNECT TO EXIST.
RELOCATE 8" SANITARY IN EASEMENT
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA = 7 AC FLOW = 18 CFS
DRAINAGE AREA = 5 AC FLOW = 13 CFS
60' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
15" SANITARY IN EASEM'T
24" STORM IN EASEM'T
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEM'T.
EXIST. 8" SAN. IN EASEMENT
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE I PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
⊕	FIRE HYDRANT	✦
	EASEMENT TO BE VACATED	

1" = 100'

Revisions

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

WILLAMETTE PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
(503)227-0455
Fax (503)274-6607
Planning • Engineering • Surveying • Landscape Architecture

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

Drawn By _____ Checked By _____

Job No. 4-440-02[illegible] Date 10-9-11

Sheet Title
MASTER UTILITIES PLAN

Sheet No.
2 of

PARKWAY CIRCLE

VILLAGE DRIVE

EXISTING WATER LINE

6' SIDEWALK & UTILITY EASEMENT TO REMAIN

EXTEND WATER & CONNECT TO EXIST.

ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT

RELOCATE 8" SANITARY IN EASEMENT

WATERLINE EASEMENT

DRAINAGE AREA - 7 AC FLOW = 18 CFS

DRAINAGE AREA - 5 AC FLOW - 13 CFS

10' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT

EXISTING SANITARY IN EASEMENT

EXTEND STORM AND CONNECT TO EXISTING

EXISTING SANITARY IN EASEMENT

SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA

21" PIPE TO BE PLUGGED

30' STORM

CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.

SHIFT BUILDING AS NECESSARY TO AVOID SANITARY

36' STORM

15" SANITARY IN EASEM'T.

24" STORM IN EASEM'T.

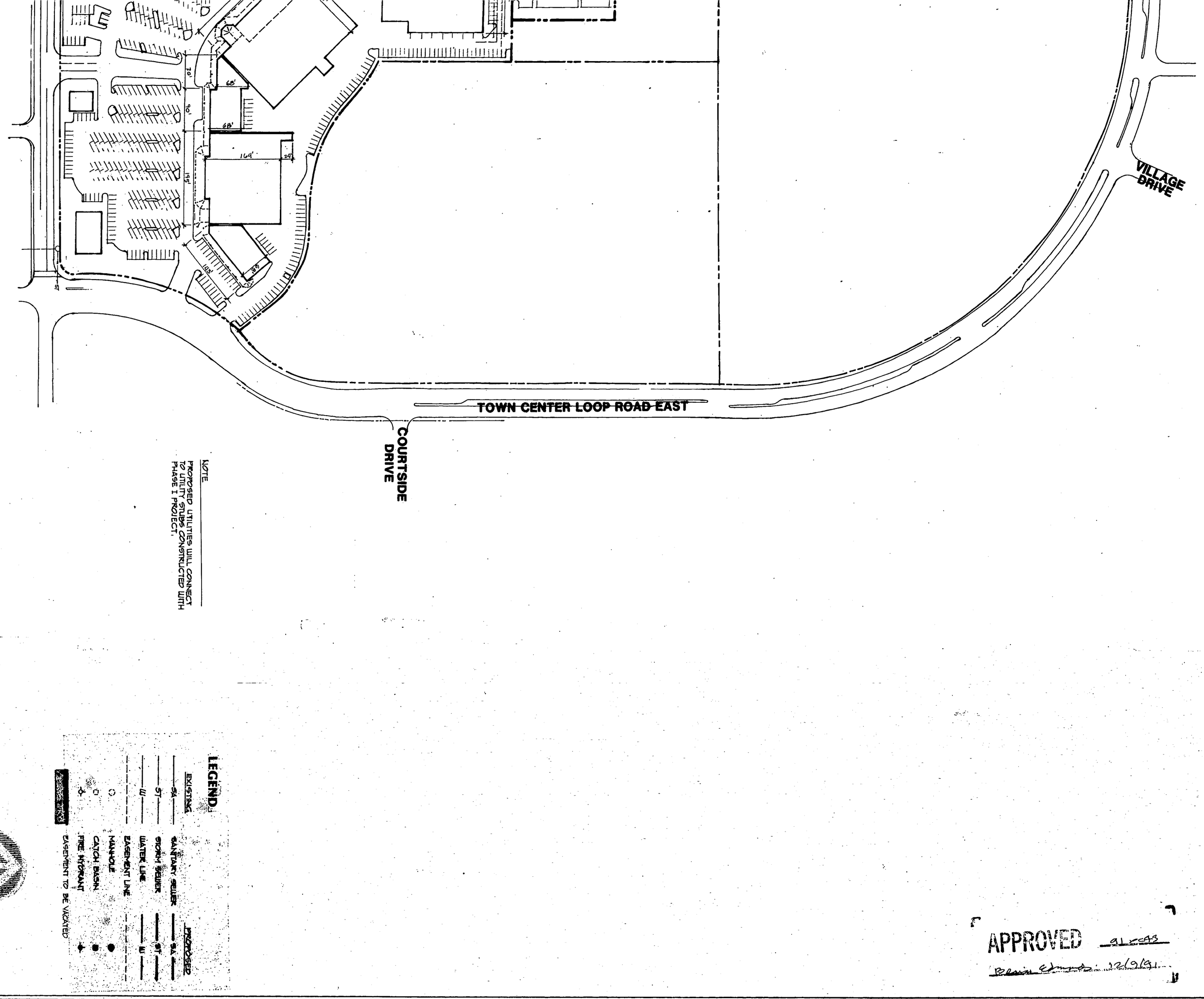
12" WATER IN EASEMENT

EXIST. 8" SAN. IN EASEMENT

TOWN CENTER LOOP ROAD

WEST

WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE 1 PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
	FIRE HYDRANT	
	EASEMENT TO BE VACATED	

1" = 100'

APPROVED 9/25/91
Bruce Edmonds 12/9/91

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

Revisions

Drawn By: Checked By:

Date: 4/30/91
MASTER UTILITIES PLAN
Sheet Title

Sheet No. 2 of

W&H PACIFIC
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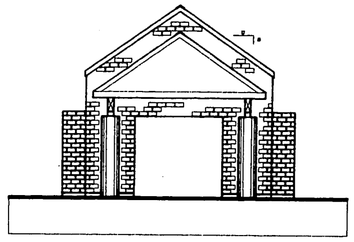
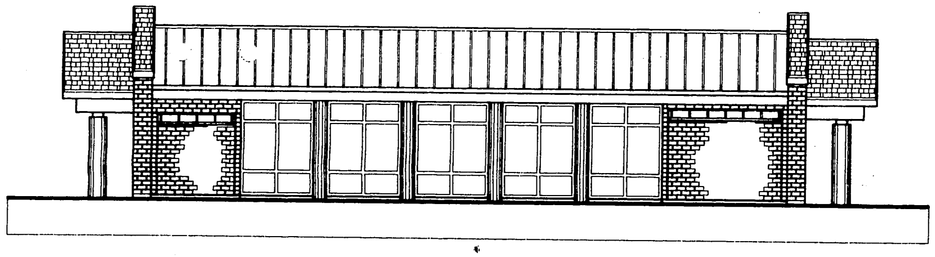


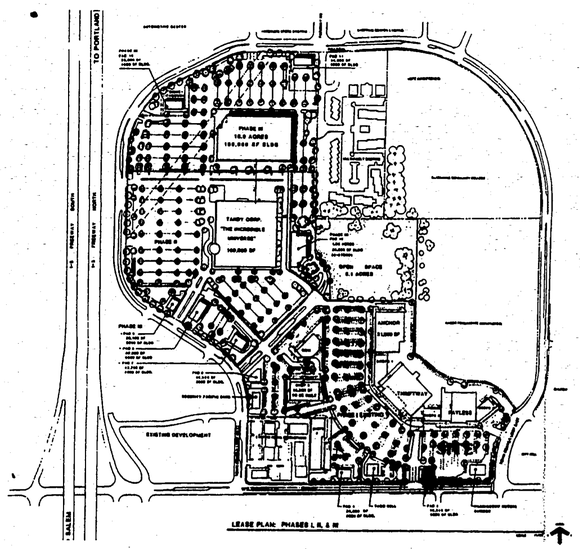
END ELEVATION

1/8" = 1'-0"



FRONT ELEVATION

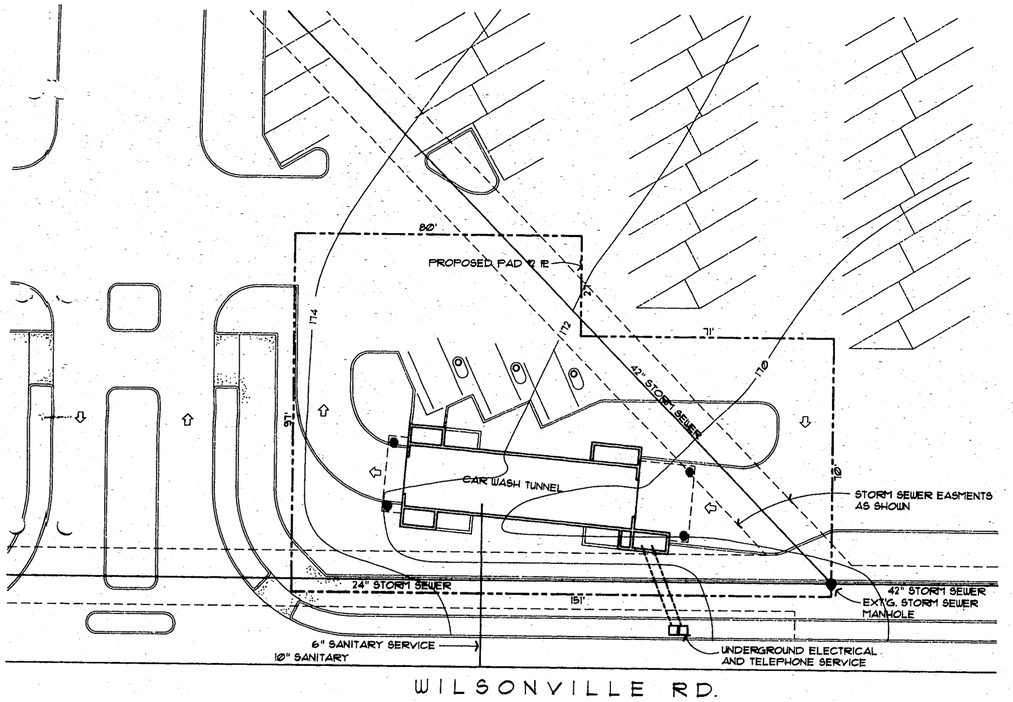
1/8" = 1'-0"



VICINITY MAP

SITE DATA

	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA	1,500±	12%
PARKING & DRIVES	8,293±	65%
LANDSCAPING/OPEN SPACE	2,937±	23%
TOTAL SITE AREA	12,730±	100%



NORTH

PRELIMINARY SITE PLAN

1" = 20'

NICOLI ENGINEERING
and Construction Services Inc
9025 S.W. Center Street • P.O. Box 23784
Tigard, Oregon 97223
Phone: (503) 620-2086
FAX: (503) 684-3636

WILSONVILLE TOWN CENTER
PROPOSED CAR WASH

WILSONVILLE, OREGON

CLIENT:
DENNIS THOMPSON

REVISIONS:

Date:	11-20-92
Scale:	AS SHOWN
Drawn by:	SET
Checked by:	JDA
Job No.:	2023
Drawing No.:	2023TITL

SHEET 1 OF 1

Exhibit D
2566
Page 155 of 161

PEN WTS. 1 2 3 4 1 3 1 6 8 8 8 8 8 8 8

3 | CED ATL 'GLAUCA'

30 | PPU LAU 'OTTO LUYKEN'

7 | EUO ALA 'COMPACTA'

36 | JUN HOP 'BAR HARBOR' 4 PER ISLAND

LIMIT OF WORK

14 | RHO 'JEAN MARIE'

78 | PPU LAU 'OTTO LUYKEN'

11 | ACE PUB 1 3/4" 'ARMSTRONG'

22 | RHO 'JEAN MARIE'

6 | ACE PLA 3" 'EMERALD QUEEN' SEE PLTG. NOTES.

2 | PYR CAL 'REDSPIRE'

11 | EUO ALA 'COMPACTA'

EQ. EQ.

16 | PYR CAL 1 3/4" 'REDSPIRE'

5'-0" MIN. (TYP.)

LAWN - SEED (FINE) SEE SPECS.

50'-0" TYP.

45'-0"

SHOVEL CUT EDGE SEE PLTG. NOTES.

5 | CED ATL 'GLAUCA'

533 | PPU LAU 'OTTO LUYKEN'

TOWN CENTER LOOP ROAD WEST

LAWN - SEED SEE SPEC'S.

6 | PSL

AS REQ | AZALEA 'PURPLE SPLENDOR' 30" O.C.

AS REQ | PIN MUG 2 GAL | 36" O.C.

60 | RHO 'UNIQUE'

9 | SYR VUL 2 GAL. 'LAVENDER LAD

31 | PIE 'FOREST FLAME'

4 | VIB DAV

1 | QUE PUB

BARK MULCH SEE SPEC'S.

12 | BER THU 'ROSY GLOW'

2 | PYR CAL 'REDSPIRE'

LAWN - SEED SEE SPEC'S.

EQ. EQ.

1

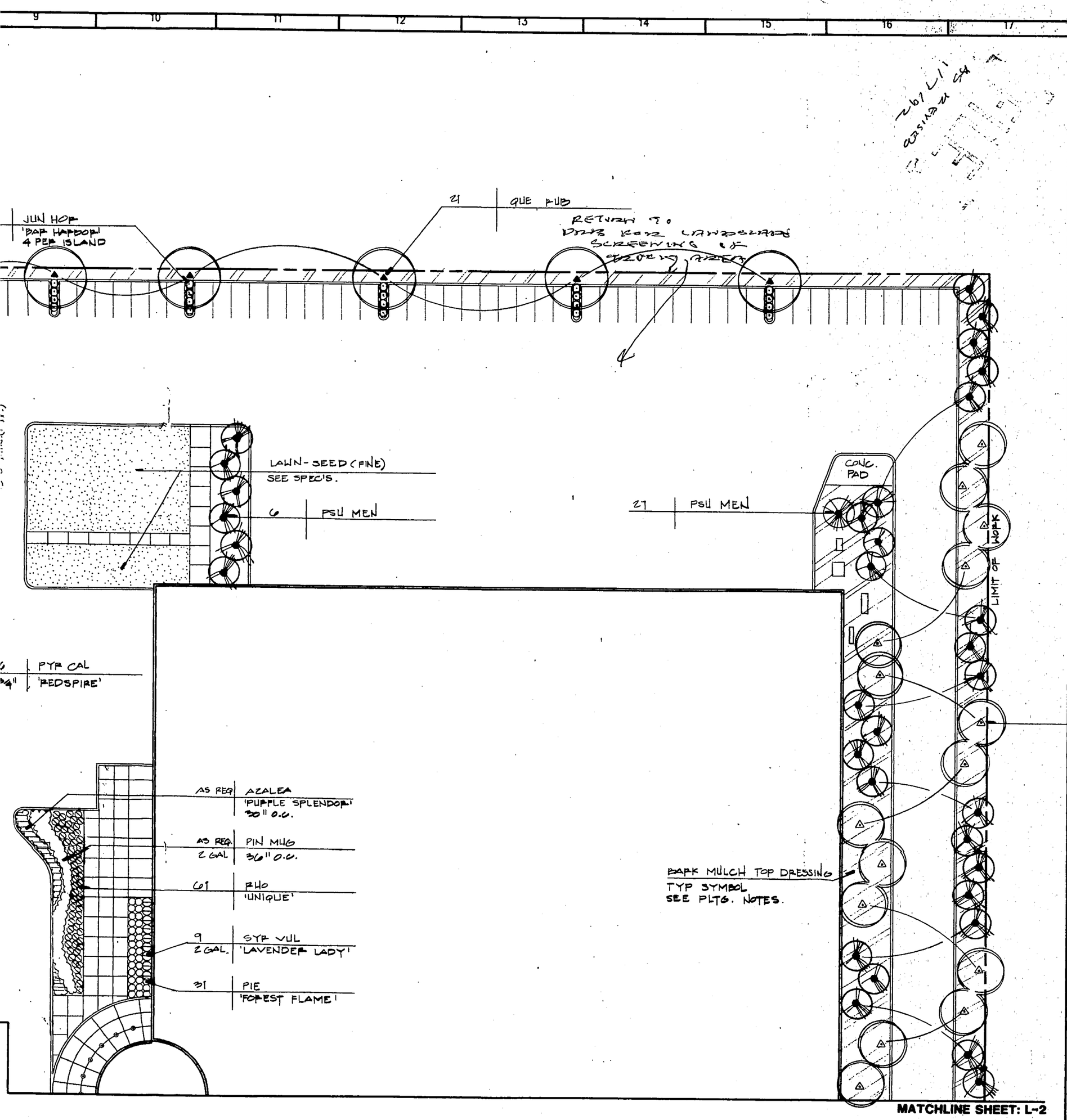
5

A PLANTING ISLAND 'A' DETAIL N.T.S.

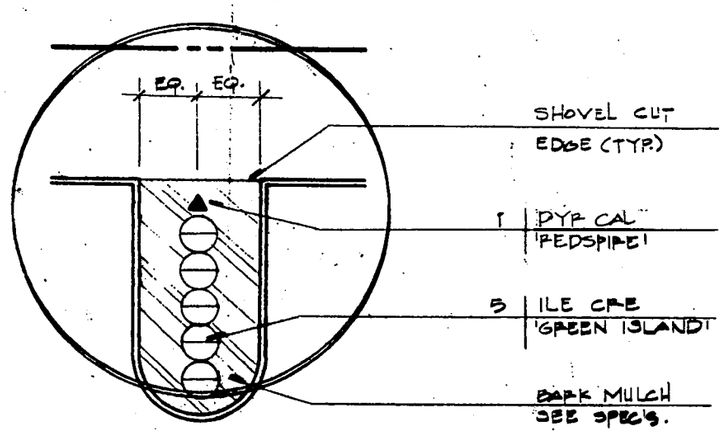
B PLANTING ISLAND 'B' DETAIL N.T.S.

C PLANTING ISLAND 'C' DETAIL

PROJECT NO. 4-755-0202
CADD FILE '0775LS01.DWG'



MATCHLINE SHEET: L-2



C PLANTING ISLAND 'C' DETAIL N.T.S.

SHEET NOTES

PLANTING GENERAL NOTES:

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES IN PLANTING AREAS PRIOR TO PLANTING. CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES 48 HOURS PRIOR TO BEGINNING EXCAVATION WORK FOR UTILITY LOCATION INFORMATION:

TELEPHONE:	503 246 6699	
GAS:	503 246 6699	
ELECTRIC:	503 246 6699	
SEWER:	503 682 4960	ATTN: MARTIN BROWN
WATER:	503 682 4960	ATTN: MARTIN BROWN

LIGHT STANDARDS ARE SHOWN FOR REFERENCE ONLY. REFER TO DRAWING NUMBER DRBC2 FOR ADDITIONAL LIGHTING INFORMATION.

PLANTING IN PARKING LOT ISLANDS AS SHOWN IN ENLARGEMENTS ON SHEET L-1.0.

ALL SHRUB AND GROUNDCOVER PLANTING AREAS TO RECIEVE MINIMUM 2" DEPTH OF BARK MULCH. SEE SPECIFICATIONS 02950.

REFER TO CIVIL'S FOR FINISH GRADES IN PLANTING AREAS.

STREET TREES ON TOWN CENTER LOOP ROAD WEST SHALL BE PLANTED PER CITY OF WILSONVILLE STANDARD PLAN. IF NONE EXISTS, INSTALL PER DETAIL 1, L-2.0.

ALL LAWN EDGES AT SHRUB PLANTING AREAS SHALL BE SHOVEL CUT. CONTRACTOR SHALL MAINTAIN ALL SHOVEL CUT EDGES IN A SMOOTH AND EVEN CONDITION UNTIL FINAL ACCEPTANCE.

CONTRACTOR SHALL SUPPLY AND INSTALL ANNUAL COLOR, 4" POT SIZE AT 10" O.C.. COLOR MATERIALS TO BE SELECTED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO PLANTING. ANNUAL COLOR MATERIAL SHALL BE IN SEASON (FULL BLOOM) AT TIME OF INSTALLATION.

NOT FOR CONSTRUCTION

PRINTED JAN 06 1992 W & H PACIFIC

APPROVED

PROJECT NORTH

W&H PACIFIC
200 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title: PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title: LANDSCAPE PLAN

Seal: REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L1.0
Reviewed MH	
Date 12-27-91	c 1991 DESIGN FORUM ARCHITECTS

PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8

MATCHLINE SHEET: L-1

TOWN CENTER LOOP ROAD WEST

11'-0" TYP.

20 | RHO 'JEAN MARIE' | AS REQ. | AZALEA 'PURPLE SPL.' 30" O.C.

AS REQ. | PIN MUG | 2 GAL. | 30" O.C.

3 | 3" | ACE CIP

4" POT | ANNUAL COLOR SEE PLTG. NOTES

SHOVEL CUT EDGE (TYP.) SEE PLTG. NOTES.

EQ. EQ. 5'-0" MIN.

61 | RHO 'UNIQUE'

31 | PIE 'FOREST FLAME'

9 | 2 GAL | SYR VUL 'LAVENDER LADY'

30 | VIB DAV

5 | CED ATL. 'GLAUCA'

10 | ILE CRE 'GREEN ISLAND'

61 | PRU LAU 'OTTO LUYKEN'

56 | EUO ALA COMPACTA'

25 | VIB DAV

13 | AZA 'PURPLE SPL.'

5'-0" MIN.

42 | AZA 'PURPLE SPL.'

AS REQ. | 4" POT | HED HEL 'GLACIER'

4 | 3" | ACE PLA 'EMERALD QUEEN' SEE PLTG. NOTES

LAWN - SEED (FINE) SEE SPEC'S.

6 | 2" CAL | QUE PUB

ROUGH SEEDED AREA
See Grading Plans for Limits

15 | 1 3/4" | PPY CAL 'REDSPIRE'

6 | ACE CIP

SIDEWALK N.I.C.

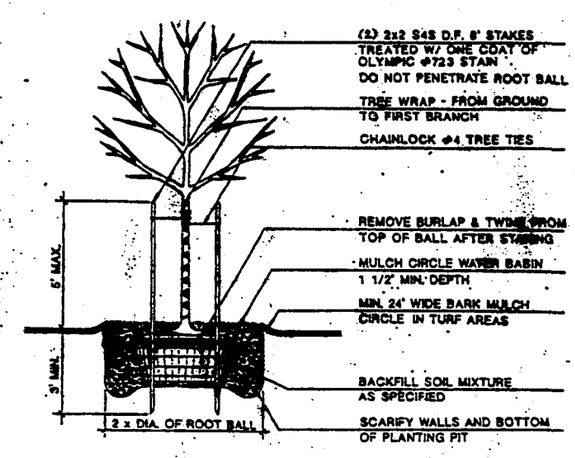
9 | 2" CAL | QUE PUB

ROUGH SEEDED AREA
See Grading Plans for Limits

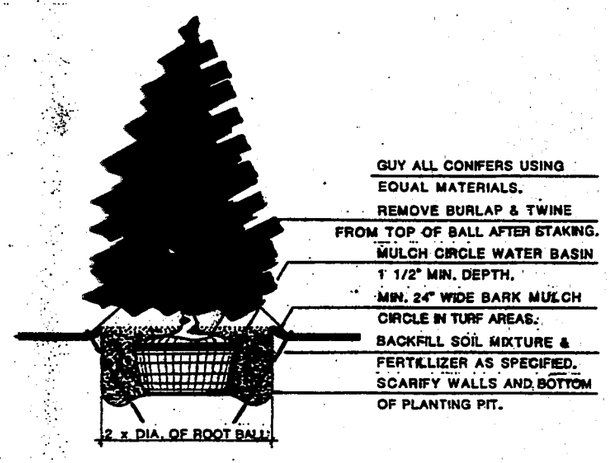
LAWN - SE
SEE SPEC'

PLANT LEGEND

QTY	CODE	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
9	Ace Cir	Acer circinatum	Vine Maple	7'- 8'
10	Ace pla	Acer platanoides 'Emerald Queen'	Emerald Queen Maple	3" Cal.
11	Ace rub	Acer rubrum 'Armstrong'	Armstrong Columnar Maple	1-3/4" Ca
18	Ced atl	Cedrus atlantica 'Glauca'	Blue Atlas Cedar	8'- 10'
19	Pyr cal	Pyrus calleryana 'Chanticleer'	Chanticleer Pear	1-3/4" Ca
40	Pse men	Pseudotsuga menziesii	Douglas Fir	8'- 10'
36	Que rub	Quercus rubra	Red Oak	2" Cal.
70	Pyr cal	Pyrus calleryana 'Redspire'	Redspire Pear	1 3/4" C
SHRUBS				
210	Aza	Azalea 'Purple Splendor'	Purple Splendor Azalea	12-15"
12	Ber thu	Berberris thunbergii 'Rosy Glow'	Rosy Glow Japanese Barberry	2 Gal.
184	Euo ala	Euonymous alata 'Compacta'	Compact Winged Euonymous	12-15"
53	I le cre	Ilex crenata 'Green Island'	Japanese Holly	2 Gal.
62	Pie	Pieris 'Forest Flame'	Forest Flame Pieris	12-15"
131	Pin mug	Pinus mugo Pumilio	Dwarf Mugo Pine	2 Gal.
240	Pru lau	Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	12-15"
56	Rho	Rhododendron 'Jean Marie'	Rhododendron	12-15"
122	Rho	Rhododendron 'Unique'	Rhododendron	12-15"
18	Syr vul	Syringa vulgaris 'Lavender Lady'	Lavender Lilac	2 Gal.
53	Vib dav	Viburnum davidii	David Viburnum	12-15"
GROUNDCOVER				
2,210	Hed hel	Hedera helix 'Glacier'	Glacier Ivy	4" Pots
66	Jun hor	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Juniper	1 Gal.
216		Annual Color		4" Pots

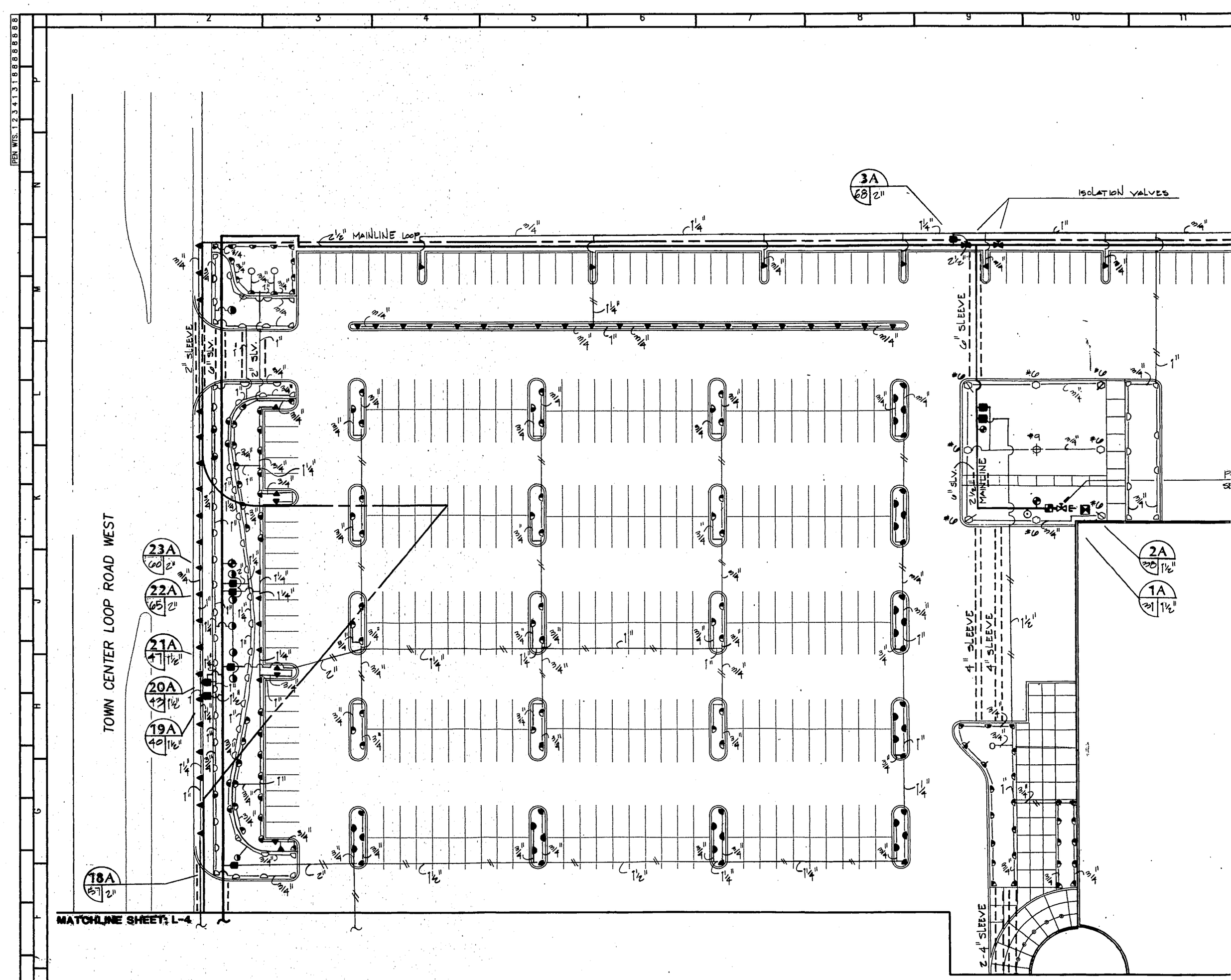


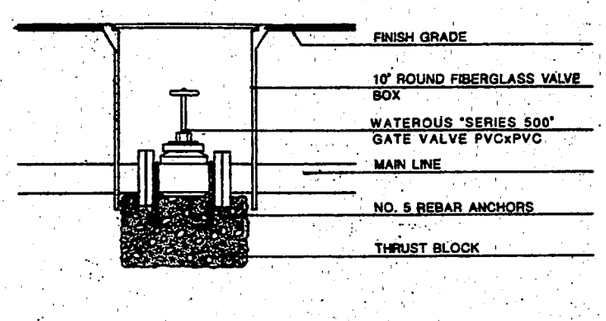
1 TREE PLANTING DETAIL N.T.S.



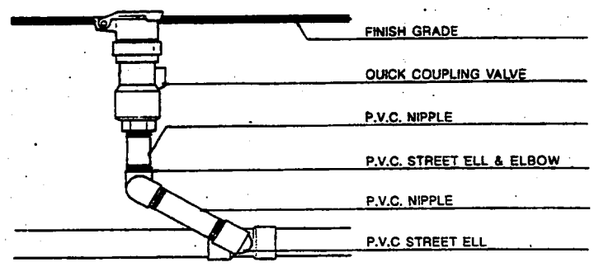
2 CONIFER PLANTING DETAIL N.T.S.

PROJECT NO. 4-755-0202
CADD FILE 0775L502.DWG

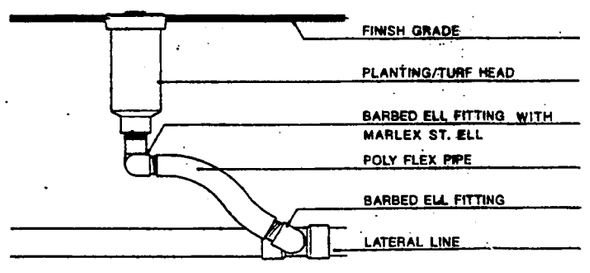




MAINLINE GATE VALVE



QUICK COUPLING VALVE DETAIL



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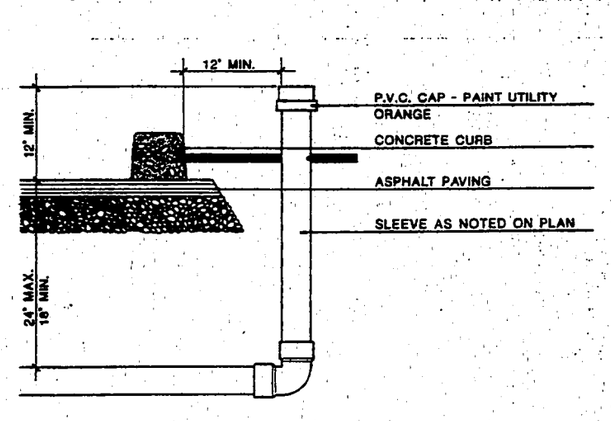
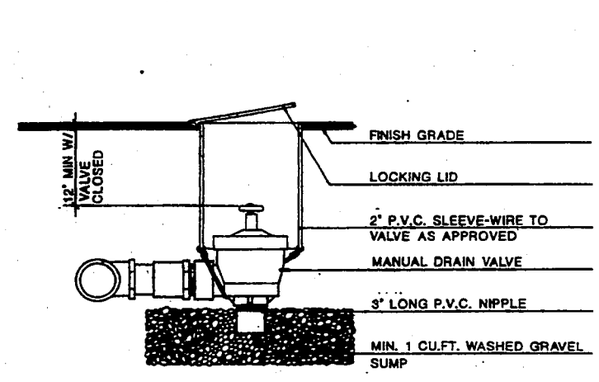
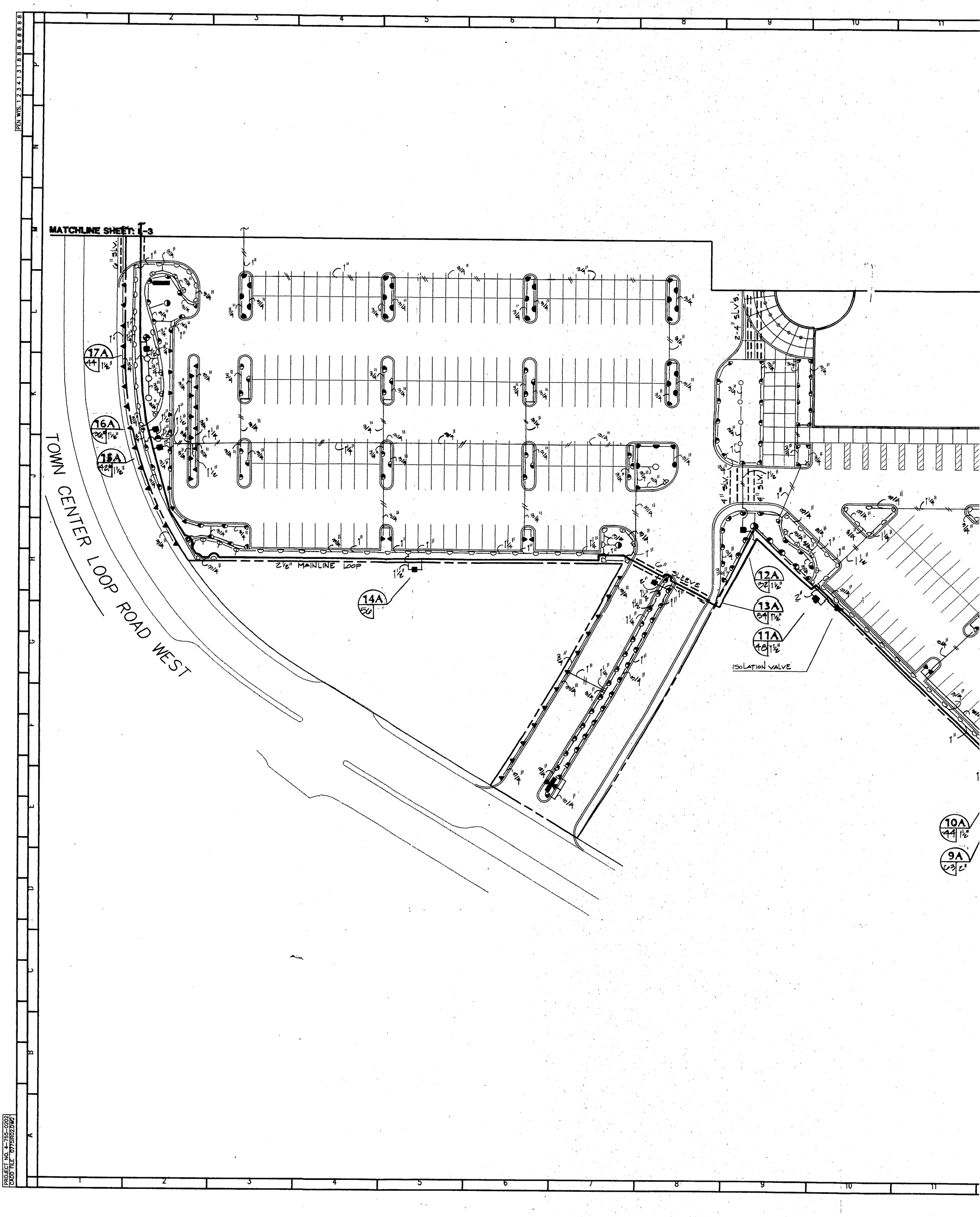


SLEEVING DETAIL



MANUAL DRAIN VALVE DETAIL

PROJECT NO. 4-755-0202
CADD FILE 0775IR01.DWG


MATCHLINE SHEET: C-3
TOWN CENTER LOOP ROAD WEST
2½" MAINLINE LOOP
6" SLEEVE
ISOLATION VALVE
2-4" SLVs.
17A
16A
15A
14A
12A
13A
11A
10A
9A
PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8 8
PROJECT NO. 4-755-0202
CADD FILE 0775IR02.DWG

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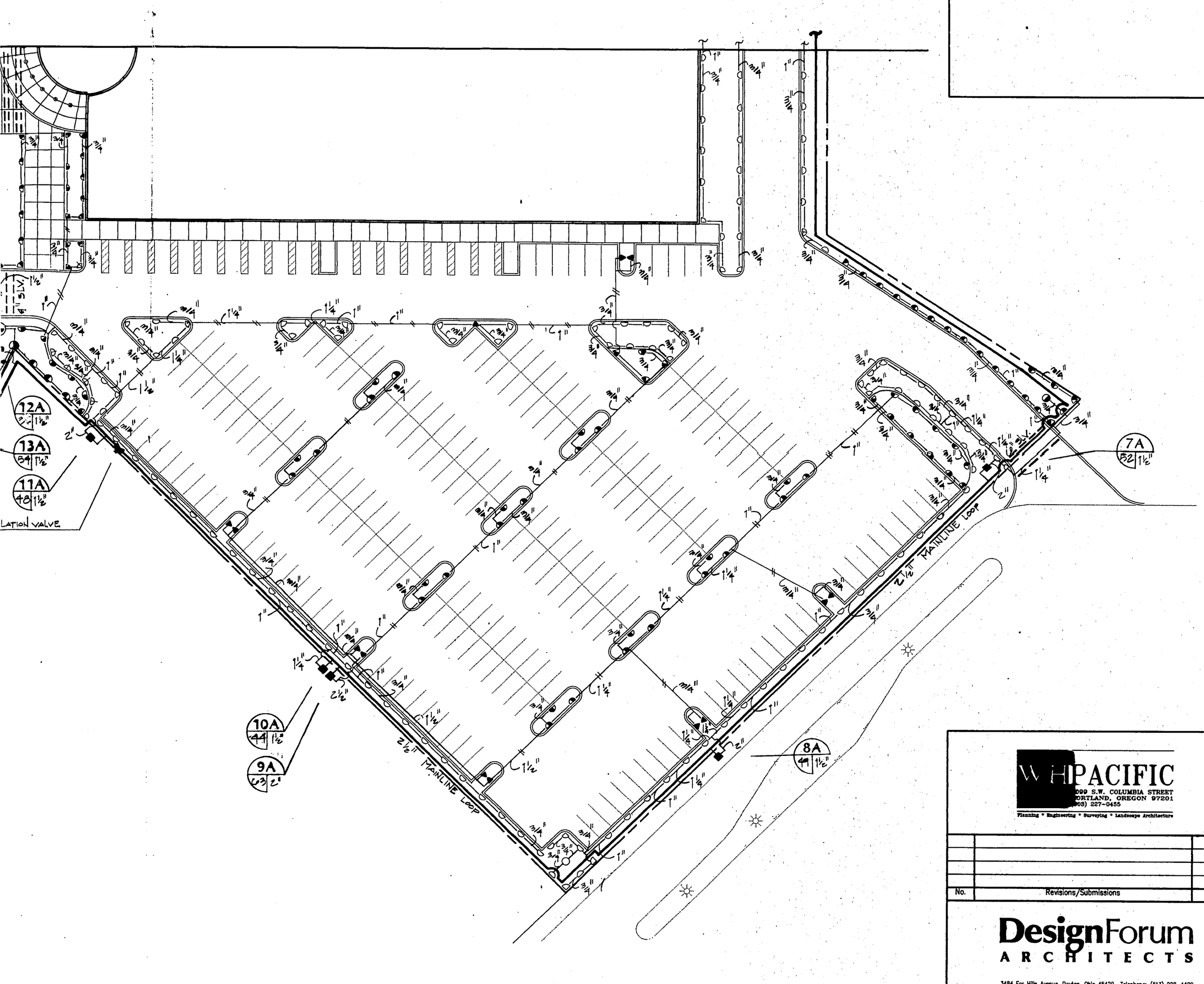
SHEET NOTES



PROJECT NORTH

WHPACIFIC
2099 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title
PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title
IRRIGATION PLAN

Seal: REGISTERED 2801 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L4.0
Reviewed MH	
Date 12-27-91	© 1991 DESIGN FORUM ARCHITECTS

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DEVELOPMENT REVIEW BOARD MEETING

MONDAY, FEBRUARY 26, 2024
6:30 PM

Public Hearing:

3. **Resolution No. 429. Appeal of Administrative Decision.** The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

   Case File:
   DB24-0002 Appeal of Administrative Decision

DEVELOPMENT REVIEW BOARD
RESOLUTION NO. 429

A RESOLUTION AFFIRMING THE PLANNING DIRECTOR'S DETERMINATION OF NON-CONFORMANCE IN CASE FILE ADMN23-0029 AND DENYING THE APPLICANT'S APPEAL DB24-0002.

WHEREAS, an application for Class 1 Administrative Review (ADMN23-0029), together with planning exhibits, has been submitted by Dan Zoldak of Lars Andersen & Associates, Inc. – Applicant, on behalf of David Fry of Lumberjack LP – Owner, in accordance with the procedures set forth in Section 4.008 of the Wilsonville Code; and

WHEREAS, the subject property is located at 29400 SW Town Center Loop West on Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon; and

WHEREAS, the subject of the Class 1 Administrative Review was a Planning Director Determination on non-conformance per Subsection 4.030 (.01) A. 7. of the Wilsonville Development Code; and

WHEREAS, the City issued the Planning Director Determination, on the above-captioned subject, that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone, dated December 28, 2023; and

WHEREAS, within the prescribed appeal period, the Administrative Decision was appealed by Dan Zoldak of Lars Andersen & Associates, Inc. – Appellant/Applicant, dated January 10, 2024; and

WHEREAS, specifically, the filed appeal grounds were stated: "*An APPEAL of Planning Director Determination ADMN20-0029 [sic] determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West"*; and

WHEREAS, per Code Section 4.022 (.01), a decision by the Planning Director on issuance of an Administrative Decision may be appealed, and such appeals shall be heard by the Development Review Board for all quasi-judicial land use matters; and

WHEREAS, the matter at issue will be a determination of the appropriateness of the action or interpretation of the requirements of the Code; and

WHEREAS, the Planning Staff mailed the Notice of Public Hearing for the Appeal on February 6, 2024, in advance of the Public Hearing; and

WHEREAS, the Planning Staff has prepared the staff report on the above-captioned subject dated February 15, 2024, for consideration by the Development Review Board in hearing the appeal; and

WHEREAS, said planning exhibits and staff report were duly considered by the Development Review Board Panel B at a scheduled meeting conducted on February 26, 2024, at which time exhibits, together with findings and public testimony were entered into the public record; and

WHEREAS, interested parties, if any, have had an opportunity to be heard on the subject; and

WHEREAS, the Development Review Board considered all evidence and testimony on the record and, thereafter, deliberated.

NOW, THEREFORE, BE IT RESOLVED that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, attached hereto, with findings and recommendations contained therein, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

ADOPTED by the Development Review Board of the City of Wilsonville this 26th day of February 2024, and filed with the Planning Administrative Assistant on _____. This resolution is final on the 15th calendar day after the postmarked date of the written notice of decision per *WC Sec 4.022 (.09)* unless appealed per *WC Sec 4.022 (.02)* or called up for review by the Council in accordance with *WC Sec 4.022 (.03).*

_____,
Rachelle Barrett, Chair - Panel B
Wilsonville Development Review Board

Attest:

_____
Shelley White, Planning Administrative Assistant

WILSONVILLE
OREGON

Exhibit A1
Staff Report
Wilsonville Planning Division
Appeal of Administrative Decision
29400 SW Town Center Loop West

Development Review Board Panel 'B'
Quasi-Judicial Public Hearing

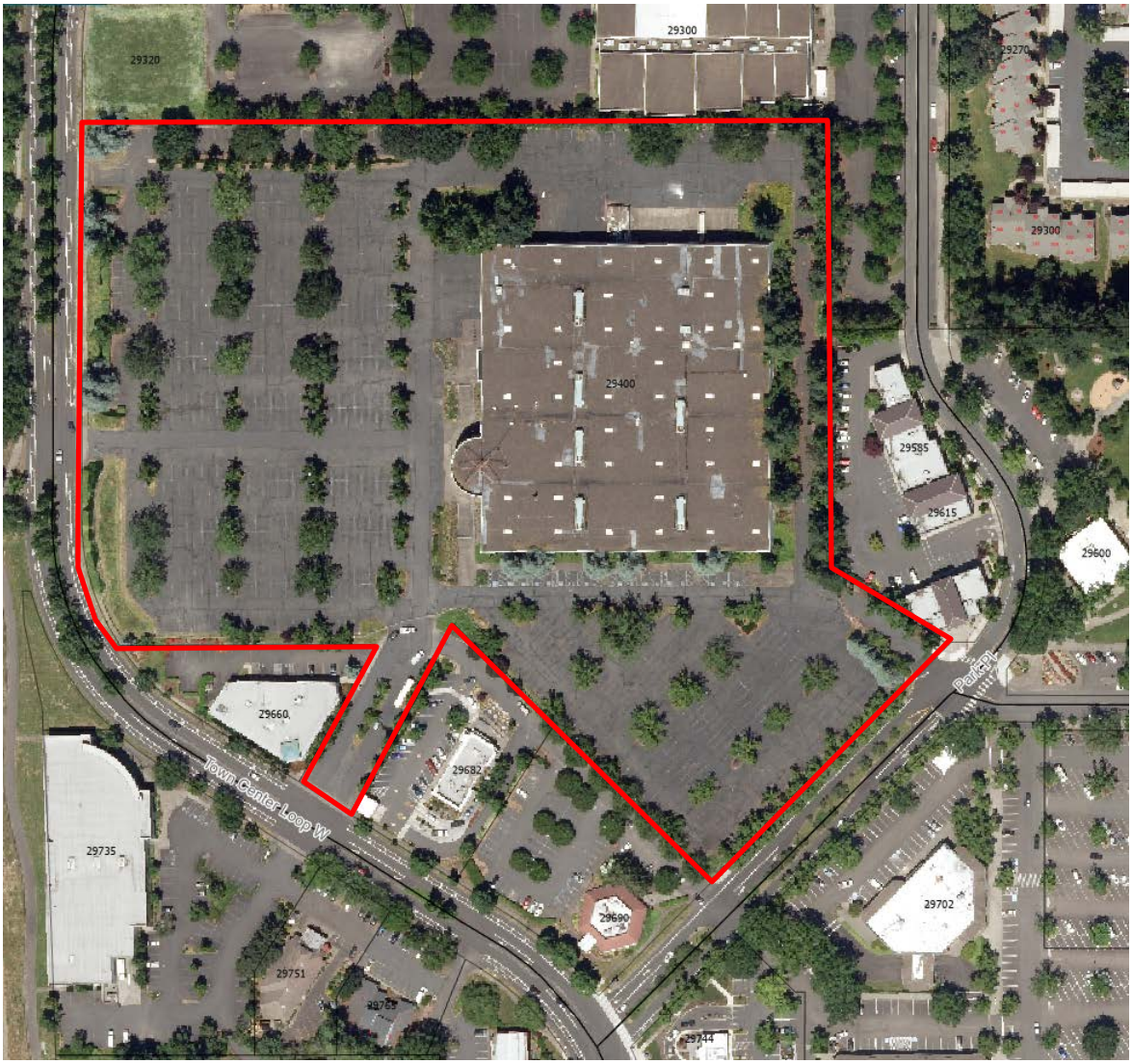
Hearing Date:	February 26, 2024
Date of Report:	February 15, 2024
Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Comprehensive Plan Designation:	Town Center
Zone Map Classification:	Town Center (TC); Sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), Main Street District (MSD)
Staff Reviewers:	Cindy Luxhoj AICP, Associate Planner Miranda Bateschell, Planning Director

Staff Recommendation: **Affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029).

Applicable Review Criteria:

DB24-0002 Appeal of Administrative Decision	
Development Code:	
Section 4.022	Appeal and Call-up Procedures
ADMN23-0029 Class 1 Review Request	
Development Code:	
Section 4.001	Definitions
Section 4.008	Application Procedures-In General
Section 4.009	Who May Initiate Application
Section 4.010	How to Apply
Section 4.011	How Applications are Processed
Section 4.014	Burden of Proof
Section 4.030	Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.031	Authority of the Development Review Board
Section 4.034	Application Requirements
Subsection 4.035 (.05)	Complete Submittal Requirement
Section 4.102	Official Zoning Map
Section 4.110	Zones
Section 4.132	Town Center (TC) Zone
Section 4.189	Non-Conforming Uses
Section 4.190	Non-Conforming Structures
Section 4.191	Non-Conforming Site Conditions
Other Planning Documents:	
Previous Land Use Approvals	

Site Location:



Existing Development:

Procedural Background:

On October 30, 2023, the City received an application for Class 1 Review (ADMN23-0029) to confirm the status of the existing use and structure at 29400 SW Town Center Loop West (respectively, the "Class 1 Review Application" and the "Location"). The Location was previously occupied by Fry's Electronics, an electronics retail store and has been vacant since 2021. In their submittal, the Applicant requested a Class 1 Review to confirm the status of the existing non-conforming use at the Location.

On November 28, 2023, City staff contacted the applicant by email providing options for processing the application and requesting that they notify staff of their preference by December 8, 2023 (Exhibit A3). Applicant did not contact the City to withdraw the Class 1 Review Application, so the City deemed the application complete on November 29, 2023 and processed the request as a Class 1 Planning Director Determination per Subsection 4.030 (.01) A. 7. of the Development Code. On December 28, 2023, the City's Planning Director issued a Notice of Planning Director Determination, which provided the Planning Director's decision on the Class 1 Review Application that Fry's Electronics located on the subject property is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone (Exhibit A4) (the "Planning Director's Decision").

The Appellant submitted a notice of appeal of the Planning Director's Decision on January 10, 2024 (the "Notice of Appeal").

The City is currently processing a separate but related Class 2 Review application per Subsection 4.030 (.01) B. 3, which was filed by the Applicant on December 15, 2023 (AR23-0031) (the "Class 2 Review Application").

Scope of Review:

This appeal is a *de novo* review of the Class 1 Review Application under Subsection 4.022 (.01) of the Wilsonville Development Code. "De novo," is Latin for "from the beginning;" the Development Review Board must review the Class 1 Review Application as if the action had not been previously heard and as if no decision had been rendered by the Planning Director. The Development Review Board should base its decision on the testimony, evidence and other material submitted by Applicant to the City in the Class 1 Review Application, as stated in Subsection 4.022 (.07) B. of the Wilsonville Development Code. Further, it shall, by order, affirm, reverse, or modify, in whole or part, a decision that is under review; in this proceeding the decision under review is the Planning Director's Decision. Subsection 4.022 (.08) A. of the Wilsonville Development Code.

For the purpose of applying the applicable 120-day time limit, a final decision on the Class 1 Application, including any appeals, must be rendered by March 28, 2024.

The Class 2 Review Application, and any issues that are subject to the Class 2 Review – such as the scope of what non-conforming use may be continued – are beyond the scope of this appeal proceeding.

Questions Presented:

On the cover page of the Class 1 Review Application, Applicant requests "non conforming use confirmation." See Exhibit B1. Reviewing this document with the portion of the Class 1 Review Application titled, "Applicant's Narrative and Exhibits Demonstrating Compliance with the Relevant Approval Criteria," City staff believe that Applicant requests an answer to the following questions:

1. Is the Location a non-conforming use?
2. Does the Location contain a non-conforming structure?
3. Does the Location contain non-conforming site conditions?

Considering that this is a *de novo* review of the Class 1 Review Application, the Development Review Board should address all three questions listed above. However, the Notice of Appeal does not challenge the Planning Director's Decision on the second and third questions listed above. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these points. The main point of disagreement between the Applicant and the City is the Planning Director's Decision regarding the first question listed above.

This staff report addresses each question in order, outlining the legal standard that applies to the question, then highlighting facts that staff believe are relevant to the question, and finally, quoting the determination of the question as stated in the Planning Director's Decision.

Non-Conforming Use Inquiry:

1. Applicable Legal Standard

Before a use can be deemed "non-conforming" it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty*., 290 Or App 111, 114, (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty*., 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Subsection 4.001 (196.) of the Development Code (defining a non-conforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform"). As is outlined in greater detail below, the Location's existing use would not be permitted by the City due to the Town Center Plan, which was adopted effective June 5, 2019.

"Nonconforming uses are not favored because, by definition, they detract from the effectiveness of a comprehensive zoning plan. . . . Accordingly, provisions for the continuation of nonconforming uses are strictly construed against continuation of the use, and, conversely, provisions for limiting nonconforming uses are liberally construed to prevent the continuation or expansion of nonconforming uses as much as possible." *Parks v. Bd. of Cnty. Comm'rs of Tillamook Cnty.*, 11 Or App 177, 196–97 (1972) (internal citation omitted).

Once a use is determined to be impermissible under a current land use ordinance, the question becomes: may the use continue because it is legally protectable as "non-conforming"? "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995).

Appellant has the burden of establishing that a non-conforming use exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal); *ODOT v. City of Mosier*, 36 Or LUBA 666, 671 (1999) (citing *Lane Cnty. v. Bessett*, 46 Or App 319 (1980)); *Sabin v. Clackamas Cnty*., 20 Or LUBA 23, 30 (1990) (citing *Webber v. Clackamas Cnty*., 42 Or App 151, *rev. den*., 288 Or 81 (1979)). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

The only portion of the City's code that is relevant to this inquiry is Subsection 4.189(.01)A., which states that "[a] non-conforming use may be continued subject to the requirements of this Section." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

The identity of the party that engaged in the use is irrelevant to this inquiry. *See City of Mosier* at 678 (stating that focus of the inquiry is the nonconforming activities themselves, not whether the entity performing the activity is a landowner, permittee, or licensee). In other words, it is not relevant that the party that engaged in the use at issue was Fry's Electronics – rather than Applicant.

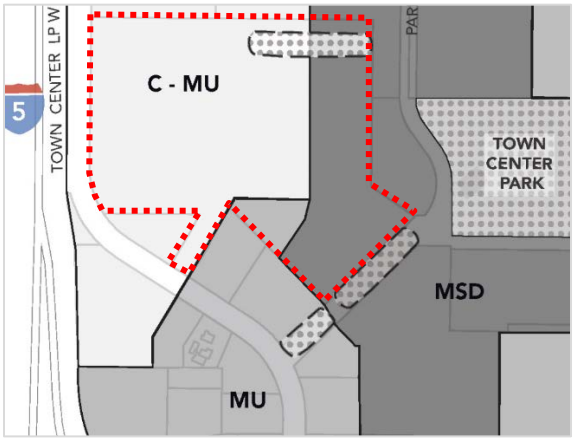
To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the current use of the Location impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," what was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

2. Relevant Facts

A. Is the current use of the Location impermissible under a current land use ordinance?

The Location is currently in the TC Zone, and more specifically, the following three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU).



The C-MU sub-district applies to roughly two-thirds of the Location. Permitted uses within this sub-district include retail sales and service of retail products, under a footprint of 30,000 square feet per use, office, personal and professional services, and single-user commercial or retail, such as a grocery store or retail establishment, that may exceed 30,000 square feet if located on more than one (1) story of a multi-story building, provided the footprint of the building does not exceed 30,000 square feet.

The existing structure at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone.

Applicant appears to concede that use of the Location is impermissible under the City's current Code provisions. *See* Exhibit B1, pages 4-5 and page 15 (referring to the use of the Location as non-conforming).

B. What was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

As of June 5, 2019, the actual use of the Location was a Fry's Electronics store, an electronics retail store with a total interior square-footage of 159,400 square feet and a footprint of 124,215 square feet.

To the extent that the Development Review Board finds it is relevant to this review, the original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store." *See* Exhibit B1, page 31.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he use is a legally established Non-Conforming Use in the TC zone."

Non-Conforming Structure Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that a non-conforming structure exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located." The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements[.]" Subsection 4.190 (.01) further states that "[a] non-conforming structure that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the Location's structure impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," was the structure legally established and may it continue to be used?

2. Relevant Facts

A. Is the Location's structure impermissible under a current land use ordinance?

The structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted.

B. Was the structure legally established and may it continue to be used?

The Planning Director has conceded that the structure was legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore may continue to be used in its current state.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he structure is a legally established Non-Conforming Structure in the TC zone."

Non-Conforming Site Condition Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that non-conforming site conditions exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located." The definition further states that "a site may be rendered non-

conforming to development standards through a change in zoning requirements[.]" Subsection 4.191 (.01) further states that "[a] property with non-conforming site conditions that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Are the Location's site conditions impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," were the site conditions legally established, and may the Location continue to be used?

2. Relevant Facts

A. Are the Location's site conditions impermissible under a current land use ordinance?

The existing site conditions do not comply with at least two City code sections:

- Subsection 4.132 (.04) A. requires that "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". Existing site conditions do not conform with this requirement as they do not include the proposed streets, a multi-use path, and bicycle facilities shown in the Network within or immediately adjacent to the subject property.

- Subsection 4.132 (.05) A. requires that "all development will be consistent with the Open Space Network, shown in Figure 4". The existing site conditions do not include the proposed open spaces shown in the northeast corner and along the southeast boundary of the subject property and, therefore, are non-conforming with this requirement.

Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas.

Existing site conditions do not comply with these applicable standards.

B. Were the site conditions legally established, and may the Location continue to be used?

The Planning Director has conceded that the site conditions at the Location were legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore the Location may continue to be used.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he existing site conditions are legally established Non-Conforming Site Conditions in the TC zone."

Neighborhood and Public Comments:

No public comments were received during the public comment period for the appeal.

Conclusion:

Staff recommends that the Development Review Board **affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029) determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

Master Exhibit List:

Entry of the following exhibits into the public record by the Development Review Board confirms its consideration of the application as submitted. The list below includes exhibits for Planning Case File No. DB24-0002 and reflects the electronic record posted on the City's website and retained as part of the City's permanent electronic record. Any inconsistencies between printed or other electronic versions of the same exhibits are inadvertent and the version on the City's website and retained as part of the City's permanent electronic record shall be controlling for all purposes.

Planning staff Materials

A1. Staff report and Findings (this document)
A2. Staff's Presentation Slides for Public Hearing (to be presented at Public Hearing)
A3. Staff Email Correspondence with Applicant regarding ADMN23-0029, Dated November 28, 2023
A4. ADMN23-0029 Class 1 Planning Director Determination of Non-Conformance, Issued December 28, 2023

Materials from Applicant

B1. **Applicant's Materials –** *Available Under Separate Cover*
Signed Application Form
Applicant's Notice of Appeal

Findings:

NOTE: Pursuant to Section 4.014 the burden of proving that the necessary findings of fact can be made for approval of any land use or development application rests with the applicant in the case.

General Information

Application Procedures - In General
Section 4.008

The application is being processed in accordance with the applicable general procedures of this Section.

Initiating Application
Section 4.009

The application for Class 1 Review (ADMN23-0029) has the signatures of David Fry of Lumberjack LP, owner, and Dan Zoldak of Lars Andersen & Associates, Inc., applicant and authorized representative.

Pre-Application Conference
Subsection 4.010 (.02)

A pre-application conference (PA22-0004) for the subject property was held on March 24, 2022.

Lien Payment before Approval
Subsection 4.011 (.02) B.

No applicable liens exist for the subject property. The application can thus move forward.

General Submission Requirements
Subsections 4.035 (.04) A. and 4.035 (.05)

The applicant has provided all of the applicable general submission requirements contained in this subsection. The following documents/testimony within Exhibit B1 are hereby deemed rejected and are excluded from the record as being beyond the scope of this Class I Review and/or not relevant to the Class I Review:

- Page 6 of 184: 3rd Paragraph – entire paragraph (parking calculations are irrelevant)
- Pages 18-19 of 184: Photographs (not Wilsonville, irrelevant)
- Page 19 of 184: 2nd Paragraph – 1st, 2nd, and 3rd sentences (continuing on page 20) (relates to Class II)
- Page 20 of 184: 1st Full paragraph – entire paragraph (relates to Class II)
- Page 20 of 184: Response to WDC 4.189.02 Change of Use – 2nd sentence (relates to Class II)
- Page 21 of 184: Response to WDC 4.190.05 Non-Conforming Structures – entire paragraph (relates to Class II)

- Page 184 of 184: Proposed site plan for Home Depot – entire page (irrelevant, relates to Class II)

Zoning - Generally
Section 4.110

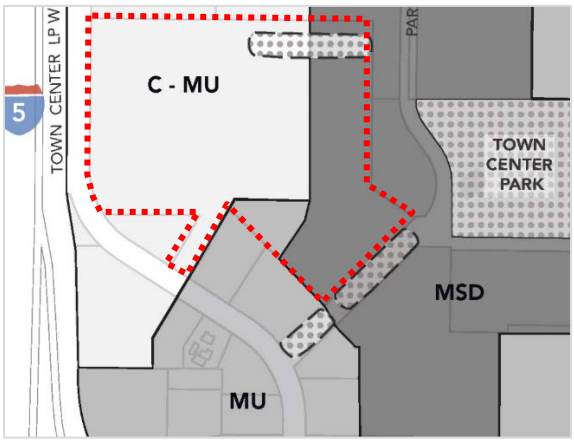
The subject property is located in the Town Center (TC) zone, in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. Applicable zoning district and general development regulations, as appropriate, have been applied in accordance with this Section, as discussed in more detail in the Findings in this staff report.

Request: ADMN23-0029 Class 1 Review Request

Town Center (TC) Zone

Purpose of Town Center Zone
Subsection 4.132 (.01)

A1. The TC Zone in which the subject property is located is divided into four sub-districts that contain recommendations for building form and use to achieve the vision set forth in the Town Center Plan. The subject property is located in three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. All adjacent property is also zoned TC.



Allowed Uses in TC Zone
Subsection 4.132 (.02) F.

A2. With regard to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Although the existing use on the subject property is a retail store and, thus, consistent with allowed use in the TC zone, its footprint of 124,215 square feet exceeds the 30,000 square feet per use limitation of the TC zone.

Permitted and Prohibited Uses in Specific Sub-districts in TC Zone
Subsection 4.132 (.03) A. 1.

A3. Per Subsection 4.132 (.03) A. 1., single-user commercial or retail (e.g. grocery store or retail establishment) that exceeds 30,000 square feet if located on more than one story of a multi-story building is an additional permitted use allowed in the C-MU sub-district. The current use on the subject property does not meet this additional permitted use standard due to its large format footprint of 124,215 square feet square feet in a single story, exceeding the maximum footprint of 30,000 square feet.

Consistency with Street Network and Multi-modal Network
Subsection 4.132 (.04) A.

A4. With regard to site conditions, per Subsection 4.132 (.04) A., "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Site conditions as they currently exist on the subject property do not comply with these applicable standards.

Consistency with Open Space Network
Subsection 4.132 (.05) A.

A5. Per Subsection 4.132 (.05) A., "all development [in the TC zone] will be consistent with the Open Space Network, shown in Figure 4". Proposed open spaces are shown in the northeast corner and along the southeast boundary of the subject property; however, these are not included in the existing development. Therefore, existing site conditions do not comply with these applicable standards

Consistency with Design and Development Standards of TC Zone
Subsection 4.132 (.06)

A6. With regard to structures and site design, per Subsection 4.132 (.06), all developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building, as it currently exists on the subject property, does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted. Therefore, the existing structure does not comply with these applicable standards.

Other Development Standards

Non-Conforming Uses
Subsection 4.001 (196.) and 4.189

A7. A Non-Conforming Use is defined as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform" (Subsection 4.001 (196.)). As noted elsewhere in this report, the existing use at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone. The use is a legally established Non-Conforming Use in the TC zone.

Non-Conforming Structures
Subsection 4.001 (195.) and Section 4.190

A8. Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located". The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, the structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. The structure is a legally established Non-Conforming Structure in the TC zone.

Non-Conforming Site Conditions
Subsection 4.001 (194.) and Section 4.191

A9. Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located". The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, existing site conditions do not conform TC zone requirements including planned streets, a multi-use path, bicycle facilities, open spaces, parking location, landscape design, and plaza areas. The existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

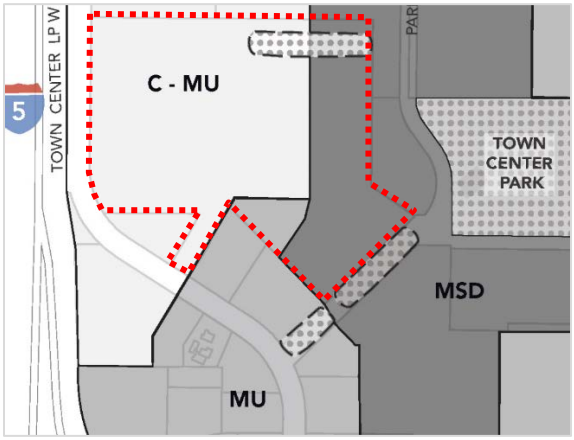
On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

City of Wilsonville
Exhibit A4 DB24-0002

1. The most relevant previous Planning approvals for the property include:
    - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
    - 91DR29 Site Design (Architectural, Landscaping) and Signage
    - 01AR01 Minor Architectural Revisions
    - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
    - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
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Mr. Zoldak,

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You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
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Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

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29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

WILSONVILLE
OREGON

Appeal of Administrative Decision ADMN23-0029 DRB Case File No. DB24-0002

Development Review Board Meeting

February 26, 2024

Presented by:

Cindy Luxhoj AICP, Associate Planner

WILSONVILLE OREGON

Existing Development

Existing Development

2601

WILSONVILLE OREGON

Procedural Background

October 30, 2023
Received Class 1 Review Application

December 23, 2023
Issued Planning Director Determination of Non-Conformance

January 10, 2024
Received Notice of Appeal

February 26, 2024
DRB Public Hearing on Appeal

Class 1 Review

- Ministerial action without public notice or hearing
- Determination of Non-Conformance
  - Processed as Class 1 Review
  - Except Planning Director may choose to process as Class 2 when there is any uncertainty as to the history of the property
- Appeal to Development Review Board
  - Only applicant may appeal Class 1 Decision

Scope of Review

- “De novo” review
- Decision based on testimony, evidence and other material submitted in Class 1 Review application
- DRB shall, by order, affirm, reverse, or modify, in whole or in part, Planning Director’s Decision
- 120-day time limit is March 28,2024

Beyond Scope of Review

- Separate, but related, Class 2 Review application AR23-0031

Summary of Case Law

- To be deemed non-conforming, use must be impermissible under current land use ordinance
- Provisions for limiting non-conforming uses liberally construed to prevent continuation or expansion uses as much as possible
- To determine existence of non-conforming use, must determine what use existed on the date restrictive regulations were applied

Questions Presented

- Is the Location a non-conforming use?
- Does the Location contain a non-conforming structure?
- Does the Location contain non-conforming site conditions?

Non-Conforming Use Inquiry

- Is the current use of the Location impermissible under a current land use ordinance?
- If the answer to the first question is “yes”, what was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

Non-Conforming Structure Inquiry

- Is the Location's structure impermissible under a current land use ordinance?
- If the answer to the first question is "yes", was the structure legally established and may it continue to be used?

Non-Conforming Site Conditions Inquiry

- Are the Location's site conditions impermissible under a current land use ordinance?
- If the answer to the first question is "yes", were the site conditions legally established and may the Location continue to be used?

Recommendation

- **Affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029)

WILSONVILLE
OREGON

Questions?

Updated 1/11/2019 all previous version of this form are obsolete

WILSONVILLE
OREGON

29799 SW Town Center Loop E, Wilsonville, OR 97070
Phone: 503.682.4960 Fax: 503.682.7025
Web: www.ci.wilsonville.or.us

Planning Division
Development Permit Application

Final action on development application or zone change is required within 120 days per ORS 227.175 or as otherwise required by state or federal law for specific application types.

A pre application conference may be required.

The City will not accept applications for wireless communication facilities or similar facilities without a completed copy of a Wireless Facility Review Worksheet.

The City will not schedule incomplete applications for public hearing or send administrative public notice until all of the required materials are submitted.

Applicant:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Authorized Representative:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Property Owner:
Name: David A. Fry
Company: Lumberjack LP
Mailing Address: 600 E Brokaw RD
City, State, Zip: San Jose, CA 95112
Phone: Fax:
E-mail: dave@rdjdevelopment.com

Property Owner's Signature:
Printed Name: David A. Fry Date: 9/19/2023

Applicant's Signature: (if different from Property Owner)
Printed Name: Date:

Site Location and Description:
Project Address if Available: 29400 Town Center Loop W Wilsonville, OR 97070 Suite/Unit
Project Location: 29400 Town Center Loop W Wilsonville, OR 97070
Tax Map #(s): 01507257 Tax Lot #(s): County: ☐ Washington ☐ Clackamas

Request:
An APPEAL of Planning Director Determination ADMN20-0029 determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West

Project Type: **Class I** ◉ **Class II** ☐ **Class III** ☐

☐ Residential ■ Commercial ☐ Industrial ☐ Other:

Application Type(s):

☐ Annexation	◉ Appeal	☐ Comp Plan Map Amend	☐ Parks Plan Review
☐ Final Plat	☐ Major Partition	☐ Minor Partition	☐ Request to Modify Conditions
☐ Plan Amendment	☐ Planned Development	☐ Preliminary Plat	
☐ Request for Special Meeting	☐ Request for Time Extension	☐ Signs	☐ Site Design Review
☐ SROZ/SRIR Review	☐ Staff Interpretation	☐ Stage I Master Plan	☐ Stage II Final Plan
☐ Type C Tree Removal Plan	☐ Tree Permit (B or C)	☐ Temporary Use	☐ Variance
☐ Villebois SAP	☐ Villebois PDP	☐ Villebois FDP	☐ Other (describe) Non conforming use application (NCU)
☐ Zone Map Amendment	☐ Waiver(s)	☐ Conditional Use	

2613

City of Wilsonville
Exhibit B1 DB24-0002

X Daniel J Zoldak

2614

VIA E-MAIL

BEFORE THE DEVELOPMENT REVIEW BOARD FOR THE CITY OF WILSONVILLE, OREGON

An APPEAL of Planning Director Determination ADMN20-0029 determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West	APPLICANT'S NOTICE OF APPEAL

This is a notice of appeal of the Class I Planning Director Determination ADMN20-0029 (the "**Decision**") finding that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West (the "**subject property**"). *See attached,* **Exhibit A** This appeal is timely submitted, in writing, prior to January 11, 2024, the deadline that *may* be established by Wilsonville Development Code ("**WDC**") 4.022.01.[1]

1. STANDING

Kenneth Katzaroff and Keenan Ordon-Bakalian are legal counsel for the Applicant, and as such, are the Applicant's authorized agents. As the project proponent, the Applicant prepared and filed the Class I application upon which the Decision was issued. "Only the applicant may appeal a Class I decision unless otherwise specified in Section 4.030." WDC 4.022.01. Therefore, the Applicant has standing to file this appeal.

2. FILING REQUIREMENTS

a. Name and Address of Appellant.

Lars Andersen & Associates, Inc.
c/o Kenneth Katzaroff & Keenan Ordon-Bakalian
1211 SW 5th Ave., Suite 1900
Portland, OR 97204

[1] This is Notice of Appeal for a Class I decision. The Notice of Decision for ADMN 23-0029 was issued on December 28, 2023. WDC 4.022.01 does not specify a deadline for appeals of Class I decisions, however, WDC 4.022.01 does state that appeals of Class II decisions must be filed within "14 calendar days of notice of the decision." Out of an abundance of caution, the Appellant is submitting this Notice of Appeal *early*, prior to the January 11, 2024 deadline that would constitute 14 calendar days from the issuance of the Notice of Decision.

KKatzaroff@SCHWABE.com
Kordon-bakalian@schwabe.com

b. Reference to the Subject Development and Case Number.

The decision being appealed is Planning Director Determination ADMN23-0029 finding that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at the subject property. Exhibit A. On October 30, Appellant submitted an application for a Class I application to confirm the legality of a nonconforming use at the subject property. *See attached*, **Exhibit B**. The City of Wilsonville (the "**City**") issued its Notice of Decision on December 28, 2023. Exhibit A.

c. Statement of the Basis for Appeal.

The Appellant hereby files this appeal to challenge several findings within the Decision related to the status of the existing use and structure at the subject property. Specifically, the Appellant appeals the following findings:

- "The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021." Decision, at 2.
- "Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store." Decision, at 2.
- "The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet." Decision, at 3.
- "it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone." Decision, at 3-4.
- "nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.)." Decision, at 4.

Exhibit A.

The Appellant intends to operate a Home Depot within the existing structure at the subject property. To this end, the Appellant sought a Class I director's determination that the warehouse retail use that was established as a result of the 1991 development approval (Case File

Nos. 91PC43 and 91DR29)[2] remained a lawfully established non-conforming use at the subject property.

Upon receipt of the Appellant's application, the City attempted to bifurcate Appellant's request to confirm the legality of a nonconforming use at the subject property from Appellant's request for a determination to establish the scope of use at the property. Exhibit A, Enclosure.[3] To this end, the City has required the Appellant to submit two applications – a Class I application to confirm the legality of the nonconforming use, and a Class II application to establish the *actual* nature and scope of use at the subject property. Appellant's Class II application was submitted to the City on December 15, 2023 and is currently in the 30-day completeness review period. Exhibit A, at 4. However, based on many of the findings contained within the Decision, the City appears to have prejudged Appellant's Class II application for a use determination. Specifically, within the Decision subject to this appeal, the City has determined that the lawfully established non-conforming use at the subject property is a "Fry's Electronics." Exhibit A, at 3-4.

The City's nonconforming use determination is contrary to the express language of the 1991 Decision, in addition to well-established principles of Oregon nonconforming use case law. A nonconforming use is one that " 'lawfully existed prior to enactment of a zoning ordinance, and which is maintained after the effective date of the ordinance although it does not comply with the use restrictions applicable to the area * * *.' " *Clackamas County v. Portland City Temple*, 13 Or.App. 459, 461 n. 1, 511 P.2d 412 (1973) (quoting 1 Anderson, *American Law of Zoning* 306, § 6.01 (1968)). The *use and structure* approved by the 1991 Decision was a "commercial retail store," specifically a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store, *not a* "Fry's Electronics." Exhibit C, at 12, 14. A "Fry's Electronics" use is not mentioned or approved *anywhere* in the 1991 Decision, and the 1991 Decision is the controlling authority for determining the scope and nature of the legally established nonconforming use present at the subject property – a commercial retail use without additional restriction. The City's findings within the Decision abrogate the plain language of the 1991 Decision and impermissibly narrow the scope and nature of the lawfully established nonconforming use at the property. As such, the City's findings that the legally established non-conforming use and structure at the subject property is a "Fry's Electronics" must be reversed.

[2] Attached hereto as **Exhibit C** (the "**1991 Decision**").

[3] "You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision." Exhibit A, Enclosure, at 1.

The Decision also finds that "[t]he existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store." Exhibit A, at 3. This finding renders the Decision internally inconsistent because – as stated above – the City also included findings that the legally established nonconforming use is a "Fry's Electronics," which is a narrower use than a "single-user electronics retail store." *Id.* Moreover, the City's finding that the nonconforming use at the property is a "single-user electronics retail store" is still in contravention with the use approved in the 1991 Decision, which is a "commercial retail store" that includes retail, office, warehouse, manufacturing, and service offerings. Exhibit C, at 12, 14. Again, the Decision disregards the controlling authority of the 1991 Decision and adopts an overly narrow finding regarding the scope and nature of the nonconforming use at the subject property. The Appellant respectfully requests that the Decision's finding that the nonconforming use at the property is a "single-user electronics retail store" be reversed.

Furthermore, the Appellant has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Appellant is also not aware of any state law that makes such a distinction. As such, the Decision must be reversed or modified to reject the limitation of the use approved by the 1991 Decision to either a "Fry's Electronics" or "single-user electronics retail store."

Finally, the Appellant challenges the Decision's finding that the retail, office, warehouse, manufacturing, and service uses approved by the 1991 Decision relate only to "minimum parking requirements for the site." Decision, at 2; *see also* Exhibit C, at 12 (approving retail, office, warehouse, manufacturing, and service uses within the 159,400 commercial retail structure). The City's finding on this point is unsupported by any authority and again represents an attempt to narrow the scope and nature of the legally established nonconforming use at the property. The Appellant requests that this finding be struck from the Decision.

3. REQUESTED RELIEF

The Appellant requests that the Development Review Board impose the relief requested by the Appellant in the above argument. Specifically, Appellant respectfully requests that the Development Review Board find that the legally established nonconforming use at the subject property is the use approved in the 1991 Decision, a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use); not a "Fry's Electronics" or "single-user electronics retail store" and to not provide additional restriction as to the type of commercial retail because no such limitation existed in the 1991 zoning code or the 1991 Decision itself.

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

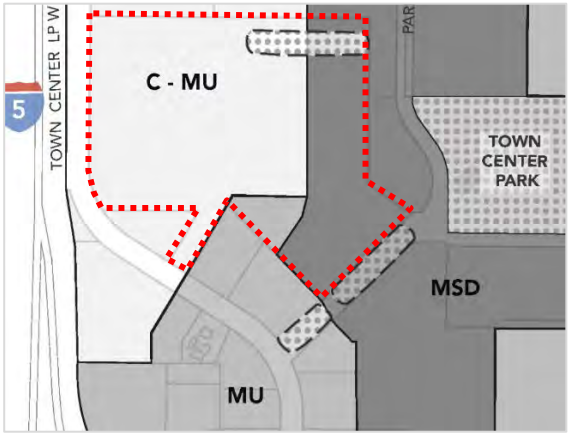
The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

1. The most relevant previous Planning approvals for the property include:
    - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
    - 91DR29 Site Design (Architectural, Landscaping) and Signage
    - 01AR01 Minor Architectural Revisions
    - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
    - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

Updated 1/11/2019 all previous version of this form are obsolete

WILSONVILLE
OREGON

29799 SW Town Center Loop E, Wilsonville, OR 97070
Phone: 503.682.4960 Fax: 503.682.7025
Web: www.ci.wilsonville.or.us

Planning Division
Development Permit Application

Final action on development application or zone change is required within 120 days per ORS 227.175 or as otherwise required by state or federal law for specific application types.

A pre application conference may be required.

The City will not accept applications for wireless communication facilities or similar facilities without a completed copy of a Wireless Facility Review Worksheet.

The City will not schedule incomplete applications for public hearing or send administrative public notice until all of the required materials are submitted.

Applicant:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Authorized Representative:
Name: Dan Zoldak
Company: Lars Andersen & Associates, Inc.
Mailing Address: 4694 W Jacquelyn Avenue
City, State, Zip: Fresno, CA 93722
Phone: 559.276.0850 Fax:
E-mail: dzoldak@larsandersen.com

Property Owner:
Name: David A. Fry
Company: Lumberjack LP
Mailing Address: 600 E Brokaw RD
City, State, Zip: San Jose, CA 95112
Phone: Fax:
E-mail: dave@rdjdevelopment.com

Property Owner's Signature:
Printed Name: David A. Fry Date: 9/19/2023

Applicant's Signature: (If different from Property Owner)
Printed Name: Date:

Site Location and Description:
Project Address if Available: 29400 Town Center Loop W Wilsonville, OR 97070 Suite/Unit
Project Location: 29400 Town Center Loop W Wilsonville, OR 97070
Tax Map #(s): 01507257 Tax Lot #(s): County: ☐ Washington ☐ Clackamas

Request:
Applicant proposes a Home Improvement store within the footprint of the existing structure. Need non conforming use confirmation (NCU) for TI Permit

Project Type: Class I ☐ Class II ☐ Class III ☐
☐ Residential ■ Commercial ☐ Industrial ☐ Other:

Application Type(s):

☐ Annexation	☐ Appeal	☐ Comp Plan Map Amend	☐ Parks Plan Review
☐ Final Plat	☐ Major Partition	☐ Minor Partition	☐ Request to Modify Conditions
☐ Plan Amendment	☐ Planned Development	☐ Preliminary Plat	☐ Site Design Review
☐ Request for Special Meeting	☐ Request for Time Extension	☐ Signs	☐ Stage II Final Plan
☐ SROZ/SRIR Review	☐ Staff Interpretation	☐ Stage I Master Plan	☐ Variance
☐ Type C Tree Removal Plan	☐ Tree Permit (B or C)	☐ Temporary Use	■ Other (describe)
☐ Villebois SAP	☐ Villebois PDP	☐ Villebois FDP	Non conforming use application (NCU)
☐ Zone Map Amendment	☐ Waiver(s)	☐ Conditional Use	

WILSONVILLE
OREGON

PROPERTY OWNER ACKNOWLEDGEMENT FORM

By signing below, I certify that I am the property owner for the application in question and that the applicant, Lars Andersen & Associates, Inc., has my permission to submit this application for the property located at:

Site Address: 29400 Town Center Loop W, Wilsonville, OR 97070

Tax Lot(s): 01507257 Section: _____

I understand the application will not be deemed complete without this documentation. I understand that submittal of this application does not entitle the applicant to engage in the work applied for until such an application is approved, the plan approval is issued, and the specified appeal period has passed. I also understand that all work must be performed in compliance with all applicable state, federal, and local laws, ordinances and regulations.

Property Owner's Signature:

Printed Name: David A. Fry Date: 9/18/2023

Property Owner Contact Information:

Company (if applicable): Lumberjack LP

Mailing Address: 600 E. Brokaw Rd.

City, State, Zip: San Jose, CA 95112

Phone: _____ E-mail: dave@rdjdevelopment.com

BEFORE THE PLANNING DIRECTOR FOR THE CITY OF WILSONVILLE

In the Matter of an application to confirm the legality of a nonconforming use at 29400 Town Center Loop W, Wilsonville, OR 97070	APPLICANT'S NARRATIVE AND EXHIBITS DEMONSTRATING COMPLIANCE WITH THE RELEVANT APPROVAL CRITERIA

SUBJECT PROPERTY:	29400 Town Center Loop W, Wilsonville, OR 97070 TL ID: 31W14D 00220
APPLICANT:	Lars Andersen & Associates, Inc. 4694 W. Jacquelyn Ave., Fresno, CA 93722 Attn: Dan Zoldak Phone: 559-276-0850 E-Mail: dzoldak@larsandersen.com
APPLICANT REPRESENTATIVE:	J. Kenneth Katzaroff Keenan Ordon-Bakalian Schwabe, Williamson & Wyatt, P.C. 1211 SW 5th Avenue, Suite 1900 Portland, Oregon 97204 Phone: 206-405-1985 E-Mail: KKatzaroff@SCHWABE.com E-Mail: Kordon-bakalian@schwabe.com
PROPERTY OWNER:	Lumberjack LP 600 E Brokaw Rd. San Jose, CA 95112
REQUEST:	A Class I review and determination verifying the status of an existing non-conforming office, warehouse, manufacturing, service and retail use.

I. APPLICABLE STANDARDS AND CRITERIA

The applicant has identified the following code provisions that the City of Wilsonville (hereinafter, the "**City**") may apply to its review of this application:

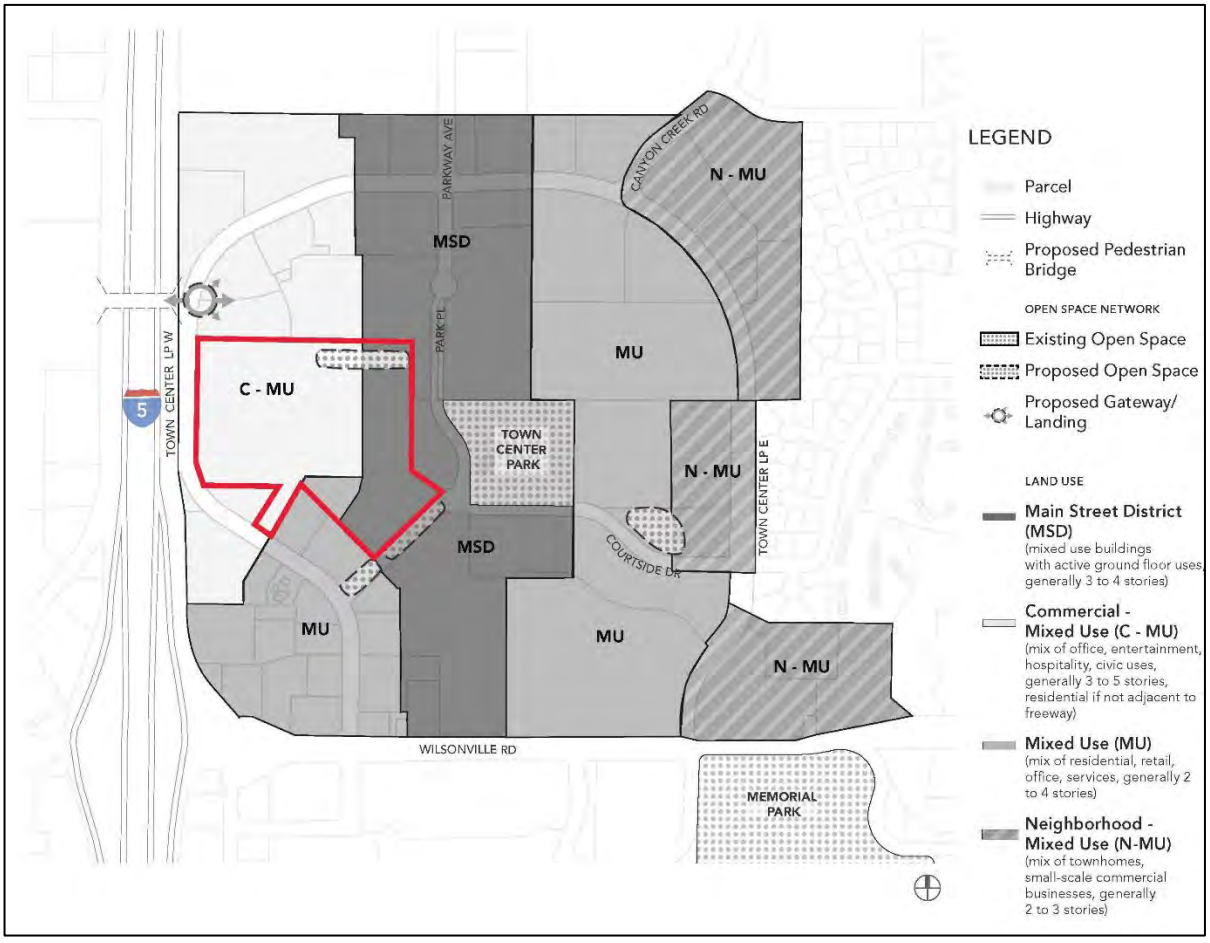
Title 4 – the Wilsonville Development Code ("**WDC**")

Section 4.000-4.035 – Administration
Section 4.001 – Definitions

Section 4.030 – Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.132 – Town Center Zone
Section 4.189-4.192 – Non-Conforming Uses, Structures, Site Conditions, and Lots

II. INTRODUCTION AND BACKGROUND

Lars Andersen & Associates, Inc. (the "**applicant**") is seeking a Class I review to confirm the status of the existing non-conforming office, warehouse, manufacturing, service and retail use (the "**subject use**") at 29400 SW Town Center Loop W, Wilsonville, OR 97070[1] (the "**property**"). The 15.01-acre property is located within the City of Wilsonville (the "**City**") and is zoned Planned Development Commercial – Town Center ("**TC**"). The property is designated with three Town Center Sub-Districts – Commercial-Mixed Use ("**C-MU**"), Mixed Use ("**MU**"), and Main Street District ("**MSD**").



[1] TL 31W14D 00220.

As pictured below, the property is located in a relatively flat, developed commercial area within the City's Town Center District. There is an existing structure at the property that was operated as a Fry's Electronics ("**Fry's"**) from 1991 to 2021.

In 1991 the City approved a Modification to the Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plan (the "**1991 Decision**") to allow the development of a 159,400 square foot ("**SF**") retail, office, warehouse, manufacturing, and service store at the property. *See attached,* **Exhibit A**. The property was zoned Planned Development Commercial ("**PDC**") and designated commercial in the City's Comprehensive Plan when the City approved the subject use of the property. *Id.*, at 14. Subsequent to the City's land use approval, Fry's began operating a retail, office, warehouse, manufacturing, and service store at the property.

Fry's was a large electronics warehouse store that retailed software, consumer electronics, household appliances, cosmetics, tools, toys, accessories, magazines, technical books, snack foods, electronic components, and computer hardware. Fry's also had in-store computer repair and custom computer building services, and offered technical support to customers. The Fry's model was unique for electronics retail outlets of the time, in that Fry's was an electronics warehouse that offered customers a variety of retail, manufacturing and service offerings that exceeded the offerings of Fry's competitors. Because Fry's stocked a wide range of electronics products, they were popular with electronics and computer hobbyists, as well as professionals.

Image Credit: Alamy, https://www.alamy.com/las-vegas-sep-7-2020-interior-view-of-the-frys-electronics-image375519870.html?imageid=595679EA-E5D6-4FAA-8BDE-4437A0B5DF19&p=283543&pn=1&searchId=9fd62e6ba47e6193d28e3b42e316bc4e&searchtype=0 (last accessed Oct. 20, 2023).

Image Credit: PC Magazine, https://www.pcmag.com/opinions/to-all-the-frys-i-loved-before-an-elegy-for-the-best-electronics-chain (last accessed Oct. 20, 2023).

In February 2021, Fry's suddenly went out of business, closing all 31 stores across the United States including the Wilsonville Fry's that was operating at the property.[2] Since the closure of the Fry's in 2021, the owner of the property has been actively marketing the site and making other plans for its use. The owner has also continued to make utility payments for city services. *See attached*, **Exhibit B.**

The Home Depot, Inc. ("**HD**") intends to operate a store within the existing structure that was previously occupied by Fry's, and therefore seeks confirmation from the City that a warehouse retail store can continue operating at the property. *See attached*, **Exhibit C**. HD operates home improvement warehouse stores that retail tools, construction products, appliances, and services, including transportation and equipment rentals. HD's Home Services division also offers technical expertise for home improvement projects, and both onsite and offsite install, repair, and

[2] *Fry's Electronics suddenly went out of business*, CNN, https://www.cnn.com/2021/02/24/business/frys-electronics-closure/index.html (last accessed Oct. 9, 2023); *Fry's Electronics closes, leaving Wilsonville store barren*, Portland Tribune, https://www.portlandtribune.com/news/frys-electronics-closes-leaving-wilsonville-store-barren/article_cde50d46-de09-5ce3-a647-9f54ce7d4bb1.html (last accessed Oct. 9, 2023).

remodel services. Although the vast majority of HD customers are private individuals, contractors and other professionals account for close to half of HD's annual sales.[3]

Fry's and HD stores are retail, office, warehouse, manufacturing, and service uses allowed at the subject property pursuant to the 1991 Decision and the property's historic PDC zoning. Both Fry's and HD stores are [were] organized warehouse-style, stock a large range of supplies available for retail, cater to retail consumers and professionals, and offer onsite services and technical support. As both Fry's and HD are warehouse retailers that fall within the subject use approved in the 1991 Decision, the applicant is seeking a non-conforming use determination to verify the status of the property's existing non-conforming use rights.

The applicant requests that the Planning Director process this application through the City's Class I review procedures because there no uncertainty as to the history of the property due to the existence of the 1991 Decision. WDC 4.030.01(A)(7); *see also* Exhibit A.

III. APPROVAL CRITERIA

WDC 4.189.01 –Continuation of Use

> *A. A non-conforming use may be continued subject to the requirements of this Section.*

RESPONSE: In compliance with WDC 4.189.03, the lawfully established non-conforming subject use at the property has not been discontinued or abandoned. The ongoing non-conforming use complies with the criteria of WDC 4.189 and is therefore permitted to continue.

WDC 4.189.02 – Change of Use

> *A. A non-conforming use may not be changed unless the change or replacement is to a use that is determined by the Planning Director to be no less conforming to the regulations for the zone district in which the use is located than the existing use.*

RESPONSE: The purpose of this provision is to consider the impacts of potential changes in use for lawfully established non-conforming uses. In this case, the applicant is not proposing to change the established non-conforming use of the property. Rather, the applicant is seeking a non-conforming use determination to confirm the status of the existing non-conforming use of the property. Therefore, this criterion is not applicable.

WDC 4.189.03 – Abandoned Use.

> *If a non-conforming use is abandoned for a period of 18 consecutive months, the use shall not be re-established without fully complying with the use requirements of the zone. Mere vacancy of a site or building while it is being marketed or other plans for its use are being*

[3] *Home Depot CEO Says Contractor Spend Remains Strongest Business Line*, PYMNTS, https://www.pymnts.com/earnings/2023/home-depot-ceo-says-contractor-spend-remains-strongest-business-line/ (last accessed Oct. 25, 2023).

readied, does not constitute abandonment. In order to be considered abandoned, a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale. These standards concerning abandonment do not in any way affect the City's processes for the abatement of nuisances as delineated in Chapter 6 of the Wilsonville Code.

RESPONSE: The existing non-conforming subject use at the property has not been abandoned. For a non-conforming use to be abandoned, "a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale." WDC 4.189.03. Here, the subject property is actively being marketed for rent, lease, or sale, and is currently receiving, and paying for, City utilities. *See* **Exhibit B**. Therefore, the non-conforming use of the property has not been abandoned. This criterion is met.

WDC 4.190.02 – Non-Conforming Structures

If a non-conforming structure is abandoned, as defined herein, for a period of 18 months, it may not again be used unless brought into conformity with the requirements of this ordinance. Except, however, that an abandoned non-conforming structure may be re-occupied if a Variance is approved per the requirements of Section 4.196.

RESPONSE: The existing structure at the property is not non-conforming per the definition set forth in WDC 4.001.195 because it conforms to the standards for structures within the TC zone. Therefore this criterion is not applicable.

WDC 4.190.05 – Non-Conforming Structures

A non-conforming structure may be expanded or enlarged, provided that the portion of the structure being enlarged meets zoning requirements in terms of setbacks, height, and lot coverage.

RESPONSE: The existing structure at the property is not non-conforming because it meets the setback, height, and lot coverage requirements for the TC zone. The applicant's plans involve alterations to the Fry's building and the subsequent operation of a Home Depot at the property. *See attached*, **Exhibit C**. The proposed project would consist of up to 124,215 SF of building area, previously occupied by Fry's. The reduction in square footage will result from interior renovations, specifically the removal of the existing mezzanine within the structure. **Exhibit C**. Exterior alterations include changes to the parking lot, including curbs and the approach to the building. The concept plan demonstrates that the applicant's proposed alterations <u>are not an expansion</u>. Therefore, this criterion is not applicable.

IV. CONCLUSION

For the reasons stated above, the Planning Director can find that all applicable criteria are met and approve the subject application.

Enclosed with this application are the following exhibits:

A. 1991 Decision
B. Proof of Utility Payments
C. Concept Plan

Unique Serial Number: (assigned by dbase) 4808

Department: Planning

Case No: 91PC43 File Creation Date:

Request: Modified Stage I Master Plan and Stage II Phase II site development plans, reconsideration of Condition ofApproval #8 of 90PC15

Action: Approved with conditions

Project Expiration Date:

Property Description: TL 500, 600, 601, 604 Sec. 13 County: C
TL 101, 200, 201, 300, 405 Sec. 14D County: C

Location: Wilsonville Town Center

Street Address:

Project Name(s): **Project Thunder**

Applicant: Capital Realty Corporation

Retention Schedule: Permanent

Location of Microfilm: City Hall Vault

Hard Copies of drawings/plans available? Yes

Physical copy of file retained? No

See also Case Files: 89PC50, 90PC15, 90PC15EX, 91DR29, 92DR21

Other name(s) on file:

MAP

SW 10/5/06 Initial/Date

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

NOTICE OF DECISION

Project Name: PROJECT THUNDER File No: 91PC43

Applicant / Owner: Capital Realty Corp.

Proposed Action: Modified Stage I Master Plan, Phase II Stage II Site Development Plans and Amending Condition of Approval 8 of Resolution 90PC5

Property Description:

Map No: 13 & 14D Tax Lot No: 101,102,200,201, 300 and 500 Site Size: _____

Address: _____

Location: Wilsonville Town Center - east of Town Center Loop West and northwest of shopping center

On December 9, 1991, at the meeting of the Planning Commission the following decision was made on the above-referenced Proposed Development Action:

_____Approval XX Approval with Conditions _____Denied

This decision has been finalized in written form and placed on file in the City records at the Wilsonville City Hall this 16th day of December, 1991, and is available for public inspection. The date of filing is the date of the decision. Any appeal(s) must be filed with the Planning Department by 5:00 p.m. on December 30, 1991.

XX Written decision is attached

_____ Written decision is on file and available for inspection and/or copying.

This action, if approved, will expire on December 9, 1993 unless development commences prior to the expiration date.

For further information, please contact the Wilsonville Planning Department at City Hall, Community Development, or phone 682-4960.

FILED 12-16

PLANNING COMMISSION
RESOLUTION NO. 91PC43

A RESOLUTION ADOPTING FINDINGS AND CONDITIONS OF APPROVAL FOR A MODIFIED STAGE I MASTER PLAN, PHASE II STAGE II SITE DEVELOPMENT PLANS AND AMENDING CONDITION OF APPROVAL 8 OF RESOLUTION 90PC5 - CAPITAL REALTY CORP., APPLICANT. THE PROPERTY IS IDENTIFIED AS WILSONVILLE TOWN CENTER AND IS LOCATED ON TAX LOTS 101, 102, 200, 201, 300 AND 500, T3S-R1W, SECTIONS 13 AND 14D, CLACKAMAS COUNTY, OREGON

WHEREAS, an application, together with planning exhibits for the above-captioned development, has been submitted in accordance with the procedures set forth in Sections 4.008(4) and 4.139(1), (2) and (3) of the Wilsonville Code, and .

WHEREAS, the Planning staff has prepared a report on the above-captioned subject which is attached hereto as Exhibit A, and

WHEREAS, said planning exhibits and staff report were duly considered by the Planning Commission at a regularly scheduled meeting conducted on December 9, 1991, at which time all exhibits, together with findings and public testimony, were entered into the public record, and

WHEREAS, the Commission has duly considered the subject and the recommendations contained in the staff report, and

WHEREAS, all interested parties have been afforded an opportunity to be heard on the subject.

NOW, THEREFORE, BE IT RESOLVED that the Wilsonville Planning Commission does hereby adopt the staff report attached hereto as Exhibit A, along with the findings, recommendations and Conditions of Approval contained therein. The Wilsonville Planning Director is hereby authorized to issue a Stage I Master Plan and Stage II Site Development Permit for Phase II and a Revised Condition of Approval 8 -Resolution 90PC5 once the prescribed appeal period has expired.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 9th day of December, 1991, and filed with the Planning Secretary this same day.

Richard D. Wilson
Chairman, Planning Commission

Attest:
Judee Emison
Judee Emison, Planning Secretary

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

Chairman Mike Williams moved to accept the staff report with the following amendments:

Revise Condition of Approval Number 10 to provide that instead of at the time building permits are issued at the Phase II Stage II site development, to provide that at the time the Certificate of Occupancy is issued the applicant/property owner shall dedicate 5.1 acres. And to provide another sentence at the end, that the City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

Provide an additional condition of approval that at the time that the Design Review Board specifically reviews the applicants plans, regarding the east wall of the large structure on Phase II, to insure its compatibility with the proposed park. And to also have the DRB look at the pathway and sidewalk circulation plan. And an additional condition of approval that the applicant consider on-site detention in its submittal to the city. That the applicant coordinate with the engineering department the storm drainage plans with some consideration toward whether or not an on-site detention is feasible and meets the engineering standards of the city. And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

An additional Condition of approval is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the property across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to the Project Thunder.

(Mike Kohlhoff - Add the phrase, "unless the project owner and the city council reach other agreement")

Condition 10 will read that dedication of 5.1 acres for a public park will be required before issuance of the Certificate of Occupancy unless the applicant and the City Council reach an agreement for a later date.

Motion was seconded by Lew Hendershott and carried 4-2.

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

SUMMARY

Capital Realty Corporation is representing a retail business with the anonymous name "Project Thunder". The Project Thunder people desire to develop 14.75 acres (Phase II of Wilsonville Town Center) for a 159,400 square foot electronics-related retail store.

The proposed Project Thunder Stage II Site Development Plans has caused Capital Realty Corp. to modify and re-submit the Stage I Wilsonville Town Center Master Plan to reflect an expanded master plan area, reclassify overlay zones associated with Ordinance 55, resdesignate the phasing sequence and to establish approximately 5.4 acres for open space.

Capital Realty Corp. is also seeking reconsideration of Condition 8 of Planning Commission Resolution 90PC15 which imposed certain design and development requirements for the development of the 5.4 acre open space.

All Comprehensive Plan and Zoning Code requirements that apply to this Stage I review are satisfied or can be met. Parking issues, building height and setback, final design, utility placement, and other site specific development requirements are further considered in this application for Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building. The applicant has also submitted conceptual plans showing Project Thunder's architecture, landscaping and a signage program. The Design Review Board is the City's review authority of the project's architecture, landscaping and signage program.

The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. The proposed findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

Project Thunder can be adequately served by existing or immediately planned public facilities and services.

RECOMMENDATION: **Approve the modified Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plans with Conditions of Approval attached herein. This recommendation acknowledges the conceptual configuration of a 5.1 acre open space as proposed by the developer.**

FINDINGS: PDC & PDI

The following findings are hereby adopted by the PLANNING COMMISSION and entered into the public record in consideration of the application as submitted in conformance with the City's Comprehensive Plan and Zoning Regulations. "PROJECT THUNDER" STAGE II

NA = NOT APPLICABLE
DRB = DESIGN REVIEW BOARD

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
A. Land Use					
Zoning	PDC	PDC	●	○	1 to 7
Comprehensive Plan Designation	COMMERCIAL TOWN CENTER		●	○	1 to 7, 32 to 36
B. Land and Building Improvements	ORD # 55				
1. Lot Size					
a. Total site area (acreage)	NOT SPECIFIED	652,687 SF	●	○	
b. Lot sizes (subdivision)	NA		○	○	NA
Acreage lot size	NA		○	○	NA
2. Lot Coverage					
a. All buildings	NOT SPECIFIED	24% 159,400 SF	●	○	
b. Parking/paved	↓	61% 395,242 SF	●	○	
c. Landscaping					
1. total size area (%)	MINIMUM. 15%	15% 98,045 SF	○	○	DRB
2. parking area (%)	10%	-	○	○	↓
3. screening/buffering	REQ'D	-	○	●	42, 43
4. irrigation system	↓	-	○	○	DRB
3. Building Setbacks					
Front / TOWN CENTER LOOP WEST	0'	445'	●	○	
Right side / NORTH	0'	160'	●	○	
Left side / SOUTH	0'	85'	●	○	
Rear side / EAST	0'	70'	●	○	

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
4. Building Use					
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	
5. Building Specifications					
a. Building Height	35'	-	●	○	44
b. (Sun Exposure Plane)	NA		○	○	NA.
c. Gross Floor area of Building	NO LIMIT	150,407 SF	●	○	
6. Number of Off-Street Parking					
a. Standard 9' X 18'	472	858	●	○	44
b. Compact 8 1/2' X 17' (30% 10 allowed)	OPTIONAL	NOT SHOWN.	●	○	
c. Handicapped 12' X 18' (1 to 50 required)	11	16	●	○	UBC TABLE 31-A
Total	483	872	●	○	46 to 48
d. Truck load berths	2	26	●	○	
7. Access/Egress					
a. Direct access to street	-	3	○	●	17.18
b. Access provided by easement	NA		○	○	NA
c. Rail Access	NA		○	○	NA.
8. Open Space Slope Protection					
a. Existing vegetation protected	NA		○	○	NA
b. Slopes over 20% to 30% impervious coverage	NA		○	○	NA
c. River and stream corridors protected	NA		○	○	NA
d. Adequate erosion control provided			●	○	EXHIBIT G.4
e. Within greenway	NA		○	○	NA

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
C. Other Planning Considerations					
1. Outside storage area provided/ screening	—	—	○	○	DRB
2. Adequate screenage of mechanical equipment	—	—	○	○	DRB
3. Safety/crime prevention					
a. Location of addressing	—	—	○	○	DRB
b. Natural surveillance	—	—	○	○	
c. Type of exterior lighting	—	—	○	○	
D. Bike Paths, Pedestrian Trails, & Equestrian Trails					
1. Pathway Standards					
a. Pathways are provided consistent with pathway master plan and design standards (Section 4.168 W.C.)	REQ'D	NOT SHOWN	○	●	28 & 31

E. Previous Approval actions and applicable conditions or approvals

1. City Council	Yes	No	File No.	See finding	ORD 55
2. DRB	Yes	No	File No.	See finding	90-15 & 50
3. P.C.	Yes	No	File No.	See finding	
4. Other	Yes	No	File No.	See finding	

Inter-agency review comments

Yes	No	See Exhibit No.	

Inter-agency review comments (Written Only)

City Engineer	Yes	No	See Exhibit No.	D
Parks & Recreat.	Yes	No	See Exhibit No.	
Traffic Safety	Yes	No	See Exhibit No.	
Building Dept.	Yes	No	See Exhibit No.	E
Tualatin Fire Dept.	Yes	No	See Exhibit No.	
Sheriff	Yes	No	See Exhibit No.	

91PC43

MODIFIED STAGE I MASTER PLAN AND STAGE II PHASE II SITE DEVELOPMENT PLANS AND RECONSIDERATION OF CONDITION OF APPROVAL 8 OF 90PC15
PLANNING COMMISSION FINDINGS

Property Owner:	Capitol Realty Corporation
Project:	Project Thunder
Developer:	Project Thunder
Architects:	Stage I Master Plan revision - JKS Architects Stage II Phase II - Design Forum Architects
Traffic Engineer:	Kittelson & Associates, Inc.

Property Description:

The subject master plan area comprises 59.79 acres for retail commercial/office development more specifically described as Tax Lots 500, 600, 601 and 604 of Section 13 and Tax Lots 101, 200, 201, 300 and 405 of Section 14D, T3S-R1W, Clackamas County, Wilsonville Oregon. Approximately 114 acres comprise the Town Center Master Plan as recognized in Ordinance No. 55. Wilsonville Town Center, the name of Capital Realty Corporation's commercial retail development, has the same name of a retail district identified in Ordinance No. 55. For clarification, the applicant's Stage I Master Plan will be identified as the Wilsonville Town Center and the City's Master Plan of the district will be identified as Ordinance No. 55.

For years the interior area of Town Center Loop was in agricultural use with farm exemption tax status. It wasn't until the last eight years that the area experienced rapid residential and commercial growth with the development of Park Center Apartments, Town Center Mercantile, Wilsonville Market Place, Phase I Wilsonville Town Center, Clackamas Community College and various office and retail developments. It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot commercial retail store. Capital Realty forecasted commercial growth trends in Town Center and have subsequently purchased additional property to accommodate their plans to develop the Wilsonville Town Center Master Plan. Thus, the overall master plan area will increase from 53.39 acres to 59.79 acres. This adjustment will also create a new development phase in the overall Master Plan. With respect to Project Thunder, the relatively level site is easily accessible to Town Center Loop, Parkway Court and Wilsonville Road. The proposed Project Thunder site is also highly visible to I-5 and Town Center Loop West.

LAND USE

Project Data
Stage I - 89PC50

1. Building Area

Phase I	24.08 acres	170,900 square feet
Phase II	6.52 acres	61,000 square feet
Phase III	22.79 acres	179,000 square feet
Total	53.39 acres	

Building Area

Phase I	207,130 square feet
Open Space	5.62 acres

Project Data
Stage I Modification:

2.

Phase I	22.96 acres (Existing Wilsonville Town Center commercial dev.)
Phase II	14.75 acres (Proposed Project Thunder)
Phase III	22.08 acres (Undeveloped property)
Total	59.79 acres

Building Area

Phase I	207, 130 sq.ft.
Phase II	159, 400 sq.ft.

3. The Master Plan amendment also seeks to amend the current overlay zones in Ordinance No. 55 to reflect modifications proposed in Stage I Wilsonville Town Center. Essentially, the amendments would replace the Motor Hotel (MH), Office Professional (OP), Service Commercial (SC) and Residential (R) use designations with Central Commercial (CC).

Plan Designation and Zoning

4. The subject site is designated "Commercial" on the Comprehensive Plan map and zoned "Planned Development Commercial" (PDC) on the zoning map. The site is also situated within an area identified as Town Center Master Plan area (Ordinance No. 254). Ordinance No. 254 identifies the property in the following overlay zones; Service Commercial (SC), Office Professional (OP), Central Commercial (CC), Motor Hotel (MH), Residential (R) and within an area designated for a Lake or Open Space.

5. Within the Comprehensive Plan, a number of goal and policy statements address the commercial planning designation and development review which apply to the subject property. The applicable criteria for Stage I Master Plan review is found in Section 4.139(2) of the Wilsonville Code. Recommended uses for development within the Town Center Master Plan are embodied in Chapter 4 of the Wilsonville Code. In brief, the combined review criteria are the following:

The Most Applicable Comprehensive Plan Goals, Policies and Objectives

Goal 1.1	Citizen Involvement Goal
Objective 3.1	Public Facilities Availability
Policy 3.3.1	Street System Master Plan
Policy 3.3.1(b)	Street System Master Plan
Policy 3.3.1(c)	Street System Master Plan
Policy 3.3.2(a)	Arterial and Collector Streets
Policy 3.3.5(b)	Private Owner Responsibility to Build Streets
Policy 3.3.8(a)	Transportation Impact Analysis
Policy 3.3.8(c)	Traffic Trip Reduction
Policy 3.3.8(d)	Consolidation of Vehicle Trips
Policy 3.3.8(e)	Mass Transit
Policy 3.3.14	Major Street Improvements Required
Policy 3.3.3	Street Standard and Dedication
Policy 3.3.11	Bikeways and Pathways
Policy 3.3.12	Pathway Construction
Policy 3.8.3	Open Space
Policy 4.2.3	Site Plan Information Requirements
Policy 4.2.5	Development Coincide with Public Facilities

Applicable Zoning Ordinance Provisions

Section 4.123	This Section provides the requirements of the PDC zone which are governed by Section 4.130 to 4.140.
Section 4.138(4)	Stage I Master Plan compliance
Section 4.139(4)	Criteria for approval of a planned development including subsections a, b and c

Town Center Master Plan

Ordinance Nos. 55 and 254.

Goal 1.1 - Citizen Involvement

6. The Planning Commission will be conducting the Stage I Master Plan as a public hearing and all notification requirements have been met.

CONCLUSIONARY FINDING

7. The proposed uses, both separtely and as a whole, are consistent with the Comprehensive Plan and can be made consistent with Ordinance No. 55.

PUBLIC FACILITIES

Objective 3.1

8. The City Engineering Department has provided detailed comments regarding public facilities improvements required to serve the site. These findings and recommendations are listed on Exhibit D.

Sanitary Sewer

9. Three sanitary sewer lines serve the site. An eight-inch line is located on the west side of the site which extends south through Citizens Drive to a trunkline in Wilsonville Road. A 15-inch line is located in the center of the site and a 10-inch line traverses the site originating from the Courtside Estates subdivision. This line was relocated to accommodate Phase I development. Approximately 1,500 linear feet of a sanitary sewer line was constructed along the northerly right-of-way of Wilsonville Road. This finding is also applicable to Stage II site development.

Storm Drainage

10. The subject site is located within two storm drainage basins. Phase I site grading recontoured the site Master Plan to divert storm water to a piped system in the easterly basin that out falls to an existing 48-inch pipe on the southeast corner of Phase I site. This diversion helps relieve the westerly storm basin from the storm drainage system that out falls to constricted culvert under I-5. Phase II development will remove the existing storm detention pond located on the west side of the site and be replaced with storm pipes to connect with the improved Phase I storm system. The City requires detailed storm drainage plans designed to pass a 25-year storm frequency. The detention pond has not been investigated with the Oregon Division of State Lands for wetlands status.

Water

11. Existing 12-inch waterlines located in Wilsonville Road and Town Center Loop East and West have adequate flow to serve full buildout of the site. This finding is also applicable to Stage II site developement.

Police

12. Police protection is provided to the City by the Clackamas County Sheriff's Department. This department has a headquarters in Wilsonville City Hall which is near the subject property.

Fire/Emergency

13. The Tualatin Valley Consolidated Fire and Rescue District provides fire protection to this site. The City is served by two fire stations strategically located in the City that can provide adequate fire protection services to the proposed development.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

STREETS and TRAFFIC

Policy 3.3.1(a) - Street System Master Plan

15. The Street System Master Plan identifies design standards and conceptual locations for arterials and major collectors. Wilsonville Road and Town Center Loop are classified as major arterial streets. The Master Street System and Functional Classification Map does not identify or classify any internal streets within the Town Center Loop. In the case of the proposed retail development, private drives will be constructed and connected to an internal drive/road system. This finding is also applicable to Phase II Stage II site development.

16. The design standards for Wilsonville Road show an approximate 94-foot right-of-way with a median planter island. The standards for the Town Center Loop show a 72-foot right-of-way with a median planter island. This finding is also applicable to Stage II site development.

17. The proposed development will construct driveway connections within Town Center Loop, but not in the same alignments as shown on the pictorial map representing the Town Center Master Plan. This finding is also applicable to Stage II site development.

18. Though the proposed access drive located near the northwest corner of the site is shown at a location supported by the Town Center Master Plan, this access is situated along a radius of Town Center Loop West that may position it in an unsafe location for egress and ingress.

Policy 3.3.2(a) - Dedication of Arterial and Collector Streets and Control or Consolidation of Access Drives.

19. The dedication of additional right-of-way and half-street improvements along Wilsonville Road and Town Center Loop East were accomplished in Phase I Stage II site development. This finding is also applicable to Stage II site development.

20. The Wilsonville Town Center Master Plan shows ten access drives at arterials. The full access drive shown near the northwest corner of Phase III at Town Center Loop West should be analyzed for safe vision clearance.

21. The proposed access drive to Project Thunder, shown at the southwest corner of the site, does not align with the location of the existing curb cut approved to the site in Local Improvement District No. 5. This access drive would further create a staggered intersection with access drives constructed on the opposite side of Town Center Loop West. This access drive also deviates from the access drive shown on the Town Center Master Plan approved in 89PC50. The Planning Commission cannot change the locations of access drives approved in LID No. 5 without first obtaining approval from the City Council. This finding is also applicable to Stage II site Development.

22. It appears from the re-submitted Stage I Master Plan that access is not proposed at Parkway Court which would have encouraged through traffic from Wilsonville Road and Town Center Loop to the Parkway Court.

Policy 3.3.3

23. Policy 3.3.3 requires the City to establish minimum street standards and dedication of adequate right-of-way prior to actual site development. It further provides that if proposed development exceeds minimum service capacity, then appropriate improvements shall be required prior to occupancy of the completed development. With respect to Project Thunder, the arterials servicing the site, Town Center Loop West and Wilsonville Road are already constructed to the Public Works standards. Phase I of Wilsonville Town Center is required to install a traffic signal to comply with minimum service capacity levels.

24. Section 4.139(4) stipulates that a Planned Development Permit may be granted by the Planning Commission only if it is found that the development conforms to subsections 4.139(4)(a),(b) and (c) and Sections 4.130 to 4.140. Section 4.139(4)(b) states:

> "That the location, design, size and uses are such that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on existing or immediately planned arterial or collector streets and will, in the case of commercial or industrial developments, avoid traversing local streets."

25. The applicant has provided an updated transportation analysis prepared by Kittelson & Associates, Inc. for Project Thunder. Wayne Kittelson's updated report is labeled Exhibit G-7. The report recommends that a traffic signal be installed at the intersection of Town Center Loop West with Wilsonville Road at the time of occupancy of Phase II. However, Capital Realty was conditioned in Phase I Stage II development (Resolution 90PC15) to install the subject traffic signal as determined by the City Engineering Department. This requires that the State of Oregon Department of Transportation warrant the signal. This finding is also applicable to Stage II site development.

- All of the intersections within the study area, with the exception of Wilsonville Road/Parkway Avenue, are currently operating within acceptable level of service limits.

- Under projected 1991 total traffic conditions and with the addition of site-generated Phase I traffic, the minor street left-turn movements at the Town Center Loop West/Wilsonville Road intersection are projected to experience an "E" Level of Service. While a traffic signal would improve the level of service for the 45 vehicles making this movement, it would also cause an overall increase in intersection delay and is not considered appropriate in view of the surrounding street system, the traffic circulation patterns and the projected operational characteristics of this intersection.

- By 1995, the projected background traffic volume conditions, without Phases II and III, will warrant the installation of a traffic signal at the intersections of Wilsonville Road/Town Center Loop West and Wilsonville Road/Town Center Loop East. It is therefore recommended that traffic operations at both the Town Center Loop intersections with Wilsonville Road be monitored on a regular basis. Traffic signals should be installed only when one or more MUTCD signal warrants are met and the operational and/or safety characteristics dictate a need for a traffic signal.

- The number of access drives included in the Site Plan will be adequate to serve the proposed retail development. These access drives will disperse the site-generated traffic sufficiently to minimize the overall effect of the retail center on the capacity and quality of service provided by the adjacent arterial street system. At the same time, they are sufficiently separated from each other and from adjacent intersections to avoid significant operational, stacking and safety problems.

- By 1995, the projected background traffic volume will, by itself, exceed the existing capacity of Wilsonville Road in the vicinity of the Wilsonville Road/I-5 interchange. The proposed ODOT improvement project at the interchange would add sufficient capacity to accommodate both the 1995 background traffic, as well as the additional traffic from Phases II and III of the proposed development.

Kittleson and Associates has also provided additional findings and recommendations found in their letter of October 16, 1991, labeled Exhibit G, which are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Policies 3.3.8(a)-(e)

26. These policies address traffic impacts and congestion.

As noted in the previous findings responding to Policy 3.3.3, the applicant has provided a detailed traffic analysis that responds to Policies 3.3.8(a)-(e) and Section 4.139(4) of the Wilsonville Code.

CONCLUSIONARY FINDING

27. The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West, and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. These findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

TRANSIT FEATURES, SIDEWALKS AND BIKEWAYS

28. Specific transit features such as transit stop locations and right-of-way fixtures for transit uses should be provided in the Stage II Site Development Plan. These findings are also applicable to Stage II site development.

Policies 3.3.11, 3.3.12, 3.3.13 and 3.3.13(b)

29. These policies addresses pathways and bikeways. Written comments received by Myers/Kroker (the architectural firm responsible for master planning Town Center) in case file 90PC15, have the following observations concerning pedestrian pathways:

> "There will need to be a landscape design study of the public right-of-way system defining the nature of plant materials, berm forms, ground cover, public walk systems and street light systems. Design definition of pedestrian overpasses would be developed within the recommended 'Design Review Parameter Study'."

30. The modified Stage I Master Plan shows a bikeway through Phase I to extend through Phase III and connect with the future park. A shoulder-side bikeway is required on the Comprehensive Plan to occur on the south side of Wilsonville Road.

31. The Phase II Stage II submittal plans do not indicate sidewalks along Town Center Loop West as required by Ordinance No. 55 and by Section 4.168 and Subsection 4.167(1)(b) of the Wilsonville Code. Regarding Project Thunder, a five-foot wide concrete sidewalk is required along Town Center Loop West to be off-set five feet from the curb. In order to provide for safe pedestrian access around and on the Phase II site, pedestrian walkways should be extended from Town Center Loop West via the central access drives up to Project Thunder's storefront. It also appears that the applicant has not considered pedestrian sidewalks to link the site with the future park and adjoining businesses.

OPEN SPACE

Policy 3.8.3

32. This policy addresses open space. The proposal, as presented, will have a major impact on the location, size and configuration of the area designated by Ordinance No. 55 shown as lake or open space. Approximately 8.5 acres of lake or open space is conceptually shown on the Town Center Master Plan. The open space depicted on the modified Town Center Master Plan or Ordinance No. 55 does not have the same configuration as shown for the Primary Open Space area depicted on the Comprehensive Plan Map.

33. The modified Stage I Master Plan shows 5.1 acres in open space to be reconfigured to satisfy Capital Realty's site development program, and hopefully, for the City's benefit to develop the property as a public park. The application does not propose a specific open space plan with uses, nor is the applicant proposing a development development schedule. In this regard, the Planning Commission had previously conditioned the applicant in Resolution 90PC15 to perform the following:

Condition No. 8:

> "At Phase II Stage II site development, which shall be the next phase presented, applicant shall submit to the Planning Commission and the Design Review Board a detailed open space plan and development schedule for the development of the 5.4 acre open space shown on the Stage I Master Plan."

With respect to the above issues, the applicant is requesting the Planning Commission to reconsider Condition No. 8 as follows:

"1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions.

2. To formulate a development plan and time frame consistent with the development of Phases II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto."

34. Ordinance No. 55 depicts an open space or lake with a centralized location in Town Center with surrounding development to be oriented and related with it. One can compare this relationship to be similar with the concept of a public square of a small European city or even with an Early American town square. Those kind of public spaces create a sense of place and encourage a community gathering place within an urban context. It also creates a city center environment that involves the pedestrian in its function and design that is not found in retail strip developments designed around automobiles.

35. The proposal, as presented, shows approximately 5.1 acres in open space. The City will require that the open space be dedicated for development of a City park. At issue is the proposed configuration of the open space. In this regard, the proposed open space has a spacial composition that positively responds to the open space concept in Ordinance No. 55. The proposed Master Plan is an assembly of properties that make up a reasonable configuration for future park development. Conversely, the surrounding development plan represents an augmentation of the more traditional strip retail commercial center showing buildings oriented to major collectors and arterials together with large storefront parking areas. Truck delivery activities are then generally found on the sides or at the rear of the stores which attract outside storage of palettes, boxes etc. The applicant has modified the original submittal drawings designed to lessen the impact of Project Thunder's building mass on the proposed open space. Buffering can be accomplished by reducing the mass of Project Thunder with siting a smaller intervening building between Project Thunder and the open space. The revised plan also re-positioned potential building sites to open up the view of the open space to Town Center Loop West.

36. The proposed 5.1 acre open space, combined with approximately 3 acres in open space created for Town Center Park Apartments and Clackamas Community College, will provide a generous area for a future public park.

Policy 4.2.3 and Section 4.139(2)(a) and (b)

37. This policy and zoning section identify the information which must be included in the Site Plan. The information set forth has been submitted in compliance with the Comprehensive Plan and Zoning Ordinance. Landscape and Architectural Plans will be reviewed by the Design Review Board.

Policy 4.2.5

38. This policy requires that development coincide with the provision of public streets, water, sanitary sewer and storm drainage facilities. Such facilities are currently available at the site. Sewer and water are located within the abutting roads. Storm drainage is provided at the eastern portion of the site. The extension of these services will be coordinated with site construction and facilities and will be designed to meet City public works standards.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

40. Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassifed uses and reconfigured open space.

41. Condition No. 2 of the Stage I Master Plan approval requires separate Stage II land development applications for review of each pad. Therefore, the buildings proposed on the pads are not part of this application.

BUFFERING and SCREENING

42. Section 4.163 of the Wilsonville Code requires:

A. All outdoor storage and garbage collection areas shall be screened from off-site view with fencing and/or landscaping.

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. Multi-family developments shall be screened and buffered from single-family areas.

43. The Site Plan illustrates an area between the truck loading area and proposed open space. This site arrangement orientes the massive and mundane backside of Project Thunder to Parkway Court and the proposed open space. The impact can be lessened, as proposed in Finding No. 35, together with innovative design utilizing landscaping, screenage, murals etc.

BUILDING HEIGHT

44. Definition no. 12 of Chapter 4 of the Wilsonville Code (Building of Structural Height) is defined by the following:

> "The term 'height of building' shall be deemed to mean the perpendicular distance from the average elevation of the adjoining ground to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the middle height gable between the eaves and ridge of a pitch or hip roof. If a building is divided into units by means of masonry division walls, each unit shall be considered separately in calculation for height of building."

45. In order to distinguish Project Thunder to the public, the applicant proposes to construct a dome and flag pole atop the main entrance of the store. Section 4.172(1) exempts domes and flag poles from the height limits of the PDC zone. However, the flag pole can only fly the United States and the State of Oregon flags. Just for general information, the top of the dome is shown approximately 55 feet above grade level. The top of the flag pole is approximately 81 feet above grade level.

PARKING ANALYSIS

46. Section 4.150WC:

"Commercial:

Commercial retail, 1,501 square feet or more	1 space/200 sq.ft. @ 63,914 sq. ft. of floor area
Service or repair shops	1 space/200 sq.ft. @ 17,276 sq. ft. of floor area
Eating or drinking establishments	1 space/200 sq.ft. @ 6,096 sq. ft. of floor area
Storage warehouse, wholesale establishment, rail or trucking freight terminal	1 space/2,000 sq.ft. @ 39,336 sq.ft. of floor area up to 40,000 sq.ft.; 1 space/4,000 sq. ft. thereafter
Office	1 space/250 sq.ft. @ 9,117 sq.ft.

These calculations do not include employee lunch rooms, restrooms, HVAC roooms, cat walks, etc.

Building Area - Phase II **Minimum Parking Required:**

Project Thunder approximate floor areas:

Retail Commercial	63,914 / 200 = 320 spaces
Service	17,276 / 200 = 86 spaces
Office	9,117 / 250 = 36 spaces
Restaurant	6,096 / 200 = 31 spaces
Storage	39,336 / 4000 = 10 spaces
Mimimum parking :	**483 spaces**

47. Though the proposed off-street parking count shows 16 handicapped and 856 standard parking spaces for a total of 872 parking spaces, the proposed parking is almost twice the minimum requirement of the Code. This figure does not include parking for the future pads. Those parking areas will not be constructed until each pad is developed.

48. The parking plan specifies dimensions for a typical standard parking space at 9' x 18' with 25'-0" drive aisles. The Zoning Code has a minimum 9' x 18' standard parking space dimension. Compact parking spaces are not proposed and are optional by the Zoning Code.

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

B. Storm sewer shall be aligned on the south and east side of all street centerlines.

C. Water line shall be aligned on the south and east side of all street centerlines.

D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

EXHIBITS

The following Exhibits are hereby entered into the public record by the Planning Commission as confirmation of its consideration of the application as submitted.

A. Findings and Conditions of Approval
B. City of Wilsonville Comprehensive Plan
C. Chapter 4 of the Wilsonville Code
D. City Engineering Department Report
E. City Building Official's Report
F. Town Center Master Plan
G. Applicant's submittal documents:
   1. Revised Stage I Master Plan and Master Utilities Plan
   2. Phase II Site Plan
   3. Phase II Exterior Elevations
   4. Phase II Grading Plan and Erosion Control Plan
   5. Phase II Utilities Plan
   6. Phase II Preliminary Landscape Plan
   7. Traffic Report by Wayne Kittelson and addendum letter
   8. Request for Modification of Condition No. 8 of 90PC15
   9. Stage I Master Plan Re-submittal
   10. Phase II Stage II narrative
   11. Alternative Open Space Concept

H. Original Stage I Master Plan - 89PC50.

I. Ordinance no. 55

City of
WILSONVILLE
in OREGON

30000 SW Town Cente
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

August 16, 1999

Gary M. Graumann
Lumberjack, L.P.
PO Box 7458
Menlo Park, California 94026

Re: 29400 SW Town Center Loop

Dear Mr. Graumann:

Mr. Lashbrook, Wilsonville Planning Director, has asked me to answer your request for a zoning compliance letter. You will find the information you requested as follows:

1. Zoning Classification Code:
   Planned Development Commercial (PDC) (Town Center)

2. Property Owner's Name and Lender's Name
   Lumberjack, L.P. (owner)
   PO Box 7458
   Menlo Park, CA 94026

   GE Capital Business Asset Funding Corp.
   10900 NE 4th St., Suite 500
   Bellevue WA 98004

3. Address of the Property:
   29400 SW Town Center Loop, Wilsonville, Oregon

4. Type of Permitted Use:
   Commercial (Planned Development)

5. Expiration Dated Copy of Conditions or Restrictions of Use:
   Case File 91PC43 approved 12/9/91
   Case File 91DR29 approved 1/27/92
   Case File 92DR21 motion revising condition

I have researched our records and find that in receiving final occupancy the city found that the development had complied with all plan proposals and conditions of approval. However, the project is now almost seven years old and is beginning to show some wear and deferred maintenance. About a year ago, Mr. Blaise Edmonds wrote you about broken curbs and destroyed landscaping where vehicles have driven over the curb. This is at a major entrance area (Southwest entry drive, between the rug dealer and McDonalds.) This problem area still requires attention.

Sincerely,

Robert G. Hoffman AICP

Robert G. Hoffman AICP
Manager of Current Planning

Attachment: Decision and Conditions of Approval
98PC43
91DR29

RGH:sh

N:annex\plng\hoffman\bh81699graumann\sh

LUMBERJACK, L.P.
P.O. BOX 7458
MENLO PARK, CALIFORNIA 94026
(650)813-9100 FAX(650)813-9190

August 5, 1999

Mr. Stephan Lashbrook
Planning Director
CITY OF WILSONVILLE
30000 SW Town Center Loop E
Wilsonville, OR 97070

Dear Mr. Lashbrook:

Thank you very much for returning my call with respect to revisions to the Development Codes. I look forward to reviewing the changes and will provide any comments that I may have.

We also discussed the following outline that my lender has requested that I obtain from the city. I have provided the information for items 2) and 3). If you could have someone on your staff complete the rest of the requirements requested by the lender it would be greatly appreciated.

I would like to receive a compliance letter from your office within the next 10 days. Should you have any questions please feel free to call me at the number listed above.

Once again, thank you for your attention to this matter.

Sincerely,

Gary M. Graumann

ZONING COMPLIANCE LETTER REQUIREMENTS

This item should be obtained from the City Planner's, County Clerk's, or Zoning Department's office and should contain the following information:

1) Zoning Classification Code — Planning Development Commercial (PDC (Town Center)

2) Property Owner's Name and Lender's Name

3) Address of the Property

4) Type of Permitted Use. — Commercial (Planned Development)

5) Expiration Dated Copy of Conditions or Restrictions of Use.

91PC43 - Appr. 12-9-91
91DR29 - Appr 1-27-92
92DR21 - Appr 6-22-92

2) Lumberjack, L.P. (owner)
P.O. Box 7458
MENLO PARK, CA 94026

GE Capital Business Asset Funding Corp.
10900 NE 4th St., Suite 500
Bellevue, Wa 98004

3) 29400 SW Town Center Loop
Wilsonville, Or.

Incredible Universe

Aetna's local presence shrinks after loss of key large clients

Continued from page 1

er away from the Portland market.

Despite a strong national presence, Aetna's local client base has eroded as

market is already dominated by strong HMO players that have left little room for carriers like Aetna.

Stone said the downsizing was planned a national restructuring effort, and not nply because of the lost clients in Portid. Many who watch insurance activis nationally agree. The change reflects nilar strategies by nationwide carriers. tna wants to consolidate offices, rece overhead and gain efficiencies in increasingly competitive health inrance market.

'It is definitely consistent with the nd that we've seen in this industry," id Post. Improvements in electronic tims handling and standardization ross offices have made such changes ssible and even advantageous, he said, gain efficiencies.

'Insurance in general has become more d more of a commodity market," said iss Poll, an insurance analyst with The licago Corp., a Chicago-based investent bank that tracks insurance companies. "Insurance companies, especially the big guys, have a big expense burden. They tend to be big and clumsy."

In Aetna's case, said Poll, the national carrier's life and health business has been its strongest asset. Hartford, Conn.-based Aetna is the third-largest U.S.-based property and casualty insurer, according to Value Line's December 1993 investment survey. Aetna, a public company traded on the New York Stock Exchange, also has been subject to large market fluctuations.

Aetna "peaked" on Nov. 1, 1993, with a per-share price of $60.75, said Poll. The stock closed at $47.75 per share on Oct. 18.

Aetna Health Plans reported $4.5 million in insurance premiums in Oregon during 1993, down from $12.7 million in premiums it wrote in 1991, according to reports filed with the state. It covers an estimated 40,000 enrollees.

Aetna handles about 4.9 million Medicare claims representing some $250 million annually out of the Portland office.

Blaise
Pam
Sally

Incredible Universe building sold, leased

Tandy Corp. has sold off its Incredible Universe building in Wilsonville and leased back the facility from the new owner.

Tandy sold the 166,495-square-foot retail property to Pier Set Inc., a Delaware corporation, for $13.5 million, according to a Clackamas County sale deed.

Pier Set is a subsidiary of London-based NatWest bank, said Bill Bousquette, chief financial officer of Fort Worth, Texas-based Tandy.

Tandy also sold three other Incredible Universe buildings to the bank. The four properties sold for about $60 million, Bousquette said.

Selling off store facilities to outside investors is common among large retailers. "We have no interest in tying up our capital in real estate," Bousquette said.

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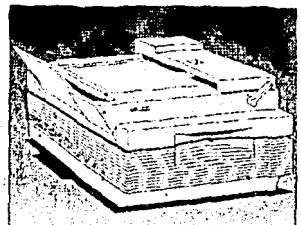

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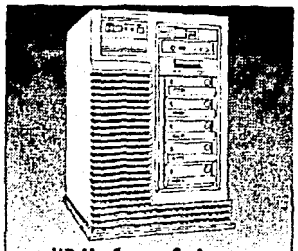

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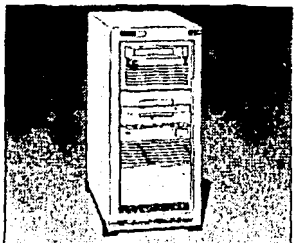

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City of Wilsonville
Community Development Department
30000 S.W. Town Center Loop East
Wilsonville, Oregon 97070
(503) 682-4960
Fax 682-7025

FAX COVER SHEET

DATE: 11-29-93

TO: Mark Whitlow FAX: 721-3666

FROM: Mike Kohlhoff / Wayne Lorenson

SUBJECT: Project - Thunder

NUMBER OF PAGES IN THIS TRANSMITTAL (INCLUDING COVER SHEET) 20

COMMENTS:

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

September 29, 1993

Mr. Bryan L. Spain, CSM
Assistant Director State/Local Taxation
Tandy Tax Service
Tandy Corporation
P.O. Box 1643
Fort Worth TX 76101

91PC43

Re: Systems Development Credit - Wilsonville Incredible Universe

Dear Mr. Spain:

The purpose of this letter is to formally close action on an appeal of the discretionary decision concerning the amount of the street systems development charge for the Incredible Universe. Prior to his departure from Tandy Tax Service, Mr. Bryan L. Spain, CSM, had formally appealed the discretionary decision.

On December 7, 1992, I provided an interim response in which we provided a comparison of a number of different calculations of the street systems development charge and in all cases they came very close to the amount that was charged based on the number of employees. Subsequently, on March 2, 1992, I extended the time for submission of any additional data concerning the street systems development charge to April 15, 1993.

Later telephone conversations indicated that you were not going to submit any additional data. Based on the information that has been received, your appeal of the discretionary decision has not been favorably considered. I would like to inform you that we will be using most of the systems development charge for streets that you paid to install an asphalt overlay on Town Center Loop West to increase the structural strength of the road. This should significantly delay deterioration of the street.

I apologize for the delay in providing a formal response; however, other higher priority projects have interfered with a more timely response. Your understanding is appreciated.

Sincerely,

Eldon R. Johansen
Community Development Director

pc: Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Tom Jowaiszas, Finance Director
Wayne Sorensen, Planning Director
Mike Stone, City Engineer
Martin Brown, Building Official

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

Info —
Pam
Blaise
Sally
file
91PC43

December 4, 1992

Mr. Wayne Kittelson
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland OR 97205

Re: Incredible Universe Traffic Issues

Dear Mr. Kittelson:

You provided me with a copy of your letter dated October 27, 1992, to Mr. Wayne Sorensen, Planning Director, concerning the above subject. I appreciate receiving a copy of your letter since it provides an excellent background from the consultant and the developer's perspective.

Your letter addresses several transportation topics which are of current interest to staff and council. Your letter included a copy to Councilor Carter and copies have also been provided to the Mayor and other Councilors to ensure that they all have the same background concerning this topic.

Your letter indicated that you are troubled by several comments in the October 22 issue of the Oregonian, entitled "Traffic Count Zooms at Electronic Store". I also am troubled by several of the statements in your letter of October 27, 1992, and would like to explain my concerns with your letter. Prior to explaining my concerns, I will review the overall traffic information that was provided to the Planning Commission prior to its decision. The Transportation Impact Analysis for the Wilsonville Town Center, dated April, 1990, was submitted to the Planning Commission as background for approval of the Master Plans for Phase I, Phase II and Phase III of the Wilsonville Town Center. Subsequently, the letter dated October 16, 1991, subject Traffic Analysis for Wilsonville Town Center - Phase II was submitted to the Planning Commission prior to approval of the plan for Project Thunder, which subsequently was changed in name to the Incredible Universe. When Project Thunder was approved, the Traffic Impact Analysis Report for the Wilsonville Town Center, dated April, 1990, was not provided to the Planning Commission at the time of the hearing.

Specific sections of your letter which are troublesome to me as well as comments on these sections are as follows:

"Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersection of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted, (April 1990), our engineers pointed out to city staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak-hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> 'As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersection, are anticipated to operate at an acceptable level of service [under projected 1995 peak-hour conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition.'"

The April 1990 Traffic Impact Analysis for Wilsonville Town Center has several tables which give the existing and predicted level of services for the southbound and northbound I-5/Wilsonville Road interchanges. Table 5 on Page 16 gives an existing level of service for both intersections of "B". Table 8 indicates level of service "C" for both intersections for the 1991 total traffic level of service results. These levels of service do not support your statement that the intersections were already operating near peak capacity.

The Project Thunder update, which was included in your October 16, 1991 letter concerning traffic analysis for Wilsonville Town Center Phase II, could be read as you state, "that this update included the I-5 northbound and southbound intersections with Wilsonville Road". If I read it that way, then I concur that the significant findings and recommendations of the October 16, 1991 report state: "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period." This would be contrary to your dire predictions of intersection failure.

On the other hand, I have looked at the October 16, 1991 letter and have found no specific updates for the traffic analysis for Wilsonville Town Center Phase II concerning the I-5 intersections with Wilsonville Road. It was this lack of any data concerning the I-5 northbound and southbound intersections with Wilsonville Road that led me to conclude that the traffic impact analysis for the Incredible Universe did not include information on the I-5 intersections with Wilsonville Road. If I had read the October 16, 1991 report to accept at face value the statement that "the key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period", then I would have concluded that you covered the interchange; however, I would have also felt that your coverage was inaccurate.

"Initial planning for the Incredible Universe Store began in late 1991 and was completed in 1992. It is important to note that throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our

engineers knew only that it was to be a retail development. By their own choice, city staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of city staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that city staff made this decision; for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion."

The April 1990 Traffic Impact Analysis includes three pages to describe the site-generated traffic volume and also a special study by Kittelson & Associates, Inc. to better define the probable breakdown of site-generated vehicle trips among the category of drop-in trips, diverted trips and new trips. There is nothing in the April 1990 report or the October 16, 1991 update to forewarn staff, the Planning Commission or Council that there could be unusual special event nature retail activities which could have a different impact on traffic volumes than is predicted by the transportation impact analysis and the October 16, 1991 update for Wilsonville Town Center Phase II. This lack of information concerning a potential problem area leaves the city staff responsible for prediction of traffic problems which should be left to traffic experts. I also would think that a plan for a commercial building with 160,000 square feet of floor space in a city with less than 10,000 residents would at least cause a question in the mind of the traffic engineer concerning drop-ins of 40%.

"Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the city's transportation system in order to mitigate the traffic impacts we identified. Further, the Incredible Universe store contributed $250,000 in system development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments; it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs."

The newspaper article states in reference to the I-5 and Wilsonville Road interchange "It was that intersection that clogged up at the Incredible Universe opening, September 17, 1992, and caused traffic to back up for miles in both directions." The expenditures by Capital Realty did nothing to improve the intersection of Wilsonville Road and Parkway, and the improvements proved inadequate to handle the traffic at the intersection of Wilsonville Road and Town Center Loop West. The city had county sheriff's deputies available and Tandy Corporation had private security guards. These individuals directed traffic at the Town Center Loop West and Wilsonville Road intersection as well as at the intersection of Wilsonville Road and Parkway during much of the Grand Opening weekend so that traffic was able to get through these intersections. By no stretch of anyone's imagination could the expenditures and improvements by Capital Realty be

considered to be adequate to allow the traffic to freely flow through these intersections at level of service D or better.

"Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering."

Upon reflection, this comment contains a good suggestion in that the city should require a traffic control plan to minimize vehicle disruption and delay during the initial opening of a new store of significant size. We will incorporate this in to our plans review efforts and into our recommended conditions of development for future stores with a major traffic impact.

"In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to city staff since early 1990 at least."

Your October 16, 1991 letter deleted the concerns for the I-5/Wilsonville Road interchange in the third subparagraph under the significant findings and recommendations which reads as follows:

> "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period."

Based on my reading of a level of service "C" for 1991, and this particular paragraph, I had assumed that we, initially, on the opening of the Incredible Universe would not have any major problems with the I-5 and Wilsonville Road interchange and would not anticipate problems until later. In summary on this particular item, it appears that your April 1990 report did indicate that by 1995 there would be problems; however, the October 16, 1991 report alleviated the concern for these problems.

"Since that time and through all subsequent development reviews, city staff, planning official, and policy makers have had three options available to them:

a) **Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;**

b) **Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or**

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision."

It may well be a viable option to consider your suggestion of placing a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5; however, staff feels that it would be premature to present this option to Council at this time. In addition with the October 16, 1991 letter from your organization, subject: Traffic Analysis for Wilsonville Town Center Phase II, including the following significant finding and recommendation:

"Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.".

The record does not reflect a conscious adoption of option c). It reflects that intersections will operate within an acceptable level of service limits.

"We value our reputation for honest, objective, and technically valid analysis very highly, and so it is important to us that this matter be resolved to everyone's satisfaction."

In the comments which staff made at the council meeting, and also in subsequent responses to questions from newspaper reporters, we were careful not to be judgmental concerning particular consulting firms and kept from placing blame on any of the consultants which were involved. I have reread the article which you quoted and still feel that we adhered to the above and avoided incorrectly placing blame.

"If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter."

Your letter very eloquently describes your position with regard to the impact of the Incredible Universe on traffic. I have come to a somewhat different conclusion from reading the applicable reports. Although I would be very happy to meet with you to discuss this issue, it appears that this may be one subject in which we probably will continue to have different opinions which may never be fully resolved. If you do desire

to meet with myself or other members of the Community Development staff on this subject, please contact the undersigned.

Sincerely,

Eldon R. Johansen
Community Development Director

erj:mld

pc: Kim Beach, Capital Realty
Mayor & City Council
Transportation Advisory Commission
Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Mike Stone, City Engineer
Wayne Sorensen, Planning Director
Steve Starner, Public Works Director

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

STAFF
Pam
Blaise
Sally
Project file
11/PC 4/3

OCT 29

October 27, 1992

Project No.: P10.00

Mr. Wayne Sorensen
Planning Director
City of Wilsonville
P.O. Box 220
Wilsonville, Oregon 97070

SUBJECT: Incredible Universe Traffic Issues

Dear Wayne,

I read with some concern an article in the October 22 issue of *The Oregonian* titled, "Traffic Count Zooms at Electronic Store". I am enclosing a copy of the article for your information in case you missed it.

I was troubled by several comments in the article which seemed to suggest that, in the eyes of some high-level City officials, our traffic analysis had misled City officials:

> "The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts", said Arlene Loble, city manager.
>
> The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5...If the study were being done today, the city would insist that engineers look at one more intersection down the road, [Eldon Johansen] said.
>
> [Eldon Johansen] said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built. Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic...Finally, the traffic study did not account for the success of the store's marketing effort.

I would like to take this opportunity to clarify the analytic process we followed and the directions we received. Hopefully, this clarification will allow you, Ms. Loble, Mr. Johansen, and other City staff to more confidently and accurately respond should this issue arise again.

The transportation impact analysis that we performed for Capital Realty was begun in 1990 and completed in 1991. The site development plans called for construction of a shopping center containing 450,000 gross square feet of floor area. Given this information, the trip generation rates that we used were entirely appropriate, as was the estimate that 40 percent of the site-generated trips would be drop-in traffic. This is evidenced by the fact that the first phase of the shopping center development, which has already been completed, operates very close to the estimates that we provided.

Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersections of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted (April 1990), our engineers pointed out to City staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> "As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersections, are anticipated to operate at an acceptable level of service [under projected 1995 peak our conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition."

The current best estimate, by the way, is that these improvements will not be completed before 1996. Further, it should be noted that, even at this early date, City staff did not rely solely upon the findings of Kittelson & Associates, who were retained by the applicant. Instead, the City retained its own independent traffic engineering consultant to review the traffic impact analysis report and to critique the analysis assumptions, methodology, and findings. This independent traffic engineering consultant performed the requested review and confirmed every essential element of the report, including the projected capacity deficiency at the I-5/Wilsonville interchange area.

In personal discussions, City staff were informed of this finding of a future capacity deficiency, and were asked to interpret the City's requirement that a level of service equal to or better than "D" be provided at all intersections. City staff informed our engineers that, because the I-5/Wilsonville Road intersections are actually controlled by ODOT and, further, because ODOT has already established plans to improve the interchange and increase the capacity of these intersections, the finding of a capacity deficiency at the interchange would not be considered a fatal flaw. This conclusion by City staff is confirmed by the fact that the project was ultimately recommended for approval, even with the report's recognition of capacity deficiencies on Wilsonville Road near I-5 as noted above. It should also be pointed out that City staff's position was not unique to this project, but has also been recently applied to projects in the vicinity of the Stafford Road interchange.

On this basis, the transportation impact analysis was completed, all other on-site and off-site traffic-related deficiencies were identified, considerable mitigation projects were undertaken, and the necessary approvals were obtained.

Initial planning for the Incredible Universe store began in late 1991, and was completed in 1992. It is important to note that, throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our engineers knew only that it was to be a retail development. By their own choice, City staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of City staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that City staff made this decision: for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion.

Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the City's transportation system in order to mitigate the traffic impacts we

identified. Further, the Incredible Universe store contributed $250,000 in System Development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments: it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs.

Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering.

In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to City staff since early 1990 at least. Since that time and through all subsequent development reviews, City staff, planning officials, and policy makers have had three options available to them:

a) Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;

b) Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision. These

effects were temporary in that they will most likely die away after the Christmas season and as the store's novelty begins to fade. Additionally, these effects were exaggerated by the special event nature of the Grand Opening, which did not give patrons a chance to adjust their arrival time or choice of route. Therefore, it is unlikely that the City will again experience extended periods of mile-plus queues caused by the failure of the I-5/Wilsonville Road interchange. Even so, City staff and policy makers should recognize that less visible daily failures of the interchange are already programmed to occur: several already-approved residential and commercial projects have not yet been completed, and the combined future traffic effects of these projects virtually assure periods of peak-hour failure of the interchange during most typical weekdays. Thus, the City no longer has control over *whether* peak hour congestion and failures will occur at the interchange (they will), although future land use decisions can still affect the *duration* of these failures.

We have no quarrel with the prudence of the City's conscious decision to adopt option c) above. We are, however, disappointed that the City would suggest to the public, through articles such as the one published on October 22, that the congestion was not anticipated and that the fault for this lies with the traffic impact analysis process.

If you have any questions, please call me. We value our reputation for honest, objective, and technically valid analyses very highly, and so it is important to us that this matter be resolved to everyone's satisfaction. If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter.

Sincerely,

Wayne K. Kittelson

Wayne K. Kittelson, P.E.
Principal

cc: Arlene Loble
Eldon Johansen
Greg Carter
Kim Beach

CITY OF WILSONVILLE
P.O. Box 220
30000 S.W. Town Center Loop East
WILSONVILLE, OREGON 97070

(503) 682-1011

LETTER OF TRANSMITTAL

TO _____

DATE	JOB NO.
10/1/92	

ATTENTION: Arlene Loble

RE: Inverse Site Universe

Copy of letter or decision, and attachments

File copy of Transportation Impact Analysis prepared by Kittelson & Assoc

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Wayne Sherson

PROJECT 7403 NEBS Inc., Groton, Mass. 01471
If enclosures are not as noted, kindly notify us at once.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

May 28, 1992

Mr. Rich Hollander
Vice President
Tandy Name Brands
P.O. Box 1643
Fort Worth, TX 76101

Ms. Kim Beach
Capital Realty
101 S.W. Main St. Ste. 905
Portland, OR 97204

Re: Tandy Name Brands dba Project Thunder

Dear Mr. Hollander & Ms. Beach:

The purpose of this letter is to summarize the current status of ongoing actions which must be completed prior to opening the facilities which were previously known as Project Thunder and currently known as the Incredible Universe. An additional purpose is to solicit your continuing assistance in resolving the remaining points of difference so that when the construction is completed, there will be no outstanding actions which would preclude issuance of the Certificate of Occupancy.

Primary items of concern are as follows:

Street Systems Development Charge

On March 2, 1992, Council adopted Resolution No. 902 authorizing deferral of the Systems Development Charges for streets from time of issuance of building permit to time of issuance of occupancy permit for Tandy Name Brand Retail Group. Resolution No. 902 contained an estimate for the Street Systems Development Charges in the amount of approximately $370,880.00. This was based on a total of 160 employees at the site. On March 6, 1992, Mr. Brian L. Spain, Assistant Tax Manager, for Tandy Tax Service, forwarded a check in the amount of $124,592.15 for the Street Systems Development charge. I am concerned that use of peak hour employees is irrelevant to peak hour traffic generation and will correspond directly with Mr. Spain to resolve differences.

Traffic Signal - Town Center Loop West and Wilsonville Road

One of the conditions that was placed on this development was that the signal at the intersection of Wilsonville Road and Town Center Loop West must be installed prior to the occupancy of the Project Thunder site. Plans have recently been received at the Community Development Department for a second review.

Kim Beach, Capital Realty, is pushing to insure that the signal is in place prior to occupancy of the Project Thunder site.

Detention Facility

The Project Thunder site was conditioned to be designed for the 25 year storm. Detailed calculations indicate detention could be deferred until development of the property just north of the Project Thunder site. The condition would appear not to allow staff to administratively transfer the detention requirement to another property. Staff is again working with Capitol Realty to insure that this is resolved.

Construction as Included in the Public Works Permit

The City requires that the Punch List for Public Works items be completed prior to issuance of a Temporary Occupancy Permit.

Maintenance Bond

The City will require a 10% Maintenance Bond for twelve months following acceptance of the work included in the Public Works Permit.

Repair of Town Center Loop West Road

The City has contacted S.D. Deacon, General Contractor, concerning the street repairs to Town Center Loop West Road. Mr. Art L. Bush, Project Manager, has informed the City that S.D. Deacon Corporation will not be held responsible for any road repairs or replacement to existing condition of either north or southbound lanes of Town Center Loop West Road at the conclusion of this project. The contractor has removed the curb along the east side of Town Center Loop West and the asphalt has substantially failed wherever the curb has been removed. The City has no intention of accepting the project until such time as damages caused by the contractor are repaired.

Modification of Median - Town Center Loop West

We have received construction plans for modification of the median. We will be submitting those plans to Council for approval. It appears that this work is necessary prior to having adequate access to parking.

Abandonment of Right-of-Way

The City has received documentation requesting abandonment of right-of-way that was part of the former Parkway Avenue. This is being processed to insure abandonment by August 1, 1992.

As you no doubt realize, I did not begin work in Wilsonville until April 6, 1992, after this project was well under way. My concern is that if we do not keep our attentions focused on resolving all outstanding issues, we will reach a point where the building will have been completed and you will have hired employees to open the facility and will be unable to issue a Certificate of Occupancy because of failure to resolve the above items. Your continued assistance and cooperation will be appreciated.

Sincerely,

Eldon R. Johansen

Eldon R. Johansen
Community Development Director

ej/js

pc: Arlene Loble, City Manager
Michael Kohlhoff, City Attorney
Steve Starner, Public Works Director
Martin Brown, Building Official
Wayne Sorensen, Planning Director

Creative Solutions ... Superior Service

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment

Copied To:
KIRK BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Margo 5/7
Orig to Angel Thunder file
Copy to Wayne myself
Eldon

Comments

ELDON,
JIM LENHART HAS PREPARED ADD'TL STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

Signed Rick Martin

2688

W&H PACIFIC
8405 S.W. Nimbus Avenue
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Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

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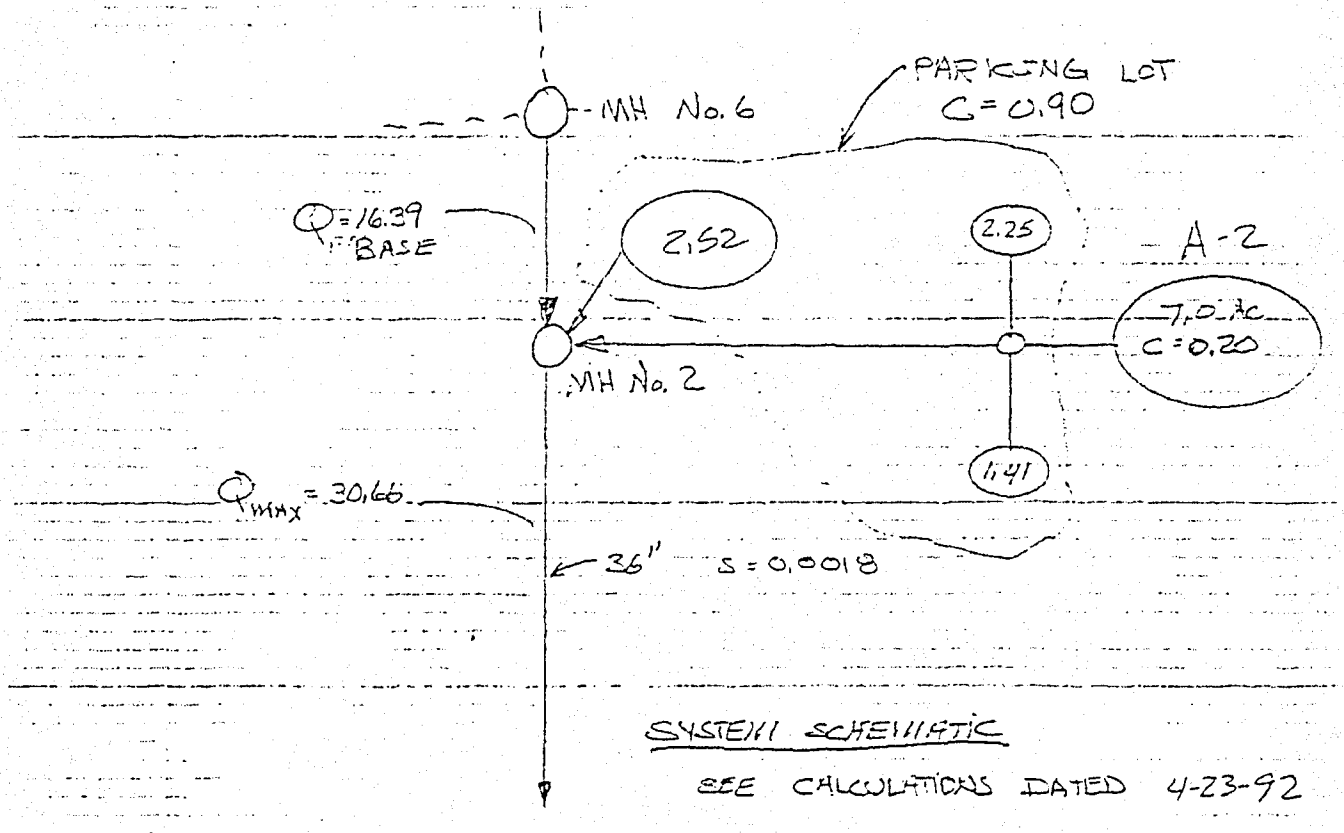
DETENTION REQUIREMENTS FOR A-2 IN HN
UNDEVELOPED CONDITION.



SYSTEM SCHEMATIC

SEE CALCULATIONS DATED 4-23-92

ASSUME WORST CASE SCENARIO

1.) FLOW FROM MH No 6 TO MH No 2 is MAXIMUM DUE TO UPSTREAM STORAGE, Q_{BASE} = 16.39 CFS

2.) ASSUME GRASSED AREA FOR A-2 with C = 0.20

3.) ASSUME 150 FEET OVERLAND TRAVEL FROM A-2

1ST 200 FEET = 20 MINUTES
REMAINDER 250' = 4 MINUTES. (SLOPE = 1%)
(IN CHANNEL)

t_c = 24 MINUTES

Project: DETENTION MANAGER Date: 5-5-92 Sheet No. 1 of 2

Prepared by: [illegible] Checked by: [illegible] Job No. 417-03-04-11

2689

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W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

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- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment
- ☐

Copied To:
KARL BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Comments

ELDON,

THIS LETTER HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

PARKING DETENTION IS POSSIBLE IN PIT III OR EITHER PROPERTY NORTH OF TANDY.

Signed Rick Martin

2690

PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

i_{25} @ 24 MINUTES = 1.6 in/hour.

$Q_{PEAK} = i \Sigma CA_i = (0.2)(7.0\ AC)(1.6) = 2.24$

$(0.9)(6.18)(1.6) = 11.33$

13.57 CFS.

$Q_{ALLOWABLE\ IN\ PIPE} = Q_{MAX} - Q_{BASE} = 30.66 - 16.39$

$Q_{ALLOWABLE} = 14.27$ CFS.

SINCE Q_{PEAK} (13.57) < $Q_{allowable}$

NO DETENTION IS REQUIRED

NOTE! THIS CALCULATION IS FOR UNDEVELOPED CONDITIONS ONLY.

Project: PROJECT THUNDER Date: 5-5-92 Sheet No. 7 of 2

Prepared by: Checked by: Job No: 467.03-04-11

2691

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: William L. Parks
Division of State Lands
1600 State Street
Salem, OR 97310

Date: 12-16-91
Project Number: 4-755-0202
Project Name: Project Thunder
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
[X] Attached	[ ] For Your Info/File	
[ ] Facsimile	[ ] As Requested	
[ ] Number Of Pages Including Cover	[X] For Review And Comment	
[ ]		

Copies	Description
1	Vicinity Map 8½x11
1	Site Map 11x17

X No Jurisdiction 10 YR 5/4
A/O Hydrology - Ann Dutton
by Phone

Comments

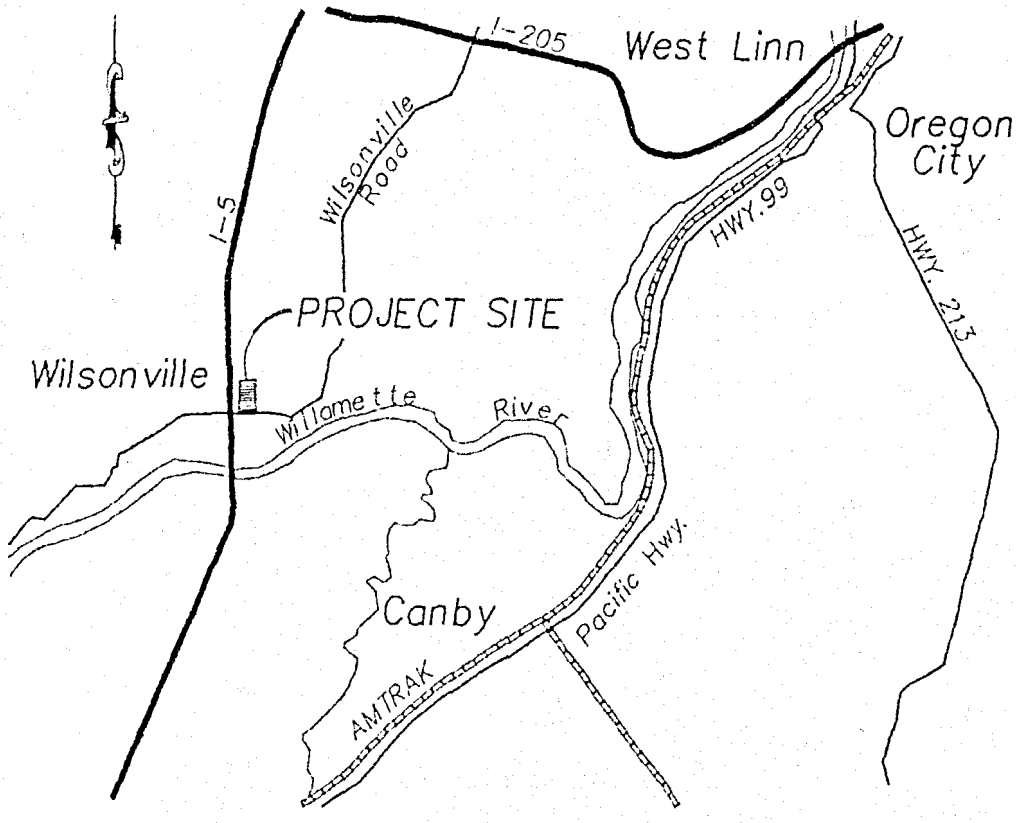
Bill,

Please make a determination whether or not the existing detention pond is a "wetland" as defined by DSL.

I prefer a response as soon as possible, but no later than January 3, 1992. If this presents a problem, please call me at your earliest.

Signed Thanks, Rick Martin

2692



VICINITY MAP

NTS

- EXIT I-5 NORTH @ WILSONVILLE RD
- TURN LEFT @ TOWN CENTER LOOP RD WEST (PORTLANDIA PIZZA ON CORNER)
- SITE IS ± 1/4 MILE NORTH OR RIGHT.

CAPITAL REALTY CORPORATION

December 30, 1991

Mr. Mike Kohlhoff
City Attorney
City of Wilsonville
30000 S.W. Town Ctr. Loop E.
Wilsonville, OR 97070

Please submit the following language for approval by the City Council at the January 6, 1992 regularly scheduled meeting, to clarify Condition #10 of Resolution 91PC43:

The 5.1 acre public park dedication will be required the earlier of the issuance of a builiding permit for Phase III or May 31, 1994. The City and the applicant will work toward resolving the related access issues prior to the land dedication. The applicant will be involved in the Town Center park development planning in an advisory capacity but will not be required to make any financial outlay for the park planning process or its actual development.

For your information I have also enclosed a master site plan, color coded by original ownership. If you have any questions or require additional information please contact me. Thank you in advance for your prompt attention to this matter as we need to resolve this issue by January 7, 1992 to proceed with our contract with Thunder.

Very truly yours,

Kim Beach

Kimberly J. Beach
Vice President

cc. Ms. Arlene Loble (with enclosure)
Mr. Wayne Sorenson (with enclosure)

DIVISION OF STATE LANDS
Environmental Planning and Permits
775 Summer Street, NE
Salem, OR 97310
503/378-3805

RECEIVED
DEC 30 1991
CITY OF WILSONVILLE ANNEX

WETLAND DETERMINATION REPORT

At the request of the landowner or agent, Division staff have conducted an offsite or onsite wetland determination on the property described below.

COUNTY Clac CITY
LOCATION Exit I-5 @ Wilsonville TR. left @ Centaloop R West ¼ mile
T 3S R 1W S 23 TAX LOT(S)
OWNER/AGENT: Rick Martin W&H Pacific
ADDRESS: 1099 S.W. Columbia St. Portland, OR
DATE OF ONSITE INVESTIGATION: 12-19-91

☒ There are no jurisdictional wetlands or waterways on the property. Therefore, no removal-fill permit is required.
Notes: No Hydrology present - soil 10YR 3/4

☐ There are wetlands and/or waterways on the property. Those areas are subject to the State Removal-Fill Law. A permit is required for 50 cubic yards or more of fill, removal, or alteration of substrate.
Notes:

☐ A wetland delineation will be needed to locate and stake the wetland/non-wetland boundary. A list of consultants can be obtained from the Division.
Notes:

☐ A removal-fill permit will be required for

☐ No removal-fill permit will be required for _____ because/if

☐ A permit may be required by the Army Corps of Engineers (326-6995)

Comments:

Determination by: William Parks Date: 12-23-91

Response Copy To:
☒ Owner/Applicant ☒ Enclosures: Request, Site Plan, Map
☒ City of Wilsonville Planning Department
☐ _____, Corps of Engineers
☒ DSL file copy
☒ Reading file copy – TO LORNA no Tues.

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • ~~PO Box 220~~
Wilsonville, OR 97070
(503) 682-1011

December 30, 1991

Mr. Jim Faulkner
Design Forum Architects
3484 Far Hills Avenue
Dayton, OH 45429

Dear Jim:

I appreciated you, Rich Hollander and Jared Chaney taking the time to meet with Blaise and me regarding Project Thunder. I hope that we will be able to find an acceptable compromise in the design of the Incredible Universe project.

Enclosed is a copy of my notes which generally outline the basic issues we discussed at the December 23rd meeting. I am also enclosing material to provide additional insight into our planning process for the Town Center:

1. A copy of the legal opinion prepared by Michael Kohlhoff, City Attorney, that was furnished to the Wilsonville Design Review Board during the hearings on the Les Schwab Tire Center which will also be located in Town Center;

2. Variance criteria contained in our City Code which must be fully met before the DRB can approve a variance request.

I want to assure you that the City will do everything we can to accommodate your schedule, but I want to be sure you understand the legal limitations to fast tracking the review process.

Once again, it was a pleasure to meet with you. I appreciate your cooperation in finding an acceptable design alternative that will do justice to the Town Center, including the future Town Center Park, and still meet your client's needs. If you have any questions, please feel free to contact either Blaise or me at (503) 682-4960.

Sincerely,

Wayne C. Sorensen

Wayne C. Sorensen
Planning Director

wcs:dp
Enclosure

TO: Honorable Mayor and City Council

FROM: Arlene Loble
City Manager

RE: City Manager's Business

DATE: December 12, 1991

SUBJECT: PROJECT THUNDER DEDICATION OF PARK LAND

Project Thunder, which is Phase II of the Town Center development, was approved by the Planning Commission and now goes before the Design Review Board. I have attached a copy of their proposed design and their request for variances from the sign code. I bring it to your attention because it seems so entirely inconsistent with what has been previously approved in Town Center and the architectural proposal was not before Planning Commission for review. They have not seen the design proposals that dealt solely with the land use issues.

There are a couple conditions of approval that need to be brought to Council's attention. One of the conditions of approval requires the dedication of a 5.4 acre public park. The dedication would be required at the time occupancy permits are issued unless the City Council and the applicant agree to a later date. The value of the property to be dedicated is at least $1,000,000, and the developers would like to be involved in the planning for park development but because of the value of the land are not willing to pay for any of the associated development costs. It is my understanding that at Phase I approval one of the conditions included not only the land dedication but financial responsibility for development of the park. That condition has now been removed because of the cost of the park land.

Leaving aside for the moment the inappropriateness of the design of the project, you can see from the attached exhibit that shows the location of the open space and the proposed building pads. This $1,000,000 park is really located in the backyard of the proposed development. Because of the type of business which is some sort of high tech retail, the rear of the building, which faces the park, doesn't even include any windows - just a large expansive blank wall. To help offset that, a smaller building to be developed at a future Phase III has been placed on the property in such a way that it could front into the city park. The development that has already occurred in Phase I, the shopping center, also faces its least attractive areas into the proposed park site. If the open space actually is worth $1,000,000, it will take at least that, in terms of the City's financial commitment, to improve the park. To put that kind of money into something that is really more of an after thought than a planned part of the development seems to me to be a big mistake. This is a

good example of something coming to Council's attention so late in the planning process that you have not had any meaningful input and yet now the City will be asked to make a substantial financial commitment. If the land is to be dedicated the developers justifiably want to know that the property will be developed in the future. What should be a wonderful design feature is really just an after thought. I don't know what, if anything, can be done at this stage, but I wanted to bring it to your attention as we will need to begin negotiations over the actual dedication of the property. Do you want a park in this location under these circumstances?

Another condition of approval that I would like to bring to your attention deals with the handling of storm drainage. Once again, this looks like we could be creating future problems because we have not had an engineer on staff and the project has probably not received the level of review from an engineering perspective that is necessary. So, the Planning Commission has added a requirement that storm sewer plans need to be coordinated with the City Engineer with a possibility of exploring the feasibility of onsight retention. As proposed by the developer, they would be eliminating the existing detention area and paving it over for additional parking. I don't know how this impact as a wetland but the staff report also brings that issue to your attention. Since the detailed engineering won't be done until or unless the plan is approved, we won't know until we get further into it how the developer's engineer plans to handle storm drainage. It is possible that they will actually need to relocate water and sewer lines that have been installed in Phase I in order to accommodate the proposed storm drainage plans for Phase II. Again, this is an area where we truly need the assistance of a City Engineer.

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

MEMORANDUM

TO: Wayne Sorensen, Planning Director
FROM: Steve Starner, Community Development Director
DATE: December 9, 1991
RE: Project Thunder

In keeping with our usual land use process, the engineers associated with the development team for this project have submitted detailed studies to quantify the impacts of traffic volume and storm sewer capacities. Although their conclusions demonstrate compliance with Wilsovnille's development criteria, I am concerned about some of the practical issues raised in the staff report.

A. Traffic - Wilsonville Road/Parkway Avenue intersection

The Wilsonville Code does not require Project Thunder to demonstrate compliance with level of service "D" at the above-referenced intersection. However, for any motorist currently using the intersection during peak hours, it is obvious vehicle congestion is reducing existing traffic management functions to an unacceptable quality. Especially for motorists attempting to enter Wilsonville Road from Parkway Avenue, the City is exploring the following:

1. Increasing the visability of the "Do Not Block Intersection" signage.

2. Placing a pavement stop bar on Wilsonville Road which corresponds with the intersection signage.

3. Controlling ingress and egress to Parkway Avenue north of Wilsonville Road.

4. Investigate the installation of an intersection traffic signal which would operate in sequence with the interchange traffic controls.

5. Investigate the construction elements involved with a new roadway joining Parkway Avenue and Town Center Loop West.

Ultimately, traffic congestion adjacent to the Wilsonville interchange (from Town Center Loop West to Kinsman Road) will only be relieved when ODOT completes the construction of the expanded interchange design.

B. Storm Sewer - Memorial Part

As I understand it, Project Thunder storm drainage will flow into the I-5 storm sewer system. At peak flows, excess water will be diverted into the Phase I (Thriftway/Payless development) storm sewer which flows past the Library and into Memorial Park. In order to accommodate the anti-cipated flows, the following park storm drainage improvements are underway:

November - December, 1991	Surge basin, stilling basin and water quality swale design
January - February, 1992	Complete design
March	Construction bidding
April	Award construction contract
May	Begin construction
September	Complete construction

The estimated cost of this project is $124,420 and is scheduled to be funded in conjunction with Memorial Park improvements. Approximately 52 per cent of the total project cost may be recovered from a payback when the Teufel and Boozier properties develop.

Also, the City will soon be undertaking a City-wide storm sewer Master Plan study in order to identify and plan for infrastructure needs. Under the current storm sewer SDC program, Project Thunder will generate approximately $16,640 to be applied directly against the cost of the new Storm Sewer Master Plan.

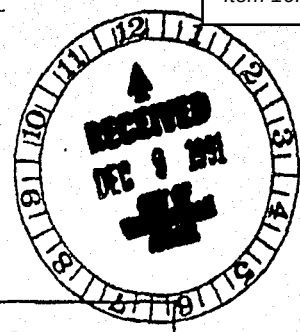
I hope this information is helpful.

ss:jme

PROJECT THUNDER

PEOPLE IN ATTENDANCE

MEETING: PLANNING COMMISSION
DATE: 9 DEC 91



NAME	ADDRESS
Ian Leitz	233 SE Washington St Hillsboro OR 97123
Loyal L Craven	JRS Architect 1611 SW Taylor Portland 97205
Jim Faulkner	3484 Far Hills Av Dayton, OH 45429 Design Forum Architects
Chris Tope	29025 S.W. Town Center Loop Wilsonville OR
Tom Jones	1099 SW Columbia PDX 97201
Rick Martin	1099 SW Columbia PDX 97201
Kim Beach	101 SW Main Suite 1500 Portland OR 97204
Don Main	8755 SW Citizens Drive Wilsonville
Mark Valdehey	610 SW Alder Suite 700 PDX 97205
Bob Lamb	13890 SW Bull Mt Road Tigard OR 97224

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1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
City of Wilsonville Annex
30470 SW Parkway
Wilsonville, OR.

Date: Dec. 2, 1991
Project Number: 467-0301
Project Name: Wilsonville Town Center
Regarding: Open Space Alternative Concept Plan

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
X Attached	For Your Info/File	KIM BEACH
Facsimile	X As Requested	LOGAN CRAVEN
Number Of Pages Including Cover	For Review And Comment	

Copies	Description
10	FOLDED FULL SIZE REVISED MASTER PLAN (SHT. #1)
1	PMT (8½"x11") OF ABOVE
1	ORIGINAL (8½"x11"): ALTERNATIVE OPEN SPACE CONCEPT.

Comments

Blaise:

Please enclose the attached materials w/in your staff report.

s - again for all your help !!!

Yours,

2703

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

November 26, 1991

Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 SW Elligsen Road
Wilsonville, Oregon 97070

RE: PROJECT THUNDER
DESIGN REVIEW SUBMITTAL
JOB NO. 4-755-0102

Dear Blaise:

Thank you again for taking time this morning to discuss Project Thunder. As per our discussion, the following items were discussed and agreed upon:

1. Approval of Drawing Scales:

   A. Design Review Submittal at 50 scale.

   B. Construction Document Submittal at 30 scale.

2. Approval to omit irrigation design for Design Review Submittal. Notes will be provided.

3. Design Review Submittal will be 50 scale landscape plan showing tree, plant and lawn layout. Plant lists and details will be provided as per City of Wilsonville's Design Review Criteria.

4. W&H Pacific will have 100% complete construction documents by December 27, 1991. We will submit to the City a set of complete drawings for additional information. These drawings will include complete landscape and irrigation plans and can be included for the January 27, 1992 Design Review meeting.

If you have any questions or comments, please give me a call.

Sincerely,

W&H PACIFIC

Matthew P. Simpson, A.S.L.A.
Project Landscape Architect

MPS/kal

STORAGE
6208
9600
22,892
420
216
39,336

SERVICE
4700
900
1020
640
1952
5016
2048
1008
17,276

RETAIL
47,874
2,240
5,880
7,920
63,914

REST
572
1024
4500
6,096

OFFICE
1856
200
50
5,294
288
912
240
149
128
9,117

EXHIBIT "A"

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

ADMINISTRATION DEPARTMENT
MEMORANDUM

DATE: OCTOBER 9, 1990

TO: DESIGN REVIEW BOARD

THROUGH: WAYNE SORENSEN, PLANNING DIRECTOR

FROM: MICHAEL E. KOHLHOFF, CITY ATTORNEY

SUBJECT: REQUESTED OPINION FOR LES SCHWAB TIRE CENTER

INTRODUCTION

At the City of Wilsonville's Design Review Board meeting of September 24, 1990, applicant, Les Schwab Tire Centers (Les Schwab), filed three legal objections to the planning staff's recommendations for revisions to the Les Schwab site plan applications as conditions of approval: violation of U.S. Constitution and Oregon Constitution free speech rights, lack of authority, and arbitrariness. The Design Review Board has requested my review of these objections, which are discussed below. The application was continued for decision only until the next regularly scheduled meeting in October.

The recommended revisions were to proposed material and color to the exterior of the tire center building. The site plan submitted by Les Schwab called for the building to be constructed of concrete block, with a metal roof and metal mansard. The proposed exterior colors of the building were red and white. The revisions recommend the use of red-colored brick instead of the red painted block on the south, east and west elevations, with the north elevation to be painted white. Also, the metal roof trim and mansard were recommended to be repainted with an earth tone color.

BACKGROUND

The City of Wilsonville was incorporated in 1969. Pursuant to state statute it adopted and had acknowledgment by the state its city-wide Comprehensive Land Use Plan and implementing Zoning Ordinance in 1982. As a newly developing city it has placed its emphasis on planning in the form of "planned development" for commercial, industrial and residential uses. In the area of commercial development, the City's Zoning Code provides:

"4.136 (1) (c). Planned Development Commercial shall be planned in the form of centers or complexes as follows:

a. The Town Center
b. Service Centers
c. Office complexes.
d. Commercial recreation.
e. Neighborhood commercial."

The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas.

The purpose of this zone is stated under 4.136 (l) (c) (12) (a).

> "Purpose: (i) The purpose of this zoning is to permit and encourage a City Center, adhering to planned commercial and planned development concepts, including provision for commercial services, sales of goods and wares, business and professional offices, department stores, shopping centers and other customer-oriented uses to meet the needs of the Wilsonville community as well as to meet the general shopping and service needs of an area-wide basis, together with such multiple family residential facilities, open space, recreational and park areas, and public uses facilities as may be approved as part of the City Center compatible with the Comprehensive Plan of the City."

The location of the Les Schwab property application is in the northwest corner of the Town Center commercial area adjacent to Interstate 5. The Town Center is planned as the City's focal center. The property's location is a major viewing point of the City's focal center and identity. Development has occurred in the area with appropriate uses, high quality materials and design, which has provided the city center with uniform and harmonious developments with an aesthetically pleasing visual environment. This development has been and is overseen by the City's Planning Commission and its Design Review Board, pursuant to the city's zoning code.

The Les Schwab application has duly gone through the Planning Commission Planned Development Approval process and is located appropriately in the service commercial area of Town Center Master Plan. Its use approval adheres to the planned commercial/planned development concepts for Town Center. It comes before the Design Review Board for site development approval.

LEGAL REVIEW

"Comprehensive planning is clearly recognized as a proper exercise of municipal police power, often seen as a safeguarding of property values on a broad public basis. The conservation of property values is a very common consideration in comprehensive zoning, ordinarily required by state zoning acts, incorporated in ordinances and sustained by the courts (footnote omitted). Likewise, regulations as to the height and mode of construction

of buildings have been sustained on the ground of the 'safety, comfort and convenience of the people and for the benefit of property owners generally'" (footnote omitted). McQuillan Mun. Corp., § 24.14 (3rd. Ed.)

As also stated in McQuillan Mun. Corp., § 24.10:

"It is well said that the police power is based chiefly on the Latin maxums, salus populi suprema est lex - the welfare of the people is the first law (footnote omitted) and sic utere tuo ut alienum non laedas - so use your property as not to injure the rights of another (footnote omitted). As stated by the United States Supreme Court, the police power 'has its foundation in the maxim of all well-ordered society which requires everyone to use his own property so as not to injure the equal enjoyment of others having equal rights of property'". (*Slaughter House Cases, 16 Wall 36, 21 L. Ed. 394).

However, the power of municipal government in this respect is not unlimited. It is limited by federal and state constitutional guarantees.

Applicant raises issues pertaining to federal and state constitutional rights to free speech, arguing that the proposed color revisions invade its rights to advertise as it chooses. Applicant also raises due process issues which prohibit the unreasonable, arbitrary use of such powers claiming the Design Review Board does not have the authority to limit materials and colors (unreasonable) and is without standards and criteria (arbitrary) to do so.

As previously stated, public necessity and protection of the public welfare forms the basis for the exercise of police power; that every person ought to so use his or her property so as to not injure one's neighbors. The unavoidable consequence of the need to exercise the police power in this regard results in the restriction on the use of property. It should also be noted that the police power is of a dynamic nature. McQuillan Mun. Corp., § 24.08 (3rd ed.) states, "Like equity jurisprudence, the police power has a dynamic or progressive capacity to be applied to new subjects or to be exercised by new or revised measures as economic and social changes require."

Wilsonville adopted its zoning code as an exercise of its police power. The presence of its Design Review Board is an example of the progressive capacity which was brought about by the public necessity and modern day quality of life concerns. Wilsonville as part of its general zoning regulations provides in 4.151 General regulations - signs for signage regulation.

The public necessity to regulate signage in terms of time, place and manner so that the signage chosen is not abusive of the rights of others is clearly recognized. See cases cited in McQuillan Mun. Corp., § 24.384 (footnotes 1-10). Within these general regulations, 4.151 (3) applies to commercial use within the Wilsonville Town Center as follows:

> "(a) The Wilsonville Town Center, as designated in the Wilsonville Code, Section 4.136 et seq., is well suited for the institution of a coordinated signing program because of its geographic unity, focal location, and the fact that it is in the early stage of development. The purpose of Section 4.151(3) of this chapter is to provide the Town Center with a program of coordinated signing which is both functional and aesthetic, and to provide a method of administration which will insure continuity and enforcement. In this manner, the framework will be provided for a comprehensive balanced system of street graphics which provide a clear and pleasant communication between people and their environment..."

"In regulating the use of street graphics and building signage, the following design criteria shall be applied in conjunction with the provisions of this Code: That street graphics and building signage be:

1. Appropriate to the type of activity to which they pertain.

2. Expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole.

3. Legible in the circumstances in which they are seen.

4. Functional as they relate to other graphics and signage."

Wilsonville Code 4.001 (70) defines "sign" as "***painting...or other device that is designed, used or intended for advertising purposes, or to inform or to attract the attention of the public, and includes where applicable...display surfaces and all components of the sign***".

Wilsonville Code 4.151 (3) (b) (2) provides the following definition: "Building Graphics. Signs that are not located within the first 15 feet of a property line that abut a public right-of-way. Building graphics are signs that include building-mounted and roof-mounted signs."

Wilsonville Code 4.151 (3) (d) (3) a. provides for Building Graphics Signage: "The total square foot of all signs except the single address sign and the street graphics sign shall not exceed the width of the building occupied by the use advertised. The width of a building is to be measured as the longest dimension of the width or depth of the building."

Wilsonville Code 4.151 (3) (c) (2) a. provides authority of the Design Review Board "...to administer and enforce all the provisions in Section 4.151(3) as they affect the design function and appearance of the sign."

Therefore, assuming that the applicant painted color schemes are as it proposes "an important element of the company's advertising" that "aid instant customer recognition", then the painted color scheme is a sign under Wilsonville Code 4.001 (70) whose display surface is violative of the size limitations for building graphics under 4.151 (3) (d) 3.a.

The specific criteria of size rationally limits a building by virtue of the amount and color it's painted from becoming a massive, garish sign incompatible with its neighbors. This is a reasonable time, place and manner prohibition to prevent an abusive medium, and is context neutral. The thrust of Art. 1, Section 8 of the Oregon Constitution is that free speech is not to be restricted unless it becomes abusive. See Ackerly v. Multnomah County, 72 Or. App. 617, 696 P2d 1140 (1985). The maxums involved in the police power cited above to not injure the property of others are found in the design criteria also cited that building signage not only be appropriate to the type of activity to which they pertain, but also be expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole. There is an obvious need to protect the aesthetic nature and character of other properties and the identity of the Town Center. There is no less need to preserve the property values of peaceful and harmonious use from loud and offensive noise than from loud and massive signage. Each is equally abusive.

As referenced above, comprehensive planning is widely recognized as a legitimate exercise of police power to preserve property values. Because of geographic unity, focal location and its early stage of development there is a rational basis to provide for a

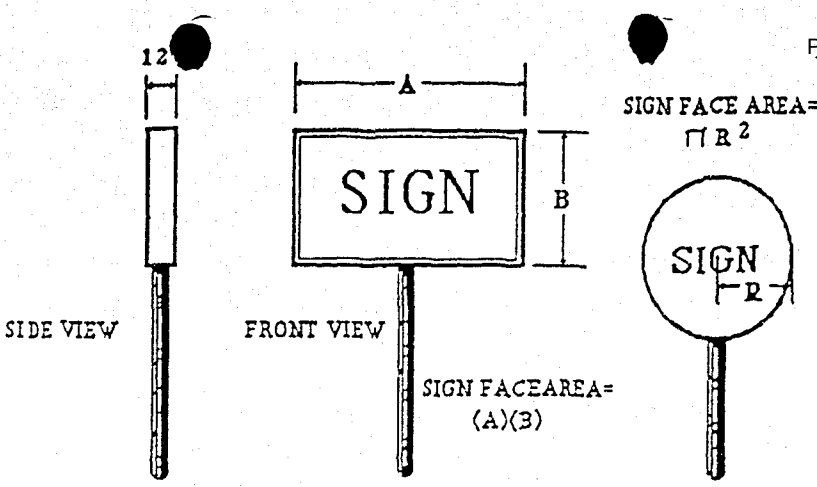
coordinated signage program which is both functional and aesthetic and to provide a method of administration through a Design Review Board for Town Center development. Clearly, this is in keeping with the multiple and often interrelated purposes set forth in 4.440 of the City's Code for Design Review Board. General criteria and standards are set forth to review site development in section 4.421, including color and material and as it relates to advertising medium that they "shall not detract from the design of proposed buildings and structures and the surrounding properties." Aesthetic sensibilities are also recognized as a sole ground and a proper subject for support of zoning regulation. See Oregon City v. Hartke, 240 Or 35, 400 Ord. 255.(1965); Naegele Outdoor Advertising v. City of Waynesville, 833 F.2d 43 (CA4 1987); Don's Porta Signs Inc. v. City of Clearwater, 829 F2d 1051 (CA11 1987).

The dynamic nature of police power is clearly seen in the contemporary, community trends to view aesthetic considerations as valid subjects for the exercise of police power. The very exercise of police power is based upon need. Modern, contemporary society has recognized that advertising in the commercial setting has historically been poorly constructed, grossly disproportionate in size or height, aesthetically disharmonious, located in manners detrimental to traffic safety, and has even obscured the rights of others to be seen, creating a need to establish reasonable time, place and manner restrictions.

On the other hand, such necessity has not risen to the same level of need to regulate the use of homes as signs. The business entrepreneurs who are willing to advertise their commercial product by virtue of using gross advertising structures in commercial areas have not historically turned their private homes into such uses. In short, the need to protect other homeowners from the detrimental effects of having the color schemes of homes turned into speech of a loud and abusive nature has not presented a public need to regulate. (Often, developers have instituted self regulation through homeowners associations in residential subdivisions). Thus, single family dwelling units are exempt from initial Design Review Board development approval. They are not exempt if and when the use involves signage. There are specific regulations which the Design Review Board has authority to govern addressing normal and typical signage within a residential use area, namely residential name plates, 4.151 (l)(a), bulletin boards, 4.151 (l)(b); real estate signs advertising individual lots, 4.151 (l)(c); subdivision signage, 4.151 (l)(d) and home occupation signage, 4.151 (l)(d). Nor is the applicant's comparison of industrial Planned Developments with the commercial developments a justification for not distinguishing the differences in the nature of uses. What may be appropriate to locate and identify industrial users and be harmonious with other surrounding industrial properties may, in fact, not be compatible with commercial uses. That basic recognition between different uses is what allows for zoning districts in the first instance.

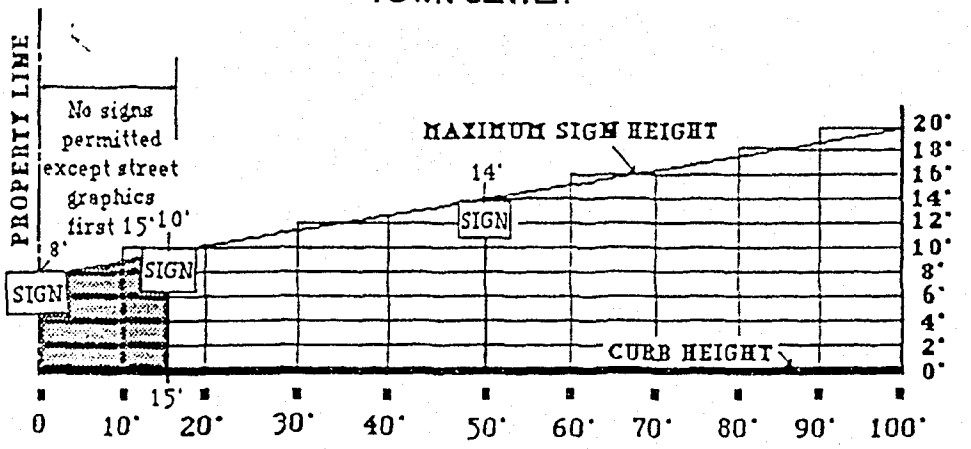
Therefore, I am of the opinion that the recommended revisions submitted by staff are reasonable time, place and manner restrictions, to prevent the use of a building as a grossly, large sign offensive to aesthetic sensibilities, coupled with the use of materials which are not harmonious with existing properties and the focal nature of Town Center to the detriment of the property of others. The regulations provide authority in the Design Review Board to act and neither as set forth or applied, are they arbitrary.

mek:pjm



SIGN FACE MEASUREMENT

TOWN CENTER



The maximum height of a sign is measured from a point 8 feet above the curb at the property line, to a point 20 feet in height or 4 feet above the roof, which ever is less.

MAXIMUM SIGN HEIGHT

EaE1aE1a
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRST
UVWXYZ
123456780&?!$(.,,.)^^><

FIG. 2

CHAPTER 4, ZONING CODE
TOWN CENTER SIGNAGE CODE
EXHIBIT "B"

2711

City of Wilsonville
COMMUNITY DEVELOPMENT DEPARTMENT
Memorandum

November 7, 1991

TO: Blaise Edmonds, Planning
FROM: Martin Brown, Building Official
SUBJECT: DEVELOPMENT REVIEW TEAM

The following is a list of concerns for the proposed Project Thunder and the proposed Liberty Organization office/warehouse. Actual working drawings may expose additional code concerns.

THUNDER PROJECT

1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

LIBERTY ORGANIZATION OFFICE/WAREHOUSE

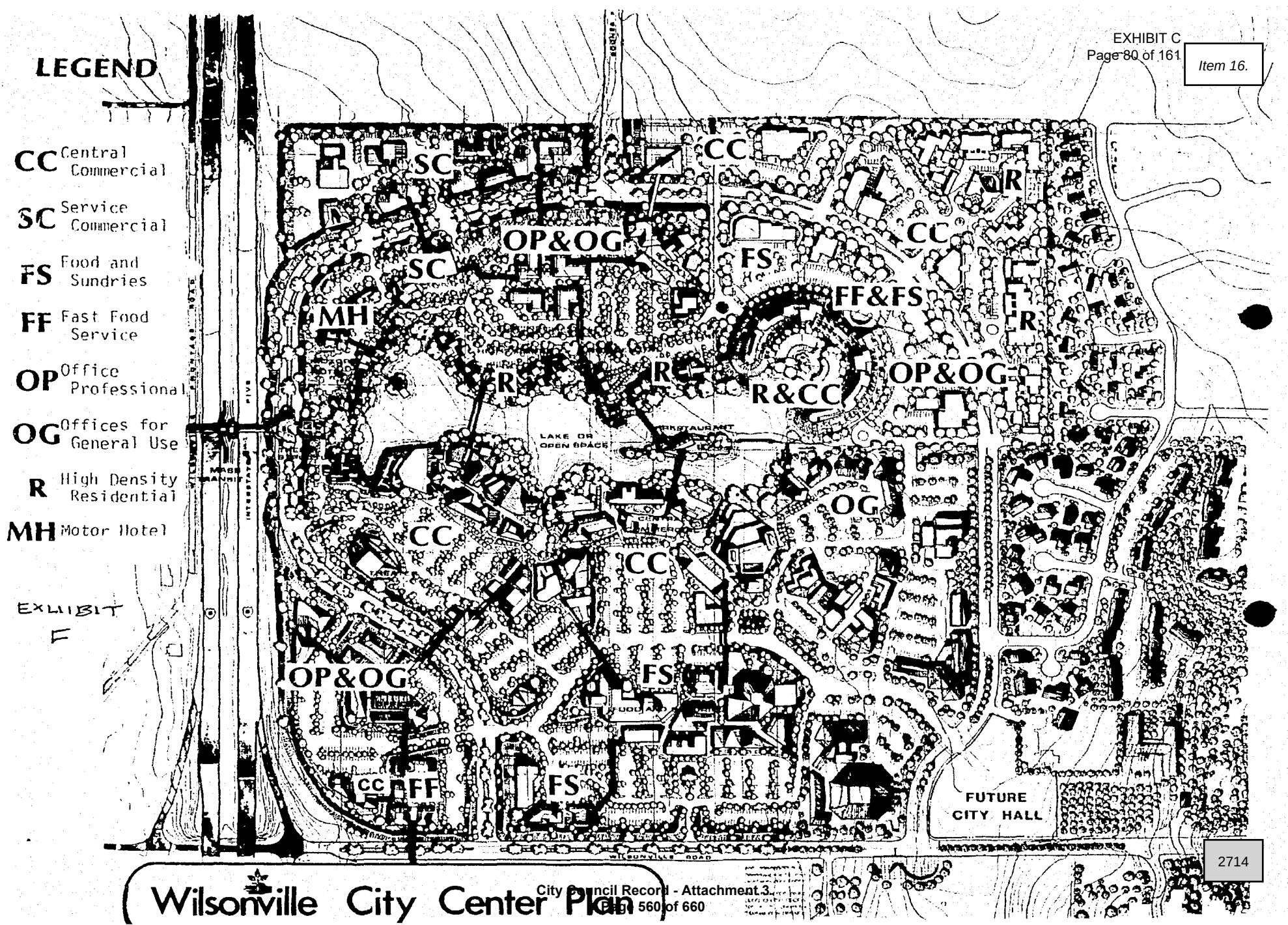
1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

2. Proposed building shall comply with the A.D.A.

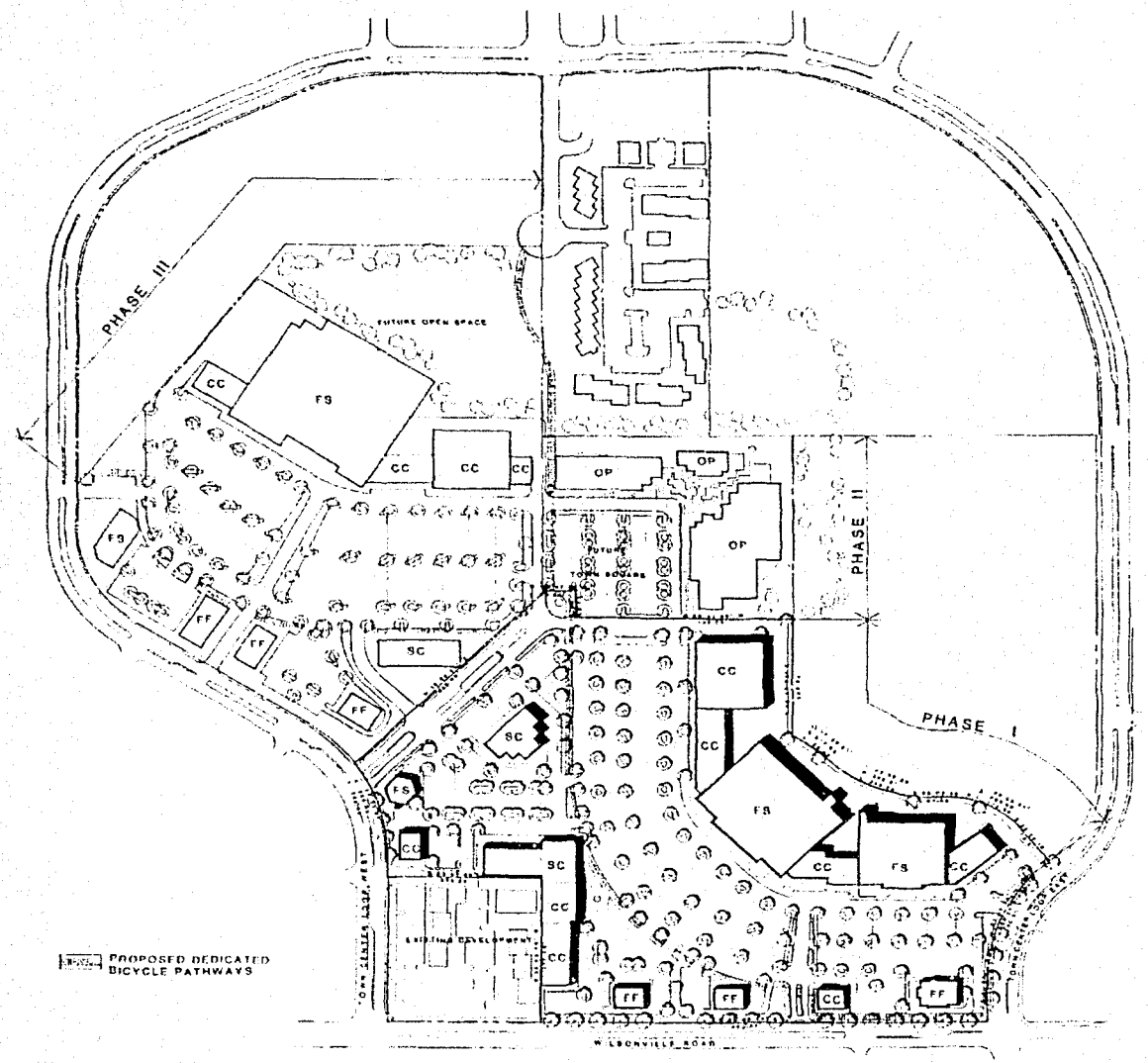
/sf

EXHIBIT E

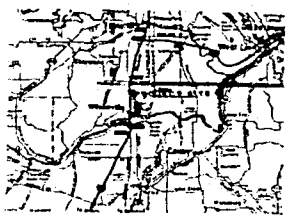
DEFECTS IN ORIGINAL DOCUMENT



Wilsonville City Center Plan



MASTER PLAN: PHASE I, II, & III



VICINITY MAP

ACREAGE

PHASE I	23.17 ACRES
PHASE II	5.41 ACRES
PHASE III	22.02 ACRES
TOTAL	50.60 ACRES

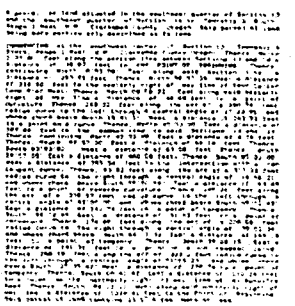


EXHIBIT H

JKS Architects PC

WILSONVILLE MARKETPLACE

1

EXHIBIT G 1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OREGON 97205 • (503) 228-5230 • FAX (503) 273-8169

October 16, 1991

Ms. Kim Beach
Capital Realty Corporation
101 SW Main, Suite 1500
Portland, OR 97204

RE: Traffic Analysis for Wilsonville Town Center Phase II

Dear Ms. Beach:

The purpose of this letter is to discuss the results of an update to the April 1990 Traffic Impact Analysis we conducted for the Wilsonville Town Center relative to the current phase II development proposal. Some of the specific issues that this letter addresses include:

- the level of development proposed in the current phase II submittal,
- the level of development analyzed in the April 1990 Traffic Impact Analysis,
- an update of current conditions within the vicinity of the site
- an assessment of projected conditions upon completion of the current development proposal
- an assessment of the need for a traffic signal at the Wilsonville Road/Town Center Loop West intersection upon completion of the proposed development

Based on the results of both the previous and updated analysis, the proposed development can occur while still maintaining acceptable levels of traffic operations and safety at site driveways and nearby key intersections. The significant findings and recommendations are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

EXHIBIT G-7 SUPPLEMENT

2716

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Current Phase II Development Plans

The current phase II development plans call for the construction of a retail facility consisting of approximately 159,000 gross square feet of floor area. This development level (and substantially more) has already been accounted for in the previous traffic impact analysis. The traffic impact analysis conducted in April 1990 considered a Phase I development level of approximately 211,000 gross square feet of floor area, and a combined Phase II and III development level of approximately 451,000 gross square feet of retail space and 40,000 gross square feet of commercial office space. Therefore, the original traffic impact analysis, which evaluated conditions through the year 1995 is considered to be more than adequate in terms of its assessment of traffic impacts of the proposed development for the four year horizon. Included with this letter are 10 copies of the April 1990 Traffic Impact Analysis.

Update of Existing Conditions

Within the last week, Kittelson & Associates, Inc. obtained weekday p.m. peak hour turning movement counts at the intersections of Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East. The results of those counts revealed that compared to the counts conducted in conjunction with the April 1990 study, traffic volumes have increased by approximately 70 percent on Wilsonville Road, by approximately 80 percent on Town Center Loop East, and have remained essentially the same on Town Center Loop West. The growth in traffic on Wilsonville Road and Town Center Loop East is due primarily to the substantial amount of residential development that has occurred within the vicinity of the site (particularly to the east of Town Center Loop East) within the past year, as well as to the development associated with Phase I of the Wilsonville Town Center.

The reason traffic volumes have remained basically the same on Town Center Loop West is likely due to the fact that the majority site-generated traffic associated with Phase I of the Wilsonville Town Center, as well as some of the site-generated traffic from the retail/office development located in the southwest corner of Town Center Loop are using the Wilsonville Town Center access drives on Wilsonville Road and Town Center Loop East. Another contributing factor may be that traffic volumes within the Wilsonville area have re-distributed somewhat since 1990. Table 1 displays a comparison of the 1990 and the current 1991 volumes.

TABLE 1
COMPARISON OF PEAK HOUR VOLUMES

Intersection	Approach	1990 Volume (Veh/Hr)	1991 Volume (Veh/Hr)
Wilsonville Rd./ Town Center Loop W.	Westbound	165	410
	Eastbound	530	785
	Southbound	295	270
Wilsonville Rd./ Town Center Loop E.	Westbound	155	300
	Eastbound	280	435
	Southbound	80	145

Based on the results of the recent p.m. peak hour traffic counts, Level of Service analyses were conducted at each of the intersections following the analytical techniques described in the *1985 Highway Capacity Manual*. Table 2 displays the results of that analysis. As indicated in the table, both intersections are currently operating at Level of Service "D" or better, which is considered acceptable by standards.

Projected 1992 Conditions

The current site plan indicates that three access driveways on Town Center Loop West will serve the proposed retail development, consisting of a main access drive, a secondary access drive, and a service drive on the north end of the development which will be limited to right-turns only. This access scheme is consistent with what was assumed in the 1990 Traffic Impact Analysis, with the exception of the north service drive. In the previous analysis, the two primary access drives were projected to operate at Level of Service "D" or better through the year 1995. Given that traffic volumes will be substantially lower in 1992 than the projected 1995 levels, all three driveways serving

TABLE 2
PM PEAK HOUR LOS
EXISTING TRAFFIC VOLUMES

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	113	D
Wilsonville Rd./ Town Center Loop E.	PM	299	C

the development are anticipated to operate at Level of Service "D" or better upon completion development.

Estimates of site-generated traffic for the Phase II development proposal were added to the existing traffic volumes at the intersections of Wilsonville Road/Town Center Loop W. and Wilsonville Road/Town Center Loop E. Based on that assignment, additional analyses were conducted to assess the level of service at these two intersections upon completion of the development. Table 3 displays the results of that analysis. As shown in the table, the intersection of Wilsonville Road/Town Center Loop West is anticipated to experience an "F" Level of Service, which is considered unacceptable by City standards. An examination of signal warrants contained in the *Manual on Uniform Traffic Control Devices* indicates that at least two warrants for a traffic signal will be met under projected 1992 conditions.

Based on these results, and given that background traffic volumes on Wilsonville Road are likely to continue to increase somewhat, it is recommended that a traffic signal be installed at the Wilsonville Road/Town Center Loop West intersection coinciding with the completion of the current Phase II development proposal. Based on this recommendation officials at Capital Realty Corporation have retained Kittelson & Associates, Inc. to begin the preliminary design of a traffic signal at the Wilsonville Road/Town Center Loop West intersection.

TABLE 3
PM PEAK HOUR LOS
PROJECTED 1992 EXISTING + SITE TRAFFIC

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	-29	F
Wilsonville Rd./ Town Center Loop E.	PM	113	D

I trust that this letter adequately addresses City staff's traffic related concerns with respect to this development proposal. If in the meantime you have any questions or comments please do not hesitate to contact me.

Sincerely,

Mark A. Vandehey

Mark A. Vandehey
Associate

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Request for Modification of Condition of Approval No. 90PC15

On behalf of the Owner, Capital Realty Corp., we request a reconsideration of Condition No. 8 of Planning Commission Resolution No. 90PC15 to provide the opportunity for Capital Realty to work with the City to accomplish the following:

1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions,

2. To formulate a development plan and time frame consistent with the development of Phase II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto.

Concurrently submitted to you are Stage I Master Plan Re-submittal and Stage II, Phase II of the Center. We feel that they have a bearing on this condition and warrant review.

Thank you for your consideration, if you have any questions, please call.

Very truly yours,

Richard S. Brooks, AIA
Project Manager

bc

C:\BC\RSB\WTC-1017.PM

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT G-8

2721

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bassinger AIA • Gerald H. Williams AIA • Of Counsel: John F. Jensen AIA Emeritus
Associates: Richard S. Brooks AIA • Warren A. Tyler AIA

Stage I Master Plan Re-submittal
Wilsonville Town Center—Wilsonville, Oregon

1. Nature of Application:

This is a re-submittal for Stage I Master Plan approval for a proposed retail development of 59.79 acres, to be located adjacent to, and north of Wilsonville Road spanning from the southeast portion of Town Center Loop East, the inner portion of Town Center Loop West, north to the intersection of the Loop West and Parkway in that area previously designated as The Wilsonville Town Centre.

The Applicant:

Seeks to develop the site as a community shopping center. The center, at full build out would consist of approximately five larger retail commercial anchor stores, infill retail commercial space and pads located independently from the central retail complex for commercial retail development.

The proposed development includes a total building area of approximately 500,000 square feet constructed in three phases.

Phase I

The existing development of Phase I will include retail commercial space of approximately 207,130 square feet oriented primarily to Wilsonville Road. The Phase I Center consists of three anchor tenants, including major grocery and drugstore tenants, with infill commercial retail shop space and several pads at the periphery for retail uses. Parking for Phase I is 1,063 spaces at a ratio in excess of five spaces per 1,000 square feet of gross leasable area. The third anchor and several of the pads are as yet un-built.

The initial development provides two full-turning accesses along Town Center Loop; one at the eastern end of the development near Wilsonville Road, and the other off Town Center Loop West, which is a heavily landscaped entry boulevard, that in later phases will become the central identified main entry to the fully built-out center. Further, a secondary full turn access is proposed at Town Center Loop West and the Northern boundary of the existing retail center; and finally in Phase I, a right-in-right-out access at mid-site on Wilsonville Road, which is temporarily a full access entry until development to the south of Wilsonville Road completes construction of the final road design.

EXHIBIT 69

1. Nature of Application: (cont'd)

Phase II:

The proposed Phase II development is one retail user of approximately 159,400 square feet located on 14.75 acres primarily fronting Loop Road West. Phase II is to be built and developed by a separate owner other than Capital Realty Corp. Capital Realty, however, maintains its right of review for compliance with the concept and intent of the Town Center retail development. Approximately 872 parking spaces are provided (see Stage II Submittal attached).

Phase III:

The proposed development of Phase III includes retail commercial space of approximately 143,568 square feet completing the connection to Phases I and II. The Phase III development would consist of one large retail anchor tenant, retail pad tenants, and a two-story professional office building oriented at the end of the main entrance boulevard.

The parking development for Phase III, approximately 980 spaces, brings the total parking count to 2,915 spaces, serving the proposed 510,000 square feet of gross building area.

2. Property Description:

The property is located north of Wilsonville Road, east of Interstate 5, and west of City Hall. The property is located on the following parcels:

Parcel 1: 19.73 acres
Tax Lots 600 and 601, Section 13, Township 3 south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

Parcel 2: 4.37 acres
Tax Lot 500, Section 13, Township 3, south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

2. Description (cont'd)

Parcel 3: 25.96 acres
Tax Lots 200, 300, and 405, Clackamas County Map 3-1W-14D and ownership interests in a triangle of land approximately 6,381 square feet on the west of Tax Lot 200.

Parcel 4: 9.73 acres
Tax Lots 101, 201, and 102 Clackamas County Map 3-1W-14D

3. Plan Designation and Zoning:

The subject site is designated commercial on the comprehensive plan map and zoned Planned Development Commercial on the zoning map. The site, being situated within the Wilsonville Town Center master Plan map, has underlying use designations indicating CC Central Commercial, FS Food and Sundries, OP Office Professional, FF Fast Food Restaurant, R high density residential, and open space.

The intent of our proposal is to accomplish the mix of other desired and designated uses within the boundaries of our development. We feel our plan as submitted is consistent with the comprehensive plan goals and with the Town Center Master Plan.

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Stage I Re-submittal Master Plan Approval Wilsonville Town Center
Stage II, Phase II Submittal

On behalf of Capital Realty Corp., and the owners of properties so designated as comprising the development area, we are re-submitting this application for a Stage I Master Plan Approval for a 59.79 acre commercial center and Stage II approval for the Phase II 14.75 acre site.

As you may be well aware, Phase I of this plan has been completed in part. The economics of the region and the country have impacted the nature of the project as originally planned. This re-submittal represents those pressures, and at the same time expands the size of the project while maintaining the original intent of mixed uses as outlined in the Wilsonville City Center Plan.

Capital Realty has the opportunity to bring to the Town Center project a major, innovative retail anchor which will comprise all of Phase II. This parcel will be sold to a separate user for which application for Stage II, Phase II is attached. Their progress and subsequent design submittals will be reviewed and monitored by Capital Realty.

The addition of this anchor, at this time will serve as a catalyst for the completion of Phase I buildings as well as increase the desirability of Phase III tenants. This, in effect, will improve the success of the entire City Center Plan to the benefit of Wilsonville as a whole.

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT 6-90

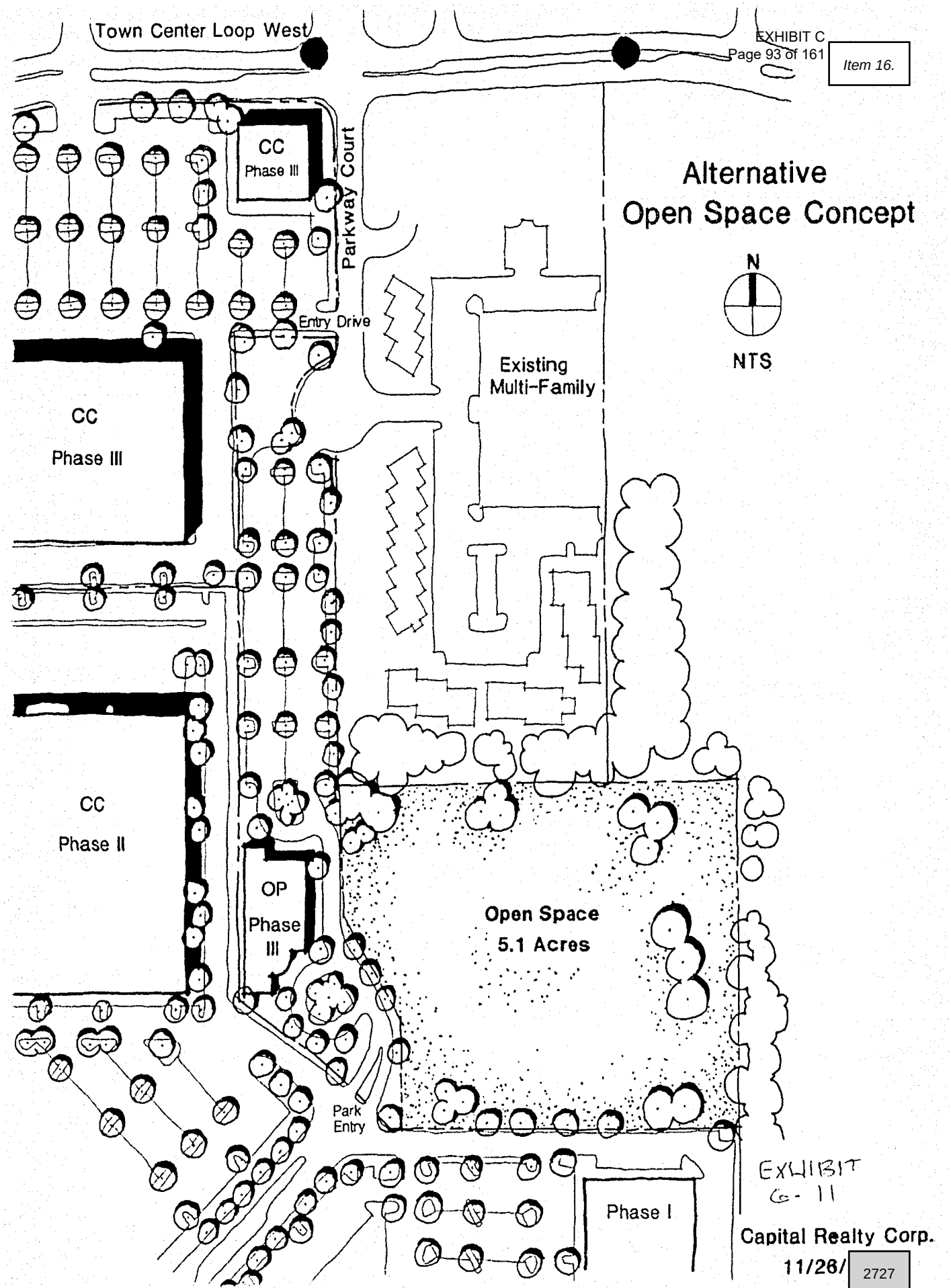
Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bassinger AIA • Gerald H. Williams AIA • Of Counsel: John F. Jensen AIA Emeritus
Associates: Richard S. Beyer AIA • Wayne R. Jacobsen AIA • Edward J. Sellers AIA • Warren A. Tyler AIA

We are always available to answer questions to aid you in your analysis of this re-submission and its compliance with the current conditions of approval. This project represents a long-term commitment on the part of Capital Realty in the development of a strong, successful center for Wilsonville which will serve the needs of all its citizens. Thank you for your's and the City Staff's time, energy and cooperation towards the realization of this project.

Sincerely,

Richard S. Brooks, AIA
Project Manager

bc


Town Center Loop West
CC
Phase III
Parkway Court
Entry Drive
Alternative
Open Space Concept
N
NTS
Existing
Multi-Family
CC
Phase III
CC
Phase II
OP
Phase
III
Open Space
5.1 Acres
Park
Entry
Phase I
EXHIBIT
G-11
Capital Realty Corp.
11/26/
2727

AS REVISED
11/19/2

DesignForum
ARCHITECTS

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 1R
REVISED GENERAL COMMENTARY:

Project Thunder is a single story building with mezzanine, 166,495 GSF retail sales building, with accessary storage areas. Project Thunder is a new concept in merchandising with this location selected for the pilot program.

Enclosed is data that we believe supports the design concepts expressed, outlines the project exterior signage program; building architecture, materials and colors. The project exterior lighting program, the project landscaping and site improvements information is shown on the revised drawings included with this additional submittal.

As per phone conversations with Blaise Edmonds, Associate Planner, the materials and colors sample board will be presented at the evening of the actual meeting. It will not be forgotten. We will provide a sample board of wall elements, as requested, as soon as we receive material samples from the manufacturers involved.

Enclosed within this booklet are color photocopies of the revised color scheme, two views, plus the proposed parking lot light standards with the directory signage of aisle indicators. Also enclosed is a new drawing titled "View Corridor Concept." Submitted separately are revised drawings DRBC1, DRBC2, DRB1, DRB2, DRB3, and DRBL1.

We believe we meet all known City of Wilsonville ordinances in regards to architecture, landscaping and site improvements. There are no signage variances required. We do request a deviation from the Phase I signage program as explained following. Since our reconsideration of the signage program has eliminated all variances we request reimbursement of the variance fees previously paid.

We request the Design Review Boards consideration of Project Thunder, as resubmitted.

Sincerely,

James L. Faulkner, AIA
Senior Vice President, Architecture

JLF:dr

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 2R
MATERIALS/COLORS DIALOGUE:

The general concept of the project design aesthetic is to create a vibrant and lively shopping environment, having this a "fun place to be". This concept is visualized to the shopper by the dynamic main facade of the building by three means: building form, materials selected and colors used.

The basic building background material is an "Exterior Insulation and Finish System", common name used Dryvit. While proprietary, we will use this term in this discussion. The Dryvit will be in a field color of light beige (neutral) with dark green color Dryvit used as a horizontal accent band on the North and West elevations. Dark green will also be used at the curved wall element of the primary building entry and exit points on the West elevation. The Dryvit will be on all sides of the building, scored in the patterns indicated on the elevations. Use of the dark green color relates this project to the Phase I buildings.

To compliment the Dryvit field, and to help to reduce the scale of this building, a horizontal band of metal siding, in a light bronze color with 50% reflectivity is expressed on the West, North and South elevations. This metal siding is a vertical pattern with vertical "grooves" 6" o.c. On the East elevation, the color and position of the metal siding is simulated by use of Dryvit accent band.

To accent and provide visitor orientation to the entry area, an open "dome" of steel framing, painted red, is mounted on the roof. Coupled with the curved element wall, this designates the building entry area. At grade the curved element concept is carried forward with curved concrete curbs, radial lined concrete walkways and flagpoles/bollards in a circular centerline aligning with the curved wall element at entry. The flagpoles are 25'-0" high, natural aluminum color, and will fly solid color flags or nylon banners. The non-illuminated bollards are 42" high, 10" diameter pipe painted light beige. Bollards around entry points will be internally lighted, and be painted red.

To further designate entry points, clear glass in natural aluminum storefront framing is located adjacent to the curved element entry area, and also occurs at the building service entrance and other secondary entrance points.

The overhead doors will be solid, insulating units without windows, painted light beige. Other secondary doors will be hollow metal painted to match adjacent wall color. Miscellaneous site items such as handrails will be painted black.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 3R

The following are our calculations of area for the Project Thunder Signage Program:

Wall Graphics:

Single face, backlit signs:

Store Name Sign*:	1 Each at 224 SF	=	224 SF
Fascia Sign: "Service":	1 Each at 12 SF	=	12 SF
Fascia Sign: "Customer Pickup":	1 Each at 28.5 SF	=	28.5 SF
Fascia Sign: "Car Stereo Installation":	1 Each at 40.5 SF	=	40.5 SF
TOTAL WALL GRAPHICS AREA			305 SF

* This sign of channelume construction with individual letters for the word "UNIVERSE"; the word "INCREDIBLE" is in script neon.

There are miscellaneous directional signs on site, i.e. stop signs, that are under 2' x 2' in size, single face, non-illuminated and pole mounted. These include the Parking Lot Aisle Indicator Signs: 12 each at 8 SF = 96 SF. These are shown on sheet DRBC1, but are not included in signage area calculations.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting **4R**

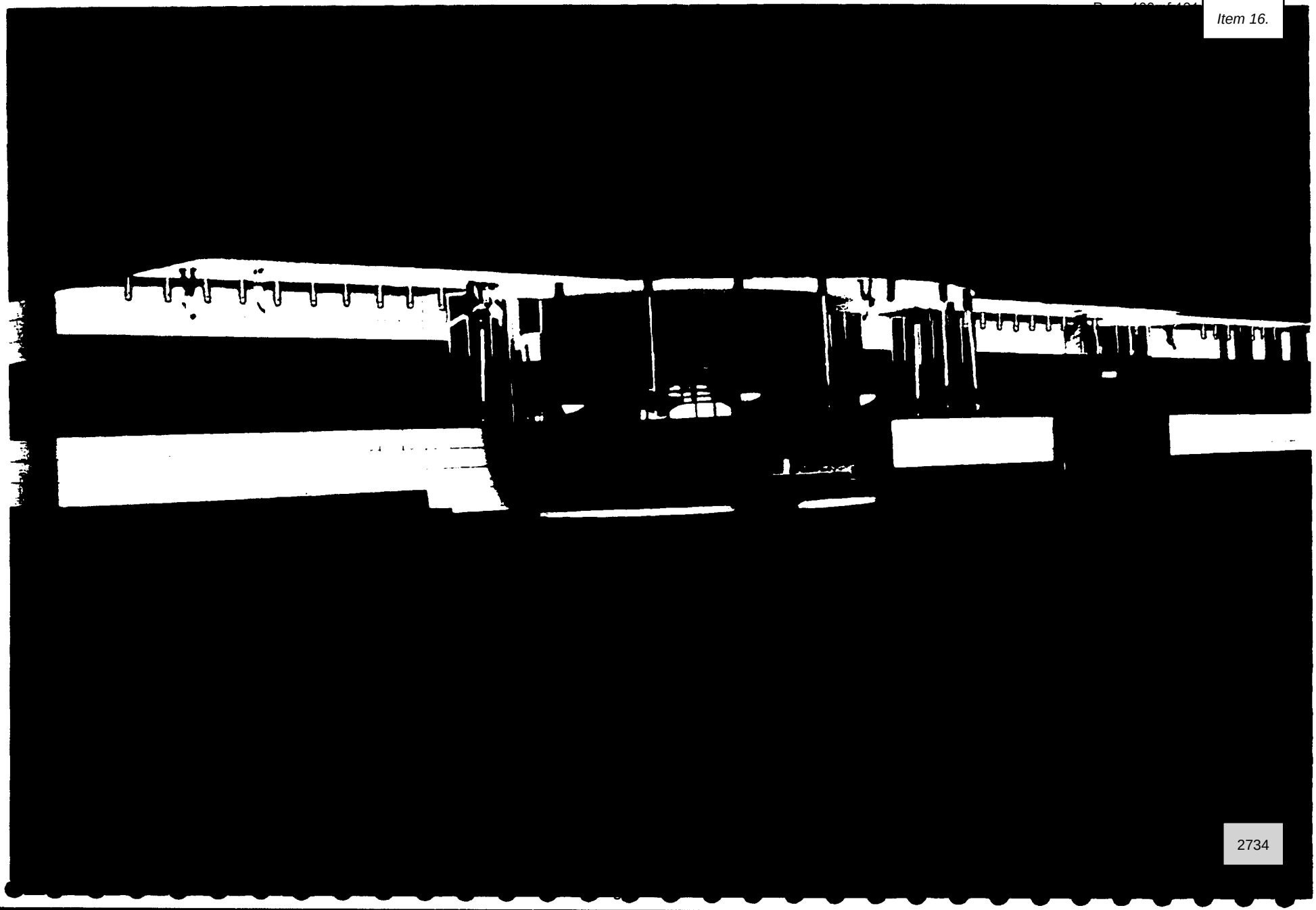
We request the consideration of the Design Review Board for a deviation from the Phase I, Wilsonville Town Center Signage program, as follows:

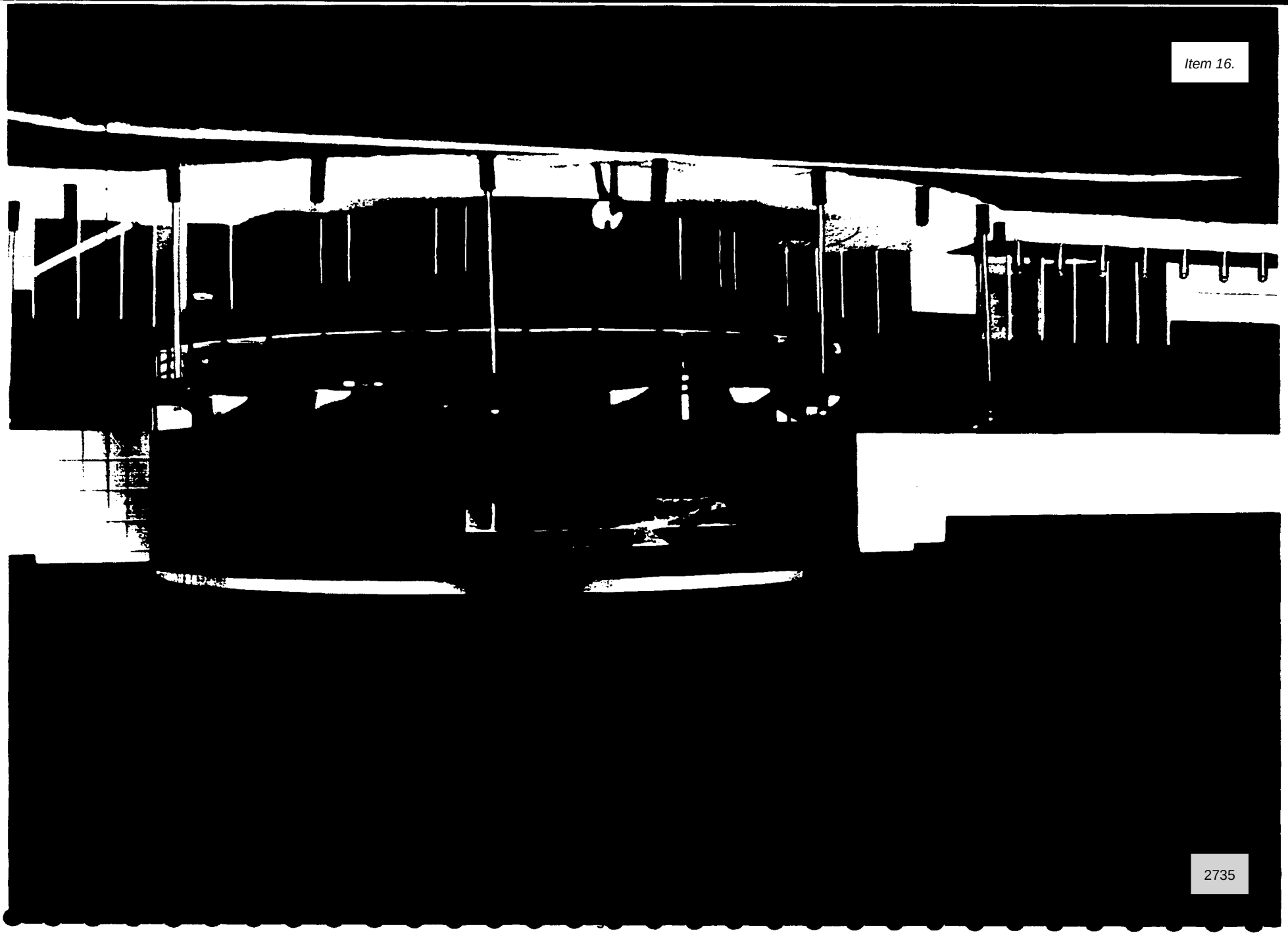
- Deviation #1 from Phase I signage program for sign construction method

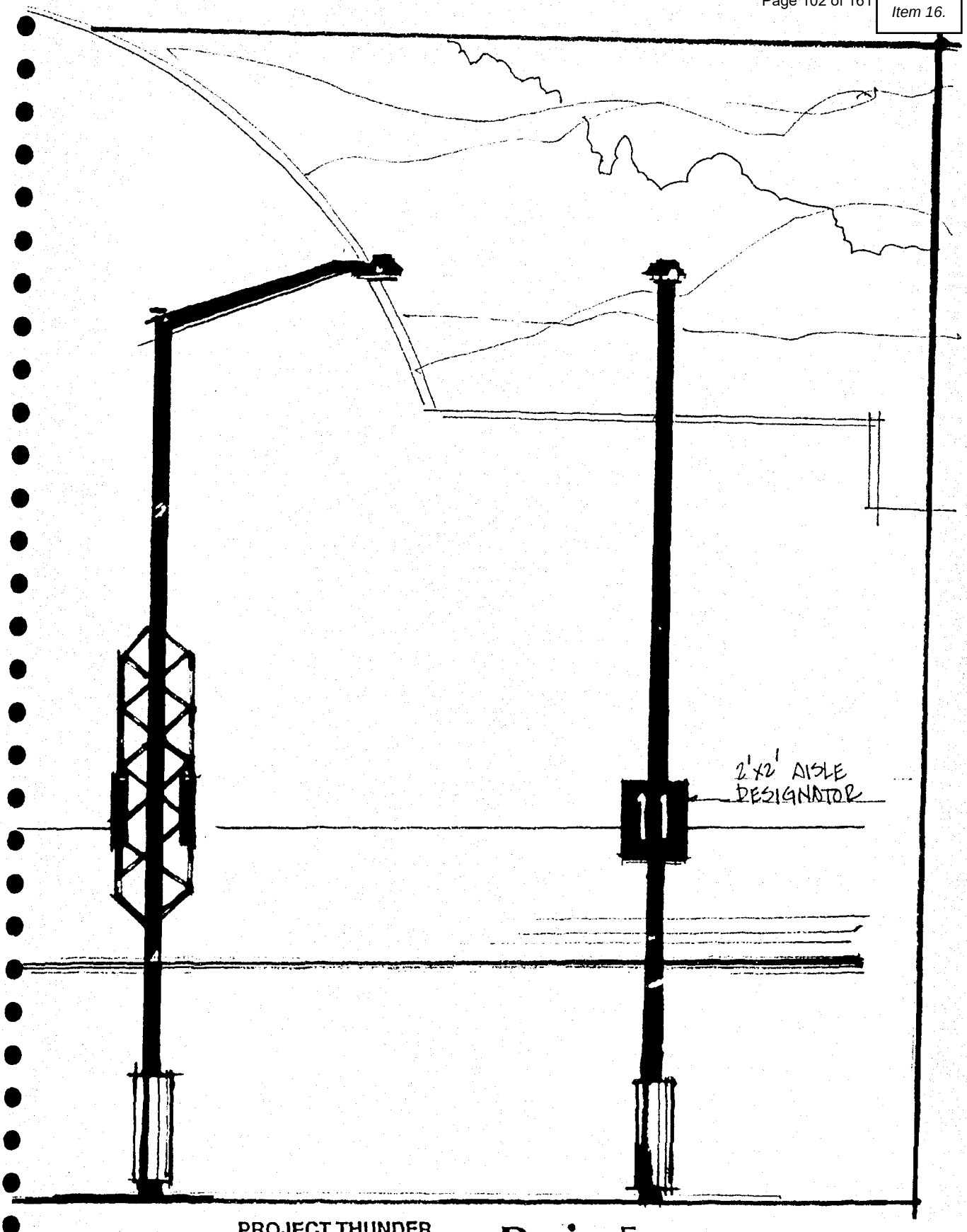
Deviation #1 from Phase I signage program for Wilsonville Town Center

We request this deviation from the approved program for the purpose of changing the method of construction for the 3 fascia signs (aggregate area approximate 81 SF) to be consistent with our design idiom. We feel our approach of a fascia panel type sign, back lit, cutout individual letters, appearing to be in a larger horizontal band to be of more benefit to this architectural design. Individual channel construction is not an appropriate usage in this application.

DEFECTS IN ORIGINAL DOCUMENT







PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting

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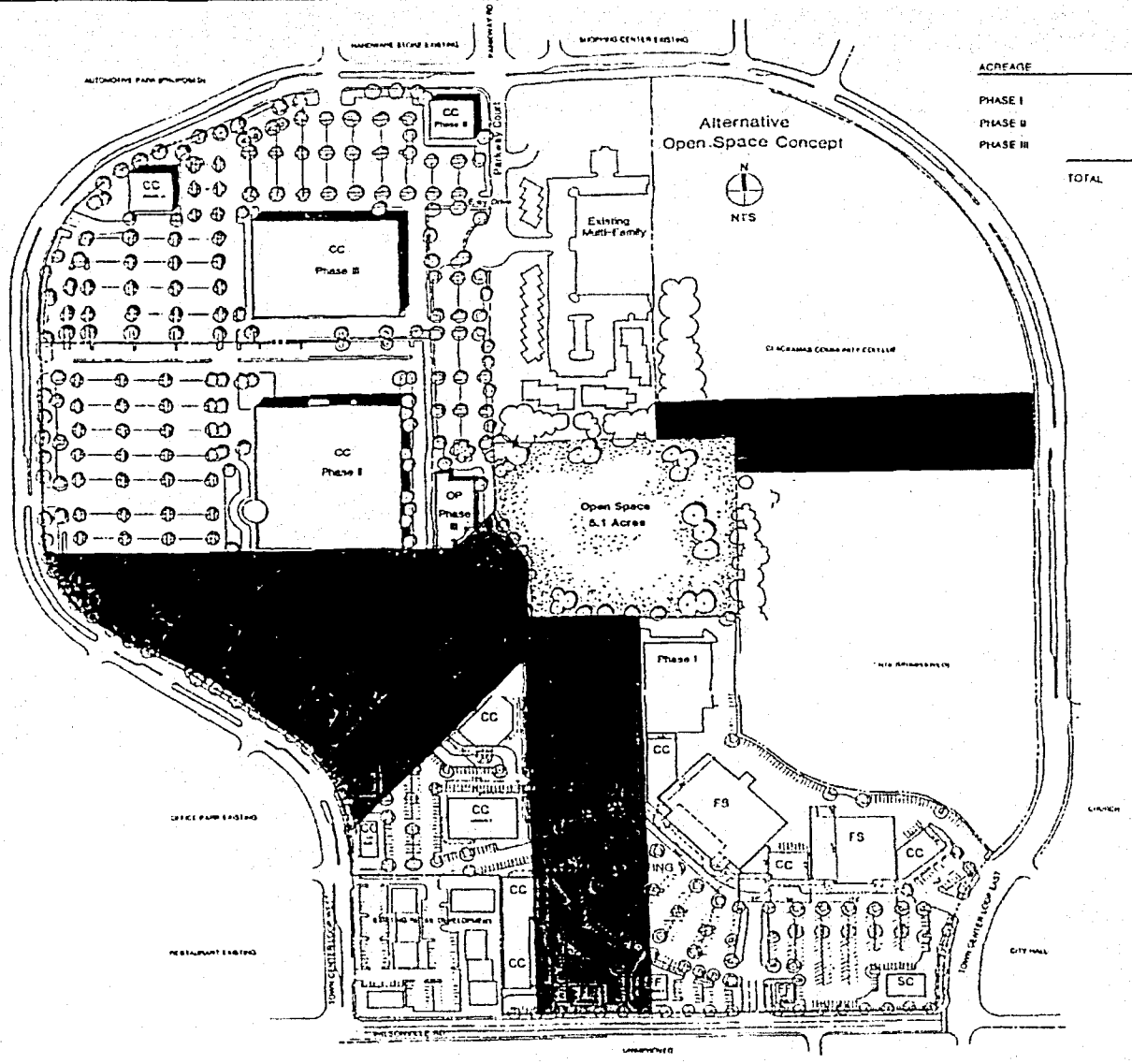
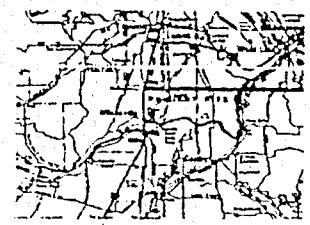
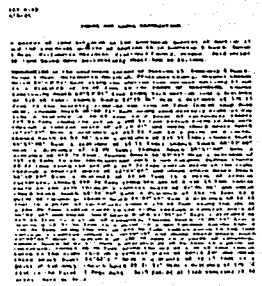
ARCHITECTS

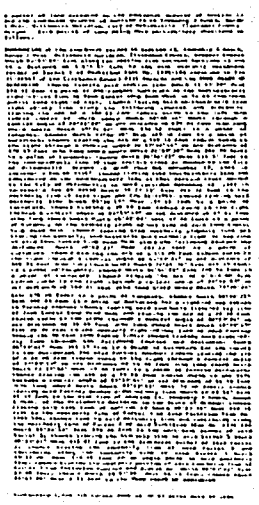


ACREAGE	
PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



VICINITY MAP





SITE MASTER PLAN: PHASE I, II, & III

VIEW CORRIDOR CONCEPT

1-6-92

JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

1

2737

DesignForum

LETTER OF TRANSMITTAL

From: William F. Bergman, AIA
Design Forum
3484 Far Hills Avenue
Dayton, OH 45429

To: Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 S.W. Elligsen Road
Wilsonville, OR 97070

We are sending you:
- [ ] Prints
- [ ] Estimates
- [ ] Copy of letter
- [ ] Samples
- [ ] Photography
- [ ] Specifications
- [ ] Keylines
- [ ] Layouts
- [ ] Plans
- [ ] Shop Drawings
- [ ] Comps Prototypes
- [ ] _____

COPIES	DATE OR NO.	DESCRIPTION
2	10/28/91	Preliminary Prints of First Floor and Mezzanine Floor Plans

- [X] For your use
- [ ] For approval
- [X] As requested
- [ ] For review & comment
- [ ] Approved & noted
- [ ] Construction approval
- [ ] Returned for corrections
- [ ] Returned after loaned to us
- [ ] Return _____ corrected prints
- [ ] Submit _____ copies for _____
- [ ] Resubmit _____ copies for _____
- [ ] For bids due _____
- [ ] _____

Remarks:

Signed: William F. Bergman
William F. Bergman, AIA
Project Architect

Date: 10/28/91

cc: Rich Hollander
Marla

MEMORANDUM

TO: Development Review Team DATE: October 21, 1991

FROM: Blaise Edmonds, Associate Planner, City of Wilsonville.

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).
2. Office and warehouse, Liberty Organization, applicant.
3. Comprehensive plan amendment, Mr. Marvin Wagner, applicant.

Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

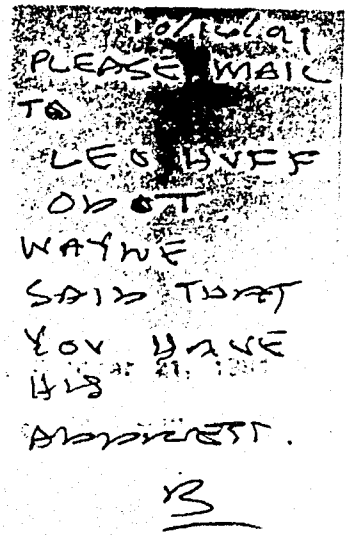
DATE: October 18, 1991

RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

Blaze—
I understand W&H says 150 cfs for Town Center to go into 48" culvert — is there more from other properties? If so how does that affect park drainage — if not I think probably need to make sure all info is available before abandoning on site retention — could keel a plus as a water feature for Town Center.
Mike.
cc. Steve Shaner



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(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

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1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: Blaise Edmonds
Pam Ehmons
City of Wilsonville, Annex
30000 SW Town Center Loop East
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 467-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	☒ For Your Info/File	
☒ Facsimile 682-7025	☐ As Requested	
3 Number Of Pages Including Cover	☒ For Review And Comment	
☐	☐	

Copies	Description
Yes	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Ehmons

2743

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

October 15, 1991

TO: Kim Beach, Capital Realty Corp.
Bill Bergman, Design Form Architects
All in Attendance

FROM: Tom Jones

RE: MINUTES OF MEETING WITH THE CITY OF WILSONVILLE
OCTOBER 14, 1991, 4:00 P.M. TO 5:05 P.M.
PROJECT THUNDER
4-467-0301; 4-755-0101

ATTENDEES: Tom Jones, W&H Pacific
Rick Martin, W&H Pacific
Pat Marquis, W&H Pacific
Logan Cravens, JKS Architects
Blaise Edmonds, City Planner
Pam Emmons, Planning Assistant

The following was discussed regarding the project in preparation for the Friday, October 18th submittal.

STAGE ONE SUBMITTAL

1. The site plan prepared by JKS should show:
   a. Revised project phasing
   b. Open space area as previously shown as a condition of approval from initial submittal.
   c. Specific "Town Center" land use designations must be shown for the northerly portion of the site not previously included and for any changed designations from the original submittal for Phases II and III.

2. Submit ten (10) copies of the original Traffic Report and provide an Executive Summary outlining any revisions to the initial projections and provide a summary that addresses the level of service "D" or better at surrounding intersections. Review the Parkway/Loop Road intersection.

3. Show existing adjacent land uses (i.e., vacant or improved) and the names of key surrounding developments for the Planning Commission orientation. Show only existing improvements not proposed.

4. Capital Realty must provide an updated list of addresses and property owners within 250 feet from the project.

(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

W&H PACIFIC

5. Capital Realty must submit the Certification of Assessments and Liens form with the application. This is to determine if the tax lots included owe money to the City. Contact Atta Curser for clarification.

6. All property owners must sign the application.

7. Application fees:
   a. Stage One Submittal: $500.00
   b. Stage Two Submittal: $250.00 plus $25 per acre (Project Thunder is 14.98 acres)
   c. Application fee for Friday: ($500 + $250 + $375 = $1,125)
   d. Design Review: $250 plus a fee for the master signage plan review.

STAGE TWO SUBMITTAL

1. Design of site signs are not required to be submitted until Design Review submittal of December 6th.

2. Landscape design needs to show planting areas, significant trees and plaza areas. Plant list is optional.

3. Grading calculations and storm drainage calculations are not required for Friday's submiual according to Blaise. Grading plan should show existing contours and general grading concept.

4. Utilities design should be kept schematic. Graphically illustrate the utility alignments that will require easement vacations and relocation.

5. Architectural elevations can be conceptual in detail. Planning Commission is only concerned with general massing and quality of appearance. Materials and color board to be submitted at Design Review.

6. If waivers to the City development standards are anticipated, be specific with your request and how it would be consistent with other surrounding project development standards.

GENERAL COMMENT

The two issues that will be of the most interest to the Planning Commission will be traffic and the implementation of the open space. We should develop a clear strategy to present to the Commission prior to the December 9th hearing addressing these two issues.

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

W&H PACIFIC

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FAXED 10/17/91

1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607

• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop ~~EAST~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 967-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	X For Your Info/File	
X Facsimile 682-7025	As Requested	
3 Number Of Pages Including Cover	X For Review And Comment	

Copies	Description
1es.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

2746

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

In Attendance:

Pam Emmons	City of Wilsonville, Associate Planner	WSV	503-682-4960
Martin Brown	City of Wilsonville, Building Official	WSV	503-682-4960
Steven Starner	City of Wilsonville, Community Development Dir.	WSV	503-682-4960
Jim Long	City of Wilsonville, Design & Survey Technician	WSV	503-682-4960
Doug Seely	Real Estate Investment and Sales	REI	503-655-7631
Jim Parsons	Grubb & Ellis	GEI	503-241-1155
Jim Faulkner	Design Forum Architects	DFA	800-835-4401

Item No.	Action	Item
1.10	CAP/WHP	Storm drainage is an issue. Calculations and 25 year storm design for Phase II master plan must be submitted with application by October 18, 1991 deadline. The connection for metered release to interstate highway from existing retention pond and the retention pond itself will be eliminated. According to Wayne Bauer of Wilsey & Ham Pacific, Civil Engineers for Phase I development of the site, the new storm sewer system was designed to accommodate this. The city would like to see calculations supporting this.
1.2	CAP/KAI	According to the city, a traffic light at Wilsonville Road and Town Center Loop West is now warranted. The north intersection at Town Center Loop East and West at Parkway Avenue needs to be addressed in traffic study.
1.3	DFA	The currently approved master plan calls for "Food and Sundries" (FS) and "Central Commercial" (CC). These zoned uses are compatible with the desired development of Project Thunder. No rezoning is necessary, however, currently approved uses will have to be redistributed on the site.

3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400 Fax: (513) 291-2842

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.4	ALL	The Stage I and Stage II planning review applications will be made simultaneously on October 8, 1991, and be reviewed simultaneously at the Planning Commission on December 9, 1991.
1.5	GEI	Hearing notification list for all property owners of record within 250 foot of any point on property (not including street widths) must be presented with October 18, 1991 submittal. Notification does not have to cross interstate highway. The city will send the notices. Jim Parsons will obtain list from assessors office or from a title company.
1.6	DFA	The signage theme from Phase I should be carried through Phase II. Sign issues are handled by the Design Review Board. Setback issues are handled by the Planning Commission.
1.7	DFA/WHP	The building is designed utilizing the "unlimited area" provision of the code. A sixty (60) foot minimum distance from all property lines and an approved automatic sprinkler system throughout will be provided to accommodate this provision.
1.8	TNB	There is a ten (10) day appeal period following design review approval. Normal procedure is such that no work should be commenced during the appeal period. Due to the tight schedule for this project and the need to utilize every available good weather period for site escavation, an option for work during the appeal period was discussed. A "hold harmless" agreement from owner in favor of the City of Wilsonville, enabling work to start immediately after design review approval during the appeal period at the sole risk of the owner has been used in the past to facilitate an early start.

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.9	WHP	For any construction to begin, fire hydrants must be installed to within 250 feet of any point of the exterior wall of the building. Work should begin immediately to obtain Public Works approval and have installation complete by scheduled start of construction, February 1, 1992.
1.10	ALL	The required completion date of construction necessitates a start date for construction of February 1, 1992. For this to happen, working drawings and specifications would have to be accomplished prior to design review hearing date of January 27, 1992. To minimize risk of changes to completed documents, a partial permit (foundation permit) can be applied for at a cost of $250.00. This would allow work to begin while balance of documents are being prepared. The review time for foundation and underground utilities permit is approximately three weeks, so documents should be submitted by January 10, 1992 for a February 1, 1992 start of construction.
1.11	DFA	The zoning height limitation for any point of the building is 35'-0". Design Forum will check with Blaise Edmonds regarding height of dome feature with center pole.
1.12	DFA	Elevations and material, color and finish boards must be submitted with Design Review Board application by December 6, 1991 deadline for hearing date of January 27, 1992.

DesignForum
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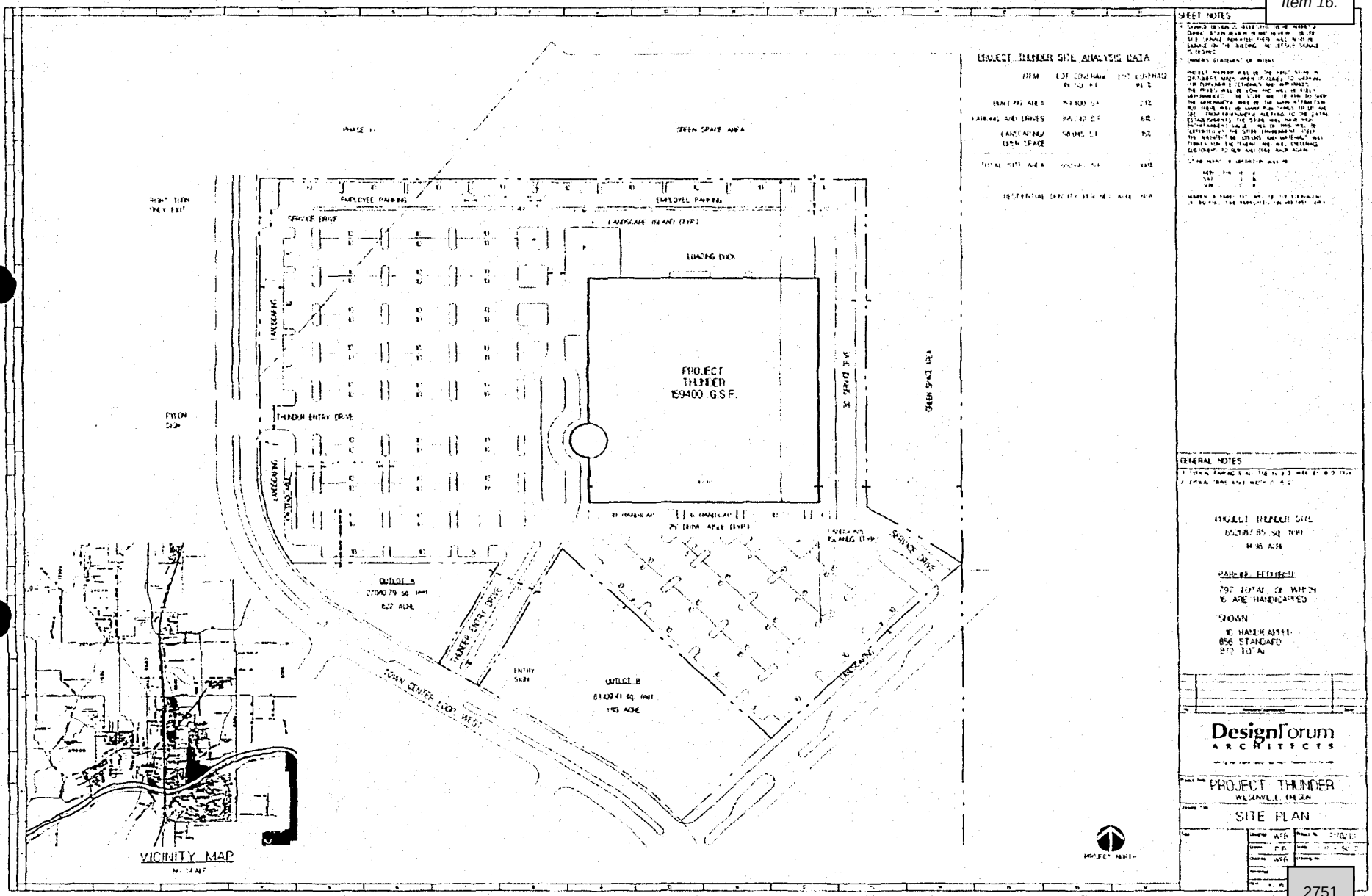
Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

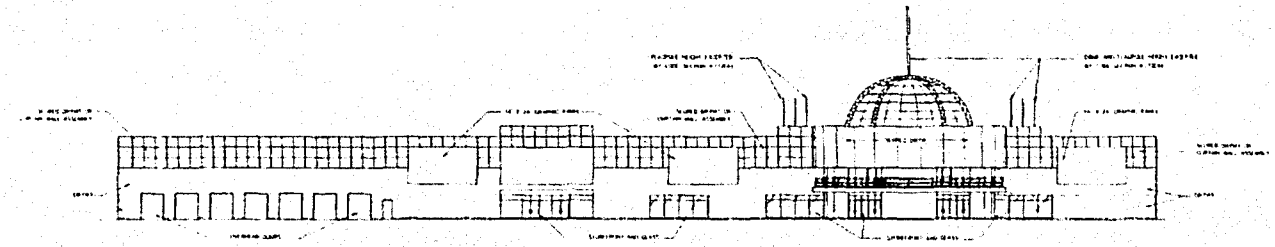
The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

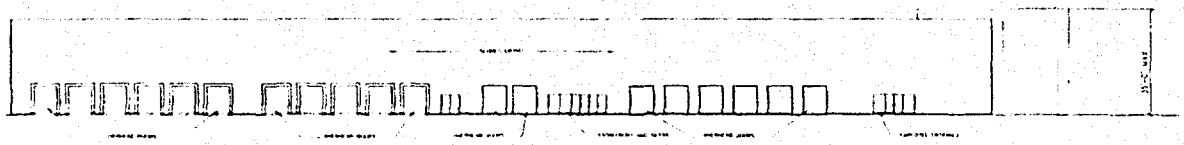
Respectfully submitted,

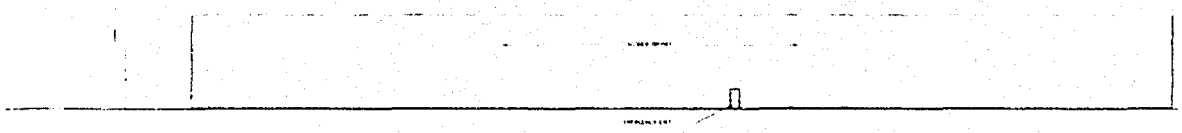
James L. Faulkner, AIA
Vice President, Architecture

cc: All in Attendance
Rich Hollander, Tandy Name Brand (TNB)
Blaise Edmonds, City of Wilsonville, Associate Planner (WSV)
Kimberly Beach, Capital Realty Corporation (CAP)
Tom Jones, Wilsy & Ham Pacific (WHP)
Wayne Kittelson, Kittelson & Associates, Inc. (KAI)
D. Lee Carpenter, Design Forum
Bruce Dybvad, Design Forum
Marla Halley, Design Forum
Bill Bergman, Design Forum Architects


PROJECT THUNDER
159400 G.S.F.
EMPLOYEE PARKING
SERVICE DRIVE
LANDSCAPE ISLAND (TYP.)
LOADING DOCK
LANDSCAPING
THUNDER ENTRY DRIVE
PYLON SIGN
OUTLOT A
OUTLOT B
TOWN CENTER LOOP WEST
ENTRY SIGN
GREEN SPACE AREA
PROJECT THUNDER SITE ANALYSIS DATA
SHEET NOTES
GENERAL NOTES
PARKING REQUIRED
SHOWN
DesignForum
ARCHITECTS
PROJECT THUNDER
SITE PLAN
VICINITY MAP
PROJECT NORTH







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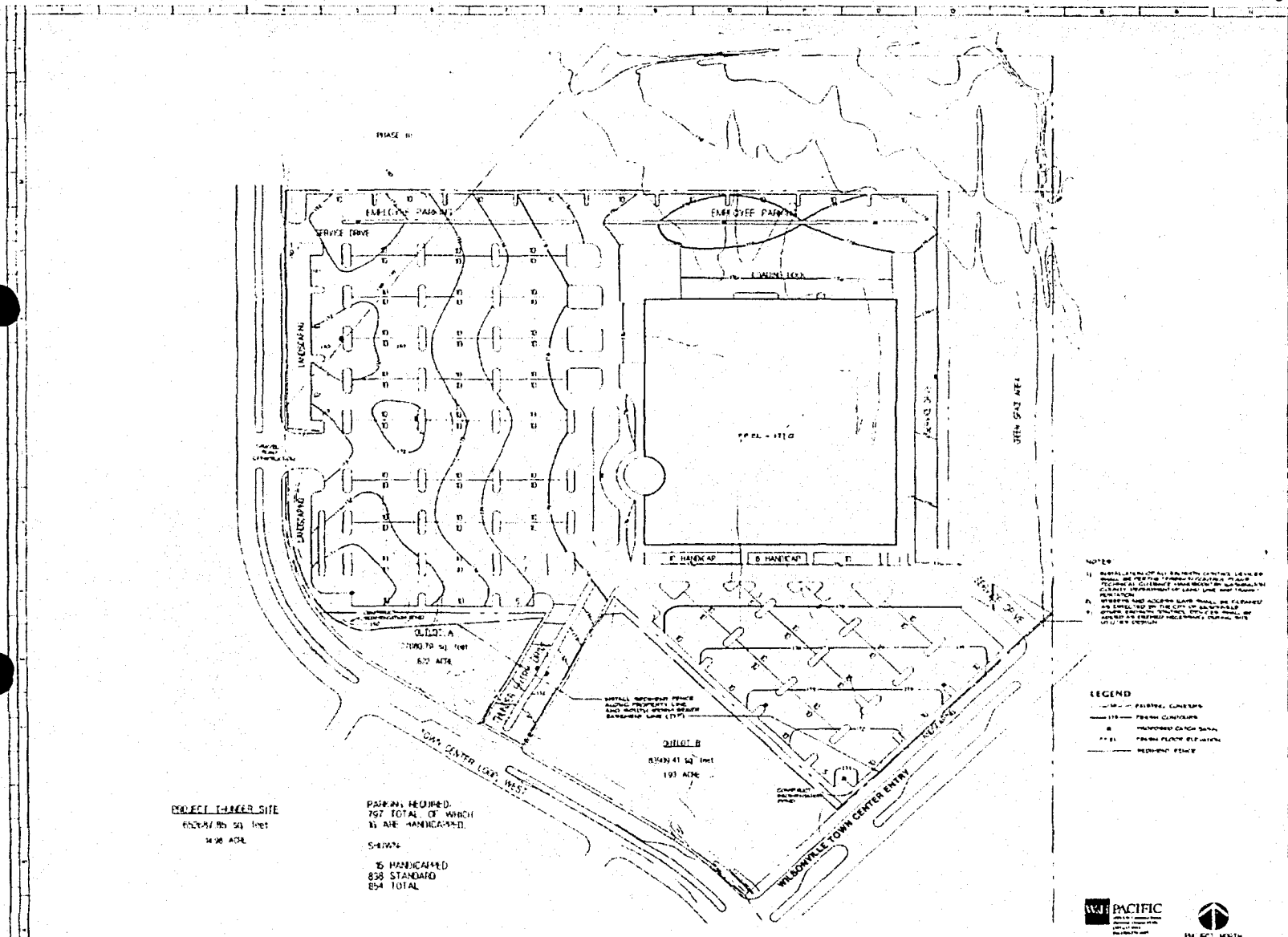
PROJECT THUNDER
MESSINGER, OREGON

EXTERIOR ELEVATIONS

2752



SHEET NOTES

GENERAL NOTES

Key Plan

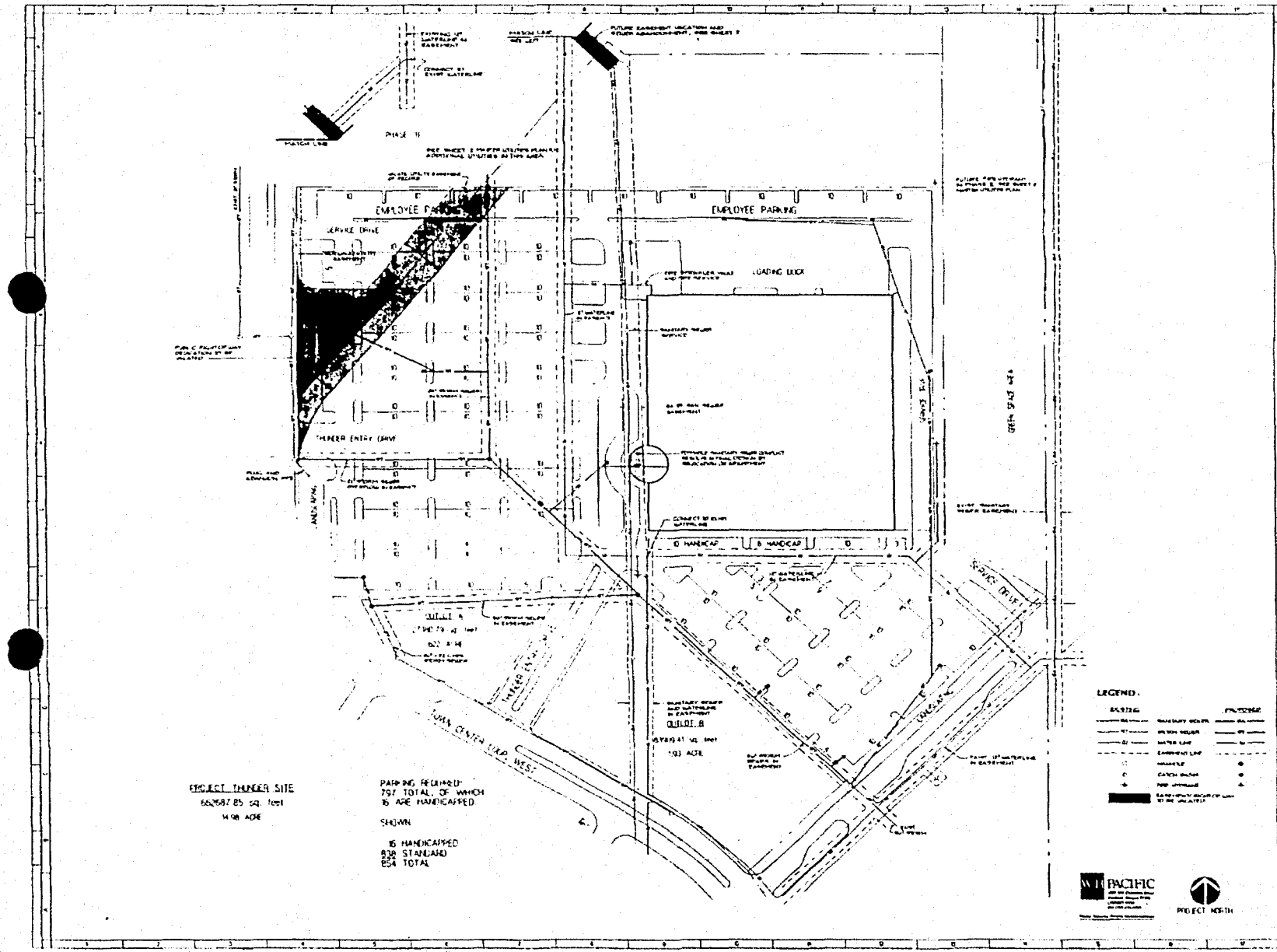
DesignForum ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II GRADING/EROSION CONTROL PLAN

1" = 50'-0"

2753



SHEET NOTES

GENERAL NOTES

Key Plan

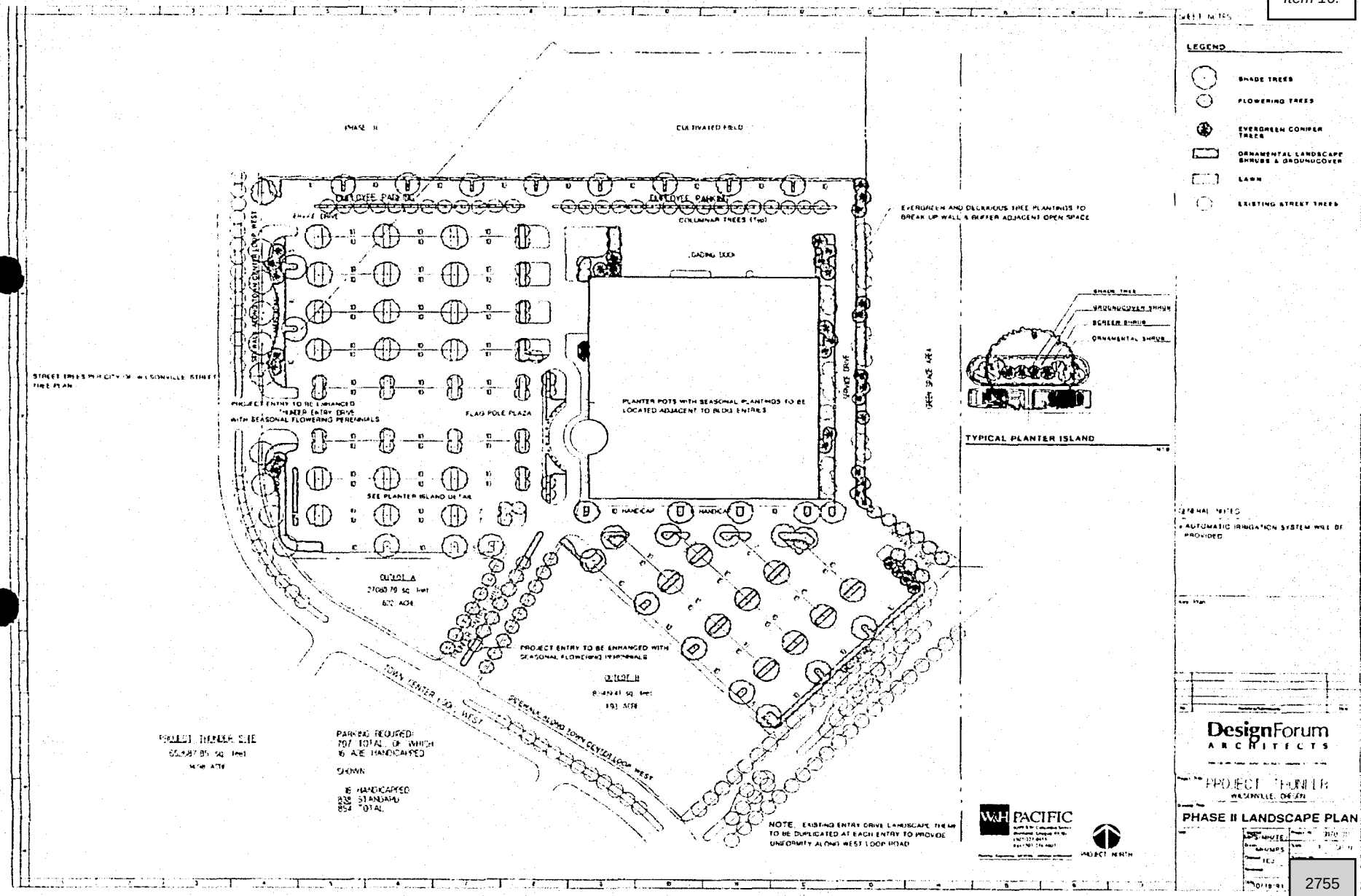
DesignForum ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II UTILITIES PLAN

1" = 50'-0"

2754


PHASE II
CULTIVATED FIELD
EMPLOYEE PARKING
EMPLOYEE PARKING
COLUMNAR TREES (Typ)
EVERGREEN AND DECIDUOUS TREE PLANTINGS TO BREAK UP WALL & BUFFER ADJACENT OPEN SPACE
LOADING DOCK
STREET TREES PER CITY OF WILSONVILLE STREET TREE PLAN
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
FLAG POLE PLAZA
PLANTER POTS WITH SEASONAL PLANTINGS TO BE LOCATED ADJACENT TO BLDG ENTRIES
SEE PLANTER ISLAND DETAIL
HANDICAP
OUTLOT A
OUTLOT B
PROJECT ENTRY TO BE ENHANCED WITH SEASONAL FLOWERING PERENNIALS
TOWN CENTER LOOP - WEST
PROJECT SITE
PARKING REQUIRED:
PARKING PROVIDED:
STANDARD
TOTAL
NOTE: EXISTING ENTRY DRIVE LANDSCAPE THEME TO BE DUPLICATED AT EACH ENTRY TO PROVIDE UNIFORMITY ALONG WEST LOOP ROAD
PROJECT NORTH
LEGEND
SHADE TREES
FLOWERING TREES
EVERGREEN CONIFER TREES
ORNAMENTAL LANDSCAPE SHRUBS & GROUNDCOVER
LAWN
EXISTING STREET TREES
TYPICAL PLANTER ISLAND
GENERAL NOTES
AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED
DesignForum ARCHITECTS
PHASE II LANDSCAPE PLAN

ASSIGNMENT

FOR VALUABLE CONSIDERATION, receipt and sufficiency of which are hereby acknowledged, SFS INVESTMENT CORP., an Oregon corporation (Assignor), hereby assigns, transfers and conveys to CAPITAL REALTY CORP., an Oregon corporation (Assignee), all of Assignor's right, title and interest in each option agreement, offer and other document described in Exhibit A attached hereto, the real property described in any such option agreement or offer, and all rights which Assignor now has or may hereafter acquire with respect thereto.

February 1, 1990.

SFS INVESTMENT CORP.

By _____
President

STATE OF OREGON)
) ss.
County of Multnomah)

On this 1st day of February, 1990, before me personally appeared Steven F. Stiles who, being duly sworn, did say that he is the president of SFS INVESTMENT CORP., an Oregon corporation, and acknowledged that the foregoing instrument was executed on behalf of the corporation by authority of its board of directors as its voluntary act and deed.

Before me:

_____
NOTARY PUBLIC for Oregon
My Commission Expires 10/31/92

2756

AGREEMENT AND OPTION

THIS AGREEMENT AND OPTION is between E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as Marlene A. Young Rifai, the Estate of Harold J. Laswell, Deceased, and FRED A. ANDERSON, hereinafter collectively referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-14D, are E. Jean Young, Sherilyn J. Young, David S. Young, Marlene A. Young, also known as Marlene A. Young Rifai, and Jack L. Lozo.

B. The owner of Parcel II, i.e. tax lot 300, MAP 3-1W-14D is Jack L. Lozo.

C. Grantee has options to purchase Parcel I and II by documents respectively dated August 17, 1989 and August 23, 1989; said options are valid through December 21, 1989.

D. Grantor's offer to option Parcel III is contingent upon Grantee's obtaining extensions of the options to purchase Parcel I and II.

E. Grantors own Parcel III, i.e. Tax Lot 200, 300 & 401, Clackamas County MAP 3-1W-14D and ownership interests in a triangle of land approximately 6381 square feet on the west of Tax Lot 200 , described in Exhibit A. Parcel III shall refer to the

be made in full upon closing and a statutory warrenty deed provided at that time.

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

~~Extension.~~ The Option to purchase Phase 2 in its enti[illegible]er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel III unless Grantees pay to Grantors $50,000 for an extension of the Option for one year. Payment for such extension is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or be[illegible]vember 2, 1992, at the purchase price of [illegible]ent on an additional $50,000, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantor's name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors prior to formal application to the City of Wilsonville. Grantors shall retain the right of review during the planning process with the City,

Grantee may not agree to any request to increase the Open Space requirements on any Phase of any Parcel.

11. Real Property Taxes. The Option Property has been specifically assessed as Farm Use Land. Therefore, portions of the annual taxes are deferred until the Option Property becomes disqualified for that purpose. If Grantee exercises the Option as

preliminary agreements. This Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 31 day of October, 1989.

E. Jean Young
E. JEAN YOUNG

SFS INVESTMENT CORP.
11-8-89

SHERILYNN J. YOUNG

By
SFS President
Steven F. Styles

David S. Young
DAVID S. YOUNG

SFS INVESTMENT CORP.

Marlene A. Young
by D. Young, attorney in fact
MARLENE A. YOUNG

By
SFS Officer

ESTATE OF HAROLD J. LASWELL
DECEASED

GRANTEES

By Emma D. Laswell
Emma D. Laswell
Personal Representative

By
Eugene L. Deffler
Personal Representative

Fred A. Anderson
FRED A. ANDERSON

GRANTORS

ST IDES PROPERTIES LTD.
by Elden E Enstad

EXHIBIT A

I
Wilsonville Property

Option dated November 16, 1989 granted by Jack L. Lozo for property generally known as Tax Lot 500, Map 3-1W-13, Clackamas County, Oregon.

Agreement and Option dated October 31, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Estate of Harold J. Laswell, Deceased, and Fred A. Anderson for property generally known as Tax Lots 200, 300 and 405, Map 3-1W-14D, Clackamas County, Oregon, togther with a triangular parcel containing approximately 6,381 square feet on the westerly side of Tax Lot 200.

Option dated November 15, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Jack L. Lozo, and Anne S. Lozo, Trustee for Claude F. Smith Trust, for property generally known as Tax Lots 600 and 601, Map 3-1W-13, Clackamas County, Oregon.

Attached hereto is a plot map showing the general location of the three parcels.

II
Gresham Property

Earnest Money Agreement dated August 1, 1989, amended by Memorandum of Agreement dated September 20, 1989, with Leonard P. Holfman and Kenneth G. Holfman, Trustees of the Olive H. Holfman 1979 Trust dated May 7, 1979, for the purchase of a tract of land in the Robert P. Wilmot DLC and being Sections 19 and 30, Township 1 North, Range 3 East of the Willamette Meridian, Multnomah County, Oregon (Tax Lot #32), containing approximately 21.3 acres on the north side of N. E. Sandy Boulevard west of Northeast 181st Avenue.

III
Salem Property

Offer dated November 1, 1989, accepted by Anita Hager Conley, Trustee, on November 29, 1989, for a parcel containing approximately 9.38 acres in the southwest quarter of Section 31, Township 7 South, Range 2 West, known as Tax Lot 200, Salem, Marion County, Oregon.

AGREEMENT AND OPTION

PARCEL II

THIS AGREEMENT AND OPTION is between JACK L. LOZO, hereinafter referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-13, are E. JEAN YOUNG, SHERILYN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, JACK L. LOZO, and the CLAUDE F. SMITH TRUST, ANN S. LOZO Trustee.

B. The owner of Parcel III, i.e. tax lot 200, 300 & 405, Clackamas County MAP 3-1W-14D and a triangle of land approximately 6,381 square feet on the west of tax lot 200 are E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, the estate of HAROLD J. LASWELL, Deceased, and FRED A. ANDERSON.

C. Grantors own Parcel II, i.e. Tax Lot 500, MAP 3-1W-13. Parcel II shall also be referred to as the Option property.

D. Grantee has options to purchase Parcel I & II by documents dated August 17, 1969 and August 23, 1969, said options are valid through December 31, 1969.

E. Grantors' offer to option Parcel II is contingent upon Grantee's obtaining an extension of the option to purchase Parcel

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

4. Extension. The Option to purchase Phase 1b and 2 in its ent er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel II unless Grantee pays to Grantors $5,000 for an extension of the Option to purchase Phase 1b property, ~~and pays to Grantor an additional $5,000 for an extension of the Option to purchase Phase 2 property if owned by Grantors~~. Payment for such extension shall be for one year, is nonrefundable and not applicable to the purchase price.

SFT
J.X.L.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or before November 2, 199 at the purchase price of payment on an additional $5,000, s, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

authority to grant the Option and to sell their interest in the Option Property in accordance herewith.

7. Reciprocal Easements: Grantors and Grantee agree that each will enter into reciprocal easements with the owners of Parcels I and III as agreed upon by the parties.

8. Right of Entry. Grantee may, at its risk and expense during the term of the Option, enter upon the Option Property at any time to make engineering tests, soil tests and for any other lawful purpose in pursuit of the purchase and development of said property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantors' name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors

the entire agreement among the parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. This Agreement and Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 11 day of November, 1989.

JACK L. LOZO

AND S. LOZO, Trustee for
CLAUDE F. SMITH TRUST

GRANTORS

SFS INVESTMENT CORP.

By
SFS President
Steven F. Stiles

SFS INVESTMENT CORP.

By
SFS Officer

GRANTEES

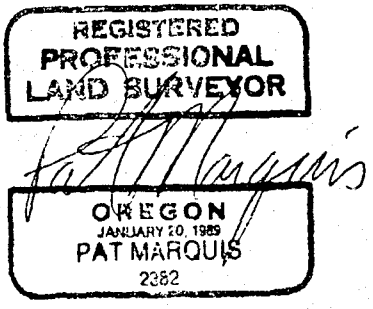
PROJECT THUNDER LEGAL DESCRIPTION

A parcel of land situated in the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southeast corner of Section 14, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon: thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**: thence leaving said section line and tracing the following courses and distances: South 45°03'00" West 400.00 feet; thence North 44°57'00" West 435.01 feet to a point of non-tangent curvature; thence tracing the arc of a 2,000.00 foot radius curve to the right (the radial center of which bears North 65°07'50" West) through a central angle of 07°23'12" an arc distance of 257.84 feet (the long chord bears South 28°33'46" West 257.66 feet) to the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line North 57°44'38" West 72.00 feet to a point of radial intersection with a 1,928.00 foot radius curve; thence leaving said northeasterly right-of-way line and tracing the arc of a 1,928.00 foot radius curve to the left through a central angle of 05°32'12" an arc distance of 186.31 feet (the long chord bears North 29°29'16" East 186.23 feet); thence South 89°52'55" West 304.91 feet to a point of non-tangent curvature on the said northeasterly right-of-way line of Town Center Loop Road West; thence tracing said right-of-way line along a 268.16 foot radius curve to the right (the radial center bears North 56°01'43" East) through a central angle of 33°55'55" an arc distance of 158.81 feet (the long chord bears North 17°00'19" West 156.50 feet) to a point of tangency; thence continuing along said right-of-way line North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing said right-of-way line North 00°02'22" West 121.76 feet; thence leaving said right-of way line and tracing the following

courses and distances: North 89°52'55" East 894.39 feet to a line being parallel with and 140.00 feet westerly of the said section line common to sections 13 and 14; thence tracing said parallel line South 00°03'01" West 528.73 feet; thence South 56°23'33" East 168.00 feet to the **TRUE POINT OF BEGINNING**. Said parcel contains 642,427 square feet or 14.75 acres more or less.

755-0101
10/16/91



Jim Parsons
Jim Faulkner
Doug Seely

Phase
Stage I, II, III → Cap. Realty will submit

Phase II →
Cap. Realty Δ master plan modification
Site plan I, II

Landy - Thunder 120+ thou ☐ footprint
Electronics +

Parkway / TC (E) + (W)

Park → Open Space.

Submit Stage I + II Simultaneously

Blaise
what else?

* Gave Stage I + II + application x2
250' radius map owners

Topo - 1' intervals - (map has readings)

~~Blaise - 50' top dirt~~

Ø phase

4/13 & 10/12

100 - 1

CITY

100 - 120 DWELLING UNITS.

- DOUG SEELY TALKED TO BOB DANT -
- ABOUT DENSITY TRANSFER TO BRIDGE CREEK.
- P.O.S.

- CONTOUR SURVEY - 720 0/0
- TREE SURVEY
  >6" caliper
- MAJOR DRAINAGEWAY.

STAKE THE PROPERTY - SITE VISIT TO VERIFY P.O.S LINE - AMBIGUITY - GO TO P.L TO C.C. FOR INTERPRETATION.

~~CALL MIKE - 720-~~

CITY of WILSONVILLE
PLANNING COMMISSION
SITE MASTER PLAN (STAGE I)
GENERAL SUBMISSION REQUIREMENTS

1. Completed application form, with appropriate fee, signed by property owner.
2. Set forth the professional coordinator and professional design team.
3. State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.
4. The application shall include conceptual and quantitatively accurate representation of the entire development sufficient to judge the scope, size and impact of the development on the community; and, in addition, shall be accommodated be the following information:

   13 FOLDED copies of Site Master Plan dimensioned at a scale of 1" = 20 ft. (or as determined by the Planning Director) showing the following:

   a. Vicinity map.
   b. The entire lot as described by the legal description.
   c. Location and size if all public facilities, utilities and easements.
   d. Location and dimension of site improvements such as roads, buildings, driveways, parking, loading and landscaping.
   e. All adjacent rights-of-way and improvements.
   f. Any surrounding development, i.e., existing buildings, property lines, driveways, etc.
   g. Development phasing. A stage development schedule demonstrating that the developer intends to commence construction within (1) One year after the approval of the development plan, and will proceed diligently to completion.
   h. Topographic information at one-foot intervals up to 5% slope; two-foot intervals, 6% - 12%; five-foot intervals. 12% - 20%; ten-foot intervals, 20% and above.

5. One copy of Site Plan reduced to 8-1/2" x 11". This must be a legible photo-mechanical transfer (PMT).
6. Site Analysis Data.

Item	Lot Coverage in sq. ft.	Lot Coverage in %.
Building area	458,771 sq. ft.	.18 %
Parking and Drives	1,394,390 sq. ft.	.53 %
Landscaping/Open Space	751,291.4 sq. ft.	.29 %
Residential density per net acreage.		
TOTAL SITE AREA	2,604,452.4 sq. ft. 59.79 ACRES	100 %

Planning Department 682-4960

INCOMPLETE SUBMITTALS WILL NOT BE SCHEDULED FOR A PUBLIC MEETING !

10 ■ 4M-MSO 10-22-90 Oregonian

Traffic count zooms at electronic store

■ Wilsonville's projections for vehicle flow at the Incredible Universe fall woefully short

By JOHN M. GRUND
Correspondent, The Oregonian

WILSONVILLE — When it comes to predicting how much traffic a new development will bring, Wilsonville officials always have gone by the book.

But going by the book has not worked for some recently opened projects — in particular the Incredible Universe electronics store. In some cases, traffic is already at levels predicted for 2010.

Now city officials are looking at ways to refine the city's traffic projections.

Eldon Johansen, community development director, told the City Council early this month that traffic on Town Center Loop West near the new electronics store is averaging 1,227 vehicles an hour northbound at 2 p.m. That's 550 more vehicles per hour than anticipated in projections for 1995, he said.

"As far as the traffic counts go, we've had a real eye-opener on our traffic projections. We're already up past (the year) 2010 on some of our traffic projections," Johansen said.

"The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts," said Arlene Loble, city manager.

The city has changed its procedure for getting traffic analysis done on proposed developments. This fall, it switched from having a developer hire a traffic engineering firm to requiring applicants to pay for a study by D.K.S. Associates, the firm chosen by the city to handle all of its traffic analysis.

Planning Director Wayne Sorensen said the move should not be interpreted as a criticism of the firms that have done studies in the past. All of them, in fact, bid on the city contract, he said.

"I think we feel better now (that) the traffic engineer is working for the city," he said. "When the applicant hires the engineer, they're working for the client, and the city's not the client."

Johansen said the city also would expand the scope of some studies.

The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5.

It was that intersection that clogged up at the Incredible Universe opening Sept. 17 and caused traffic to back up for miles in both directions.

If the study were being done today, the city would insist that engineers look at one more intersection down the road, Johansen said.

City Councilor Greg Carter asked if the traffic effects of some recent developments meant that the city should consider a moratorium on some new construction.

"I'm not willing to say that yet," Johansen said.

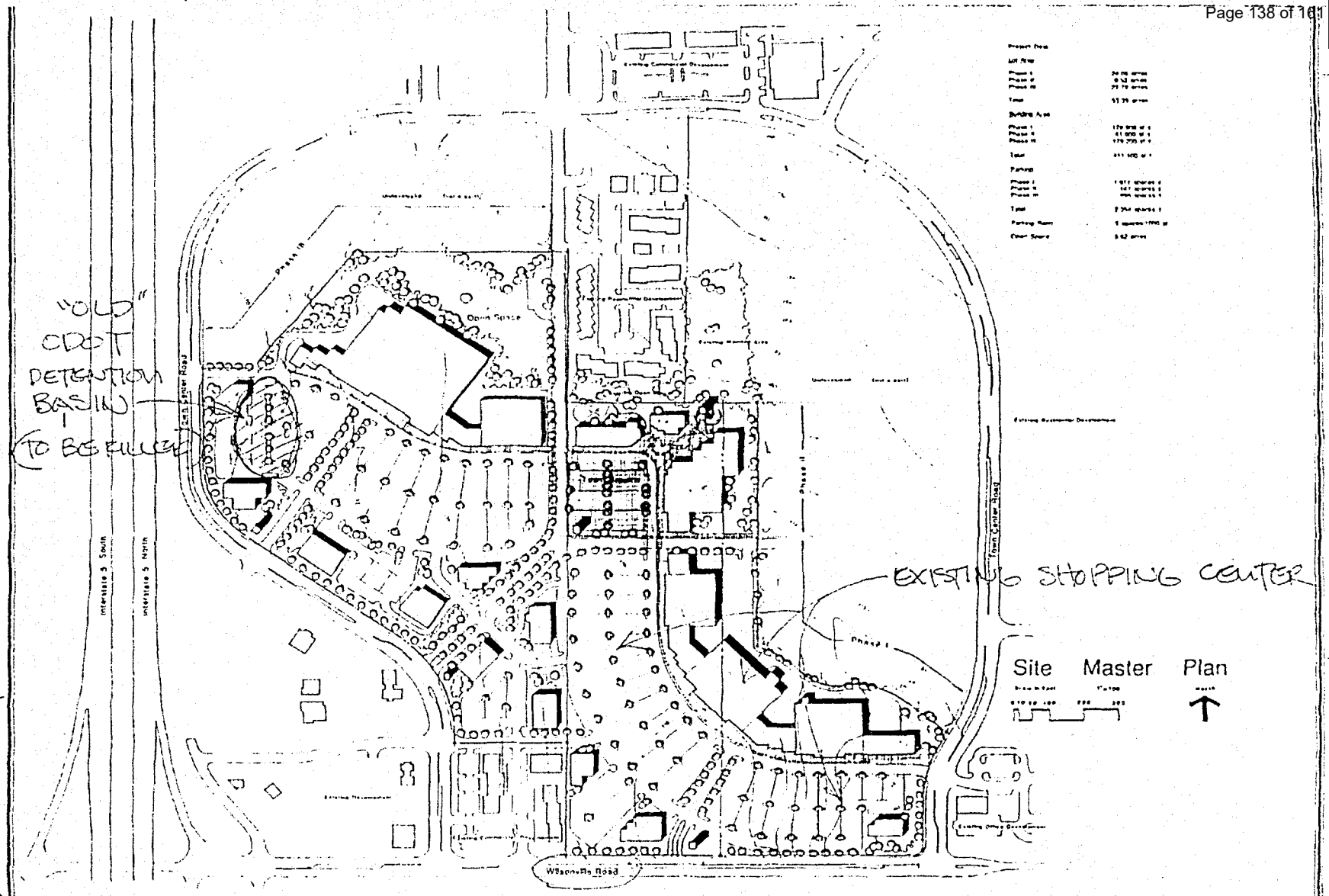
He said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built.

Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic — that is, traffic already on the streets for other reasons. But the store has become a regional draw, and "drop-in" traffic is a tiny percentage of traffic it attracts. Finally, the traffic study did not account for the success of the store's marketing effort.

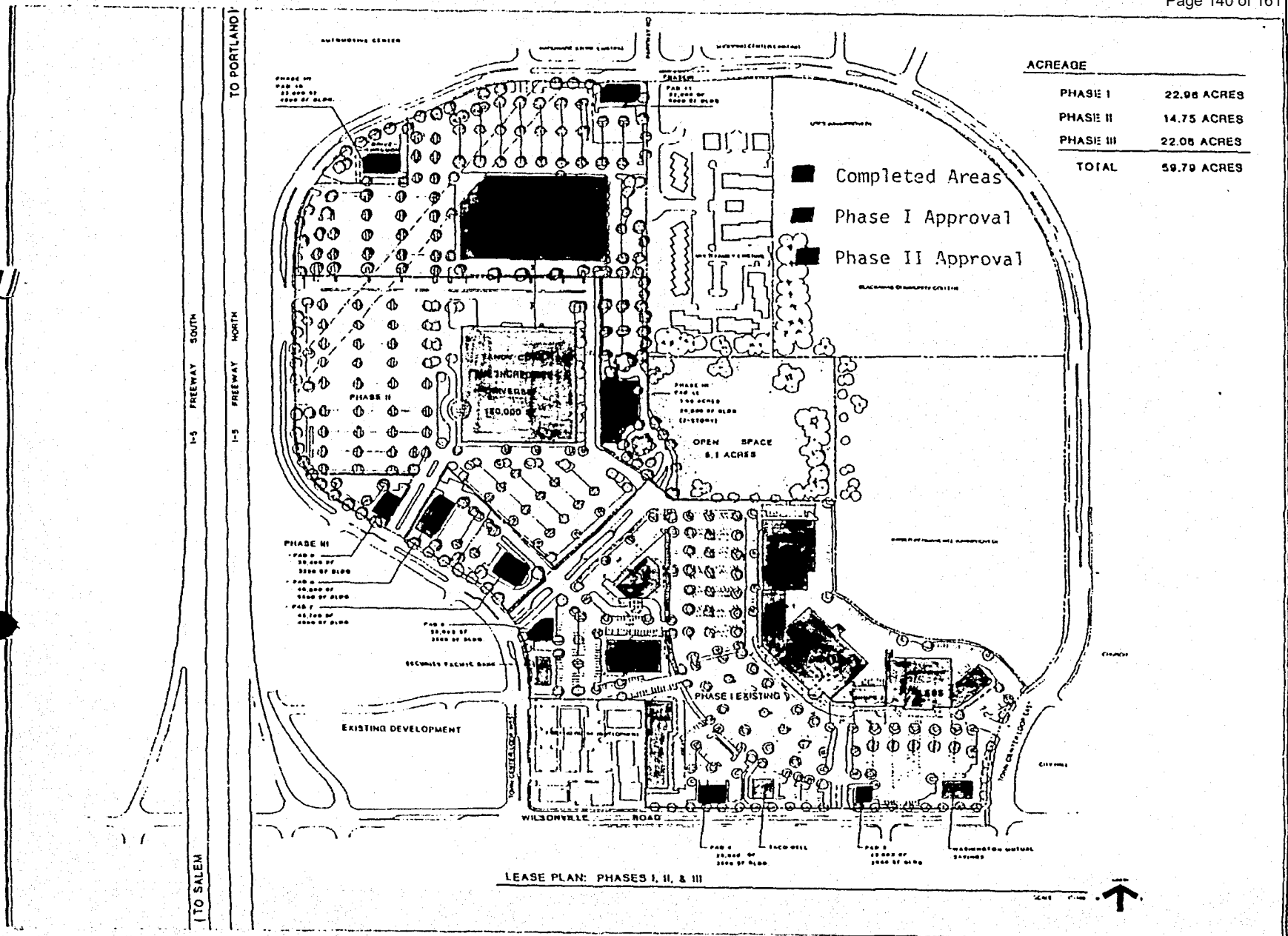
"At a minimum, we need to be broadening the assumptions on which decisions are made," Loble said. "We've recognized that the traffic situation is beyond anything anticipated in the rational decision-making model."

Sorensen, however, later said there are no plans to tinker with the engineering manual — he called it "the bible" — that predicts how many new trips will be generated by a particular use.

Sorensen would not hazard a guess about whether any of the changes will mean that developments will have a tougher time getting planning approval in Wilsonville. But he said that at least one major development was turned down as long as two years ago because it would have brought too much traffic to an overburdened street.

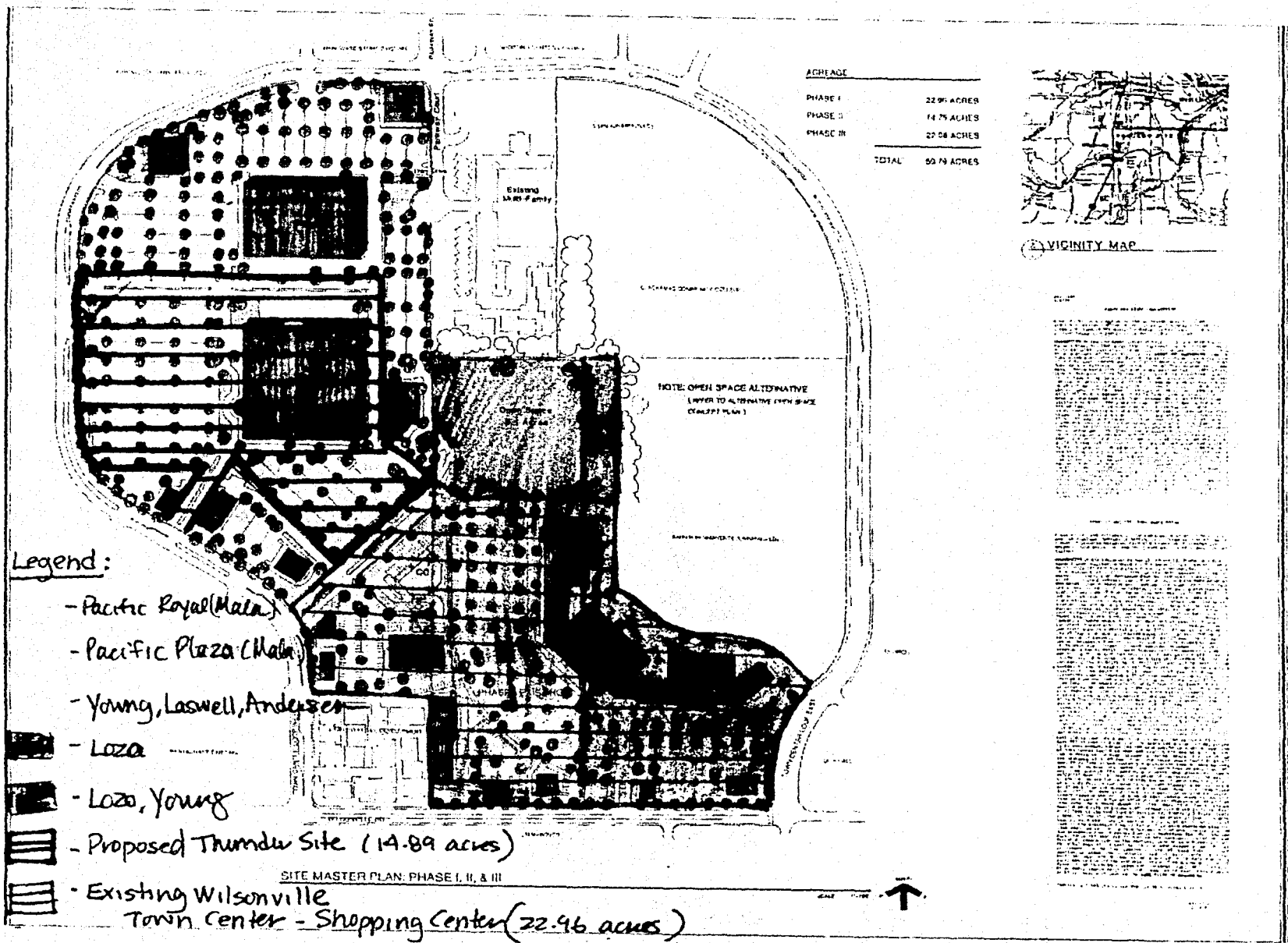

"OLD"
CDOT
DETENTION
BASIN
(TO BE FILLED)
EXISTING SHOPPING CENTER
Site Master Plan
Wilsonville Road
Interstate 5 South
Interstate 5 North
Town Center Road
Open Space
Phase II
Phase I
JKS Architects PC
Wilsonville Town Centre
P1

STAGE 1 IN 2



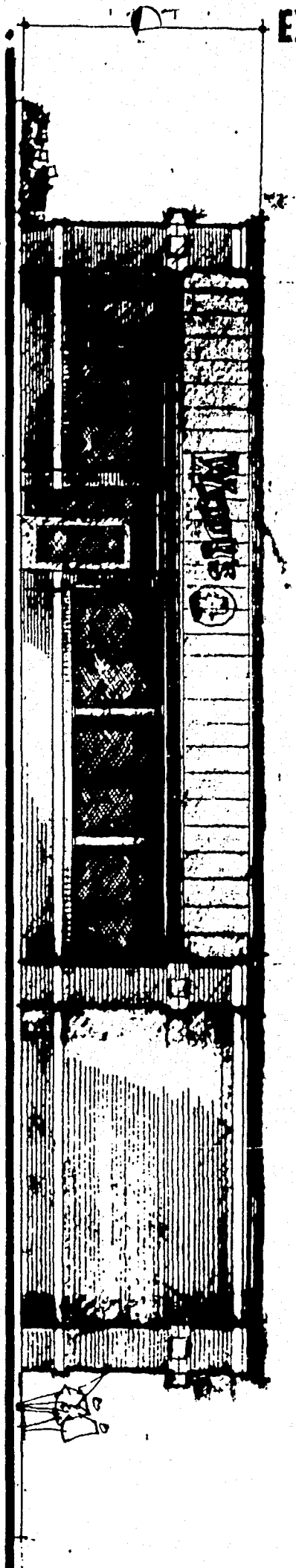
JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON


ACREAGE
PHASE I 22.96 ACRES
PHASE II 14.75 ACRES
PHASE III 22.08 ACRES
TOTAL 59.79 ACRES
NOTE: OPEN SPACE ALTERNATIVE
VICINITY MAP
Legend:
- Pacific Royal (Main)
- Pacific Plaza (Main)
- Young, Laswell, Andersen
- Loza
- Loza, Young
- Proposed Thunder Site (14.89 acres)
- Existing Wilsonville Town Center - Shopping Center (22.96 acres)
SITE MASTER PLAN: PHASE I, II, & III
JKS Architects PC
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON
1

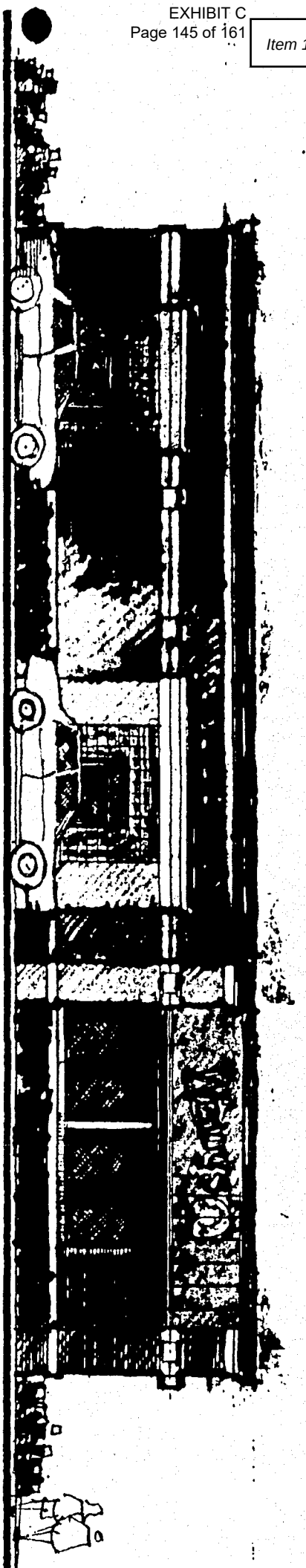
DEFECTS IN ORIGINAL DOCUMENT

EXHIBIT F



NORTH ELEVATION

1/8" = 1'-0"



SOUTH ELEVATION

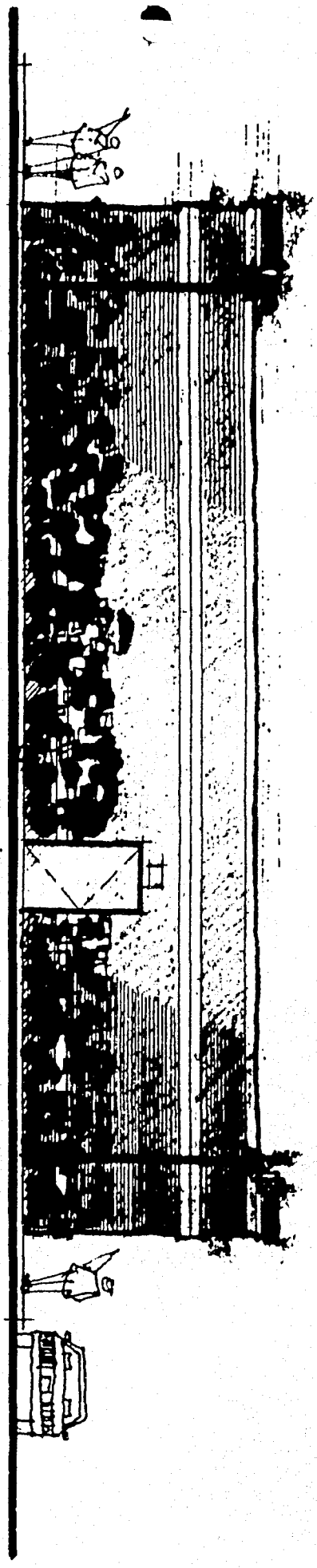
1/8" = 1'-0"

DRAWING NO: 1	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

Brown Connally Rowan Architects, Inc. • 222 E. 26th Street, Tacoma, WA 98

WEST ELEVATION

1/8" = 1'-0"



EAST ELEVATION

1/8" = 1'-0"

DRAWING NO:	PROJECT NAME:	DATE:
2	**Wendy's Restaurant**	**2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

EXHIBIT C
Page 147 of 161

Item 16.

CITY OF WILSONVILLE

30445 S.W. Boones Ferry Road
P.O. Box 220 Wilsonville, OR 97070-0220
(503) 682-4960

PLANNING DEPARTMENT
SITE DEVELOPMENT APPLICATION

File No. 91 PC 43 1/4 Sec.

Final action on application or zone change is required within 120 days in accordance with provisions of ORS 227.178

Pre-App. ____ No. ____ Day ____ Yr.

A preapplication conference normally is required prior to submittal of an application. Please contact the Planning Department at 682-4960 for an appointment.

APPLICANT - COMPLETE

Owner's Name CAPITAL REALTY CORP. Contact Person Kim Beach

Address 101 S.W. MAIN SUITE 1500 Address ____

Portland OR. 97204

Phone 223-1200 Phone SAME

Owner's Signature Kimberlin J. Beach, Vice President Capital Realty Corp
Plaza Royal Officially Designated Representative

Property Description: T 3 R ____ Map 3S 1W 12 Tax Lot(s) 200, 201, 701 See ON 13 102, 300

Request STAGE I MASTER PLAN REVISION
STAGE II PHASE II WILSONVILLE Town Center
SITE PLAN - MOBILEY CONDITION #8 OF 90PC15

Please attach a plot plan (scale: 1"=40') and any other documents to this application. Please review the Planning Department submittal requirements to ensure that your application is complete.

—OFFICE USE ONLY—

Complete Application Accepted: Date 10/18/91 Public Hearing Date 12/9/91

Staff Signature Blair Edwards

☐ Class I ☐ Class II ☒ Class III

☐ PLAN AMENDMENT	☐ MAJOR PARTITION	☐ DESIGN REVIEW
☐ ZONE CHANGE	☐ MINOR PARTITION	☐ TEXT AMENDMENT
☐ PRELIMINARY PLAT	☐ CONDITIONAL USE	☐ SIGN REVIEW
☐ FINAL PLAT	☐ VARIANCE	☐ TEMPORARY USE
☒ PLANNED DEVELOPMENT	☒ OTHER REGNSIDER CONDITION OF 90PC15	

SITE FINDINGS

1. Zoning: PDC Town CENTER
2. Area of Lot: SEE FILE
3. Building or Sign Height: (Max) ____
4. Zoning Code Minimum Setbacks: Front ____ Side ____ Rear ____
5. Building Area ____
6. Access to Property TOWN CENTER LOOP WEST
7. Other: ____

☐ Approved ☐ Denied ☐ Approved with Conditions (see attached)

Conditions of Development

Approval of this development permit is submitted as based on information submitted by the applicant as called out above. Any change of plans or incorrect information when discovered will void this decision and may be corrected in accordance with the provisions of the Wilsonville Code and ORS 227.180.

Fee Amount Paid $1315.00 Check No. SEE ⇨ Cash 1205 PAY $ SEE ... FEE - I
1206 PAY $625.00 II
1207 PAY $315.00 - CASH 4

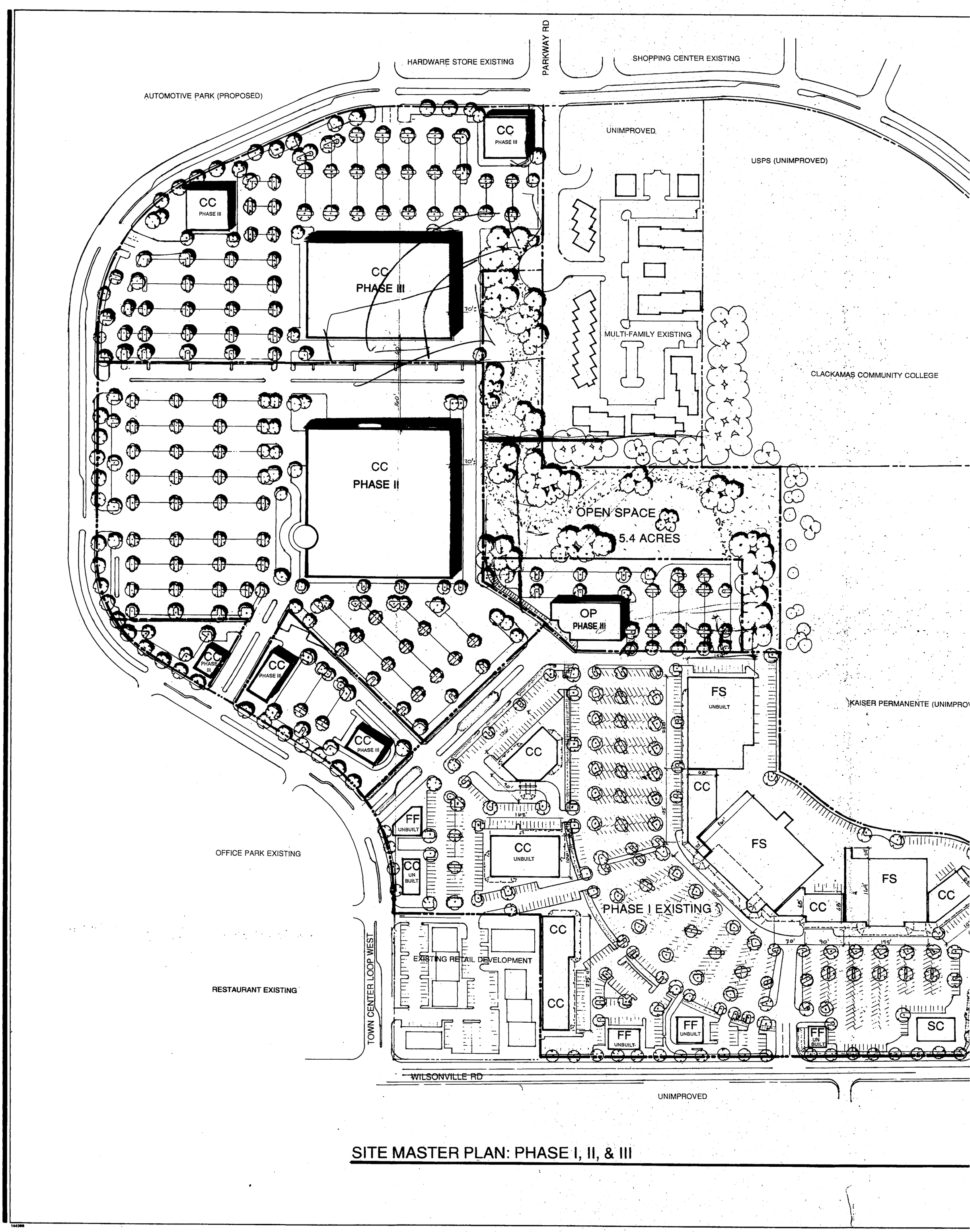
Permit Approval: Planner's Signature ____ Date: ____

City Council or Planning Commission Approval ☐ Yes ☐ No

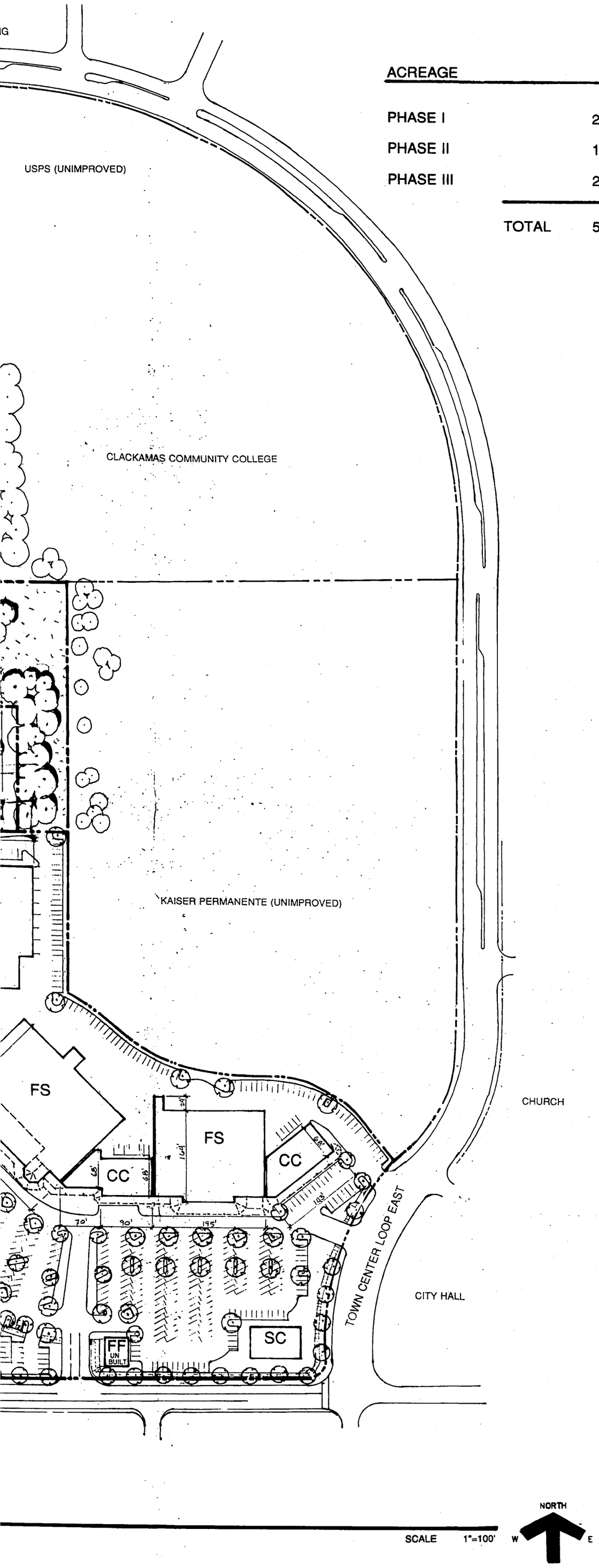
Order/Resolution ____

2781

White — Applicant's Permit Yellow — File Pink — Finance Gold — Applicant's Receipt

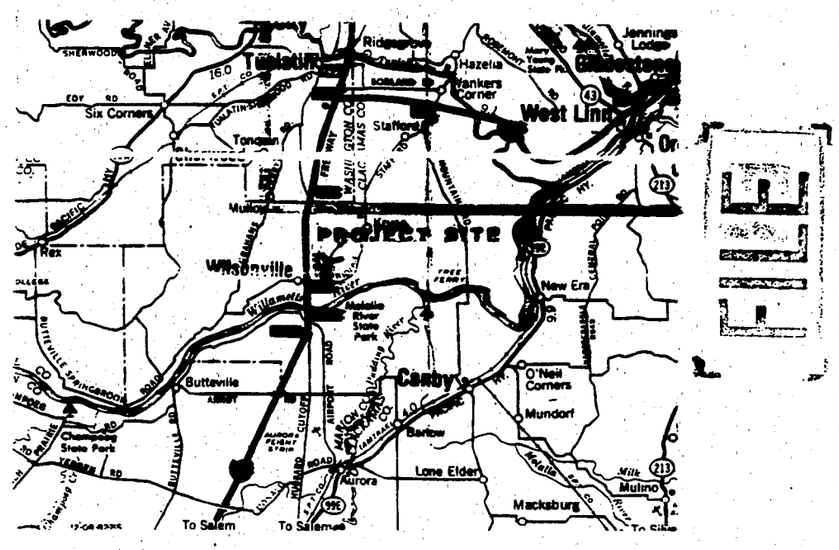


SITE MASTER PLAN: PHASE I, II, & III



ACREAGE

PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



(2/1) VICINITY MAP

467-0102
5/6/91

PHASE ONE LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'31" East along the section line between Sections 13 and 14 a distance of 44.00 feet to the **POINT OF BEGINNING**; thence continuing North 00°03'01" East along said section line a distance of 339.50 feet; thence South 89°59'30" West a distance of 338.63 feet to the easterly right-of-way line of Town Center Loop Road West; thence North 00°00'22" East along said easterly right-of-way line a distance of 44.55 feet to a point of curvature; thence 247.91 feet along the arc of a 360.54 foot radius curve to the left through a central angle of 39°23'57" and whose chord bears North 18°39'27" West a distance of 243.05 feet to a point on a curve; thence North 46°03'00" East a distance of 594.01 feet; thence South 89°57'00" East a distance of 66.14 feet; thence South 00°03'00" West a distance of 63.00 feet; thence South 89°57'00" East a distance of 479.78 feet; thence South 00°03'01" West a distance of 285.68 feet to the intersection with a non-tangent curve; thence 93.82 feet along the arc of a 317.33 foot radius curve to the right through a central angle of 16°56'21" and whose chord bears South 55°30'59" East a distance of 93.48 feet to a point of reverse curvature; thence 348.26 feet along the arc of a 336.67 foot radius curve to the left through a central angle of 42°03'00" and whose chord bears South 68°02'49" East a distance of 242.74 feet to a point of tangency; thence South 89°02'49" East a distance of 51.65 feet to a point of curvature; thence 174.68 feet along the arc of a 200.00 foot radius curve to the right through a central angle of 50°02'34" and whose chord bears South 64°01'32" East a distance of 169.15 feet to a point of tangency; thence South 39°00'15" East a distance of 97.50 feet to a point on a non-tangent curve; thence 328.21 feet along the arc of 494.00 foot radius curve to the left through a central angle of 38°04'18" and whose chord bears South 19°42'06" West a distance of 331.74 feet to a point of tangency; thence South 00°42'57" West a distance of 99.46 feet to a point of curvature; thence 48.14 feet along the arc of a 30.00 foot radius curve to the right through a central angle of 91°56'29" and whose chord bears South 44°40'11" West a distance of 43.17 feet to a point of tangency; thence South 89°21'26" West a distance of 375.16 feet to the Point of Beginning. Said parcel of land contains 22.96 acres, more or less.

PHASE II AND III LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**; thence leaving said section line South 45°03'00" West 589.42 feet to point of non-tangent curvature on the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line along the following courses and distances: tracing the arc of a 360.54 foot radius curve to the left (the radial center of which bears South 53°40'44" West) through a central angle of 20°25'22" an arc distance of 135.64 feet (the long chord bears North 47°31'56" West 134.92 feet) to a point of tangency; thence North 57°44'38" West 463.30 feet to a point of curvature; thence tracing the arc of a 258.16 foot radius curve to the right through a central angle of 57°42'16" an arc distance of 270.07 feet (the long chord bears North 28°53'30" West 258.80 feet) to a point of tangency; thence North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing the easterly, southeasterly and southerly right-of-way line of said Town Center Loop Road West along the following courses and distances: North 00°02'22" West 211.31 feet to a point of curvature; thence tracing the arc of a 444.00 foot radius curve to the right through a central angle of 64°15'44" an arc distance of 498.01 feet (the long chord bears North 32°24'30" East 444.85 feet) to a point of tangency; thence North 64°32'22" East 286.54 feet to a point of curvature; thence tracing the arc of a 414.00 foot radius curve to the right through a central angle of 24°58'03" an arc distance of 180.41 feet (the long chord bears North 77°20'24" East 178.96 feet) to a point of tangency; thence North 89°49'25" East 300.93 feet to a point of curvature for a right-of-way return to Parkway Avenue; thence leaving said southerly right-of way line of Town Center Loop Road West and tracing the arc of a 20.00 foot radius curve to the right through a central angle of 90°13'35" an arc distance of 31.49 feet (the long chord bears South 45°03'47" East 28.34 feet to the westerly right-of-way line of said Parkway Avenue (31.00 feet from center line); thence tracing said right-of-way line through the following courses and distances: South 00°03'01" West 311.17 feet to a point of curvature for the return to the cul-de-sac for said Parkway Avenue; thence tracing the arc of a 20.00 foot radius curve to the right through a central angle of 47°09'23" an arc distance of 16.46 feet (the long chord bears South 23°37'42" West 16.00 feet) to a point of reverse curvature; thence tracing the arc of a 55.00 foot radius curve to the left through a central angle of 87°59'01" an arc distance of 84.46 feet (the long chord bears South 03°12'53" West 76.40 feet); thence leaving said Parkway Avenue right-of-way line North 89°52'55" East 41.62 feet to the east line of section 14, Township 3 South, Range 1 West, of the Willamette Meridian in the State of Oregon; thence tracing said east line of section 14 South 00°03'01" West 446.55 feet to the northerly line of Parcel 3 of said **Partition Plat No. 1991-164**; thence tracing said northerly line and continuing along the northerly line of Parcel 2 of said **Partition Plat No. 1991-164** North 89°26'52" East 549.20 feet to the northeast corner of said Parcel 2; thence tracing the easterly line of said Parcel 2 South 00°03'01" West 440.61 feet to the southeast corner of said Parcel 2; thence tracing the southerly line of said Parcel 2 and continuing along the southerly line of said Parcel 3 North 89°57'00" West 479.78 feet to an angle point in said southerly line; thence tracing the westerly portion of said southerly line of Parcel 3 the following courses and distances: North 00°03'01" East 63.00 feet; thence North 89°57'00" West 66.14 feet; thence South 45°03'00' West 4.59 feet to the **TRUE POINT OF BEGINNING.**

Containing 1,604,349 square feet or 36.83 acres more or less.

467-0301
10/16/91

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

Revisions

KJD	RSB
Drawn By	Checked By
8963	10/18/91
Job No.	Date

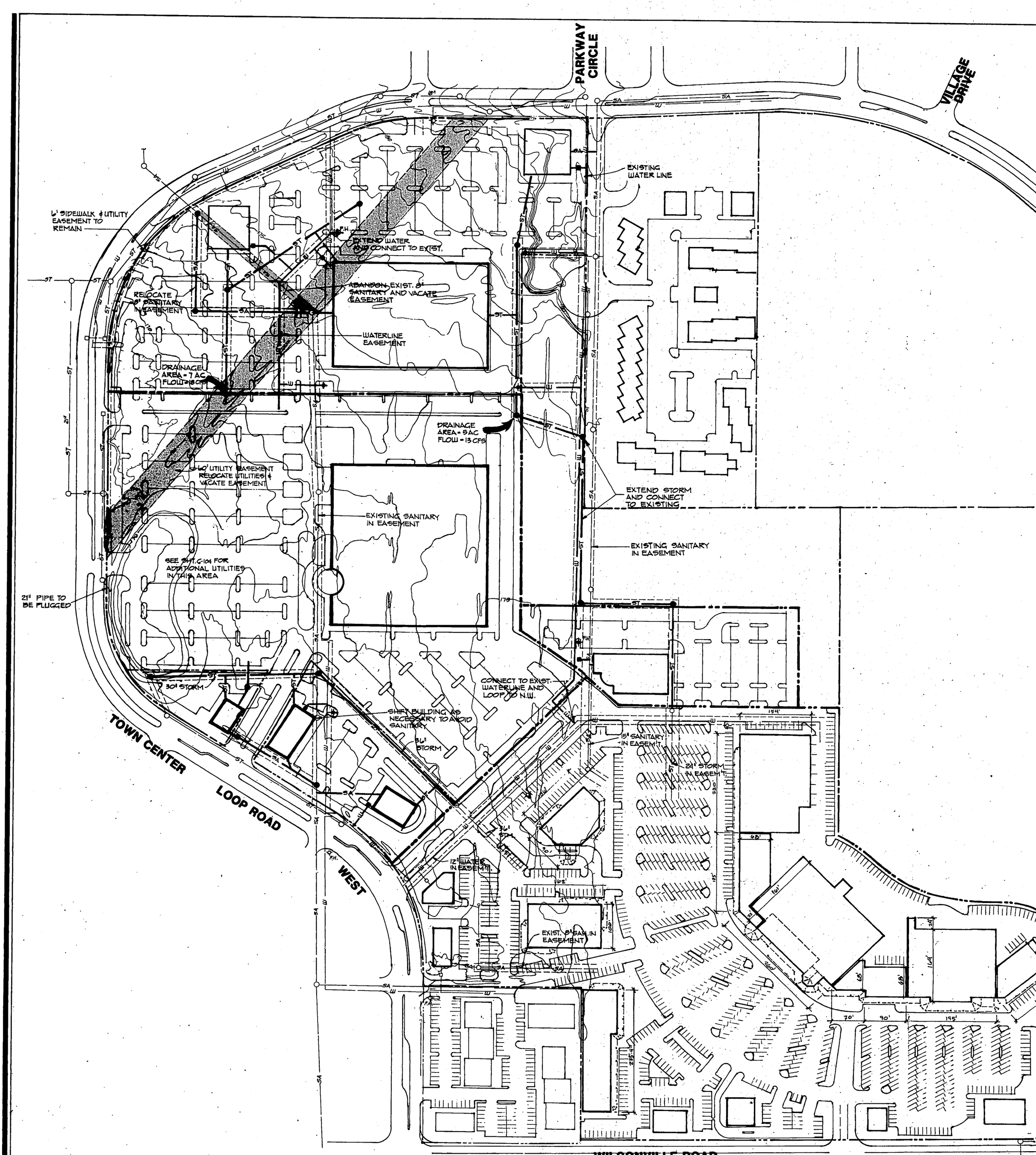
SITE MASTER PLAN

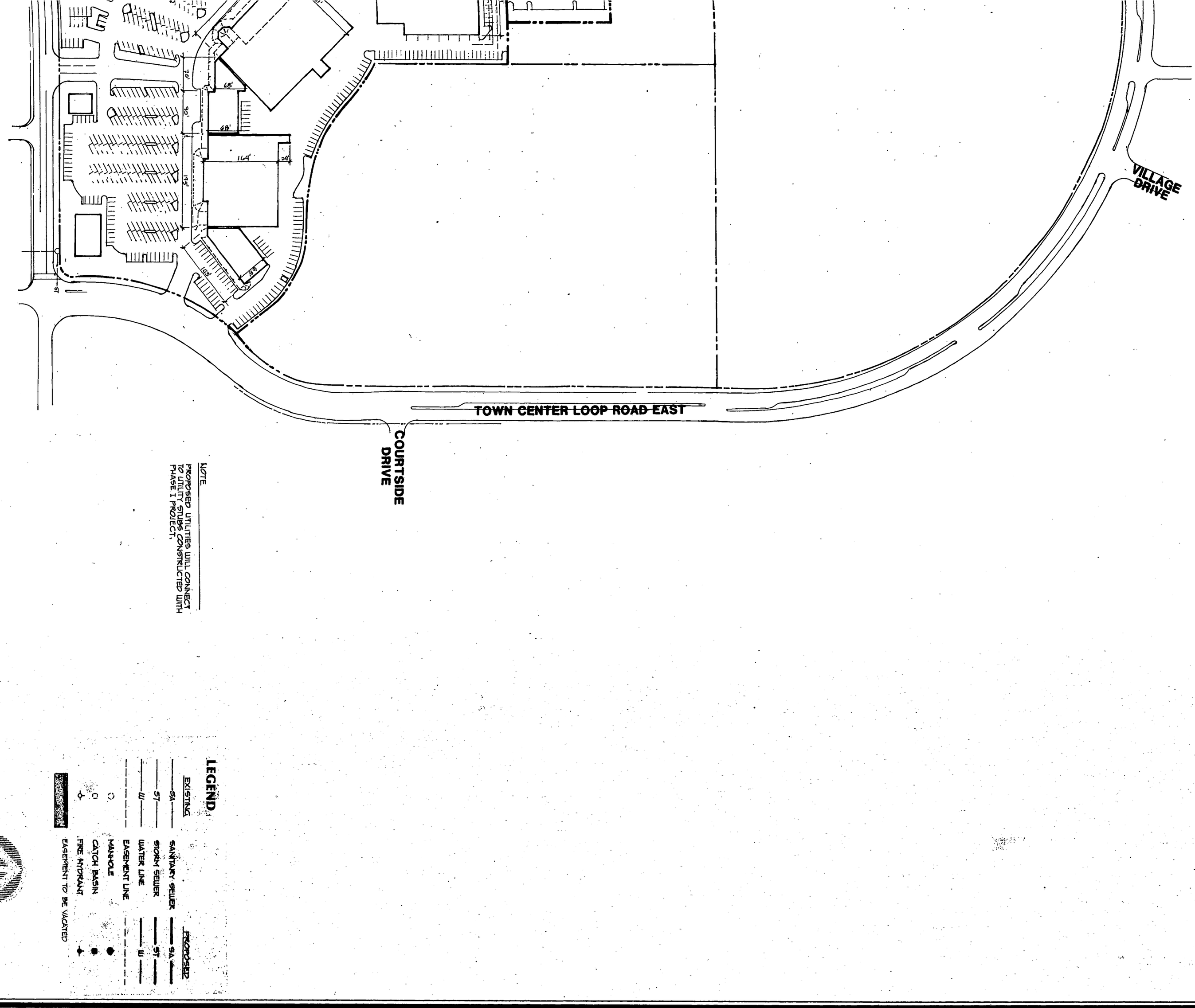
Sheet Title

Sheet No.

1

of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER AND CONNECT TO EXIST.
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA = 7 AC FLOW = 18 CFS
DRAINAGE AREA = 5 AC FLOW = 13 CFS
60' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEMT.
15" SANITARY IN EASEMT
24" STORM IN EASEMT
EXIST. 8" SAN. IN EASEMENT
WILSONVILLE ROAD



WILSONVILLE TOWN CENTER
Wilsonville, Oregon

Revisions

Drawn By ____ Checked By ____

Job No. 4-440-0201
Date 10-29-01
Sheet Title
MASTER UTILITIES PLAN

Sheet No. 2 of

WILLAMETTE PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
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Fax (503)276-6607
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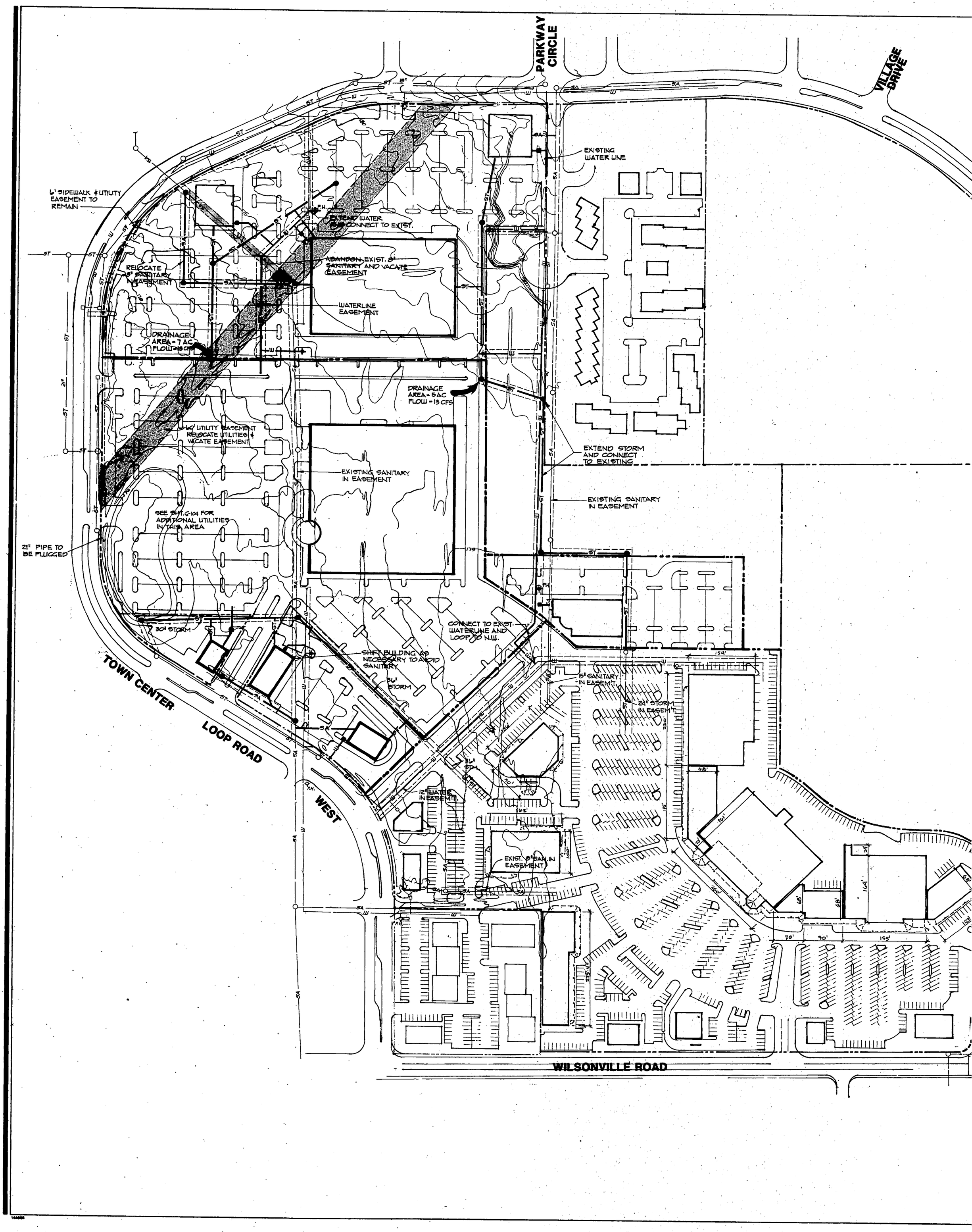
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
F.H.
EXTEND WATER & CONNECT TO EXIST.
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA - 7 AC FLOW = 18 CFS
DRAINAGE AREA - 5 AC FLOW - 13 CFS
10' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
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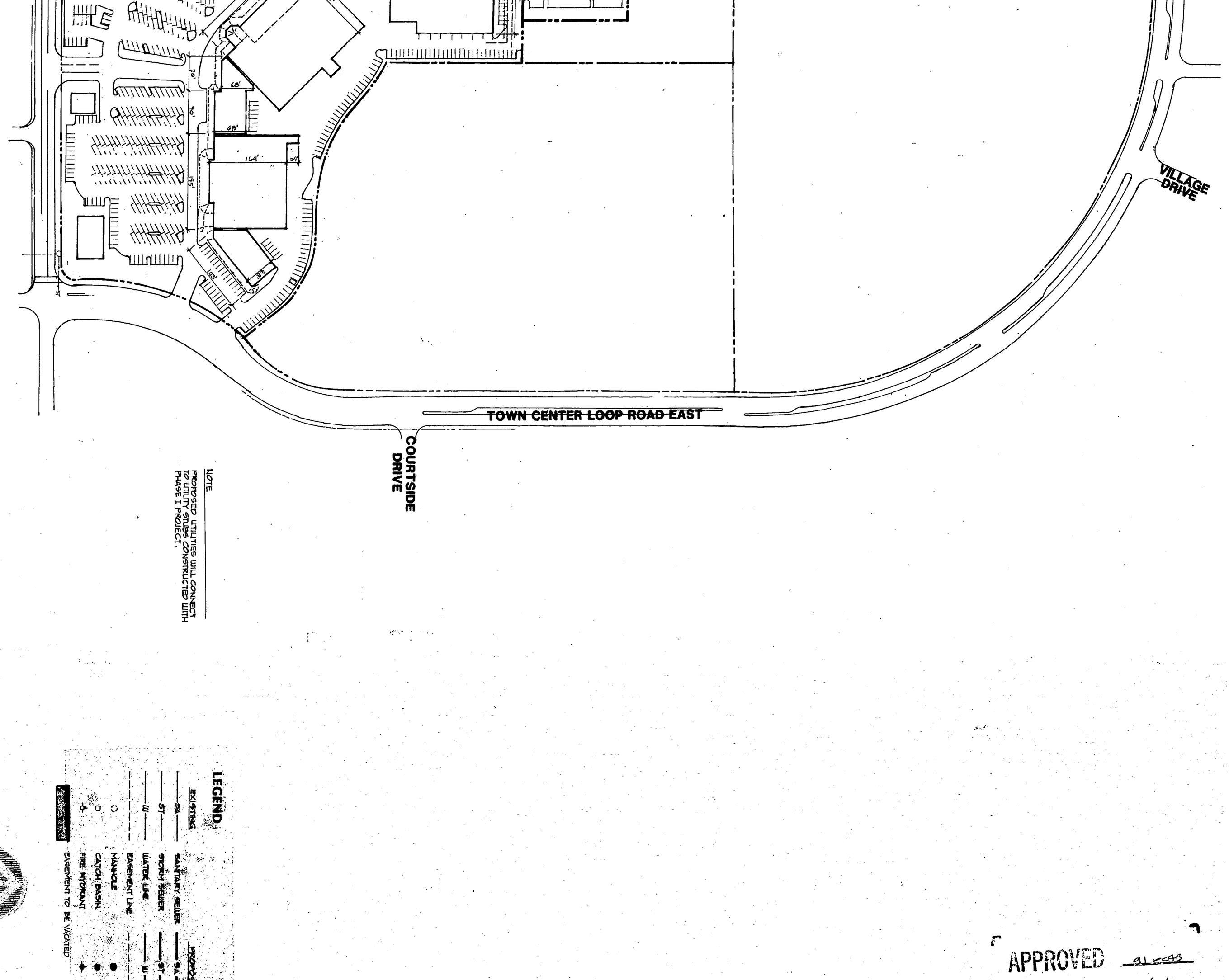
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEMENT
EXIST. 8" SAN. IN EASEMENT
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE 1 PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
⊹	FIRE HYDRANT	✦
	EASEMENT TO BE VACATED	

1" = 100'

APPROVED 9/25/91
Design Review 12/9/91

Sheet No. 2 of	Sheet Title MASTER UTILITIES PLAN	Date 4-26-91 Revised 9-20-91	Drawn By Checked By

Revisions

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

W&H PACIFIC
1099 S.W. Columbia Street
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1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
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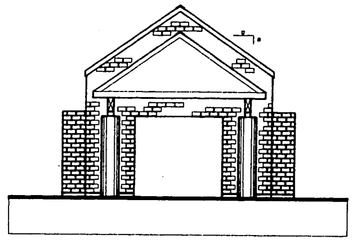
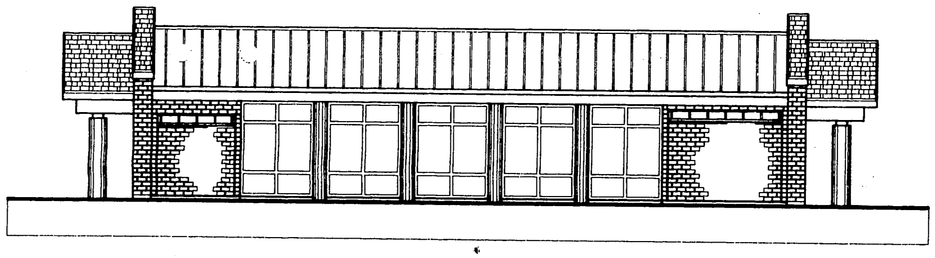
NICOLI ENGINEERING
and Construction Services Inc
9025 S.W. Center Street • P.O. Box 23784
Tigard, Oregon 97223
Phone: (503) 620-2086
FAX: (503) 684-3636

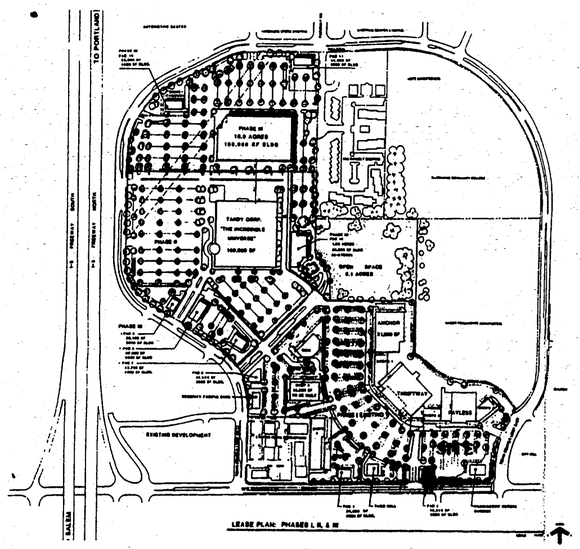
WILSONVILLE TOWN CENTER
PROPOSED CAR WASH
WILSONVILLE, OREGON



END ELEVATION
1/8" = 1'-0"



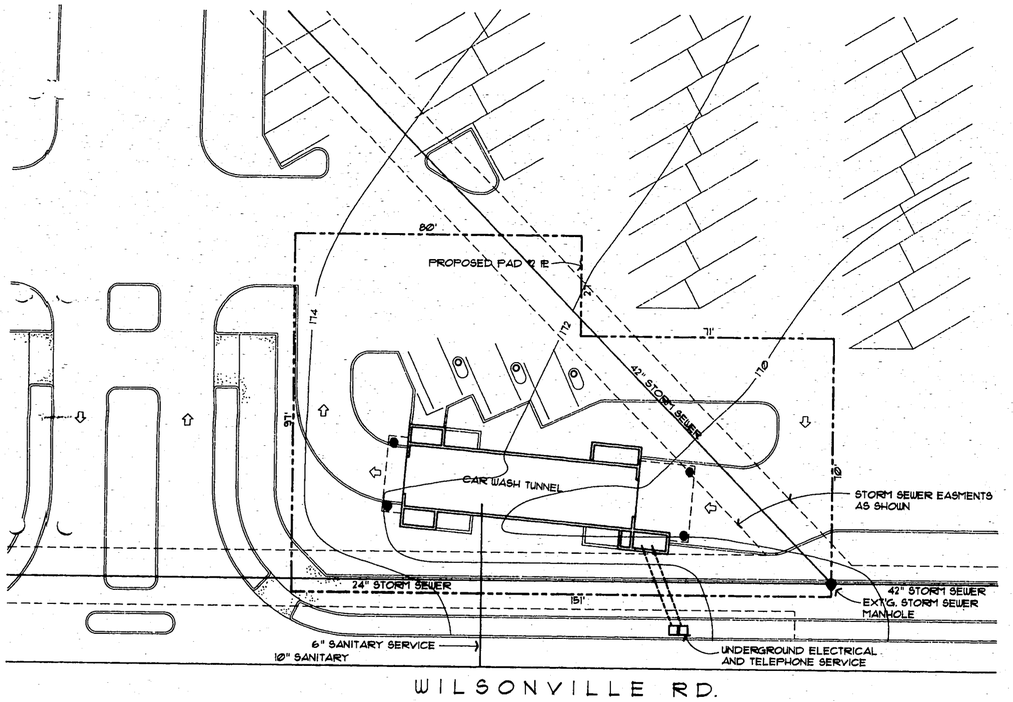
FRONT ELEVATION
1/8" = 1'-0"



VICINITY MAP

SITE DATA

	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA	1,500±	12%
PARKING & DRIVES	8,293±	65%
LANDSCAPING/OPEN SPACE	2,937±	23%
TOTAL SITE AREA	12,730±	100%



NORTH

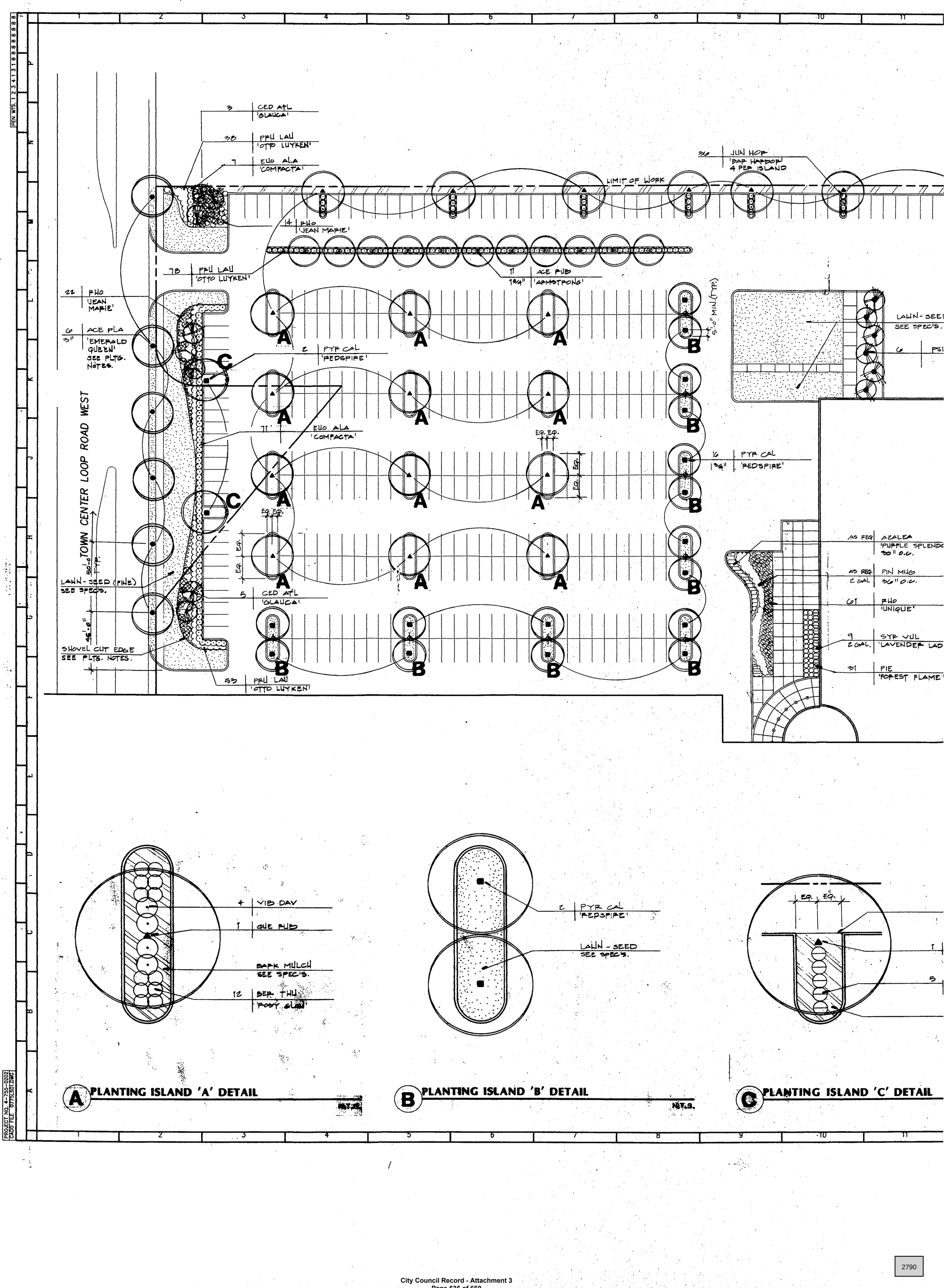
PRELIMINARY SITE PLAN
1" = 20'

CLIENT:
DENNIS THOMPSON

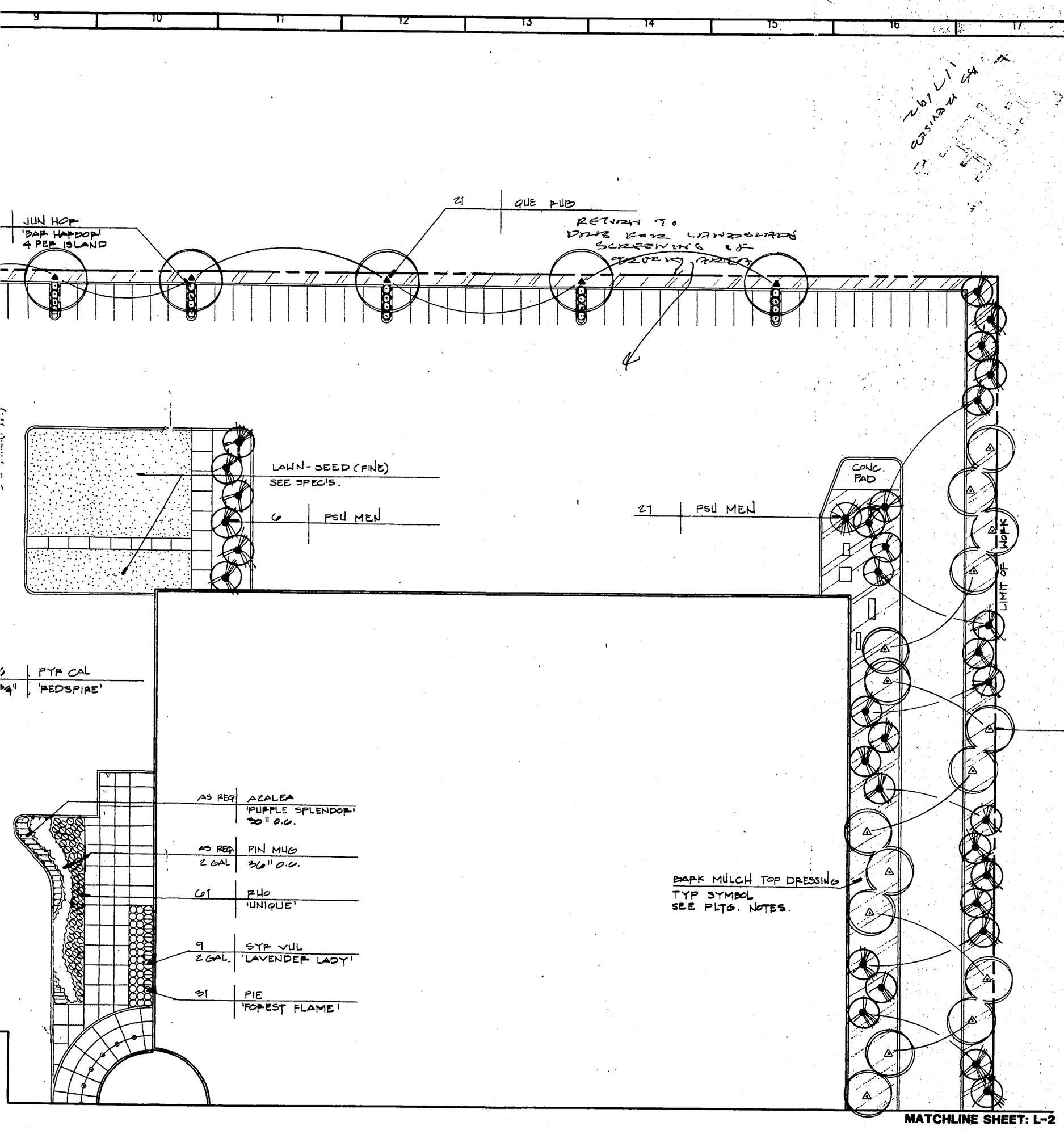
REVISIONS:

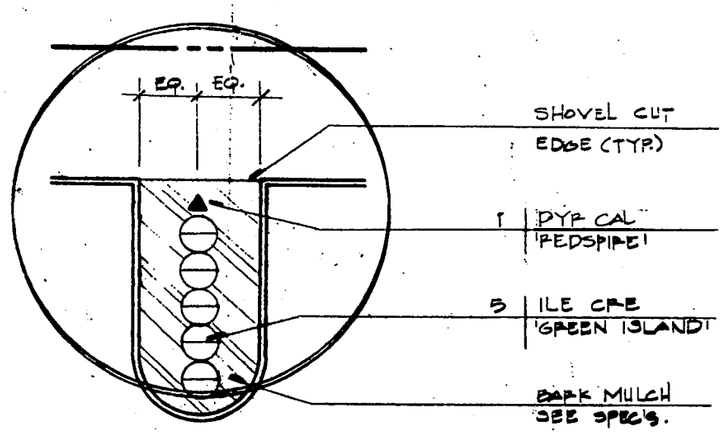
Date:	11-20-92
Scale:	AS SHOWN
Drawn by:	SET
Checked by:	JDA
Job No.:	2023
Drawing No.:	2023TITL

SHEET 1 OF: 2789



PROJECT NO. 4-755-0202
CADD FILE '0775LS01.DWG'





C PLANTING ISLAND 'C' DETAIL N.T.S.

NOT FOR CONSTRUCTION

PRINTED JAN 06 1992 W & H PACIFIC

APPROVED

PROJECT NORTH

SHEET NOTES

PLANTING GENERAL NOTES:

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES IN PLANTING AREAS PRIOR TO PLANTING. CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES 48 HOURS PRIOR TO BEGINNING EXCAVATION WORK FOR UTILITY LOCATION INFORMATION:

TELEPHONE:	503 246 6699	
GAS:	503 246 6699	
ELECTRIC:	503 246 6699	
SEWER:	503 682 4960	ATTN: MARTIN BROWN
WATER:	503 682 4960	ATTN: MARTIN BROWN

LIGHT STANDARDS ARE SHOWN FOR REFERENCE ONLY. REFER TO DRAWING NUMBER DRBC2 FOR ADDITIONAL LIGHTING INFORMATION.

PLANTING IN PARKING LOT ISLANDS AS SHOWN IN ENLARGEMENTS ON SHEET L-1.0.

ALL SHRUB AND GROUNDCOVER PLANTING AREAS TO RECIEVE MINIMUM 2" DEPTH OF BARK MULCH. SEE SPECIFICATIONS 02950.

REFER TO CIVIL'S FOR FINISH GRADES IN PLANTING AREAS.

STREET TREES ON TOWN CENTER LOOP ROAD WEST SHALL BE PLANTED PER CITY OF WILSONVILLE STANDARD PLAN. IF NONE EXISTS, INSTALL PER DETAIL 1, L-2.0.

ALL LAWN EDGES AT SHRUB PLANTING AREAS SHALL BE SHOVEL CUT. CONTRACTOR SHALL MAINTAIN ALL SHOVEL CUT EDGES IN A SMOOTH AND EVEN CONDITION UNTIL FINAL ACCEPTANCE.

CONTRACTOR SHALL SUPPLY AND INSTALL ANNUAL COLOR, 4" POT SIZE AT 10" O.C.. COLOR MATERIALS TO BE SELECTED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO PLANTING. ANNUAL COLOR MATERIAL SHALL BE IN SEASON (FULL BLOOM) AT TIME OF INSTALLATION.

W&H PACIFIC
2300 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title: PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title: LANDSCAPE PLAN

Seal: REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L1.0
Reviewed MH	
Date 12-27-91	

c 1991 DESIGN FORUM ARCHITECTS

PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8

MATCHLINE SHEET: L-1

TOWN CENTER LOOP ROAD WEST

4" POT | ANNUAL COLOR | SEE PLTG. NOTES

3 | 3" | ACE CIR

20 | RHO 'JEAN MARIE'

SHOVEL CUT EDGE (TYP.) SEE PLTG. NOTES.

30 | VIB DAV

5 | CED ATL. 'GLAUCA'

61 | PRU LAU 'OTTO LUYKEN'

56 | EUO ALA 'COMPACTA'

4 | 3" | ACE PLA 'EMERALD QUEEN' SEE PLTG. NOTES

LAWN - SEED (FINE) SEE SPEC'S.

6 | 2" CAL | QUE RUB

ROUGH SEEDED AREA
See Grading Plans for Limits

15 | 1 3/4" | PPY CAL 'REDSPIRE'

EQ. EQ. 5'-0" MIN.

10 | ILE CRE 'GREEN ISLAND'

AS REQ. | 2 GAL. | AZALEA 'PURPLE SPL.' 30" O.C.

AS REQ. | 2 GAL. | PIN MUG 30" O.C.

61 | RHO 'UNIQUE'

31 | PIE 'FOREST FLAME'

9 | 2 GAL | SYR VUL 'LAVENDER LADY'

25 | VIB DAV

13 | AZA 'PURPLE SPL.'

5'-0" MIN.

42 | AZA 'PURPLE SPL.'

AS REQ. | 4" POT | HED HEL 'GLACIER'

6 | ACE CIR

SIDEWALK N.I.C.

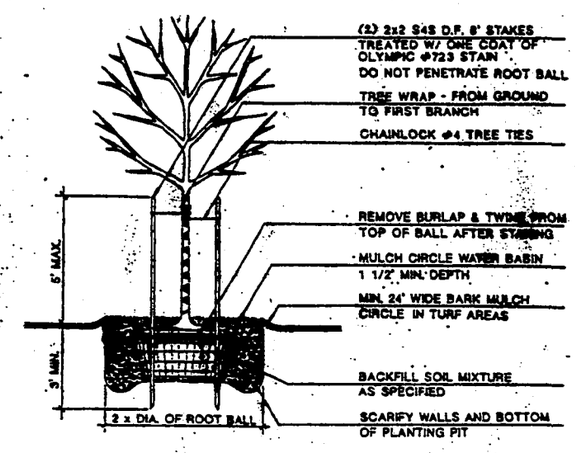
9 | 2" CAL | QUE RUB

ROUGH SEEDED AREA
See Grading Plans for Limits

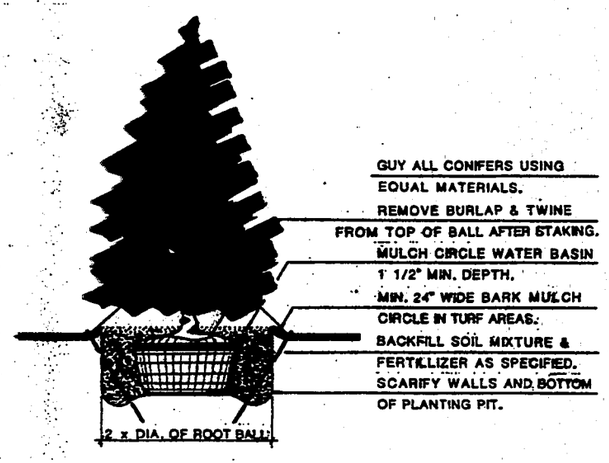
LAWN - SE
SEE SPEC'

PLANT LEGEND

QTY	CODE	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
9	Ace Cir	Acer circinatum	Vine Maple	7'- 8'
30	Ace pla	Acer platanoides 'Emerald Queen'	Emerald Queen Maple	3" Cal.
11	Ace rub	Acer rubrum 'Armstrong'	Armstrong Columnar Maple	1-3/4" Ca
18	Ced atl	Cedrus atlantica 'Glauca'	Blue Atlas Cedar	8'- 10'
19	Pyr cal	Pyrus calleryana 'Chanticleer'	Chanticleer Pear	1-3/4" Ca
40	Pse men	Pseudotsuga menziesii	Douglas Fir	8'- 10'
36	Que rub	Quercus rubra	Red Oak	2" Cal.
70	Pyr cal	Pyrus calleryana 'Redspire'	Redspire Pear	1 3/4" C
SHRUBS				
210	Aza	Azalea 'Purple Splendor'	Purple Splendor Azalea	12-15"
12	Ber thu	Berberris thunbergii 'Rosy Glow'	Rosy Glow Japanese Barberry	2 Gal.
184	Euo ala	Euonymous alata 'Compacta'	Compact Winged Euonymous	12-15"
53	I le cre	Ilex crenata 'Green Island'	Japanese Holly	2 Gal.
62	Pie	Pieris 'Forest Flame'	Forest Flame Pieris	12-15"
131	Pin mug	Pinus mugo Pumilio	Dwarf Mugo Pine	2 Gal.
240	Pru lau	Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	12-15"
56	Rho	Rhododendron 'Jean Marie'	Rhododendron	12-15"
122	Rho	Rhododendron 'Unique'	Rhododendron	12-15"
18	Syr vul	Syringa vulgaris 'Lavender Lady'	Lavender Lilac	2 Gal.
53	Vib dav	Viburnum davidii	David Viburnum	12-15"
GROUNDCOVER				
2,210	Hed hel	Hedera helix 'Glacier'	Glacier Ivy	4" Pots
66	Jun hor	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Juniper	1 Gal.
216		Annual Color		4" Pots



1 TREE PLANTING DETAIL N.T.S.



2 CONIFER PLANTING DETAIL N.T.S.

PROJECT NO. 4-755-0202
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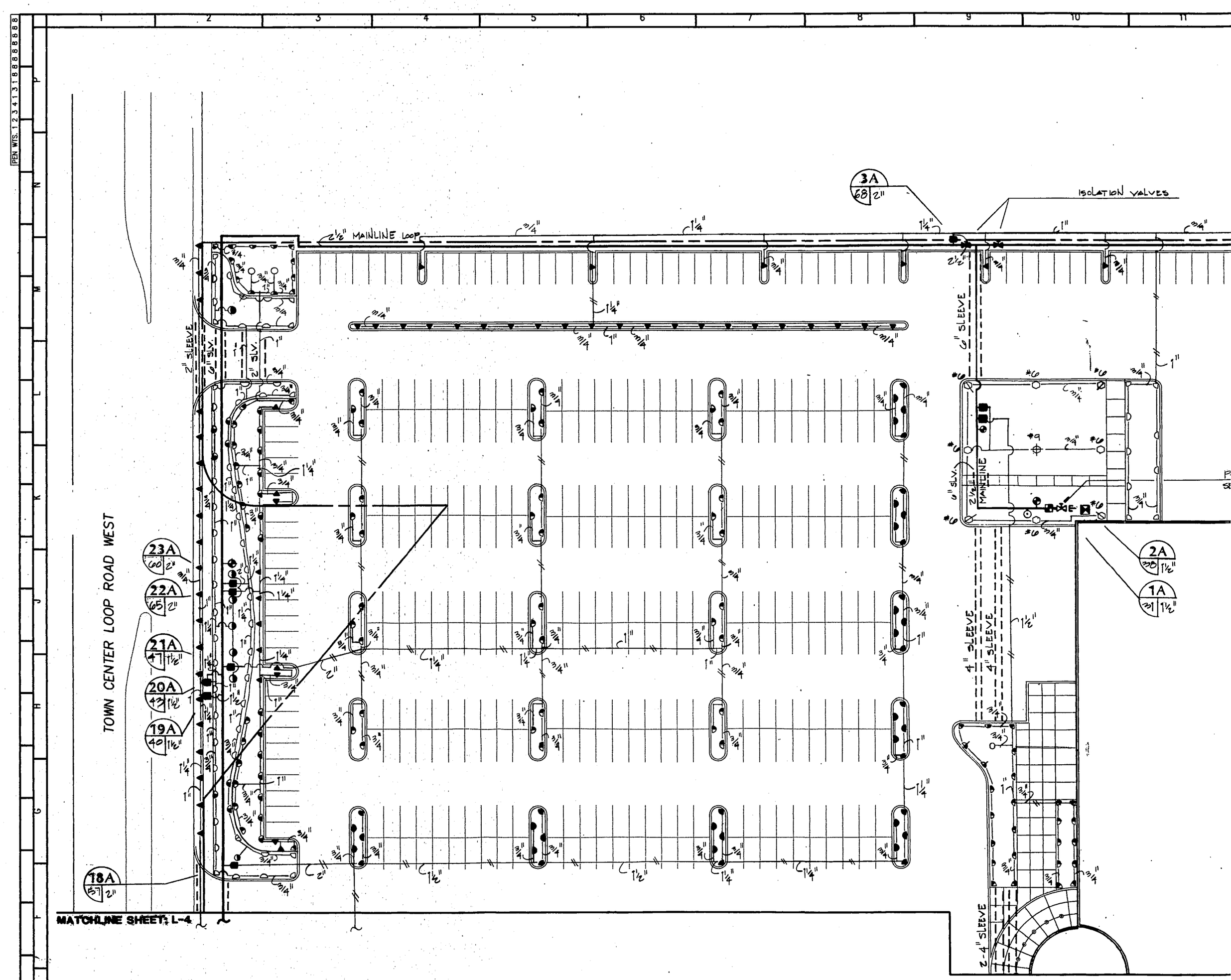
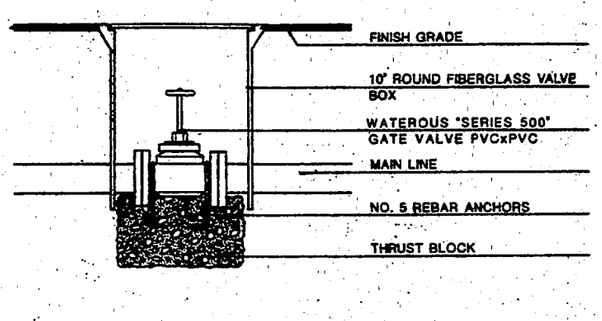
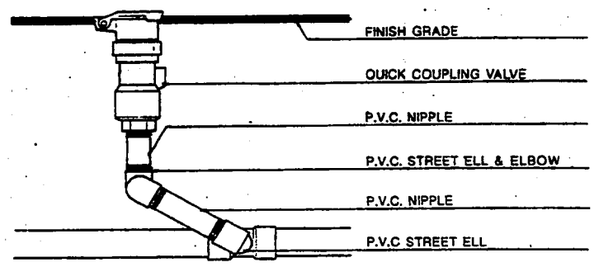
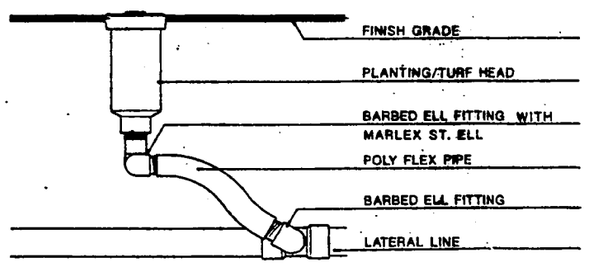




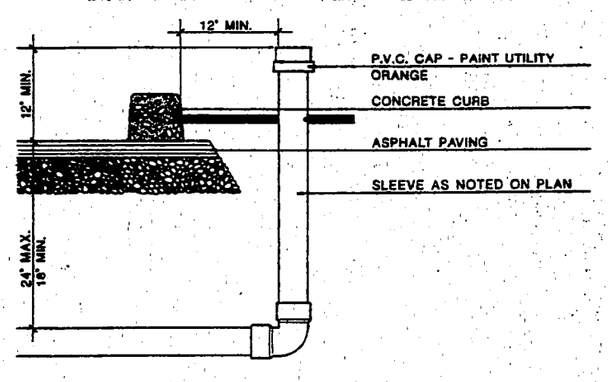
MAINLINE GATE VALVE



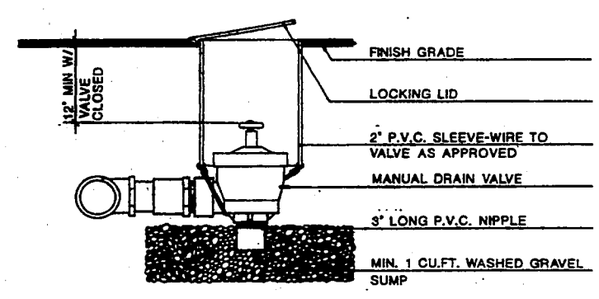
QUICK COUPLING VALVE DETAIL



POLY FLEX RISER DETAIL

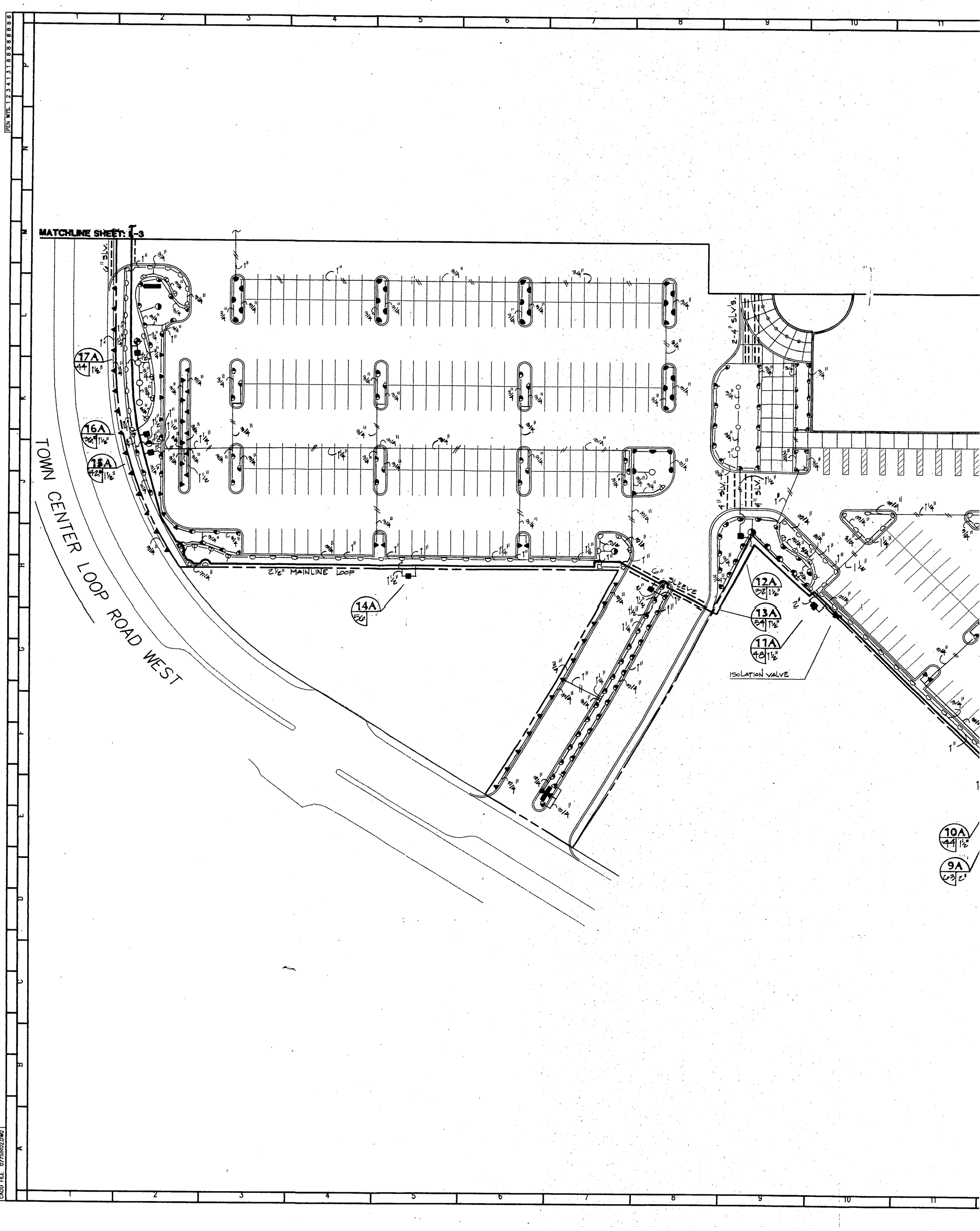


SLEEVING DETAIL



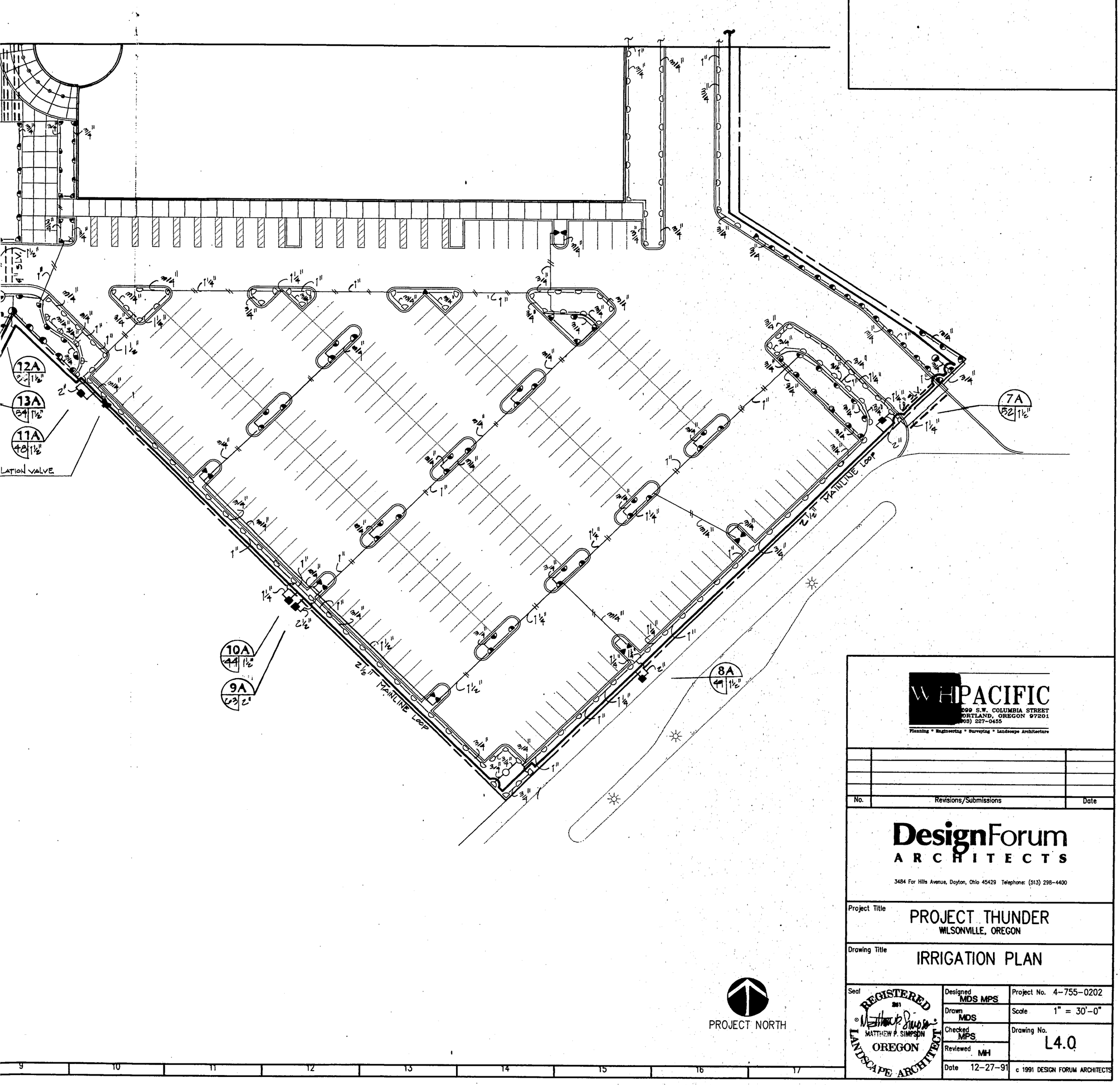
MANUAL DRAIN VALVE DETAIL

PROJECT NO. 4-755-0202
CADD FILE 0775IR01.DWG


PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8 8
MATCHLINE SHEET: C-3
TOWN CENTER LOOP ROAD WEST
2½" MAINLINE LOOP
6" SLEEVE
ISOLATION VALVE
2-4" SLV's.
4" SLV.
17A
16A
15A
14A
12A
13A
11A
10A
9A
PROJECT NO. 4-755-0202
CADD FILE 0775IR02.DWG

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

SHEET NOTES



PROJECT NORTH

WHPACIFIC
2099 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

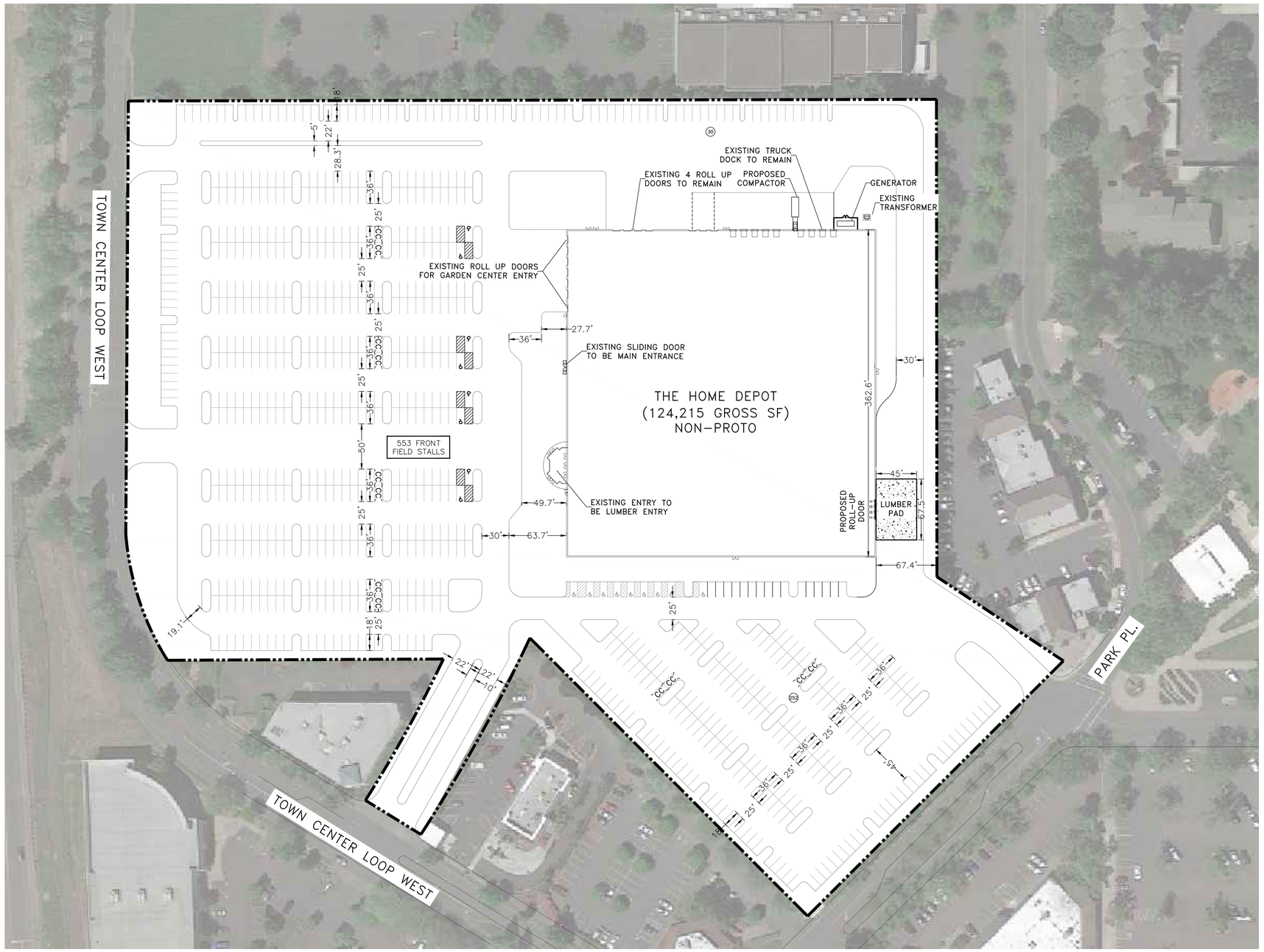
Project Title
PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title
IRRIGATION PLAN

Seal: REGISTERED 2801 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L4.0
Reviewed MH	
Date 12-27-91	© 1991 DESIGN FORUM ARCHITECTS

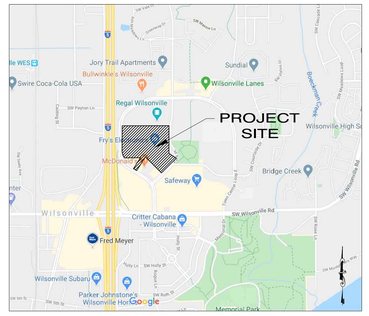
9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17



NOTES
1. PLAN BOUNDARY IS BASED OFF AVAILABLE APN MAPS; AN ALTA SHOULD BE COMPLETED FOR ACCURACY.

LARS ANDERSEN & ASSOCIATES, INC.
CIVIL ENGINEERS - LAND SURVEYORS - PLANNERS
4694 WEST JACQUELYN AVENUE – FRESNO CALIFORNIA 93722
TEL: 559 276-2790 FAX: 559 276-0850 WWW.LARSANDERSEN.COM

LA PROJECT NO. 20042.00



LOCATION MAP (NTS)

SITE AREA

THE HOME DEPOT PARCEL	15.01 AC	653,836 SF

BUILDING AREA

THE HOME DEPOT	124,215 SF
MEZZANINE	0 SF
SUBTOTAL	124,215 SF
TOTAL BUILDING AREA	124,215 SF

PARKING REQUIRED

THE HOME DEPOT	4.1 / 1,000 SF	509 STALLS
TOTAL PARKING REQUIRED		509 STALLS

PARKING PROVIDED

FRONT FIELD	553 STALLS
SIDE FIELD / REAR	282 STALLS
TOTAL PARKING PROVIDED	839 STALLS

INCLUDED IN PARKING PROVIDED

ACCESSIBLE STALLS (17 REQ. @ 2%)	17 STALLS

NOT INCLUDED IN PARKING PROVIDED

CART CORRALS	10 STALLS
ACCESSORY PARKING NOT INCLUDED	10 STALLS
TOTAL THD PARKING PROVIDED	839 STALLS

ZONING CLASSIFICATION

JURISDICTION	CITY OF WILSONVILLE
ZONING CLASSIFICATION	PLANNED DEVELOPMENT COMMERCIAL TOWN CENTER (PDC-TC)
THD USE PERMITTED BY RIGHT	YES

THE HOME DEPOT
WILSONVILLE, OR

29400 TOWN CENTER LOOP W
WILSONVILLE, OR 97070

DRAWING ISSUE DATE 10.19.2023
HD SITE SELECTION NUMBER SS-02804.2001

SCALE: 1"=50'-0"

25 0 25 50 100 150 200

OR - SITE PLAN 10

2796

HOME BUILDING ASSOCIATION
OF GREATER PORTLAND

To: City of Wilsonville Development Review Board
Re: Resolution No. 429 [DB24-0002 Appeal of Administrative Decision]

Members of the Development Review Board,

The Home Building Association of Greater Portland represents thousands of businesses and individuals seeking to address our region's biggest issues by building the housing, infrastructure, and jobs that make our region livable and economically vibrant. HBA is dedicated to maximizing housing choice for all who reside in our region by shaping an environment in which industry professionals can meet the diverse needs of all communities.

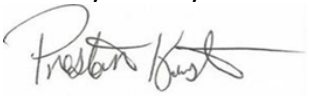
We are writing in support of the City's determination which found that the property located at 29400 SW Town Center Loop West is a legally established, non-conforming use, structure, and site condition under current zoning code. We urge you to affirm the city's decision.

After a robust, two-year community engagement effort, the Wilsonville Town Center Plan was adopted in 2019. The stated purpose of this plan is, "…attracting and retaining local businesses, employment opportunities, housing choices, and cultural and educational institutions. The Plan puts people first with walkable streetscapes and places to gather, shop, work, eat and recreate".

Oregon is staring down a housing deficit of 140,000+ units, and will need 443,000 new homes built over the next 20 years. This means we must not only prioritize the development of new housing now, but also plan to encourage and manage growth for the future as well. At a time when our region is facing a worsening housing crisis, we believe that every opportunity should be pursued to generate new and diverse housing options.

The economic analysis of the area contained within this plan shows the potential to create close to 4,200 diverse dwelling unit types during a Governor-declared housing emergency. This should be priority number one. We urge you to reinforce the city's determination of non-conforming use while exploring ways to encourage new housing development in this and other areas across the city.

Thank you for your consideration,



Preston Korst
Director of Public Policy and Government Affairs
Home Building Association of Greater Portland

Resolution No. 429: Appeal of Administration Decision

ADMN23-0029 Findings

- The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as “a retail business with the anonymous name “Project Thunder” “**a 159,400 square foot electronics-related retail store**.” Decision, at 2.
- The existing use on the subject property, per the original approval as described above, is a **large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store** that exceeds a footprint of 30,000 square feet.” Decision, at 3.
- “It is the determination of the Planning Director that **Fry’s Electronics**, on the subject property at 29400 SW Town Center Loop West, **is a legally established Non-Conforming Use** in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone.

1991 Decision Findings

(Case File Nos. 91PC43 and 91DR29)

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

REPRESENTED BY Schwabe

4. Building Use	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
a. Office	___ sq. ft.	9,117 SF	●	○	
b. Warehouse	___ sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	___ sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	___ sq. ft.	63,914 SF	●	○	

REPRESENTED BY Schwabe

- "It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a **159,400 square foot commercial retail store**." 1991 Decision, at 13.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

REPRESENTED BY Schwabe

The lawfully established nonconforming use at the subject property is a **commercial retail use** consistent with the 1991 Decision and the property's 1991 Planned Development — Commercial zoning designation.

Wilsonville is not Entitled to Deference in Interpreting the 1991 Decision

- ORS 197.829(1) generally does not require LUBA to affirm a local government's interpretation of a prior land use decision or conditions of approval attached to a prior land use decision. *Gould v. Deschutes County*, 79 Or LUBA 561 (2019) (*Gould VIII*), *aff'd without opinion*, 310 Or App 868, 484 P.3d 1073 (2021).

Requested Relief

- Home Depot respectfully requests that the Development Review Board find that the legally established nonconforming use at the subject property is a **commercial retail use** as approved in the 1991 Decision, not a “Fry’s Electronics” or “single-user electronics retail store.”

Future Development

TABLE 3.1 POTENTIAL FUTURE DEVELOPMENT BY LAND USE TYPE IN TOWN CENTER

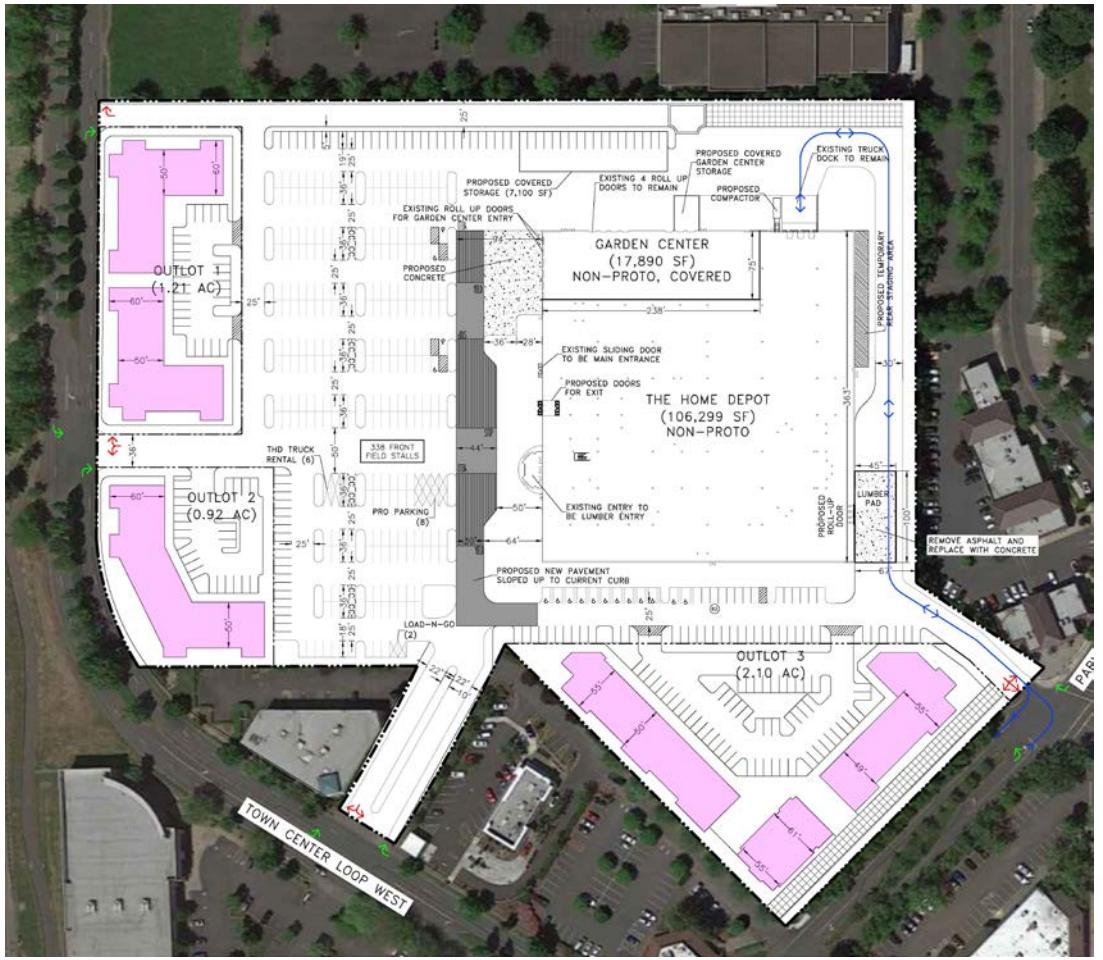
	COMMERCIAL (SQ. FT.)	RETAIL (SQ. FT.)	OFFICE (SQ. FT.)	RESIDENTIAL (UNITS)
EXISTING	299,240	321,340	178,950	80
NET NEW DEVELOPMENT (20 YEAR)	130,230	31,860	297,440	880
NET NEW DEVELOPMENT (40 YEAR)	204,595	50,000	541,050	1,600
NET TOTAL	**503,835**	**371,340**	**720,000**	**1,680**
PROJECTED EMPLOYEES	1,000	740	2,880	n/a

Note: Commercial land uses includes a broad category of real estate. For this analysis, commercial land uses are typically larger types of development, such as grocery stores, restaurants, larger retail (non-main street type uses) and entertainment uses. Retail, as defined for Town Center, are typically smaller scale uses typical of a main street development pattern. Residential unit calculations assume units of approximately 750 square feet, although the expectation is that a variety of housing unit sizes (studio, one, two and three bedroom) would be constructed over time. Square footage and housing units were determined using GIS analysis, market feasibility, and proposed zoning district density allowances. Approximately 40 percent of the square footage of developable parcels was removed to accommodate for landscaping, new streets, off-street parking (including loading and circulation), public spaces, stormwater retention and treatment.

THE FUTURE TOWN CENTER

Town Center's evolution will take time and there are many steps to reach the ultimate vision the Wilsonville community has developed. Land uses, transportation connections, and parks described in this chapter are all pieces in creating a walkable hub and heart of the community. The focus should always be on achieving the vision and goals of the Plan, while acknowledging that many of these transformational steps are incremental, both publicly and privately funded, and complex in nature.

Town Center Future Scenario



Aerial Right

2808

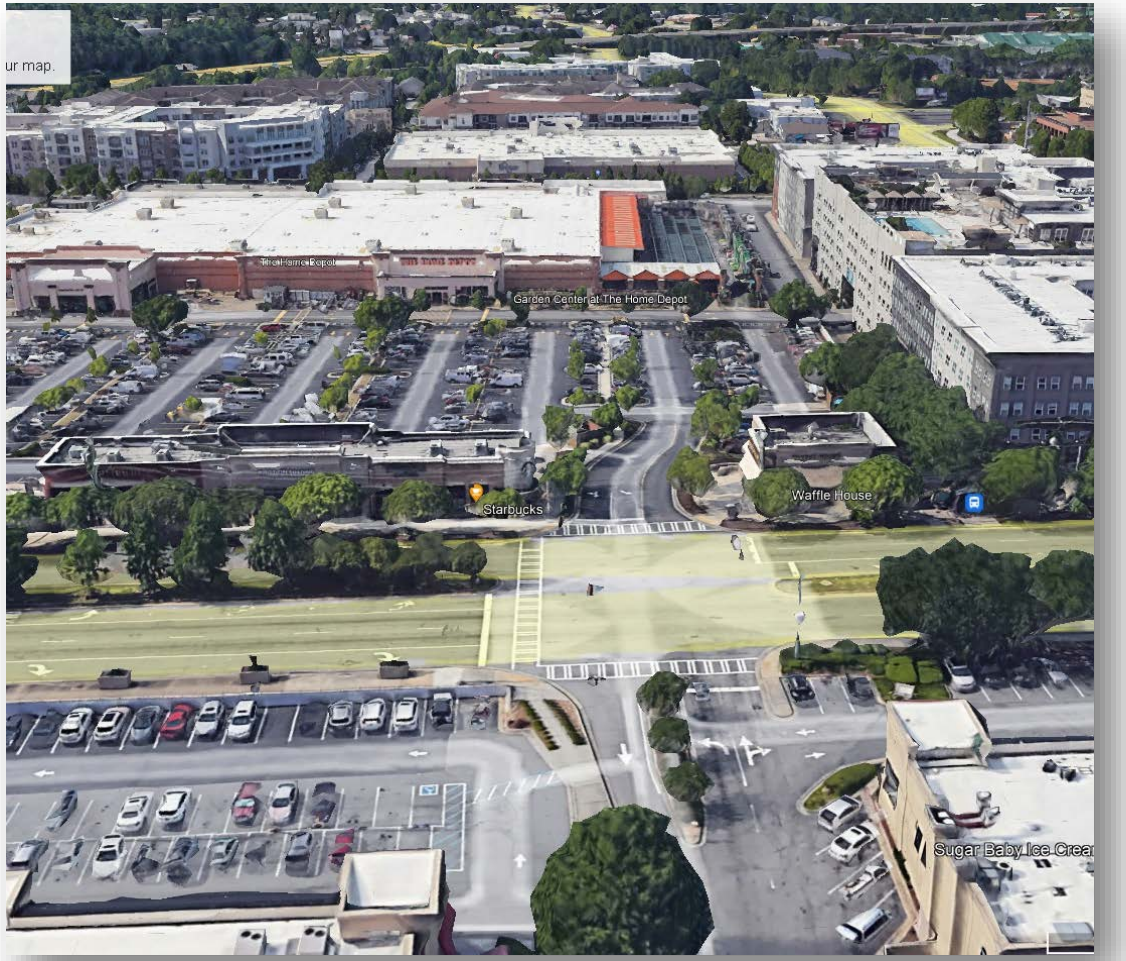
Aerial Left

The Home Depot - Wilsonville Town Center

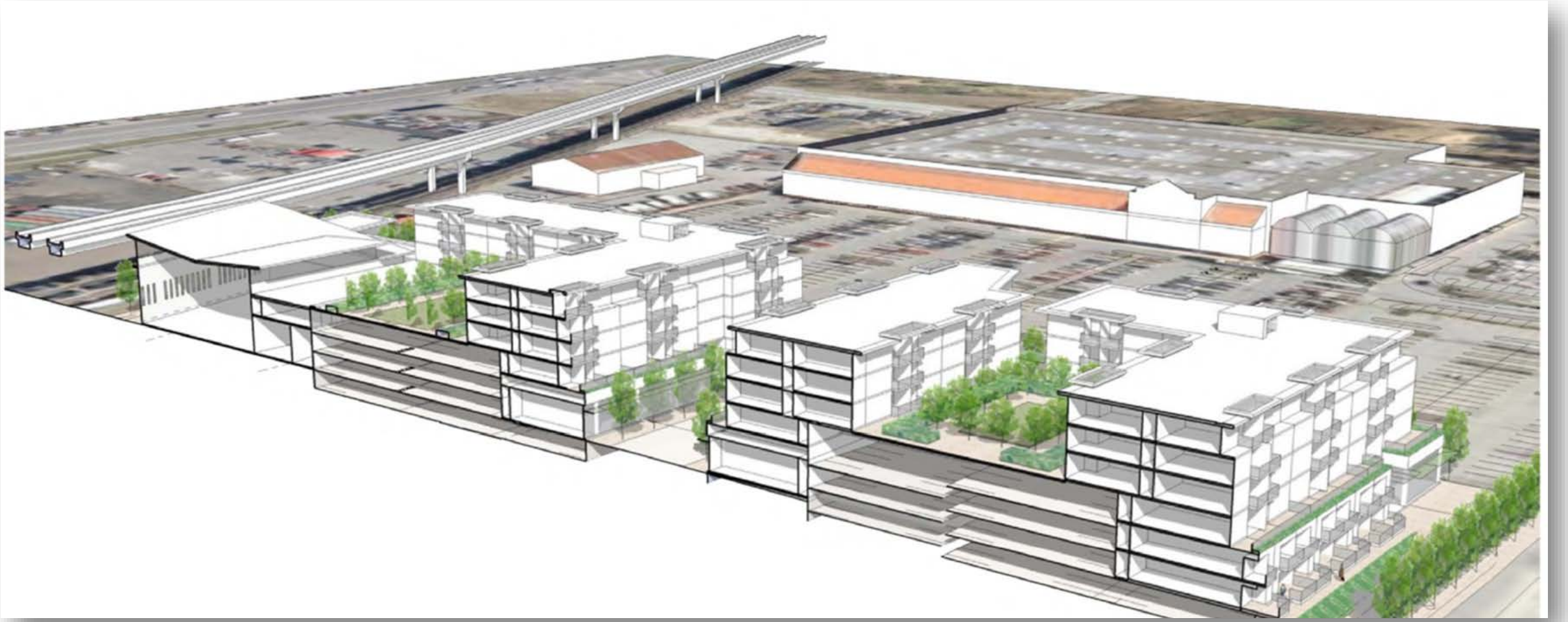
29400 Town Center Loop W

Wilsonville, Oregon

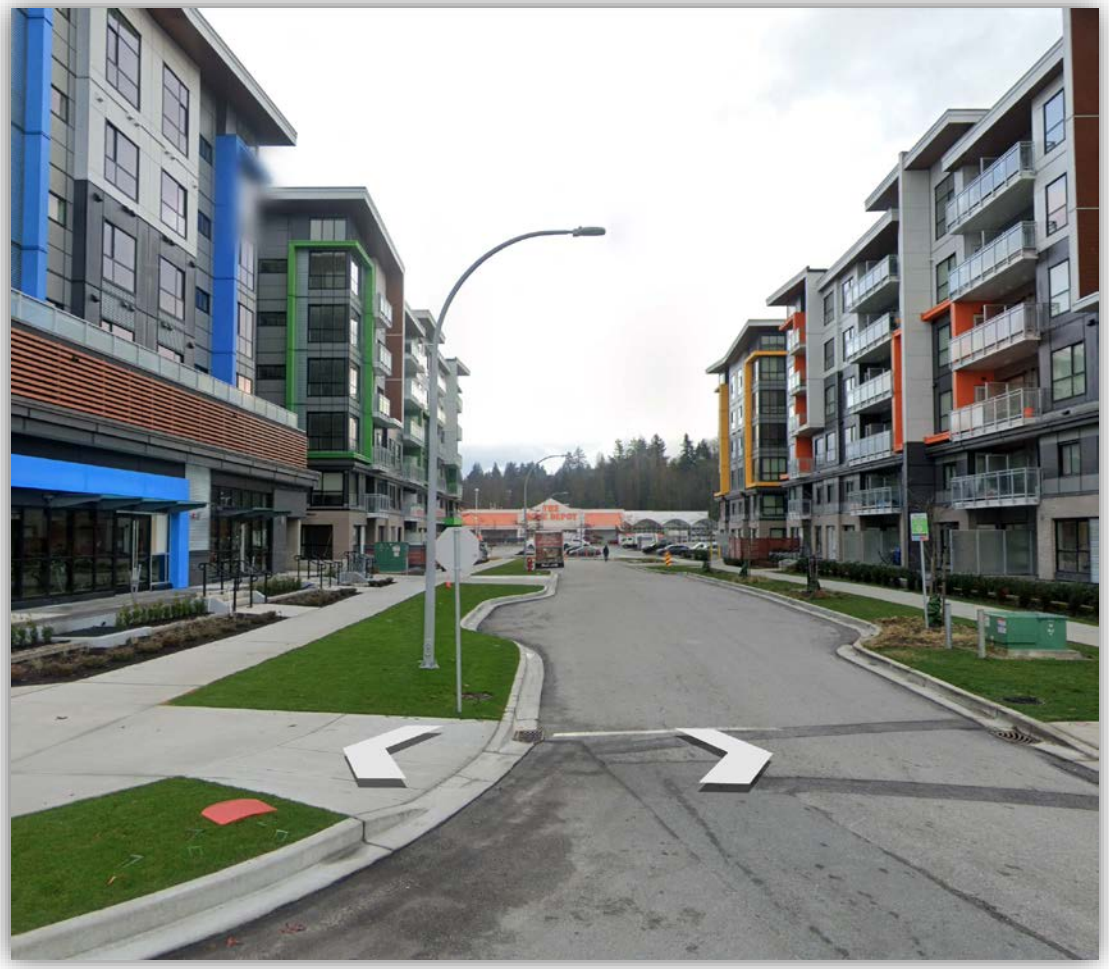
Atlanta, Georgia

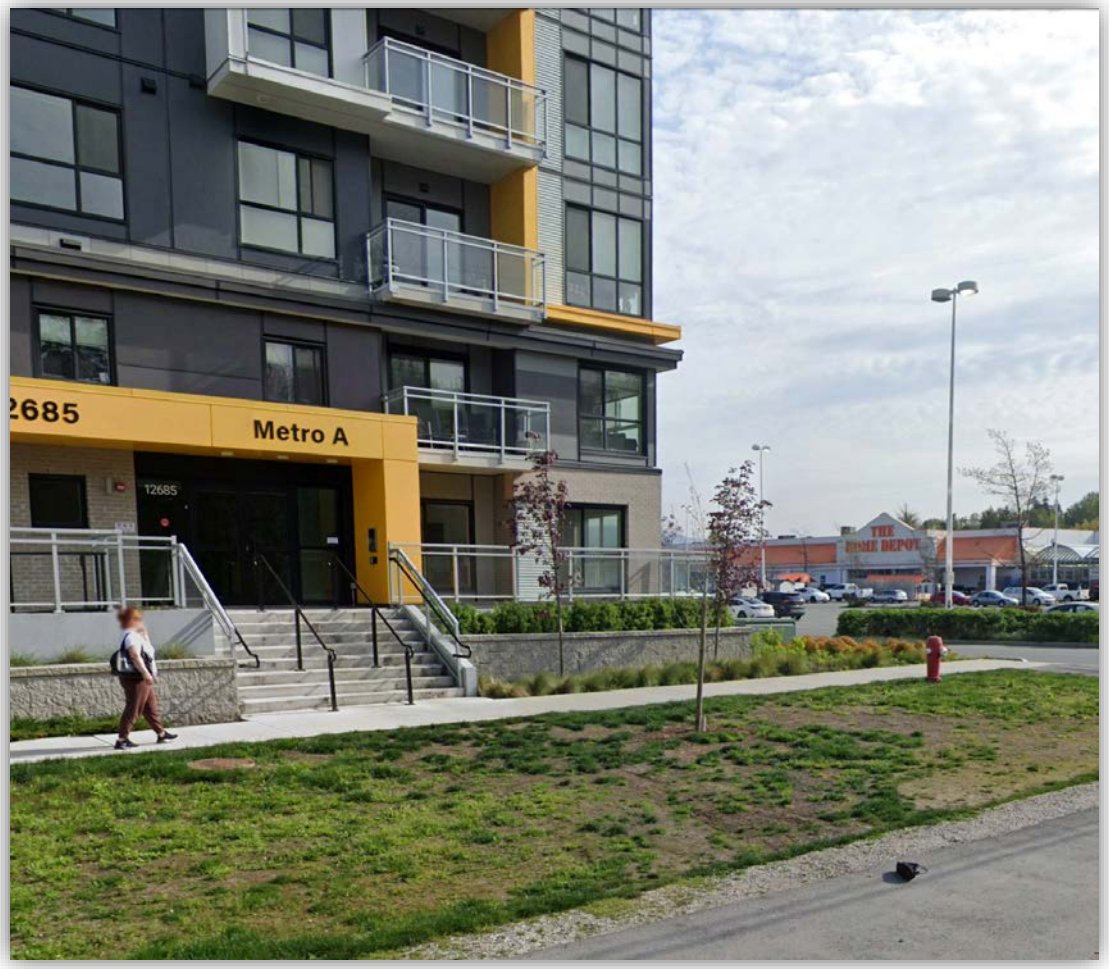


N. Surrey, Canada



N. Surrey, Canada





Lynwood, Washington

Economic Impact:

Oregon

DEVELOPMENT REVIEW BOARD PANEL B
VERBATIM MINUTES EXCERPT
Appeal of Administrative Decision ADMN23-0029
February 26, 2024 at 6:30 PM
City Hall Council Chambers & Remote Video Conferencing

CALL TO ORDER

A regular meeting of the Development Review Board Panel B was held at City Hall beginning at 6:30 p.m. on Monday, February 26, 2024. Chair Rachelle Barrett called the meeting to order at 6:32 p.m., followed by roll call.

CHAIR'S REMARKS

The Conduct of Hearing and Statement of Public Notice were read into the record.

ROLL CALL

Present for roll call were: Rachelle Barrett, Alice Galloway, John Andrews, and Kamran Mesbah. Megan Chuinard was absent.

Staff present: Daniel Pauly, Stephanie Davidson, Amy Pepper, Kimberly Rybold, Amanda Guile-Hinman, Miranda Bateschell, Georgia McAlister, Cindy Luxhoj, and Shelley White

PUBLIC HEARINGS

3. **Resolution No. 429. Appeal of Administrative Decision.** The Applicant is appealing the Planning Director's Determination of non-conformance in Case File ADMN23-0029.

   Case File:
   DB24-0002 Appeal of Administrative Decision

Chair Barrett called the public hearing to order at 7:05 p.m. and read the conduct of hearing format into the record. Alice Galloway and John Andrews declared for the record that they had visited the site. No board member, however, declared a conflict of interest, bias, or conclusion from a site visit. No board member participation was challenged by any member of the audience.

Kamran Mesbah noted for the record that he was on the Planning Commission when the Town Center Plan was adopted.

Cindy Luxhoj, AICP, Associate Planner, announced that the criteria applicable to the application were stated starting on page 2 of the Staff report, which was entered into the record. Copies of the report were made available to the side of the room and on the City's website.

The following exhibit was entered into the record:

- Exhibit C1: Written comments received from the Home Building Association (HBA) after publication of the DRB B February 26, 2024 meeting packet.

Presentation references Staff's Appeal of Administrative Decision PowerPoint (Exhibit A2)

[Verbatim transcript begins 36:40]

Ms. Luxhoj: The property subject to the appeal is located at 29400 SW Town Center Loop West referred to as the "Location" in my presentation and outlined in red in the aerial photograph on the left of this slide. The existing development on the property is shown in the photograph on the right. The Comprehensive Plan designation is Town Center, and the property is zoned Town Center and located in three sub districts: Commercial Mixed-Use, Mixed-Use, and Main Street District. (Slide 2, Exhibit A2)

On October 30, 2023, the City received an application for Class 1 Review to confirm the status of an existing non-conforming use and structure at the Location, which was previously occupied by Fry's Electronics, an electronics retail store, and has been vacant since 2021. The City deemed the application complete on November 29, 2023, and processed the request as a Class 1 Planning Director Determination per Subsection 4.030(.01)A7 of the Development Code.

- On December 28th, 2023, the City's Planning Director issued a notice of Planning Director Determination, which provided the Planning Director's decision on the Class 1 Review application. The Appellant submitted a notice of appeal of the Planning Director's decision on January 10th, 2024. The Planning director has the authority under Section 4.030(.01)A of the Development Code to deal with non-discretionary matters including Class 1 Review applications, and to process these applications as a ministerial action without public notice or public hearing.

Per Section 4.030(.01)A7, a determination that an existing use or structure is a non-conforming use or non-conforming structure is to be processed as a Class 1 Review, except, however, that the Planning Director may, in cases where there is any uncertainty as to the history of the property, choose to process such determinations as a Class 2 Review. Appeal of a decision on an administrative action by the Planning Director, such as the Class 1 review application in this case, is to be heard by the Development Review Board. Only the Applicant has standing to appeal a Class 1 decision.

The appeal of the Class 1 Review application ADMN23-0029 currently before the DRB is a de novo review under Subsection 4.022(.01) of the Development Code. De Novo is Latin for from the beginning. This means that that the DRB must review the Class 1 Review application as if the action had not been previously heard, and as if no decision had been rendered by the Planning Director. The DRB should base its decision on the testimony, evidence, and other materials submitted by the Applicant to the City in the Class 1 Review application, as stated in

Subsection 4.022(.07)B of the Development Code. Further, the DRB must, by order, affirm, reverse or modify in whole or part a decision that is under review.

In this proceeding, the decision under review is the Planning Director's decision in Case File Number ADMN23-00 29. For the purpose of applying the applicable 120-day time limit, a final decision on the Class 1 Review application, including any appeals must be rendered by March 28th, 2024. Staff notes that the City is currently processing a separate but related Class 2 Review application per Subsection 4.030(.01)B3 of the Development Code filed by the Applicant on December 15th, 2023. That case file number is AR23-0031. Any issues that are subject to the Class 2 Review, such as the scope of what non-conforming use may be continued at the location, are beyond the scope of this appeal proceeding.

Staff further notes that the findings related to General Submission Requirements on Pages 13 to 14 of the DRB staff report for tonight's public hearing include a list of documents and/or testimony contained within the Appellant's Exhibit B1 that are deemed rejected or excluded from the record. This is because the materials are beyond the scope of and/or not relevant to the Class 1 Review. Staff respectfully requests that the DRB keep this in mind during tonight's public hearing as testimony is presented. If this raises any questions related to the scope of review, please feel free to ask Staff what is relevant to tonight's proceedings.

The applicable legal standards related to non-conformance are discussed in detail in the DRB Staff report. However, Staff thought it would be helpful to briefly summarize some key points of case law as follows:

- Before use can be deemed non-conforming, it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be one that is contrary to a land use ordinance, but that, nonetheless, is allowed to continue because the use lawfully existed prior to the enactment of the ordinance. Non-conforming uses are not favored because by definition, they detract from the effectiveness of a comprehensive zoning plan. Accordingly, provisions for the continuation of non-conforming uses are strictly construed against continuation of the use, and conversely, provisions for limiting non-conforming uses are liberally construed to prevent the continuation or expansion of non-conforming uses as much as possible. Once the use is determined to be impermissible under a current land use ordinance, the question becomes, may the use continue because it is legally protectable as non-conforming? The purpose of a local government proceeding to determine the existence of a non-conforming use is to determine what use existed on the date restrictive regulations were applied.

As stated in the DRB staff report, City Staff believed that the Applicant in the Class 1 Review application requests an answer to the following questions: One, is the location a non-conforming use? Two, does the location contain a non-conforming structure? And three, does the location contain non-conforming site conditions? Considering that tonight's public hearing is a de novo review of the Class 1 Review application, the DRB should address all three

questions listed on this slide. However, the Notice of Appeal does not challenge the Planning Director's decision on the second and third questions. Accordingly, City Staff believe that there is no disagreement between the Applicant and the City with respect to those points. The main point of disagreement between the Applicant and the City is the Planning Director's decision regarding the first question of non-conforming use. (Slide 8)

The Staff report addresses each question in order outlining the legal standard that applies to the question, then highlighting facts that Staff believe are relevant to the question and finally quoting the determination of the question as stated in the Planning Director's decision. I'll briefly summarize this information. However, DRB has requested to refer to the detailed findings in the Staff report as the basis for tonight's deliberation and decision.

Before a use can be deemed non-conforming, it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be one that is contrary to a land use ordinance, but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance. As stated earlier in this presentation, the Location is currently in the Town Center (TC) Zone. The ordinance implementing the Town Center zoning became effective on June 5th, 2019. Permitted uses include retail sales and service of retail products under a footprint of 30,000 sq ft per use, office, personal and professional services. The Commercial Mixed-Use subject strict of the TC zoning applies to roughly two-thirds of the Location, which also allows single-user commercial or retail such as a grocery store or retail establishment that may exceed 30,000 sq ft if located on more than one story of a multi-story building, provided the footprint of the building does not exceed 30,000 sq ft.

The existing structure at the location has a footprint of 124,215 sq ft in a single-story with a partial mezzanine, which exceeds the footprint of 30,000 sq ft per retail user and footprint limitation that is allowed in the TC Zone. As of June 5th, 2019, the actual use at the location was a Fry's Electronics store, an electronics retail store with a total interior square footage of 159,400 sq ft and a footprint of 124,215 sq ft. Therefore, the Planning Director's decision addressed the non-conforming use inquiry as follows: the use is a legally established non-conforming use in the TC Zone.

The structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132(.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, facade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for nor has a waiver been granted. The Planning Director's decision addressed the non-conforming structure inquiry as follows: the structure is a legally established non-conforming structure in the Town Center Zone.

The existing site conditions do not comply with at least two City Code sections including Subsection 4.132(.04)A, which requires that all development in the Town Center Zone be

consistent with the street network and multimodal network, and Subsection 4.132(.05)A, which requires that all development be consistent with the open space network. Other site improvement standards of the TC Zone address such features as walkway connection to building entrances, parking location, landscape design and plaza areas. Existing site conditions do not comply with these applicable standards. The Planning Director's decision addressed the non-conforming site conditions inquiry as follows: the existing site conditions are legally established non-conforming site conditions in the TC Zone.

Staff recommends that the Development Review Board affirm the Planning Director Determination of non-conformance in ADMN23-0029, determining that there is a legally established non-conforming use at the location, specifically that the protected use is a 159,400 sq ft electronics related retail store. Two, there is — that there is a legally established non-conforming structure at the location and that there are legally established non-conforming site conditions at the location.

This concludes my presentation. Tonight, the Applicant is participating in the hearing and is prepared to make a presentation when invited by the Development Review Board. I'm happy to take the next few minutes to answer any questions you may have for Staff before moving on to the Applicant's presentation. Additional questions can be asked of Staff after the Applicant's presentation. Thank you.

Chair Barrett: Do we have any questions right now or should we wait?

John Andrews: No questions now.

Kamran Mesbah: None for me.

Chair Barrett: All right. We are going to – will the Applicant please come to the podium with the microphone or commence your presentation when unmuted on Zoom. State your name and address and present any testimony you'd like to present to the Development Review Board.

Daniel Pauly, Planning Manager: Something that'd be helpful if you would, for the record, is who all is here as part of the Applicant's team to be clear.

Presentation references the Appellant's Resolution No. 429 Appeal of Administrative Decision PowerPoint

Keenan Ordon-Bakalian, Schwabe Williamson & Wyatt: Absolutely. One second here guys, I'm sorry. There is a lot of things on this view point. Okay. Can everyone see that on their screens? Awesome. For the record, my name is Keenan Ordon-Bakalian with the law firm Schwabe Williamson and Wyatt. I'm here on behalf of the Applicant/Appellant, Home Depot. My corporate address is 1211 Southwest Fifth Avenue, Suite 1900, Portland, Oregon 97204. With me today is Barry Simmons, representing Home Depot, as well as another member of our project team, Dan Zoldak with Lars Anderson. If you'd like, they can provide their addresses as well.

Barry Simmons: Barry Simmons with Home Depot. Address is 2455, Paces Ferry Road, Atlanta, Georgia 30339.

Daniel Zoldak: Dan Zoldak, Lars Anderson Associates. Address is 4694 West Jacqueline, Fresno, California 93722.

Mr. Ordon-Bakalian: Before I get into the substance of our appeal, I'd just like to take a moment to thank you guys, members of the Development Review Board for your time tonight. It's very much appreciated. I'd also like to thank Cindy and the rest of Staff for their work on this project.

I was going to start off with a brief background here, but I did want to address one preliminary matter. Turns out that apparently a comment has been received after the Development Review packet was submitted. We haven't been provided that comment. I haven't been able to read it, so because of that, we'd request that the record be held open for written testimony after this hearing.

So, moving on to my presentation. First, I'm going to provide a brief background of the procedural history for this appeal. I'm also going to address the findings of the Planning Director's Determination.

Mr. Pauly: It was on the side of the room.

Mr. Ordon-Bakalian: Thank you. So, I'm not going to read this whole comment right now and develop thoughts to it. Again, my request to have the record remain open stands. Unfortunately, we weren't provided that via email. I understand it was in the room, but I wasn't aware. So, moving back to the procedural history, on October 30, 2023, Home Depot applied for a Class 1 Review to confirm the non-conforming use status of the existing use and structure at the property. Within this application, Home Depot indicated that its intention was to operate a Home Depot within the existing structure at the property once the property's non-conforming use status was confirmed.

On November 28, 2023, the City emailed the Appellant, Home Depot, stating that the Appellant’s request for confirmation that Home Depot could continue operating at the property under the scope of the non-conforming use required an interpretation of the City's Development Code under the City's Class 2 procedures.

The City provided the Appellant with several options including an option where Staff proceeds with the Class 1 Review and in addition, Home Depot applies for a Class 2 Review, requesting a written interpretation regarding the classification and scope of the non-conforming use of the property. This email is in the record as well as your Staff packet, and Home Depot did choose to proceed with the option I just detailed to submit a Class 2 application. Home Depot submitted the Class 2 application on December 15th, 2023. The application was deemed complete on January 12th, 2024. On December 28th, 2023, the City issued its decision for the Class 1 decision—for the Class 1 application. That's the decision before you on appeal today.

So, there's a lot of text on this slide. (Slide 2, Applicant's/Appellant's Appellant's Resolution No. 429 Appeal of Administrative Decision PowerPoint) It's the only slide with a lot of text. I do apologize, but I wanted to capture the City's findings pretty accurately here. They're also contained in our notice of appeal. The City's decision for a Class 1 application approved the non-conforming use of the property, but it contained several findings that we take issue with. Some of these findings are that it is a 150,940 sq ft electronics retail store; a large format, single-story with partial mezzanine, single-user electronics retail store, or that it's a Fry's Electronics. In fact, the City's decision or Staff's decision is inconsistent, because at some points, it finds that the non-conforming use is a Fry's Electronics, where at other points, it finds that the non-conforming use is a single-user electronics retail store. Those are two very different things. Although Fry's Electronics is an electronics retail store, the scope of the use is much different for those two purposes. Regardless, we disagree with both of those conclusions within the Staff decision.

The City's findings around the nature of the non-conforming use of the property are entirely unsupported within their decision. They don't cite to any evidence for coming to these conclusions; they just effectively find that the non-conforming use is what they say it is. Moreover, Staff's packet for tonight's appeal hearing is also inconsistent because it contains a draft resolution that would have the DRB find that non- conforming use of the property as a 159,400 sq ft electronics related retail store, whereas the Staff report request the DRB affirm the Planning Director's decision, that the non-conforming use is a Fry's Electronics. Those again are two very different things.

What should be controlling in this appeal is what was determined in 1991, when the original use was approved of the subject property. The 1991 Decision is attached to our notice of appeal, as well as the application. It's certainly within the record, and it contains findings that conflict with Staff's findings in terms of the Planning Director Determination. The 1991 Decision was prepared on the basis of an anonymous company. Fry's Electronics is not within the decision whatsoever, so the fact that the non-conforming use could be a Fry's Electronics is inconsistent with the controlling document which approved the underlying use, the 1991 Decision.

Specifically, if you look at the request for the 1991 Decision, it is seeking approval of a 159,400 sq ft retail commercial building, not a single-user electronics retail store. The Staff report was adopted by a resolution as findings and conditions of approval for the 1991 Decision, so it is, in effect, the decision.

Throughout the decision—throughout Staff report for the decision, which was adopted as part of the City's approval, the use as being approved is repeatedly being stated as a commercial retail use and conclude a couple other findings for your review. Here, they detail the building use. (Slide 4) You have office, warehouse, manufacturing and service and retail. There is some comments in the Staff report that these relate to parking standards, but if you actually look at the decision itself, which is on page 3, there is no reference to parking standards whatsoever.

This is the use of the building, which is the use of the property. At this point, we're talking about a commercial retail use.

There are some other findings and comments within the Staff report, which again, were adopted as the decision, where it stated that the use is a commercial retail use. It is apparent the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 sq ft commercial retail store. That's on page 3 of the 1991 Decision. It's also a conclusionary finding that it is a retail commercial center. There are other statements throughout the record and the application materials for the 1991 Decision talking about a retail anchor store—or a commercial retail anchor store. Sections 4.130 to 4.140 were the findings within the 1991 Decision related to zoning consistency, whether the use is allowed in underlying zone, which at the time was Planned Development Commercial, if I'm not mistaken. In this finding, there's a statement that the proposed commercial office units—uses are permitted in the overlay zones as part of the Town Center Master Plan. So, there's no reference to a single user electronic retail store. There's certainly no reference to Fry's Electronics. That's nowhere in the decision. So, this is really where we take issue with the Planning Director's Determination.

Moving forward, we obviously respectfully disagree with the Planning Director's Determination of the nature of the non-conforming use of the property. We believe it is a commercial retail use because as detailed, that is controlled by the 1991 Decision. Frankly, we were a little surprised that the Planning Director's Determination contained interpretations of use because we were under the impression, based on the November 28 email, that this would be addressed in the Class 2 proceeding. When we received the Class 1 Determination that found non-conforming use, but then went as far as to find what the nature and scope of the use was, we were effectively forced to appeal to preserve our rights here.

We believe the City's interpretation of the non-conforming use is wrong. It's neither a single-user electronics retail store or Fry's Electronics because that is an impermissibly narrow interpretation of what was approved in the 1991 Decision. It's also certainly not in accordance with any of the findings that were adopted.

In addition, I'd like to note, just for the record, that the City's interpretation of a prior decision is not afforded any deference were there to be an appeal to the Land Use Board of Appeals. The case regarding that is *Gould v. Deschutes County*. There are several of them. This is the one detailed on the screen here. (Slide 7) This is important because, generally, local jurisdictions may have deference in interpreting their land use code, but because this is a decision and not the land use code, it would be reviewed effectively as a clean slate before the Land Use Board of Appeals.

The DRB has the responsibility of reviewing the 1991 Decision in the first instance, as noted by this de novo hearing procedure. From the unambiguous request statement in the 1991 Decision, where it references a commercial retail use to the numerous references of the use

being reviewed and approved, it's absolutely clear that the use approved within the 1991 Decision is commercial retail. Due to the City's adoption of the Town Center Plan, which Commissioner Mesbah noted he was on the Planning Commission for, the commercial retail use has been rendered non-conforming. Staff did a very good job of detailing why those—why it conflicts with the current zoning designation for the subject property.

We're not disputing that there's a non-conforming use here, just effectively what the nature of that use is. We believe that the commercial retail use was lawfully established, and this is, again, why we've appealed the Planning Director's Determination narrowing the non-conforming use to a single user electronics retail store or even a Fry's Electronics.

In short, Staff may dislike the idea of a Home Depot at the subject property. We acknowledge that. We understand the Staff may believe a Home Depot is inconsistent with the City's Town Center Plan that was adopted in 2019; however, Staff's position is inconsistent with the legal authorization and non-conforming use law in the State of Oregon, and certainly, Home Depot has the right to continue its lawfully established commercial retail non-conforming use of the property.

That said, we're not talking about a traditional big box retail use of the property. Because of this, and the fact that the Home Depot's Class 2 application will likely be before the DRB in the near future, we briefly want to show Home Depot's vision at the site in which we believe is consistent with the vision and goals for the City's Town Center Plan.

With me tonight to do so is Mr. Barry Simmons with Home Depot. Barry, I will turn it over to you.

Mr. Simmons: Thank you. I appreciate the chance to speak to you guys tonight. As you see here, we did pull out —we have reviewed the Town Center Plan, and we actually believe, as we've said earlier, we're actually in alignment with the Plan, and we hope to further the Plan and with the – in partnership with the City of Wilsonville—town of Wilsonville.

So, in the Table 3.1 here, that was that was pulled from the Town Center Plan, the commercial square footage, the 300,000 existing square footage, clearly, this was adopted back in 2019. (Slide 9) Obviously, at the time, you guys had no way of knowing that Fry's would no longer be operating as of 2021. But, certainly, today Home Depot would like to reoccupy, re-energize, and make use of the existing 125,000 sq ft for our purpose.

We also have a vision that, again, that closely aligns with the Town Center Plan for multifamily use in the area. We believe, based off of the size of our out-parcels around that store, that we could put another 250 to 300 housing units around our store. So based off of this table, I think that, you know, the Home Depot use, again, that's a – we may be getting a little further down the road, but, at least, to communicate the vision that that Home Depot could bring back

125,000 sq ft of commercial retail as well as up to 300 housing units towards the—this future town home center or a future Town Center vision.

I will highlight there, in the right corner, that, one, this is over a 40-year plan. And the note, the first sentence there says that this will take time; there will be many steps. And we believe that this partnership or this future partnership with Wilsonville and Home Depot could be one of those steps to further that vision. Next slide.

Mr. Ordon-Bakalian: Sure.

Mr. Simmons: So, the Town Center Future Scenario. (Slide 10) As you can see on the left, is your Phase 1, directly from your Town Center Plan, that indicates the existing 125,000 sq ft building with the purple indicating some infill of new housing, new street-level retail, etcetera. On the right side of that plan is effectively our site plan, is what we envision, and within the four or five acres of out lots that we would—we would identify them as out lots. We believe that we can get those 200 to 300 additional housing units with multifamily housing and street-level retail. So, we have a couple of slides here, and, again, these are high level representations, I guess, or renderings, but we have a couple of pictures that we can show you what we think this might look like in the future.

Go ahead and go to the next slide. (Slide 11) These are just a couple of aerial shots of what we think that our store, kind of tucked in behind multifamily residences here in the Town Center, again, might look like within this 15-acre property. Click the next slide. (Slide 12) So, just a couple of pictures there to give that picture and image of how we can kind of walk along for this Town Center Plan together. Now, the question may be asked, you may be thinking like, “No one really wants to live next to a Home Depot.”

We don't believe that's true. In several places around the country, we have several examples that are exactly like this, where Home Depot's have found themselves in the middle of kind of play – live-play-work communities. And we can—we can show you a couple of examples of those. This is Atlanta, Georgia. This is the Buckhead store. (Slide 13) This is a very high performing store for us. As you can see, there's multifamily—large complex and multifamily both in front and behind the store. In front of the store, before you get to the main road, there's some street-level retail. Again, we fit right in with this community. Again, this is a high performing store for Home Depot.

The next one is Surrey, Canada. (Slide 14) Now, this is a rendering of residential in front of our store. The next slide, and this is what it looks like in real life. (Slide 15) These are Google Earth images of a Home Depot store tucked in behind as a part of a larger development of multifamily housing units. And the last I have is Lynnwood Washington, which is not too far up the road here, where you see a couple of shots here. (Slide 16) The Atlanta store was—I think that was built in 2006, and the housing was finished about 2008. The Lynnwood Washington site here was built in 2021 and finished—and the housing was finished in about 2022. So these are

relatively recent developments that Home Depot was involved in, that included multifamily, street-level retail, all the things that we believe closely align with what you guys are expecting with your Town Center Plan.

So again, I appreciate you having us here, allowing us to, kind of, share our thoughts with you guys. But we do believe that there's a benefit, potentially, for everyone to, kind of, walk hand-in-hand with this Town Center Plan, and I think we're—like I said, I think we're more in alignment than opposed to it. Thank you.

Mr. Ordon-Bakalian: Thank you, Barry. I'm just going to move back to one slide here. So, just kind of put the requested relief up here in terms of what we're looking for. (Slide 8) To wrap up, again, this appeal proceeding is only necessary because of the Planning Director Determination, which we think impermissibly narrowed the scope of the approval in the 1991 Decision, which is controlling for the property.

Like Barry noted, we want to be a collaborative partner with the City. We don't intend for this to be an adversarial process. At the same time, based on the findings of the decision, we were obligated to file this appeal. We certainly disagree with the scope and nature of the non-conforming use determination within the Director's Determination.

We respectfully request the DRB find that the legally established non-conforming use of the subject property is a commercial retail use as approved in the '91 Decision, not a Fry's Electronics, not a single-user electronics retail store. And again, I'd like to request the record remain open, not only so we can respond to the comment, which was received earlier tonight, but also to provide additional written testimony. We'd also like to thank you again for your time and request that we have the opportunity to provide rebuttal or final argument should Staff have any additional testimony. At this point, happy to take any questions or wait till the end.

Chair Barrett: Well, do we have any questions?

John Andrews: 1991 seems like a long time ago. The community here has changed a lot, and Fry's has kind of abandoned ship. So why should—why do we need to continue with that?

Mr. Ordon-Bakalian: Very good question, Commissioner Andrews. So, we can certainly detail this more in writing in our written response as well, but Oregon non-conforming use law allows certain uses that may no longer be consistent with the underlying zoning of a property to continue. The 1991 Decision approved a commercial retail use. So, although Fry's may be gone and bankrupt, a commercial retail use is still allowed at the subject property. We believe, based on what Barry detailed, that Home Depot would be a willing and able partner to achieve both the City's vision under the Town Center Plan while also providing an anchor commercial retail use at the property stepping into Fry's shoes.

Mr. Andrews: One more thing. So, the proposal for all the residential things around that, I mean, that just kind of came up. Is there—I mean, has there been any formal proposal or anything like that

that involves that? Or is that something that may happen later if you decide to do that, instead of layout more parking?

Mr. Simmons: We have not marketed those spots yet. Yeah, I mean, we can't go that far yet. We haven't even built a store yet. But certainly, it's our plan, as we have done at other locations, is to market the excess property or what we would consider excess property; those out parcels—out lots to multifamily home builders to get that work done. So yes, we would—if it is in alignment with the vision of the Town Center Plan, we could more specifically look at targeting that type of use for that land if we were to get a store at this location.

Mr. Ordon-Bakalian: Just to follow on Barry's comments here, I mean, again, Home Depot is trying to approach this as a collaborative partner with the City. We've had some initial discussions with, kind of, what our vision is for the site. That said, I think it's everyone's understanding at this point that until we sort out the issue with the non-conforming use, those discussions are kind of on hold. From a certainty perspective, both for the City and also for Home Depot, trying to pull the cart before the horse, if you will, doesn't really benefit anyone here. So again, we are willing and open to have those discussions. I think we just need to kind of get alignment together as partners.

Mr. Andrews: Okay, thank you.

Chair Barrett: I have a question, but maybe I don't know who can answer it. It might be any lawyer in the room. What is an effective date for non-conforming use, like, when does that go into effect?

Mr. Ordon-Bakalian: I'm happy to answer first unless—so, effectively, a use becomes non- conforming when it is prohibited by the underlying zoning district. This may be a kind of oversimplification of the Oregon case law at this point. But, the use only became non-conforming when the Town Center Zone was adopted for the subject property, which has that 30,000 sq ft maximum and several other standards that, in full disclosure, the subject property nor the structure do not comply with. However, uses that were lawfully established prior to the change of the zoning are allowed to continue. And so in this case, it is our position the commercial retail use that was approved in 1991 was lawfully established. It was approved by the City. It has never been abandoned. Your Code actually has provision for abandonment, which we detail in our application, and I think both the City and us believe is met. I don't want to speak for them, however.

So, because the use was established in 1991, it may continue. The effective date for its non-conformance was when the zoning designation changed, and I believe that was in 2019 with the adoption of the Town Center Plan.

Stephanie Davidson, Assistant City Attorney: City Staff agree with that. The effective date of that zoning regulation was June 5th of 2019.

Mr. Ordon-Bakalian: Thank you, Stephanie.

Chair Barrett: So, what was the use? It was the Fry's retail store in 2019.

Ms. Davidson: The legal standard, this is outlined in the Staff report, one of the key cases here is the Nehoda LUBA case. I'm going to read from it right now. "The purpose of the local government proceeding to determine the existence of a non-conforming use is to determine what use existed on the date the restrictive regulations were applied." So, essentially, the question is, what was the actual use of the property as of June of 2019?

Mr. Ordon-Bakalian: And in our position, the use was commercial retail. In the Planning Director Determination, they've narrowed it to a Fry's Electronics; in some instances, maybe a single-user electronic retail store. Again, the stuff I showed you on the presentation is directly pulled from the 1991 Decision. It is clear in 1991, the use approved was a commercial retail use. Electronic stores, including Fry's, fall within that subset of uses, but I don't think the '91 Decision intended to narrow such a use to that level.

Chair Barrett: Okay. One last question. Fry's went out of business—sorry, the retail store went out of business in 2021. So, how is it being used since?

Mr. Ordon-Bakalian: So that's actually a very good question and kind of a unique facet of Wilsonville's Code here. So, the property itself has been vacant since Fry's went out of business. But for the purposes of the City's non-conforming use standards, the use has continued. It has not been abandoned. I can, again, respond more detailed—in more detail in writing. However, I believe the standards for continuance of a non-conforming use include continuing to pay utilities, taxes, and other facets of continuing to employ the site. The current owner of the site has done so. There's no evidence that they have stopped doing any of those things. So, it is our position, and, again, I believe Staff's position as well, just based on the findings in the Planning Director Determination, that there is a non-conforming use there. It has not been abandoned. The question just is what is the nature of that use.

Chief Barrett: Thank you. Any other questions? Yeah, okay.

Mr. Mesbah: You mentioned in your presentation that you were essentially forced to appeal the decision of the Planning Director. Could you explain why that is?

Mr. Ordon-Bakalian: I think "compelled" might be a better word than forced. Certainly, we could have chosen not to appeal the decision. However, again, this all kind of goes back to the November 28th email, which is in the record for this appeal proceeding. We requested confirmation there was a non- conforming use of the property. Within that, we did state our intention to operate a Home Depot at the site. In response, Staff responded and stated that that second part of our request required a Planning Director interpretation, which should be processed under a Class 2 application. So, we believed the Class 1 would just be, effectively, a stamp that said, this is

either a non-conforming use or it's not; it's non-conforming structure, it's not. However, when we received the Planning Director Determination, the Director determined that the non-conforming use, the nature of the use, was a Fry's Electronics or a single-user electronic retail store. That would mean if that decision was not appealed, that would be the only use allowed at the site under its non-conforming use rights. We're not denying Home Depot is not a single-user electronic retail store or a Fry's, so we were obligated to appeal because we believe that '91 Decision, again, approved a commercial retail use; not something as narrow as was in the determination.

Mr. Mesbah: So, I guess my second question is if a Class 2 Review, which is going to be coming in front of us, is going to be dealing with that specific question?

Mr. Ordon-Bakalian: Yes.

Mr. Mesbah: What's the difference?

Mr. Ordon-Bakalian: The difference is if we hadn't appealed the decision within the allotted appeal timeline, the decision would become final. And the decision in the Class 1 Determination which, again, we think may be outside the scope of what should have been decided, is that the use is a Fry's Electronics or a commercial—or a single-user electronic retail store. So, in effect, the Class 2 decision had already been made, even though it wasn't our understanding that was supposed to occur. If we let that decision stand, there's a decision that hangs out there that says the non-conforming use is a Fry's Electronics. And so, the Class 2 process effectively would be moot. There's no reason for us to proceed at that point.

Mr. Mesbah: As a person who needs to figure out the complexity of this, I don't feel there is enough information, other than your say so, for me to determine whether or not this is conforming or not. In other words, there's a continuation of use or not. I'd rather wait until a Class 2 Review with a thorough kind of evaluation of that, and so I don't know if there's an option of withdrawing your application for Class 1 so that we can go forward with Class 2 with an open slate or something like that, instead of prejudicing it, as you're worried it will happen. That's the nature of my questioning is—

Mr. Ordon-Bakalian: It makes perfect sense. I think that's very astute observation there. I think, you know, again, we are open to discussing potential solutions with the City in terms of what we can do to kind of focus this process before the DRB, so we don't have two different processes proceeding at once. That said, like you noted, we were, maybe not, forced to, but we were obligated to appeal based on the substance of the determination in the Class 1 decision. You know—

Ms. Davidson: Yeah, I'd just like to chime in here. There have been negotiations with the Applicant. Even late on Friday afternoon, there was some talk about potentially withdrawing the Class 1 application, but the Applicant has to agree. I think the document that I saw circulated said—one of the resolutions within that document said that, you know, as part of this withdrawal, the Planning Director would modify her letter dated December 28th of 2023, to say that no determination of non-conformance is made. So that's something that the Applicant would have to agree to, but City Staff agree that the record is a little confused between the Class 1 and the Class 2 applications proceeding at the same time.

Mr. Mesbah: So**,** it is—it is possible—

Ms. Davidson: It is possible.

Mr. Mesbah: —to have a clean slate for a Class 2?

Ms. Davidson: But the Applicant has to agree.

Mr. Mesbah: Yes.

Mr. Ordon-Bakalian: Yeah, and I think just to kind of flush that out a little bit more. I also saw the same correspondence, and I believe we also corresponded with Amanda this morning on that. We would have to have an agreement between the City and us, Home Depot, that the DRB would adopt a new resolution, effectively cleaning the slate from the Planning Director's Determination before we dismissed our appeal. Because if we dismiss or appeal prior to that, we would have a decision which is inconsistent with what we agree with, so we would need some certainty there. I think that, maybe, there's a benefit to having the open record period here because we may be allowed to continue to have these discussions proceeding from this. I mean, I don't know if you're interested in kind of exploring that option a little bit more, but I do understand the DRB's concerns here.

Ms. Davidson: Absolutely. And we have heard your request to keep the record open, so that is going to happen.

Mr. Mesbah: Do we have another DRB meeting – do we need to have another DRB meeting if you continue this kind of negotiation and leaving the record open? DRB, essentially at the end, will need to adopt some resolution, right?

Mr. Ordon-Bakalian: Yes.

Ms. Davidson: Yes.

Mr. Pauly: And we may have to do a special meeting to do that, so—

Mr. Mesbah: Because March 28th is before the next meeting or after the next meeting or what?

Mr. Pauly: No, but there's also—Stephanie, do you want to cover it?

Ms. Davidson: I think we —

Mr. Mesbah: The deadline, I understand, is March 28th.

Ms. Davidson: Given the timelines at play here, I think we need to discuss your availability on March 5th, but also March 21st.

Mr. Mesbah: I'm not here on the 21st, I can tell you that.

Ms. Davidson: Okay.

Mr. Mesbah: But there's others. I mean, you can have a quorum.

Alice Galloway: I'm not here on the 5th.

Ms. Davidson: Chair Barrett?

Chair Barrett: I am here all of those days.

Paula Pinyerd, Scribe, ABC Transcription Services, LLC: Mr. Andrews? Can you speak into the mic so we can record that?

Mr. Andrews: Oh, I just said I will be here. My current plans are to be here both those days, and the rest was nonsense.

Ms. Galloway: Sorry—

Ms. Pinyerd: —for clarity of the record.

Ms. Galloway: I am going to be here on the 5th. It's the end of the month that I'm not going to be here. I'm here on March 5th.

Miranda Bateschell, Planning Director: Good evening, Board. Miranda Bateschell, Planning Director for the City of Wilsonville. I'm just coming up because I want to try to do a raise of hands inventory for each of the days that week. So first of all, just given that we're going to leave the record open for seven days. Please show me your hands if you're available on March 5.

Mr. Pauly: We did talk that Chair Barrett isn't available till later, till 7:30—

Ms. Bateschell: 7 p.m. or later.

Mr. Pauly: And, I have the same conflict.

Ms. Bateschell: That's fine. We can have it as—whatever time is needed. Okay, so we have at least three on the 5th. So now, I'm going to go through the whole week of March 18th, one by one. So, Monday, March 18th?

[Multiple responses off-mic]

Ms. Bateschell: Yeah, okay, so four on the 18th. How about the 19th? Four? Okay. 20th? Four. 21st? Three. Okay. Thank you very much.

Chair Barrett: Do we have to have a motion to continue that?

Ms. Davidson: I think that should come later.

Chair Barrett: Later?

Ms. Davidson: Yes.

Chair Barrett: Okay.

Mr. Pauly: We'd still—I mean, we do have a public hearing still open so we'd—

Chair Barrett: So let's gather as much as we can.

Mr. Pauly:—still want to take testimony from others that may be here as well.

Chair Barrett: Okay. I have one further question just for clarity. What is the difference between a Class 1 and a Class 2 Review?

Mr. Pauly: I can take that one for starters. So for the record, Class 1—both of them are administrative decisions by the Planning Director or the designee. Class 1 is a—what we call a ministerial or administrative decision where there's no discretion. It's—and there's no notice to surrounding property owners. The only person noticed of the application is the applicant. A Class 2 is also administrative with the difference being is that the DRB receives notice where they can call it up as well as surrounding properties receive notice of a Class 2. And, as well as a—the Planning Director can actually refer a Class 2 to the Development Review Board. So more notice, more process for a Class 2; where the Class 1 —essentially some Class 1s we essentially issue over the counter.

Chair Barrett: Are the questions different?

Mr. Pauly: There's more discretion, really, allowed under a Class 2.

Kimberly Rybold, Senior Planner: And are you speaking specifically to as it pertains to the two applications that are in from this Applicant in terms of the questions that they have posed?

Chair Barrett: Would the question they would pose be different for a Class 1 versus a Class 2?

Ms. Rybold: Yes. So, the Class 1 application that they submitted is the determination of non-conforming status related to the Location, so that would be the use site conditions and structure. The Class 2 is a Planning Director's interpretation of essentially, the question that is posed is related to the two, the Fry's Electronics and the Home Depot, and whether or not that is a continuation of use. So that really gets to the bigger question about, you know, use and, you know, whether or not in our Code, that would be a continuation, and so that is what requires an interpretation of the standards within the Development Code.

Chair Barrett: And who interprets?

Ms. Rybold: So that would be a Planning Director's interpretation. So, that's the nature of the difference. They're both decisions issued by the Planning Director. It's just that one really is just a determination of status, versus the second piece, which is making an interpretation as to whether or not those two retail users would constitute a continuation of use. And so, again, that's why in Cindy's presentation tonight, as she's highlighted, really any testimony, any conversation related to the proposed user in this case is tied more to the Class 2 Review than it is the current Class 1 Review.

Mr. Ordon-Bakalian: Respectfully, I would just like to add one thing. Although we agree in premise with what Ms. Rybold just said, ORS 197.979 - excuse me, ORS 197.797 says that, "For a quasi-judicial hearing, to the extent there's argument or evidence that the Appellant believes is relevant, we are allowed to offer that." So, I think like you noted, because these two proceedings have gotten so intertwined, there are things that we feel obligated we must raise during this hearing to preserve them going forward. Whether or not they are deemed relevant is effectively up to you guys, not the City and not us.

Chair Barrett: Okay. Lots of testimony, but I think we need to give an opportunity for the public to continue.

[Break in verbatim transcript]

Chair Barrett called for public testimony regarding the application and confirmed with Staff that no one was present at City Hall to testify and no one on Zoom indicated they wanted to testify.

[Verbatim transcript resumes]

Chair Barrett: Okay. Well, that was simpler than I expected. Does the Applicant have any rebuttal or responsive testimony that the Applicant wishes to present?

Mr. Ordon-Bakalian: Point of clarification, will we also be able to respond any Staff testimony?

Amanda Guile-Hinman, City Attorney: You need to come before the microphone.

Mr. Ordon-Bakalian: Oh, excuse me. For the record, Keenan Ordon-Bakalian on behalf of the Applicant. Would we have the opportunity to rebut any Staff testimony that comes after us, or is this our final time to speak?

Chair Barrett: We will just be asking questions now, so you can stay there and answer.

Mr. Ordon-Bakalian: Absolutely. And if you'll permit me, I do have an answer to Commissioner Mesbah's earlier question about non-conforming use standards for whether a use is continued. That was detailed in our application because that was application criteria. That's Exhibit 429 of the City's Staff report and packet. Wilsonville Development Code (WDC) 4.189(.01) says, "A non-conforming use may be continued subject to the requirements of this Section." One of the requirements of this section is to determine whether the use has been abandoned, that is WDC 4.189(.03). That says, "If a non-conforming use is abandoned for a period of 18 consecutive months, the use shall not be reestablished without fully complying with the use requirements of the zone." That would be the TC Zone. "Mere vacancy of a site or building while it is being marketed, or other plans for its use are being readied, does not constitute abandonment. In order for it to be considered abandoned, a site must not be receiving city utilities, must not be actively marketed for rent, lease, or sale. These standards concerning abandonment do not affect the City's process for abating nuisances..." That part is, in our opinion, likely not relevant to this proceeding. However, what is relevant is whether the property was receiving City utilities, whether it was marketed for rent, lease, or sale. Both of those are true. There's evidence in the record demonstrating as much. That is the City's standard for abandonment. We believe the use has not been abandoned because the City—the site is receiving utilities, and it was currently being—is currently being marketed for rent, sale, or lease.

So again, we believe the use, the commercial retail use that was approved in 1991 has not been abandoned and has continued. To our knowledge, based on the Planning Director's Determination, the Staff report for this appeal, the City does not appear to dispute that, but again, I do not want to speak for the City on that point.

Mr. Mesbah: To be clear, the kind of line of questions that I had for you was not that I was confused about your position. I was very clear about what you're saying. I read the Staff analysis and your submittal. It was that the Staff doesn't necessarily agree with all of what your positions are, and my understanding is that during a Class 2 Review, because we are expanding the scope of analysis and all of that, that may become clearer to those of us who are sitting on this side of the dais, and I was, I guess, kind of raising that into — beg the question, if this becomes clearer later, why do we rush it now? I think we got to that answer is that yeah, really there isn't any reason to rush it now, if there is some understanding that can be engineered here.

Mr. Ordon-Bakalian: Absolutely.

Chair Barrett: All right. Do we have any further questions of Staff or Applicant or the other members of the audience?

Mr. Andrews: I guess I have one question. The 2019 date that you mentioned, is that really the effective date for when the use of the property becomes defined?

Ms. Davidson: Well, June 5th 2019, that is the date that the Town Center Plan became effective, and based on the content of the Town Center Plan, the proposed use would not be allowed. So that's the date of the more restrictive land use regulation.

Mr. Pauly: Because, yeah, per current City Code, even though it's Planned Unit Development, that that is now non-conforming Planned Unit Development because the zoning did change.

Ms. Galloway: So, we're here this evening to affirm or reject a Planning Director's decision, and I think that's our focus for this evening. So, I don't know if this is the right time to do this, but I'd like to move to reject from the record certain information from the Applicant.

Ms. Davidson: Oh, Alice?

Ms. Galloway: Uh-huh?

Ms. Davidson: Because the Applicant has requested to keep the record open for seven days, we will not do anything with the record tonight. We'll just leave it open, and we will talk about when you will reconvene to make a decision on this application.

Ms. Galloway: All right. Thank you.

Ms. Davidson: Thank you.

Mr. Ordon-Bakalian: Respectfully, we would formally object, based ORS 197.797 and the standards that allow us to make argument in evidence in a quasi-judicial setting, so just for the record.

Mr. Davidson: I'm sorry, what are you objecting to?

Mr. Ordon-Bakalian: The future excludence of testimony and evidence in the record that was intimated by Commissioner Galloway.

Ms. Davidson: Okay. And I want to add something before the public hearing is closed tonight. So, the plan would be to close the public hearing tonight, but leave the record open for seven days. So, before we close the public hearing, I just wanted to comment on the legal standard that was presented by the Applicant. I think the slide that this information was on was Slide Number 7. So, I just want to add into the record that City Staff reviewed the case that was cited, which is Gould v. Deschutes County 79 or LUBA 561. It's a 2019 case. That case does not cite – does not cite the statute ORS 197.829, which is what the slide says it does. I just want to encourage that the legal standard is outlined in the Staff report, which you've reviewed.

Chief Barrett: Can I get that ORS standard one more time?

Mr. Ordon-Bakalian: Which one?

Chief Barrett: The one you cited?

Mr. Ordon-Bakalian: Yes. So, ORS 197.797 sub 9.

Chief Barrett: Hold on, 197?

Mr. Ordon-Bakalian: 797.

Chief Barrett: 797, thank you.

Mr. Ordon-Bakalian: Sub 9. And that is the procedure for local quasi-judicial land use proceedings or hearings. It details both hearing process as well as notice requirements. Subsection 9 of that — statute says that arguing evidence constitutes — and I mean, I can read through the entire thing here, "Argument means assertions and analysis regarding the satisfaction or violation of legal standards or policy believed to be relevant by a proponent to a decision. Evidence means facts, documents, data or other information offered to demonstrate compliance or non-compliance with the standards believed to be relevant by the proponent."

In this case, we believe that all the information we've entered into the record is relevant for the decision before the DRB.

Chief Barrett: Okay. And that was in Gould?

Mr. Ordon-Bakalian: No, that was not in Gould. That was the other standard.

Chief Barrett: I'm sorry. I'm trying to make sure I get it all straight.

Mr. Ordon-Bakalian: So, again, we can follow up more in writing because the record will be open on this. However, the Gould decision, what we believe it stands for is that a local government's interpretation of a prior land use decision, in this case, the 1991 Decision, is not afforded the same level of deference before the Land Use Board of Appeals that the City would be afforded if they were interpreting their Development Code. That's called Sapporan deference and the City is generally afforded deference when it's interpreting its own code. But in this case, because you are interpreting the 1991 Decision, and the nature of the use that is allowed to continue at the property, that would not be afforded any sort of special deference. It's more of just some context for the decision before the Board here.

Chair Barrett: Thank you. Oh, I see testimony.

Ms. Guile-Hinman: Thank you, Chair. Amanda Guile-Hinman, City Attorney. I just want to keep the record very clear about it because there was something left out of that definition. It ends with "argument does not include facts." And then "Evidence means facts, documents, data or other information offered to demonstrate compliance or non-compliance with the standards believed

by the proponent to be relevant to the decision." So, I just want to make sure that we're clear about that argument and evidence are different and they're discussed differently in ORS 197.797.

Mr. Ordon-Bakalian: I would agree with that, Sub A and Sub B.

Chair Barrett: Okay, argument versus evidence. Okay, do we have all of the evidence and testimony that we want submitted in this record?

Ms. Rybold: I would add one clarification just as it pertains to uses and the new zoning and what's applying. I just want to clarify that from our perspective of how¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬¬—when the Planning Director is making determinations or interpretations, I just want to be clear that our standards from—for the uses that are allowed are agnostic of a specific business or user. So, just to be clear that there are no preferences being expressed in terms of a specific business, either being preferred or not preferred by Staff. Staff in making these determinations is doing so based on uses and interpretations of uses and looking at things like prior decisions or legal case law to determine how to define those uses, not businesses.

Chair Barrett: Does a business name have to go into a use?

Ms. Davidson: The DRB has discretion to decide the nature and the extent of the use in the Class 2 proceedings.

Chair Barrett: Thank you. Okay. Do we have any other testimony? Any other questions? What kind of motion should we make in order to make sure that we maintain the record?

Mr. Pauly: First, we'd want to close the hearing

Chair Barrett: Okay. Hearing no further discussion, I'm prepared to close the hearing. Once the hearing is closed, there cannot be any other discussion, comment, or questions except among board members. The Board may ask Staff specific procedural questions confirming there's no additional discussion at this point and no further questions of Staff or any party. Okay. I declare this public hearing closed at 8:18 p.m.

Ms. Bateschell: So, before I give you additional instruction, I know we talked about a few dates that might work for you all for reconvening. I think all of you were available March 18th, March 19th, and March 20th. Are there any preferences? Shall we shoot for March 18th?

Chair Barrett: That would be my preference.

Ms. Bateschell: March 18th?

Chair Barrett: March 18th.

Ms. Bateschell: Do you have a time preference? 6:30?

Chair Barrett: Yeah.

Ms. Rybold: I believe that is during a City Council meeting.

Mr. Pauly: So we'd have to—

Ms. Bateschell: Yeah, if I may, I think what we're going to have to do is get back to you on the specific day. And at this point hold March 5th and March 19th. We have to work internally on determining what other meetings are happening in this building and how we can shift people around. And then also, we'll determine if the seven days—the seven days maybe all we need for the additional argument. But if for some reason somebody who else who has been on the record submits anything, then the Applicant has an opportunity for additional time in order to respond to that.

So, I think the plan would be hopefully to move forward with this next week. But if additional information is submitted, they are granted additional time to respond to that other argument, in which case, we would then be looking at March 19th. So, Staff will confirm once we're able to confirm with the rest of the calendars in the building. Unfortunately, many boards and commissions meet in this room.

Mr. Mesbah: Amanda, day and time you're going to confirm, so we're keeping the whole day open?

Ms. Bateschell: Most of our meetings of this nature are held in the evening, in order to provide—

Mr. Mesbah: So, six-ish?

Ms. Bateschell: Most likely, yes. And so, we will confirm the time but at this point in time, I would say hold the evenings. And if you, for example, are only available after a certain point on one of those evenings that we've discussed, please communicate that as soon as possible to Mr. Pauly.

Ms. Davidson: So, in the meantime, you should—someone should move to keep the written record open for seven days until March 4th, 2024 at 5:00 p.m. That's the date that the record will close and we will have to separately determine the date of the—date when you reconvene. So that's a motion to keep the written record open for seven days until March 4th, 2024 at 5:00p.m.

Mr. Andrews: So moved.

Ms. Galloway: So, I move that we keep the record written record open until 7:00 p.m. on March 4th, 2024 at 5:00 p.m.

Mr. Pauly: Seven or five? You said both. Five?

Ms. Galloway: That's what she said, 5:00 p.m.

Ms. Davidson: 5:00 p.m. Yeah.

Mr. Pauly: Just making sure the record is clear on that.

Chair Barrett: So, the motion was for March 4th, 2024 at 5:00p.m.

Ms. Galloway: Right.

Mr. Ordon-Bakalian: Understood.

Chair Barrett: Do I hear a second?

Mr. Mesbah: Second.

Chair Barrett: Okay. All in favor of leaving the written record open until March 4th, 2024 until 5pm?

ALL: Aye.

Chair Barrett: Okay. The motion carries, four to zero.

[End of Verbatim Excerpt]

Respectfully submitted,

Paula Pinyerd, ABC Transcription Services, LLC. for
Shelley White, Planning Administrative Assistant

DEVELOPMENT REVIEW BOARD PANEL B – SPECIAL MEETING
VERBATIM MINUTES EXCERPT
Appeal of Administrative Decision ADMN23-0029
March 14, 2024 at 4:30 PM
City Hall Council Chambers & Remote Video Conferencing

CALL TO ORDER

A special meeting of the Development Review Board Panel B was held at City Hall beginning at 4:30 p.m. on Thursday March 14, 2024. Chair Rachelle Barrett called the meeting to order at 4:31 p.m.

ROLL CALL

Present for roll call were: Rachelle Barrett, Alice Galloway, John Andrews, and Kamran Mesbah. Megan Chuinard was absent.

Staff present: Daniel Pauly, Stephanie Davidson, Kimberly Rybold, Amanda Guile-Hinman, Miranda Bateschell, and Mandi Simmons

CONTINUING BUSINESS

Resolution No. 429. Appeal of Administrative Decision. The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

Case File:
DB24-0002 Appeal of Administrative Decision

On February 26, 2024, the Development Review Board closed the public hearing and moved to keep the record open until March 4, 2024. This item will be for deliberation and decision only based on the evidence in the record. No further testimony or written comments will be accepted.

[Verbatim transcript begins 0:19]

Chair Barrett: With the public hearing and record closed, it is time for the Board to entertain a motion to deliberate and make a decision on the application before us. As part of these proceedings, the Board will also need to establish the record. I will begin by calling for a motion regarding the record, then the Staff report, and finally the Resolution.

So that paper we have is the Resolution, just so everyone's clear.

Roll Call was taken at this time.

Chair Barrett: Okay. So, I'm starting with the record. If there's been evidence provided that is outside of the scope of the appeal before the Board, a Board member can make a motion to reject such evidence from the record. If no motion or action is taken on the record, all information, exhibits, materials, and

testimony by all parties placed before the Board during the public hearing will become part of the record.

Do I have a motion regarding any of the evidence submitted on this appeal?

Alice Galloway: Madam Chair, I would like to make the following additional finding. The following evidence submitted is not relevant to the DRB appeal of ADMN23-0029:

Any oral testimony or written material regarding the 1991 Planning Department approvals, including Slides Nos. 3 and 5 of Applicant's PowerPoint presentation, because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.

B. Any oral testimony or written material regarding "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.

I move to reject from the record the following evidence, anywhere in the record it appears:

1. Oral testimony or written evidence that refers to "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property, including the image of Home Depot on Slide No. 1 of Applicant's PowerPoint presentation and Slide Nos. 9 through 17 of the Applicant's PowerPoint presentation and including the materials attached as Exhibits A and B to Applicant's written materials submitted on March 4th, 2024.
2. The documents and the testimony submitted by the Applicant that pertain to the Class 2 application under review as outlined in Pages 13 and 14 of the Staff report, anywhere in the record that they appear.
3. Any material from the 1991 Planning Department approvals related to calculation of parking requirements, including Slide No. 4 of the Applicant's PowerPoint presentation.

Chair Barrett: Do I have a second?

John Andrews: I'll second that.

Chair Barrett: Do we need to have some discussion on that motion?

Alice Galloway: No discussion.

Chair Barrett: I would like to clarify that we are not removing the original 1991 application, just the parking from the record.

Stephanie Davidson: Okay, that's correct.

Chair Barrett: All right. Any other discussion that we need to have?

All right. I will call to vote. All in favor of this motion, say 'Aye'.

Voices Heard: Aye. Aye. Aye. Aye.

Chair Barrett: The motion carries 4 to 0.

Okay, next I will call for a motion to adopt the Staff report, including all findings and exhibits, except those listed before, and enter it into the record. If a Board member wishes to amend the Staff report in any way, including adding a new condition, removing a condition, or modifying a condition, it should be included in the motion.

Do I have a motion on the Staff report?

Alice Galloway: I move to adopt the Staff report as presented.

Kamran Mesbah: Second.

Chair Barrett: Did you hear the second? Okay. Is there discussion that needs to happen on the Staff report?

Alice Galloway: No.

John Andrews: No

Kamran Mesbah: No.

Chair Barrett: No. Okay. I'm going to call the vote for adopting the Staff report into the record. All in favor?

Voices Heard: Aye. Aye. Aye.

Chair Barrett: Aye. The motion carries 4 to 0.

It is moved and seconded that the Staff report was entered into the record. Do we need to have any further discussion on making a different motion to adopt the Resolution before us?

Okay. Do I hear a motion on the Resolution before us today? On Resolution No. 429.

Kamran Mesbah: I move that we adopt Resolution No. 429.

John Andrews: I'll second it.

Chair Barrett: Okay. It has been moved and seconded that we adopt Resolution 429. Any discussion now?

Alice Galloway: No.

John Andrews: No.

Kamran Mesbah: None.

Chair Barrett: Can I have that?

Kamran Mesbah: Absolutely.

Chair Barrett: I want to specifically call out that on No. 1 of this Resolution, down at the bottom, the second page, last paragraph, it says, "Now, therefore, it be resolved that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director's determination of nonconformance dated December 28th, 2023, attached hereto with findings and recommendations contained therein, determining that there is a legally established non-conforming use at the location, specifically that the protected use is a 159,400 square foot electronics related retail store."

I just wanted to clarify that it says that and not Fry's, so that we have that clear in our record. So are we—that's all the discussion I wanted to have. Any further discussion?

Alice Galloway: No.

Kamran Mesbah: No.

Chair Barrett: Okay. Hearing no further discussion, I will call it to a vote. All in favor of adopting the Resolution and the Staff report on Resolution 429?

Alice Galloway: Aye.

John Andrews: Aye.

Chair Barrett: Aye.

Kamran Mesbah: Aye.

Chair Barrett: The motion carries 4 to 0.

If you desire to appeal this decision to the City Council, you must file an application stating the grounds for the appeal to the City Council and submit any applicable fee within 14 days of mailing of the decision of notice.

[End of Verbatim Transcription 9:25]

STAFF COMMUNICATION

Daniel Pauly, Planning Manager, confirmed that Chair Barrett, John Andrews, and Kamran Mesbah were available to attend the DRB Panel B meeting, which was rescheduled to the 2nd Monday next month, on April 8th. DRB Panel A would meet on the 4th Monday of April.

ADJOURNMENT

The meeting adjourned at 4:42 p.m.

WILSONVILLE
OREGON

Appeal of Development Review Board Resolution No. 429 (DB24-0002)

City Council Special Meeting

April 15, 2024

Presented by:

Cindy Luxhoj AICP, Associate Planner

WILSONVILLE OREGON

Existing Development

2845

see Attachment 3 to staff report, pp. 46-47 of 660

WILSONVILLE OREGON

Procedural Background

October 30, 2023

Class I Review Application Submitted

December 28, 2023

Planning Director Determination Issued

January 10, 2024

Notice of Appeal Filed

see Attachment 3 to staff report, pg. 47 of 660

Procedural Background

February 26, 2024
DRB Public Hearing on Appeal

March 14, 2024
DRB Special Meeting

March 15, 2024
DRB Decision Issued

March 27, 2024
Notice of Appeal Filed

see Attachment 2 to staff report, pp. 3-4 of 20; Attachment 4 to staff report, all pages; Attachment 5 to staff report, all pages; Appellant's Notice of Appeal dated March 27, 2024, pp. 1-7

Procedural Background

April 1, 2024

City Council Order on Appeal Issued

April 3, 2024

City Council Special Meeting

Scheduled and Continued

April 15, 2024

City Council Meeting

see Appellant's Notice of Appeal dated March 27, 2024, pp. 1-7

Concurrent Class II Review

- Referred by Planning Director to Development Review Board
- Public Hearing held on April 8, 2024
  - Closed public hearing
  - Record kept open for 7 days until April 15, 2024
  - Special Meeting not yet scheduled

Class I Decision

- Town Center Development Regulations
  - Ordinance No. 835
  - Effective Date June 5, 2019

see Applicant's Notice of Appeal, pg. 4; Attachment 3 to staff report, pp. 24-25

Issue on Appeal

- Is the Development Review Board's definition of the scope of the recognized legally established non-conforming use at the Location – "a 159,400 square-foot electronics-related retail store" – correct?

see Attachment 1 to staff report, pg. 3 of 15

WILSONVILLE OREGON

Burden of Proof

- Appellant has the burden of proof
- Impact of “Substantial Evidence” standard
  - City may decide evidence is not persuasive or not credible
  - City is not obligated to present its own evidence
  - City may find that Appellant has failed to satisfy its burden of proof
  - City’s decision must be one that a reasonable person could make when viewing the same evidence

What is a Non-Conforming Use?

- A use that is “contrary to a land use ordinance
- but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance.”

Morgan v. Jackson Cnty., 290 Or App 111, 114 (2018) (full citation included in legal memorandum).

Key Questions before City Council

- What was the actual use of the Location as of June 5, 2019?
  - Nature, and
  - Extent.

Types of Evidence

- Relevant evidence
  - Testimony/affidavits
  - Contemporaneous records
    - Advertisements
    - Tax returns
    - Photographs
- Irrelevant evidence
  - What would have been allowed under original zoning
  - Content of original land use approvals

NCUs are Not Favored

- NCUs are no favored – they detract from local government's ability to engage in land use planning and undermine zoning regulations.
- Liberally construe provisions to limit NCUs to prevent expansion of NCUs as much as possible
- Only allow least intensive variation of NCU to continue

Examples

	Recognized use	NOT
Smith v. Lane Cnty.	"The use of horses and cattle to practice equine/bovine eventing is verified as to the participation of up to ten individuals during any one session."	Agricultural use
Larson v. City of Warrenton	" . . . storing and repairing marine construction equipment and as a base of operations for his construction company. Equipment typically seen at the site included trucks, cranes and other earth moving equipment used in marine and land construction."	Industrial use

Examples

	Recognized use	NOT
Senkovich v. Lane Cnty.	"agricultural and forestry uses, counseling, educational uses, seminars, conferences, retreats, religious uses, and residential uses," but limited the nonconforming use to "150 resident students, 35 staff members and families, and 3,000 annual guests."	Recreational, educational, agricultural and forestry uses

Takings Issue

- Appellant had no actionable property interest in the Location on June 5, 2019

Establishing a Record

- OAR 661-010-0025(1)(b): LUBA may review, "[a]ll written testimony and all exhibits, maps, documents or other materials specifically incorporated into the record or placed before, and not rejected by, the final decision maker, during the course of the proceedings before the final decision maker."
- ORS 197.797 does not prohibit rejection of evidence

Recommendation

- **Affirm** the Development Review Board decision in Resolution No. 429, affirming the Planning Director's Determination of Non-Conformance in Case File No. ADMN23-0029 determining that the scope of the legally established non-conforming use at the Location is "a 159,400 square-foot electronics-related retail store."

see Attachment 1 to staff report, pg. 13 of 15

APPELLANT'S MATERIALS

VIA E-MAIL

BEFORE THE WILSONVILLE CITY COUNCIL

An APPEAL of the Development Review Board's Decision and Resolution No. 429 Affirming and modifying the Planning Director Determination in Case File ADMN23-0029 and denying the Appeal in Case File DB24-0002.	APPLICANT'S NOTICE OF APPEAL

This is a notice of appeal to the Wilsonville City Council ("**City Council**") for Development Review Board ("**DRB**") Decision and Resolution No. 429 (the "**Decision**") affirming – but also modifying – Planning Director Determination ADMN23-0029 and denying the Applicant's Appeal of ADMN23-0029 at 29400 SW Town Center Loop West (the "**subject property**"). *See attached*, Case File Nos. DB24-0002/APPL24-0001 ("**Exhibit A**"). This Appeal is timely submitted, in writing, prior to the March 29, 2024 deadline. *See* Wilsonville Development Code ("**WDC**") 4.022.09.

1. STANDING AND PROCEDURAL BACKGROUND

Kenneth Katzaroff and Keenan Ordon-Bakalian are legal counsel for the Applicant, and as such, are the Applicant's authorized agents. As the project proponent, the Applicant prepared and filed the Class I application upon which the Planning Director's Determination was issued. *See attached*, **Exhibit B**.[1] On January 10, 2024, the Applicant timely appealed the Planning Director's Determination. Exhibit A, at 3. On February 26, 2024, DRB Panel B held a public hearing to consider the Applicant's appeal of the Planning Director's Decision. *Id.*, at 3-4. On March 14, 2024, the DRB deliberated to the Decision that is subject to this Appeal. Exhibit A. The City of Wilsonville (the "**City**") issued its Notice of Decision on March 15, 2024. *Id.*

As the applicant for the Class I application upon which the Decision is based on – and the appellant for DB24-0002/APPL24-0001 – the Applicant has standing to file this appeal.

2. FILING REQUIREMENTS

A. Name and Address of Appellant.

Lars Andersen & Associates, Inc.
c/o Kenneth Katzaroff & Keenan Ordon-Bakalian
1211 SW 5th Ave., Suite 1900
Portland, OR 97204
KKatzaroff@SCHWABE.com
Kordon-bakalian@schwabe.com

[1] The Planning Director Determination for ADMN23-0029.

B. Reference to the Subject Development and Case Number.

The decision being appealed is DRB Decision and Resolution No. 429 finding that "there is a legally established non-conforming use at the Location; specifically, that the protected use is 'a 159,400 square-foot electronics-related retail store.'" Exhibit A, at 4. The Decision also modifies the Planning Director's Determination that "Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use." Exhibit B, at 3. In short, the Decision has replaced the Planning Director's finding that the lawfully established non-conforming use is a "Fry's Electronics" with the finding that the lawfully established non-conforming use is "a 159,400 square-foot electronics-related retail store." Exhibit A, at 4 (emphasis added). Both the Decision and the Planning Director's Determination are in error, as they are unsupported by the City's past decisions or applicable law.

Moreover, the Applicant also specifically challenges several actions taken by the DRB during the March 14, 2024 deliberation where the Decision was adopted:

1. The DRB's motion to reject and exclude from the record portions of the documents and testimony that the Applicant has submitted and offered in support of both the Class I application, as well as the Applicant's appeal of the Planning Director's Determination (APPL24-0001); and
2. The DRB's motion to adopt the Staff Report for APPL24-0001 as part of the Decision.

C. Statement of the Basis for Appeal.

The Applicant hereby files this appeal to challenge the Decision's ultimate finding that the legally established non-conforming use at the subject property is "a 159,400 square-foot electronics-related retail store" (Exhibit A, at 4), as well as the aforementioned motions made by the DRB during the March 14 deliberation to reject and exclude from the record portions of the Applicant's submittals and testimony, as well as the DRB's adoption of the Staff Report for APPL24-0001. *See supra*, Section 2(B). The Applicant objects to the DRB's efforts to reject and exclude any of the Applicant's evidence and testimony from the record for APPL24-0001 and hereby re-incorporates by reference all evidence and argument made within the Applicant's Class I Application Packet, March 4, 2024 Open Record Submittal and the Applicant's Final Legal Argument, submitted March 11, 2024. **Exhibit C**.

i. Background.

The Applicant intends to operate a Home Depot within the existing structure at the subject property. To this end, the Applicant sought a Class I director's determination that the commercial retail use that was established as a result of the 1991 development approval (Case File Nos. 91PC43 and 91DR29, hereinafter the "**1991 Decision**" and attached hereto as **Exhibit D**) remained a lawfully established non-conforming use at the subject property. Upon receipt of the Applicant's Class I application, the City attempted to bifurcate Applicant's request to

confirm the legality of a non-conforming use at the subject property from Applicant's request for a determination to establish the scope of use at the property. Exhibit B, Enclosure.[2]

The City required the Applicant to submit two applications – a Class I application to confirm the legality of the non-conforming use, and a Class II application to establish the *actual* nature and scope of use at the subject property. The Applicant's Class II application was submitted to the City on December 15, 2023. On March 19, 2024, the Applicant's Class II request was referred to the DRB for a public hearing rather than a decision being rendered by the Planning Director. *See* AR23-0031; DB24-0003.

Although the Applicant's Class II application remains under review, it is the Applicant's belief – based on the findings contained within the City's Decision for the Class I application – that the City has prejudged Applicant's Class II application for a use determination. Specifically, within the Decision subject to this appeal, the DRB determined that the lawfully established non-conforming use at the subject property is "a 159,400 square-foot electronics-related retail store." Exhibit A, at 4. The Planning Director similarly found that the lawfully established non-conforming use at the subject property is a "Fry's Electronics." Exhibit B, at 3. Therefore, the City has already determined the nature and scope of the non-conforming use at the subject property – something the City initially said it could only do within the Class II application. Exhibit B, Enclosure.

ii. The Decision erred in finding that the lawfully established non-conforming use at the subject property is "a 159,400 square-foot electronics-related retail store."

The lawfully established non-conforming use at the subject property is neither a "Fry's Electronics" nor "a 159,400 square-foot electronics-related retail store" as the Decision found. Instead, the lawfully established non-conforming use at the subject property is a *commercial retail use*. The 1991 Decision is the controlling authority for determining the nature and extent of the non-conforming commercial retail use at the property because the 1991 Decision lawfully established the non-conforming use in the first instance. "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty*., 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995). A non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed

[2] "You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision." Exhibit B, Enclosure, at 1.

prior to the enactment of the ordinance." *Morgan v. Jackson Cnty.*, 290 Or App 111, 114 (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* WDC 4.001.196 (defining a non-conforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform").

The commercial retail use at subject property is a lawfully established non-conforming use pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018). As explained in the Applicant's Class I application materials and throughout the appeal proceeding before the DRB, the City approved a commercial retail use at the subject property on December 9, 1991 with the adoption of Planning Commission Resolution No. 91PC43 (the 1991 Decision). Exhibit D, at 3.[3] Specifically, the 1991 Decision approved a 159,400 retail commercial building and associated commercial retail activities on the 14.75 acre subject property. Exhibit D, at 9. At the time, the subject property's Planned Development Commercial ("**PDC**") zoning allowed commercial retail uses of the nature and extent that was approved by the 1991 Decision. Exhibit D, at 9.

The commercial retail use approved by the 1991 Decision was rendered non-conforming on June 5, 2019, when the City adopted its Town Center Plan and rezoned the property Town Center ("**TC**"). This is because the property's present TC zoning prohibits commercial retail uses that exceed 30,000 square feet, unless the commercial retail use is located on more than one story of a multi-story building, and the 1991 Decision approved a 159,400 retail commercial building. WDC 4.132.03(A)(1); Exhibit D, at 9. Although the City's application of the TC zone to the property rendered the ongoing commercial retail use non-conforming, the commercial retail use approved in the 1991 Decision is allowed to continue pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018).

The DRB's determination that the non-conforming use allowed to continue at the subject property is "a 159,400 square-foot electronics-related retail store" is contrary to the express language of the 1991 Decision, which is the controlling substantial evidence for the City's non-conforming use analysis. Furthermore, the Applicant has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Applicant is also not aware of any state law that makes such a distinction; nor has the City pointed to any state law or code provision applicable at the time. Finally, the both the Planning Director and DRB have abjectly failed to so much as even *address* the 1991 Decision as it relates to the lawfully established commercial retail nonconforming use at the subject property.

[3] The Planning Commission's adopting resolution includes findings of fact and conditions of approval, and incorporates all application materials, staff reports, and associated planning exhibits.

As such, the Decision must be reversed or modified to reject the limitation of the use approved by the 1991 Decision to "a 159,400 square-foot electronics-related retail store." *See* Exhibit A, at 4.

iii. The Decision effects a taking on the Applicant.

As explained in the Applicant's submittals before the DRB and within the record for this Appeal, both the Planning Director's Determination and the Decision effect a compensable regulatory "taking" under Article I, section 18, of the Oregon Constitution, and the Fifth and Fourteenth Amendments to the United States Constitution. The Decision's overly-restrictive "use" determination is unsupported by the City's own code and Oregon law. If left to stand, the Decision will deny the Applicant (or any other party) any economic use of the lawfully established non-conforming use at the property.

The City Council must reverse or modify the Decision's finding that the lawfully established non-conforming use at the subject property is "a 159,400 square-foot electronics-related retail store."

iv. The DRB's rejection and exclusion of portions of the Applicant's written and oral testimony from the record was improper and violates ORS 197.797(9).

The Applicant also appeals the DRB's attempt to exclude from the record certain documents and testimony submitted by the Applicant as part of its Class I application. *See* Exhibit A, at 17 (Staff Report for APPL24-0001, Exhibit A1, at 13); *see also*, Development Review Board Panel B – Special Meeting Verbatim Minutes Excerpt (**Exhibit E**).

At the March 14, 2024 deliberation for APPL24-0001, DRB Board Member Alice Galloway made the following motion, which was adopted by the DRB:

> "Madam Chair, I would like to make the following additional finding. The following evidence submitted is not relevant to the DRB appeal of ADMN23-0029:
>
> Any oral testimony or written material regarding the 1991 Planning Department approvals, including Slides Nos. 3 and 5 of Applicant's PowerPoint presentation, because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.
>
> B. Any oral testimony or written material regarding "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.

> I move to reject from the record the following evidence, anywhere in the record it appears:
>
> 1. Oral testimony or written evidence that refers to "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property, including the image of Home Depot on Slide No. 1 of Applicant's PowerPoint presentation and Slide Nos. 9 through 17 of the Applicant's PowerPoint presentation and including the materials attached as Exhibits A and B to Applicant's written materials submitted on March 4th, 2024.
>
> 2. The documents and the testimony submitted by the Applicant that pertain to the Class 2 application under review as outlined in Pages 13 and 14 of the Staff report, anywhere in the record that they appear.
>
> 3. Any material from the 1991 Planning Department approvals related to calculation of parking requirements, including Slide No. 4 of the Applicant's PowerPoint presentation."

Exhibit E, at 2.

Critically, Board Member Galloway's motion *is not contained in the written decision for APPL24-0001*. Therefore, the Applicant does not believe that the DRB actually rejected any of the Applicant's argument and evidence aside from those documents and testimony explicitly listed on Pages 13 and 14 of the Staff Report that was incorporated within the Decision. *See* Exhibit A, at 17-18.

Regardless, the documents and testimony submitted by the Applicant as part of its application are within the record before the DRB on appeal. The documents and testimony that the DRB moved to exclude constitute "argument" and "evidence" as defined in ORS 197.797(9):

> (a) "Argument" means assertions and analysis regarding the satisfaction or violation of legal standards or policy believed relevant by the proponent to a decision. "Argument" does not include facts.
>
> (b) "Evidence" means facts, documents, data or other information offered to demonstrate compliance or noncompliance with the standards believed by the proponent to be relevant to the decision. [Formerly 197.763]

The DRB cannot exclude certain documents and testimony within the Applicant's Class I application because the documents and testimony that the DRB excluded are "argument" and "evidence" that the Applicant believed – and continues to believe – to be relevant to the satisfaction of the applicable approval criteria for the subject application, as well as the Applicant's appeals of both the Planning Director Determination and the Decision currently on appeal. ORS 197.797(9). In addition, the City's attempt to omit certain documents and testimony that were submitted by the Applicant as part of its Class I application runs afoul ORS 197.797(4)(a)'s requirement that "[a]documents or evidence relied upon by the applicant shall be submitted to the local government and be made available to the public." ORS 197.797 prohibits

the DRB from excluding portions of the Applicant's Class I application materials from the record. Therefore, the Applicant reincorporates all argument and evidence submitted in support of its Class I application. *See attached*, Exhibit C.

Furthermore, the Applicant must respectfully object to the DRB's premature motion to exclude certain documents and testimony from the record that were offered by the Appellant during the February 26, 2024 public hearing. The Applicant takes the position that all of the argument and evidence that the Applicant offered during the February 26 hearing was relevant to the DRB's decision on the appeal, and must be held within the record pursuant to ORS 197.797(9).

3. REQUESTED RELIEF

The Applicant requests that the City Council impose the relief requested by the Applicant in the above argument. Specifically, the Applicant respectfully requests that the City Council find that the lawfully established non-conforming use at the subject property is the use approved in the 1991 Decision, a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use); not a 159,400 square-foot electronics-related retail store and to not provide additional restriction as to the type of commercial retail because no such limitation existed in the 1991 zoning code or the 1991 Decision itself.

The Applicant reserves the right to submit additional written testimony prior to the public hearing date that will be set for this Appeal, as well as within any open record period.

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VIA: Certified Mail, Return Receipt Requested

March 15, 2024

Dan Zoldak
Lars Andersen & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Re: Determination of Non-Conformance
29400 SW Town Center Loop West

Case File: DB24-0002 Appeal of Administrative Decision
- Appeal (APPL24-0001)

The Development Review Board's Decision and Resolution No. 429 are attached, affirming the Planning Director Determination in Case File ADMN23-0029 and denying the Appeal in Case File DB24-0002.

Thank you.

Mandi Simmons
Planning Administrative Assistant

CC: David Fry, Lumberjack LP

CC via e-mail: Kenneth Katzaroff, KKatzaroff@schwabe.com
Keenan Ordon-Bakalian, Kordon-bakalian@schwabe.com
Barry Simmons, barry_simmons@homedepot.com
Patrick Donaldson, pfdforbes@aol.com

March 15, 2024

DEVELOPMENT REVIEW BOARD PANEL B

NOTICE OF DECISION

Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.

On March 15, 2024, at the meeting of the Development Review Board the following action was granted on the above-referenced subject:

The Development Review Board affirmed the Planning Director Determination in Case File ADMN23-0029, and denied the Appeal in Case File DB24-0002.

Any appeals by anyone who has participated in this hearing, orally or in writing, must be filed with the City Recorder within fourteen (14) calendar days of the mailing of the Notice of Decision. *WC Sec. 4.022 (.02).*

This decision has been finalized in written form and placed on file in the City records at Wilsonville City Hall this **15th day of March 2024** and is available for public inspection. This decision shall become effective on the fifteenth (15th) calendar day after the postmarked date of the written Notice of Decision, unless appealed or called up for review by the Council in accordance with this Section. *WC Sec. 4.022 (.09).*

Written decision is attached

For further information, please contact the Wilsonville Planning Division at Wilsonville City Hall, 29799 SW Town Center Loop E, Wilsonville Oregon 97070 or phone 503-682-4960.

Attachments: DRB Resolution No. 429

DEVELOPMENT REVIEW BOARD
RESOLUTION NO. 429

A RESOLUTION AFFIRMING THE PLANNING DIRECTOR'S DETERMINATION OF NON-CONFORMANCE IN CASE FILE ADMN23-0029 AND DENYING THE APPLICANT'S APPEAL DB24-0002.

WHEREAS, an application for Class 1 Administrative Review (ADMN23-0029), together with planning exhibits, has been submitted by Dan Zoldak of Lars Andersen & Associates, Inc. – Applicant, on behalf of David Fry of Lumberjack LP – Owner, in accordance with the procedures set forth in Section 4.008 of the Wilsonville Code; and

WHEREAS, the subject property is located at 29400 SW Town Center Loop West on Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon ("the Location"); and

WHEREAS, the subject of the Class 1 Administrative Review was a Planning Director's Determination of non-conformance per Subsection 4.030 (.01) A. 7. of the Wilsonville Development Code; and

WHEREAS, the City issued the Planning Director's Determination, on the above-captioned subject, that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone, dated December 28, 2023; and

WHEREAS, within the prescribed appeal period, the Administrative Decision was appealed by Dan Zoldak of Lars Andersen & Associates, Inc. – Appellant/Applicant, dated January 10, 2024; and

WHEREAS, specifically, the filed appeal grounds were stated: *"An APPEAL of Planning Director Determination ADMN20-0029 [sic] determining that Fry's Electronics is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions at 29400 SW Town Center Loop West"*; and

WHEREAS, per Code Section 4.022 (.01), a decision by the Planning Director on issuance of an Administrative Decision may be appealed, and such appeals shall be heard by the Development Review Board for all quasi-judicial land use matters; and

WHEREAS, the matter at issue will be a determination of the appropriateness of the action or interpretation of the requirements of the Code; and

WHEREAS, the Planning Staff mailed the Notice of Public Hearing for the Appeal on February 6, 2024, in advance of the Public Hearing; and

WHEREAS, the Planning Staff has prepared the staff report on the above-captioned subject dated February 15, 2024, for consideration by the Development Review Board in hearing the appeal; and

WHEREAS, said planning exhibits and staff report were duly considered by the Development Review Board Panel B at a scheduled meeting conducted on February 26, 2024, at which time exhibits, together with findings and public testimony were entered into the public record; and

WHEREAS, interested parties, if any, have had an opportunity to be heard on the subject; and

WHEREAS, during the February 26, 2024 public hearing, the Applicant requested that the record be kept open for seven days to allow it to respond to testimony entered into the record; and

WHEREAS, the Development Review Board Panel B closed the public hearing and unanimously approved the request to keep the record open for Resolution No. 429 until March 4, 2024 at 5:00 pm; and

WHEREAS, on March 4, 2024, the Applicant filed a first written submittal, which has been marked as Exhibit B2, forwarded by Planning Staff to the Development Review Board on March 7, 2024; and

WHEREAS, on March 11, 2024, the Applicant filed a final arguments submittal, which has been marked as Exhibit B3, forwarded by Planning Staff to the Development Review Board on March 12, 2024; and

WHEREAS, on March 14, 2024, commencing at 4:30 pm, the Development Review Board Panel B held a special meeting to consider all evidence timely submitted to, and not rejected by, the Development Review Board regarding Case File No. DB24-0002; and

WHEREAS, the Development Review Board considered all evidence placed before, and not rejected by, the Development Review Board on the record for Resolution No. 429, and, thereafter, deliberated.

NOW, THEREFORE, BE IT RESOLVED that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director's Determination of Non-Conformance (ADMN23-0029) dated December 28, 2023, attached hereto, with findings and recommendations contained therein, determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

ADOPTED by the Development Review Board of the City of Wilsonville this 14th day of March 2024, and filed with the Planning Administrative Assistant on 3/14/24. This resolution is final on the 15th calendar day after the postmarked date of the written notice of decision per *WC Sec 4.022 (.09)* unless appealed per *WC Sec 4.022 (.02)* or called up for review by the Council in accordance with *WC Sec 4.022 (.03)*.

Rachelle Barrett, Chair - Panel B
Wilsonville Development Review Board

Attest:

Mandi Simmons, Planning Administrative Assistant

WILSONVILLE
OREGON

Exhibit A1
Staff Report
Wilsonville Planning Division
Appeal of Administrative Decision
29400 SW Town Center Loop West

Development Review Board Panel 'B'
Quasi-Judicial Public Hearing
Amended and Adopted March 14, 2024
Added language ***bold italics underline***
Removed language ~~struck through~~

Hearing Date:	February 26, 2024
Special Meeting Date:	***March 14, 2024***
Date of Report:	February 15, 2024
Application Nos.:	DB24-0002 Appeal of Administrative Decision - Appeal (APPL24-0001)
Appellant/Applicant:	Lars Andersen & Associates, Inc. (Contact: Dan Zoldak)
Request:	Appeal of Administrative Decision
Case File Appealed:	ADMN23-0029 Class 1 Review Request
Decision Appealed:	Planning Director Determination of Non-Conformance
Owner:	Lumberjack LP (Contact: David Fry)
Location:	29400 SW Town Center Loop West. The property is specifically known as Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Comprehensive Plan Designation:	Town Center
Zone Map Classification:	Town Center (TC); Sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), Main Street District (MSD)
Staff Reviewers:	Cindy Luxhoj AICP, Associate Planner Miranda Bateschell, Planning Director

Staff Recommendation: **Affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029).

Applicable Review Criteria:

DB24-0002 Appeal of Administrative Decision	
Development Code:	
Section 4.022	Appeal and Call-up Procedures
ADMN23-0029 Class 1 Review Request	
Development Code:	
Section 4.001	Definitions
Section 4.008	Application Procedures-In General
Section 4.009	Who May Initiate Application
Section 4.010	How to Apply
Section 4.011	How Applications are Processed
Section 4.014	Burden of Proof
Section 4.030	Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.031	Authority of the Development Review Board
Section 4.034	Application Requirements
Subsection 4.035 (.05)	Complete Submittal Requirement
Section 4.102	Official Zoning Map
Section 4.110	Zones
Section 4.132	Town Center (TC) Zone
Section 4.189	Non-Conforming Uses
Section 4.190	Non-Conforming Structures
Section 4.191	Non-Conforming Site Conditions
Other Planning Documents:	
Previous Land Use Approvals	

Site Location:

Existing Development:

Procedural Background:

On October 30, 2023, the City received an application for Class 1 Review (ADMN23-0029) to confirm the status of the existing use and structure at 29400 SW Town Center Loop West (respectively, the "Class 1 Review Application" and the "Location"). The Location was previously occupied by Fry's Electronics, an electronics retail store and has been vacant since 2021. In their submittal, the Applicant requested a Class 1 Review to confirm the status of the existing non-conforming use at the Location.

On November 28, 2023, City staff contacted the applicant by email providing options for processing the application and requesting that they notify staff of their preference by December 8, 2023 (Exhibit A3). Applicant did not contact the City to withdraw the Class 1 Review Application, so the City deemed the application complete on November 29, 2023 and processed the request as a Class 1 Planning Director Determination per Subsection 4.030 (.01) A. 7. of the Development Code. On December 28, 2023, the City's Planning Director issued a Notice of Planning Director Determination, which provided the Planning Director's decision on the Class 1 Review Application that Fry's Electronics located on the subject property is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the Town Center (TC) zone (Exhibit A4) (the "Planning Director's Decision").

The Appellant submitted a notice of appeal of the Planning Director's Decision on January 10, 2024 (the "Notice of Appeal").

The City is currently processing a separate but related Class 2 Review application per Subsection 4.030 (.01) B. 3, which was filed by the Applicant on December 15, 2023 (AR23-0031) (the "Class 2 Review Application").

Scope of Review:

This appeal is a *de novo* review of the Class 1 Review Application under Subsection 4.022 (.01) of the Wilsonville Development Code. "De novo," is Latin for "from the beginning;" the Development Review Board must review the Class 1 Review Application as if the action had not been previously heard and as if no decision had been rendered by the Planning Director. The Development Review Board should base its decision on the testimony, evidence and other material submitted by Applicant to the City in the Class 1 Review Application, as stated in Subsection 4.022 (.07) B. of the Wilsonville Development Code. Further, it shall, by order, affirm, reverse, or modify, in whole or part, a decision that is under review; in this proceeding the decision under review is the Planning Director's Decision. Subsection 4.022 (.08) A. of the Wilsonville Development Code.

For the purpose of applying the applicable 120-day time limit, a final decision on the Class 1 Application, including any appeals, must be rendered by March 28, 2024.

The Class 2 Review Application, and any issues that are subject to the Class 2 Review – such as the scope of what non-conforming use may be continued – are beyond the scope of this appeal proceeding.

Questions Presented:

On the cover page of the Class 1 Review Application, Applicant requests "non conforming use confirmation." See Exhibit B1. Reviewing this document with the portion of the Class 1 Review Application titled, "Applicant's Narrative and Exhibits Demonstrating Compliance with the Relevant Approval Criteria," City staff believe that Applicant requests an answer to the following questions:

1. Is the Location a non-conforming use?
2. Does the Location contain a non-conforming structure?
3. Does the Location contain non-conforming site conditions?

Considering that this is a *de novo* review of the Class 1 Review Application, the Development Review Board should address all three questions listed above. However, the Notice of Appeal does not challenge the Planning Director's Decision on the second and third questions listed above. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these points. The main point of disagreement between the Applicant and the City is the Planning Director's Decision regarding the first question listed above.

This staff report addresses each question in order, outlining the legal standard that applies to the question, then highlighting facts that staff believe are relevant to the question, and finally, quoting the determination of the question as stated in the Planning Director's Decision.

Non-Conforming Use Inquiry:

1. Applicable Legal Standard

Before a use can be deemed "non-conforming" it must be impermissible under a current land use ordinance. Generally, a non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty.*, 290 Or App 111, 114, (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Subsection 4.001 (196.) of the Development Code (defining a non-conforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform"). As is outlined in greater detail below, the Location's existing use would not be permitted by the City due to the Town Center Plan, which was adopted effective June 5, 2019.

"Nonconforming uses are not favored because, by definition, they detract from the effectiveness of a comprehensive zoning plan. . . . Accordingly, provisions for the continuation of nonconforming uses are strictly construed against continuation of the use, and, conversely, provisions for limiting nonconforming uses are liberally construed to prevent the continuation or expansion of nonconforming uses as much as possible." *Parks v. Bd. of Cnty. Comm'rs of Tillamook Cnty.*, 11 Or App 177, 196–97 (1972) (internal citation omitted).

Once a use is determined to be impermissible under a current land use ordinance, the question becomes: may the use continue because it is legally protectable as "non-conforming"? "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty.*, 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995).

Appellant has the burden of establishing that a non-conforming use exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal); *ODOT v. City of Mosier*, 36 Or LUBA 666, 671 (1999) (citing *Lane Cnty. v. Bessett*, 46 Or App 319 (1980)); *Sabin v. Clackamas Cnty.*, 20 Or LUBA 23, 30 (1990) (citing *Webber v. Clackamas Cnty.*, 42 Or App 151, *rev. den.*, 288 Or 81 (1979)). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

The only portion of the City's code that is relevant to this inquiry is Subsection 4.189(.01)A., which states that "[a] non-conforming use may be continued subject to the requirements of this Section." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

The identity of the party that engaged in the use is irrelevant to this inquiry. *See City of Mosier* at 678 (stating that focus of the inquiry is the nonconforming activities themselves, not whether the entity performing the activity is a landowner, permittee, or licensee). In other words, it is not relevant that the party that engaged in the use at issue was Fry's Electronics – rather than Applicant.

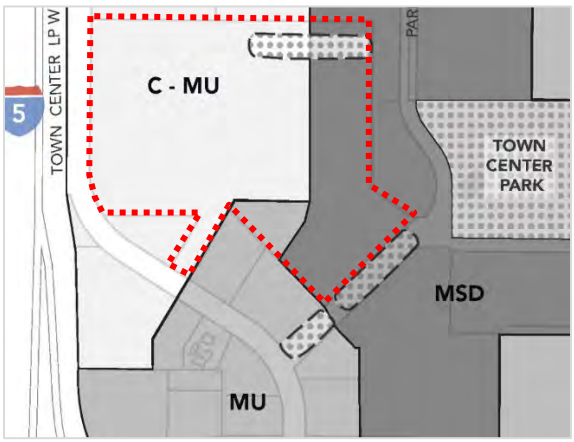
To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the current use of the Location impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," what was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

2. Relevant Facts

A. Is the current use of the Location impermissible under a current land use ordinance?

The Location is currently in the TC Zone, and more specifically, the following three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU).



The C-MU sub-district applies to roughly two-thirds of the Location. Permitted uses within this sub-district include retail sales and service of retail products, under a footprint of 30,000 square feet per use, office, personal and professional services, and single-user commercial or retail, such as a grocery store or retail establishment, that may exceed 30,000 square feet if located on more than one (1) story of a multi-story building, provided the footprint of the building does not exceed 30,000 square feet.

The existing structure at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone.

Applicant appears to concede that use of the Location is impermissible under the City's current Code provisions. *See* Exhibit B1, pages 4-5 and page 15 (referring to the use of the Location as non-conforming).

B. What was the actual use of the Location as of the date the ordinance became effective (i.e., June 5, 2019)?

As of June 5, 2019, the actual use of the Location was a Fry's Electronics store, an electronics retail store with a total interior square-footage of 159,400 square feet and a footprint of 124,215 square feet.

To the extent that the Development Review Board finds it is relevant to this review, the original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store." *See* Exhibit B1, page 31.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he use is a legally established Non-Conforming Use in the TC zone."

Non-Conforming Structure Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that a non-conforming structure exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located." The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements[.]" Subsection 4.190 (.01) further states that "[a] non-conforming structure that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Is the Location's structure impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," was the structure legally established and may it continue to be used?

2. Relevant Facts

A. Is the Location's structure impermissible under a current land use ordinance?

The structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted.

B. Was the structure legally established and may it continue to be used?

The Planning Director has conceded that the structure was legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore may continue to be used in its current state.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he structure is a legally established Non-Conforming Structure in the TC zone."

Non-Conforming Site Condition Inquiry:

The Notice of Appeal does not challenge the Planning Director's Decision on this point. Accordingly, City staff believe that there is no disagreement between the Applicant and the City with respect to these point. City staff are providing a complete analysis for the Development Review Board because this is a *de novo* appeal.

1. Applicable Legal Standard

Appellant has the burden of establishing that non-conforming site conditions exists by substantial evidence in the whole record. ORS 197.835(9)(a)(C); *see also* Subsection 4.014 of the Development Code (stating that the burden of proof is on the Appellant in an appeal). In other words, the Development Review Board must be sure that its decision – in favor of or against the Applicant's position – is supported by substantial evidence.

Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of

the zone in which it is located." The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements[.]" Subsection 4.191 (.01) further states that "[a] property with non-conforming site conditions that is in use may continue to be used." The balance of this code Subsection is irrelevant to the questions before the Development Review Board.

To summarize the legal standard articulated above, the Development Review Board should answer the following questions:

A. Are the Location's site conditions impermissible under a current land use ordinance?
B. If the answer to the first question is "yes," were the site conditions legally established, and may the Location continue to be used?

2. Relevant Facts

A. Are the Location's site conditions impermissible under a current land use ordinance?

The existing site conditions do not comply with at least two City code sections:

- Subsection 4.132 (.04) A. requires that "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". Existing site conditions do not conform with this requirement as they do not include the proposed streets, a multi-use path, and bicycle facilities shown in the Network within or immediately adjacent to the subject property.

- Subsection 4.132 (.05) A. requires that "all development will be consistent with the Open Space Network, shown in Figure 4". The existing site conditions do not include the proposed open spaces shown in the northeast corner and along the southeast boundary of the subject property and, therefore, are non-conforming with this requirement.

Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas.

Existing site conditions do not comply with these applicable standards.

B. Were the site conditions legally established, and may the Location continue to be used?

The Planning Director has conceded that the site conditions at the Location were legally established and complied with the applicable ordinances and standards when it was approved in 1991, and therefore the Location may continue to be used.

3. Planning Director's Decision

The Planning Director's Decision addressed this question as follows (see page 3 of Exhibit A4):

"[T]he existing site conditions are legally established Non-Conforming Site Conditions in the TC zone."

Neighborhood and Public Comments:

No public comments were received during the public comment period for the appeal.

Conclusion:

Staff recommends that the Development Review Board **affirm** the Planning Director Determination of Non-Conformance (ADMN23-0029) determining that:

1. There is a legally established non-conforming use at the Location; specifically, that the protected use is "a 159,400 square-foot electronics-related retail store."
2. There is a legally established non-conforming structure at the Location.
3. There are legally established non-conforming site conditions at the Location.

Master Exhibit List:

Entry of the following exhibits into the public record by the Development Review Board confirms its consideration of the application as submitted. The list below includes exhibits for Planning Case File No. DB24-0002 and reflects the electronic record posted on the City's website and retained as part of the City's permanent electronic record. Any inconsistencies between printed or other electronic versions of the same exhibits are inadvertent and the version on the City's website and retained as part of the City's permanent electronic record shall be controlling for all purposes.

Planning Staff Materials

A1. Staff report and Findings (this document)
A2. Staff's Presentation Slides for Public Hearing (to be presented at Public Hearing)
A3. Staff Email Correspondence with Applicant regarding ADMN23-0029, Dated November 28, 2023
A4. ADMN23-0029 Class 1 Planning Director Determination of Non-Conformance, Issued December 28, 2023

Materials from Applicant

B1. **Applicant's Materials –** *Available Under Separate Cover*
Signed Application Form
Applicant's Notice of Appeal
B2. ***Applicant's First Open Record Submittal Dated March 4, 2024***
B3. ***Applicant's Final Arguments Dated March 11, 2024***

Public Comments

C1. ***Homebuilding Association of Greater Portland Comment Dated February 26, 2024***

Findings:

NOTE: Pursuant to Section 4.014 the burden of proving that the necessary findings of fact can be made for approval of any land use or development application rests with the applicant in the case.

General Information

Application Procedures - In General
Section 4.008

The application is being processed in accordance with the applicable general procedures of this Section.

Initiating Application
Section 4.009

The application for Class 1 Review (ADMN23-0029) has the signatures of David Fry of Lumberjack LP, owner, and Dan Zoldak of Lars Andersen & Associates, Inc., applicant and authorized representative.

Pre-Application Conference
Subsection 4.010 (.02)

A pre-application conference (PA22-0004) for the subject property was held on March 24, 2022.

Lien Payment before Approval
Subsection 4.011 (.02) B.

No applicable liens exist for the subject property. The application can thus move forward.

General Submission Requirements
Subsections 4.035 (.04) A. and 4.035 (.05)

The applicant has provided all of the applicable general submission requirements contained in this subsection. The following documents/testimony within Exhibit B1 are hereby deemed rejected and are excluded from the record as being beyond the scope of this Class I Review and/or not relevant to the Class I Review:

- Page 6 of 184: 3rd Paragraph – entire paragraph (parking calculations are irrelevant)
- Pages 18-19 of 184: Photographs (not Wilsonville, irrelevant)
- Page 19 of 184: 2nd Paragraph – 1st, 2nd, and 3rd sentences (continuing on page 20) (relates to Class II)
- Page 20 of 184: 1st Full paragraph – entire paragraph (relates to Class II)
- Page 20 of 184: Response to WDC 4.189.02 Change of Use – 2nd sentence (relates to Class II)
- Page 21 of 184: Response to WDC 4.190.05 Non-Conforming Structures – entire paragraph (relates to Class II)

- Page 184 of 184: Proposed site plan for Home Depot – entire page (irrelevant, relates to Class II)

Zoning - Generally
Section 4.110

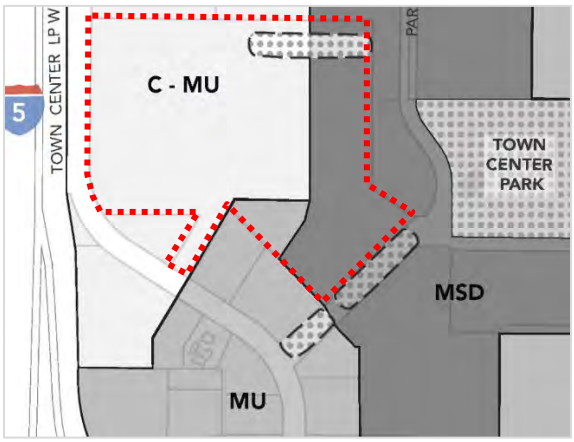
The subject property is located in the Town Center (TC) zone, in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. Applicable zoning district and general development regulations, as appropriate, have been applied in accordance with this Section, as discussed in more detail in the Findings in this staff report.

Request: ADMN23-0029 Class 1 Review Request

Town Center (TC) Zone

Purpose of Town Center Zone
Subsection 4.132 (.01)

A1. The TC Zone in which the subject property is located is divided into four sub-districts that contain recommendations for building form and use to achieve the vision set forth in the Town Center Plan. The subject property is located in three (3) TC sub-districts, as shown in the map below: Commercial-Mixed Use (C-MU), Main Street District (MSD), and Mixed Use (MU). There are two (2) proposed open space areas within or adjacent to the property. All adjacent property is also zoned TC.



Allowed Uses in TC Zone
Subsection 4.132 (.02) F.

A2. With regard to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Although the existing use on the subject property is a retail store and, thus, consistent with allowed use in the TC zone, its footprint of 124,215 square feet exceeds the 30,000 square feet per use limitation of the TC zone.

Permitted and Prohibited Uses in Specific Sub-districts in TC Zone
Subsection 4.132 (.03) A. 1.

A3. Per Subsection 4.132 (.03) A. 1., single-user commercial or retail (e.g. grocery store or retail establishment) that exceeds 30,000 square feet if located on more than one story of a multi-story building is an additional permitted use allowed in the C-MU sub-district. The current use on the subject property does not meet this additional permitted use standard due to its large format footprint of 124,215 square feet square feet in a single story, exceeding the maximum footprint of 30,000 square feet.

Consistency with Street Network and Multi-modal Network
Subsection 4.132 (.04) A.

A4. With regard to site conditions, per Subsection 4.132 (.04) A., "all development [in the TC zone] will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Site conditions as they currently exist on the subject property do not comply with these applicable standards.

Consistency with Open Space Network
Subsection 4.132 (.05) A.

A5. Per Subsection 4.132 (.05) A., "all development [in the TC zone] will be consistent with the Open Space Network, shown in Figure 4". Proposed open spaces are shown in the northeast corner and along the southeast boundary of the subject property; however, these are not included in the existing development. Therefore, existing site conditions do not comply with these applicable standards

Consistency with Design and Development Standards of TC Zone
Subsection 4.132 (.06)

A6. With regard to structures and site design, per Subsection 4.132 (.06), all developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building, as it currently exists on the subject property, does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards for the existing structure has not been applied for, nor has a waiver been granted. Therefore, the existing structure does not comply with these applicable standards.

Other Development Standards

Non-Conforming Uses
Subsection 4.001 (196.) and 4.189

A7. A Non-Conforming Use is defined as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform" (Subsection 4.001 (196.)). As noted elsewhere in this report, the existing use at the Location has a footprint of 124,215 square feet in a single story with a partial mezzanine, which exceeds the footprint of 30,000 square feet per retail user and footprint limitation that is allowed in the TC Zone. The use is a legally established Non-Conforming Use in the TC zone.

Non-Conforming Structures
Subsection 4.001 (195.) and Section 4.190

A8. Subsection 4.001 (195.) defines a Non-Conforming Structure as "a legally established building or other structure that does not conform with the height, setback, area, lot coverage, or other standards for structures of the zone in which it is located". The definition further states that "a structure may be rendered non-conforming through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, the structure as it currently exists does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. The structure is a legally established Non-Conforming Structure in the TC zone.

Non-Conforming Site Conditions
Subsection 4.001 (194.) and Section 4.191

A9. Non-Conforming Site Conditions are defined in Subsection 4.001 (194.) as "a legally established site that does not conform with the landscaping, parking or other site development standards of the zone in which it is located". The definition further states that "a site may be rendered non-conforming to development standards through a change in zoning requirements or through the acquisition of some portion of the property by a public agency." As noted elsewhere in this report, existing site conditions do not conform TC zone requirements including planned streets, a multi-use path, bicycle facilities, open spaces, parking location, landscape design, and plaza areas. The existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

WILSONVILLE
OREGON

December 28, 2023

Dan Zoldak
Lars Anderson & Associates, Inc.
4694 W Jacquelyn Avenue
Fresno, CA 93722

Application No.:	ADMN23-0029 Class 1 Review Request
Request:	Class 1 Review of Use and Structure Conformance Status (per Section 4.030 (.01) A. 7. of Wilsonville Development Code)
Location/Legal:	29400 SW Town Center Loop West. Tax Lot 220, Section 14D, Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon.
Status:	Notice of Planning Director Determination

Dear Mr. Zoldak:

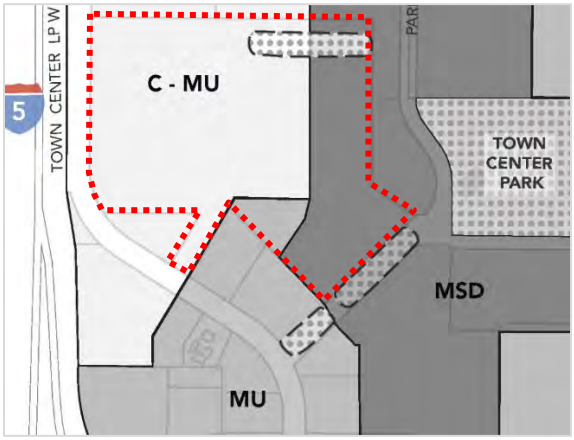
The City received your application on October 30, 2023, for Class 1 Review to confirm the status of the existing use and structure at 29400 SW Town Center Loop West. On November 28, 2023, City staff contacted you by email providing options for proceeding with your application and requesting that you notify staff of your preference by December 8, 2023 (see attached enclosure).

On November 29, 2023, staff conducted a completeness review within the statutorily allowed 30-day review period and found the Class 1 Review application to be complete. In the absence of a withdrawal of the Class 1 Review application, City staff has proceeded with the Class 1 Review of the existing use, structure, and site conditions at the above location per Section 4.030 (.01) A. 7. of the Development Code.

Here are some additional data points regarding the subject property:

Tax lot ID:	31W14D00220
Record No.:	01507257
County:	Clackamas
2008 100 Year Floodplain:	No
City Limits:	Yes
SROZ (Significant Resource Overlay Zone):	No
UGB (Urban Growth Boundary):	Yes

1. The most relevant previous Planning approvals for the property include:
   - 91PC43 Modified Stage I Master Plan, Phase II Stage II Site Development Plans, Amending Condition of Approval 8 of 90PC5
   - 91DR29 Site Design (Architectural, Landscaping) and Signage
   - 01AR01 Minor Architectural Revisions
   - 92DR21 Revise Condition of Approval 15 of 91DR29 regarding placement of containerized dumpsters
   - AR09-0053 Zoning Verification
2. The current Comprehensive Plan designation for the subject property is Town Center. The property is not located in an Area of Special Concern.
3. The current zoning classification, including any applicable overlay districts, for the subject property is Town Center (TC; adopted by Ordinance No. 835, June 5, 2019). The property is located in three (3) TC sub-districts: Commercial-Mixed Use (C-MU), Mixed Use (MU), and Main Street District (MSD). There are two (2) proposed open space areas within or adjacent to the property. The adjacent property zoning designation is TC on all sides.



4. The current use of the property is Fry's Electronics, a large format (159,400 square feet), electronics retail store, which has been vacant since 2021.
5. The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as "a retail business with the anonymous name "Project Thunder" "a 159,400 square foot electronics-related retail store". Zoning was Planned Development Commercial (PDC) with the property located in a functional use area under the Town Center Master Plan of Central Commercial (CC). Typical recommended uses in CC included department stores, retail stores, business machines retail sales and service, and similar retail or service establishments. Except for the purpose of determining minimum parking requirements for the site, which disaggregated the building square footage into such uses as retail commercial, service, office, restaurant, and storage, the primary use of the site was considered commercial retail or retail store.
6. According to the zoning ordinances and regulations for the TC zone, the current use of, structures on, and site conditions of, the subject property are legally established Non-Conforming (see Wilsonville Code Sections 4.132, 4.189, 4.190, and 4.191.) The following is a non-exhaustive list of the applicable ordinances and regulations:

- With respect to use, per Subsection 4.132 (.02) F., "retail sales and service of retail products, under a footprint of 30,000 square feet per use" is an outright allowed use in the TC zone. Further, per Subsection 4.132 (.03) A. 1., use-related regulations for the sub-districts Commercial-Mixed Use (C-MU) and Main Street District (MSD), under additional permitted uses state that "single-user commercial or retail (e.g. grocery store or retail establishment) may exceed 30,000 square feet if located on more than one story of a multi-story building". The existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store that exceeds a footprint of 30,000 square feet. Therefore, the use is a legally established Non-Conforming Use in the TC zone.
- With respect to structures, per Subsection 4.132 (.06), the purpose and intent of the design and development standards of the TC zone is, in part, "to provide high quality design in new development and redevelopment that promotes a sense of community identity and implements the Wilsonville Town Center Vision", and "provide sustainable development through the adaptive reuse of existing buildings". All developments must follow the design and development standards unless a waiver is granted by the Development Review Board per Subsection 4.132 (.06) D. The existing building as it currently exists on the subject property does not conform to many of the design and development standards in Subsection 4.132 (.06), such as building placement and frontage requirements, location of parking in relation to the building, building setbacks, height and number of stories, façade design, and architectural materials and treatments. A waiver to these standards has not been applied for, nor has a waiver been granted, for the existing structure. Therefore, the structure is a legally established Non-Conforming Structure in the TC zone.
- With respect to site conditions, per Subsection 4.132 (.04) A., "all development will be consistent with the Street Network and Multi-modal Network". The purpose of the network plans (Figures 2 and 3) is to support creation of a highly connected and walkable Town Center where there are options for travel. Several proposed streets, a multi-use path, and bicycle facilities are shown within or immediately adjacent to the subject property. Per Subsection 4.132 (.05) A., "all development will be consistent with the Open Space Network, shown in Figure 4". A proposed open space is shown in the northeast corner and along the southeast boundary of the subject property. Other site improvement standards of the TC zone address such features as walkway connection to building entrances, parking location, landscape design, and plaza areas. Existing site conditions do not comply with the applicable standards. Therefore, the existing site conditions are legally established Non-Conforming Site Conditions in the TC zone.

7. There are not any variances, special permits/exceptions, ordinances, or conditions that apply to the subject property. See case files cited above for Conditions of Approval.

Based on the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations, it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use in a Non-Conforming Structure with Non-Conforming Site Conditions in the

TC zone. The complete record for this application is available on the City's online portal under Case File No. ADMN23-0029.

In your application on October 30, 2023, requesting Class 1 Review to confirm the status of the existing use and structure at the subject site, you also stated that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's. You, therefore, sought confirmation from the City that a warehouse retail store can continue operating at the property. You went on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicated that you were requesting confirmation from the City that this is, indeed, the case. That second request is for written interpretation of the Development Code and requires Class 2 Review per Section 4.030 (.01) B. 3. In response to the options for proceeding with your application that staff provided to you via email on November 28, 2023, you submitted, on December 15, 2023, an application for Class 2 Review (Case File No. AR23-0031); that application is currently in the 30-day completeness review period, which expires on January 14, 2024. Therefore, nothing in this Class 1 decision shall be construed to provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.).

This information was provided on December 28, 2023, by the undersigned, on behalf of the City of Wilsonville, per request and as a public service. The undersigned certifies that the above information contained herein is believed to be accurate and is based upon, or relates to, the information supplied by the requestor. The Zoning Authority assumes no liability for errors and omissions. All information was obtained from public records, which may be inspected during regular business hours.

If you have any questions, please contact me at 503-682-4960, or at bateschell@ci.wilsonville.or.us.

Sincerely,

Miranda Bateschell
Planning Director
City of Wilsonville

cc via email: David Fry, Lumberjack LP, dave@rdjdevelopment.com

Enclosure: City Staff Email Correspondence to Applicant, dated November 28, 2023

From: Luxhoj, Cindy
To: dzoldak@larsandersen.com
Cc: dave@rdjdevelopment.com; Bateschell, Miranda; Rybold, Kim; Daniel Pauly (pauly@ci.wilsonville.or.us)
Bcc: Luxhoj, Cindy
Subject: ADMN23-0029 Class 1 Review Request for 29400 SW Town Center Loop
Date: Tuesday, November 28, 2023 1:51:00 PM
Attachments: image001.png

Mr. Zoldak,

This email is in regards to the application you submitted on October 30, 2023, requesting a Class 1 Review for the property located at 29400 SW Town Center Loop West, Case File No. ADMN23-0029.

In your application, you state that you are requesting a Class 1 review to confirm the status of the existing non-conforming use at the above location. If this is your intent, then the City is prepared to deem your application complete tomorrow, which is the last day within the 30-day completeness review period. We would then process the application as a Class 1 review per Section 4.030 (.01) A. 7. of the Development Code unless you indicate differently – see options listed below.

You also state, however, that The Home Depot, Inc., intends to operate a store within the existing structure that was previously occupied by Fry's and, therefore, seeks confirmation from the City that a warehouse retail store can continue operating at the property. You go on to assert that the two stores are interchangeable with respect to use as warehouse retailers and indicate that you are requesting confirmation from the City that this is, indeed, the case. This second request is for written interpretation of the Development Code and requires Class 2 review per Section 4.030 (.01) B. 3.. As such, this determination will not be part of the Class 1 review or decision.

Below are a few options we have identified for proceeding with your application:

- Staffs proceeds with the Class 1 review and issues a determination of non-conforming use at the subject site.
- You submit a request to withdraw the Class 1 review application and apply for a Class 2 review.
- Staff proceeds with the Class 1 review and, in addition, you apply for a Class 2 review requesting written interpretation.

If you choose to apply for a Class 2 review, you would select "Class 2 Review Master Plan" as the application in the City's online portal and specify "Staff Interpretation (with public notice)" as the request within your application. For convenience, here is a link to the application portal. The fee for this application is $2,027, and we would invoice you when the application is submitted to the portal.

Please let us know how you prefer to proceed. If you do not submit a request to withdraw the Class 1 by **Friday December 8**, staff will proceed with the Class 1 review and decision.

Thank you,

Cindy Luxhoj AICP
Associate Planner

City of Wilsonville

503.570.1572
luxhoj@ci.wilsonville.or.us
www.ci.wilsonville.or.us
Facebook.com/CityofWilsonville

29799 SW Town Center Loop East, Wilsonville, OR 97070

Disclosure Notice: Messages to and from this e-mail address may be subject to the Oregon Public Records Law.

BEFORE THE PLANNING DIRECTOR FOR THE CITY OF WILSONVILLE

In the Matter of an application to confirm the legality of a nonconforming use at 29400 Town Center Loop W, Wilsonville, OR 97070	APPLICANT'S NARRATIVE AND EXHIBITS DEMONSTRATING COMPLIANCE WITH THE RELEVANT APPROVAL CRITERIA

SUBJECT PROPERTY:	29400 Town Center Loop W, Wilsonville, OR 97070 TL ID: 31W14D 00220
APPLICANT:	Lars Andersen & Associates, Inc. 4694 W. Jacquelyn Ave., Fresno, CA 93722 Attn: Dan Zoldak Phone: 559-276-0850 E-Mail: dzoldak@larsandersen.com
APPLICANT REPRESENTATIVE:	J. Kenneth Katzaroff Keenan Ordon-Bakalian Schwabe, Williamson & Wyatt, P.C. 1211 SW 5th Avenue, Suite 1900 Portland, Oregon 97204 Phone: 206-405-1985 E-Mail: KKatzaroff@SCHWABE.com E-Mail: Kordon-bakalian@schwabe.com
PROPERTY OWNER:	Lumberjack LP 600 E Brokaw Rd. San Jose, CA 95112
REQUEST:	A Class I review and determination verifying the status of an existing non-conforming office, warehouse, manufacturing, service and retail use.

I. APPLICABLE STANDARDS AND CRITERIA

The applicant has identified the following code provisions that the City of Wilsonville (hereinafter, the "**City**") may apply to its review of this application:

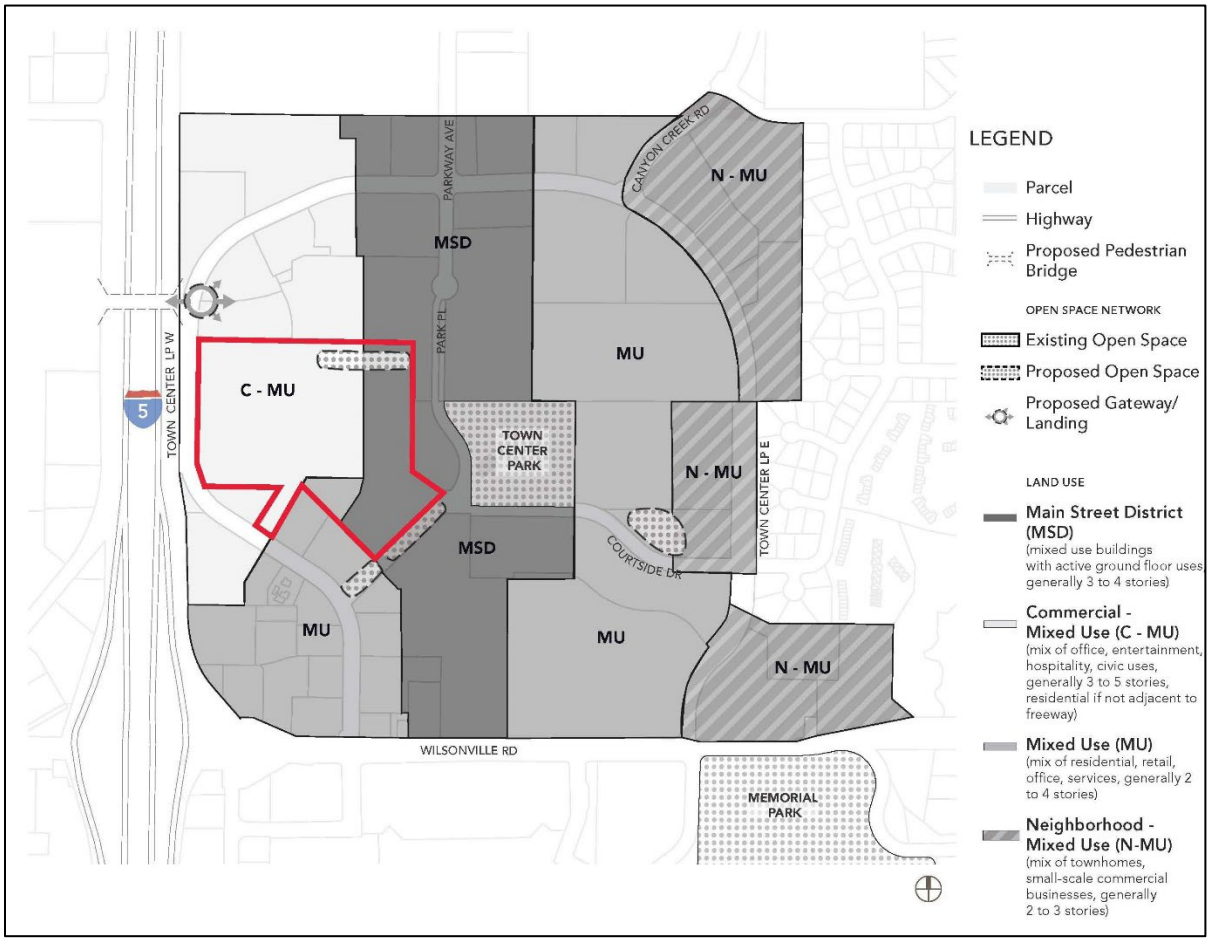
Title 4 – the Wilsonville Development Code ("**WDC**")

Section 4.000-4.035 – Administration
Section 4.001 – Definitions

Section 4.030 – Jurisdiction and Powers of Planning Director and Community Development Director
Section 4.132 – Town Center Zone
Section 4.189-4.192 – Non-Conforming Uses, Structures, Site Conditions, and Lots

II. INTRODUCTION AND BACKGROUND

Lars Andersen & Associates, Inc. (the "**applicant**") is seeking a Class I review to confirm the status of the existing non-conforming office, warehouse, manufacturing, service and retail use (the "**subject use**") at 29400 SW Town Center Loop W, Wilsonville, OR 97070[1] (the "**property**"). The 15.01-acre property is located within the City of Wilsonville (the "**City**") and is zoned Planned Development Commercial – Town Center ("**TC**"). The property is designated with three Town Center Sub-Districts – Commercial-Mixed Use ("**C-MU**"), Mixed Use ("**MU**"), and Main Street District ("**MSD**").



[1] TL 31W14D 00220.

As pictured below, the property is located in a relatively flat, developed commercial area within the City's Town Center District. There is an existing structure at the property that was operated as a Fry's Electronics ("**Fry's"**) from 1991 to 2021.

In 1991 the City approved a Modification to the Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plan (the "**1991 Decision**") to allow the development of a 159,400 square foot ("**SF**") retail, office, warehouse, manufacturing, and service store at the property. *See attached,* **Exhibit A**. The property was zoned Planned Development Commercial ("**PDC**") and designated commercial in the City's Comprehensive Plan when the City approved the subject use of the property. *Id.*, at 14. Subsequent to the City's land use approval, Fry's began operating a retail, office, warehouse, manufacturing, and service store at the property.

Fry's was a large electronics warehouse store that retailed software, consumer electronics, household appliances, cosmetics, tools, toys, accessories, magazines, technical books, snack foods, electronic components, and computer hardware. Fry's also had in-store computer repair and custom computer building services, and offered technical support to customers. The Fry's model was unique for electronics retail outlets of the time, in that Fry's was an electronics warehouse that offered customers a variety of retail, manufacturing and service offerings that exceeded the offerings of Fry's competitors. Because Fry's stocked a wide range of electronics products, they were popular with electronics and computer hobbyists, as well as professionals.

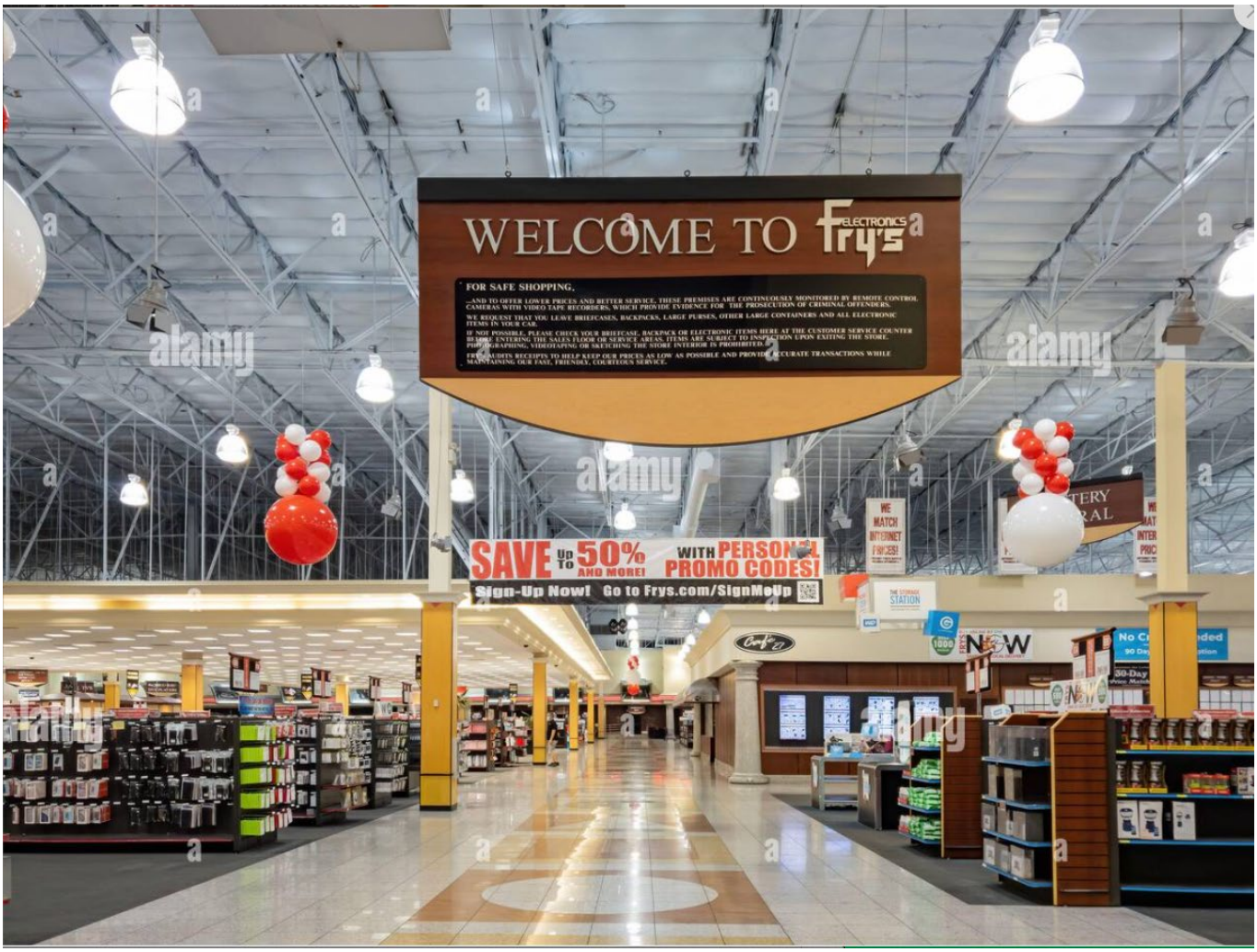


Image Credit: Alamy, https://www.alamy.com/las-vegas-sep-7-2020-interior-view-of-the-frys-electronics-image375519870.html?imageid=595679EA-E5D6-4FAA-8BDE-4437A0B5DF19&p=283543&pn=1&searchId=9fd62e6ba47e6193d28e3b42e316bc4e&searchtype=0 (last accessed Oct. 20, 2023).

Image Credit: PC Magazine, https://www.pcmag.com/opinions/to-all-the-frys-i-loved-before-an-elegy-for-the-best-electronics-chain (last accessed Oct. 20, 2023).

In February 2021, Fry's suddenly went out of business, closing all 31 stores across the United States including the Wilsonville Fry's that was operating at the property.[2] Since the closure of the Fry's in 2021, the owner of the property has been actively marketing the site and making other plans for its use. The owner has also continued to make utility payments for city services. *See attached*, **Exhibit B.**

The Home Depot, Inc. ("**HD**") intends to operate a store within the existing structure that was previously occupied by Fry's, and therefore seeks confirmation from the City that a warehouse retail store can continue operating at the property. *See attached*, **Exhibit C**. HD operates home improvement warehouse stores that retail tools, construction products, appliances, and services, including transportation and equipment rentals. HD's Home Services division also offers technical expertise for home improvement projects, and both onsite and offsite install, repair, and

[2] *Fry's Electronics suddenly went out of business*, CNN, https://www.cnn.com/2021/02/24/business/frys-electronics-closure/index.html (last accessed Oct. 9, 2023); *Fry's Electronics closes, leaving Wilsonville store barren*, Portland Tribune, https://www.portlandtribune.com/news/frys-electronics-closes-leaving-wilsonville-store-barren/article_cde50d46-de09-5ce3-a647-9f54ce7d4bb1.html (last accessed Oct. 9, 2023).

remodel services. Although the vast majority of HD customers are private individuals, contractors and other professionals account for close to half of HD's annual sales.[3]

Fry's and HD stores are retail, office, warehouse, manufacturing, and service uses allowed at the subject property pursuant to the 1991 Decision and the property's historic PDC zoning. Both Fry's and HD stores are [were] organized warehouse-style, stock a large range of supplies available for retail, cater to retail consumers and professionals, and offer onsite services and technical support. As both Fry's and HD are warehouse retailers that fall within the subject use approved in the 1991 Decision, the applicant is seeking a non-conforming use determination to verify the status of the property's existing non-conforming use rights.

The applicant requests that the Planning Director process this application through the City's Class I review procedures because there no uncertainty as to the history of the property due to the existence of the 1991 Decision. WDC 4.030.01(A)(7); *see also* Exhibit A.

III. APPROVAL CRITERIA

WDC 4.189.01 –Continuation of Use

> *A. A non-conforming use may be continued subject to the requirements of this Section.*

RESPONSE: In compliance with WDC 4.189.03, the lawfully established non-conforming subject use at the property has not been discontinued or abandoned. The ongoing non-conforming use complies with the criteria of WDC 4.189 and is therefore permitted to continue.

WDC 4.189.02 – Change of Use

> *A. A non-conforming use may not be changed unless the change or replacement is to a use that is determined by the Planning Director to be no less conforming to the regulations for the zone district in which the use is located than the existing use.*

RESPONSE: The purpose of this provision is to consider the impacts of potential changes in use for lawfully established non-conforming uses. In this case, the applicant is not proposing to change the established non-conforming use of the property. Rather, the applicant is seeking a non-conforming use determination to confirm the status of the existing non-conforming use of the property. Therefore, this criterion is not applicable.

WDC 4.189.03 – Abandoned Use.

> *If a non-conforming use is abandoned for a period of 18 consecutive months, the use shall not be re-established without fully complying with the use requirements of the zone. Mere vacancy of a site or building while it is being marketed or other plans for its use are being*

[3] *Home Depot CEO Says Contractor Spend Remains Strongest Business Line*, PYMNTS, https://www.pymnts.com/earnings/2023/home-depot-ceo-says-contractor-spend-remains-strongest-business-line/ (last accessed Oct. 25, 2023).

readied, does not constitute abandonment. In order to be considered abandoned, a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale. These standards concerning abandonment do not in any way affect the City's processes for the abatement of nuisances as delineated in Chapter 6 of the Wilsonville Code.

RESPONSE: The existing non-conforming subject use at the property has not been abandoned. For a non-conforming use to be abandoned, "a site must not be receiving City utilities and must not actively be marketed for rent, lease, or sale." WDC 4.189.03. Here, the subject property is actively being marketed for rent, lease, or sale, and is currently receiving, and paying for, City utilities. *See* **Exhibit B**. Therefore, the non-conforming use of the property has not been abandoned. This criterion is met.

WDC 4.190.02 – Non-Conforming Structures

If a non-conforming structure is abandoned, as defined herein, for a period of 18 months, it may not again be used unless brought into conformity with the requirements of this ordinance. Except, however, that an abandoned non-conforming structure may be re-occupied if a Variance is approved per the requirements of Section 4.196.

RESPONSE: The existing structure at the property is not non-conforming per the definition set forth in WDC 4.001.195 because it conforms to the standards for structures within the TC zone. Therefore this criterion is not applicable.

WDC 4.190.05 – Non-Conforming Structures

A non-conforming structure may be expanded or enlarged, provided that the portion of the structure being enlarged meets zoning requirements in terms of setbacks, height, and lot coverage.

RESPONSE: The existing structure at the property is not non-conforming because it meets the setback, height, and lot coverage requirements for the TC zone. The applicant's plans involve alterations to the Fry's building and the subsequent operation of a Home Depot at the property. *See attached*, **Exhibit C**. The proposed project would consist of up to 124,215 SF of building area, previously occupied by Fry's. The reduction in square footage will result from interior renovations, specifically the removal of the existing mezzanine within the structure. **Exhibit C**. Exterior alterations include changes to the parking lot, including curbs and the approach to the building. The concept plan demonstrates that the applicant's proposed alterations are not an expansion. Therefore, this criterion is not applicable.

IV. CONCLUSION

For the reasons stated above, the Planning Director can find that all applicable criteria are met and approve the subject application.

Enclosed with this application are the following exhibits:

A. 1991 Decision
B. Proof of Utility Payments
C. Concept Plan

Unique Serial Number: (assigned by dbase) 4808

Department: Planning

Case No: **91PC43** File Creation Date:

Request: Modified Stage I Master Plan and Stage II Phase II site development plans, reconsideration of Condition ofApproval #8 of 90PC15

Action: Approved with conditions

Project Expiration Date:

Property Description: TL 500, 600, 601, 604 Sec. 13 County: C
TL 101, 200, 201, 300, 405 Sec. 14D County: C

Location: Wilsonville Town Center

Street Address:

Project Name(s): **Project Thunder**

Applicant: Capital Realty Corporation

Retention Schedule: Permanent

Location of Microfilm: City Hall Vault

Hard Copies of drawings/plans available? yes

Physical copy of file retained? No

See also Case Files: 89PC50, 90PC15, 90PC15EX, 91DR29, 92DR21

Other name(s) on file:

MAP

SW 10/5/06 Initial/Date

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

NOTICE OF DECISION

Project Name: PROJECT THUNDER File No: 91PC43

Applicant / Owner: Capital Realty Corp.

Proposed Action: Modified Stage I Master Plan, Phase II Stage II Site Development Plans and Amending Condition of Approval 8 of Resolution 90PC5

Property Description:

Map No: 13 & 14D Tax Lot No: 101,102,200,201, 300 and 500 Site Size: _____

Address: _____

Location: Wilsonville Town Center - east of Town Center Loop West and northwest of shopping center

On December 9, 1991, at the meeting of the Planning Commission the following decision was made on the above-referenced Proposed Development Action:

_____Approval XX Approval with Conditions _____Denied

This decision has been finalized in written form and placed on file in the City records at the Wilsonville City Hall this 16th day of December, 1991, and is available for public inspection. The date of filing is the date of the decision. Any appeal(s) must be filed with the Planning Department by 5:00 p.m. on December 30, 1991.

XX Written decision is attached

_____ Written decision is on file and available for inspection and/or copying.

This action, if approved, will expire on December 9, 1993 unless development commences prior to the expiration date.

For further information, please contact the Wilsonville Planning Department at City Hall, Community Development, or phone 682-4960.

FILED 12-16

2905

PLANNING COMMISSION
RESOLUTION NO. 91PC43

A RESOLUTION ADOPTING FINDINGS AND CONDITIONS OF APPROVAL FOR A MODIFIED STAGE I MASTER PLAN, PHASE II STAGE II SITE DEVELOPMENT PLANS AND AMENDING CONDITION OF APPROVAL 8 OF RESOLUTION 90PC5 - CAPITAL REALTY CORP., APPLICANT. THE PROPERTY IS IDENTIFIED AS WILSONVILLE TOWN CENTER AND IS LOCATED ON TAX LOTS 101, 102, 200, 201, 300 AND 500, T3S-R1W, SECTIONS 13 AND 14D, CLACKAMAS COUNTY, OREGON

WHEREAS, an application, together with planning exhibits for the above-captioned development, has been submitted in accordance with the procedures set forth in Sections 4.008(4) and 4.139(1), (2) and (3) of the Wilsonville Code, and .

WHEREAS, the Planning staff has prepared a report on the above-captioned subject which is attached hereto as Exhibit A, and

WHEREAS, said planning exhibits and staff report were duly considered by the Planning Commission at a regularly scheduled meeting conducted on December 9, 1991, at which time all exhibits, together with findings and public testimony, were entered into the public record, and

WHEREAS, the Commission has duly considered the subject and the recommendations contained in the staff report, and

WHEREAS, all interested parties have been afforded an opportunity to be heard on the subject.

NOW, THEREFORE, BE IT RESOLVED that the Wilsonville Planning Commission does hereby adopt the staff report attached hereto as Exhibit A, along with the findings, recommendations and Conditions of Approval contained therein. The Wilsonville Planning Director is hereby authorized to issue a Stage I Master Plan and Stage II Site Development Permit for Phase II and a Revised Condition of Approval 8 -Resolution 90PC5 once the prescribed appeal period has expired.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 9th day of December, 1991, and filed with the Planning Secretary this same day.

Richard D. Wilson
Chairman, Planning Commission

Attest:
Judee Emison
Judee Emison, Planning Secretary

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

Chairman Mike Williams moved to accept the staff report with the following amendments:

Revise Condition of Approval Number 10 to provide that instead of at the time building permits are issued at the Phase II Stage II site development, to provide that at the time the Certificate of Occupancy is issued the applicant/property owner shall dedicate 5.1 acres. And to provide another sentence at the end, that the City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

Provide an additional condition of approval that at the time that the Design Review Board specifically reviews the applicants plans, regarding the east wall of the large structure on Phase II, to insure its compatibility with the proposed park. And to also have the DRB look at the pathway and sidewalk circulation plan. And an additional condition of approval that the applicant consider on-site detention in its submittal to the city. That the applicant coordinate with the engineering department the storm drainage plans with some consideration toward whether or not an on-site detention is feasible and meets the engineering standards of the city. And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

An additional Condition of approval is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the property across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to the Project Thunder.

(Mike Kohlhoff - Add the phrase, "unless the project owner and the city council reach other agreement")

Condition 10 will read that dedication of 5.1 acres for a public park will be required before issuance of the Certificate of Occupancy unless the applicant and the City Council reach an agreement for a later date.

Motion was seconded by Lew Hendershott and carried 4-2.

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

SUMMARY

Capital Realty Corporation is representing a retail business with the anonymous name "Project Thunder". The Project Thunder people desire to develop 14.75 acres (Phase II of Wilsonville Town Center) for a 159,400 square foot electronics-related retail store.

The proposed Project Thunder Stage II Site Development Plans has caused Capital Realty Corp. to modify and re-submit the Stage I Wilsonville Town Center Master Plan to reflect an expanded master plan area, reclassify overlay zones associated with Ordinance 55, resdesignate the phasing sequence and to establish approximately 5.4 acres for open space.

Capital Realty Corp. is also seeking reconsideration of Condition 8 of Planning Commission Resolution 90PC15 which imposed certain design and development requirements for the development of the 5.4 acre open space.

All Comprehensive Plan and Zoning Code requirements that apply to this Stage I review are satisfied or can be met. Parking issues, building height and setback, final design, utility placement, and other site specific development requirements are further considered in this application for Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building. The applicant has also submitted conceptual plans showing Project Thunder's architecture, landscaping and a signage program. The Design Review Board is the City's review authority of the project's architecture, landscaping and signage program.

The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. The proposed findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

Project Thunder can be adequately served by existing or immediately planned public facilities and services.

RECOMMENDATION: **Approve the modified Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plans with Conditions of Approval attached herein. This recommendation acknowledges the conceptual configuration of a 5.1 acre open space as proposed by the developer.**

FINDINGS: PDC & PDI

The following findings are hereby adopted by the PLANNING COMMISSION and entered into the public record in consideration of the application as submitted in conformance with the City's Comprehensive Plan and Zoning Regulations. "PROJECT THUNDER" STAGE II

NA = NOT APPLICABLE
DRB = DESIGN REVIEW BOARD

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
A. Land Use					
Zoning	PDC	PDC	●	○	1 to 7
Comprehensive Plan Designation	COMMERCIAL TOWN CENTER		●	○	1 to 7, 32 to 36
B. Land and Building Improvements	ORD # 55				
1. Lot Size					
a. Total site area (acreage)	NOT SPECIFIED	652,687 SF	●	○	
b. Lot sizes (subdivision)	NA		○	○	NA
Acreage lot size	NA		○	○	NA
2. Lot Coverage					
a. All buildings	NOT SPECIFIED	24% 159,400 SF	●	○	
b. Parking/paved	↓	61% 395,242 SF	●	○	
c. Landscaping	MINIMUM.	15%			
1. total size area (%)	15%	98,045 SF	○	○	DRB
2. parking area (%)	10%	-	○	○	↓
3. screening/buffering	REQ'D	-	○	●	42, 43
4. irrigation system	↓	-	○	○	DRB
3. Building Setbacks					
Front / TOWN CENTER LOOP WEST	0'	445'	●	○	
Right side / NORTH	0'	160'	●	○	
Left side / SOUTH	0'	85'	●	○	
Rear side / EAST	0'	70'	●	○	

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
4. Building Use					
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	
5. Building Specifications					
a. Building Height	35'	-	●	○	44
b. (Sun Exposure Plane)	NA		○	○	NA.
c. Gross Floor area of Building	NO LIMIT	150,400 SF	●	○	
6. Number of Off-Street Parking					
a. Standard 9' X 18'	472	858	●	○	48
b. Compact 8 1/2' X 17' (30% 10 allowed)	OPTIONAL	NOT SHOWN.	●	○	
c. Handicapped 12' X 18' (1 to 50 required)	11	16	●	○	UBC TABLE 31-A
Total	483	872	●	○	46 to 48
d. Truck load berths	2	26	●	○	
7. Access/Egress					
a. Direct access to street	-	3	○	●	17, 18
b. Access provided by easement	NA		○	○	NA
c. Rail Access	NA		○	○	NA.
8. Open Space Slope Protection					
a. Existing vegetation protected	NA		○	○	NA
b. Slopes over 20% to 30% impervious coverage	NA		○	○	NA
c. River and stream corridors protected	NA		○	○	NA
d. Adequate erosion control provided			●	○	EXHIBIT G.4
e. Within greenway	NA		○	○	NA

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
C. Other Planning Considerations					
1. Outside storage area provided/ screening	-	-	○	○	DRB
2. Adequate screenage of mechanical equipment	-	-	○	○	DRB
3. Safety/crime prevention					
a. Location of addressing	-	-	○	○	DRB
b. Natural surveillance	-	-	○	○	
c. Type of exterior lighting	-	-	○	○	

D. Bike Paths, Pedestrian Trails, & Equestrian Trails

1. Pathway Standards

a. Pathways are provided consistent with pathway master plan and design standards (Section 4.168 W.C.)	REQ'D	NOT SHOWN	○	●	28 10 31

E. Previous Approval actions and applicable conditions or approvals

1. City Council	Yes	No	File No.	See finding	ORD 55
2. DRB	Yes	No	File No.	See finding	90 PC 15 & 90 PC 50
3. P.C.	Yes	No	File No.	See finding	
4. Other	Yes	No	File No.	See finding	

Inter-agency review comments

Yes	No	See Exhibit No.	

Inter-agency review comments (Written Only)

City Engineer	Yes	No	See Exhibit No.	D
Parks & Recreat.	Yes	No	See Exhibit No.	
Traffic Safety	Yes	No	See Exhibit No.	
Building Dept.	Yes	No	See Exhibit No.	E
Tualatin Fire Dept.	Yes	No	See Exhibit No.	
Sheriff	Yes	No	See Exhibit No.	

91PC43

MODIFIED STAGE I MASTER PLAN AND STAGE II PHASE II SITE DEVELOPMENT PLANS AND RECONSIDERATION OF CONDITION OF APPROVAL 8 OF 90PC15
PLANNING COMMISSION FINDINGS

Property Owner:	Capitol Realty Corporation
Project:	Project Thunder
Developer:	Project Thunder
Architects:	Stage I Master Plan revision - JKS Architects Stage II Phase II - Design Forum Architects
Traffic Engineer:	Kittelson & Associates, Inc.

Property Description:

The subject master plan area comprises 59.79 acres for retail commercial/office development more specifically described as Tax Lots 500, 600, 601 and 604 of Section 13 and Tax Lots 101, 200, 201, 300 and 405 of Section 14D, T3S-R1W, Clackamas County, Wilsonville Oregon. Approximately 114 acres comprise the Town Center Master Plan as recognized in Ordinance No. 55. Wilsonville Town Center, the name of Capital Realty Corporation's commercial retail development, has the same name of a retail district identified in Ordinance No. 55. For clarification, the applicant's Stage I Master Plan will be identified as the Wilsonville Town Center and the City's Master Plan of the district will be identified as Ordinance No. 55.

For years the interior area of Town Center Loop was in agricultural use with farm exemption tax status. It wasn't until the last eight years that the area experienced rapid residential and commercial growth with the development of Park Center Apartments, Town Center Mercantile, Wilsonville Market Place, Phase I Wilsonville Town Center, Clackamas Community College and various office and retail developments. It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot commercial retail store. Capital Realty forecasted commercial growth trends in Town Center and have subsequently purchased additional property to accommodate their plans to develop the Wilsonville Town Center Master Plan. Thus, the overall master plan area will increase from 53.39 acres to 59.79 acres. This adjustment will also create a new development phase in the overall Master Plan. With respect to Project Thunder, the relatively level site is easily accessible to Town Center Loop, Parkway Court and Wilsonville Road. The proposed Project Thunder site is also highly visible to I-5 and Town Center Loop West.

LAND USE

Project Data
Stage I - 89PC50

1. Building Area

Phase I	24.08 acres	170,900 square feet
Phase II	6.52 acres	61,000 square feet
Phase III	22.79 acres	179,000 square feet
Total	53.39 acres	

Building Area

Phase I	207,130 square feet
Open Space	5.62 acres

Project Data
Stage I Modification:

2.

Phase I	22.96 acres (Existing Wilsonville Town Center commercial dev.)
Phase II	14.75 acres (Proposed Project Thunder)
Phase III	22.08 acres (Undeveloped property)
Total	59.79 acres

Building Area

Phase I	207, 130 sq.ft.
Phase II	159, 400 sq.ft.

3. The Master Plan amendment also seeks to amend the current overlay zones in Ordinance No. 55 to reflect modifications proposed in Stage I Wilsonville Town Center. Essentially, the amendments would replace the Motor Hotel (MH), Office Professional (OP), Service Commercial (SC) and Residential (R) use designations with Central Commercial (CC).

Plan Designation and Zoning

4. The subject site is designated "Commercial" on the Comprehensive Plan map and zoned "Planned Development Commercial" (PDC) on the zoning map. The site is also situated within an area identified as Town Center Master Plan area (Ordinance No. 254). Ordinance No. 254 identifies the property in the following overlay zones; Service Commercial (SC), Office Professional (OP), Central Commercial (CC), Motor Hotel (MH), Residential (R) and within an area designated for a Lake or Open Space.

5. Within the Comprehensive Plan, a number of goal and policy statements address the commercial planning designation and development review which apply to the subject property. The applicable criteria for Stage I Master Plan review is found in Section 4.139(2) of the Wilsonville Code. Recommended uses for development within the Town Center Master Plan are embodied in Chapter 4 of the Wilsonville Code. In brief, the combined review criteria are the following:

The Most Applicable Comprehensive Plan Goals, Policies and Objectives

Goal 1.1	Citizen Involvement Goal
Objective 3.1	Public Facilities Availability
Policy 3.3.1	Street System Master Plan
Policy 3.3.1(b)	Street System Master Plan
Policy 3.3.1(c)	Street System Master Plan
Policy 3.3.2(a)	Arterial and Collector Streets
Policy 3.3.5(b)	Private Owner Responsibility to Build Streets
Policy 3.3.8(a)	Transportation Impact Analysis
Policy 3.3.8(c)	Traffic Trip Reduction
Policy 3.3.8(d)	Consolidation of Vehicle Trips
Policy 3.3.8(e)	Mass Transit
Policy 3.3.14	Major Street Improvements Required
Policy 3.3.3	Street Standard and Dedication
Policy 3.3.11	Bikeways and Pathways
Policy 3.3.12	Pathway Construction
Policy 3.8.3	Open Space
Policy 4.2.3	Site Plan Information Requirements
Policy 4.2.5	Development Coincide with Public Facilities

Applicable Zoning Ordinance Provisions

Section 4.123	This Section provides the requirements of the PDC zone which are governed by Section 4.130 to 4.140.
Section 4.138(4)	Stage I Master Plan compliance
Section 4.139(4)	Criteria for approval of a planned development including subsections a, b and c

Town Center Master Plan

Ordinance Nos. 55 and 254.

Goal 1.1 - Citizen Involvement

6. The Planning Commission will be conducting the Stage I Master Plan as a public hearing and all notification requirements have been met.

CONCLUSIONARY FINDING

7. The proposed uses, both separtely and as a whole, are consistent with the Comprehensive Plan and can be made consistent with Ordinance No. 55.

PUBLIC FACILITIES

Objective 3.1

8. The City Engineering Department has provided detailed comments regarding public facilities improvements required to serve the site. These findings and recommendations are listed on Exhibit D.

Sanitary Sewer

9. Three sanitary sewer lines serve the site. An eight-inch line is located on the west side of the site which extends south through Citizens Drive to a trunkline in Wilsonville Road. A 15-inch line is located in the center of the site and a 10-inch line traverses the site originating from the Courtside Estates subdivision. This line was relocated to accommodate Phase I development. Approximately 1,500 linear feet of a sanitary sewer line was constructed along the northerly right-of-way of Wilsonville Road. This finding is also applicable to Stage II site development.

Storm Drainage

10. The subject site is located within two storm drainage basins. Phase I site grading recontoured the site Master Plan to divert storm water to a piped system in the easterly basin that out falls to an existing 48-inch pipe on the southeast corner of Phase I site. This diversion helps relieve the westerly storm basin from the storm drainage system that out falls to constricted culvert under I-5. Phase II development will remove the existing storm detention pond located on the west side of the site and be replaced with storm pipes to connect with the improved Phase I storm system. The City requires detailed storm drainage plans designed to pass a 25-year storm frequency. The detention pond has not been investigated with the Oregon Division of State Lands for wetlands status.

Water

11. Existing 12-inch waterlines located in Wilsonville Road and Town Center Loop East and West have adequate flow to serve full buildout of the site. This finding is also applicable to Stage II site developement.

Police

12. Police protection is provided to the City by the Clackamas County Sheriff's Department. This department has a headquarters in Wilsonville City Hall which is near the subject property.

Fire/Emergency

13. The Tualatin Valley Consolidated Fire and Rescue District provides fire protection to this site. The City is served by two fire stations strategically located in the City that can provide adequate fire protection services to the proposed development.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

STREETS and TRAFFIC

Policy 3.3.1(a) - Street System Master Plan

15. The Street System Master Plan identifies design standards and conceptual locations for arterials and major collectors. Wilsonville Road and Town Center Loop are classified as major arterial streets. The Master Street System and Functional Classification Map does not identify or classify any internal streets within the Town Center Loop. In the case of the proposed retail development, private drives will be constructed and connected to an internal drive/road system. This finding is also applicable to Phase II Stage II site development.

16. The design standards for Wilsonville Road show an approximate 94-foot right-of-way with a median planter island. The standards for the Town Center Loop show a 72-foot right-of-way with a median planter island. This finding is also applicable to Stage II site development.

17. The proposed development will construct driveway connections within Town Center Loop, but not in the same alignments as shown on the pictorial map representing the Town Center Master Plan. This finding is also applicable to Stage II site development.

18. Though the proposed access drive located near the northwest corner of the site is shown at a location supported by the Town Center Master Plan, this access is situated along a radius of Town Center Loop West that may position it in an unsafe location for egress and ingress.

Policy 3.3.2(a) - Dedication of Arterial and Collector Streets and Control or Consolidation of Access Drives.

19. The dedication of additional right-of-way and half-street improvements along Wilsonville Road and Town Center Loop East were accomplished in Phase I Stage II site development. This finding is also applicable to Stage II site development.

20. The Wilsonville Town Center Master Plan shows ten access drives at arterials. The full access drive shown near the northwest corner of Phase III at Town Center Loop West should be analyzed for safe vision clearance.

21. The proposed access drive to Project Thunder, shown at the southwest corner of the site, does not align with the location of the existing curb cut approved to the site in Local Improvement District No. 5. This access drive would further create a staggered intersection with access drives constructed on the opposite side of Town Center Loop West. This access drive also deviates from the access drive shown on the Town Center Master Plan approved in 89PC50. The Planning Commission cannot change the locations of access drives approved in LID No. 5 without first obtaining approval from the City Council. This finding is also applicable to Stage II site Development.

22. It appears from the re-submitted Stage I Master Plan that access is not proposed at Parkway Court which would have encouraged through traffic from Wilsonville Road and Town Center Loop to the Parkway Court.

Policy 3.3.3

23. Policy 3.3.3 requires the City to establish minimum street standards and dedication of adequate right-of-way prior to actual site development. It further provides that if proposed development exceeds minimum service capacity, then appropriate improvements shall be required prior to occupancy of the completed development. With respect to Project Thunder, the arterials servicing the site, Town Center Loop West and Wilsonville Road are already constructed to the Public Works standards. Phase I of Wilsonville Town Center is required to install a traffic signal to comply with minimum service capacity levels.

24. Section 4.139(4) stipulates that a Planned Development Permit may be granted by the Planning Commission only if it is found that the development conforms to subsections 4.139(4)(a),(b) and (c) and Sections 4.130 to 4.140. Section 4.139(4)(b) states:

> "That the location, design, size and uses are such that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on existing or immediately planned arterial or collector streets and will, in the case of commercial or industrial developments, avoid traversing local streets."

25. The applicant has provided an updated transportation analysis prepared by Kittelson & Associates, Inc. for Project Thunder. Wayne Kittelson's updated report is labeled Exhibit G-7. The report recommends that a traffic signal be installed at the intersection of Town Center Loop West with Wilsonville Road at the time of occupancy of Phase II. However, Capital Realty was conditioned in Phase I Stage II development (Resolution 90PC15) to install the subject traffic signal as determined by the City Engineering Department. This requires that the State of Oregon Department of Transportation warrant the signal. This finding is also applicable to Stage II site development.

- All of the intersections within the study area, with the exception of Wilsonville Road/Parkway Avenue, are currently operating within acceptable level of service limits.

- Under projected 1991 total traffic conditions and with the addition of site-generated Phase I traffic, the minor street left-turn movements at the Town Center Loop West/Wilsonville Road intersection are projected to experience an "E" Level of Service. While a traffic signal would improve the level of service for the 45 vehicles making this movement, it would also cause an overall increase in intersection delay and is not considered appropriate in view of the surrounding street system, the traffic circulation patterns and the projected operational characteristics of this intersection.

- By 1995, the projected background traffic volume conditions, without Phases II and III, will warrant the installation of a traffic signal at the intersections of Wilsonville Road/Town Center Loop West and Wilsonville Road/Town Center Loop East. It is therefore recommended that traffic operations at both the Town Center Loop intersections with Wilsonville Road be monitored on a regular basis. Traffic signals should be installed only when one or more MUTCD signal warrants are met and the operational and/or safety characteristics dictate a need for a traffic signal.

- The number of access drives included in the Site Plan will be adequate to serve the proposed retail development. These access drives will disperse the site-generated traffic sufficiently to minimize the overall effect of the retail center on the capacity and quality of service provided by the adjacent arterial street system. At the same time, they are sufficiently separated from each other and from adjacent intersections to avoid significant operational, stacking and safety problems.

- By 1995, the projected background traffic volume will, by itself, exceed the existing capacity of Wilsonville Road in the vicinity of the Wilsonville Road/I-5 interchange. The proposed ODOT improvement project at the interchange would add sufficient capacity to accommodate both the 1995 background traffic, as well as the additional traffic from Phases II and III of the proposed development.

Kittleson and Associates has also provided additional findings and recommendations found in their letter of October 16, 1991, labeled Exhibit G, which are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Policies 3.3.8(a)-(e)

26. These policies address traffic impacts and congestion.

As noted in the previous findings responding to Policy 3.3.3, the applicant has provided a detailed traffic analysis that responds to Policies 3.3.8(a)-(e) and Section 4.139(4) of the Wilsonville Code.

CONCLUSIONARY FINDING

27. The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West, and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. These findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

TRANSIT FEATURES, SIDEWALKS AND BIKEWAYS

28. Specific transit features such as transit stop locations and right-of-way fixtures for transit uses should be provided in the Stage II Site Development Plan. These findings are also applicable to Stage II site development.

Policies 3.3.11, 3.3.12, 3.3.13 and 3.3.13(b)

29. These policies addresses pathways and bikeways. Written comments received by Myers/Kroker (the architectural firm responsible for master planning Town Center) in case file 90PC15, have the following observations concerning pedestrian pathways:

> "There will need to be a landscape design study of the public right-of-way system defining the nature of plant materials, berm forms, ground cover, public walk systems and street light systems. Design definition of pedestrian overpasses would be developed within the recommended 'Design Review Parameter Study'."

30. The modified Stage I Master Plan shows a bikeway through Phase I to extend through Phase III and connect with the future park. A shoulder-side bikeway is required on the Comprehensive Plan to occur on the south side of Wilsonville Road.

31. The Phase II Stage II submittal plans do not indicate sidewalks along Town Center Loop West as required by Ordinance No. 55 and by Section 4.168 and Subsection 4.167(1)(b) of the Wilsonville Code. Regarding Project Thunder, a five-foot wide concrete sidewalk is required along Town Center Loop West to be off-set five feet from the curb. In order to provide for safe pedestrian access around and on the Phase II site, pedestrian walkways should be extended from Town Center Loop West via the central access drives up to Project Thunder's storefront. It also appears that the applicant has not considered pedestrian sidewalks to link the site with the future park and adjoining businesses.

OPEN SPACE

Policy 3.8.3

32. This policy addresses open space. The proposal, as presented, will have a major impact on the location, size and configuration of the area designated by Ordinance No. 55 shown as lake or open space. Approximately 8.5 acres of lake or open space is conceptually shown on the Town Center Master Plan. The open space depicted on the modified Town Center Master Plan or Ordinance No. 55 does not have the same configuration as shown for the Primary Open Space area depicted on the Comprehensive Plan Map.

33. The modified Stage I Master Plan shows 5.1 acres in open space to be reconfigured to satisfy Capital Realty's site development program, and hopefully, for the City's benefit to develop the property as a public park. The application does not propose a specific open space plan with uses, nor is the applicant proposing a development development schedule. In this regard, the Planning Commission had previously conditioned the applicant in Resolution 90PC15 to perform the following:

Condition No. 8:

> "At Phase II Stage II site development, which shall be the next phase presented, applicant shall submit to the Planning Commission and the Design Review Board a detailed open space plan and development schedule for the development of the 5.4 acre open space shown on the Stage I Master Plan."

With respect to the above issues, the applicant is requesting the Planning Commission to reconsider Condition No. 8 as follows:

"1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions.

2. To formulate a development plan and time frame consistent with the development of Phases II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto."

34. Ordinance No. 55 depicts an open space or lake with a centralized location in Town Center with surrounding development to be oriented and related with it. One can compare this relationship to be similar with the concept of a public square of a small European city or even with an Early American town square. Those kind of public spaces create a sense of place and encourage a community gathering place within an urban context. It also creates a city center environment that involves the pedestrian in its function and design that is not found in retail strip developments designed around automobiles.

35. The proposal, as presented, shows approximately 5.1 acres in open space. The City will require that the open space be dedicated for development of a City park. At issue is the proposed configuration of the open space. In this regard, the proposed open space has a spacial composition that positively responds to the open space concept in Ordinance No. 55. The proposed Master Plan is an assembly of properties that make up a reasonable configuration for future park development. Conversely, the surrounding development plan represents an augmentation of the more traditional strip retail commercial center showing buildings oriented to major collectors and arterials together with large storefront parking areas. Truck delivery activities are then generally found on the sides or at the rear of the stores which attract outside storage of palettes, boxes etc. The applicant has modified the original submittal drawings designed to lessen the impact of Project Thunder's building mass on the proposed open space. Buffering can be accomplished by reducing the mass of Project Thunder with siting a smaller intervening building between Project Thunder and the open space. The revised plan also re-positioned potential building sites to open up the view of the open space to Town Center Loop West.

36. The proposed 5.1 acre open space, combined with approximately 3 acres in open space created for Town Center Park Apartments and Clackamas Community College, will provide a generous area for a future public park.

Policy 4.2.3 and Section 4.139(2)(a) and (b)

37. This policy and zoning section identify the information which must be included in the Site Plan. The information set forth has been submitted in compliance with the Comprehensive Plan and Zoning Ordinance. Landscape and Architectural Plans will be reviewed by the Design Review Board.

Policy 4.2.5

38. This policy requires that development coincide with the provision of public streets, water, sanitary sewer and storm drainage facilities. Such facilities are currently available at the site. Sewer and water are located within the abutting roads. Storm drainage is provided at the eastern portion of the site. The extension of these services will be coordinated with site construction and facilities and will be designed to meet City public works standards.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

40. Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassifed uses and reconfigured open space.

41. Condition No. 2 of the Stage I Master Plan approval requires separate Stage II land development applications for review of each pad. Therefore, the buildings proposed on the pads are not part of this application.

BUFFERING and SCREENING

42. Section 4.163 of the Wilsonville Code requires:

A. All outdoor storage and garbage collection areas shall be screened from off-site view with fencing and/or landscaping.

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. Multi-family developments shall be screened and buffered from single-family areas.

43. The Site Plan illustrates an area between the truck loading area and proposed open space. This site arrangement orientes the massive and mundane backside of Project Thunder to Parkway Court and the proposed open space. The impact can be lessened, as proposed in Finding No. 35, together with innovative design utilizing landscaping, screenage, murals etc.

BUILDING HEIGHT

44. Definition no. 12 of Chapter 4 of the Wilsonville Code (Building of Structural Height) is defined by the following:

> "The term 'height of building' shall be deemed to mean the perpendicular distance from the average elevation of the adjoining ground to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the middle height gable between the eaves and ridge of a pitch or hip roof. If a building is divided into units by means of masonry division walls, each unit shall be considered separately in calculation for height of building."

45. In order to distinguish Project Thunder to the public, the applicant proposes to construct a dome and flag pole atop the main entrance of the store. Section 4.172(1) exempts domes and flag poles from the height limits of the PDC zone. However, the flag pole can only fly the United States and the State of Oregon flags. Just for general information, the top of the dome is shown approximately 55 feet above grade level. The top of the flag pole is approximately 81 feet above grade level.

PARKING ANALYSIS

46. Section 4.150WC:

"Commercial:

Commercial retail, 1,501 square feet or more	1 space/200 sq.ft. @ 63,914 sq. ft. of floor area
Service or repair shops	1 space/200 sq.ft. @ 17,276 sq. ft. of floor area
Eating or drinking establishments	1 space/200 sq.ft. @ 6,096 sq. ft. of floor area
Storage warehouse, wholesale establishment, rail or trucking freight terminal	1 space/2,000 sq.ft. @ 39,336 sq.ft. of floor area up to 40,000 sq.ft.; 1 space/4,000 sq. ft. thereafter
Office	1 space/250 sq.ft. @ 9,117 sq.ft.

These calculations do not include employee lunch rooms, restrooms, HVAC roooms, cat walks, etc.

Building Area - Phase II **Minimum Parking Required:**

Project Thunder approximate floor areas:

Retail Commercial	63,914 / 200 = 320 spaces
Service	17,276 / 200 = 86 spaces
Office	9,117 / 250 = 36 spaces
Restaurant	6,096 / 200 = 31 spaces
Storage	39,336 / 4000 = 10 spaces
Mimimum parking :	**483 spaces**

47. Though the proposed off-street parking count shows 16 handicapped and 856 standard parking spaces for a total of 872 parking spaces, the proposed parking is almost twice the minimum requirement of the Code. This figure does not include parking for the future pads. Those parking areas will not be constructed until each pad is developed.

48. The parking plan specifies dimensions for a typical standard parking space at 9' x 18' with 25'-0" drive aisles. The Zoning Code has a minimum 9' x 18' standard parking space dimension. Compact parking spaces are not proposed and are optional by the Zoning Code.

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

EXHIBITS

The following Exhibits are hereby entered into the public record by the Planning Commission as confirmation of its consideration of the application as submitted.

A. Findings and Conditions of Approval
B. City of Wilsonville Comprehensive Plan
C. Chapter 4 of the Wilsonville Code
D. City Engineering Department Report
E. City Building Official's Report
F. Town Center Master Plan
G. Applicant's submittal documents:
    1. Revised Stage I Master Plan and Master Utilities Plan
    2. Phase II Site Plan
    3. Phase II Exterior Elevations
    4. Phase II Grading Plan and Erosion Control Plan
    5. Phase II Utilities Plan
    6. Phase II Preliminary Landscape Plan
    7. Traffic Report by Wayne Kittelson and addendum letter
    8. Request for Modification of Condition No. 8 of 90PC15
    9. Stage I Master Plan Re-submittal
    10. Phase II Stage II narrative
    11. Alternative Open Space Concept

H. Original Stage I Master Plan - 89PC50.

I. Ordinance no. 55

91PC43

Item 16.

City of WILSONVILLE in OREGON

30000 SW Town Cente
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

August 16, 1999

Gary M. Graumann
Lumberjack, L.P.
PO Box 7458
Menlo Park, California 94026

Re: 29400 SW Town Center Loop

Dear Mr. Graumann:

Mr. Lashbrook, Wilsonville Planning Director, has asked me to answer your request for a zoning compliance letter. You will find the information you requested as follows:

1. Zoning Classification Code:
   Planned Development Commercial (PDC) (Town Center)

2. Property Owner's Name and Lender's Name
   Lumberjack, L.P. (owner)
   PO Box 7458
   Menlo Park, CA 94026

   GE Capital Business Asset Funding Corp.
   10900 NE 4th St., Suite 500
   Bellevue WA 98004

3. Address of the Property:
   29400 SW Town Center Loop, Wilsonville, Oregon

4. Type of Permitted Use:
   Commercial (Planned Development)

5. Expiration Dated Copy of Conditions or Restrictions of Use:
   Case File 91PC43 approved 12/9/91
   Case File 91DR29 approved 1/27/92
   Case File 92DR21 motion revising condition

I have researched our records and find that in receiving final occupancy the city found that the development had complied with all plan proposals and conditions of approval. However, the project is now almost seven years old and is beginning to show some wear and deferred maintenance. About a year ago, Mr. Blaise Edmonds wrote you about broken curbs and destroyed landscaping where vehicles have driven over the curb. This is at a major entrance area (Southwest entry drive, between the rug dealer and McDonalds.) This problem area still requires attention.

Sincerely,

Robert G. Hoffman AICP

Robert G. Hoffman AICP
Manager of Current Planning

Attachment: Decision and Conditions of Approval
98PC43
91DR29

RGH:sh

N:annex\plng\hoffman\bh81699graumann\sh

LUMBERJACK, L.P.
P.O. BOX 7458
MENLO PARK, CALIFORNIA 94026
(650)813-9100 FAX(650)813-9190

August 5, 1999

Mr. Stephan Lashbrook
Planning Director
CITY OF WILSONVILLE
30000 SW Town Center Loop E
Wilsonville, OR 97070

Dear Mr. Lashbrook.

Thank you very much for returning my call with respect to revisions to the Development Codes. I look forward to reviewing the changes and will provide any comments that I may have.

We also discussed the following outline that my lender has requested that I obtain from the city. I have provided the information for items 2) and 3). If you could have someone on your staff complete the rest of the requirements requested by the lender it would be greatly appreciated.

I would like to receive a compliance letter from your office within the next 10 days. Should you have any questions please feel free to call me at the number listed above.

Once again, thank you for your attention to this matter.

Sincerely,

Gary M. Graumann

ZONING COMPLIANCE LETTER REQUIREMENTS

This item should be obtained from the City Planner's, County Clerk's, or Zoning Department's office and should contain the following information:

1) Zoning Classification Code — Planning Development Commercial (PDC (Town Center)

2) Property Owner's Name and Lender's Name

3) Address of the Property

4) Type of Permitted Use. — Commercial (Planned Development)

5) Expiration Dated Copy of Conditions or Restrictions of Use.

91PC43 - Appr. 12-9-91
91DR29 - Appr 1-27-92
92DR21 - Appr 6-22-92

2) Lumberjack, L.P. (owner)
P.O. Box 7458
MENLO PARK, CA 94026

GE Capital Business Asset Funding Corp.
10900 NE 4th St., Suite 500
Bellevue, Wa 98004

3) 29400 SW Town Center Loop
Wilsonville, Or.

Item 16.

Aetna's local presence shrinks after loss of key large clients

Continued from page 1

er away from the Portland market.

Despite a strong national presence, Aetna's local client base has eroded as [illegible] market is already dominated by strong HMO players that have left little room for carriers like Aetna.

Stone said the downsizing was planned a national restructuring effort, and not nply because of the lost clients in Portid. Many who watch insurance activis nationally agree. The change reflects nilar strategies by nationwide carriers. tna wants to consolidate offices, rece overhead and gain efficiencies in increasingly competitive health inrance market.

'It is definitely consistent with the nd that we've seen in this industry," id Post. Improvements in electronic tims handling and standardization ross offices have made such changes ssible and even advantageous, he said, gain efficiencies.

'Insurance in general has become more d more of a commodity market," said iss Poll, an insurance analyst with The licago Corp., a Chicago-based investent bank that tracks insurance companies. "Insurance companies, especially the big guys, have a big expense burden. They tend to be big and clumsy."

In Aetna's case, said Poll, the national carrier's life and health business has been its strongest asset. Hartford, Conn.-based Aetna is the third-largest U.S.-based property and casualty insurer, according to Value Line's December 1993 investment survey. Aetna, a public company traded on the New York Stock Exchange, also has been subject to large market fluctuations.

Aetna "peaked" on Nov. 1, 1993, with a per-share price of $60.75, said Poll. The stock closed at $47.75 per share on Oct. 18.

Aetna Health Plans reported $4.5 million in insurance premiums in Oregon during 1993, down from $12.7 million in premiums it wrote in 1991, according to reports filed with the state. It covers an estimated 40,000 enrollees.

Aetna handles about 4.9 million Medicare claims representing some $250 million annually out of the Portland office.

Incredible Universe building sold, leased

Tandy Corp. has sold off its Incredible Universe building in Wilsonville and leased back the facility from the new owner.

Tandy sold the 166,495-square-foot retail property to Pier Set Inc., a Delaware corporation, for $13.5 million, according to a Clackamas County sale deed.

Pier Set is a subsidiary of London-based NatWest bank, said Bill Bousquette, chief financial officer of Fort Worth, Texas-based Tandy.

Tandy also sold three other Incredible Universe buildings to the bank. The four properties sold for about $60 million, Bousquette said.

Selling off store facilities to outside investors is common among large retailers. "We have no interest in tying up our capital in real estate," Bousquette said.

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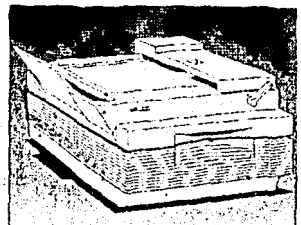

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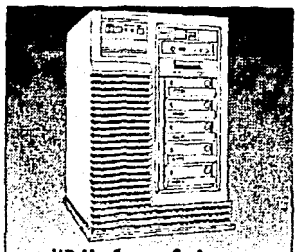

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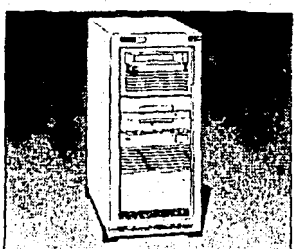

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File 9.1 pc 43

City of Wilsonville
Community Development Department
30000 S.W. Town Center Loop East
Wilsonville, Oregon 97070
(503) 682-4960
Fax 682-7025

FAX COVER SHEET

DATE: 11-29-93

TO: Mark Whitlow FAX: 721-3666

FROM: Mike Kohlhoff / Wayne Lorenson

SUBJECT: Project Thunder

NUMBER OF PAGES IN THIS TRANSMITTAL (INCLUDING COVER SHEET) 20

COMMENTS:

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

September 29, 1993

Mr. Bryan L. Spain, CSM
Assistant Director State/Local Taxation
Tandy Tax Service
Tandy Corporation
P.O. Box 1643
Fort Worth TX 76101

91PC43

Re: Systems Development Credit - Wilsonville Incredible Universe

Dear Mr. Spain:

The purpose of this letter is to formally close action on an appeal of the discretionary decision concerning the amount of the street systems development charge for the Incredible Universe. Prior to his departure from Tandy Tax Service, Mr. Bryan L. Spain, CSM, had formally appealed the discretionary decision.

On December 7, 1992, I provided an interim response in which we provided a comparison of a number of different calculations of the street systems development charge and in all cases they came very close to the amount that was charged based on the number of employees. Subsequently, on March 2, 1992, I extended the time for submission of any additional data concerning the street systems development charge to April 15, 1993.

Later telephone conversations indicated that you were not going to submit any additional data. Based on the information that has been received, your appeal of the discretionary decision has not been favorably considered. I would like to inform you that we will be using most of the systems development charge for streets that you paid to install an asphalt overlay on Town Center Loop West to increase the structural strength of the road. This should significantly delay deterioration of the street.

I apologize for the delay in providing a formal response; however, other higher priority projects have interfered with a more timely response. Your understanding is appreciated.

Sincerely,

Eldon R. Johansen
Community Development Director

pc: Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Tom Jowaiszas, Finance Director
Wayne Sorensen, Planning Director
Mike Stone, City Engineer
Martin Brown, Building Official

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

Info —
Pam
Blaise
Sally
file
91PC43

December 4, 1992

Mr. Wayne Kittelson
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland OR 97205

Re: Incredible Universe Traffic Issues

Dear Mr. Kittelson:

You provided me with a copy of your letter dated October 27, 1992, to Mr. Wayne Sorensen, Planning Director, concerning the above subject. I appreciate receiving a copy of your letter since it provides an excellent background from the consultant and the developer's perspective.

Your letter addresses several transportation topics which are of current interest to staff and council. Your letter included a copy to Councilor Carter and copies have also been provided to the Mayor and other Councilors to ensure that they all have the same background concerning this topic.

Your letter indicated that you are troubled by several comments in the October 22 issue of the Oregonian, entitled "Traffic Count Zooms at Electronic Store". I also am troubled by several of the statements in your letter of October 27, 1992, and would like to explain my concerns with your letter. Prior to explaining my concerns, I will review the overall traffic information that was provided to the Planning Commission prior to its decision. The Transportation Impact Analysis for the Wilsonville Town Center, dated April, 1990, was submitted to the Planning Commission as background for approval of the Master Plans for Phase I, Phase II and Phase III of the Wilsonville Town Center. Subsequently, the letter dated October 16, 1991, subject Traffic Analysis for Wilsonville Town Center - Phase II was submitted to the Planning Commission prior to approval of the plan for Project Thunder, which subsequently was changed in name to the Incredible Universe. When Project Thunder was approved, the Traffic Impact Analysis Report for the Wilsonville Town Center, dated April, 1990, was not provided to the Planning Commission at the time of the hearing.

Specific sections of your letter which are troublesome to me as well as comments on these sections are as follows:

"Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersection of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted, (April 1990), our engineers pointed out to city staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak-hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> 'As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersection, are anticipated to operate at an acceptable level of service [under projected 1995 peak-hour conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition.'"

The April 1990 Traffic Impact Analysis for Wilsonville Town Center has several tables which give the existing and predicted level of services for the southbound and northbound I-5/Wilsonville Road interchanges. Table 5 on Page 16 gives an existing level of service for both intersections of "B". Table 8 indicates level of service "C" for both intersections for the 1991 total traffic level of service results. These levels of service do not support your statement that the intersections were already operating near peak capacity.

The Project Thunder update, which was included in your October 16, 1991 letter concerning traffic analysis for Wilsonville Town Center Phase II, could be read as you state, "that this update included the I-5 northbound and southbound intersections with Wilsonville Road". If I read it that way, then I concur that the significant findings and recommendations of the October 16, 1991 report state: "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period." This would be contrary to your dire predictions of intersection failure.

On the other hand, I have looked at the October 16, 1991 letter and have found no specific updates for the traffic analysis for Wilsonville Town Center Phase II concerning the I-5 intersections with Wilsonville Road. It was this lack of any data concerning the I-5 northbound and southbound intersections with Wilsonville Road that led me to conclude that the traffic impact analysis for the Incredible Universe did not include information on the I-5 intersections with Wilsonville Road. If I had read the October 16, 1991 report to accept at face value the statement that "the key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period", then I would have concluded that you covered the interchange; however, I would have also felt that your coverage was inaccurate.

"Initial planning for the Incredible Universe Store began in late 1991 and was completed in 1992. It is important to note that throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our

engineers knew only that it was to be a retail development. By their own choice, city staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of city staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that city staff made this decision; for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion."

The April 1990 Traffic Impact Analysis includes three pages to describe the site-generated traffic volume and also a special study by Kittelson & Associates, Inc. to better define the probable breakdown of site-generated vehicle trips among the category of drop-in trips, diverted trips and new trips. There is nothing in the April 1990 report or the October 16, 1991 update to forewarn staff, the Planning Commission or Council that there could be unusual special event nature retail activities which could have a different impact on traffic volumes than is predicted by the transportation impact analysis and the October 16, 1991 update for Wilsonville Town Center Phase II. This lack of information concerning a potential problem area leaves the city staff responsible for prediction of traffic problems which should be left to traffic experts. I also would think that a plan for a commercial building with 160,000 square feet of floor space in a city with less than 10,000 residents would at least cause a question in the mind of the traffic engineer concerning drop-ins of 40%.

"Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the city's transportation system in order to mitigate the traffic impacts we identified. Further, the Incredible Universe store contributed $250,000 in system development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments; it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs."

The newspaper article states in reference to the I-5 and Wilsonville Road interchange "It was that intersection that clogged up at the Incredible Universe opening, September 17, 1992, and caused traffic to back up for miles in both directions." The expenditures by Capital Realty did nothing to improve the intersection of Wilsonville Road and Parkway, and the improvements proved inadequate to handle the traffic at the intersection of Wilsonville Road and Town Center Loop West. The city had county sheriff's deputies available and Tandy Corporation had private security guards. These individuals directed traffic at the Town Center Loop West and Wilsonville Road intersection as well as at the intersection of Wilsonville Road and Parkway during much of the Grand Opening weekend so that traffic was able to get through these intersections. By no stretch of anyone's imagination could the expenditures and improvements by Capital Realty be

considered to be adequate to allow the traffic to freely flow through these intersections at level of service D or better.

"Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering."

Upon reflection, this comment contains a good suggestion in that the city should require a traffic control plan to minimize vehicle disruption and delay during the initial opening of a new store of significant size. We will incorporate this in to our plans review efforts and into our recommended conditions of development for future stores with a major traffic impact.

"In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to city staff since early 1990 at least."

Your October 16, 1991 letter deleted the concerns for the I-5/Wilsonville Road interchange in the third subparagraph under the significant findings and recommendations which reads as follows:

> "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period."

Based on my reading of a level of service "C" for 1991, and this particular paragraph, I had assumed that we, initially, on the opening of the Incredible Universe would not have any major problems with the I-5 and Wilsonville Road interchange and would not anticipate problems until later. In summary on this particular item, it appears that your April 1990 report did indicate that by 1995 there would be problems; however, the October 16, 1991 report alleviated the concern for these problems.

"Since that time and through all subsequent development reviews, city staff, planning official, and policy makers have had three options available to them:

a) **Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;**

b) **Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or**

c) **Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.**

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision."

It may well be a viable option to consider your suggestion of placing a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5; however, staff feels that it would be premature to present this option to Council at this time. In addition with the October 16, 1991 letter from your organization, subject: Traffic Analysis for Wilsonville Town Center Phase II, including the following significant finding and recommendation:

"Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.".

The record does not reflect a conscious adoption of option c). It reflects that intersections will operate within an acceptable level of service limits.

"We value our reputation for honest, objective, and technically valid analysis very highly, and so it is important to us that this matter be resolved to everyone's satisfaction."

In the comments which staff made at the council meeting, and also in subsequent responses to questions from newspaper reporters, we were careful not to be judgmental concerning particular consulting firms and kept from placing blame on any of the consultants which were involved. I have reread the article which you quoted and still feel that we adhered to the above and avoided incorrectly placing blame.

"If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter."

Your letter very eloquently describes your position with regard to the impact of the Incredible Universe on traffic. I have come to a somewhat different conclusion from reading the applicable reports. Although I would be very happy to meet with you to discuss this issue, it appears that this may be one subject in which we probably will continue to have different opinions which may never be fully resolved. If you do desire

to meet with myself or other members of the Community Development staff on this subject, please contact the undersigned.

Sincerely,

Eldon R. Johansen
Community Development Director

erj:mld

pc: Kim Beach, Capital Realty
Mayor & City Council
Transportation Advisory Commission
Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Mike Stone, City Engineer
Wayne Sorensen, Planning Director
Steve Starner, Public Works Director

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

STAFF
Pam
Blaine
Sally
Project file
11/PC 4/3

OCT 29

October 27, 1992

Project No.: P10.00

Mr. Wayne Sorensen
Planning Director
City of Wilsonville
P.O. Box 220
Wilsonville, Oregon 97070

SUBJECT: Incredible Universe Traffic Issues

Dear Wayne,

I read with some concern an article in the October 22 issue of *The Oregonian* titled, "Traffic Count Zooms at Electronic Store". I am enclosing a copy of the article for your information in case you missed it.

I was troubled by several comments in the article which seemed to suggest that, in the eyes of some high-level City officials, our traffic analysis had misled City officials:

> "The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts", said Arlene Loble, city manager.
>
> The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5...If the study were being done today, the city would insist that engineers look at one more intersection down the road, [Eldon Johansen] said.
>
> [Eldon Johansen] said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built. Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic...Finally, the traffic study did not account for the success of the store's marketing effort.

I would like to take this opportunity to clarify the analytic process we followed and the directions we received. Hopefully, this clarification will allow you, Ms. Loble, Mr. Johansen, and other City staff to more confidently and accurately respond should this issue arise again.

The transportation impact analysis that we performed for Capital Realty was begun in 1990 and completed in 1991. The site development plans called for construction of a shopping center containing 450,000 gross square feet of floor area. Given this information, the trip generation rates that we used were entirely appropriate, as was the estimate that 40 percent of the site-generated trips would be drop-in traffic. This is evidenced by the fact that the first phase of the shopping center development, which has already been completed, operates very close to the estimates that we provided.

Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersections of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted (April 1990), our engineers pointed out to City staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> "As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersections, are anticipated to operate at an acceptable level of service [under projected 1995 peak our conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition."

The current best estimate, by the way, is that these improvements will not be completed before 1996. Further, it should be noted that, even at this early date, City staff did not rely solely upon the findings of Kittelson & Associates, who were retained by the applicant. Instead, the City retained its own independent traffic engineering consultant to review the traffic impact analysis report and to critique the analysis assumptions, methodology, and findings. This independent traffic engineering consultant performed the requested review and confirmed every essential element of the report, including the projected capacity deficiency at the I-5/Wilsonville interchange area.

In personal discussions, City staff were informed of this finding of a future capacity deficiency, and were asked to interpret the City's requirement that a level of service equal to or better than "D" be provided at all intersections. City staff informed our engineers that, because the I-5/Wilsonville Road intersections are actually controlled by ODOT and, further, because ODOT has already established plans to improve the interchange and increase the capacity of these intersections, the finding of a capacity deficiency at the interchange would not be considered a fatal flaw. This conclusion by City staff is confirmed by the fact that the project was ultimately recommended for approval, even with the report's recognition of capacity deficiencies on Wilsonville Road near I-5 as noted above. It should also be pointed out that City staff's position was not unique to this project, but has also been recently applied to projects in the vicinity of the Stafford Road interchange.

On this basis, the transportation impact analysis was completed, all other on-site and off-site traffic-related deficiencies were identified, considerable mitigation projects were undertaken, and the necessary approvals were obtained.

Initial planning for the Incredible Universe store began in late 1991, and was completed in 1992. It is important to note that, throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our engineers knew only that it was to be a retail development. By their own choice, City staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of City staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that City staff made this decision: for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion.

Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the City's transportation system in order to mitigate the traffic impacts we

identified. Further, the Incredible Universe store contributed $250,000 in System Development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments: it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs.

Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering.

In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to City staff since early 1990 at least. Since that time and through all subsequent development reviews, City staff, planning officials, and policy makers have had three options available to them:

a) Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;

b) Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision. These

effects were temporary in that they will most likely die away after the Christmas season and as the store's novelty begins to fade. Additionally, these effects were exaggerated by the special event nature of the Grand Opening, which did not give patrons a chance to adjust their arrival time or choice of route. Therefore, it is unlikely that the City will again experience extended periods of mile-plus queues caused by the failure of the I-5/Wilsonville Road interchange. Even so, City staff and policy makers should recognize that less visible daily failures of the interchange are already programmed to occur: several already-approved residential and commercial projects have not yet been completed, and the combined future traffic effects of these projects virtually assure periods of peak-hour failure of the interchange during most typical weekdays. Thus, the City no longer has control over *whether* peak hour congestion and failures will occur at the interchange (they will), although future land use decisions can still affect the *duration* of these failures.

We have no quarrel with the prudence of the City's conscious decision to adopt option c) above. We are, however, disappointed that the City would suggest to the public, through articles such as the one published on October 22, that the congestion was not anticipated and that the fault for this lies with the traffic impact analysis process.

If you have any questions, please call me. We value our reputation for honest, objective, and technically valid analyses very highly, and so it is important to us that this matter be resolved to everyone's satisfaction. If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter.

Sincerely,

Wayne K. Kittelson

Wayne K. Kittelson, P.E.
Principal

cc: Arlene Loble
Eldon Johansen
Greg Carter
Kim Beach

CITY OF WILSONVILLE
P.O. Box 220
30000 S.W. Town Center Loop East
WILSONVILLE, OREGON 97070

(503) 682-1011

LETTER OF TRANSMITTAL

TO _____

DATE	JOB NO.
10/1/92	
ATTENTION: Arlene Loble	
RE: Inner Belt Universe	
Copy of letter or decision, and attachments	
One copy of Transportation Impact Analysis prepared by Kittelson & Assoc	

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Wayne Sorensen, P.E.

PRODUCT 7403 NEBS Inc., Groton, Mass. 01471

If enclosures are not as noted, kindly notify us at once.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

May 28, 1992

Mr. Rich Hollander
Vice President
Tandy Name Brands
P.O. Box 1643
Fort Worth, TX 76101

Ms. Kim Beach
Capital Realty
101 S.W. Main St. Ste. 905
Portland, OR 97204

Re: Tandy Name Brands dba Project Thunder

Dear Mr. Hollander & Ms. Beach:

The purpose of this letter is to summarize the current status of ongoing actions which must be completed prior to opening the facilities which were previously known as Project Thunder and currently known as the Incredible Universe. An additional purpose is to solicit your continuing assistance in resolving the remaining points of difference so that when the construction is completed, there will be no outstanding actions which would preclude issuance of the Certificate of Occupancy.

Primary items of concern are as follows:

Street Systems Development Charge

On March 2, 1992, Council adopted Resolution No. 902 authorizing deferral of the Systems Development Charges for streets from time of issuance of building permit to time of issuance of occupancy permit for Tandy Name Brand Retail Group. Resolution No. 902 contained an estimate for the Street Systems Development Charges in the amount of approximately $370,880.00. This was based on a total of 160 employees at the site. On March 6, 1992, Mr. Brian L. Spain, Assistant Tax Manager, for Tandy Tax Service, forwarded a check in the amount of $124,592.15 for the Street Systems Development charge. I am concerned that use of peak hour employees is irrelevant to peak hour traffic generation and will correspond directly with Mr. Spain to resolve differences.

Traffic Signal - Town Center Loop West and Wilsonville Road

One of the conditions that was placed on this development was that the signal at the intersection of Wilsonville Road and Town Center Loop West must be installed prior to the occupancy of the Project Thunder site. Plans have recently been received at the Community Development Department for a second review.

Kim Beach, Capital Realty, is pushing to insure that the signal is in place prior to occupancy of the Project Thunder site.

Detention Facility

The Project Thunder site was conditioned to be designed for the 25 year storm. Detailed calculations indicate detention could be deferred until development of the property just north of the Project Thunder site. The condition would appear not to allow staff to administratively transfer the detention requirement to another property. Staff is again working with Capitol Realty to insure that this is resolved.

Construction as Included in the Public Works Permit

The City requires that the Punch List for Public Works items be completed prior to issuance of a Temporary Occupancy Permit.

Maintenance Bond

The City will require a 10% Maintenance Bond for twelve months following acceptance of the work included in the Public Works Permit.

Repair of Town Center Loop West Road

The City has contacted S.D. Deacon, General Contractor, concerning the street repairs to Town Center Loop West Road. Mr. Art L. Bush, Project Manager, has informed the City that S.D. Deacon Corporation will not be held responsible for any road repairs or replacement to existing condition of either north or southbound lanes of Town Center Loop West Road at the conclusion of this project. The contractor has removed the curb along the east side of Town Center Loop West and the asphalt has substantially failed wherever the curb has been removed. The City has no intention of accepting the project until such time as damages caused by the contractor are repaired.

Modification of Median - Town Center Loop West

We have received construction plans for modification of the median. We will be submitting those plans to Council for approval. It appears that this work is necessary prior to having adequate access to parking.

Abandonment of Right-of-Way

The City has received documentation requesting abandonment of right-of-way that was part of the former Parkway Avenue. This is being processed to insure abandonment by August 1, 1992.

As you no doubt realize, I did not begin work in Wilsonville until April 6, 1992, after this project was well under way. My concern is that if we do not keep our attentions focused on resolving all outstanding issues, we will reach a point where the building will have been completed and you will have hired employees to open the facility and will be unable to issue a Certificate of Occupancy because of failure to resolve the above items. Your continued assistance and cooperation will be appreciated.

Sincerely,

Eldon R. Johansen

Eldon R. Johansen
Community Development Director

ej/js

pc: Arlene Loble, City Manager
Michael Kohlhoff, City Attorney
Steve Starner, Public Works Director
Martin Brown, Building Official
Wayne Sorensen, Planning Director

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

Creative Solutions ... Superior Service

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment

Copied To:
KIRK BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

margo 5/7
Orig to Angel Thunder file
Copy to Wayne myself
Eldon

Comments

ELDON,
JIM LENHART HAS PREPARED ADD'TL STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

Signed Rick Martin

W&H PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

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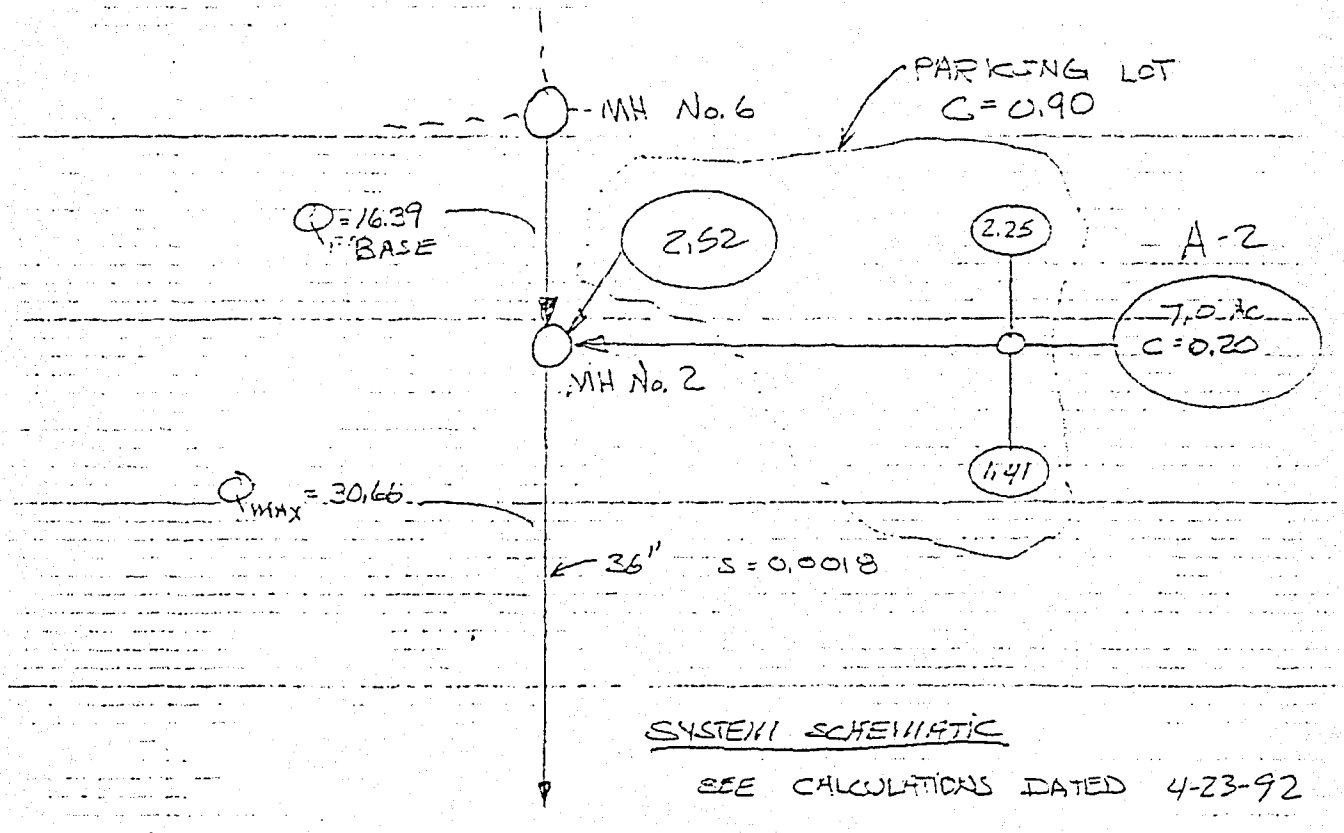
DETENTION REQUIREMENTS FOR A-2 IN HN UNDEVELOPED CONDITION.



SYSTEM SCHEMATIC

SEE CALCULATIONS DATED 4-23-92

ASSUME WORST CASE SCENARIO

1.) FLOW FROM MH. No 6 TO MH No 2 is MAXIMUM DUE TO UPSTREAM STORAGE, Q_{BASE} = 16.39 CFS

2.) ASSUME GRASSED AREA FOR A-2 with C = 0.20

3.) ASSUME 150 FEET OVERLAND TRAVEL FROM A-2

1ST 200 FEET = 20 MINUTES

REMAINDER 250' = 4 MINUTES. (SLOPE = 1%)
IN CHANNEL

t_c = 24 MINUTES

Project: DETENTION MANAGER Date: 5-6-92 Sheet No. 1 of 2

Prepared by: Checked by: Job No.

Creative Solutions ... Superior Service

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment
- ☐

Copied To:
KARL BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Comments

ELDON,

THIS LETTER HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

PARKING DETENTION IS POSSIBLE IN PH III ON EITHER PROPERTY NORTH OF TANDY.

Signed Rick Martin

PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775
• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

i_{25} @ 24 MINUTES = 1.6 in/hour.

$Q_{PEAK} = i \Sigma CA_i = (0.2)(7.0\ AC)(1.6) = 2.24$

$(0.9)(6.18)(1.6) = 11.33$

13.57 CFS.

$Q_{ALLOWABLE\ IN\ PIPE} = Q_{MAX} - Q_{BASE} = 30.66 - 16.39$

$Q_{ALLOWABLE} = 14.27$ CFS.

SINCE Q_{PEAK} (13.57) < $Q_{allowable}$

NO DETENTION IS REQUIRED

NOTE! THIS CALCULATION IS FOR UNDEVELOPED CONDITIONS ONLY.

Project: PROJECT THUNDER Date: 5-5-92 Sheet No. 7 of 2

Prepared by: CU Checked by: Job No. 4657.03-04-11

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: William L. Parks
Division of State Lands
1600 State Street
Salem, OR 97310

Date: 12-16-91
Project Number: 4-755-0202
Project Name: Project Thunder
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
[X] Attached
[ ] Facsimile
Number Of Pages Including Cover: 1

These Are Transmitted:
[ ] For Your Info/File
[ ] As Requested
[X] For Review And Comment

Copied To:

Copies	Description
1	Vicinity Map 8½×11
1	Site Map 11×17

X No Jurisdiction 10 YR 5/4
A/O Hydrology - Ann Dufford
by Planning

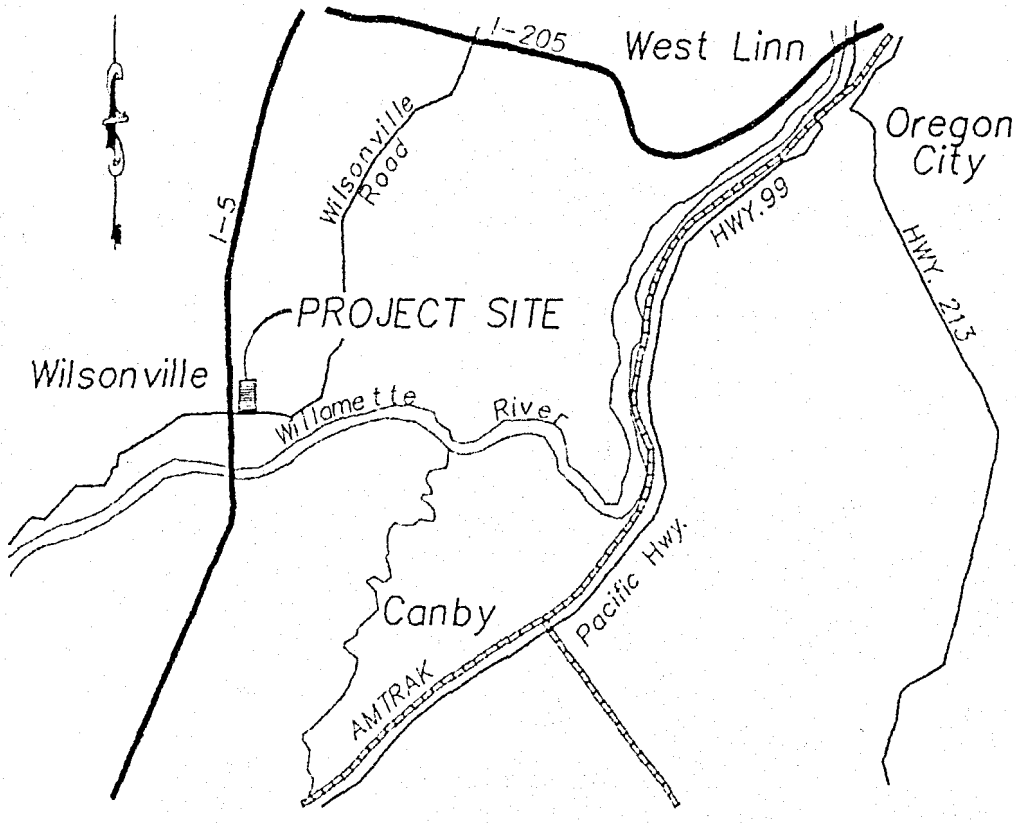
Comments:

Bill,

Please make a determination whether or not the existing detention pond is a "wetland" as defined by DSL.

I prefer a response as soon as possible, but no later than January 3, 1992. If this presents a problem, please call me at your earliest.

Signed: Thanks, Rick Martin



VICINITY MAP

NTS

- EXIT I-5 NORTH @ WILSONVILLE RD
- TURN LEFT @ TOWN CENTER LOOP RD WEST (PORTLANDIA PIZZA ON CORNER)
- SITE IS ± 1/4 MILE NORTH OR RIGHT.

CAPITAL REALTY CORPORATION

December 30, 1991

Mr. Mike Kohlhoff
City Attorney
City of Wilsonville
30000 S.W. Town Ctr. Loop E.
Wilsonville, OR 97070

Please submit the following language for approval by the City Council at the January 6, 1992 regularly scheduled meeting, to clarify Condition #10 of Resolution 91PC43:

The 5.1 acre public park dedication will be required the earlier of the issuance of a builiding permit for Phase III or May 31, 1994. The City and the applicant will work toward resolving the related access issues prior to the land dedication. The applicant will be involved in the Town Center park development planning in an advisory capacity but will not be required to make any financial outlay for the park planning process or its actual development.

For your information I have also enclosed a master site plan, color coded by original ownership. If you have any questions or require additional information please contact me. Thank you in advance for your prompt attention to this matter as we need to resolve this issue by January 7, 1992 to proceed with our contract with Thunder.

Very truly yours,

Kim Beach

Kimberly J. Beach
Vice President

cc. Ms. Arlene Loble (with enclosure)
Mr. Wayne Sorenson (with enclosure)

DIVISION OF STATE LANDS
Environmental Planning and Permits
775 Summer Street, NE
Salem, OR 97310
503/378-3805

RECEIVED
DEC 30 1991
CITY OF WILSONVILLE ANNEX

WETLAND DETERMINATION REPORT

At the request of the landowner or agent, Division staff have conducted an offsite or onsite wetland determination on the property described below.

COUNTY Clac CITY
LOCATION Exit I-5 @ Wilsonville TR. left @ Centaloop R West ¼ mile
T 3S R 1W S 23 TAX LOT(S)
OWNER/AGENT: Rick Martin W&H Pacific
ADDRESS: 1099 S.W. Columbia St. Portland, OR
DATE OF ONSITE INVESTIGATION: 12-19-91

☒ There are no jurisdictional wetlands or waterways on the property. Therefore, no removal-fill permit is required.
Notes: No Hydrology present - soil 10YR 3/4

☐ There are wetlands and/or waterways on the property. Those areas are subject to the State Removal-Fill Law. A permit is required for 50 cubic yards or more of fill, removal, or alteration of substrate.
Notes:

☐ A wetland delineation will be needed to locate and stake the wetland/non-wetland boundary. A list of consultants can be obtained from the Division.
Notes:

☐ A removal-fill permit will be required for

☐ No removal-fill permit will be required for _____ because/if

☐ A permit may be required by the Army Corps of Engineers (326-6995)

Comments:

Determination by: William Parks Date: 12-23-91

Response Copy To:
☒ Owner/Applicant ☒ Enclosures: Request, Site Plan Map
☒ City of Wilsonville Planning Department
☐ _____, Corps of Engineers
☒ DSL file copy
☒ Reading file copy – TO LORNA no Tus.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • ~~PO Box 220~~
Wilsonville, OR 97070
(503) 682-1011

December 30, 1991

Mr. Jim Faulkner
Design Forum Architects
3484 Far Hills Avenue
Dayton, OH 45429

Dear Jim:

I appreciated you, Rich Hollander and Jared Chaney taking the time to meet with Blaise and me regarding Project Thunder. I hope that we will be able to find an acceptable compromise in the design of the Incredible Universe project.

Enclosed is a copy of my notes which generally outline the basic issues we discussed at the December 23rd meeting. I am also enclosing material to provide additional insight into our planning process for the Town Center:

1. A copy of the legal opinion prepared by Michael Kohlhoff, City Attorney, that was furnished to the Wilsonville Design Review Board during the hearings on the Les Schwab Tire Center which will also be located in Town Center;

2. Variance criteria contained in our City Code which must be fully met before the DRB can approve a variance request.

I want to assure you that the City will do everything we can to accommodate your schedule, but I want to be sure you understand the legal limitations to fast tracking the review process.

Once again, it was a pleasure to meet with you. I appreciate your cooperation in finding an acceptable design alternative that will do justice to the Town Center, including the future Town Center Park, and still meet your client's needs. If you have any questions, please feel free to contact either Blaise or me at (503) 682-4960.

Sincerely,

Wayne C. Sorensen

Wayne C. Sorensen
Planning Director

wcs:dp
Enclosure

TO: Honorable Mayor and City Council

FROM: Arlene Loble
City Manager

RE: City Manager's Business

DATE: December 12, 1991

SUBJECT: PROJECT THUNDER DEDICATION OF PARK LAND

Project Thunder, which is Phase II of the Town Center development, was approved by the Planning Commission and now goes before the Design Review Board. I have attached a copy of their proposed design and their request for variances from the sign code. I bring it to your attention because it seems so entirely inconsistent with what has been previously approved in Town Center and the architectural proposal was not before Planning Commission for review. They have not seen the design proposals that dealt solely with the land use issues.

There are a couple conditions of approval that need to be brought to Council's attention. One of the conditions of approval requires the dedication of a 5.4 acre public park. The dedication would be required at the time occupancy permits are issued unless the City Council and the applicant agree to a later date. The value of the property to be dedicated is at least $1,000,000, and the developers would like to be involved in the planning for park development but because of the value of the land are not willing to pay for any of the associated development costs. It is my understanding that at Phase I approval one of the conditions included not only the land dedication but financial responsibility for development of the park. That condition has now been removed because of the cost of the park land.

Leaving aside for the moment the inappropriateness of the design of the project, you can see from the attached exhibit that shows the location of the open space and the proposed building pads. This $1,000,000 park is really located in the backyard of the proposed development. Because of the type of business which is some sort of high tech retail, the rear of the building, which faces the park, doesn't even include any windows - just a large expansive blank wall. To help offset that, a smaller building to be developed at a future Phase III has been placed on the property in such a way that it could front into the city park. The development that has already occurred in Phase I, the shopping center, also faces its least attractive areas into the proposed park site. If the open space actually is worth $1,000,000, it will take at least that, in terms of the City's financial commitment, to improve the park. To put that kind of money into something that is really more of an after thought than a planned part of the development seems to me to be a big mistake. This is a

good example of something coming to Council's attention so late in the planning process that you have not had any meaningful input and yet now the City will be asked to make a substantial financial commitment. If the land is to be dedicated the developers justifiably want to know that the property will be developed in the future. What should be a wonderful design feature is really just an after thought. I don't know what, if anything, can be done at this stage, but I wanted to bring it to your attention as we will need to begin negotiations over the actual dedication of the property. Do you want a park in this location under these circumstances?

Another condition of approval that I would like to bring to your attention deals with the handling of storm drainage. Once again, this looks like we could be creating future problems because we have not had an engineer on staff and the project has probably not received the level of review from an engineering perspective that is necessary. So, the Planning Commission has added a requirement that storm sewer plans need to be coordinated with the City Engineer with a possibility of exploring the feasibility of onsight retention. As proposed by the developer, they would be eliminating the existing detention area and paving it over for additional parking. I don't know how this impact as a wetland but the staff report also brings that issue to your attention. Since the detailed engineering won't be done until or unless the plan is approved, we won't know until we get further into it how the developer's engineer plans to handle storm drainage. It is possible that they will actually need to relocate water and sewer lines that have been installed in Phase I in order to accommodate the proposed storm drainage plans for Phase II. Again, this is an area where we truly need the assistance of a City Engineer.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

MEMORANDUM

TO: Wayne Sorensen, Planning Director
FROM: Steve Starner, Community Development Director
DATE: December 9, 1991
RE: Project Thunder

In keeping with our usual land use process, the engineers associated with the development team for this project have submitted detailed studies to quantify the impacts of traffic volume and storm sewer capacities. Although their conclusions demonstrate compliance with Wilsovnille's development criteria, I am concerned about some of the practical issues raised in the staff report.

A. Traffic - Wilsonville Road/Parkway Avenue intersection

The Wilsonville Code does not require Project Thunder to demonstrate compliance with level of service "D" at the above-referenced intersection. However, for any motorist currently using the intersection during peak hours, it is obvious vehicle congestion is reducing existing traffic management functions to an unacceptable quality. Especially for motorists attempting to enter Wilsonville Road from Parkway Avenue, the City is exploring the following:

1. Increasing the visability of the "Do Not Block Intersection" signage.

2. Placing a pavement stop bar on Wilsonville Road which corresponds with the intersection signage.

3. Controlling ingress and egress to Parkway Avenue north of Wilsonville Road.

4. Investigate the installation of an intersection traffic signal which would operate in sequence with the interchange traffic controls.

5. Investigate the construction elements involved with a new roadway joining Parkway Avenue and Town Center Loop West.

Ultimately, traffic congestion adjacent to the Wilsonville interchange (from Town Center Loop West to Kinsman Road) will only be relieved when ODOT completes the construction of the expanded interchange design.

B. Storm Sewer - Memorial Part

As I understand it, Project Thunder storm drainage will flow into the I-5 storm sewer system. At peak flows, excess water will be diverted into the Phase I (Thriftway/Payless development) storm sewer which flows past the Library and into Memorial Park. In order to accommodate the anti-cipated flows, the following park storm drainage improvements are underway:

November - December, 1991	Surge basin, stilling basin and water quality swale design
January - February, 1992	Complete design
March	Construction bidding
April	Award construction contract
May	Begin construction
September	Complete construction

The estimated cost of this project is $124,420 and is scheduled to be funded in conjunction with Memorial Park improvements. Approximately 52 per cent of the total project cost may be recovered from a payback when the Teufel and Boozier properties develop.

Also, the City will soon be undertaking a City-wide storm sewer Master Plan study in order to identify and plan for infrastructure needs. Under the current storm sewer SDC program, Project Thunder will generate approximately $16,640 to be applied directly against the cost of the new Storm Sewer Master Plan.

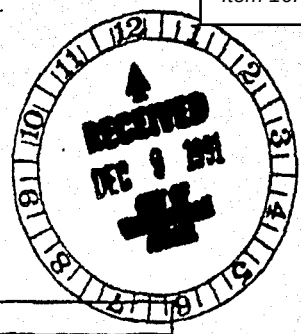
I hope this information is helpful.

ss:jme

PROJECT THUNDER

PEOPLE IN ATTENDANCE

MEETING: PLANNING COMMISSION
DATE: 9 DEC 91



NAME	ADDRESS
Ron Leeta	233 SE Washington St Hillsboro OR 97123
Loyal L Craven	JRS ARCHITECT 1611 SW Taylor Portland 97205
JIM FAULKNER	3484 FAR HILLS AV DAYTON, OH 45429 DESIGN FORUM ARCHITECTS
Chris Tope	29025 S.W. town center Loop Wilsonville OR
TOM JONES	1099 SW COLUMBIA PDX 97201
RICK MARTIN	1099 SW COLUMBIA PDX 97201
Kim Beach	101 SW Main Suite 1500 Portland OR 97204
DON MALIN	8755 SW CITIZENS DRIVE WILSONVILLE
MARK VANDEHEY	610 SW Alder Suite 700 PDX 97205
BOB LAMB	13890 SW BULL MT ROAD TIGARD OR 97224

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Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
City of Wilsonville Annex
30470 SW Parkway
Wilsonville, OR.

Date: Dec. 2, 1991
Project Number: 467-0301
Project Name: Wilsonville Town Center
Regarding: Open Space Alternative Concept Plan

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
X Attached	For Your Info/File	KIM BEACH
Facsimile	X As Requested	LOGAN CRAVEN
Number Of Pages Including Cover	For Review And Comment	

Copies	Description
10	FOLDED FULL SIZE REVISED MASTER PLAN (SHT. #1)
1	PMT (8½"x11") OF ABOVE
1	ORIGINAL (8½"x11"): ALTERNATIVE OPEN SPACE CONCEPT.

Comments

Blaise:

Please enclose the attached materials w/in your staff report.

s - again for all your help !!!

Yours,

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

November 26, 1991

Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 SW Elligsen Road
Wilsonville, Oregon 97070

RE: PROJECT THUNDER
DESIGN REVIEW SUBMITTAL
JOB NO. 4-755-0102

Dear Blaise:

Thank you again for taking time this morning to discuss Project Thunder. As per our discussion, the following items were discussed and agreed upon:

1. Approval of Drawing Scales:

   A. Design Review Submittal at 50 scale.

   B. Construction Document Submittal at 30 scale.

2. Approval to omit irrigation design for Design Review Submittal. Notes will be provided.

3. Design Review Submittal will be 50 scale landscape plan showing tree, plant and lawn layout. Plant lists and details will be provided as per City of Wilsonville's Design Review Criteria.

4. W&H Pacific will have 100% complete construction documents by December 27, 1991. We will submit to the City a set of complete drawings for additional information. These drawings will include complete landscape and irrigation plans and can be included for the January 27, 1992 Design Review meeting.

If you have any questions or comments, please give me a call.

Sincerely,

W&H PACIFIC

Matthew P. Simpson, A.S.L.A.
Project Landscape Architect

MPS/kal

STORAGE	SERVICE	RETAIL	RET
6208	4700	47,879	572
9600	900	2,240	1024
22,892	1020	5,880	4500
420	640	7,920	6096
216	1952	63,919	
39,336	5016		
	2048		
	1008		
	17,275		

OFFICE
18156
200
50
5,294
288
912
240
149
128
9,117

EXHIBIT "A"

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

ADMINISTRATION DEPARTMENT
MEMORANDUM

DATE: OCTOBER 9, 1990

TO: DESIGN REVIEW BOARD

THROUGH: WAYNE SORENSEN, PLANNING DIRECTOR

FROM: MICHAEL E. KOHLHOFF, CITY ATTORNEY

SUBJECT: REQUESTED OPINION FOR LES SCHWAB TIRE CENTER

INTRODUCTION

At the City of Wilsonville's Design Review Board meeting of September 24, 1990, applicant, Les Schwab Tire Centers (Les Schwab), filed three legal objections to the planning staff's recommendations for revisions to the Les Schwab site plan applications as conditions of approval: violation of U.S. Constitution and Oregon Constitution free speech rights, lack of authority, and arbitrariness. The Design Review Board has requested my review of these objections, which are discussed below. The application was continued for decision only until the next regularly scheduled meeting in October.

The recommended revisions were to proposed material and color to the exterior of the tire center building. The site plan submitted by Les Schwab called for the building to be constructed of concrete block, with a metal roof and metal mansard. The proposed exterior colors of the building were red and white. The revisions recommend the use of red-colored brick instead of the red painted block on the south, east and west elevations, with the north elevation to be painted white. Also, the metal roof trim and mansard were recommended to be repainted with an earth tone color.

BACKGROUND

The City of Wilsonville was incorporated in 1969. Pursuant to state statute it adopted and had acknowledgment by the state its city-wide Comprehensive Land Use Plan and implementing Zoning Ordinance in 1982. As a newly developing city it has placed its emphasis on planning in the form of "planned development" for commercial, industrial and residential uses. In the area of commercial development, the City's Zoning Code provides:

"4.136 (1) (c). Planned Development Commercial shall be planned in the form of centers or complexes as follows:

a. The Town Center
b. Service Centers
c. Office complexes.
d. Commercial recreation.
e. Neighborhood commercial."

The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas.

The purpose of this zone is stated under 4.136 (l) (c) (12) (a).

> "Purpose: (i) The purpose of this zoning is to permit and encourage a City Center, adhering to planned commercial and planned development concepts, including provision for commercial services, sales of goods and wares, business and professional offices, department stores, shopping centers and other customer-oriented uses to meet the needs of the Wilsonville community as well as to meet the general shopping and service needs of an area-wide basis, together with such multiple family residential facilities, open space, recreational and park areas, and public uses facilities as may be approved as part of the City Center compatible with the Comprehensive Plan of the City."

The location of the Les Schwab property application is in the northwest corner of the Town Center commercial area adjacent to Interstate 5. The Town Center is planned as the City's focal center. The property's location is a major viewing point of the City's focal center and identity. Development has occurred in the area with appropriate uses, high quality materials and design, which has provided the city center with uniform and harmonious developments with an aesthetically pleasing visual environment. This development has been and is overseen by the City's Planning Commission and its Design Review Board, pursuant to the city's zoning code.

The Les Schwab application has duly gone through the Planning Commission Planned Development Approval process and is located appropriately in the service commercial area of Town Center Master Plan. Its use approval adheres to the planned commercial/planned development concepts for Town Center. It comes before the Design Review Board for site development approval.

LEGAL REVIEW

"Comprehensive planning is clearly recognized as a proper exercise of municipal police power, often seen as a safeguarding of property values on a broad public basis. The conservation of property values is a very common consideration in comprehensive zoning, ordinarily required by state zoning acts, incorporated in ordinances and sustained by the courts (footnote omitted). Likewise, regulations as to the height and mode of construction

of buildings have been sustained on the ground of the 'safety, comfort and convenience of the people and for the benefit of property owners generally'" (footnote omitted). McQuillan Mun. Corp., § 24.14 (3rd. Ed.)

As also stated in McQuillan Mun. Corp., § 24.10:

"It is well said that the police power is based chiefly on the Latin maxums, salus populi suprema est lex - the welfare of the people is the first law (footnote omitted) and sic utere tuo ut alienum non laedas - so use your property as not to injure the rights of another (footnote omitted). As stated by the United States Supreme Court, the police power 'has its foundation in the maxim of all well-ordered society which requires everyone to use his own property so as not to injure the equal enjoyment of others having equal rights of property'". (*Slaughter House Cases, 16 Wall 36, 21 L. Ed. 394).

However, the power of municipal government in this respect is not unlimited. It is limited by federal and state constitutional guarantees.

Applicant raises issues pertaining to federal and state constitutional rights to free speech, arguing that the proposed color revisions invade its rights to advertise as it chooses. Applicant also raises due process issues which prohibit the unreasonable, arbitrary use of such powers claiming the Design Review Board does not have the authority to limit materials and colors (unreasonable) and is without standards and criteria (arbitrary) to do so.

As previously stated, public necessity and protection of the public welfare forms the basis for the exercise of police power; that every person ought to so use his or her property so as to not injure one's neighbors. The unavoidable consequence of the need to exercise the police power in this regard results in the restriction on the use of property. It should also be noted that the police power is of a dynamic nature. McQuillan Mun. Corp., § 24.08 (3rd ed.) states, "Like equity jurisprudence, the police power has a dynamic or progressive capacity to be applied to new subjects or to be exercised by new or revised measures as economic and social changes require."

Wilsonville adopted its zoning code as an exercise of its police power. The presence of its Design Review Board is an example of the progressive capacity which was brought about by the public necessity and modern day quality of life concerns. Wilsonville as part of its general zoning regulations provides in 4.151 General regulations - signs for signage regulation.

The public necessity to regulate signage in terms of time, place and manner so that the signage chosen is not abusive of the rights of others is clearly recognized. See cases cited in McQuillan Mun. Corp., § 24.384 (footnotes 1-10). Within these general regulations, 4.151 (3) applies to commercial use within the Wilsonville Town Center as follows:

> "(a) The Wilsonville Town Center, as designated in the Wilsonville Code, Section 4.136 et seq., is well suited for the institution of a coordinated signing program because of its geographic unity, focal location, and the fact that it is in the early stage of development. The purpose of Section 4.151(3) of this chapter is to provide the Town Center with a program of coordinated signing which is both functional and aesthetic, and to provide a method of administration which will insure continuity and enforcement. In this manner, the framework will be provided for a comprehensive balanced system of street graphics which provide a clear and pleasant communication between people and their environment..."

"In regulating the use of street graphics and building signage, the following design criteria shall be applied in conjunction with the provisions of this Code: That street graphics and building signage be:

1. Appropriate to the type of activity to which they pertain.

2. Expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole.

3. Legible in the circumstances in which they are seen.

4. Functional as they relate to other graphics and signage."

Wilsonville Code 4.001 (70) defines "sign" as "***painting...or other device that is designed, used or intended for advertising purposes, or to inform or to attract the attention of the public, and includes where applicable...display surfaces and all components of the sign***".

Wilsonville Code 4.151 (3) (b) (2) provides the following definition: "Building Graphics. Signs that are not located within the first 15 feet of a property line that abut a public right-of-way. Building graphics are signs that include building-mounted and roof-mounted signs."

Wilsonville Code 4.151 (3) (d) (3) a. provides for Building Graphics Signage: "The total square foot of all signs except the single address sign and the street graphics sign shall not exceed the width of the building occupied by the use advertised. The width of a building is to be measured as the longest dimension of the width or depth of the building."

Wilsonville Code 4.151 (3) (c) (2) a. provides authority of the Design Review Board "...to administer and enforce all the provisions in Section 4.151(3) as they affect the design function and appearance of the sign."

Therefore, assuming that the applicant painted color schemes are as it proposes "an important element of the company's advertising" that "aid instant customer recognition", then the painted color scheme is a sign under Wilsonville Code 4.001 (70) whose display surface is violative of the size limitations for building graphics under 4.151 (3) (d) 3.a.

The specific criteria of size rationally limits a building by virtue of the amount and color it's painted from becoming a massive, garish sign incompatible with its neighbors. This is a reasonable time, place and manner prohibition to prevent an abusive medium, and is context neutral. The thrust of Art. 1, Section 8 of the Oregon Constitution is that free speech is not to be restricted unless it becomes abusive. See Ackerly v. Multnomah County, 72 Or. App. 617, 696 P2d 1140 (1985). The maxums involved in the police power cited above to not injure the property of others are found in the design criteria also cited that building signage not only be appropriate to the type of activity to which they pertain, but also be expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole. There is an obvious need to protect the aesthetic nature and character of other properties and the identity of the Town Center. There is no less need to preserve the property values of peaceful and harmonious use from loud and offensive noise than from loud and massive signage. Each is equally abusive.

As referenced above, comprehensive planning is widely recognized as a legitimate exercise of police power to preserve property values. Because of geographic unity, focal location and its early stage of development there is a rational basis to provide for a

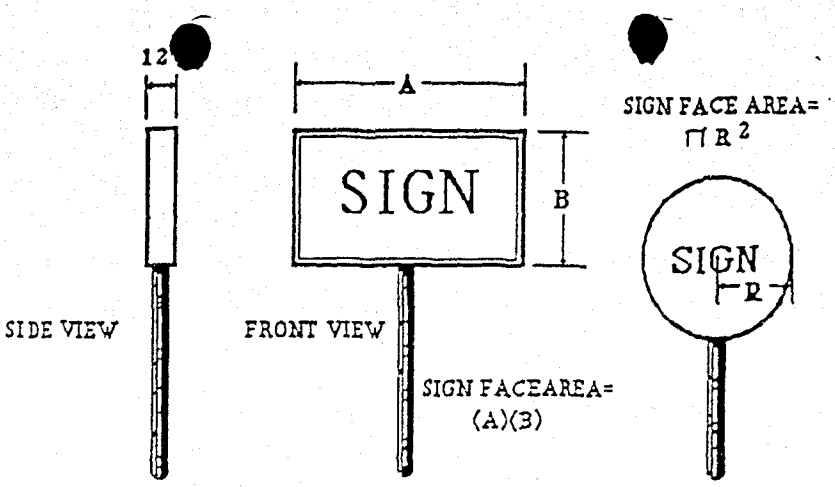
coordinated signage program which is both functional and aesthetic and to provide a method of administration through a Design Review Board for Town Center development. Clearly, this is in keeping with the multiple and often interrelated purposes set forth in 4.440 of the City's Code for Design Review Board. General criteria and standards are set forth to review site development in section 4.421, including color and material and as it relates to advertising medium that they "shall not detract from the design of proposed buildings and structures and the surrounding properties." Aesthetic sensibilities are also recognized as a sole ground and a proper subject for support of zoning regulation. See Oregon City v. Hartke, 240 Or 35, 400 Ord. 255.(1965); Naegele Outdoor Advertising v. City of Waynesville, 833 F.2d 43 (CA4 1987); Don's Porta Signs Inc. v. City of Clearwater, 829 F2d 1051 (CA11 1987).

The dynamic nature of police power is clearly seen in the contemporary, community trends to view aesthetic considerations as valid subjects for the exercise of police power. The very exercise of police power is based upon need. Modern, contemporary society has recognized that advertising in the commercial setting has historically been poorly constructed, grossly disproportionate in size or height, aesthetically disharmonious, located in manners detrimental to traffic safety, and has even obscured the rights of others to be seen, creating a need to establish reasonable time, place and manner restrictions.

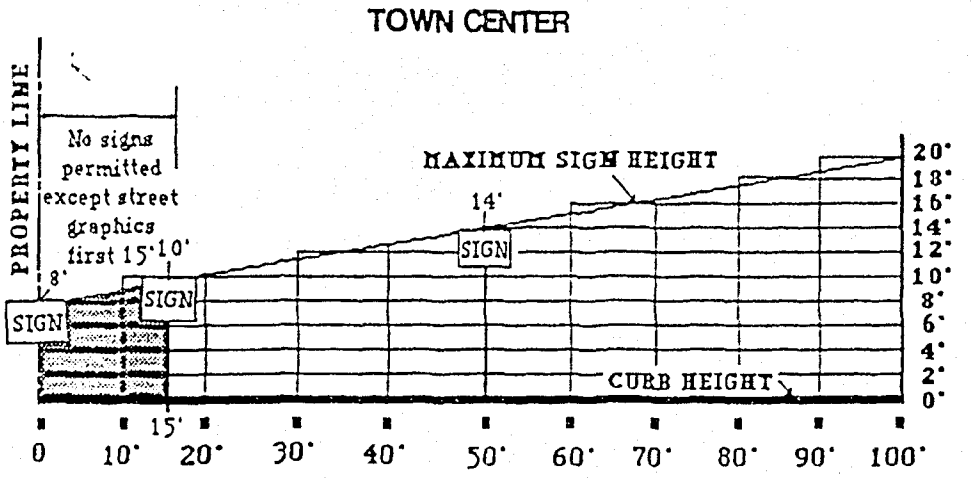
On the other hand, such necessity has not risen to the same level of need to regulate the use of homes as signs. The business entrepreneurs who are willing to advertise their commercial product by virtue of using gross advertising structures in commercial areas have not historically turned their private homes into such uses. In short, the need to protect other homeowners from the detrimental effects of having the color schemes of homes turned into speech of a loud and abusive nature has not presented a public need to regulate. (Often, developers have instituted self regulation through homeowners associations in residential subdivisions). Thus, single family dwelling units are exempt from initial Design Review Board development approval. They are not exempt if and when the use involves signage. There are specific regulations which the Design Review Board has authority to govern addressing normal and typical signage within a residential use area, namely residential name plates, 4.151 (l)(a), bulletin boards, 4.151 (l)(b); real estate signs advertising individual lots, 4.151 (l)(c); subdivision signage, 4.151 (l)(d) and home occupation signage, 4.151 (l)(d). Nor is the applicant's comparison of industrial Planned Developments with the commercial developments a justification for not distinguishing the differences in the nature of uses. What may be appropriate to locate and identify industrial users and be harmonious with other surrounding industrial properties may, in fact, not be compatible with commercial uses. That basic recognition between different uses is what allows for zoning districts in the first instance.

Therefore, I am of the opinion that the recommended revisions submitted by staff are reasonable time, place and manner restrictions, to prevent the use of a building as a grossly, large sign offensive to aesthetic sensibilities, coupled with the use of materials which are not harmonious with existing properties and the focal nature of Town Center to the detriment of the property of others. The regulations provide authority in the Design Review Board to act and neither as set forth or applied, are they arbitrary.

mek:pjm



SIGN FACE MEASUREMENT



The maximum height of a sign is measured from a point 8 feet above the curb at the property line, to a point 20 feet in height or 4 feet above the roof, which ever is less.

MAXIMUM SIGN HEIGHT

EaE1aE1a
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRST
UVWXYZ
123456780&?!$(.,,.)^^><

FIG. 2

CHAPTER 4, ZONING CODE
TOWN CENTER SIGNAGE CODE
EXHIBIT "B"

City of Wilsonville
COMMUNITY DEVELOPMENT DEPARTMENT
Memorandum

November 7, 1991

TO: Blaise Edmonds, Planning
FROM: Martin Brown, Building Official
SUBJECT: DEVELOPMENT REVIEW TEAM

The following is a list of concerns for the proposed Project Thunder and the proposed Liberty Organization office/warehouse. Actual working drawings may expose additional code concerns.

THUNDER PROJECT

1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

LIBERTY ORGANIZATION OFFICE/WAREHOUSE

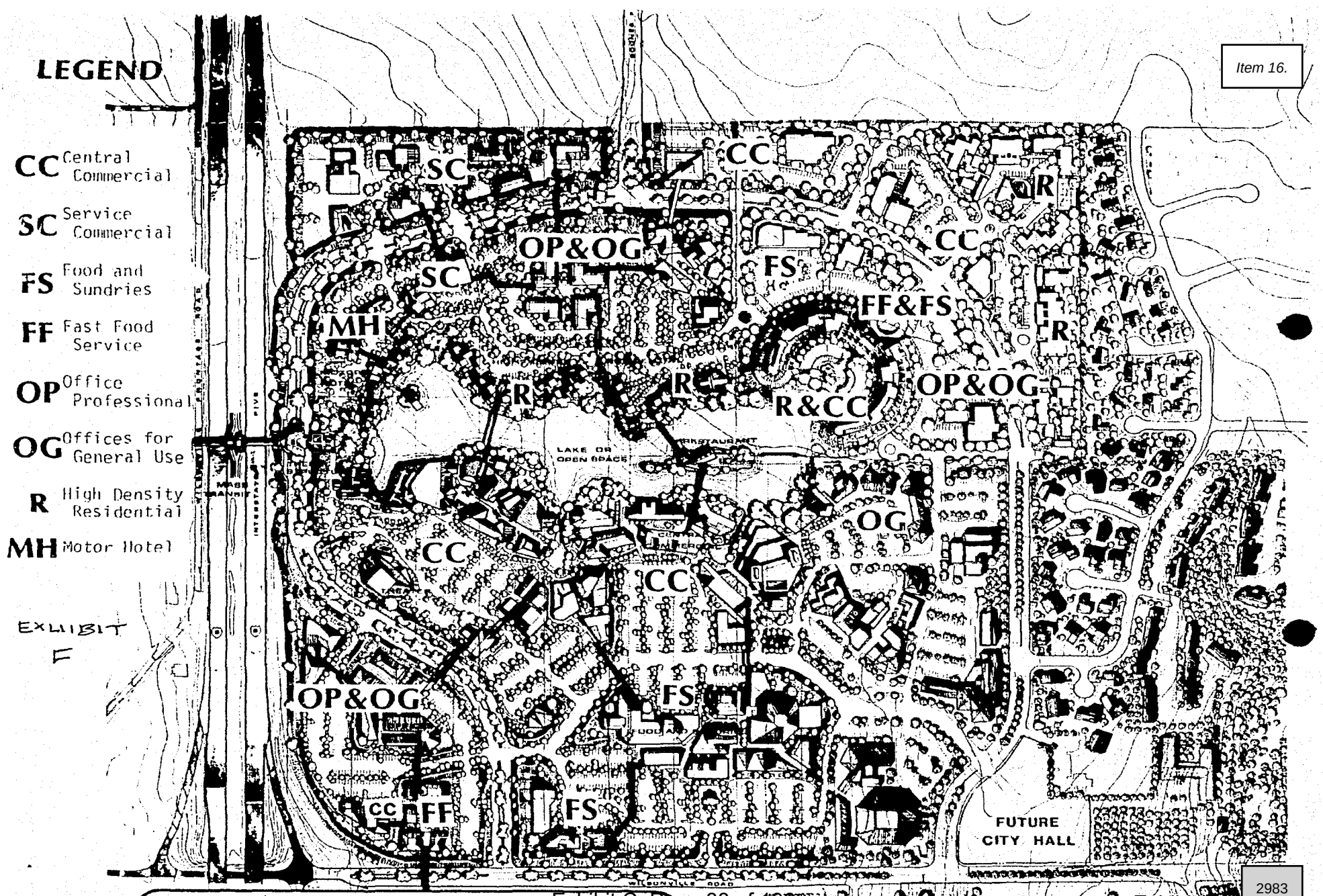
1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

2. Proposed building shall comply with the A.D.A.

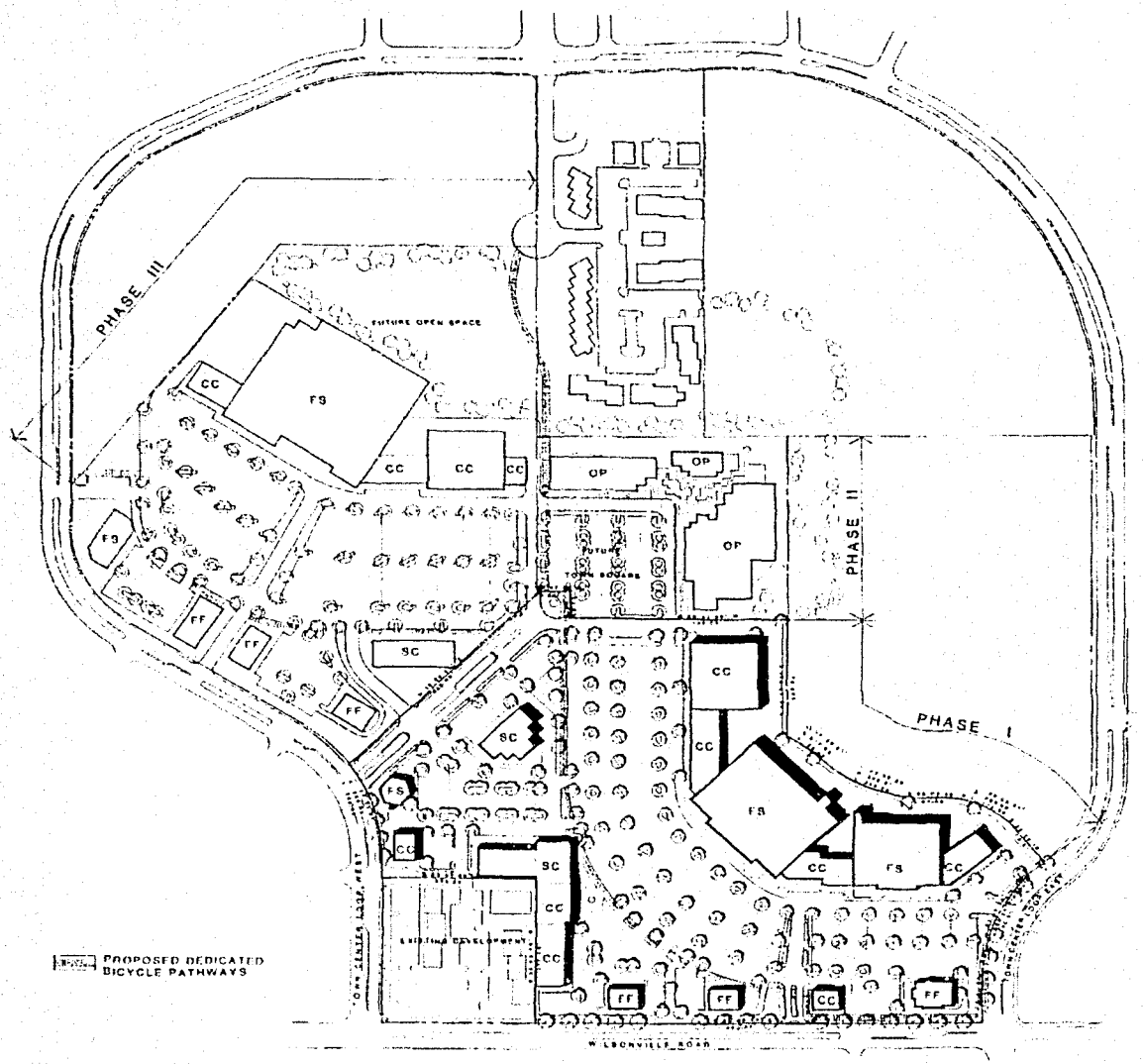
/s f

EXHIBIT E

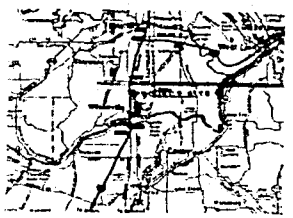
DEFECTS IN ORIGINAL DOCUMENT



Wilsonville City Center Plan



MASTER PLAN: PHASE I, II, & III



VICINITY MAP

ACREAGE

PHASE I	23.17 ACRES
PHASE II	5.41 ACRES
PHASE III	22.02 ACRES
TOTAL	50.60 ACRES

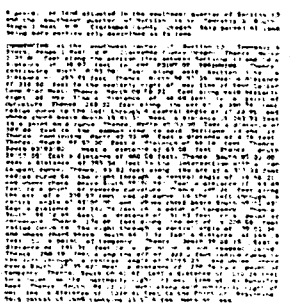


EXHIBIT H

JKS Architects PC

WILSONVILLE MARKETPLACE

1

2984

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OREGON 97205 • (503) 228-5230 • FAX (503) 273-8169

October 16, 1991

Ms. Kim Beach
Capital Realty Corporation
101 SW Main, Suite 1500
Portland, OR 97204

RE: Traffic Analysis for Wilsonville Town Center Phase II

Dear Ms. Beach:

The purpose of this letter is to discuss the results of an update to the April 1990 Traffic Impact Analysis we conducted for the Wilsonville Town Center relative to the current phase II development proposal. Some of the specific issues that this letter addresses include:

- the level of development proposed in the current phase II submittal,
- the level of development analyzed in the April 1990 Traffic Impact Analysis,
- an update of current conditions within the vicinity of the site
- an assessment of projected conditions upon completion of the current development proposal
- an assessment of the need for a traffic signal at the Wilsonville Road/Town Center Loop West intersection upon completion of the proposed development

Based on the results of both the previous and updated analysis, the proposed development can occur while still maintaining acceptable levels of traffic operations and safety at site driveways and nearby key intersections. The significant findings and recommendations are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

EXHIBIT G-7

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Current Phase II Development Plans

The current phase II development plans call for the construction of a retail facility consisting of approximately 159,000 gross square feet of floor area. This development level (and substantially more) has already been accounted for in the previous traffic impact analysis. The traffic impact analysis conducted in April 1990 considered a Phase I development level of approximately 211,000 gross square feet of floor area, and a combined Phase II and III development level of approximately 451,000 gross square feet of retail space and 40,000 gross square feet of commercial office space. Therefore, the original traffic impact analysis, which evaluated conditions through the year 1995 is considered to be more than adequate in terms of its assessment of traffic impacts of the proposed development for the four year horizon. Included with this letter are 10 copies of the April 1990 Traffic Impact Analysis.

Update of Existing Conditions

Within the last week, Kittelson & Associates, Inc. obtained weekday p.m. peak hour turning movement counts at the intersections of Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East. The results of those counts revealed that compared to the counts conducted in conjunction with the April 1990 study, traffic volumes have increased by approximately 70 percent on Wilsonville Road, by approximately 80 percent on Town Center Loop East, and have remained essentially the same on Town Center Loop West. The growth in traffic on Wilsonville Road and Town Center Loop East is due primarily to the substantial amount of residential development that has occurred within the vicinity of the site (particularly to the east of Town Center Loop East) within the past year, as well as to the development associated with Phase I of the Wilsonville Town Center.

The reason traffic volumes have remained basically the same on Town Center Loop West is likely due to the fact that the majority site-generated traffic associated with Phase I of the Wilsonville Town Center, as well as some of the site-generated traffic from the retail/office development located in the southwest corner of Town Center Loop are using the Wilsonville Town Center access drives on Wilsonville Road and Town Center Loop East. Another contributing factor may be that traffic volumes within the Wilsonville area have re-distributed somewhat since 1990. Table 1 displays a comparison of the 1990 and the current 1991 volumes.

TABLE 1
COMPARISON OF PEAK HOUR VOLUMES

Intersection	Approach	1990 Volume (Veh/Hr)	1991 Volume (Veh/Hr)
Wilsonville Rd./ Town Center Loop W.	Westbound	165	410
	Eastbound	530	785
	Southbound	295	270
Wilsonville Rd./ Town Center Loop E.	Westbound	155	300
	Eastbound	280	435
	Southbound	80	145

Based on the results of the recent p.m. peak hour traffic counts, Level of Service analyses were conducted at each of the intersections following the analytical techniques described in the *1985 Highway Capacity Manual*. Table 2 displays the results of that analysis. As indicated in the table, both intersections are currently operating at Level of Service "D" or better, which is considered acceptable by standards.

Projected 1992 Conditions

The current site plan indicates that three access driveways on Town Center Loop West will serve the proposed retail development, consisting of a main access drive, a secondary access drive, and a service drive on the north end of the development which will be limited to right-turns only. This access scheme is consistent with what was assumed in the 1990 Traffic Impact Analysis, with the exception of the north service drive. In the previous analysis, the two primary access drives were projected to operate at Level of Service "D" or better through the year 1995. Given that traffic volumes will be substantially lower in 1992 than the projected 1995 levels, all three driveways serving

TABLE 2
PM PEAK HOUR LOS
EXISTING TRAFFIC VOLUMES

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	113	D
Wilsonville Rd./ Town Center Loop E.	PM	299	C

the development are anticipated to operate at Level of Service "D" or better upon completion development.

Estimates of site-generated traffic for the Phase II development proposal were added to the existing traffic volumes at the intersections of Wilsonville Road/Town Center Loop W. and Wilsonville Road/Town Center Loop E. Based on that assignment, additional analyses were conducted to assess the level of service at these two intersections upon completion of the development. Table 3 displays the results of that analysis. As shown in the table, the intersection of Wilsonville Road/Town Center Loop West is anticipated to experience an "F" Level of Service, which is considered unacceptable by City standards. An examination of signal warrants contained in the *Manual on Uniform Traffic Control Devices* indicates that at least two warrants for a traffic signal will be met under projected 1992 conditions.

Based on these results, and given that background traffic volumes on Wilsonville Road are likely to continue to increase somewhat, it is recommended that a traffic signal be installed at the Wilsonville Road/Town Center Loop West intersection coinciding with the completion of the current Phase II development proposal. Based on this recommendation officials at Capital Realty Corporation have retained Kittelson & Associates, Inc. to begin the preliminary design of a traffic signal at the Wilsonville Road/Town Center Loop West intersection.

TABLE 3
PM PEAK HOUR LOS
PROJECTED 1992 EXISTING + SITE TRAFFIC

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	-29	F
Wilsonville Rd./ Town Center Loop E.	PM	113	D

I trust that this letter adequately addresses City staff's traffic related concerns with respect to this development proposal. If in the meantime you have any questions or comments please do not hesitate to contact me.

Sincerely,

Mark A. Vandehey

Mark A. Vandehey
Associate

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Request for Modification of Condition of Approval No. 90PC15

On behalf of the Owner, Capital Realty Corp., we request a reconsideration of Condition No. 8 of Planning Commission Resolution No. 90PC15 to provide the opportunity for Capital Realty to work with the City to accomplish the following:

1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions,

2. To formulate a development plan and time frame consistent with the development of Phase II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto.

Concurrently submitted to you are Stage I Master Plan Re-submittal and Stage II, Phase II of the Center. We feel that they have a bearing on this condition and warrant review.

Thank you for your consideration, if you have any questions, please call.

Very truly yours,

Richard S. Brooks, AIA
Project Manager

bc

C:\BC\RSB\WTC-1017.PM

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT G-8

Principals: Norman E. Krause AIA • George E. Schmanski III AIA • James R. Kaufman AIA • Scott H. Williams AIA • Of Counsel: John E. Jensen AIA Emeritus
Associates: Richard S. Brooks AIA • Andrew C. Jacobson AIA • Brian A. Roberts AIA • Warren A. Tyler AIA

Stage I Master Plan Re-submittal
Wilsonville Town Center—Wilsonville, Oregon

1. Nature of Application:

This is a re-submittal for Stage I Master Plan approval for a proposed retail development of 59.79 acres, to be located adjacent to, and north of Wilsonville Road spanning from the southeast portion of Town Center Loop East, the inner portion of Town Center Loop West, north to the intersection of the Loop West and Parkway in that area previously designated as The Wilsonville Town Centre.

The Applicant:

Seeks to develop the site as a community shopping center. The center, at full build out would consist of approximately five larger retail commercial anchor stores, infill retail commercial space and pads located independently from the central retail complex for commercial retail development.

The proposed development includes a total building area of approximately 500,000 square feet constructed in three phases.

Phase I

The existing development of Phase I will include retail commercial space of approximately 207,130 square feet oriented primarily to Wilsonville Road. The Phase I Center consists of three anchor tenants, including major grocery and drugstore tenants, with infill commercial retail shop space and several pads at the periphery for retail uses. Parking for Phase I is 1,063 spaces at a ratio in excess of five spaces per 1,000 square feet of gross leasable area. The third anchor and several of the pads are as yet un-built.

The initial development provides two full-turning accesses along Town Center Loop; one at the eastern end of the development near Wilsonville Road, and the other off Town Center Loop West, which is a heavily landscaped entry boulevard, that in later phases will become the central identified main entry to the fully built-out center. Further, a secondary full turn access is proposed at Town Center Loop West and the Northern boundary of the existing retail center; and finally in Phase I, a right-in-right-out access at mid-site on Wilsonville Road, which is temporarily a full access entry until development to the south of Wilsonville Road completes construction of the final road design.

EXHIBIT 69

1. Nature of Application: (cont'd)

Phase II:

The proposed Phase II development is one retail user of approximately 159,400 square feet located on 14.75 acres primarily fronting Loop Road West. Phase II is to be built and developed by a separate owner other than Capital Realty Corp. Capital Realty, however, maintains its right of review for compliance with the concept and intent of the Town Center retail development. Approximately 872 parking spaces are provided (see Stage II Submittal attached).

Phase III:

The proposed development of Phase III includes retail commercial space of approximately 143,568 square feet completing the connection to Phases I and II. The Phase III development would consist of one large retail anchor tenant, retail pad tenants, and a two-story professional office building oriented at the end of the main entrance boulevard.

The parking development for Phase III, approximately 980 spaces, brings the total parking count to 2,915 spaces, serving the proposed 510,000 square feet of gross building area.

2. Property Description:

The property is located north of Wilsonville Road, east of Interstate 5, and west of City Hall. The property is located on the following parcels:

Parcel 1: 19.73 acres
Tax Lots 600 and 601, Section 13, Township 3 south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

Parcel 2: 4.37 acres
Tax Lot 500, Section 13, Township 3, south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

2. Description (cont'd)

Parcel 3: 25.96 acres
Tax Lots 200, 300, and 405, Clackamas County Map 3-1W-14D and ownership interests in a triangle of land approximately 6,381 square feet on the west of Tax Lot 200.

Parcel 4: 9.73 acres
Tax Lots 101, 201, and 102 Clackamas County Map 3-1W-14D

3. Plan Designation and Zoning:

The subject site is designated commercial on the comprehensive plan map and zoned Planned Development Commercial on the zoning map. The site, being situated within the Wilsonville Town Center master Plan map, has underlying use designations indicating CC Central Commercial, FS Food and Sundries, OP Office Professional, FF Fast Food Restaurant, R high density residential, and open space.

The intent of our proposal is to accomplish the mix of other desired and designated uses within the boundaries of our development. We feel our plan as submitted is consistent with the comprehensive plan goals and with the Town Center Master Plan.

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: **Stage I Re-submittal Master Plan Approval Wilsonville Town Center**
Stage II, Phase II Submittal

On behalf of Capital Realty Corp., and the owners of properties so designated as comprising the development area, we are re-submitting this application for a Stage I Master Plan Approval for a 59.79 acre commercial center and Stage II approval for the Phase II 14.75 acre site.

As you may be well aware, Phase I of this plan has been completed in part. The economics of the region and the country have impacted the nature of the project as originally planned. This re-submittal represents those pressures, and at the same time expands the size of the project while maintaining the original intent of mixed uses as outlined in the Wilsonville City Center Plan.

Capital Realty has the opportunity to bring to the Town Center project a major, innovative retail anchor which will comprise all of Phase II. This parcel will be sold to a separate user for which application for Stage II, Phase II is attached. Their progress and subsequent design submittals will be reviewed and monitored by Capital Realty.

The addition of this anchor, at this time will serve as a catalyst for the completion of Phase I buildings as well as increase the desirability of Phase III tenants. This, in effect, will improve the success of the entire City Center Plan to the benefit of Wilsonville as a whole.

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT 6-90

Principals: Norman E. Krause AIA • George L. Schmidt AIA • Gary L. Williams AIA • Jeffrey H. Williams AIA • Of Counsel: John F. Jensen • Associates: Richard S. Brooks AIA • Andrew C. Jacobson AIA • Brian S. Roberts AIA • Warren A. Tyler AIA

We are always available to answer questions to aid you in your analysis of this re-submission and its compliance with the current conditions of approval. This project represents a long-term commitment on the part of Capital Realty in the development of a strong, successful center for Wilsonville which will serve the needs of all its citizens. Thank you for your's and the City Staff's time, energy and cooperation towards the realization of this project.

Sincerely,

Richard S. Brooks, AIA
Project Manager

bc

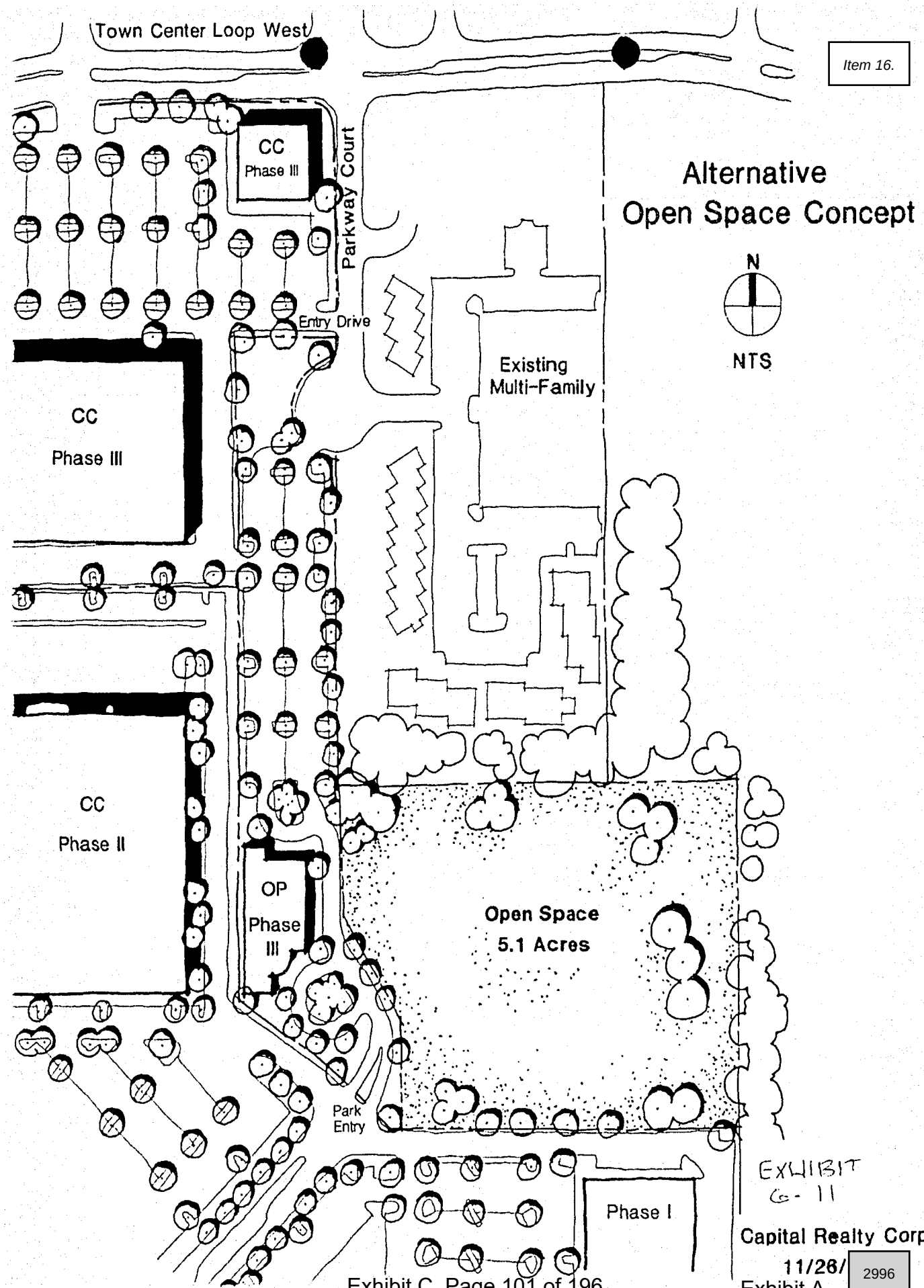


EXHIBIT
G-11

Capital Realty Corp.

11/26/ 2996

AS REVISED
11/19/2

DesignForum
ARCHITECTS

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 1R
REVISED GENERAL COMMENTARY:

Project Thunder is a single story building with mezzanine, 166,495 GSF retail sales building, with accessary storage areas. Project Thunder is a new concept in merchandising with this location selected for the pilot program.

Enclosed is data that we believe supports the design concepts expressed, outlines the project exterior signage program; building architecture, materials and colors. The project exterior lighting program, the project landscaping and site improvements information is shown on the revised drawings included with this additional submittal.

As per phone conversations with Blaise Edmonds, Associate Planner, the materials and colors sample board will be presented at the evening of the actual meeting. It will not be forgotten. We will provide a sample board of wall elements, as requested, as soon as we receive material samples from the manufacturers involved.

Enclosed within this booklet are color photocopies of the revised color scheme, two views, plus the proposed parking lot light standards with the directory signage of aisle indicators. Also enclosed is a new drawing titled "View Corridor Concept." Submitted separately are revised drawings DRBC1, DRBC2, DRB1, DRB2, DRB3, and DRBL1.

We believe we meet all known City of Wilsonville ordinances in regards to architecture, landscaping and site improvements. There are no signage variances required. We do request a deviation from the Phase I signage program as explained following. Since our reconsideration of the signage program has eliminated all variances we request reimbursement of the variance fees previously paid.

We request the Design Review Boards consideration of Project Thunder, as resubmitted.

Sincerely,

James L. Faulkner, AIA
Senior Vice President, Architecture

JLF:dr

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 2R
MATERIALS/COLORS DIALOGUE:

The general concept of the project design aesthetic is to create a vibrant and lively shopping environment, having this a "fun place to be". This concept is visualized to the shopper by the dynamic main facade of the building by three means: building form, materials selected and colors used.

The basic building background material is an "Exterior Insulation and Finish System", common name used Dryvit. While proprietary, we will use this term in this discussion. The Dryvit will be in a field color of light beige (neutral) with dark green color Dryvit used as a horizontal accent band on the North and West elevations. Dark green will also be used at the curved wall element of the primary building entry and exit points on the West elevation. The Dryvit will be on all sides of the building, scored in the patterns indicated on the elevations. Use of the dark green color relates this project to the Phase I buildings.

To compliment the Dryvit field, and to help to reduce the scale of this building, a horizontal band of metal siding, in a light bronze color with 50% reflectivity is expressed on the West, North and South elevations. This metal siding is a vertical pattern with vertical "grooves" 6" o.c. On the East elevation, the color and position of the metal siding is simulated by use of Dryvit accent band.

To accent and provide visitor orientation to the entry area, an open "dome" of steel framing, painted red, is mounted on the roof. Coupled with the curved element wall, this designates the building entry area. At grade the curved element concept is carried forward with curved concrete curbs, radial lined concrete walkways and flagpoles/bollards in a circular centerline aligning with the curved wall element at entry. The flagpoles are 25'-0" high, natural aluminum color, and will fly solid color flags or nylon banners. The non-illuminated bollards are 42" high, 10" diameter pipe painted light beige. Bollards around entry points will be internally lighted, and be painted red.

To further designate entry points, clear glass in natural aluminum storefront framing is located adjacent to the curved element entry area, and also occurs at the building service entrance and other secondary entrance points.

The overhead doors will be solid, insulating units without windows, painted light beige. Other secondary doors will be hollow metal painted to match adjacent wall color. Miscellaneous site items such as handrails will be painted black.

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PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 3R

The following are our calculations of area for the Project Thunder Signage Program:

Wall Graphics:

Single face, backlit signs:

Store Name Sign*:	1 Each at 224 SF	=	224 SF
Fascia Sign: "Service":	1 Each at 12 SF	=	12 SF
Fascia Sign: "Customer Pickup":	1 Each at 28.5 SF	=	28.5 SF
Fascia Sign: "Car Stereo Installation":	1 Each at 40.5 SF	=	40.5 SF
TOTAL WALL GRAPHICS AREA			305 SF

* This sign of channelume construction with individual letters for the word "UNIVERSE"; the word "INCREDIBLE" is in script neon.

There are miscellaneous directional signs on site, i.e. stop signs, that are under 2' x 2' in size, single face, non-illuminated and pole mounted. These include the Parking Lot Aisle Indicator Signs: 12 each at 8 SF = 96 SF. These are shown on sheet DRBC1, but are not included in signage area calculations.

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PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 4R

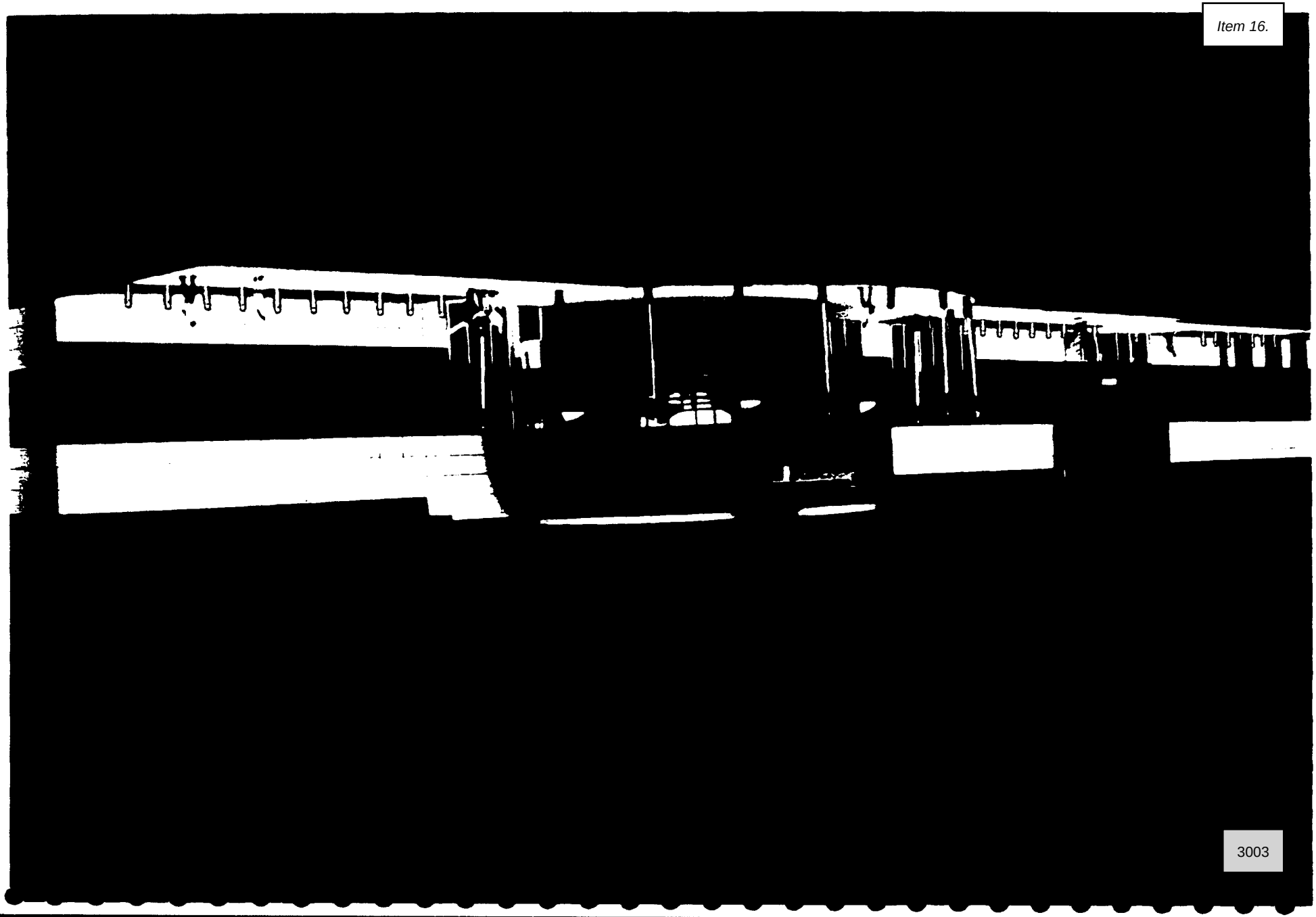
We request the consideration of the Design Review Board for a deviation from the Phase I, Wilsonville Town Center Signage program, as follows:

- Deviation #1 from Phase I signage program for sign construction method

Deviation #1 from Phase I signage program for Wilsonville Town Center

We request this deviation from the approved program for the purpose of changing the method of construction for the 3 fascia signs (aggregate area approximate 81 SF) to be consistent with our design idiom. We feel our approach of a fascia panel type sign, back lit, cutout individual letters, appearing to be in a larger horizontal band to be of more benefit to this architectural design. Individual channel construction is not an appropriate usage in this application.

DEFECTS IN ORIGINAL DOCUMENT



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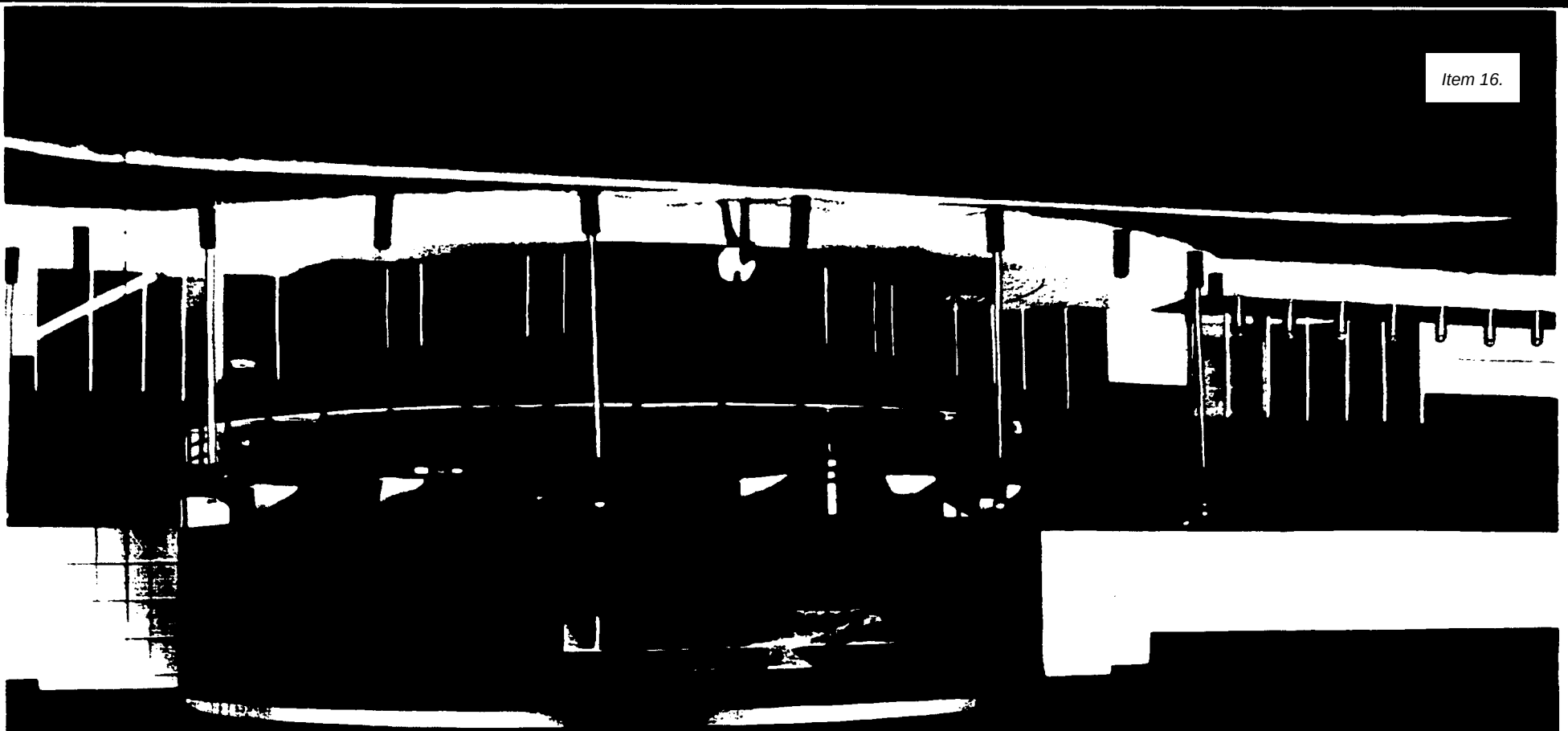

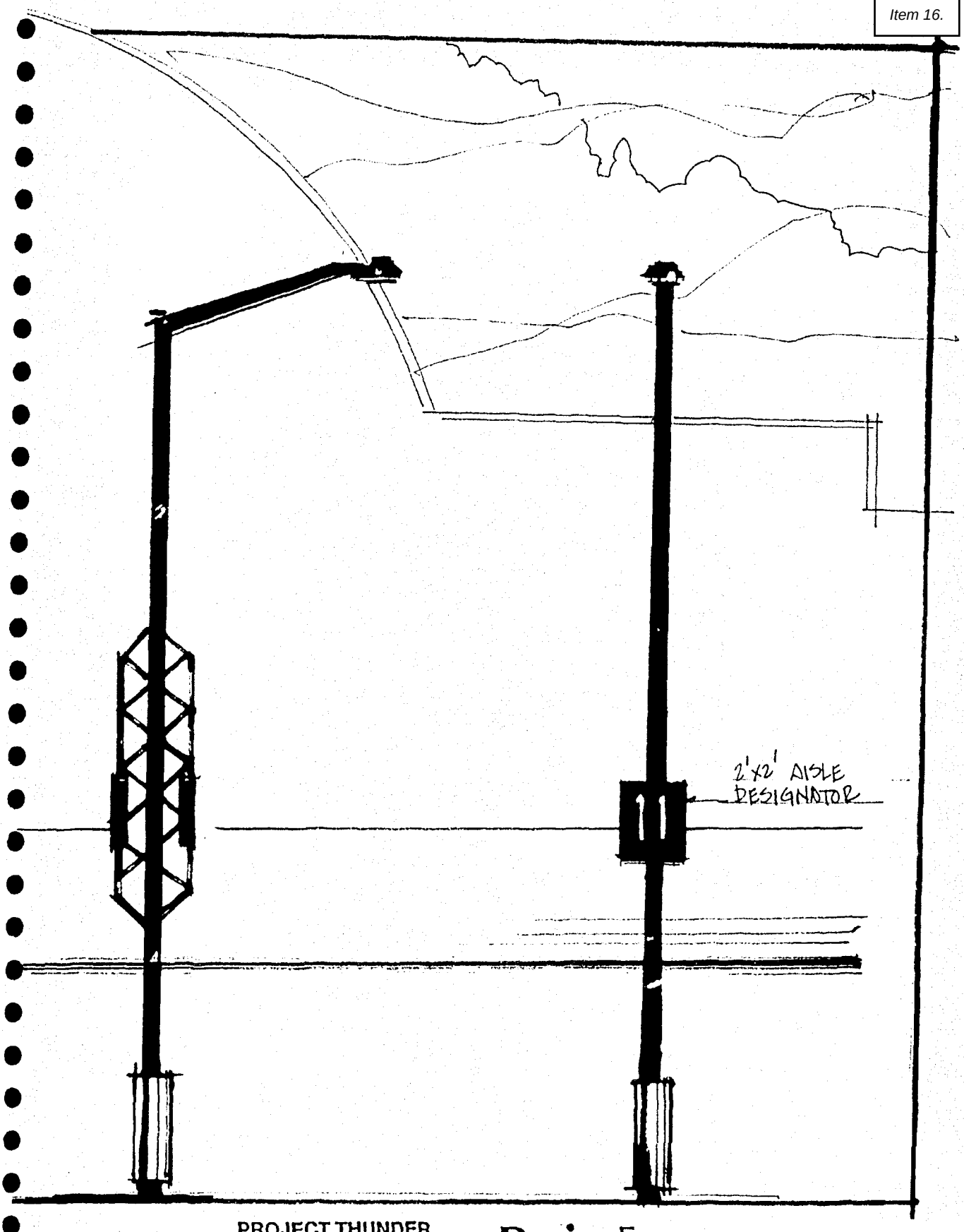

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting

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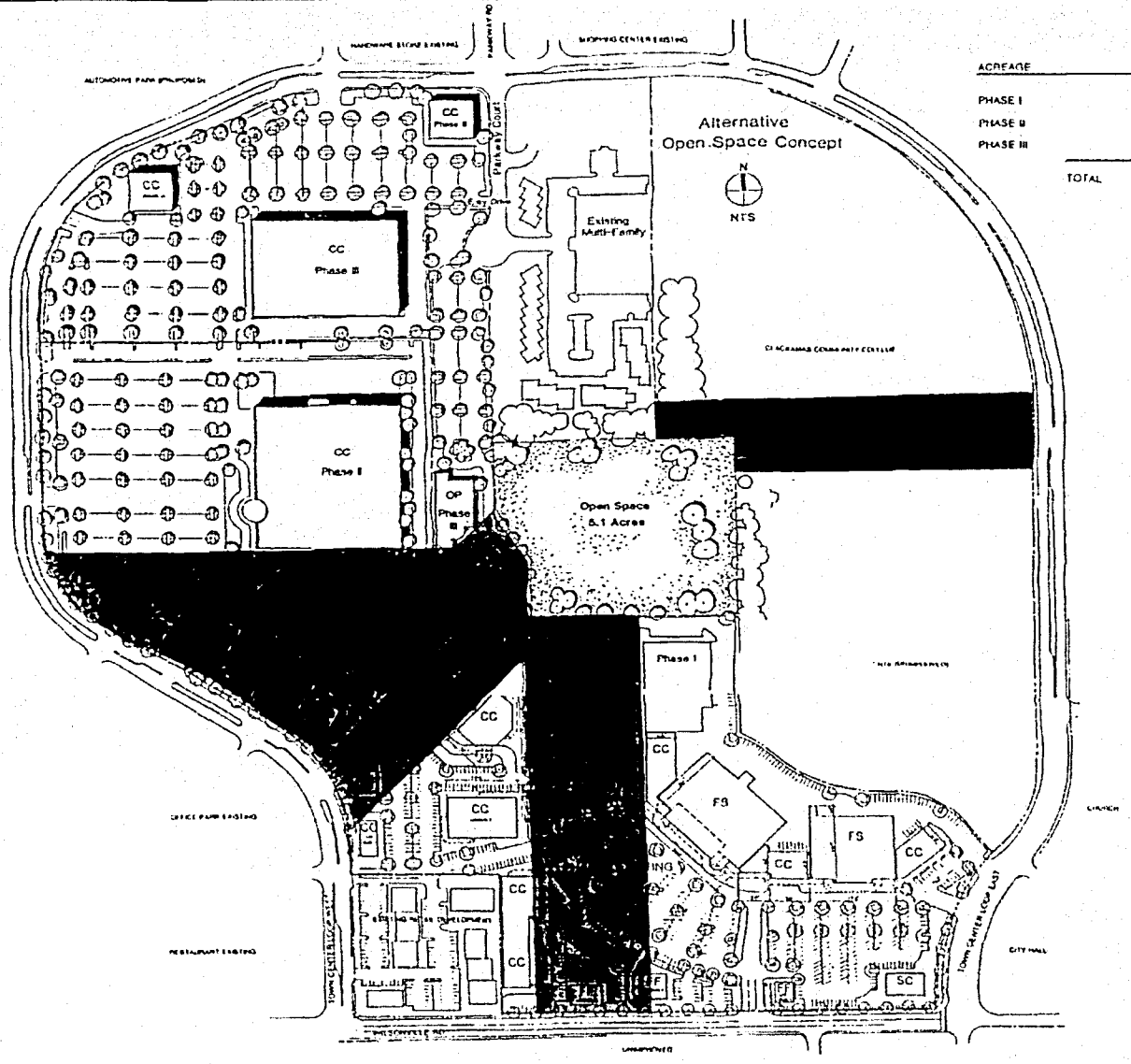
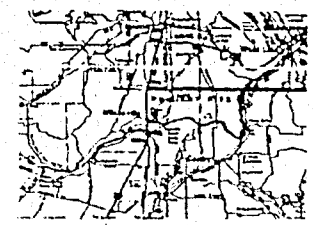
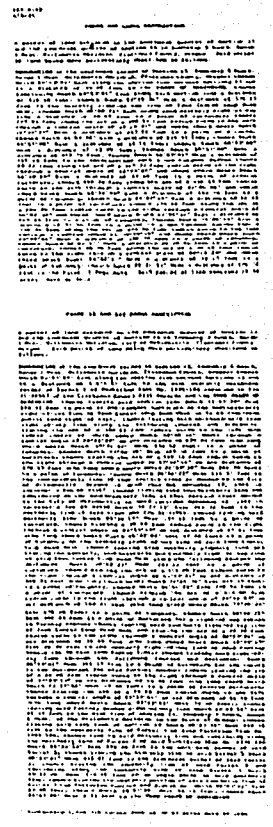


ACREAGE	
PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



VICINITY MAP



SITE MASTER PLAN: PHASE I, II, & III

VIEW CORRIDOR CONCEPT

1-6-92

JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

1

3006

DesignForum

LETTER OF TRANSMITTAL

From: William F. Bergman, AIA
Design Forum
3484 Far Hills Avenue
Dayton, OH 45429

To: Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 S.W. Elligsen Road
Wilsonville, OR 97070

We are sending you:

- [ ] Prints
- [ ] Plans
- [ ] Estimates
- [ ] Shop Drawings
- [ ] Copy of letter
- [ ] Samples
- [ ] Comps Prototypes
- [ ] Photography
- [ ] Specifications
- [ ] Keylines
- [ ] Layouts

COPIES	DATE OR NO.	DESCRIPTION
2	10/28/91	Preliminary Prints of First Floor and Mezzanine Floor Plans

- [X] For your use
- [ ] For approval
- [X] As requested
- [ ] For review & comment
- [ ] Approved & noted
- [ ] Construction approval
- [ ] Returned for corrections
- [ ] Returned after loaned to us
- [ ] Return ____ corrected prints
- [ ] Submit ____ copies for ____
- [ ] Resubmit ____ copies for ____
- [ ] For bids due ____
- [ ] ____

Remarks:

Signed: William F. Bergman
William F. Bergman, AIA
Project Architect

Date: 10/28/91

cc: Rich Hollander
Marla

MEMORANDUM

TO: Development Review Team DATE: October 21, 1991

FROM: Blaise Edmonds, Associate Planner, City of Wilsonville.

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).
2. Office and warehouse, Liberty Organization, applicant.
3. Comprehensive plan amendment, Mr. Marvin Wagner, applicant.

Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

Blai

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

DATE: October 18, 1991

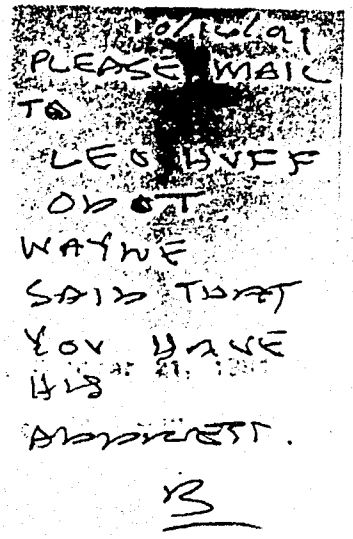
RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

Blaze—
I understand W&H says 150 cfs for Town Center to go into 48" culvert — is there more from other properties — if so how does that affect park drainage — if yes we need to make sure all info is available before abandoning on site retention — could keep a pond as a water feature for Town Center
Mike.
cc. Steve Shaner

(503) 227-0455 Fax (503) 274-4607



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TO: Development Review Team DATE

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W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

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City of Wilsonville

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W&H Pacific

DATE: October 18, 1991

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(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

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1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: Blaise Edmonds
Pam Ennemoser
City of Wilsonville, Annex
30000 SW Town Center Loop ~~East~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 467-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	☒ For Your Info/File	
☒ Facsimile 682-7025	☐ As Requested	
3 Number Of Pages Including Cover	☒ For Review And Comment	
☐	☐	

Copies	Description
1 ea.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Ennemoser

3012

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

October 15, 1991

TO: Kim Beach, Capital Realty Corp.
Bill Bergman, Design Form Architects
All in Attendance

FROM: Tom Jones

RE: MINUTES OF MEETING WITH THE CITY OF WILSONVILLE
OCTOBER 14, 1991, 4:00 P.M. TO 5:05 P.M.
PROJECT THUNDER
4-467-0301; 4-755-0101

ATTENDEES: Tom Jones, W&H Pacific
Rick Martin, W&H Pacific
Pat Marquis, W&H Pacific
Logan Cravens, JKS Architects
Blaise Edmonds, City Planner
Pam Emmons, Planning Assistant

The following was discussed regarding the project in preparation for the Friday, October 18th submittal.

STAGE ONE SUBMITTAL

1. The site plan prepared by JKS should show:
   a. Revised project phasing
   b. Open space area as previously shown as a condition of approval from initial submittal.
   c. Specific "Town Center" land use designations must be shown for the northerly portion of the site not previously included and for any changed designations from the original submittal for Phases II and III.

2. Submit ten (10) copies of the original Traffic Report and provide an Executive Summary outlining any revisions to the initial projections and provide a summary that addresses the level of service "D" or better at surrounding intersections. Review the Parkway/Loop Road intersection.

3. Show existing adjacent land uses (i.e., vacant or improved) and the names of key surrounding developments for the Planning Commission orientation. Show only existing improvements not proposed.

4. Capital Realty must provide an updated list of addresses and property owners within 250 feet from the project.

5. Capital Realty must submit the Certification of Assessments and Liens form with the application. This is to determine if the tax lots included owe money to the City. Contact Atta Curser for clarification.

6. All property owners must sign the application.

7. Application fees:
   a. Stage One Submittal: $500.00
   b. Stage Two Submittal: $250.00 plus $25 per acre (Project Thunder is 14.98 acres)
   c. Application fee for Friday: ($500 + $250 + $375 = $1,125)
   d. Design Review: $250 plus a fee for the master signage plan review.

STAGE TWO SUBMITTAL

1. Design of site signs are not required to be submitted until Design Review submittal of December 6th.

2. Landscape design needs to show planting areas, significant trees and plaza areas. Plant list is optional.

3. Grading calculations and storm drainage calculations are not required for Friday's submiual according to Blaise. Grading plan should show existing contours and general grading concept.

4. Utilities design should be kept schematic. Graphically illustrate the utility alignments that will require easement vacations and relocation.

5. Architectural elevations can be conceptual in detail. Planning Commission is only concerned with general massing and quality of appearance. Materials and color board to be submitted at Design Review.

6. If waivers to the City development standards are anticipated, be specific with your request and how it would be consistent with other surrounding project development standards.

GENERAL COMMENT

The two issues that will be of the most interest to the Planning Commission will be traffic and the implementation of the open space. We should develop a clear strategy to present to the Commission prior to the December 9th hearing addressing these two issues.

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

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Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

FAXED 10/17/91

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop ~~EAST~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 967-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile 682-7025
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These Are Transmitted:
- ☒ For Your Info/File
- As Requested
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Copied To:

Copies	Description
1 ea.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

In Attendance:

Pam Emmons	City of Wilsonville, Associate Planner	WSV	503-682-4960
Martin Brown	City of Wilsonville, Building Official	WSV	503-682-4960
Steven Starner	City of Wilsonville, Community Development Dir.	WSV	503-682-4960
Jim Long	City of Wilsonville, Design & Survey Technician	WSV	503-682-4960
Doug Seely	Real Estate Investment and Sales	REI	503-655-7631
Jim Parsons	Grubb & Ellis	GEI	503-241-1155
Jim Faulkner	Design Forum Architects	DFA	800-835-4401

Item No.	Action	Item
1.10	CAP/WHP	Storm drainage is an issue. Calculations and 25 year storm design for Phase II master plan must be submitted with application by October 18, 1991 deadline. The connection for metered release to interstate highway from existing retention pond and the retention pond itself will be eliminated. According to Wayne Bauer of Wilsey & Ham Pacific, Civil Engineers for Phase I development of the site, the new storm sewer system was designed to accommodate this. The city would like to see calculations supporting this.
1.2	CAP/KAI	According to the city, a traffic light at Wilsonville Road and Town Center Loop West is now warranted. The north intersection at Town Center Loop East and West at Parkway Avenue needs to be addressed in traffic study.
1.3	DFA	The currently approved master plan calls for "Food and Sundries" (FS) and "Central Commercial" (CC). These zoned uses are compatible with the desired development of Project Thunder. No rezoning is necessary, however, currently approved uses will have to be redistributed on the site.

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.4	ALL	The Stage I and Stage II planning review applications will be made simultaneously on October 8, 1991, and be reviewed simultaneously at the Planning Commission on December 9, 1991.
1.5	GEI	Hearing notification list for all property owners of record within 250 foot of any point on property (not including street widths) must be presented with October 18, 1991 submittal. Notification does not have to cross interstate highway. The city will send the notices. Jim Parsons will obtain list from assessors office or from a title company.
1.6	DFA	The signage theme from Phase I should be carried through Phase II. Sign issues are handled by the Design Review Board. Setback issues are handled by the Planning Commission.
1.7	DFA/WHP	The building is designed utilizing the "unlimited area" provision of the code. A sixty (60) foot minimum distance from all property lines and an approved automatic sprinkler system throughout will be provided to accommodate this provision.
1.8	TNB	There is a ten (10) day appeal period following design review approval. Normal procedure is such that no work should be commenced during the appeal period. Due to the tight schedule for this project and the need to utilize every available good weather period for site escavation, an option for work during the appeal period was discussed. A "hold harmless" agreement from owner in favor of the City of Wilsonville, enabling work to start immediately after design review approval during the appeal period at the sole risk of the owner has been used in the past to facilitate an early start.

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Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.9	WHP	For any construction to begin, fire hydrants must be installed to within 250 feet of any point of the exterior wall of the building. Work should begin immediately to obtain Public Works approval and have installation complete by scheduled start of construction, February 1, 1992.
1.10	ALL	The required completion date of construction necessitates a start date for construction of February 1, 1992. For this to happen, working drawings and specifications would have to be accomplished prior to design review hearing date of January 27, 1992. To minimize risk of changes to completed documents, a partial permit (foundation permit) can be applied for at a cost of $250.00. This would allow work to begin while balance of documents are being prepared. The review time for foundation and underground utilities permit is approximately three weeks, so documents should be submitted by January 10, 1992 for a February 1, 1992 start of construction.
1.11	DFA	The zoning height limitation for any point of the building is 35'-0". Design Forum will check with Blaise Edmonds regarding height of dome feature with center pole.
1.12	DFA	Elevations and material, color and finish boards must be submitted with Design Review Board application by December 6, 1991 deadline for hearing date of January 27, 1992.

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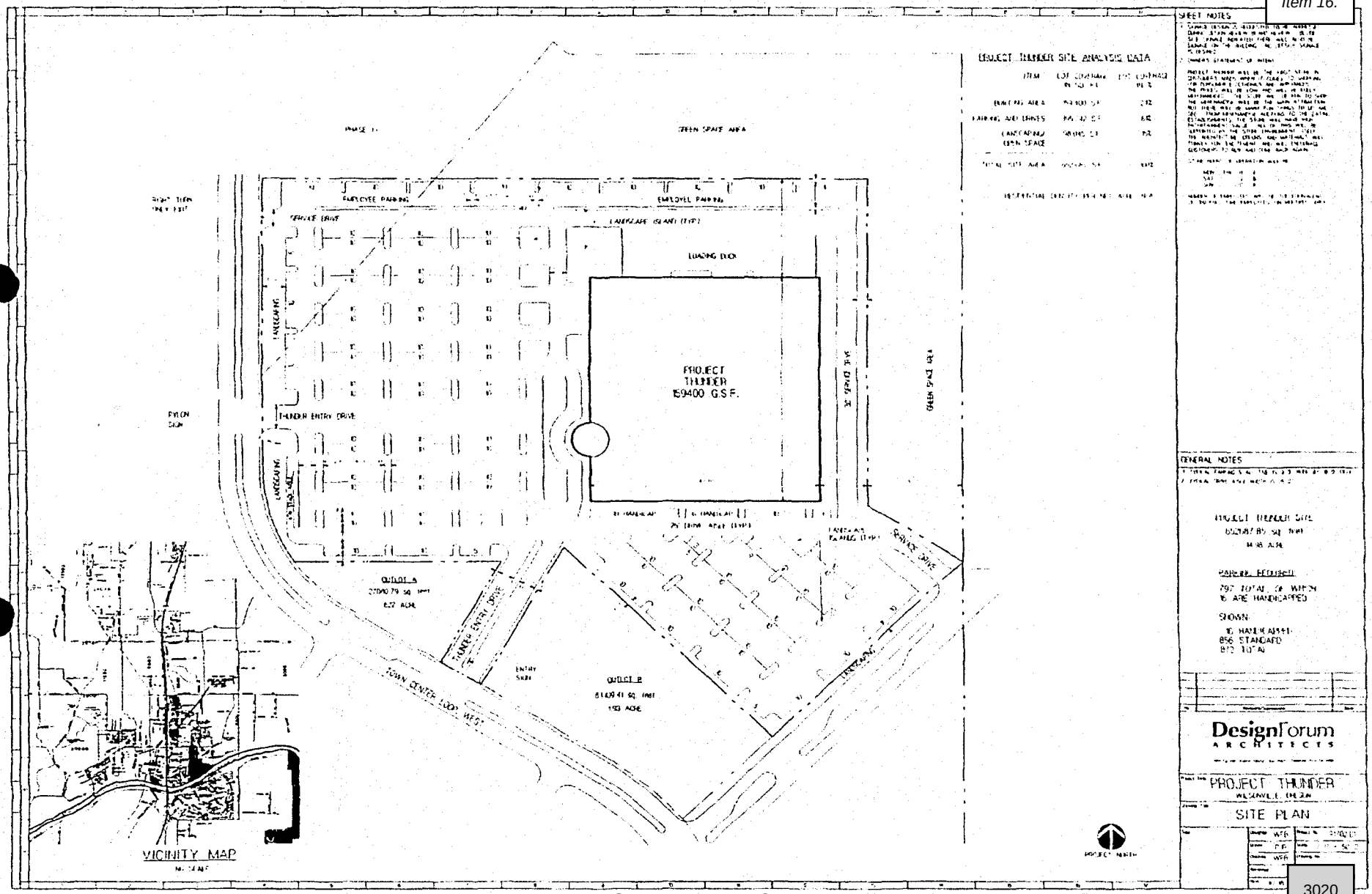
Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

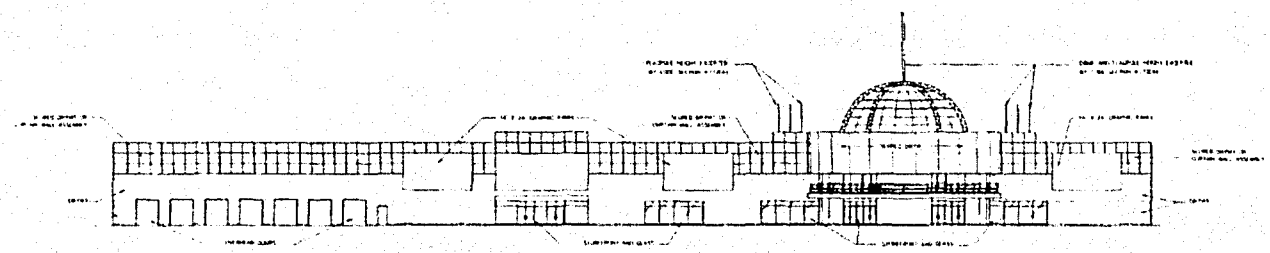
The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

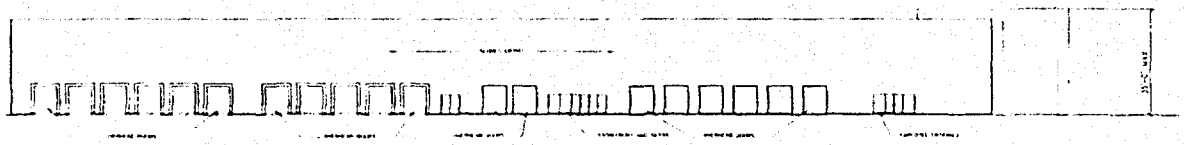
Respectfully submitted,

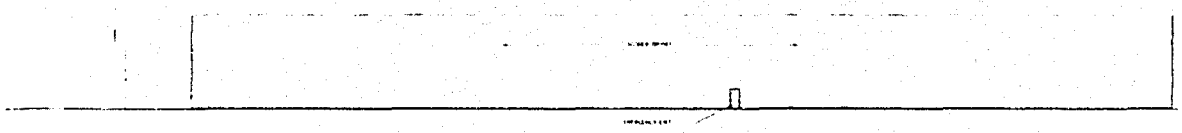
James L. Faulkner, AIA
Vice President, Architecture

cc: All in Attendance
Rich Hollander, Tandy Name Brand (TNB)
Blaise Edmonds, City of Wilsonville, Associate Planner (WSV)
Kimberly Beach, Capital Realty Corporation (CAP)
Tom Jones, Wilsy & Ham Pacific (WHP)
Wayne Kittelson, Kittelson & Associates, Inc. (KAI)
D. Lee Carpenter, Design Forum
Bruce Dybvad, Design Forum
Marla Halley, Design Forum
Bill Bergman, Design Forum Architects


PROJECT THUNDER
159400 G.S.F.
EMPLOYEE PARKING
SERVICE DRIVE
LANDSCAPE ISLAND (TYP.)
LOADING DOCK
LANDSCAPING
THUNDER ENTRY DRIVE
PYLON SIGN
OUTLOT A
OUTLOT B
ENTRY SIGN
GREEN SPACE AREA
PROJECT THUNDER SITE ANALYSIS DATA
ITEM
LOT COVERAGE
PARKING AND DRIVES
LANDSCAPING/ OPEN SPACE
SHEET NOTES
GENERAL NOTES
PARKING REQUIRED
SHOWN
DesignForum
ARCHITECTS
PROJECT THUNDER
SITE PLAN
VICINITY MAP
PROJECT NORTH







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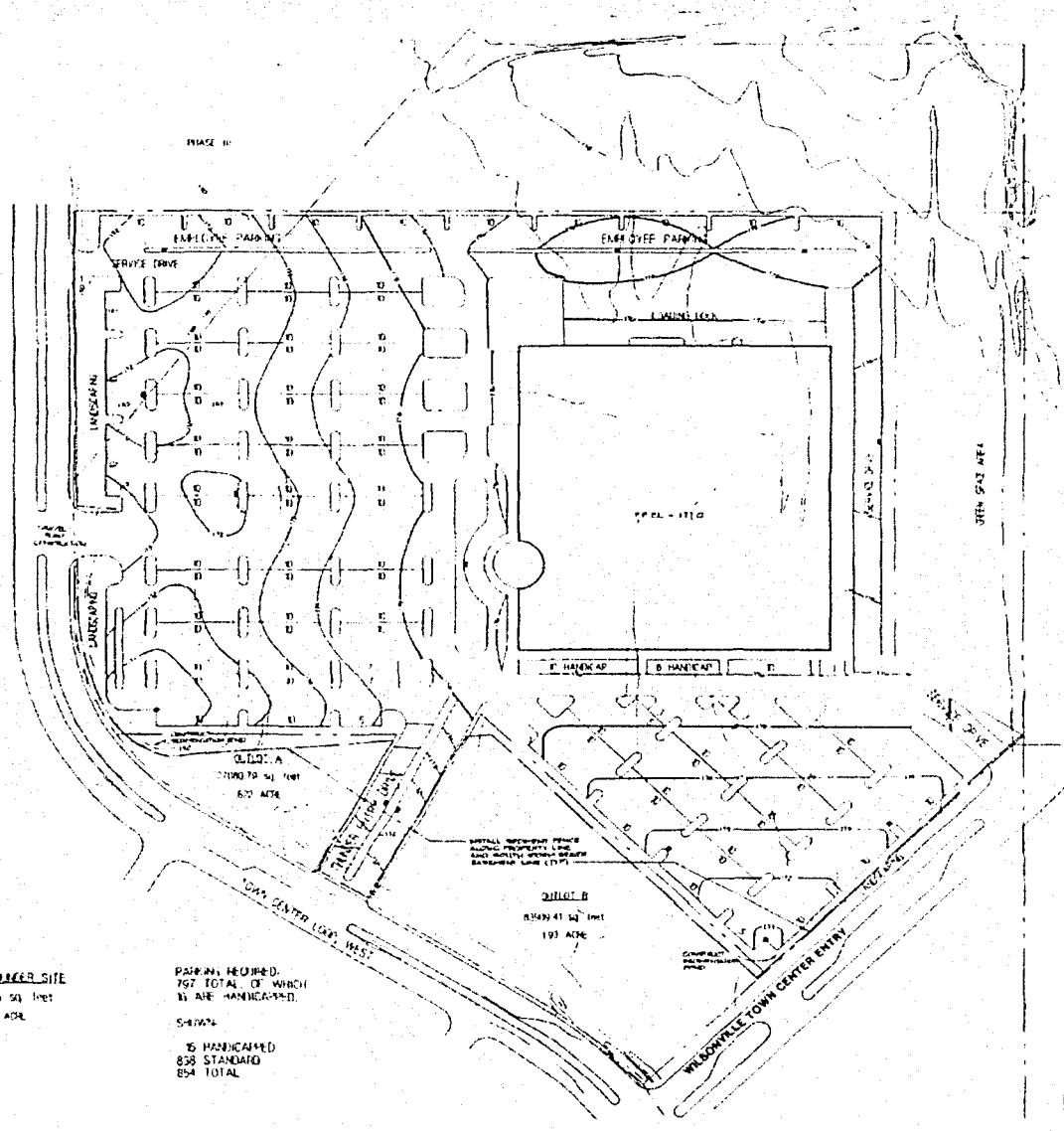
PROJECT THUNDER
HILLSBORO, OREGON

EXTERIOR ELEVATIONS

3021



SHEET NOTES

GENERAL NOTES

key plan

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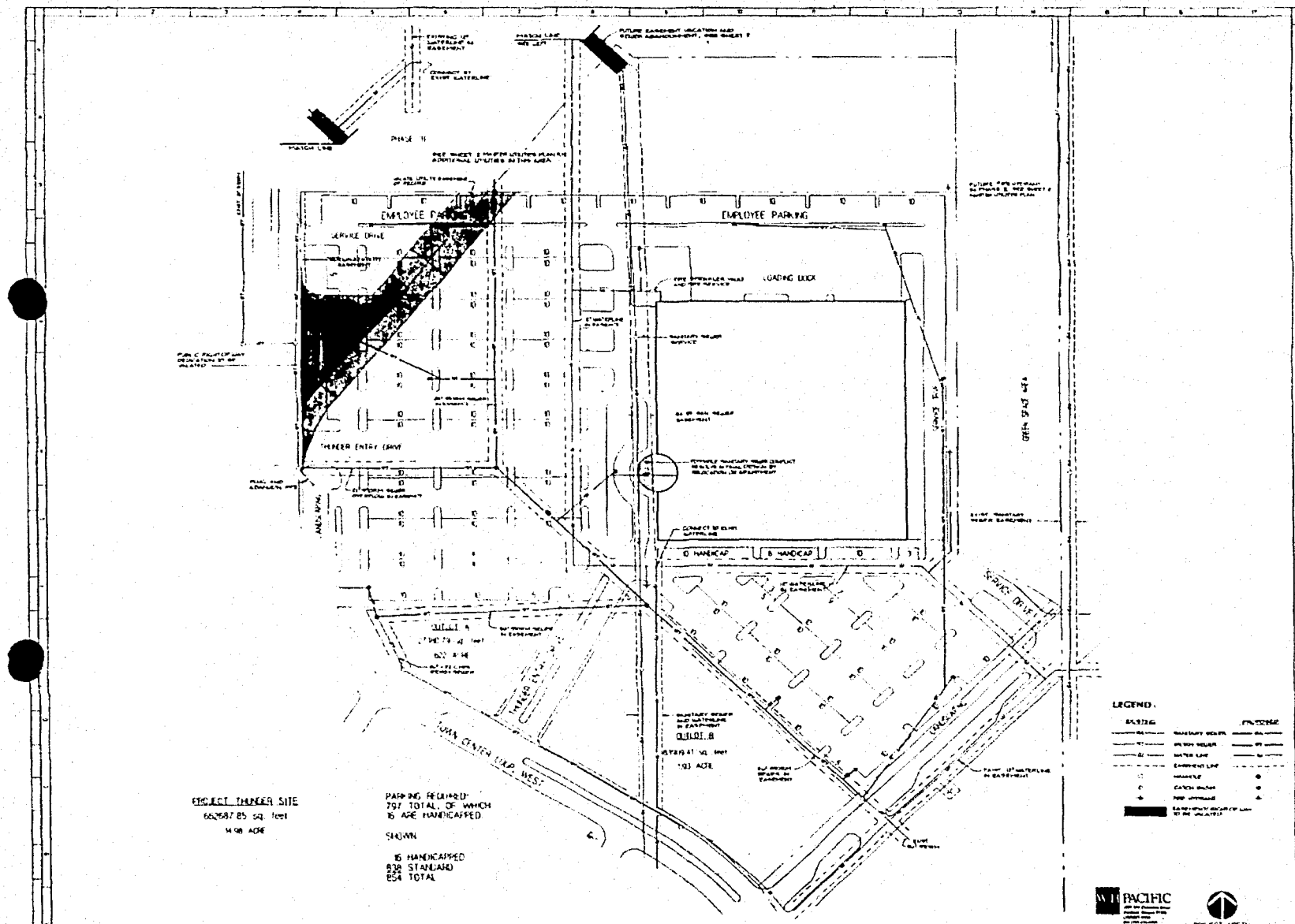
PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II GRADING/EROSION CONTROL PLAN

1" = 50'-0"

3022



SHEET NOTES

GENERAL NOTES

Key Plan

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PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II UTILITIES PLAN

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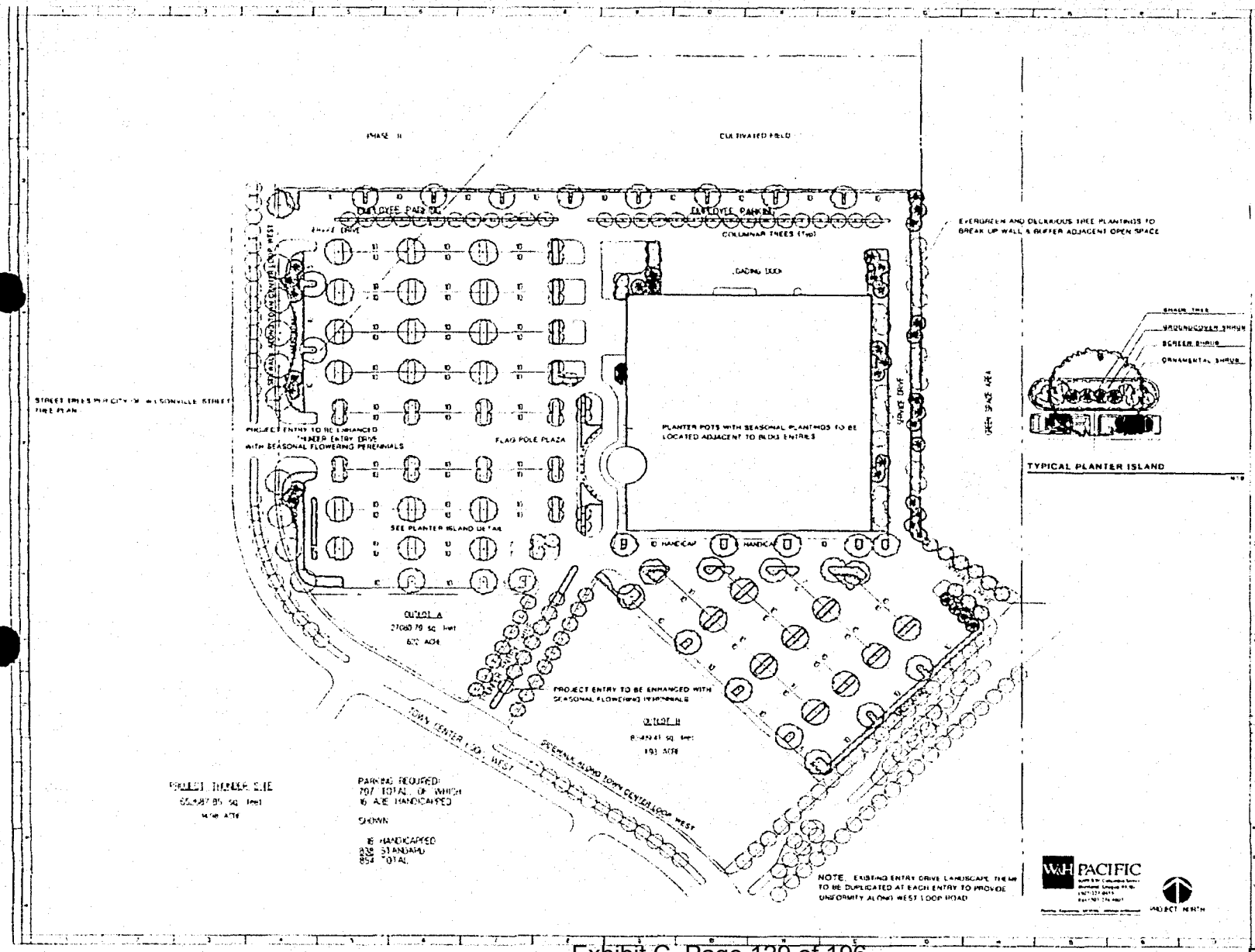


SHEET NOTES

LEGEND

- SHADE TREES
- FLOWERING TREES
- EVERGREEN CONIFER TREES
- ORNAMENTAL LANDSCAPE SHRUBS & GROUNDCOVER
- LAWN
- EXISTING STREET TREES

TYPICAL PLANTER ISLAND

GENERAL NOTES

- AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED

DesignForum ARCHITECTS

PROJECT TUNNER

WILSONVILLE, OREGON

PHASE II LANDSCAPE PLAN

ASSIGNMENT

FOR VALUABLE CONSIDERATION, receipt and sufficiency of which are hereby acknowledged, SFS INVESTMENT CORP., an Oregon corporation (Assignor), hereby assigns, transfers and conveys to CAPITAL REALTY CORP., an Oregon corporation (Assignee), all of Assignor's right, title and interest in each option agreement, offer and other document described in Exhibit A attached hereto, the real property described in any such option agreement or offer, and all rights which Assignor now has or may hereafter acquire with respect thereto.

February 1, 1990.

SFS INVESTMENT CORP.

By _____
President

STATE OF OREGON)
) ss.
County of Multnomah)

On this 1st day of February, 1990, before me personally appeared Steven F. Stiles who, being duly sworn, did say that he is the president of SFS INVESTMENT CORP., an Oregon corporation, and acknowledged that the foregoing instrument was executed on behalf of the corporation by authority of its board of directors as its voluntary act and deed.

Before me:

_____
NOTARY PUBLIC for Oregon
My Commission Expires 10/31/92

AGREEMENT AND OPTION

THIS AGREEMENT AND OPTION is between E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as Marlene A. Young Rifai, the Estate of Harold J. Laswell, Deceased, and FRED A. ANDERSON, hereinafter collectively referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-14D, are E. Jean Young, Sherilyn J. Young, David S. Young, Marlene A. Young, also known as Marlene A. Young Rifai, and Jack L. Lozo.

B. The owner of Parcel II, i.e. tax lot 300, MAP 3-1W-14D is Jack L. Lozo.

C. Grantee has options to purchase Parcel I and II by documents respectively dated August 17, 1989 and August 23, 1989; said options are valid through December 21, 1989.

D. Grantor's offer to option Parcel III is contingent upon Grantee's obtaining extensions of the options to purchase Parcel I and II.

E. Grantors own Parcel III, i.e. Tax Lot 200, 300 & 401, Clackamas County MAP 3-1W-14D and ownership interests in a triangle of land approximately 6381 square feet on the west of Tax Lot 200 , described in Exhibit A. Parcel III shall refer to the

be made in full upon closing and a statutory warrenty deed provided at that time.

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

~~ion.~~ The Option to purchase Phase 2 in its enti er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel III unless Grantees pay to Grantors $50,000 for an extension of the Option for one year. Payment for such extension is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or be[redacted]vember 2, 1992, at the purchase price of ent on an additional $50,000, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantor's name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors prior to formal application to the City of Wilsonville. Grantors shall retain the right of review during the planning process with the City,

Grantee may not agree to any request to increase the Open Space requirements on any Phase of any Parcel.

11. Real Property Taxes. The Option Property has been specifically assessed as Farm Use Land. Therefore, portions of the annual taxes are deferred until the Option Property becomes disqualified for that purpose. If Grantee exercises the Option as

preliminary agreements. This Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 31 day of October, 1989.

E. Jean Young
E. JEAN YOUNG

SFS INVESTMENT CORP.

11-8-89

SHERILYNN J. YOUNG

By _____
SFS President
Steven F. Styles

David S. Young
DAVID S. YOUNG

SFS INVESTMENT CORP.

Marlene A. Young
by _____, attorney in fact
MARLENE A. YOUNG

By _____
SFS Officer

ESTATE OF HAROLD J. LASWELL
DECEASED

GRANTEES

By _____
Emma D. Laswell
Personal Representative

By _____
Eugene L. Deffler
Personal Representative

_____
FRED A. ANDERSON

GRANTORS

ST IVES PROPERTIES LTD.
by _____

EXHIBIT A

I
Wilsonville Property

Option dated November 16, 1989 granted by Jack L. Lozo for property generally known as Tax Lot 500, Map 3-1W-13, Clackamas County, Oregon.

Agreement and Option dated October 31, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Estate of Harold J. Laswell, Deceased, and Fred A. Anderson for property generally known as Tax Lots 200, 300 and 405, Map 3-1W-14D, Clackamas County, Oregon, togther with a triangular parcel containing approximately 6,381 square feet on the westerly side of Tax Lot 200.

Option dated November 15, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Jack L. Lozo, and Anne S. Lozo, Trustee for Claude F. Smith Trust, for property generally known as Tax Lots 600 and 601, Map 3-1W-13, Clackamas County, Oregon.

Attached hereto is a plot map showing the general location of the three parcels.

II
Gresham Property

Earnest Money Agreement dated August 1, 1989, amended by Memorandum of Agreement dated September 20, 1989, with Leonard P. Holfman and Kenneth G. Holfman, Trustees of the Olive H. Holfman 1979 Trust dated May 7, 1979, for the purchase of a tract of land in the Robert P. Wilmot DLC and being Sections 19 and 30, Township 1 North, Range 3 East of the Willamette Meridian, Multnomah County, Oregon (Tax Lot #32), containing approximately 21.3 acres on the north side of N. E. Sandy Boulevard west of Northeast 181st Avenue.

III
Salem Property

Offer dated November 1, 1989, accepted by Anita Hager Conley, Trustee, on November 29, 1989, for a parcel containing approximately 9.38 acres in the southwest quarter of Section 31, Township 7 South, Range 2 West, known as Tax Lot 200, Salem, Marion County, Oregon.

AGREEMENT AND OPTION

PARCEL II

THIS AGREEMENT AND OPTION is between JACK L. LOZO, hereinafter referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-13, are E. JEAN YOUNG, SHERILYN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, JACK L. LOZO, and the CLAUDE F. SMITH TRUST, ANN S. LOZO Trustee.

B. The owner of Parcel III, i.e. tax lot 200, 300 & 405, Clackamas County MAP 3-1W-14D and a triangle of land approximately 6,381 square feet on the west of tax lot 200 are E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, the estate of HAROLD J. LASWELL, Deceased, and FRED A. ANDERSON.

C. Grantors own Parcel II, i.e. Tax Lot 500, MAP 3-1W-13. Parcel II shall also be referred to as the Option property.

D. Grantee has options to purchase Parcel I & II by documents dated August 17, 1969 and August 23, 1969, said options are valid through December 31, 1969.

E. Grantors' offer to option Parcel II is contingent upon Grantee's obtaining an extension of the option to purchase Parcel

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

4. Extension. The Option to purchase Phase 1b and 2 in its ent er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel II unless Grantee pays to Grantors $5,000 for an extension of the Option to purchase Phase 1b property, ~~and pays to Grantor an additional $5,000 for an extension of the Option to purchase Phase 2 property if owned by Grantors~~. Payment for such extension shall be for one year, is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or before November 2, 199 at the purchase price of payment on an additional $5,000, s, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

authority to grant the Option and to sell their interest in the Option Property in accordance herewith.

7. Reciprocal Easements: Grantors and Grantee agree that each will enter into reciprocal easements with the owners of Parcels I and III as agreed upon by the parties.

8. Right of Entry. Grantee may, at its risk and expense during the term of the Option, enter upon the Option Property at any time to make engineering tests, soil tests and for any other lawful purpose in pursuit of the purchase and development of said property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantors' name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors

the entire agreement among the parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. This Agreement and Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 11 day of November, 1989.

JACK L. LOZO

ANN S. LOZO, Trustee for
CLAUDE F. SMITH TRUST

GRANTORS

SFS INVESTMENT CORP.

By
SFS President
Steven F. Stiles

SFS INVESTMENT CORP.

By
SFS Officer

GRANTEES

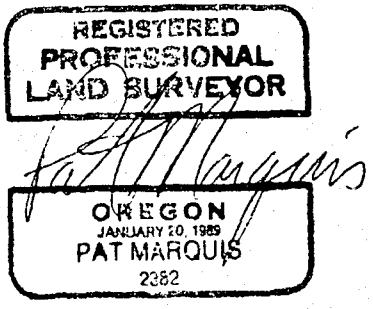
PROJECT THUNDER LEGAL DESCRIPTION

A parcel of land situated in the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southeast corner of Section 14, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon: thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**: thence leaving said section line and tracing the following courses and distances: South 45°03'00" West 400.00 feet; thence North 44°57'00" West 435.01 feet to a point of non-tangent curvature; thence tracing the arc of a 2,000.00 foot radius curve to the right (the radial center of which bears North 65°07'50" West) through a central angle of 07°23'12" an arc distance of 257.84 feet (the long chord bears South 28°33'46" West 257.66 feet) to the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line North 57°44'38" West 72.00 feet to a point of radial intersection with a 1,928.00 foot radius curve; thence leaving said northeasterly right-of-way line and tracing the arc of a 1,928.00 foot radius curve to the left through a central angle of 05°32'12" an arc distance of 186.31 feet (the long chord bears North 29°29'16" East 186.23 feet); thence South 89°52'55" West 304.91 feet to a point of non-tangent curvature on the said northeasterly right-of-way line of Town Center Loop Road West; thence tracing said right-of-way line along a 268.16 foot radius curve to the right (the radial center bears North 56°01'43" East) through a central angle of 33°55'55" an arc distance of 158.81 feet (the long chord bears North 17°00'19" West 156.50 feet) to a point of tangency; thence continuing along said right-of-way line North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing said right-of-way line North 00°02'22" West 121.76 feet; thence leaving said right-of way line and tracing the following

courses and distances: North 89°52'55" East 894.39 feet to a line being parallel with and 140.00 feet westerly of the said section line common to sections 13 and 14; thence tracing said parallel line South 00°03'01" West 528.73 feet; thence South 56°23'33" East 168.00 feet to the **TRUE POINT OF BEGINNING**. Said parcel contains 642,427 square feet or 14.75 acres more or less.

755-0101
10/16/91



Jim Parsons
Jim Faulkner
Doug Seely

Phase
~~Stage~~ I, II, III → Cap. Realty will submit

Phase II →
Cap. Realty △ master plan modification
Site plan I, II

Landy - Thunder 120+ thou footprint
Electronics +

Parkway / TC (E) + (W)

~~Park~~ → Open Space.

Submit Stage I + II ~~Simultaneously~~

Blaise
what else?

* Gave Stage I + II + application x2
250' radius map owners

Topo - 1' intervals - (map has readings)

~~Blaise - 50' top dam~~

Ø phase

100 - 1

CITY

100 - 120 DWELLING UNITS.

- DOUG SEELY TALKED TO BOB DANT -
- ABOUT DENSITY TRANSFER TO BRIDGE CREEK.
- P.O.S.

- CONTOUR SURVEY - >20%
- TREE SURVEY >6" caliper
- MAJOR DRAINAGEWAY.

STAKE THE PROPERTY - SITE VISIT TO VERIFY P.O.S LINE - AMBIGUITY - GO TO P.L TO C.L. FOR INTERPRETATION.

~~CALL MIKE - 420-2424~~

CITY of WILSONVILLE
PLANNING COMMISSION
SITE MASTER PLAN (STAGE I)
GENERAL SUBMISSION REQUIREMENTS

1. Completed application form, with appropriate fee, signed by property owner.
2. Set forth the professional coordinator and professional design team.
3. State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.
4. The application shall include conceptual and quantitatively accurate representation of the entire development sufficient to judge the scope, size and impact of the development on the community; and, in addition, shall be accommodated be the following information:

   13 FOLDED copies of Site Master Plan dimensioned at a scale of 1" = 20 ft. (or as determined by the Planning Director) showing the following:

   a. Vicinity map.
   b. The entire lot as described by the legal description.
   c. Location and size if all public facilities, utilities and easements.
   d. Location and dimension of site improvements such as roads, buildings, driveways, parking, loading and landscaping.
   e. All adjacent rights-of-way and improvements.
   f. Any surrounding development, i.e., existing buildings, property lines, driveways, etc.
   g. Development phasing. A stage development schedule demonstrating that the developer intends to commence construction within (1) One year after the approval of the development plan, and will proceed diligently to completion.
   h. Topographic information at one-foot intervals up to 5% slope; two-foot intervals, 6% - 12%; five-foot intervals. 12% - 20%; ten-foot intervals, 20% and above.

5. One copy of Site Plan reduced to 8-1/2" x 11". This must be a legible photo-mechanical transfer (PMT).
6. Site Analysis Data.

Item	Lot Coverage in sq. ft.	Lot Coverage in %.
Building area	458,771 sq. ft.	.18 %
Parking and Drives	1,394,390 sq. ft.	.53 %
Landscaping/Open Space	751,291.4 sq. ft.	.29 %
Residential density per net acreage.		
TOTAL SITE AREA	2,604,452.4 sq. ft. 59.79 ACRES	100 %

Planning Department 682-4960

INCOMPLETE SUBMITTALS WILL NOT BE SCHEDULED FOR A PUBLIC MEETING !

Traffic count zooms at electronic store

■ Wilsonville's projections for vehicle flow at the Incredible Universe fall woefully short

By JOHN M. GRUND
Correspondent, The Oregonian

WILSONVILLE — When it comes to predicting how much traffic a new development will bring, Wilsonville officials always have gone by the book.

But going by the book has not worked for some recently opened projects — in particular the Incredible Universe electronics store. In some cases, traffic is already at levels predicted for 2010.

Now city officials are looking at ways to refine the city's traffic projections.

Eldon Johansen, community development director, told the City Council early this month that traffic on Town Center Loop West near the new electronics store is averaging 1,227 vehicles an hour northbound at 2 p.m. That's 550 more vehicles per hour than anticipated in projections for 1995, he said.

"As far as the traffic counts go, we've had a real eye-opener on our traffic projections. We're already up past (the year) 2010 on some of our traffic projections," Johansen said.

"The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts," said Arlene Loble, city manager.

The city has changed its procedure for getting traffic analysis done on proposed developments. This fall, it switched from having a developer hire a traffic engineering firm to requiring applicants to pay for a study by D.K.S. Associates, the firm chosen by the city to handle all of its traffic analysis.

Planning Director Wayne Sorensen said the move should not be interpreted as a criticism of the firms that have done studies in the past. All of them, in fact, bid on the city contract, he said.

"I think we feel better now (that) the traffic engineer is working for the city," he said. "When the applicant hires the engineer, they're working for the client, and the city's not the client."

Johansen said the city also would expand the scope of some studies.

The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5.

It was that intersection that clogged up at the Incredible Universe opening Sept. 17 and caused traffic to back up for miles in both directions.

If the study were being done today, the city would insist that engineers look at one more intersection down the road, Johansen said.

City Councilor Greg Carter asked if the traffic effects of some recent developments meant that the city should consider a moratorium on some new construction.

"I'm not willing to say that yet," Johansen said.

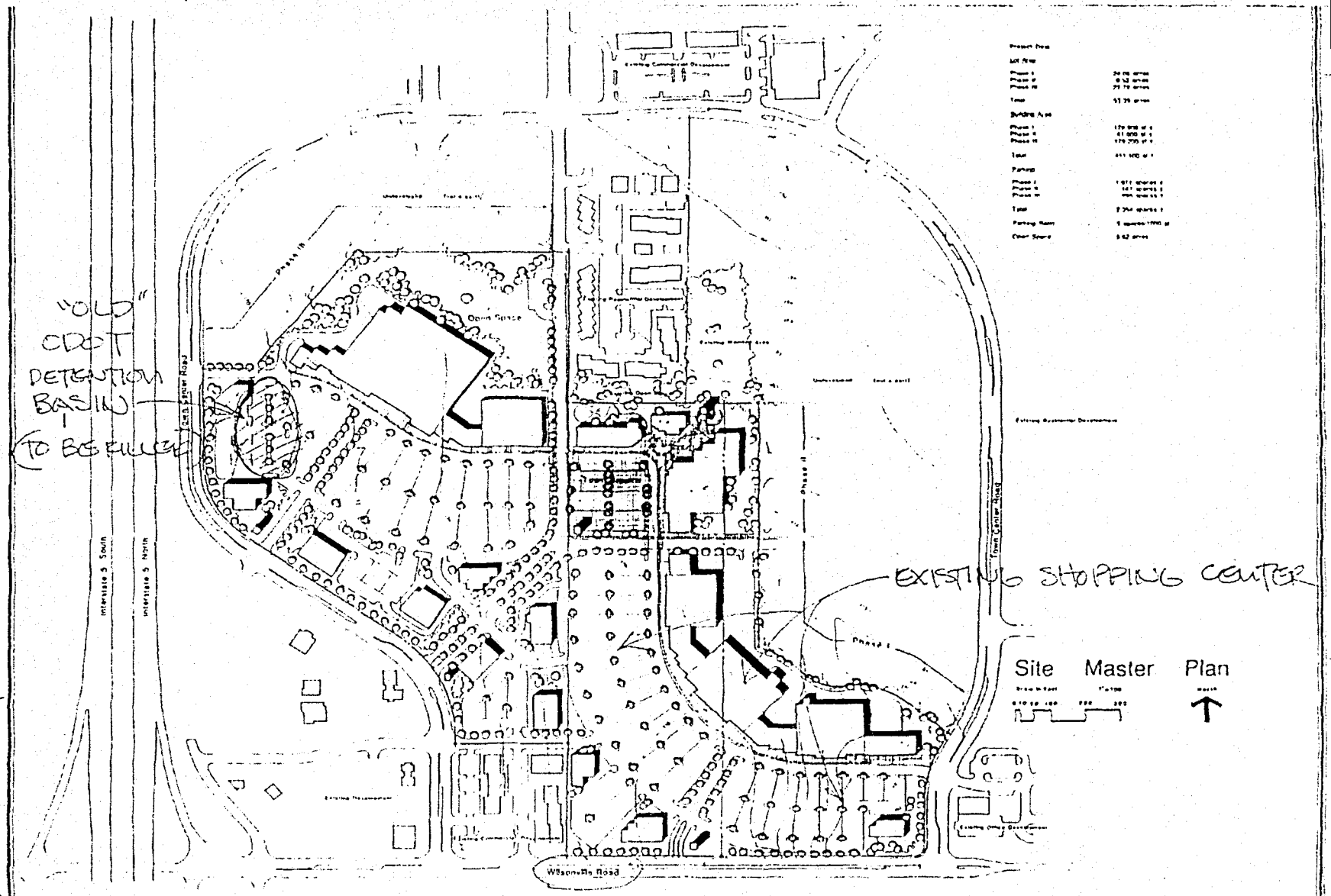
He said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built.

Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic — that is, traffic already on the streets for other reasons. But the store has become a regional draw, and "drop-in" traffic is a tiny percentage of traffic it attracts. Finally, the traffic study did not account for the success of the store's marketing effort.

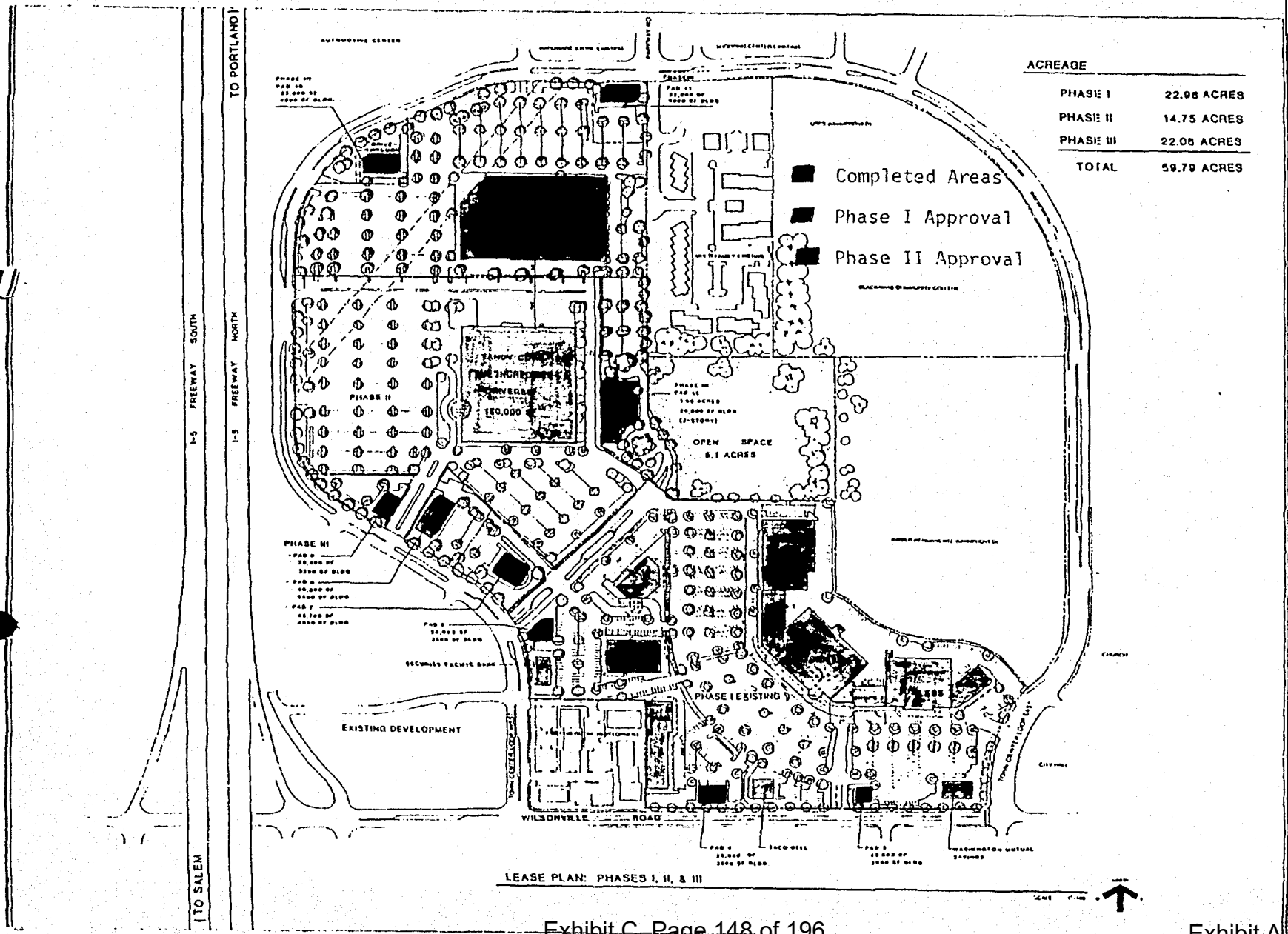
"At a minimum, we need to be broadening the assumptions on which decisions are made," Loble said. "We've recognized that the traffic situation is beyond anything anticipated in the rational decision-making model."

Sorensen, however, later said there are no plans to tinker with the engineering manual — he called it "the bible" — that predicts how many new trips will be generated by a particular use.

Sorensen would not hazard a guess about whether any of the changes will mean that developments will have a tougher time getting planning approval in Wilsonville. But he said that at least one major development was turned down as long as two years ago because it would have brought too much traffic to an overburdened street.

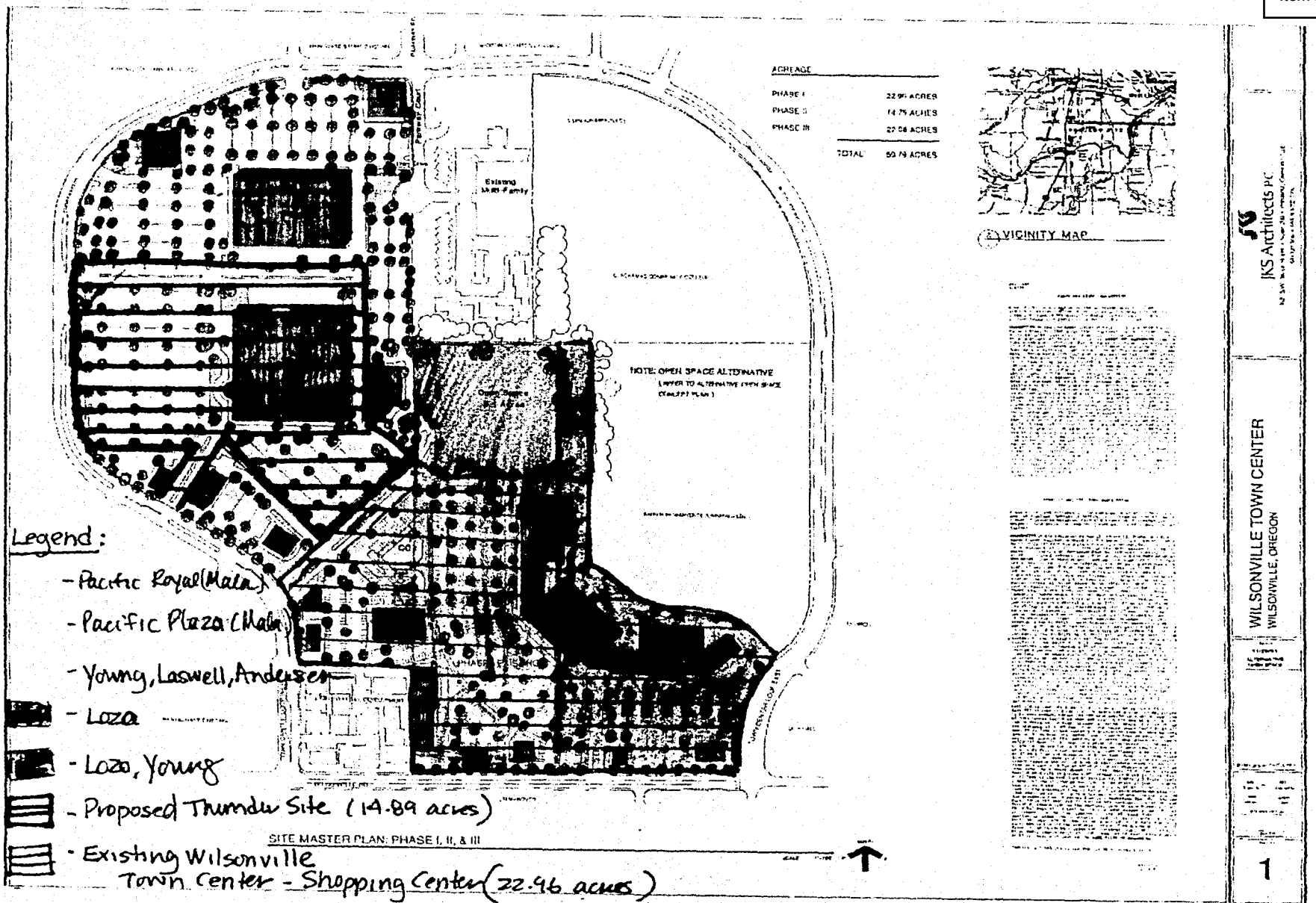

"OLD"
CDOT
DETENTION
BASIN
(TO BE FILLED)
EXISTING SHOPPING CENTER
Site Master Plan
Wilsonville Road
Interstate 5 South
Interstate 5 North
Town Center Road
Open Space
Phase II
Phase I
JKS Architects PC
Wilsonville Town Centre
P1

STAFF : CC



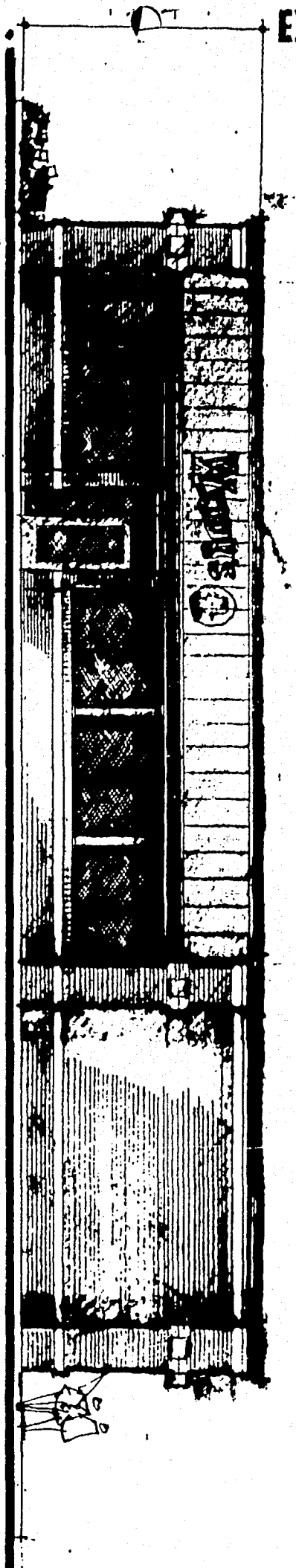
JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON


ACREAGE
PHASE I 22.96 ACRES
PHASE II 14.75 ACRES
PHASE III 22.08 ACRES
TOTAL 59.79 ACRES
NOTE: OPEN SPACE ALTERNATIVE
VICINITY MAP
Legend:
- Pacific Royal (Mall)
- Pacific Plaza (Mall)
- Young, Laswell, Anderson
- Loza
- Loza, Young
- Proposed Thunder Site (14.89 acres)
- Existing Wilsonville Town Center - Shopping Center (22.96 acres)
SITE MASTER PLAN: PHASE I, II, & III
JKS Architects PC
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON
1

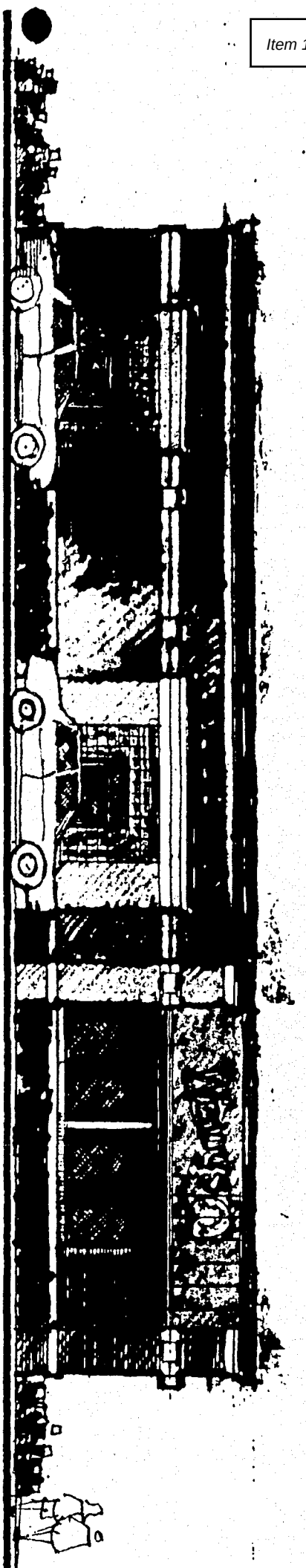
DEFECTS IN ORIGINAL DOCUMENT

EXHIBIT F



NORTH ELEVATION

1/8" = 1'-0"



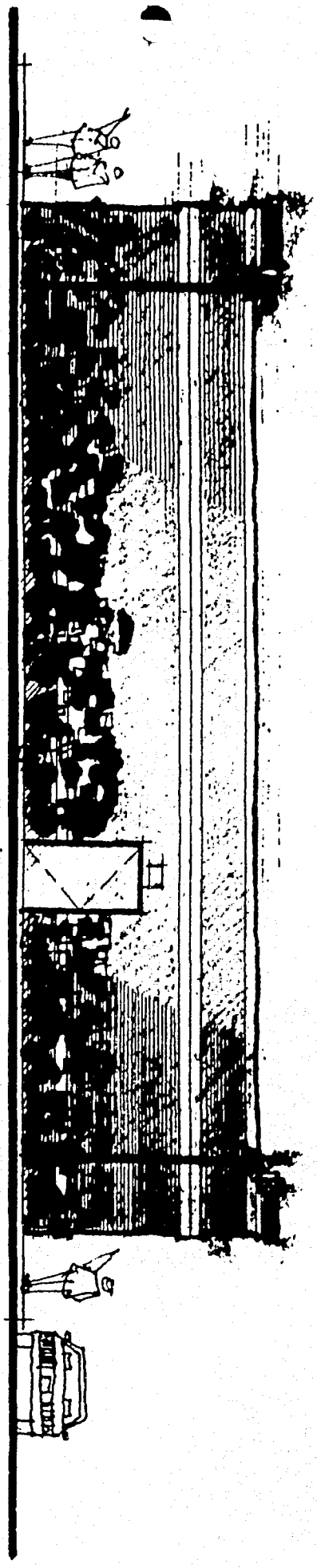
SOUTH ELEVATION

1/8" = 1'-0"

DRAWING NO: 1	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

WEST ELEVATION

1/8" = 1'-0"



EAST ELEVATION

1/8" = 1'-0"

DRAWING NO: 2	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**	
	DRAWING TITLE: **Elevations**	REVISION:	

CITY OF WILSONVILLE

30445 S.W. Boones Ferry Road
P.O. Box 220 Wilsonville, OR 97070-0220
(503) 682-4960

PLANNING DEPARTMENT
SITE DEVELOPMENT APPLICATION

Item 16.

File No. 91 PC 43 1/4 Sec.

Final action on application or zone change is required within 120 days in accordance with provisions of ORS 227.178.

Pre-App. ____ No. ____ Day ____ Yr.

A preapplication conference normally is required prior to submittal of an application. Please contact the Planning Department at 682-4960 for an appointment.

APPLICANT - COMPLETE

Owner's Name CAPITAL REALTY CORP. Contact Person Kim Beach

Address 101 S.W. MAIN SUITE 1500 Address ____

Portland OR. 97204

Phone 223-1200 Phone SAME

Owner's Signature Kimberlin Beach, Vice President Capital Realty Corp
Plaza Royale Officially Designated Representative

Property Description: T 3 R ____ Map 3 1 W 12 Tax Lot(s) 200, 201, 101, 102, 300
See ON 13

Request STAGE I MASTER PLAN REVISION
STAGE II PHASE II WILSONVILLE Town Center
SITE PLAN - MOBILEX CONDITION #8 OF 90PC15

Please attach a plot plan (scale: 1"=40') and any other documents to this application. Please review the Planning Department submittal requirements to ensure that your application is complete.

—OFFICE USE ONLY—

Complete Application Accepted: Date 10/18/91 Public Hearing Date 12/9/91

Staff Signature Blair Edwards

☐ Class I ☐ Class II ☒ Class III

☐ PLAN AMENDMENT	☐ MAJOR PARTITION	☐ DESIGN REVIEW
☐ ZONE CHANGE	☐ MINOR PARTITION	☐ TEXT AMENDMENT
☐ PRELIMINARY PLAT	☐ CONDITIONAL USE	☐ SIGN REVIEW
☐ FINAL PLAT	☐ VARIANCE	☐ TEMPORARY USE
☒ PLANNED DEVELOPMENT	☒ OTHER REGNSIDER CONDITION OF 90PC15	

SITE FINDINGS

1. Zoning: PDC Town Center
2. Area of Lot: SEE FILE
3. Building or Sign Height: (Max) ____
4. Zoning Code Minimum Setbacks: Front ____ Side ____ Rear ____
5. Building Area ____
6. Access to Property TOWN CENTER LOOP WEST
7. Other: ____

☐ Approved ☐ Denied ☐ Approved with Conditions (see attached)

Conditions of Development

Approval of this development permit is based on information submitted by the applicant as noted above. Any change of plans or incorrect information submitted may result in revocation of permit. This decision may be appealed in accordance with the provisions of the Wilsonville Code and ORS 227.180.

Fee Amount Paid $1315.00 Check No. SEE ⇨ Cash 1205 PAY $625.00 II
1206 PAY $315.00 - CASH
1207 PAY $375.00 - CASH

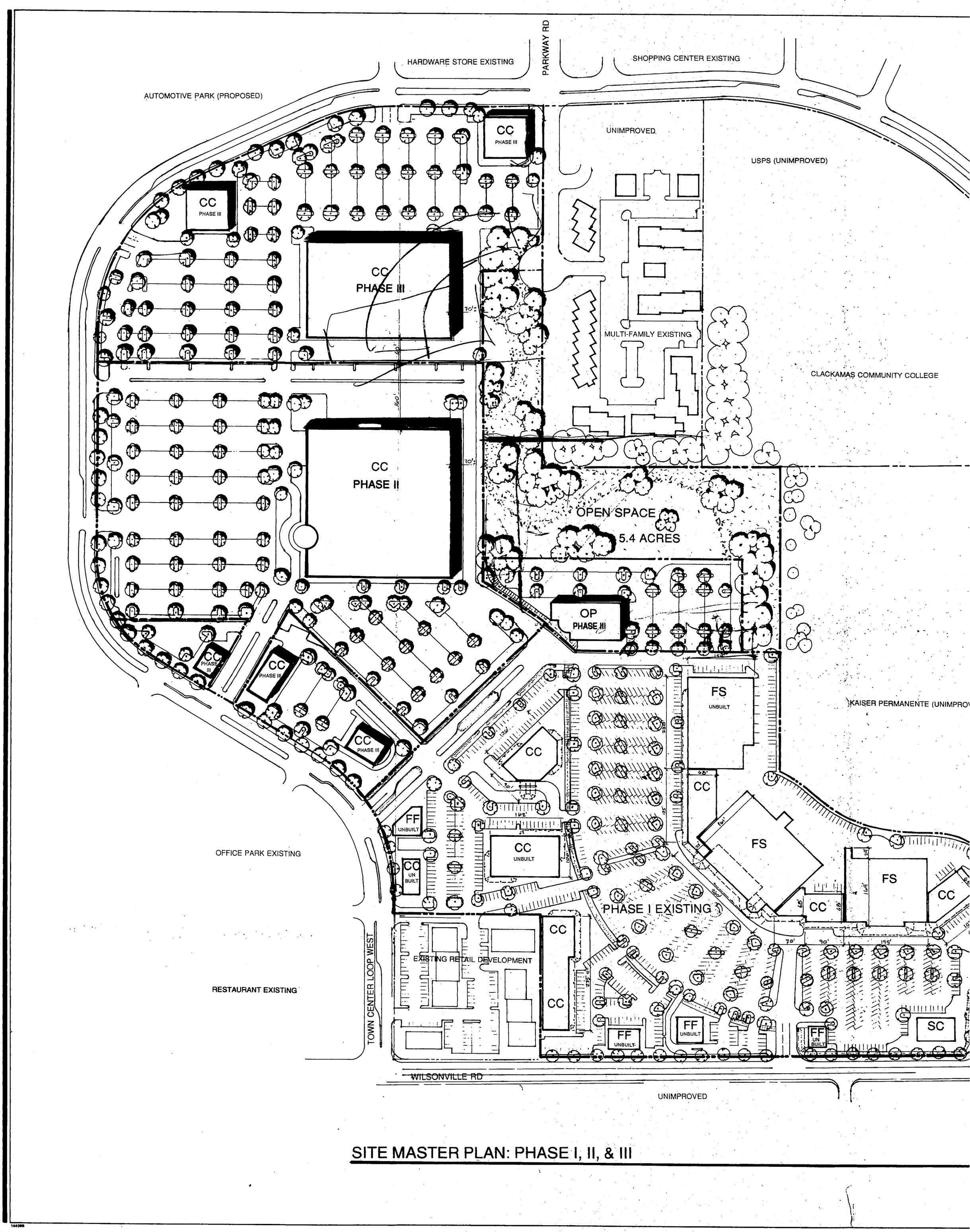
Permit Approval: Planner's Signature ____ Date: ____

City Council or Planning Commission Approval ☐ Yes ☐ No

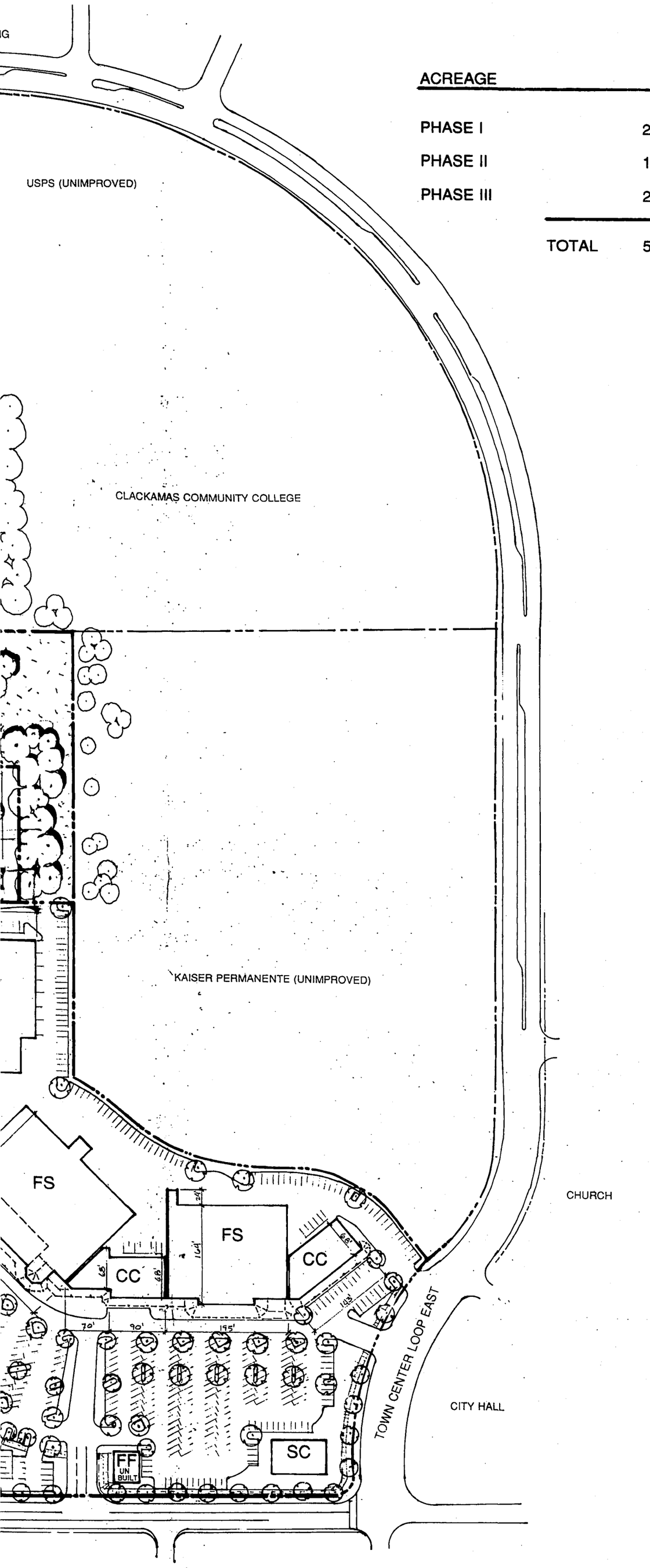
Order / Resolution ____

3050

White — Applicant's Receipt Canary — File Pink — Finance Goldenrod — Applicant's Receipt

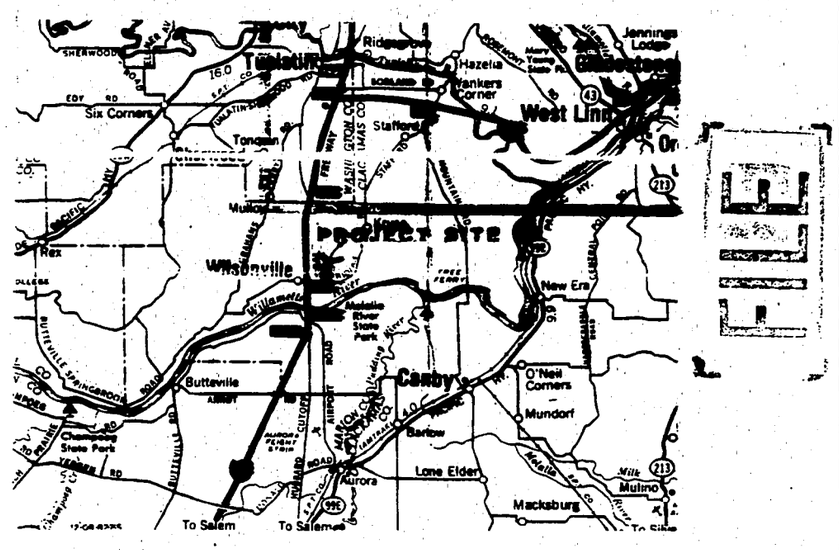


SITE MASTER PLAN: PHASE I, II, & III



ACREAGE

PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



(2/1) VICINITY MAP

467-0102
5/6/91

PHASE ONE LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'31" East along the section line between Sections 13 and 14 a distance of 44.00 feet to the **POINT OF BEGINNING**; thence continuing North 00°03'01" East along said section line a distance of 339.50 feet; thence South 89°59'30" West a distance of 338.63 feet to the easterly right-of-way line of Town Center Loop Road West; thence North 00°00'22" East along said easterly right-of-way line a distance of 44.55 feet to a point of curvature; thence 247.91 feet along the arc of a 360.54 foot radius curve to the left through a central angle of 39°23'57" and whose chord bears North 18°39'27" West a distance of 243.05 feet to a point on a curve; thence North 46°03'00" East a distance of 594.01 feet; thence South 89°57'00" East a distance of 66.14 feet; thence South 00°03'00" West a distance of 63.00 feet; thence South 89°57'00" East a distance of 479.78 feet; thence South 00°03'01" West a distance of 285.68 feet to the intersection with a non-tangent curve; thence 93.82 feet along the arc of a 317.33 foot radius curve to the right through a central angle of 16°56'21" and whose chord bears South 55°30'59" East a distance of 93.48 feet to a point of reverse curvature; thence 348.26 feet along the arc of a 336.67 foot radius curve to the left through a central angle of 42°03'00" and whose chord bears South 68°02'49" East a distance of 242.74 feet to a point of tangency; thence South 89°02'49" East a distance of 51.65 feet to a point of curvature; thence 174.68 feet along the arc of a 200.00 foot radius curve to the right through a central angle of 50°02'34" and whose chord bears South 64°01'32" East a distance of 169.15 feet to a point of tangency; thence South 39°00'15" East a distance of 97.50 feet to a point on a non-tangent curve; thence 328.21 feet along the arc of 494.00 foot radius curve to the left through a central angle of 38°04'18" and whose chord bears South 19°42'06" West a distance of 331.74 feet to a point of tangency; thence South 00°42'57" West a distance of 99.46 feet to a point of curvature; thence 48.14 feet along the arc of a 30.00 foot radius curve to the right through a central angle of 91°56'29" and whose chord bears South 44°40'11" West a distance of 43.17 feet to a point of tangency; thence South 89°21'26" West a distance of 375.16 feet to the Point of Beginning. Said parcel of land contains 22.96 acres, more or less.

PHASE II AND III LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**; thence leaving said section line South 45°03'00" West 589.42 feet to point of non-tangent curvature on the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line along the following courses and distances: tracing the arc of a 360.54 foot radius curve to the left (the radial center of which bears South 53°40'44" West) through a central angle of 20°25'22" an arc distance of 135.64 feet (the long chord bears North 47°31'56" West 134.92 feet) to a point of tangency; thence North 57°44'38" West 463.30 feet to a point of curvature; thence tracing the arc of a 258.16 foot radius curve to the right through a central angle of 57°42'16" an arc distance of 270.07 feet (the long chord bears North 28°53'30" West 258.80 feet) to a point of tangency; thence North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing the easterly, southeasterly and southerly right-of-way line of said Town Center Loop Road West along the following courses and distances: North 00°02'22" West 211.31 feet to a point of curvature; thence tracing the arc of a 444.00 foot radius curve to the right through a central angle of 64°15'44" an arc distance of 498.01 feet (the long chord bears North 32°24'30" East 444.85 feet) to a point of tangency; thence North 64°32'22" East 286.54 feet to a point of curvature; thence tracing the arc of a 414.00 foot radius curve to the right through a central angle of 24°58'03" an arc distance of 180.41 feet (the long chord bears North 77°20'24" East 178.96 feet) to a point of tangency; thence North 89°49'25" East 300.93 feet to a point of curvature for a right-of-way return to Parkway Avenue; thence leaving said southerly right-of way line of Town Center Loop Road West and tracing the arc of a 20.00 foot radius curve to the right through a central angle of 90°13'35" an arc distance of 31.49 feet (the long chord bears South 45°03'47" East 28.34 feet to the westerly right-of-way line of said Parkway Avenue (31.00 feet from center line); thence tracing said right-of-way line through the following courses and distances: South 00°03'01" West 311.17 feet to a point of curvature for the return to the cul-de-sac for said Parkway Avenue; thence tracing the arc of a 20.00 foot radius curve to the right through a central angle of 47°09'23" an arc distance of 16.46 feet (the long chord bears South 23°37'42" West 16.00 feet) to a point of reverse curvature; thence tracing the arc of a 55.00 foot radius curve to the left through a central angle of 87°59'01" an arc distance of 84.46 feet (the long chord bears South 03°12'53" West 76.40 feet); thence leaving said Parkway Avenue right-of-way line North 89°52'55" East 41.62 feet to the east line of section 14, Township 3 South, Range 1 West, of the Willamette Meridian in the State of Oregon; thence tracing said east line of section 14 South 00°03'01" West 446.55 feet to the northerly line of Parcel 3 of said **Partition Plat No. 1991-164**; thence tracing said northerly line and continuing along the northerly line of Parcel 2 of said **Partition Plat No. 1991-164** North 89°26'52" East 549.20 feet to the northeast corner of said Parcel 2; thence tracing the easterly line of said Parcel 2 South 00°03'01" West 440.61 feet to the southeast corner of said Parcel 2; thence tracing the southerly line of said Parcel 2 and continuing along the southerly line of said Parcel 3 North 89°57'00" West 479.78 feet to an angle point in said southerly line; thence tracing the westerly portion of said southerly line of Parcel 3 the following courses and distances: North 00°03'01" East 63.00 feet; thence North 89°57'00" West 66.14 feet; thence South 45°03'00' West 4.59 feet to the **TRUE POINT OF BEGINNING.**

Containing 1,604,349 square feet or 36.83 acres more or less.

467-0301
10/16/91

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

Revisions

KJD	RSB
Drawn By	Checked By
8963	10/18/91
Job No.	Date

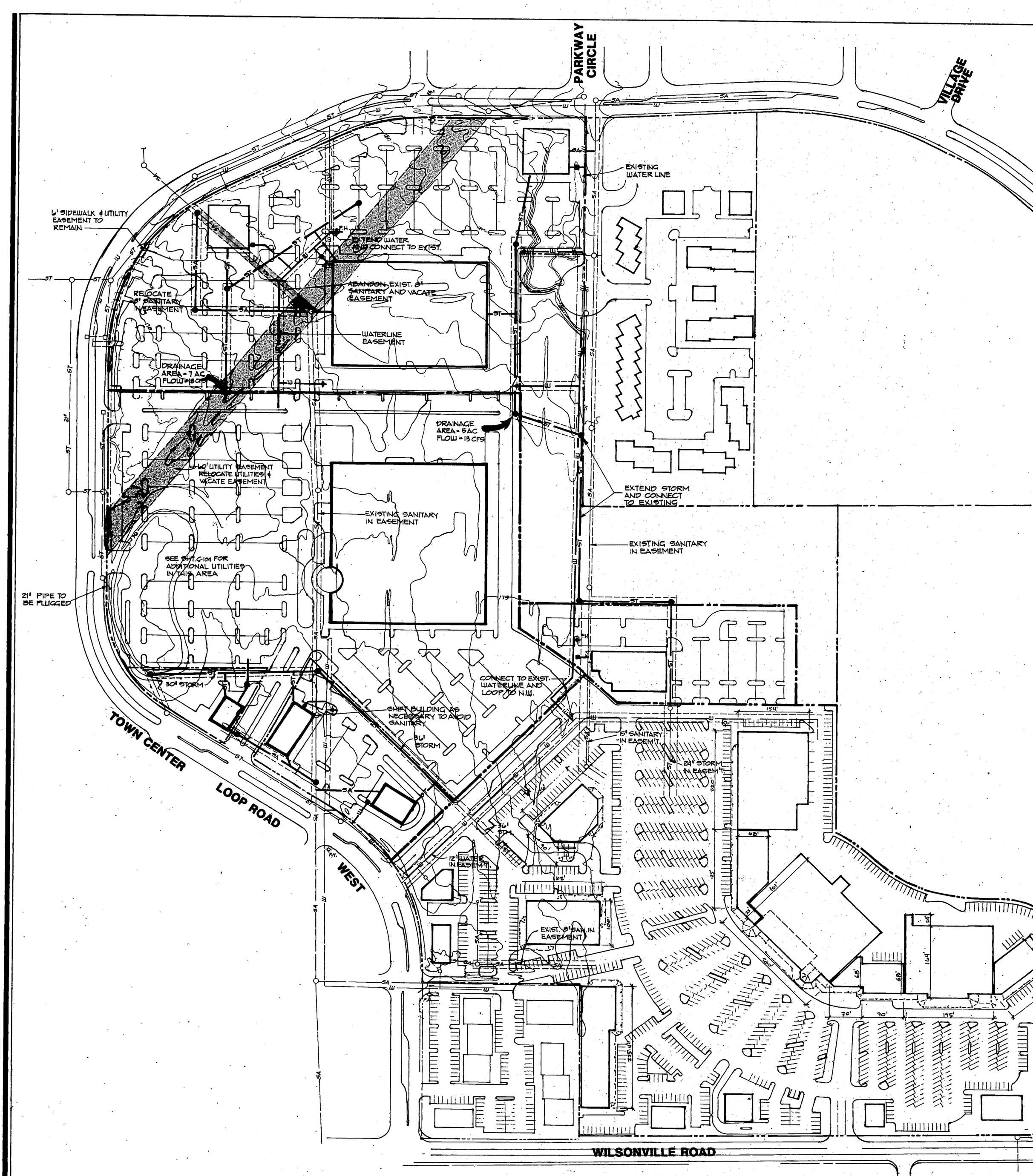
SITE MASTER PLAN

Sheet Title

Sheet No.

1

of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER AND CONNECT TO EXIST.
RELOCATE 8" SANITARY IN EASEMENT
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA = 7 AC FLOW = 18 CFS
DRAINAGE AREA = 5 AC FLOW = 13 CFS
60' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
15" SANITARY IN EASEM'T
24" STORM IN EASEM'T
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEM'T.
EXIST. 8" SAN. IN EASEMENT
WILSONVILLE ROAD

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

Revisions

Drawn By | Checked By

Job No. 4-420-0901 | Date 10.01.01

MASTER UTILITIES PLAN

Sheet Title

Sheet No. **2** of 2

JKS Architects PC
1620 S.W. Taylor Street ▪ Suite 200 ▪ Portland, Oregon 97205
503-227-5616 ▪ FAX 503-227-3590

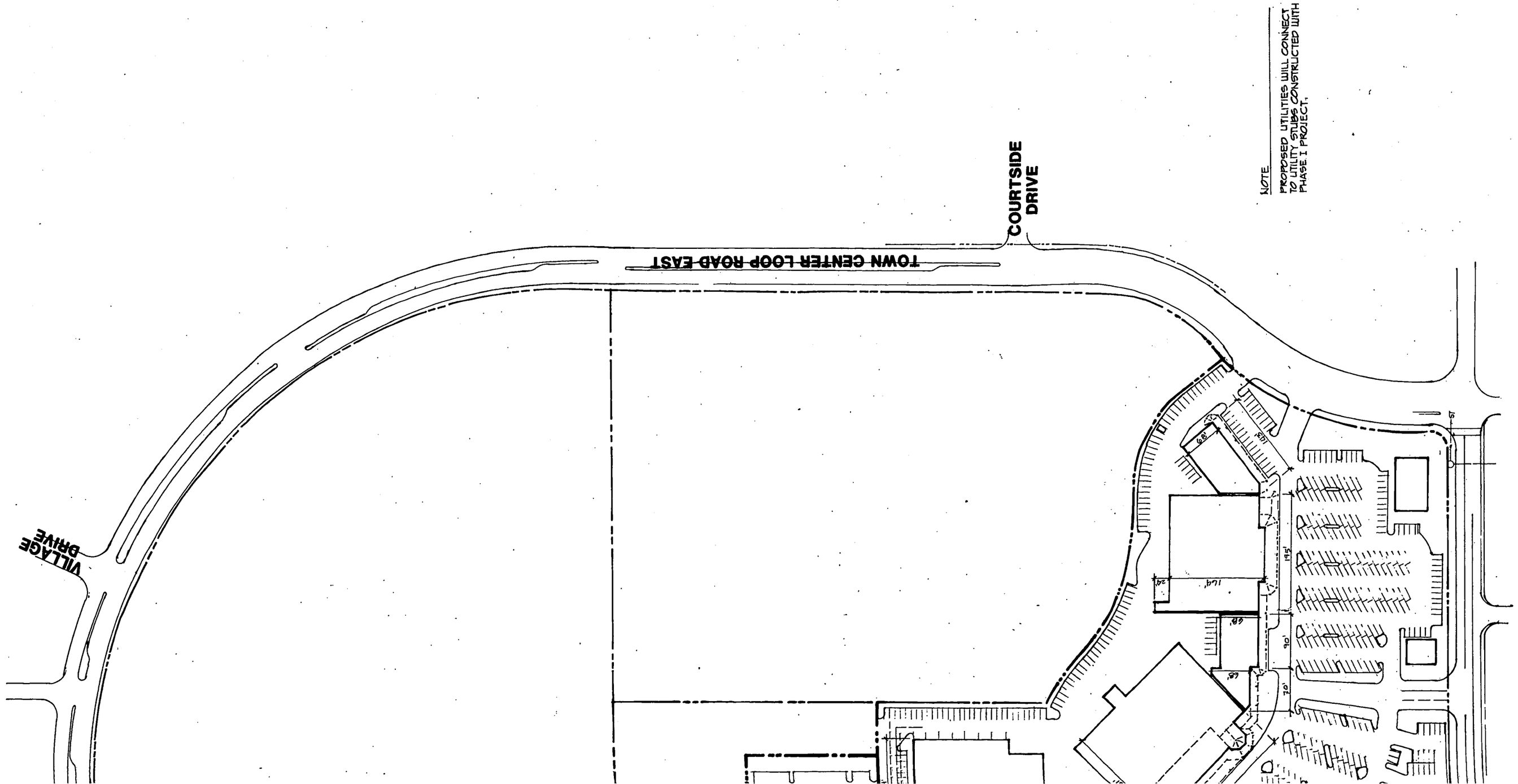
PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
(503)227-0453
Fax (503)274-4607
Planning · Engineering · Surveying · Landscape Architecture

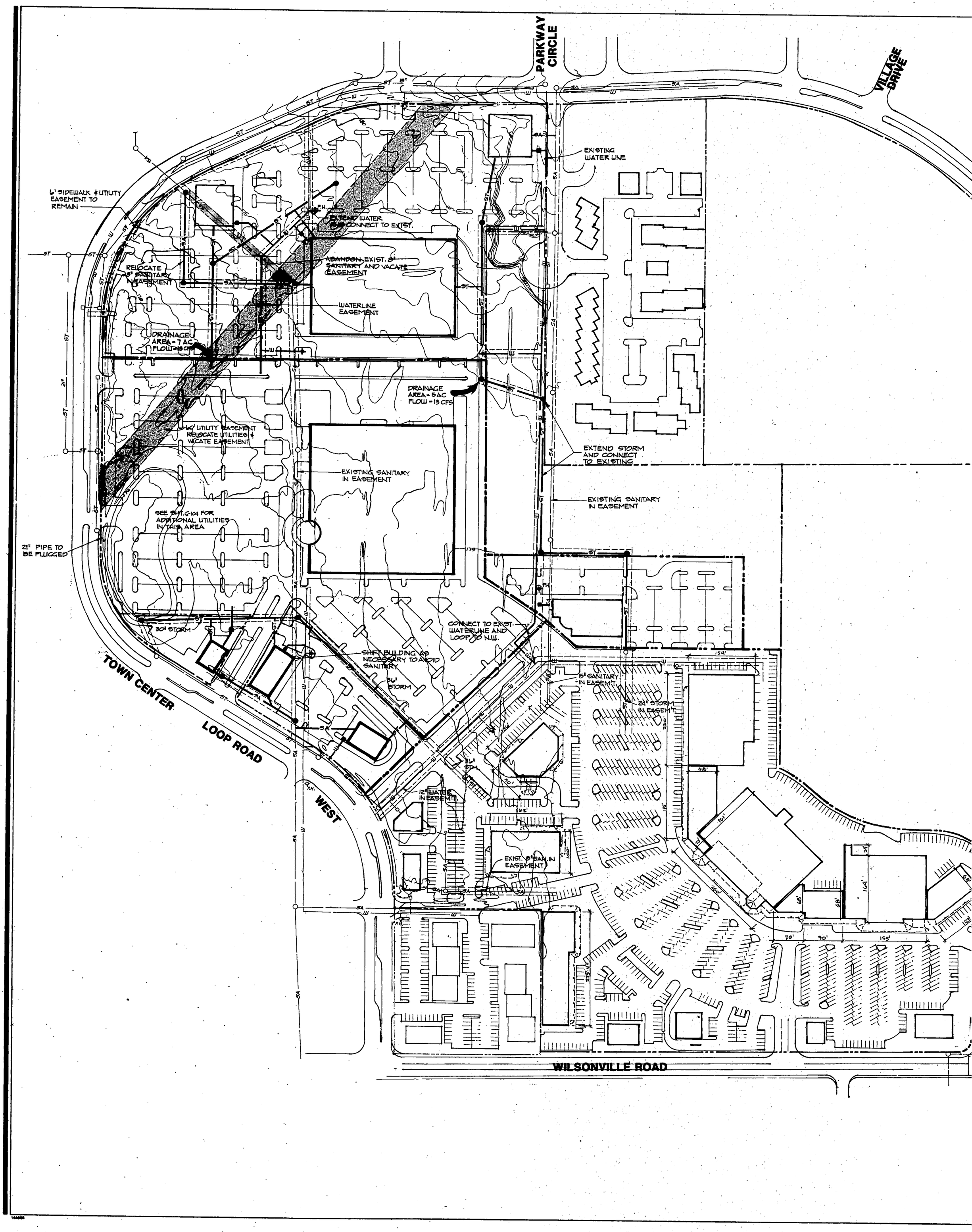
LEGEND

	EXISTING	PROPOSED
SANITARY SEWER	SA	SA
STORM SEWER	ST	ST
WATER LINE	W	W
EASEMENT LINE		
MANHOLE		
CATCH BASIN		
FIRE HYDRANT		
EASEMENT TO BE VACATED		

1" = 100'

NOTE
PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE I PROJECT.




PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
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ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
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SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
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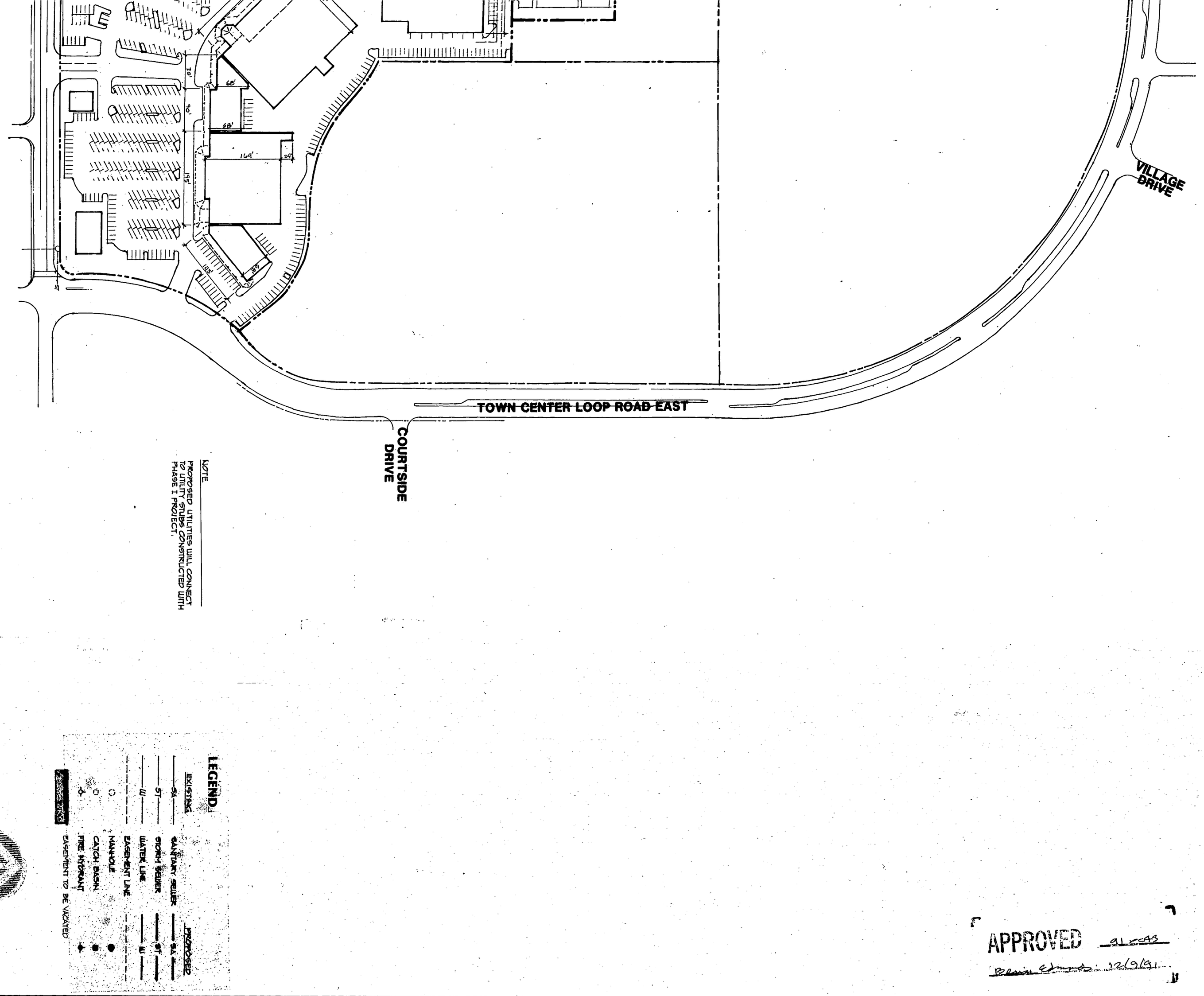
12" WATER IN EASEMENT
EXIST. 8" SAN. IN EASEMENT
TOWN CENTER LOOP ROAD
WEST
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE 1 PROJECT.

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER	SA	SA
STORM SEWER	ST	ST
WATER LINE	W	W
EASEMENT LINE		
MANHOLE	○	
CATCH BASIN	□	
FIRE HYDRANT		
EASEMENT TO BE VACATED		

1" = 100'

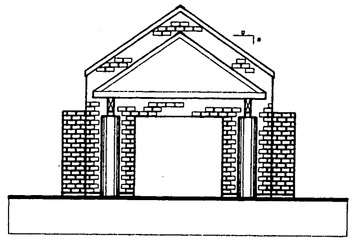
APPROVED 9/6/13
Planning Director: 12/9/13

Revisions	WILSONVILLE TOWN CENTER Wilsonville, Oregon	W&H PACIFIC 1099 S.W. Columbia Street Portland, Oregon 97201 (503)227-0455 Fax (503)274-4607 Planning • Engineering • Surveying • Landscape Architecture	JKS Architects PC 1620 S.W. Taylor Street ▪ Suite 200 ▪ Portland, Oregon 97205 503-227-5616 ▪ FAX 503-227-3590

Drawn By | Checked By

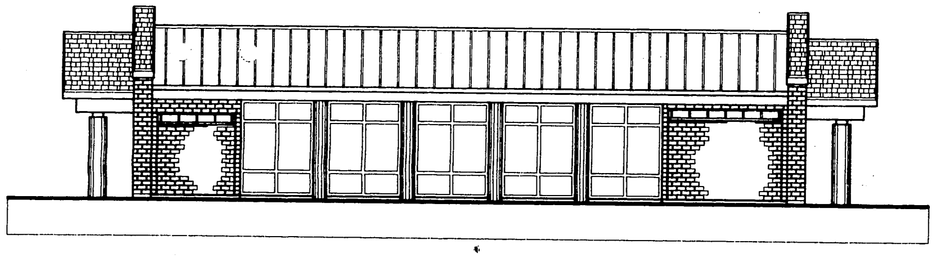
Date: 4/30/2013
MASTER UTILITIES PLAN
Sheet Title

Sheet No. 2 of



END ELEVATION

1/8" = 1'-0"

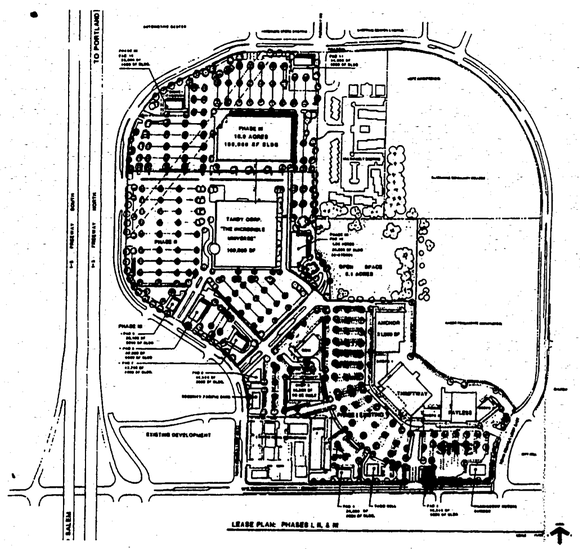


FRONT ELEVATION

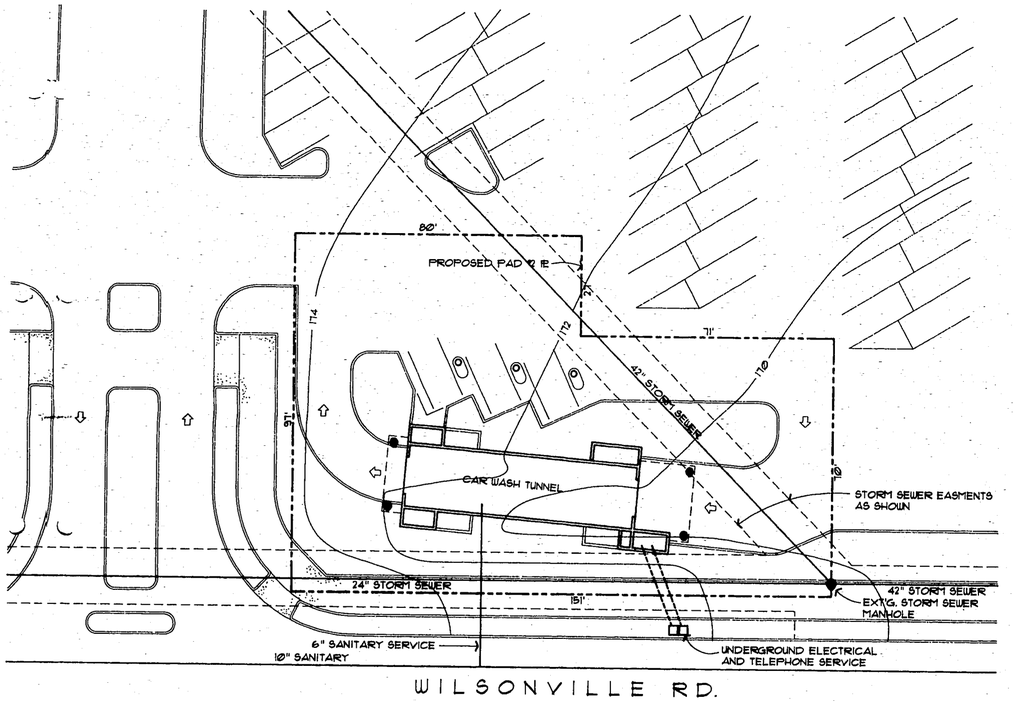
1/8" = 1'-0"

SITE DATA

	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA	1,500±	12%
PARKING & DRIVES	8,293±	65%
LANDSCAPING/OPEN SPACE	2,937±	23%
TOTAL SITE AREA	12,730±	100%



VICINITY MAP



NORTH

PRELIMINARY SITE PLAN

1" = 20'

NICOLI ENGINEERING and Construction Services Inc
9025 S.W. Center Street • P.O. Box 23784
Tigard, Oregon 97223
Phone: (503) 620-2086
FAX: (503) 684-3636

WILSONVILLE TOWN CENTER
PROPOSED CAR WASH
WILSONVILLE, OREGON

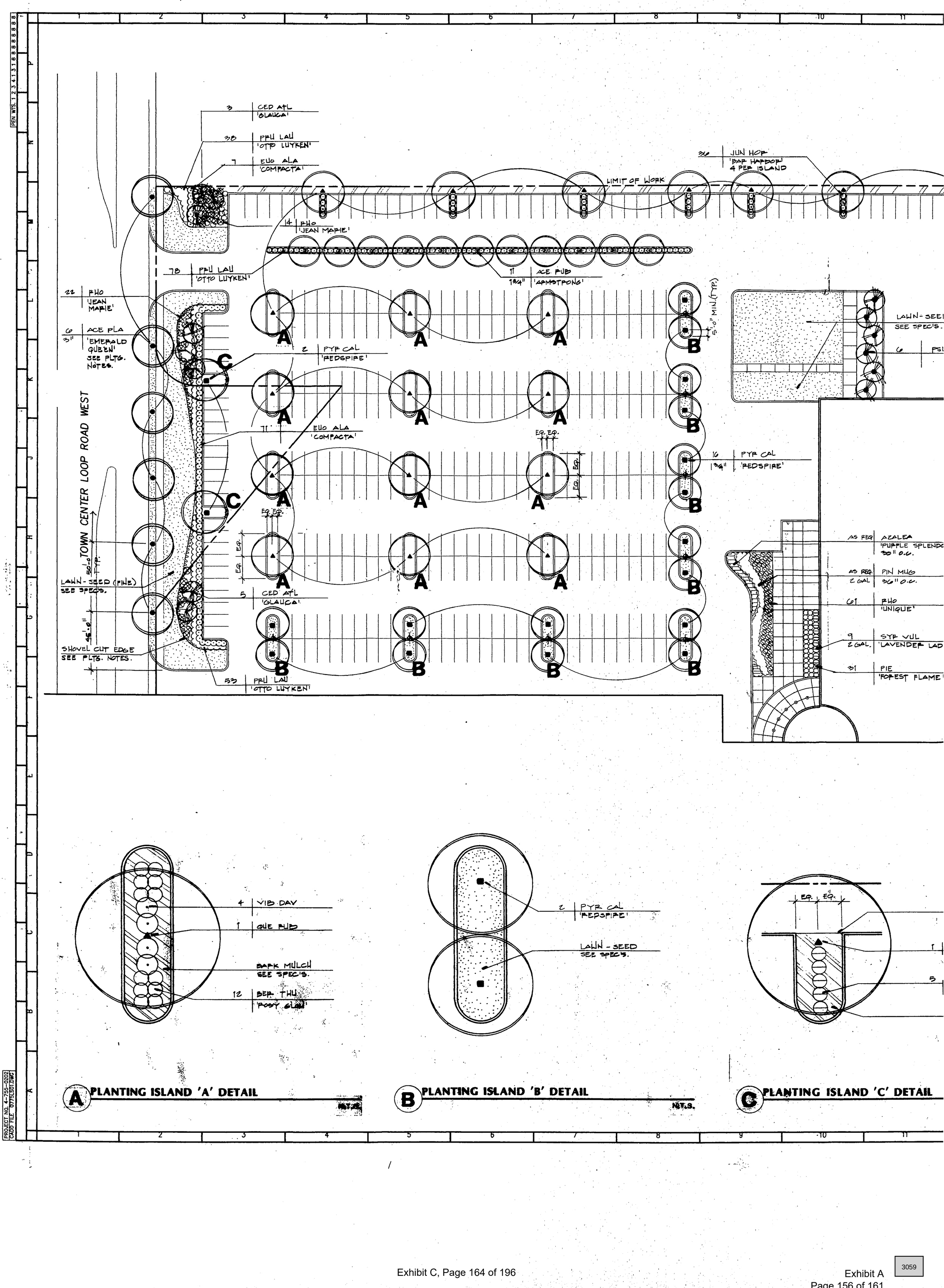
CLIENT:
DENNIS THOMPSON

REVISIONS:

Date:	11-20-92
Scale:	AS SHOWN
Drawn by:	SET
Checked by:	JDA
Job No.:	2023
Drawing No.:	2023TITL

SHEET 1 OF 1

3058

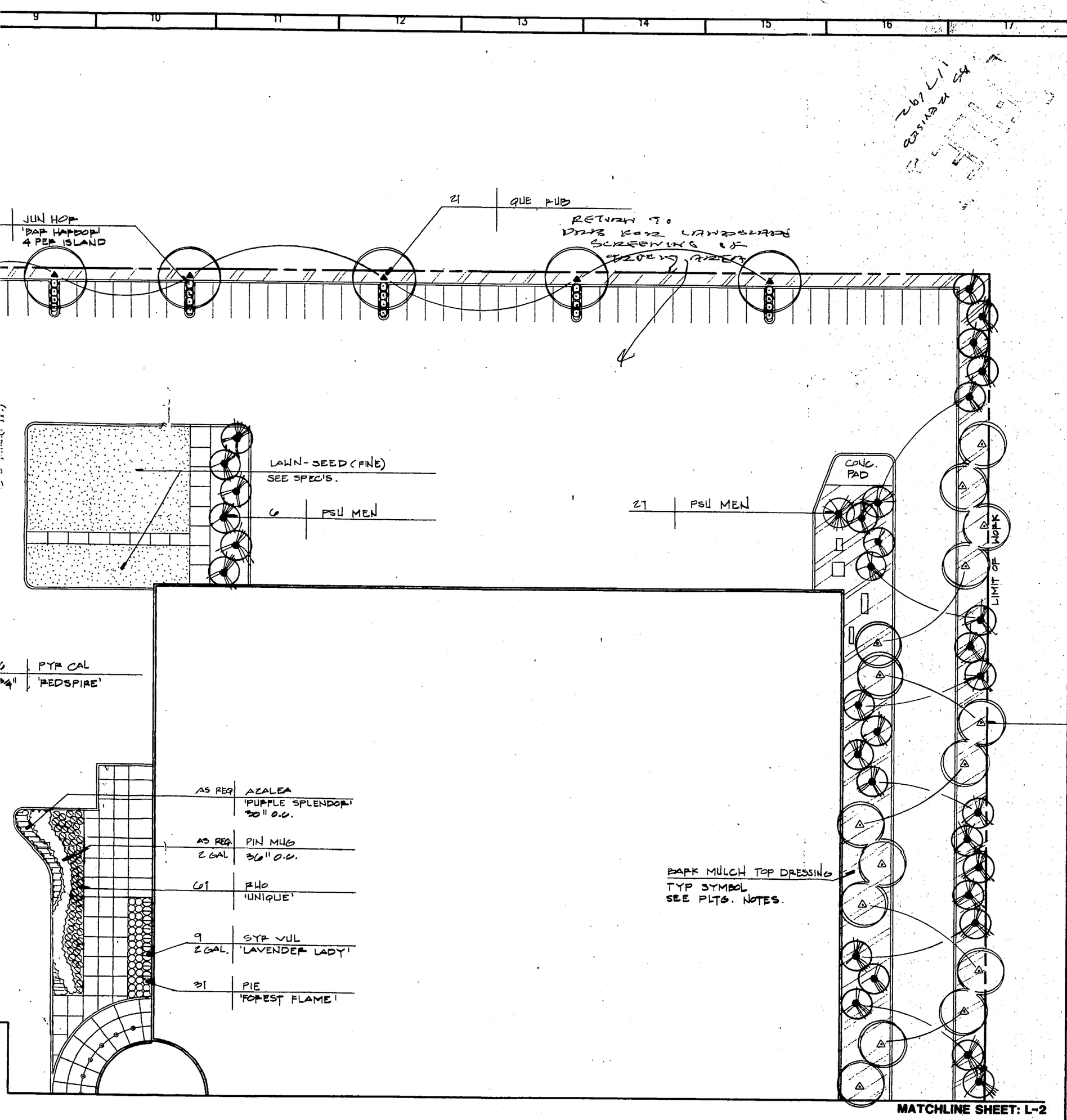


A PLANTING ISLAND 'A' DETAIL N.T.S.

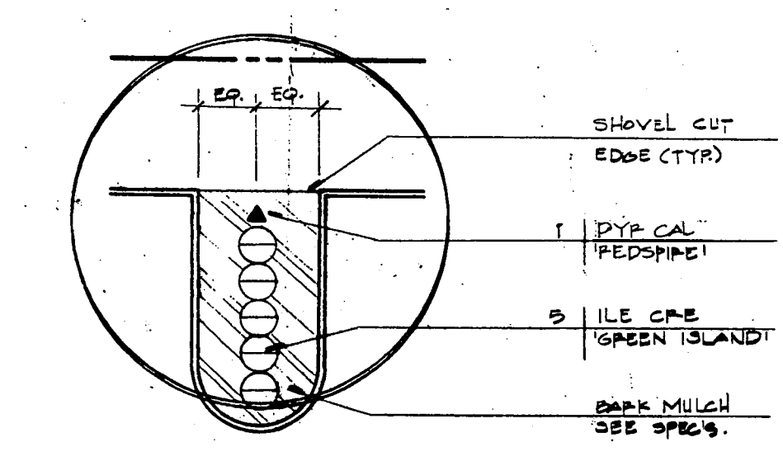
B PLANTING ISLAND 'B' DETAIL N.T.S.

C PLANTING ISLAND 'C' DETAIL

PROJECT NO. 4-755-0202
CADD FILE '0775LS01.DWG'



MATCHLINE SHEET: L-2



C PLANTING ISLAND 'C' DETAIL N.T.S.

SHEET NOTES

PLANTING GENERAL NOTES:

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES IN PLANTING AREAS PRIOR TO PLANTING. CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES 48 HOURS PRIOR TO BEGINNING EXCAVATION WORK FOR UTILITY LOCATION INFORMATION:

TELEPHONE:	503 246 6699	
GAS:	503 246 6699	
ELECTRIC:	503 246 6699	
SEWER:	503 682 4960	ATTN: MARTIN BROWN
WATER:	503 682 4960	ATTN: MARTIN BROWN

LIGHT STANDARDS ARE SHOWN FOR REFERENCE ONLY. REFER TO DRAWING NUMBER DRBC2 FOR ADDITIONAL LIGHTING INFORMATION.

PLANTING IN PARKING LOT ISLANDS AS SHOWN IN ENLARGEMENTS ON SHEET L-1.0.

ALL SHRUB AND GROUNDCOVER PLANTING AREAS TO RECIEVE MINIMUM 2" DEPTH OF BARK MULCH. SEE SPECIFICATIONS 02950.

REFER TO CIVIL'S FOR FINISH GRADES IN PLANTING AREAS.

STREET TREES ON TOWN CENTER LOOP ROAD WEST SHALL BE PLANTED PER CITY OF WILSONVILLE STANDARD PLAN. IF NONE EXISTS, INSTALL PER DETAIL 1, L-2.0.

ALL LAWN EDGES AT SHRUB PLANTING AREAS SHALL BE SHOVEL CUT. CONTRACTOR SHALL MAINTAIN ALL SHOVEL CUT EDGES IN A SMOOTH AND EVEN CONDITION UNTIL FINAL ACCEPTANCE.

CONTRACTOR SHALL SUPPLY AND INSTALL ANNUAL COLOR, 4" POT SIZE AT 10" O.C.. COLOR MATERIALS TO BE SELECTED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO PLANTING. ANNUAL COLOR MATERIAL SHALL BE IN SEASON (FULL BLOOM) AT TIME OF INSTALLATION.

W&H PACIFIC
1299 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title: PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title: LANDSCAPE PLAN

Seal: REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L1.0
Reviewed MH	
Date 12-27-91	

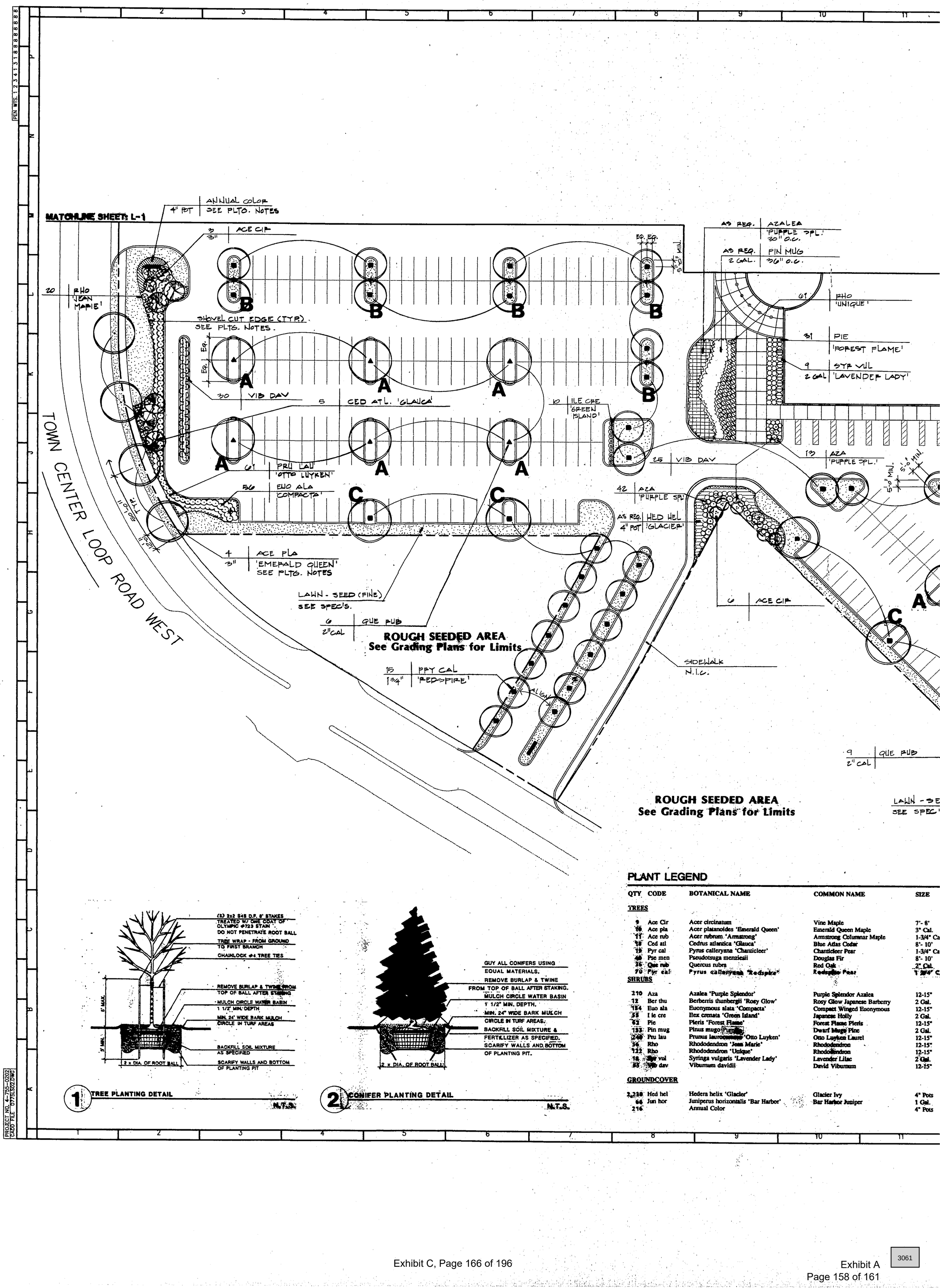
c 1991 DESIGN FORUM ARCHITECTS

NOT FOR CONSTRUCTION

PRINTED JAN 06 1992 W & H PACIFIC

APPROVED

PROJECT NORTH



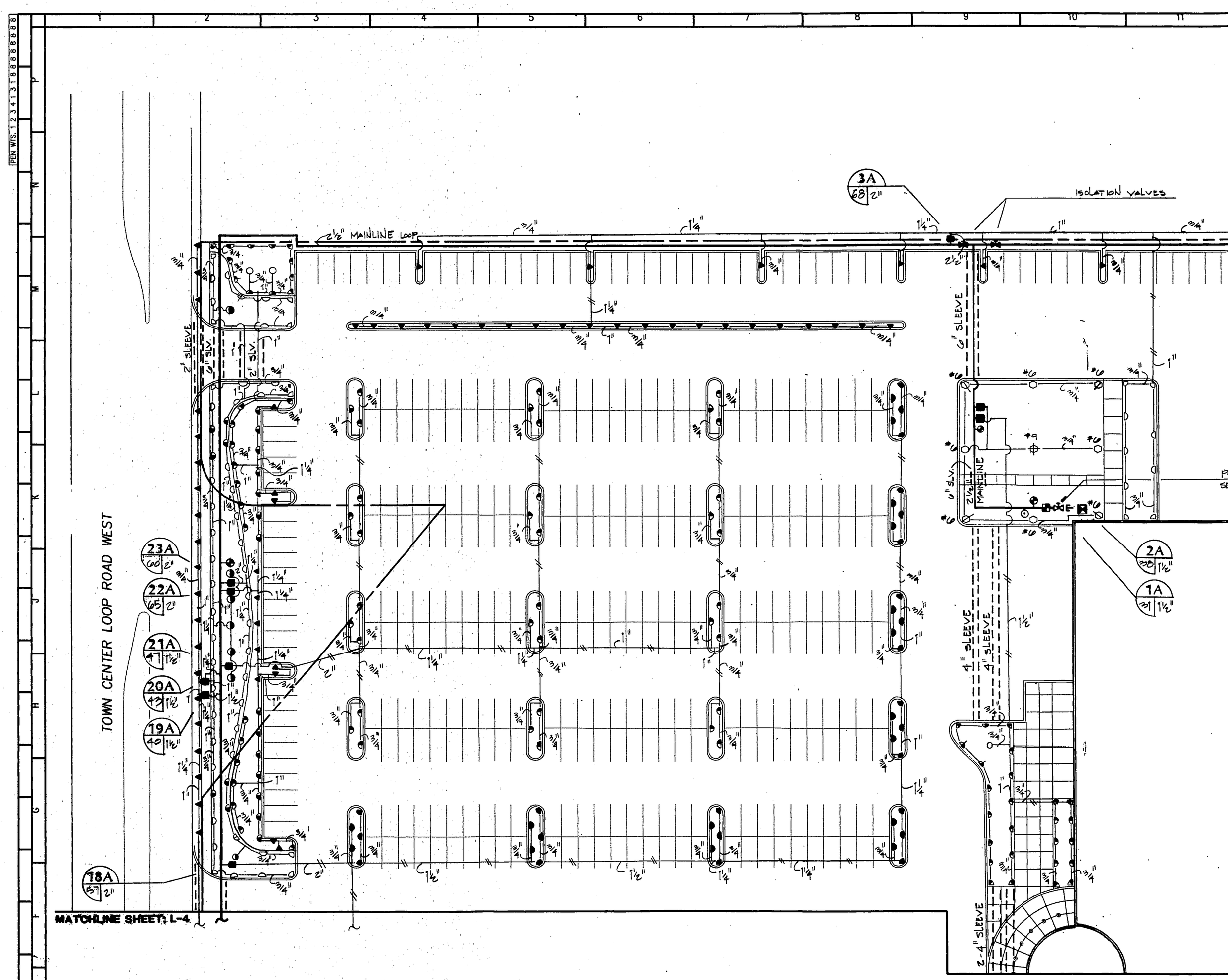
PLANT LEGEND

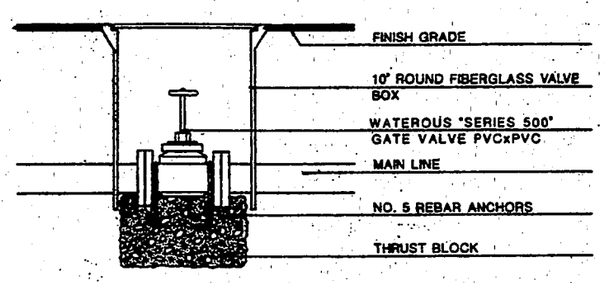
QTY	CODE	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
9	Ace Cir	Acer circinatum	Vine Maple	7'- 8'
30	Ace pla	Acer platanoides 'Emerald Queen'	Emerald Queen Maple	3" Cal.
11	Ace rub	Acer rubrum 'Armstrong'	Armstrong Columnar Maple	1-3/4" Ca
10	Ced atl	Cedrus atlantica 'Glauca'	Blue Atlas Cedar	8'- 10'
19	Pyr cal	Pyrus calleryana 'Chanticleer'	Chanticleer Pear	1-3/4" Ca
40	Pse men	Pseudotsuga menziesii	Douglas Fir	8'- 10'
36	Que rub	Quercus rubra	Red Oak	2" Cal.
70	Pyr cal	Pyrus calleryana 'Redspire'	Redspire Pear	1 3/4" C
SHRUBS				
210	Aza	Azalea 'Purple Splendor'	Purple Splendor Azalea	12-15"
12	Ber thu	Berberris thunbergii 'Rosy Glow'	Rosy Glow Japanese Barberry	2 Gal.
184	Euo ala	Euonymous alata 'Compacta'	Compact Winged Euonymous	12-15"
53	I le cre	Ilex crenata 'Green Island'	Japanese Holly	2 Gal.
62	Pie	Pieris 'Forest Flame'	Forest Flame Pieris	12-15"
131	Pin mug	Pinus mugo Pumilio	Dwarf Mugo Pine	2 Gal.
240	Pru lau	Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	12-15"
56	Rho	Rhododendron 'Jean Marie'	Rhododendron	12-15"
122	Rho	Rhododendron 'Unique'	Rhododendron	12-15"
18	Syr vul	Syringa vulgaris 'Lavender Lady'	Lavender Lilac	2 Gal.
53	Vib dav	Viburnum davidii	David Viburnum	12-15"
GROUNDCOVER				
2,230	Hed hel	Hedera helix 'Glacier'	Glacier Ivy	4" Pots
66	Jun hor	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Juniper	1 Gal.
216		Annual Color		4" Pots

1 TREE PLANTING DETAIL N.T.S.

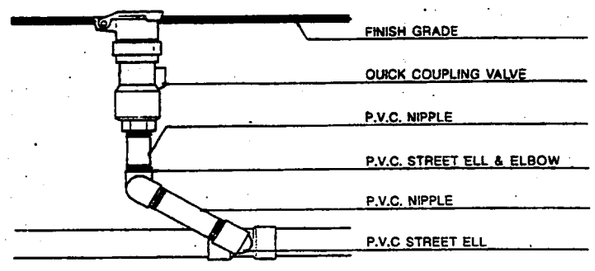
2 CONIFER PLANTING DETAIL N.T.S.

PROJECT NO. 4-755-0202
CADD FILE 0775L502.DWG

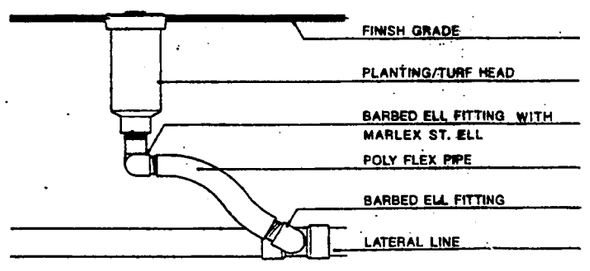




MAINLINE GATE VALVE



QUICK COUPLING VALVE DETAIL



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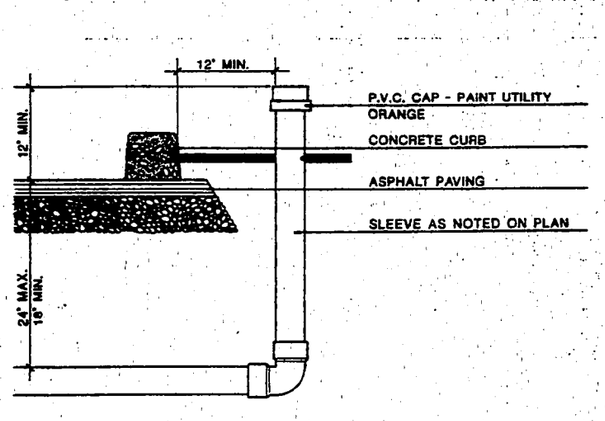
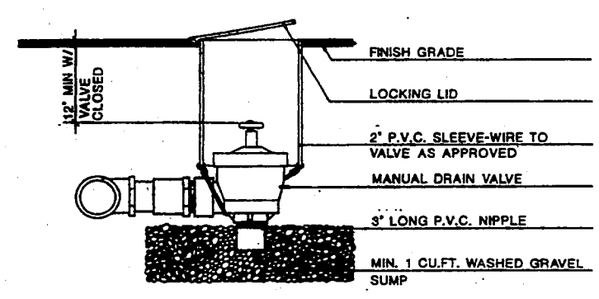
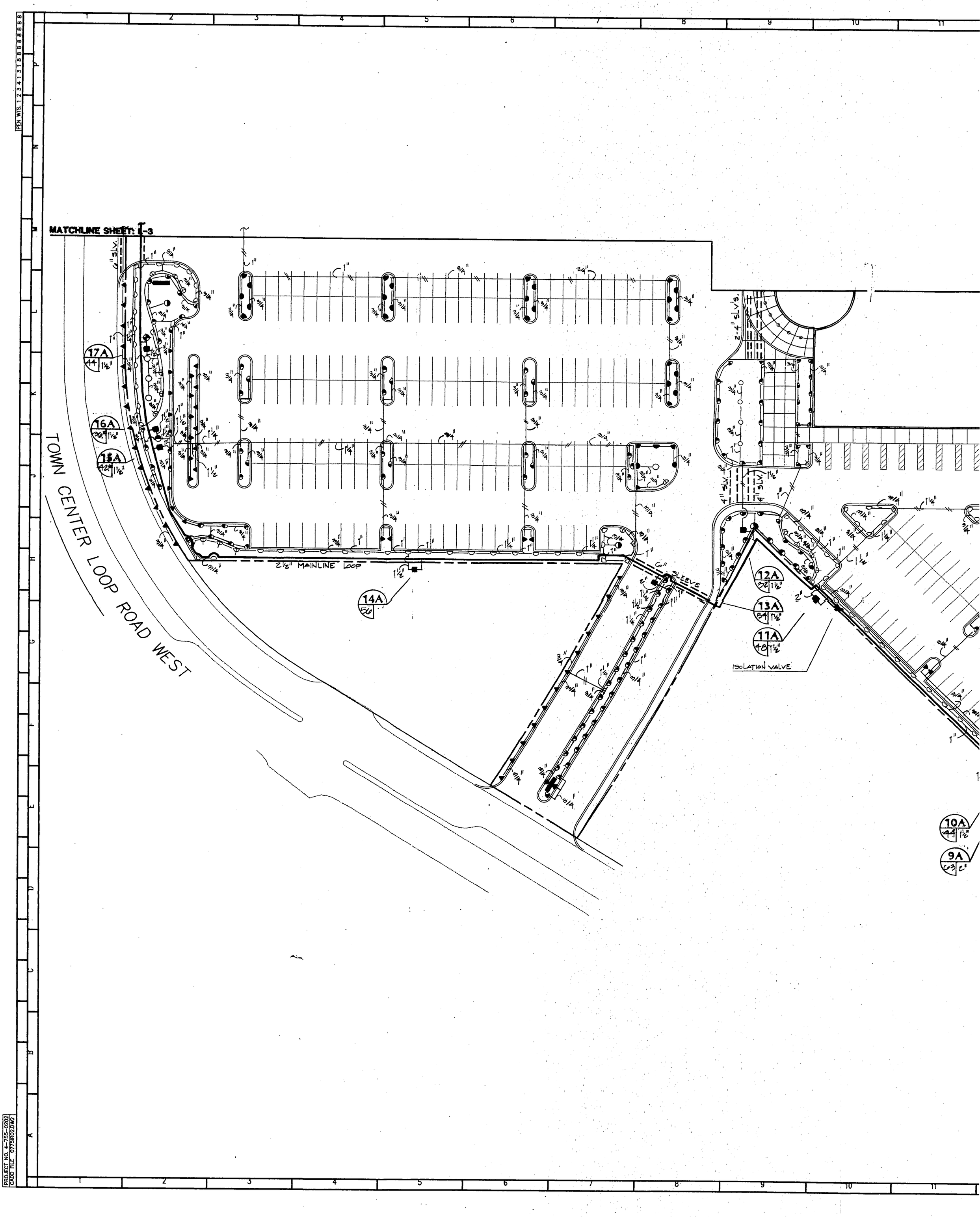


SLEEVING DETAIL



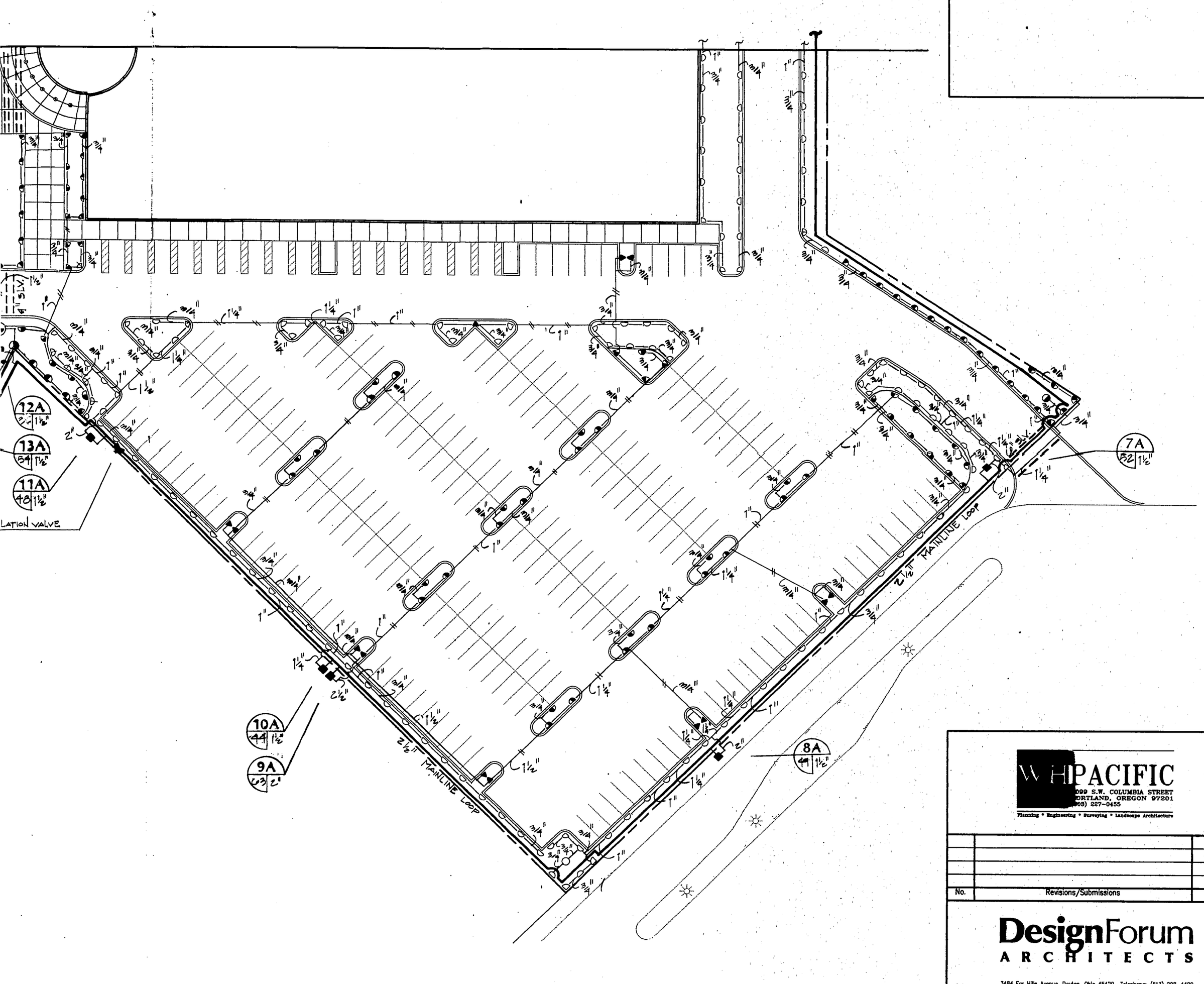
MANUAL DRAIN VALVE DETAIL

PROJECT NO. 4-755-0202
CADD FILE 0775IR01.DWG


MATCHLINE SHEET: C-3
TOWN CENTER LOOP ROAD WEST
2½" MAINLINE LOOP
6" SLEEVE
ISOLATION VALVE
2-4" SLVs.
17A
16A
15A
14A
12A
13A
11A
10A
9A
PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8 8
PROJECT NO. 4-755-0202
CADD FILE 0775IR02.DWG

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

SHEET NOTES



PROJECT NORTH

No.	Revisions/Submissions	Date

WHPACIFIC
1099 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title
PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title
IRRIGATION PLAN

Seal: REGISTERED 361 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202	
Drawn MDS	Scale 1" = 30'-0"	
Checked MPS	Drawing No. L4.0	
Reviewed MH		
Date 12-27-91	© 1991 DESIGN FORUM ARCHITECTS	

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

WILSONVILLE
OREGON

CITY OF WILSONVILLE
29799 SW TOWN CENTER LP E
WILSONVILLE OR 97070
Billing Inquiries: (503) 570-1610

Account Information

Customer Number	1202894206524
Bill Number	91999
Bill Date	9/8/2023
Due Date	9/30/2023
Amount Due	$4,553.00

Balance Summary

Last Payment Date	8/15/2023
Payments	$4,553.00
Previous Balance	$4,553.00
Current Charges	$4,553.00
Adjustments	$0.00
Amount Due	$4,553.00
Projected penalty for late payments	*$34.16*

Messages

As the fall season approaches, please don't rake or blow leaves into the street. Help yourself and the community by keeping storm drains clear of debris.

Meter Information

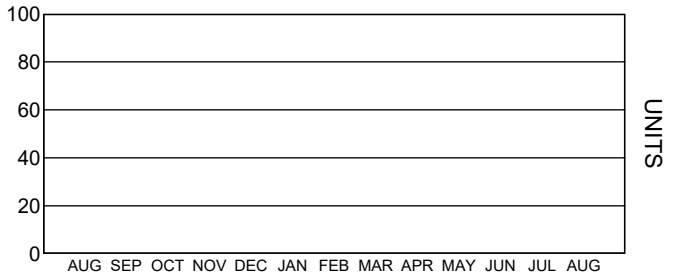
	Size	Meter #	Read Dates	Prior	Current	Usage
Water	3	04567906	7/31-8/31	1255	1255	0
Irrigation	1.5	64955200	7/31-8/31	3959	3959	0

Billing Details

Service Address: 29400 SW TOWN CENTER LOOP W
(Base fees are calculated on a monthly cycle)

Water Commercial	**$46.43**
Irrigation	**$25.68**
Sewer Commercial	**$201.25**
Stormwater Commercial	**$2,118.20**
Street Light Cobra Head	**$2.08**
Road Maintenance Commerical	**$2,159.36**
Total Current Charges	**$4,553.00**

Total Usage: 0
1 Unit = 100 Cubic Feet or 748 gallons



Consumption Graph Based on Billing Month

RETURN THIS PORTION WITH PAYMENT. MAKE CHECK PAYABLE TO: CITY OF WILSONVILLE.

BILL NUMBER	91999
CUSTOMER NUMBER	1202894206524
SERVICE ADDRESS	29400 SW TOWN CENTER LOOP W

WILSONVILLE
OREGON

CITY OF WILSONVILLE
29799 SW TOWN CENTER LP E
WILSONVILLE OR 97070

TOTAL DUE: $4,553.00

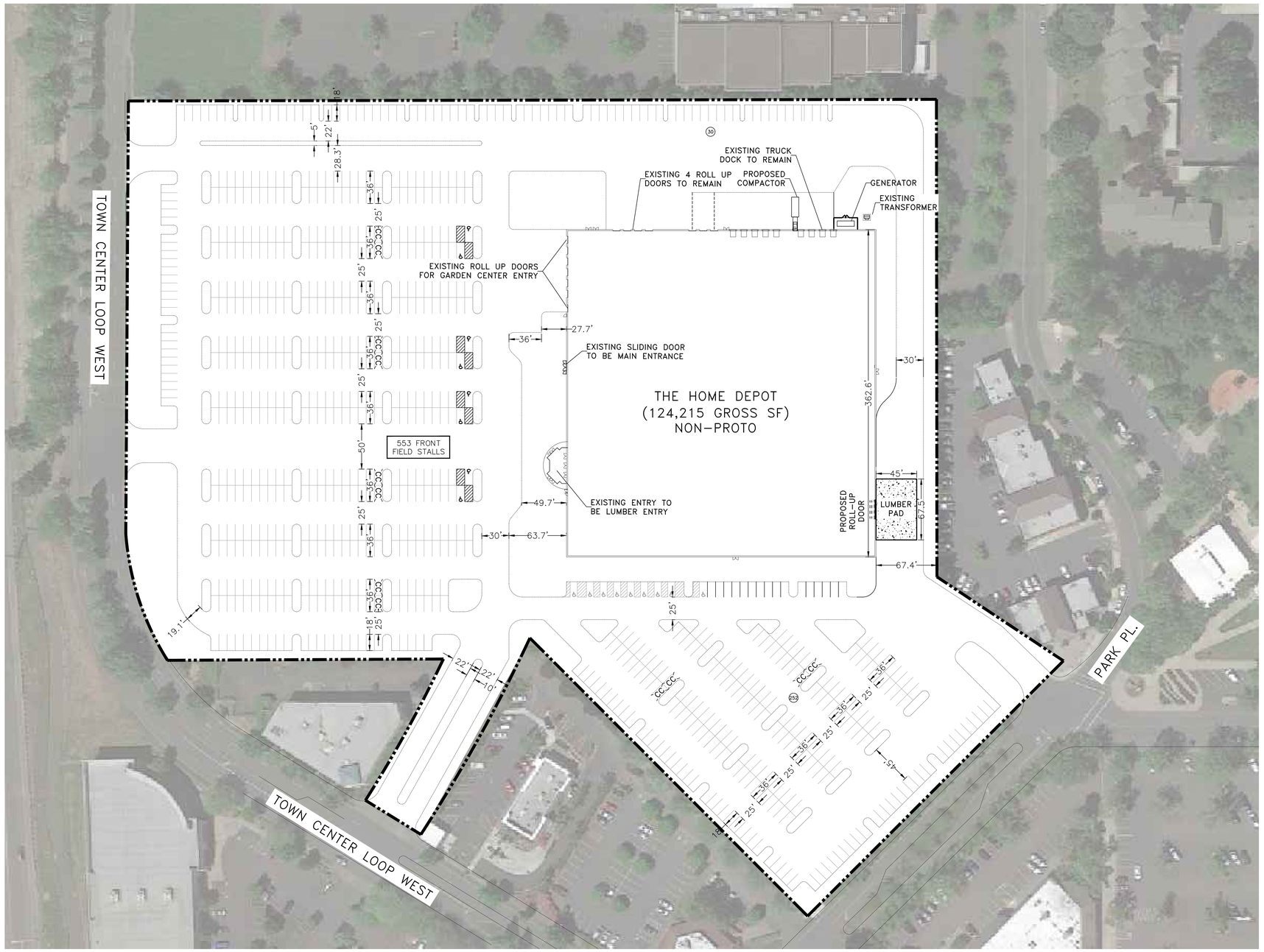
Payment Enclosed $

2584 1 MB 0.561 7/83 002699 0001:0001
LUMBERJACK, LP
C/O TAW L.P.
PO BOX 612530
SAN JOSE CA 95161-2530

CITY OF WILSONVILLE
PO BOX 5310
PORTLAND OR 97228-5310

3065

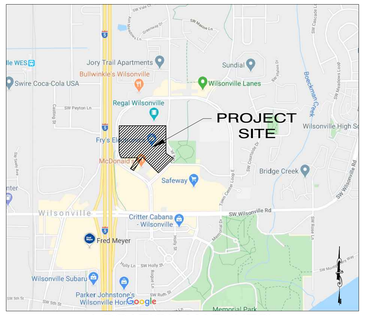
1202894206524000045530O6



NOTES
1. PLAN BOUNDARY IS BASED OFF AVAILABLE APN MAPS; AN ALTA SHOULD BE COMPLETED FOR ACCURACY.

LARS ANDERSEN & ASSOCIATES, INC.
CIVIL ENGINEERS - LAND SURVEYORS - PLANNERS
4694 WEST JACQUELYN AVENUE – FRESNO CALIFORNIA 93722
TEL: 559 276-2790 FAX: 559 276-0850 WWW.LARSANDERSEN.COM

LA PROJECT NO. 20042.00



LOCATION MAP (NTS)

SITE AREA

THE HOME DEPOT PARCEL	15.01 AC	653,836 SF

BUILDING AREA

THE HOME DEPOT	124,215 SF
MEZZANINE	0 SF
SUBTOTAL	124,215 SF
TOTAL BUILDING AREA	124,215 SF

PARKING REQUIRED

THE HOME DEPOT	4.1 / 1,000 SF	509 STALLS
TOTAL PARKING REQUIRED		509 STALLS

PARKING PROVIDED

FRONT FIELD	553 STALLS
SIDE FIELD / REAR	282 STALLS
TOTAL PARKING PROVIDED	839 STALLS

INCLUDED IN PARKING PROVIDED

ACCESSIBLE STALLS (17 REQ. @ 2%)	17 STALLS

NOT INCLUDED IN PARKING PROVIDED

CART CORRALS	10 STALLS
ACCESSORY PARKING NOT INCLUDED	10 STALLS
TOTAL THD PARKING PROVIDED	839 STALLS

ZONING CLASSIFICATION

JURISDICTION	CITY OF WILSONVILLE
ZONING CLASSIFICATION	PLANNED DEVELOPMENT COMMERCIAL TOWN CENTER (PDC-TC)
THD USE PERMITTED BY RIGHT	YES

THE HOME DEPOT
WILSONVILLE, OR
29400 TOWN CENTER LOOP W
WILSONVILLE, OR 97070

DRAWING ISSUE DATE 10.19.2023
HD SITE SELECTION NUMBER SS-02804.2001

SCALE: 1"=50'-0"
25 0 25 50 100 150 200

OR - SITE PLAN 10

Schwabe

March 4, 2024

Keenan Ordon-Bakalian
Admitted in Oregon and Washington
D: 503-796-2470
kordon-bakalian@schwabe.com

Kenneth Katzaroff
Admitted in Washington and Oregon
D: 206-405-1985
C: 206-755-2011
KKatzaroff@schwabe.com

VIA EMAIL

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
luxhoj@ci.wilsonville.or.us
29799 Town Center Loop E
Wilsonville, OR 97070

RE: ***In the Matter of an appeal of Planning Director Determination ADMN23-0029 (DB24-0002/APPL24-0001)***

Dear Members of the Development Review Board:

This firm represents The Home Depot, Inc. ("**Home Depot**") in the above-referenced casefiles (the "**Appeal**"). On February 26, 2024, the Development Review Board (the "**DRB**") held a public hearing on the Appeal. Home Depot testified orally during the hearing. At the conclusion of the hearing, the DRB closed the record to further oral testimony but allowed the written record to remain open until 5:00 PM on March 4th for any party to submit any evidence or testimony. Home Depot is also entitled to at least seven days after the record is closed to all other parties (March 11, 2024) to submit final written argument, pursuant to ORS 197.797(6)(e).

This letter addressees several themes and questions that were raised during the February 26 public hearing. It is timely submitted prior to the close of the open record period. This letter does not contain significant legal argument, but rather summarizes Home Depot's responsive evidence and testimony, which is enclosed.

I. Summary of Enclosures and Testimony

A. Home Depot's Operations at the Subject Property will be Less Significant than Fry's Electronics Prior Impacts

During the February 27 public hearing, members of the DRB raised questions regarding the scope of Home Depot's impact on the subject property and surrounding area – in relation to that of Fry's Electronics. City Staff has also suggested that operating a Home Depot at the subject property may constitute an expansion of a lawfully established nonconforming use. In response,

Home Depot provides analysis from Lars Anderson & Associates that details the potential development impacts of Home Depot, in relation to Fry's Electronics. **Exhibit A.**

This letter also encloses a Trip Generation Memorandum for Home Depot's use of the subject property, prepared by Transportation Engineering Northwest ("**TENW**"). **Exhibit B**. TENW's memo demonstrates that Home Depot's use of the subject property will result in less average daily trips than the trips previously generated by Fry's Electronics.

B. The Decision Effects a Taking on Home Depot

It is clear from the facts of this Appeal that the City's desire to prevent any development of the subject property that is inconsistent with the City's adopted Town Center Plan[1] led the Planning Director to intentionally make an nonconforming use determination of such limited scope so as to prevent any valid nonconforming use of the subject property.

The Decision has effected a compensable regulatory "taking" under Article I, section 18, of the Oregon Constitution,[2] and the Fifth and Fourteenth Amendments to the United States Constitution.[3] Here, the City's arbitrarily narrow determination that the nonconforming use at the subject property is a "Fry's Electronics" denies Home Depot (or any other party) any economic use of the lawfully established nonconforming use at the property. Looking past the impracticality of the forthcoming hypothetical, we note that Fry's Electronics is no longer in business,[4] therefore, it would be impossible for Home Depot to operate a Fry's Electronics at the property even if Home Depot had such an interest – which it does not. Moreover, the restriction

[1] Wilsonville Town Center Plan (May 6, 2019). Adopted Ord. No. 835; Amended October 18, 2021 per Ord. No. 850.
[2] Article I, section 18, of the Oregon Constitution provides, in part: "Private property shall not be taken for public use, nor the particular services of any man be demanded, without just compensation[.]"
[3] The Takings Clause of the Fifth Amendment to the United States Constitution, made applicable to the states through the Fourteenth Amendment, *see Chicago, B. & Q.R. Co. v. Chicago*, 166 U.S. 226, 17 S.Ct. 581, 41 L.Ed. 979 (1897), provides that "private property" shall not "be taken for public use, without just compensation."
[4] *Fry's Electronics suddenly went out of business*, CNN, https://www.cnn.com/2021/02/24/business/frys-electronics-closure/index.html (last accessed Oct. 9, 2023); *Fry's Electronics closes, leaving Wilsonville store barren*, Portland Tribune, https://www.portlandtribune.com/news/frys-electronics-closes-leaving-wilsonville-store-barren/article_cde50d46-de09-5ce3-a647-9f54ce7d4bb1.html (last accessed Oct. 9, 2023).

essentially precludes use of the structure as the current zoning limits retail uses to less than 30,000 square feet. As such, the City's decision has deprived Home Depot of all economically productive use of the subject property or the existing structure.

As will be discussed further in Home Depot's final written argument, the Appellant respectfully requests that the DRB modify the Decision to find that the lawfully established nonconforming use at the subject property is a commercial retail use, not a "Fry's Electronics" or "single-user electronics retail store." Alternatively, the DRB may reverse the Decision, or remand the Decision back to the Planning Director to make a decision consistent with Oregon's nonconforming use caselaw. Otherwise, the City risks effecting a regulatory taking on Home Depot.

C. *Gould* Citation Correction

Home Depot would like to correct the record regarding the citation to *Gould v. Deschutes County*, 79 Or LUBA 561 (2019) (*Gould VIII*), *aff'd without opinion*, 310 Or App 868, 484 P.3d 1073 (2021) that was contained on slide 7 of the Appellant's PowerPoint presentation. Home Depot cited *Gould VIII* for the proposition that the City is not entitled to deference in interpreting the 1991 Decision, pursuant to ORS 197.829(1). Home Depot intended to cite *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095).

As stated on the record during the hearing for this matter, ORS 197.829(1) generally[5] does not require LUBA to affirm a local government's interpretation of a prior land use decision or conditions of approval attached to a prior land use decision. *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095, at 17, Jun. 11, 2021); *see also M & T Partners, Inc. v. City of Salem*,_ Or LUBA_,_ (LUBA No 2018-143, Aug .14, 2019) (slip op at 14), *aff'd sub nom M & T Partners, Inc. v. Miller*, 302 Or App 159, 170, 460 P3d 117 (2020). In the event this appeal proceeds to LUBA, the City's interpretation of the 1991 Decision will not be entitled to deference. Therefore, the City's interpretation that the 1991 Decision approved a "Fry's Electronics" will be reviewed by LUBA for legal error. ORS 197.835(9)(a)(D); *Gould v. Deschutes County*, __ Or LUBA __, __ (LUBA No. 2020-095, at 17).

[5] To a "limited extent," LUBA will defer to plausible interpretations of county land use regulations that the governing body made in the course of interpreting a condition of approval. *Kuhn v. Deschutes County*, 74 Or LUBA 190, 194 (2016). It is Home Depot's position that this exception to the general rule that LUBA does not defer to local government interpretations of prior land use decisions is *not relevant* to the subject appeal.

Seeing as the words "Fry's Electronics" are not contained anywhere within the 1991 Decision, the City's nonconforming use Decision is likely to be reversed or remanded by LUBA. As such, Home Depot requests that the DRB to find that the 1991 Decision approved a commercial retail use, which is consistent with Oregon nonconforming use caselaw. Such a finding will prevent the unnecessary expenditure of time and resources on the part of both Home Depot and the City that will inevitably result from a LUBA appeal.

D. Objection to City's Attempted Exclusion of Home Depot's Documents and Testimony

Home Depot formally objects to the City's attempt to exclude from the record certain documents and testimony submitted by Home Depot as part of its Class I application. *See* Staff Report for APPL24-0001, Exhibit A1, at 13. The documents and testimony submitted by Home Depot as part of its application are within the record before the DRB on appeal. The documents and testimony that the City seeks to exclude constitute "argument" and "evidence" as defined in ORS 197.797(9):

> (a) "Argument" means assertions and analysis regarding the satisfaction or violation of legal standards or policy believed relevant by the proponent to a decision. "Argument" does not include facts.
>
> (b) "Evidence" means facts, documents, data or other information offered to demonstrate compliance or noncompliance with the standards believed by the proponent to be relevant to the decision. [Formerly 197.763]

The City cannot exclude certain documents and testimony within Home Depot's Class I application because the documents and testimony that the City seeks to exclude are "argument" and "evidence" that the Appellant believes to be relevant to the satisfaction of the applicable approval criteria for the subject application, as well as Home Depot's appeal of the Decision. ORS 197.797(9). In addition, the City's attempt to omit certain documents and testimony that were submitted by Home Depot as part of its Class I application runs afoul ORS 197.797(4)(a)'s requirement that "[a]documents or evidence relied upon by the applicant shall be submitted to the local government and be made available to the public." ORS 197.797 prohibits the City from excluding portions of Home Depot's Class I application materials from the record.

Furthermore, Home Depot must respectfully object to the DRB's premature motion to exclude certain documents and testimony from the record that were offered by the Appellant during the February 26 public hearing. Home Depot believes that all of the argument and evidence that

City of Wilsonville Development Review Board B
March 4, 2024

Home Depot offered during the February 26 hearing was relevant to the DRB's decision on the appeal, and must be held within the record pursuant to ORS 197.797(9).

II. Conclusion

As noted above and will be discussed further in Home Depot's final written argument, Home Depot's operations at the subject property will not be an expansion of the lawfully established commercial retail nonconforming use at the subject property. Moreover, the Decision's conclusion that the nonconforming use at the property is a "Fry's Electronics" effects a regulatory taking on Home Depot.

Thank you for your consideration of this letter. We look forward to providing additional testimony in Home Depot's final written argument.

Sincerely,

KOB:jmhi
Enclosures

cc: Client
Miranda Bateschell, bateschell@ci.wilsonville.or.us
Amanda Guile-Hinman, guile@ci.wilsonville.or.us
Shelley White, swhite@ci.wilsonville.or.us

LARS ANDERSEN & ASSOCIATES, INC.
CIVIL ENGINEERS • LAND SURVEYORS • PLANNERS
ADA COMPLIANCE • LEED ACCREDITED • STORM WATER QUALITY
4694 W JACQUELYN AVENUE
FRESNO, CA 93722
PH (559) 276-2790 FX (559) 276-0850
TEXAS REGISTERED ENGINEERING FIRM F-18450

SCOTT A. MOMMER, PE,
PRESIDENT

DANIEL J. ZOLDAK, PE, PLS
CASp, LEED AP, QSD/P
VICE PRESIDENT

March 4, 2024

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
luxhoj@ci.wilsonville.or.us
29799 Town Center Loop E
Wilsonville, OR 97070
Re: Home Depot, Wilsonville, OR – ADMN23-0029 (DB24-0002/APPL24-0001)

The purpose of this letter is to provide an overview of the reduced scale of development impacts that will be associated with Home Depot's proposed operations at 29400 Town Center Loop W. Wilsonville, OR 97070 (the "subject property").

Consistent with Planning Commission Resolution No. 91PC43 (the "1991 Decision"), Home Depot intends to operate at the subject property. Operations will include reoccupying the existing commercial retail building on the property. The structure currently has an existing 166,494 SF associated with it. Of this existing square footage, Home Depot intends to demolish portions of the existing mezzanine which will result in a reduced commercial square foot for a total proposed square footage of 129,069 square foot.

Home Depot operates stores across the United States, and typical operations require approximately 400 parking stalls. There are currently 838 parking stalls at the subject property. In the future, should other development be interested in developing on the property, Home Depot will be able to reduce the current count by over 400 stalls allowing for this future development while still retaining sufficient parking capacity for Home Depot operations.

Finally, as detailed in the Transportation Northwest ("TENW") Trip Generation Memorandum that is submitted under separate cover, Home Depot's operations at the subject property will result in a reduction of average daily trips to and from the property, as well as a potential reduction in peak hour trips.

Should you have any questions or comments, please feel free to contact me at (559) 276-2790 Ext. 117

Sincerely,
LARS ANDERSEN & ASSOCIATES, INC.

Daniel J. Zoldak PE, PLS, CASp, LEED AP, QSD/P
Vice President

TENW
Transportation Engineering NorthWest

MEMORANDUM

DATE: March 4, 2024

TO: City of Wilsonville

FROM: Amy Wasserman / Chris Forster, P.E.
TENW

SUBJECT: Trip Generation Memorandum
Home Depot Wilsonville
TENW Project No. 2023-264

This memorandum summarizes the preliminary traffic information for the proposed Home Depot Wilsonville project located at 29400 Town Center Loop West in Wilsonville, Oregon. This memo includes a project description and project trip generation estimate. Upon your review of this information, we would like to confirm if any additional traffic analysis is required for this project.

Project Description

The proposed Home Depot Wilsonville project is located at 29400 Town Center Loop West in Wilsonville, Oregon as illustrated in the Attachment A site vicinity map. The proposed project would consist of up to 129,100 square feet (SF) of building area for a home improvement superstore. The Home Depot will replace an existing building consisting of 166,495 SF that was previously occupied by an electronics superstore (Fry's). Buildout and occupancy of the Home Depot project is expected in 2025.

Vehicular access to the site is proposed to remain the same as existing with one (1) full access driveway on Park Place, and three (3) access driveways on Town Center Loop West; two (2) of which are full access and one of which is right-in right-out only. A preliminary site plan is shown in Attachment B.

Trip Generation

Trip generation estimates for the proposed project were based on methodology documented in the Institute of Transportation Engineers (ITE) *Trip Generation* Manual, 11th Edition for Code 862 (Home Improvement Superstore) and Code 863 (Electronic Superstore). Adjustments to the trip generation estimates were made to account for pass-by trips.

Pass-by trips are trips that are made by vehicles that are already on the adjacent streets and make intermediate stops at commercial uses on route to a primary destination (i.e., on the way from work to home). Pass-by trips were based on studies included in the appendices of the ITE *Trip Generation Manual*, 11th Edition, 2021.

The resulting net new weekday daily, AM peak hour, and PM peak hour trip generation for the proposed Home Depot project is summarized in Table 1. The detailed trip generation estimates are included in Attachment C.

Table 1
Project Trip Generation Summary

	Net New Trips Generated		
Weekday Time Period	In	Out	Total
Daily	-900	-800	-1,799
AM Peak Hour	22	34	56
PM Peak Hour	-129	-124	-253

Next Steps

Upon your review of this information, we would like to confirm if any additional traffic analysis is required for this project.

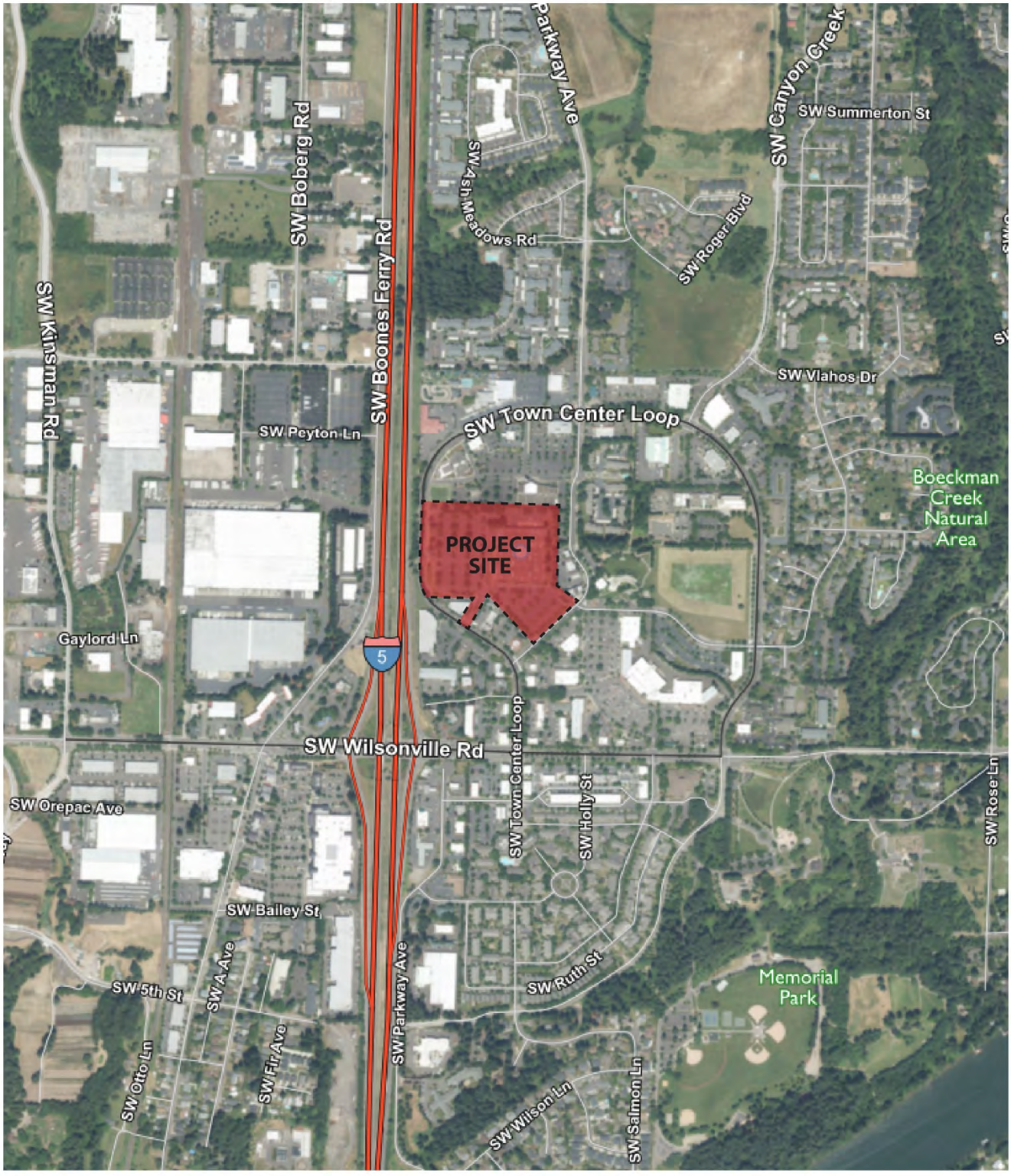
If you have any questions regarding the information presented in this memo, please contact me at (425) 466-7072 or amy@tenw.com.

cc: Dan Zoldak, Lars Andersen & Associates

Attachments: A. Project Site Vicinity
B. Preliminary Site Plan
C. Trip Generation Calculations

ATTACHMENT A

Project Site Vicinity

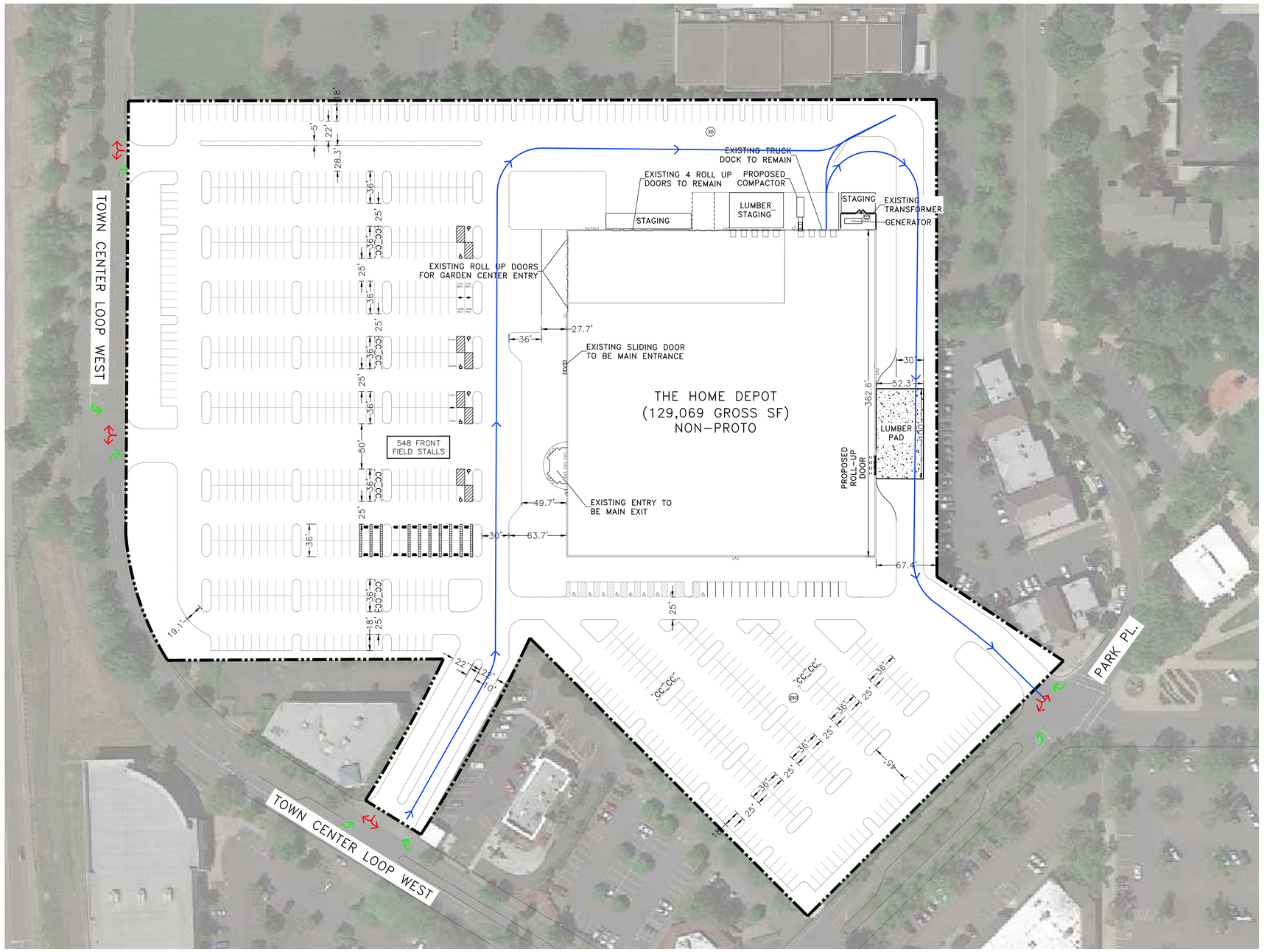


N
NOT TO SCALE

Attachment A: Project Site Vicinity

ATTACHMENT B

Site Plan



NOTES
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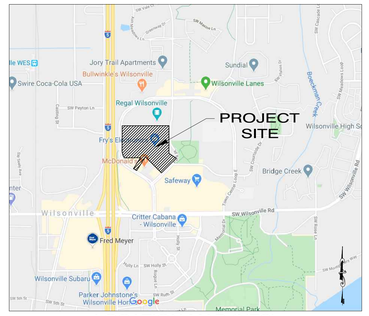
LA PROJECT NO. 20042.00



LOCATION MAP (NTS)

SITE AREA

THE HOME DEPOT PARCEL	15.01 AC	653,836 SF

BUILDING AREA

THE HOME DEPOT	125,176 SF
MEZZANINE	3,893 SF
SUBTOTAL	129,069 SF
TOTAL BUILDING AREA	129,069 SF

PARKING REQUIRED

THE HOME DEPOT	4.1 / 1,000 SF	529 STALLS
TOTAL PARKING REQUIRED		529 STALLS

PARKING PROVIDED

FRONT FIELD	548 STALLS
SIDE FIELD / REAR	290 STALLS
TOTAL PARKING PROVIDED	838 STALLS

INCLUDED IN PARKING PROVIDED

ACCESSIBLE STALLS (17 REQ. @ 2%)	17 STALLS

NOT INCLUDED IN PARKING PROVIDED

CART CORRALS	12 STALLS
ACCESSORY PARKING NOT INCLUDED	12 STALLS
TOTAL THD PARKING PROVIDED	838 STALLS

ZONING CLASSIFICATION

JURISDICTION	CITY OF WILSONVILLE
ZONING CLASSIFICATION	PLANNED DEVELOPMENT COMMERCIAL TOWN CENTER (PDC-TC)
THD USE PERMITTED BY RIGHT	YES

THE HOME DEPOT
WILSONVILLE, OR
29400 TOWN CENTER LOOP W
WILSONVILLE, OR 97070

DRAWING ISSUE DATE 03.04.2024
HD SITE SELECTION NUMBER SS-02804.2001

SCALE: 1"=50'-0"
25 0 25 50 100 150 200

OR - SITE PLAN 10

ATTACHMENT C

Trip Generation Calculations

Home Depot Wilsonville
Weekday Daily Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY DAILY								
Proposed:								
Home Improvement Superstore	129,100 SF	862	50%	50%	30.74	1,985	1,984	3,969
Passby Trips[3]	*42%*					*-834*	*-833*	*-1,667*
					Subtotal (less passby) =	1,151	1,151	2,302
Less Existing:								
Electronics Superstore	166,495 SF	863	50%	50%	41.05	3,418	3,417	6,835
Passby Trips[3]	*40%*					*-1,367*	*-1,367*	*-2,734*
					Subtotal (less passby) =	2,051	2,050	4,101
					Net New Daily Trips =	**-900**	**-899**	**-1,799**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition. The pass-by rate was assumed to be equal to the PM peak hour rate for LUC 862 and 863.

Home Depot Wilsonville
Weekday AM Peak Hour Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY AM PEAK HOUR								
Proposed:								
Home Improvement Superstore	129,100 SF	862	57%	43%	1.51	111	84	195
Passby Trips[3]	*42%*					*-47*	*-35*	*-82*
					Subtotal (less passby) =	64	49	113
Less Existing:								
Electronics Superstore	166,495 SF	863	73%	27%	0.34	42	15	57
Passby Trips[3]	*0%*					*0*	*0*	*0*
					Subtotal (less passby) =	42	15	57
					Net New AM Peak Hour Trips =	**22**	**34**	**56**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition. The pass-by rate was assumed to be equal to the PM peak hour rate for LUC 862 and was assumed to be 0% for LUC 863.

Home Depot Wilsonville
Weekday PM Peak Hour Trip Generation Summary

	Units[1]	ITE LUC[2]	Directional Distribution[2] In	Directional Distribution[2] Out	Trip Rate or Equation[2]	Trips Generated In	Trips Generated Out	Trips Generated Total
WEEKDAY PM PEAK HOUR								
Proposed:								
Home Improvement Superstore	129,100 SF	862	49%	51%	2.29	145	151	296
Passby Trips[3]	*42%*					*-61*	*-63*	*-124*
					Subtotal (less passby) =	84	88	172
Less Existing:								
Electronics Superstore	166,495 SF	863	50%	50%	4.25	354	354	708
Passby Trips[3]	*40%*					*-141*	*-142*	*-283*
					Subtotal (less passby) =	213	212	425
					Net New PM Peak Hour Trips =	**-129**	**-124**	**-253**

Notes:

[1] SF = Square Feet.

[2] Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

[3] Passby percent based on Institute of Transportation Engineers, Trip Generation Manual, 11th Edition.

Schwabe

March 11, 2024

Keenan Ordon-Bakalian
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J. Kenneth Katzaroff
Admitted in Oregon and Washington
D: 206-405-1985
kkatzaroff@schwabe.com

Development Review Board Panel B
City of Wilsonville
c/o Cindy Luxhoj, Associate Planner
29799 Town Center Loop E
Wilsonville, OR 97070

RE: ***Applicant's Final Written Argument for ADMN23-0029 (DB24-0002/APPL24-0001)***

Dear Members of the Development Review Board:

This office represents Home Depot, Inc. ("**Home Depot**" or the "**Applicant**"). On February 26, 2024, the Development Review Board (the "**DRB**") held a public hearing on the Appeal. Home Depot testified orally during the hearing. At the conclusion of the hearing, the DRB closed the record to further oral testimony but allowed the written record to remain open until 5:00 PM on March 4th for any party to submit any evidence or testimony. Home Depot is also entitled to at least seven days after the record is closed to all other parties (March 11, 2024) to submit final written argument, pursuant to ORS 197.797(6)(e).

This letter constitutes Home Depot's final written argument in this matter, and is respectfully submitted prior to the end of the final written argument period at 5:00 p.m. on Monday, March 11, 2024. The Applicant has also attached as **Exhibit A** a redline version of the Class I Planning Director Determination ADMN20-0029 (the "**Decision**") that is presently on appeal. The Applicant believes that Exhibit A will assist the DRB in understanding the portions of the Decision that the Home Depot takes issue with, as well as Home Depot's recommended changes.[1]

Home Depot respectfully requests that the DRB modify the Decision to find that the lawfully established nonconforming use at the subject property is a commercial retail use, not a "Fry's Electronics" or "single-user electronics retail store." Alternatively, the DRB may reverse the

[1] Within Exhibit A, the Applicant has also included a clean copy of the Decision with Home Depot's recommended changes incorporated.

Decision, or remand the Decision back to the Planning Director to make a decision consistent with Oregon's nonconforming use caselaw.

I. INTRODUCTION AND OVERVIEW

The Applicant proposes to operate a Home Depot within the existing structure at 29400 SW Town Center Loop West (the "**subject property**").To this end, the Applicant sought a Class I director's determination that the commercial retail use that was established as a result of a 1991 development approval[2] (the "**1991 Decision**") remained a lawfully established non-conforming use at the subject property. The Applicant's Class I application was submitted on October 30, 2023, and deemed complete by the City of Wilsonville (the "**City**") on November 29, 2023. *See attached*, DB24-0002 Staff Report, at 4 (**Exhibit B**).

As detailed in Home Depot's Notice of Appeal, the City requested that the Applicant bifurcate its request to confirm the legality of a nonconforming use at the subject property and Applicant's request for a determination to establish the scope of use at the property. To this end, the City required the Home Depot to submit two applications – a Class I application to confirm the legality of the nonconforming use, and a Class II application to establish the *actual* nature and extent of use at the subject property. Home Depot's Class II application was submitted to the City on December 15, 2023 and remains under review. However, based on many of the findings contained within the City's Decision for the Class I application, the City appears to have prejudged Applicant's Class II application for a use determination. Moreover, the current Class 1 decision makes specific findings regarding the scope of use, as described below. This is the reason that the Applicant appealed; to request the DRB to remove these scope-of-use findings that the City itself was purporting to avoid by requesting Applicant to submit its Class II application.

On December 28, 2023, the City issued its Notice of Decision for Home Depot's Class I application, finding that "it is the determination of the Planning Director that Fry's Electronics, on the subject property at 29400 SW Town Center Loop West, is a legally established Non-Conforming Use". *See attached*, **Exhibit C**, at 4. However, the City's Decision for the Class I contains contradictory findings that "[t]he existing use on the subject property, per the original approval as described above, is a large format (159,400 square feet), single-story with partial mezzanine, *single-user electronics retail store*" but also that "the primary use of the site was considered *commercial retail or retail store*." Exhibit C, at 3-4 (emphasis added). Furthermore, the Decision contains a finding that "nothing in this Class 1 decision shall be construed to

[2] Case File Nos. 91PC43 and 91DR29.

provide a determination one way or another with regard to the interpretation requested in the subsequent Class 2 Review (re: Home Depot, Inc.)." Exhibit C, at 4.

From the outset, it has been extremely difficult for the Applicant to discern *what* lawfully established nonconforming use the Planning Director has determined is present at the subject property, due to the City's internally inconsistent Decision. Home Depot's position on the matter has been clear from the beginning – the lawfully established nonconforming use at the subject property is the *commercial retail use* that was originally approved by the 1991 Decision. *See attached*, **Exhibit D**. The 1991 Decision is rife with findings and references to the commercial retail use that the decision was approving, including the plain language used by the City to describe the request subject to review – "Stage II Phase II Site Development review for a 159,400 square foot *retail commercial* building." Exhibit D, at 9. The 1991 Decision also contains the following findings demonstrating that the 1991 Decision approved a commercial retail use at the subject property:

- "It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot *commercial retail store*."
- "application for Stage II Phase II site development of Thunder Project, a 159,400 square foot *retail commercial building*."
- "That the location, design and uses are such that the *retail commercial center* will be adequately served by existing or immediately planned facilities and services."
- "The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed *commercial/office uses* are permitted in overlay zones as part of the Town Center Master Plan."

4. Building Use	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	

Exhibit D, at 9, 12-13, 18, 24 (emphasis added).

In contrast, the City's Decision simply refers to a generalized analysis of "the application materials, prior land use approvals, existing site conditions, and the applicable zoning ordinances and regulations" as the basis for the determination that Fry's Electronics is a legally established nonconforming use. Exhibit C, at 3. The Decision does not address the scope of the 1991 Decision in any detail, lacks specificity and clarity, and is unsupported by the evidence in the record. Similarly, the Staff Report for this appeal merely refers to generalized principles of Oregon nonconforming use caselaw, without applying the principals of the cited cases to the appeal before the DRB. Moreover, the Staff Report's recommendation that the DRB affirm the Planning Director's Decision that "[t]here is a legally established non-conforming use at the Location; specifically, that the protected use is 'a 159,400 square-foot electronics-related retail store'"[3] is inconsistent with the Class I Decision itself because the Planning Director found that Fry's Electronics was the nonconforming use at the subject property.

II. ARGUMENT

A. Standard of review.

The DRB's decision must be supported by substantial evidence in the whole record. ORS 197.835(9)(a)(C). Substantial evidence is evidence a reasonable person would rely upon to reach a conclusion, notwithstanding that different reasonable people could draw different conclusions from the evidence. *Adler v. City of Portland*, 25 Or LUBA 546 (1993) In making its decision, the

[3] Exhibit D, at 11.

DRB must also take care not to improperly construe applicable law, which includes Oregon's nonconforming use caselaw. *See* ORS 197.835(9)(a)(D).

B. The nonconforming use at the subject property is the commercial retail use that was approved within the 1991 Decision.

The 1991 Decision is the controlling authority for determining the nature and extent of the nonconforming commercial retail use at the property because the 1991 Decision lawfully established the nonconforming use in the first instance. "The purpose of a local government proceeding to determine the existence of a nonconforming use is to determine what use existed on the date restrictive regulations were applied." *Nehoda v. Coos Cnty*., 29 Or LUBA 251, 1995 WL 1773153, at *5 (1995). A non-conforming use is understood to be "one that is contrary to a land use ordinance but that nonetheless is allowed to continue because the use lawfully existed prior to the enactment of the ordinance." *Morgan v. Jackson Cnty.*, 290 Or App 111, 114 (2018) (citing *Rogue Advocates v. Board of Comm. Of Jackson Cnty.*, 277 Or App 651, 654 (2016), *rev. dismissed*, 362 Or 269, 407 (2017)); *see* Wilsonville Development Code ("**WDC**") 4.001.196 (defining a nonconforming use as "a legally established use, which was established prior to the adoption of the zoning use requirements for the site with which it does not conform").

The commercial retail use at subject property is a lawfully established nonconforming use pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018). As explained in Home Depot's application materials and throughout this appeal proceeding, the City approved a commercial retail use at the subject property on December 9, 1991 with the adoption of Planning Commission Resolution No. 91PC43 (the 1991 Decision). Exhibit D, at 3.[4] Specifically, the 1991 Decision approved a 159,400 retail commercial building and associated commercial retail activities on the 14.75 acre subject property. Exhibit D, at 9. At the time, the subject property's Planned Development Commercial ("**PDC**") zoning allowed commercial retail uses of the nature and extent that was approved by the 1991 Decision. Exhibit D, at 9.

The commercial retail use approved by the 1991 Decision was rendered nonconforming on June 5, 2019, when the City adopted its Town Center Plan and rezoned the property Town Center ("**TC**"). This is because the property's present TC zoning prohibits commercial retail uses that exceed 30,000 square feet, unless the commercial retail use is located on more than one story of a multi-story building, and the 1991 Decision approved a 159,400 retail commercial building.

[4] The Planning Commission's adopting resolution includes findings of fact and conditions of approval, and incorporates all application materials, staff reports, and associated planning exhibits. Exhibit D, at 3.

WDC 4.132.03(A)(1); Exhibit D, at 9. Although the City's application of the TC zone to the property rendered the ongoing commercial retail use nonconforming, the use approved in the 1991 Decision is allowed to continue pursuant to WDC 4.001.196 and *Morgan v. Jackson Cnty.*, 290 Or App 111 (2018).

The City's determination that the nonconforming use allowed to continue at the subject property is a "Fry's Electronics" or "single-user electronics retail store" is contrary to the express language of the 1991 Decision, which is the controlling substantial evidence for the City's nonconforming use analysis. Furthermore, the Applicant has reviewed the zoning code in place at the time of the 1991 Decision, and nothing within the zoning code further classified uses or limited commercial retail uses to specific subsets, such as an electronic store or commercial hardware store. The Applicant is also not aware of any state law that makes such a distinction; nor has the City pointed to any state law or code provision applicable at the time. As such, the Decision must be reversed or modified to reject the limitation of the use approved by the 1991 Decision to either a "Fry's Electronics" or "single-user electronics retail store."

C. The identity of Fry's Electronics is not relevant to the DRB's determination of the nature and extent of the nonconforming use at the subject property.

The Decision's determination that the nonconforming use at the subject property is a "Fry's Electronics" violates a key tenet of Oregon nonconforming use law. Determining the nature and extent of a nonconforming use does not depend on the identity of the entity performing the use, but rather on the nature and extent of the nonconforming activities themselves. *ODOT v. City of Mosier*, 36 Or LUBA 666, 678 (1999). City staff recognize this principle within the Staff Report for this appeal (but not within the Class I Decision), stating that "[t]he identity of the party that engaged in the use is irrelevant to this inquiry." Exhibit B, at 7. Nonetheless, the Decision found that *Fry's Electronics* is a legally established nonconforming use at the subject property, even though Fry's Electronics was not the use approved by the 1991 Decision. Exhibit C, at 3-4.

The Class I Decision erroneously focuses on the identity of the entity performing the nonconforming use at the property – Fry's Electronics – instead of the *nature and extent* of the nonconforming activities themselves. *See City of Mosier*, 36 Or LUBA, at 678. In this case, Fry's Electronics (operating under the anonymous name "Project Thunder") achieved land use approval for a commercial retail use at the subject property. Exhibit D. As demonstrated by the 1991 Decision's findings and conditions of approval – as well as the application materials in the record for that decision – the *nature and extent of the use* approved within the 1991 Decision is a commercial retail use, not a "Fry's Electronics." The 1991 Decision is the controlling substantial evidence for determining the nature and extent of the legally established nonconforming use at

the subject property, and the 1991 Decision didn't approve "Fry's Electronics" as a use, but rather the commercial retail use mentioned throughout the Decision.[5] The Decision's arbitrarily narrow nonconforming use determination is inconsistent with *City of Mosier* and must be reversed or modified.

D. The Applicant may continue the commercial retail use approved by the 1991 Decision.

In this case, Home Depot is proposing to continue the same use that Fry's Electronics was employing the subject property for – commercial retail. WDC 4.001.344 defines "use" as "the purpose for which land or a building is arranged, designed or intended, or for which either land or a building is or may be occupied." The "purpose" of the use at the subject property as approved in the 1991 Decision was commercial retail, including the construction and occupancy of the existing structure at the property. As set forth in the 1991 Decision, the existing structure at the property was approved for office, warehouse, manufacturing, service, and retail use. Exhibit D, at 12. Therefore, the commercial retail purpose of the existing structure and subject property will continue through any change in the characteristic of the owner of the property, i.e., whether it is Home Depot or Fry's that operates at the property.

This position is consistent with Oregon's nonconforming use caselaw. In *Vanspeybroeck v. Tillamook County Camden Inns, LLC*, 221 Or App 677 (2008) petitioners challenged a decision of the Tillamook Board of County Commissioners ("Board") that approved alterations to a second floor residence through a minor nonconforming use review. Petitioners argued that the nonconforming use had been abandoned due to a change in the type of occupancy from an owner-occupied unit to non-owner occupied unit. *Id.* at 684. The court examined the definition of "use" in the Tillamook County Land Use Ordinance, which is defined as the "purpose…for which a unit of land is developed, occupied or maintained" and concluded that "the single-family residential purpose of the second-floor occupancy continued through any change in the characteristic of the occupant as owner or renter, and the nonconforming use was not abandoned or discontinued by that change." *Id.* at 686.

Similarly, in *Hendgen v. Clackamas County*, 15 Or App 117 (1992), the court considered whether a proposed business warehouse, which would store produce of an off-site business, was a continuation of a nonconforming use that used the same buildings to store supplies and

[5] The Applicant notes that the City's 1991 zoning code does not list "Fry's Electronics" as an allowed use in the PDC zone – the subject property's zoning designation at the time the 1991 Decision was made.

inventory with a business located on the same property. The court concluded that the "common nucleus of both activities *is* storage." *Id.* at 120 (emphasis in original). The court went on to state that "LUBA regarded the nature of the businesses that employed the structures to be the decisive inquiry. We think that the more relevant question is whether there is a common use that the various operations share." *Id.* at 121.

Here, the common nucleus in activities for both Home Depot and Fry's Electronics *is commercial retail use*. Just like in *Vanspeybroeck* and *Hendgen*, both Fry's and Home Depot purpose and intent for operating the subject property is the same – commercial retail use. The City's nonconforming use determination for this matter misapplies the well-established nonconforming use principles in *City of Mosier*, *Vanspeybroeck*, and *Hendgen* and is nothing more than a thinly veiled attempt to prevent any development of the subject property that is inconsistent with the City's adopted Town Center Plan. The City's arbitrarily narrow determination that the nonconforming use at the property is a "Fry's Electronics" or "single-user electronics retail store" must be reversed or modified.

E. The Decision effects a taking on Home Depot.

As explained in the Applicant's open record submittal, the Decision has effected a compensable regulatory "taking" under Article I, section 18, of the Oregon Constitution, and the Fifth and Fourteenth Amendments to the United States Constitution. The City's overly-restrictive "use" determination is unsupported by the City's own code and Oregon law. If left to stand, the Decision will deny Home Depot (or any other party) any economic use of the lawfully established nonconforming use at the property. This is because the determination that "Fry's Electronics" is the lawfully established nonconforming "use" for the property essentially precludes use of the structure as the current zoning limits retail uses to less than 30,000 square feet. As such, the City's decision has deprived Home Depot of all economically productive use of the subject property or the existing structure.

For the foregoing reasons in this section and above, the DRB should reverse or modify the Decision to avoid effecting a regulatory taking on Home Depot.

III. CONCLUSION

Home Depot requests that the DRB impose the relief requested by the Appellant in the above argument. Specifically, the Applicant respectfully requests that the DRB adopt the Decision as modified by Home Depot and submitted within Exhibit A. In the alternative, the Applicant requests that the DRB take all necessary steps to modify Decision to find that the legally established nonconforming use at the subject property is the use approved in the 1991 Decision,

Development Review Board Panel B
March 11, 2024

a 159,400 square foot ("SF") retail, office, warehouse, manufacturing, and service store (a commercial retail use); not a "Fry's Electronics" or "single-user electronics retail store" and to not provide additional restriction as to the type of commercial retail because no such limitation existed in the 1991 zoning code or the 1991 Decision itself.

Sincerely,

Keenan Ordon-Bakalian

KOB:

Unique Serial Number: (assigned by dbase) 4808

Department: Planning

Case No: 91PC43 File Creation Date:

Request: Modified Stage I Master Plan and Stage II Phase II site development plans, reconsideration of Condition ofApproval #8 of 90PC15

Action: Approved with conditions

Project Expiration Date:

Property Description: TL 500, 600, 601, 604 Sec. 13 County: C
TL 101, 200, 201, 300, 405 Sec. 14D County: C

Location: Wilsonville Town Center

Street Address:

Project Name(s): **Project Thunder**

Applicant: Capital Realty Corporation

Retention Schedule: Permanent

Location of Microfilm: City Hall Vault

Hard Copies of drawings/plans available? Yes

Physical copy of file retained? No

See also Case Files: 89PC50, 90PC15, 90PC15EX, 91DR29, 92DR21

Other name(s) on file:

MAP

SW 10/5/06 Initial/Date

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

NOTICE OF DECISION

Project Name: PROJECT THUNDER File No: 91PC43

Applicant / Owner: Capital Realty Corp.

Proposed Action: Modified Stage I Master Plan, Phase II Stage II Site Development Plans and Amending Condition of Approval 8 of Resolution 90PC5

Property Description:

Map No: 13 & 14D Tax Lot No: 101,102,200,201, 300 and 500 Site Size: _____

Address: _____

Location: Wilsonville Town Center - east of Town Center Loop West and northwest of shopping center

On December 9, 1991, at the meeting of the Planning Commission the following decision was made on the above-referenced Proposed Development Action:

_____Approval XX Approval with Conditions _____Denied

This decision has been finalized in written form and placed on file in the City records at the Wilsonville City Hall this 16th day of December, 1991, and is available for public inspection. The date of filing is the date of the decision. Any appeal(s) must be filed with the Planning Department by 5:00 p.m. on December 30, 1991.

XX Written decision is attached

_____ Written decision is on file and available for inspection and/or copying.

This action, if approved, will expire on December 9, 1993 unless development commences prior to the expiration date.

For further information, please contact the Wilsonville Planning Department at City Hall, Community Development, or phone 682-4960.

FILED 12-16

PLANNING COMMISSION
RESOLUTION NO. 91PC43

A RESOLUTION ADOPTING FINDINGS AND CONDITIONS OF APPROVAL FOR A MODIFIED STAGE I MASTER PLAN, PHASE II STAGE II SITE DEVELOPMENT PLANS AND AMENDING CONDITION OF APPROVAL 8 OF RESOLUTION 90PC5 - CAPITAL REALTY CORP., APPLICANT. THE PROPERTY IS IDENTIFIED AS WILSONVILLE TOWN CENTER AND IS LOCATED ON TAX LOTS 101, 102, 200, 201, 300 AND 500, T3S-R1W, SECTIONS 13 AND 14D, CLACKAMAS COUNTY, OREGON

WHEREAS, an application, together with planning exhibits for the above-captioned development, has been submitted in accordance with the procedures set forth in Sections 4.008(4) and 4.139(1), (2) and (3) of the Wilsonville Code, and .

WHEREAS, the Planning staff has prepared a report on the above-captioned subject which is attached hereto as Exhibit A, and

WHEREAS, said planning exhibits and staff report were duly considered by the Planning Commission at a regularly scheduled meeting conducted on December 9, 1991, at which time all exhibits, together with findings and public testimony, were entered into the public record, and

WHEREAS, the Commission has duly considered the subject and the recommendations contained in the staff report, and

WHEREAS, all interested parties have been afforded an opportunity to be heard on the subject.

NOW, THEREFORE, BE IT RESOLVED that the Wilsonville Planning Commission does hereby adopt the staff report attached hereto as Exhibit A, along with the findings, recommendations and Conditions of Approval contained therein. The Wilsonville Planning Director is hereby authorized to issue a Stage I Master Plan and Stage II Site Development Permit for Phase II and a Revised Condition of Approval 8 -Resolution 90PC5 once the prescribed appeal period has expired.

ADOPTED by the Planning Commission of the City of Wilsonville at a regular meeting thereof this 9th day of December, 1991, and filed with the Planning Secretary this same day.

Richard D. Wilson
Chairman, Planning Commission

Attest:
Judee Emison
Judee Emison, Planning Secretary

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

Chairman Mike Williams moved to accept the staff report with the following amendments:

Revise Condition of Approval Number 10 to provide that instead of at the time building permits are issued at the Phase II Stage II site development, to provide that at the time the Certificate of Occupancy is issued the applicant/property owner shall dedicate 5.1 acres. And to provide another sentence at the end, that the City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

Provide an additional condition of approval that at the time that the Design Review Board specifically reviews the applicants plans, regarding the east wall of the large structure on Phase II, to insure its compatibility with the proposed park. And to also have the DRB look at the pathway and sidewalk circulation plan. And an additional condition of approval that the applicant consider on-site detention in its submittal to the city. That the applicant coordinate with the engineering department the storm drainage plans with some consideration toward whether or not an on-site detention is feasible and meets the engineering standards of the city. And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

An additional Condition of approval is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the property across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to the Project Thunder.

(Mike Kohlhoff - Add the phrase, "unless the project owner and the city council reach other agreement")

Condition 10 will read that dedication of 5.1 acres for a public park will be required before issuance of the Certificate of Occupancy unless the applicant and the City Council reach an agreement for a later date.

Motion was seconded by Lew Hendershott and carried 4-2.

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

SUMMARY

Capital Realty Corporation is representing a retail business with the anonymous name "Project Thunder". The Project Thunder people desire to develop 14.75 acres (Phase II of Wilsonville Town Center) for a 159,400 square foot electronics-related retail store.

The proposed Project Thunder Stage II Site Development Plans has caused Capital Realty Corp. to modify and re-submit the Stage I Wilsonville Town Center Master Plan to reflect an expanded master plan area, reclassify overlay zones associated with Ordinance 55, resdesignate the phasing sequence and to establish approximately 5.4 acres for open space.

Capital Realty Corp. is also seeking reconsideration of Condition 8 of Planning Commission Resolution 90PC15 which imposed certain design and development requirements for the development of the 5.4 acre open space.

All Comprehensive Plan and Zoning Code requirements that apply to this Stage I review are satisfied or can be met. Parking issues, building height and setback, final design, utility placement, and other site specific development requirements are further considered in this application for Stage II Phase II site development of Thunder Project, a 159,400 square foot retail commercial building. The applicant has also submitted conceptual plans showing Project Thunder's architecture, landscaping and a signage program. The Design Review Board is the City's review authority of the project's architecture, landscaping and signage program.

The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. The proposed findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

Project Thunder can be adequately served by existing or immediately planned public facilities and services.

RECOMMENDATION: **Approve the modified Stage I Wilsonville Town Center Master Plan and Stage II Phase II Site Development Plans with Conditions of Approval attached herein. This recommendation acknowledges the conceptual configuration of a 5.1 acre open space as proposed by the developer.**

FINDINGS: PDC & PDI

The following findings are hereby adopted by the PLANNING COMMISSION and entered into the public record in consideration of the application as submitted in conformance with the City's Comprehensive Plan and Zoning Regulations. "PROJECT THUNDER" STAGE II

NA = NOT APPLICABLE
DRB = DESIGN REVIEW BOARD

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
A. Land Use					
Zoning	PDC	PDC	●	○	1 to 7
Comprehensive Plan Designation	COMMERCIAL TOWN CENTER		●	○	1 to 7, 32 to 36
B. Land and Building Improvements	ORD # 55				
1. Lot Size					
a. Total site area (acreage)	NOT SPECIFIED	652,687 SF	●	○	
b. Lot sizes (subdivision)	NA		○	○	NA
Acreage lot size	NA		○	○	NA
2. Lot Coverage					
a. All buildings	NOT SPECIFIED	24% 159,400 SF	●	○	
b. Parking/paved	↓	61% 395,242 SF	●	○	
c. Landscaping	MINIMUM.	15%			
1. total size area (%)	15%	98,045 SF	○	○	DRB
2. parking area (%)	10%	-	○	○	↓
3. screening/buffering	REQ'D	-	○	●	42, 43
4. irrigation system	↓	-	○	○	DRB
3. Building Setbacks					
Front / TOWN CENTER LOOP WEST	0'	445'	●	○	
Right side / NORTH	0'	160'	●	○	
Left side / SOUTH	0'	85'	●	○	
Rear side / EAST	0'	70'	●	○	

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
4. Building Use					
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,336 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	
5. Building Specifications					
a. Building Height	35'	-	●	○	44
b. (Sun Exposure Plane)	NA		○	○	NA.
c. Gross Floor area of Building	NO LIMIT	150,400 SF	●	○	
6. Number of Off-Street Parking					
a. Standard 9' X 18'	472	858	●	○	44
b. Compact 8 1/2' X 17' (30% 10 allowed)	OPTIONAL	NOT SHOWN.	●	○	
c. Handicapped 12' X 18' (1 to 50 required)	11	16	●	○	UBC TABLE 31-A
Total	483	872	●	○	46 to 48
d. Truck load berths	2	26	●	○	
7. Access/Egress					
a. Direct access to street	-	3	○	●	17, 18
b. Access provided by easement	NA		○	○	NA
c. Rail Access	NA		○	○	NA.
8. Open Space Slope Protection					
a. Existing vegetation protected	NA		○	○	NA
b. Slopes over 20% to 30% impervious coverage	NA		○	○	NA
c. River and stream corridors protected	NA		○	○	NA
d. Adequate erosion control provided			●	○	EXHIBIT G.4
e. Within greenway	NA		○	○	NA

	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
C. Other Planning Considerations					
1. Outside storage area provided/ screening	-	-	○	○	DRB
2. Adequate screenage of mechanical equipment	-	-	○	○	DRB
3. Safety/crime prevention					
a. Location of addressing	-	-	○	○	DRB
b. Natural surveillance	-	-	○	○	
c. Type of exterior lighting	-	-	○	○	
D. Bike Paths, Pedestrian Trails, & Equestrian Trails					
1. Pathway Standards					
a. Pathways are provided consistent with pathway master plan and design standards (Section 4.168 W.C.)	REQ'D	HOT SHOWN	○	●	28 & 31

E. Previous Approval actions and applicable conditions or approvals

1. City Council	Yes	No	File No.	See finding	ORD 55
2. DRB	Yes	No	File No.	See finding	90-15 & 90-50
3. P.C.	Yes	No	File No.	See finding	
4. Other	Yes	No	File No.	See finding	

Inter-agency review comments

Yes	No	See Exhibit No.	

Inter-agency review comments (Written Only)

City Engineer	Yes	No	See Exhibit No.	D
Parks & Recreat.	Yes	No	See Exhibit No.	
Traffic Safety	Yes	No	See Exhibit No.	
Building Dept.	Yes	No	See Exhibit No.	E
Tualatin Fire Dept.	Yes	No	See Exhibit No.	
Sheriff	Yes	No	See Exhibit No.	

91PC43

MODIFIED STAGE I MASTER PLAN AND STAGE II PHASE II SITE DEVELOPMENT PLANS AND RECONSIDERATION OF CONDITION OF APPROVAL 8 OF 90PC15
PLANNING COMMISSION FINDINGS

Property Owner:	Capitol Realty Corporation
Project:	Project Thunder
Developer:	Project Thunder
Architects:	Stage I Master Plan revision - JKS Architects Stage II Phase II - Design Forum Architects
Traffic Engineer:	Kittelson & Associates, Inc.

Property Description:

The subject master plan area comprises 59.79 acres for retail commercial/office development more specifically described as Tax Lots 500, 600, 601 and 604 of Section 13 and Tax Lots 101, 200, 201, 300 and 405 of Section 14D, T3S-R1W, Clackamas County, Wilsonville Oregon. Approximately 114 acres comprise the Town Center Master Plan as recognized in Ordinance No. 55. Wilsonville Town Center, the name of Capital Realty Corporation's commercial retail development, has the same name of a retail district identified in Ordinance No. 55. For clarification, the applicant's Stage I Master Plan will be identified as the Wilsonville Town Center and the City's Master Plan of the district will be identified as Ordinance No. 55.

For years the interior area of Town Center Loop was in agricultural use with farm exemption tax status. It wasn't until the last eight years that the area experienced rapid residential and commercial growth with the development of Park Center Apartments, Town Center Mercantile, Wilsonville Market Place, Phase I Wilsonville Town Center, Clackamas Community College and various office and retail developments. It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a 159,400 square foot commercial retail store. Capital Realty forecasted commercial growth trends in Town Center and have subsequently purchased additional property to accommodate their plans to develop the Wilsonville Town Center Master Plan. Thus, the overall master plan area will increase from 53.39 acres to 59.79 acres. This adjustment will also create a new development phase in the overall Master Plan. With respect to Project Thunder, the relatively level site is easily accessible to Town Center Loop, Parkway Court and Wilsonville Road. The proposed Project Thunder site is also highly visible to I-5 and Town Center Loop West.

LAND USE

Project Data
Stage I - 89PC50

1. Building Area

Phase I	24.08 acres	170,900 square feet
Phase II	6.52 acres	61,000 square feet
Phase III	22.79 acres	179,000 square feet
Total	53.39 acres	

Building Area

Phase I	207,130 square feet
Open Space	5.62 acres

Project Data
Stage I Modification:

2.

Phase I	22.96 acres (Existing Wilsonville Town Center commercial dev.)
Phase II	14.75 acres (Proposed Project Thunder)
Phase III	22.08 acres (Undeveloped property)
Total	59.79 acres

Building Area

Phase I	207, 130 sq.ft.
Phase II	159, 400 sq.ft.

3. The Master Plan amendment also seeks to amend the current overlay zones in Ordinance No. 55 to reflect modifications proposed in Stage I Wilsonville Town Center. Essentially, the amendments would replace the Motor Hotel (MH), Office Professional (OP), Service Commercial (SC) and Residential (R) use designations with Central Commercial (CC).

Plan Designation and Zoning

4. The subject site is designated "Commercial" on the Comprehensive Plan map and zoned "Planned Development Commercial" (PDC) on the zoning map. The site is also situated within an area identified as Town Center Master Plan area (Ordinance No. 254). Ordinance No. 254 identifies the property in the following overlay zones; Service Commercial (SC), Office Professional (OP), Central Commercial (CC), Motor Hotel (MH), Residential (R) and within an area designated for a Lake or Open Space.

5. Within the Comprehensive Plan, a number of goal and policy statements address the commercial planning designation and development review which apply to the subject property. The applicable criteria for Stage I Master Plan review is found in Section 4.139(2) of the Wilsonville Code. Recommended uses for development within the Town Center Master Plan are embodied in Chapter 4 of the Wilsonville Code. In brief, the combined review criteria are the following:

The Most Applicable Comprehensive Plan Goals, Policies and Objectives

Goal 1.1	Citizen Involvement Goal
Objective 3.1	Public Facilities Availability
Policy 3.3.1	Street System Master Plan
Policy 3.3.1(b)	Street System Master Plan
Policy 3.3.1(c)	Street System Master Plan
Policy 3.3.2(a)	Arterial and Collector Streets
Policy 3.3.5(b)	Private Owner Responsibility to Build Streets
Policy 3.3.8(a)	Transportation Impact Analysis
Policy 3.3.8(c)	Traffic Trip Reduction
Policy 3.3.8(d)	Consolidation of Vehicle Trips
Policy 3.3.8(e)	Mass Transit
Policy 3.3.14	Major Street Improvements Required
Policy 3.3.3	Street Standard and Dedication
Policy 3.3.11	Bikeways and Pathways
Policy 3.3.12	Pathway Construction
Policy 3.8.3	Open Space
Policy 4.2.3	Site Plan Information Requirements
Policy 4.2.5	Development Coincide with Public Facilities

Applicable Zoning Ordinance Provisions

Section 4.123	This Section provides the requirements of the PDC zone which are governed by Section 4.130 to 4.140.
Section 4.138(4)	Stage I Master Plan compliance
Section 4.139(4)	Criteria for approval of a planned development including subsections a, b and c

Town Center Master Plan

Ordinance Nos. 55 and 254.

Goal 1.1 - Citizen Involvement

6. The Planning Commission will be conducting the Stage I Master Plan as a public hearing and all notification requirements have been met.

CONCLUSIONARY FINDING

7. The proposed uses, both separtely and as a whole, are consistent with the Comprehensive Plan and can be made consistent with Ordinance No. 55.

PUBLIC FACILITIES

Objective 3.1

8. The City Engineering Department has provided detailed comments regarding public facilities improvements required to serve the site. These findings and recommendations are listed on Exhibit D.

Sanitary Sewer

9. Three sanitary sewer lines serve the site. An eight-inch line is located on the west side of the site which extends south through Citizens Drive to a trunkline in Wilsonville Road. A 15-inch line is located in the center of the site and a 10-inch line traverses the site originating from the Courtside Estates subdivision. This line was relocated to accommodate Phase I development. Approximately 1,500 linear feet of a sanitary sewer line was constructed along the northerly right-of-way of Wilsonville Road. This finding is also applicable to Stage II site development.

Storm Drainage

10. The subject site is located within two storm drainage basins. Phase I site grading recontoured the site Master Plan to divert storm water to a piped system in the easterly basin that out falls to an existing 48-inch pipe on the southeast corner of Phase I site. This diversion helps relieve the westerly storm basin from the storm drainage system that out falls to constricted culvert under I-5. Phase II development will remove the existing storm detention pond located on the west side of the site and be replaced with storm pipes to connect with the improved Phase I storm system. The City requires detailed storm drainage plans designed to pass a 25-year storm frequency. The detention pond has not been investigated with the Oregon Division of State Lands for wetlands status.

Water

11. Existing 12-inch waterlines located in Wilsonville Road and Town Center Loop East and West have adequate flow to serve full buildout of the site. This finding is also applicable to Stage II site developement.

Police

12. Police protection is provided to the City by the Clackamas County Sheriff's Department. This department has a headquarters in Wilsonville City Hall which is near the subject property.

Fire/Emergency

13. The Tualatin Valley Consolidated Fire and Rescue District provides fire protection to this site. The City is served by two fire stations strategically located in the City that can provide adequate fire protection services to the proposed development.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

STREETS and TRAFFIC

Policy 3.3.1(a) - Street System Master Plan

15. The Street System Master Plan identifies design standards and conceptual locations for arterials and major collectors. Wilsonville Road and Town Center Loop are classified as major arterial streets. The Master Street System and Functional Classification Map does not identify or classify any internal streets within the Town Center Loop. In the case of the proposed retail development, private drives will be constructed and connected to an internal drive/road system. This finding is also applicable to Phase II Stage II site development.

16. The design standards for Wilsonville Road show an approximate 94-foot right-of-way with a median planter island. The standards for the Town Center Loop show a 72-foot right-of-way with a median planter island. This finding is also applicable to Stage II site development.

17. The proposed development will construct driveway connections within Town Center Loop, but not in the same alignments as shown on the pictorial map representing the Town Center Master Plan. This finding is also applicable to Stage II site development.

18. Though the proposed access drive located near the northwest corner of the site is shown at a location supported by the Town Center Master Plan, this access is situated along a radius of Town Center Loop West that may position it in an unsafe location for egress and ingress.

Policy 3.3.2(a) - Dedication of Arterial and Collector Streets and Control or Consolidation of Access Drives.

19. The dedication of additional right-of-way and half-street improvements along Wilsonville Road and Town Center Loop East were accomplished in Phase I Stage II site development. This finding is also applicable to Stage II site development.

20. The Wilsonville Town Center Master Plan shows ten access drives at arterials. The full access drive shown near the northwest corner of Phase III at Town Center Loop West should be analyzed for safe vision clearance.

21. The proposed access drive to Project Thunder, shown at the southwest corner of the site, does not align with the location of the existing curb cut approved to the site in Local Improvement District No. 5. This access drive would further create a staggered intersection with access drives constructed on the opposite side of Town Center Loop West. This access drive also deviates from the access drive shown on the Town Center Master Plan approved in 89PC50. The Planning Commission cannot change the locations of access drives approved in LID No. 5 without first obtaining approval from the City Council. This finding is also applicable to Stage II site Development.

22. It appears from the re-submitted Stage I Master Plan that access is not proposed at Parkway Court which would have encouraged through traffic from Wilsonville Road and Town Center Loop to the Parkway Court.

Policy 3.3.3

23. Policy 3.3.3 requires the City to establish minimum street standards and dedication of adequate right-of-way prior to actual site development. It further provides that if proposed development exceeds minimum service capacity, then appropriate improvements shall be required prior to occupancy of the completed development. With respect to Project Thunder, the arterials servicing the site, Town Center Loop West and Wilsonville Road are already constructed to the Public Works standards. Phase I of Wilsonville Town Center is required to install a traffic signal to comply with minimum service capacity levels.

24. Section 4.139(4) stipulates that a Planned Development Permit may be granted by the Planning Commission only if it is found that the development conforms to subsections 4.139(4)(a),(b) and (c) and Sections 4.130 to 4.140. Section 4.139(4)(b) states:

> "That the location, design, size and uses are such that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on existing or immediately planned arterial or collector streets and will, in the case of commercial or industrial developments, avoid traversing local streets."

25. The applicant has provided an updated transportation analysis prepared by Kittelson & Associates, Inc. for Project Thunder. Wayne Kittelson's updated report is labeled Exhibit G-7. The report recommends that a traffic signal be installed at the intersection of Town Center Loop West with Wilsonville Road at the time of occupancy of Phase II. However, Capital Realty was conditioned in Phase I Stage II development (Resolution 90PC15) to install the subject traffic signal as determined by the City Engineering Department. This requires that the State of Oregon Department of Transportation warrant the signal. This finding is also applicable to Stage II site development.

- All of the intersections within the study area, with the exception of Wilsonville Road/Parkway Avenue, are currently operating within acceptable level of service limits.

- Under projected 1991 total traffic conditions and with the addition of site-generated Phase I traffic, the minor street left-turn movements at the Town Center Loop West/Wilsonville Road intersection are projected to experience an "E" Level of Service. While a traffic signal would improve the level of service for the 45 vehicles making this movement, it would also cause an overall increase in intersection delay and is not considered appropriate in view of the surrounding street system, the traffic circulation patterns and the projected operational characteristics of this intersection.

- By 1995, the projected background traffic volume conditions, without Phases II and III, will warrant the installation of a traffic signal at the intersections of Wilsonville Road/Town Center Loop West and Wilsonville Road/Town Center Loop East. It is therefore recommended that traffic operations at both the Town Center Loop intersections with Wilsonville Road be monitored on a regular basis. Traffic signals should be installed only when one or more MUTCD signal warrants are met and the operational and/or safety characteristics dictate a need for a traffic signal.

- The number of access drives included in the Site Plan will be adequate to serve the proposed retail development. These access drives will disperse the site-generated traffic sufficiently to minimize the overall effect of the retail center on the capacity and quality of service provided by the adjacent arterial street system. At the same time, they are sufficiently separated from each other and from adjacent intersections to avoid significant operational, stacking and safety problems.

- By 1995, the projected background traffic volume will, by itself, exceed the existing capacity of Wilsonville Road in the vicinity of the Wilsonville Road/I-5 interchange. The proposed ODOT improvement project at the interchange would add sufficient capacity to accommodate both the 1995 background traffic, as well as the additional traffic from Phases II and III of the proposed development.

Kittleson and Associates has also provided additional findings and recommendations found in their letter of October 16, 1991, labeled Exhibit G, which are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Policies 3.3.8(a)-(e)

26. These policies address traffic impacts and congestion.

As noted in the previous findings responding to Policy 3.3.3, the applicant has provided a detailed traffic analysis that responds to Policies 3.3.8(a)-(e) and Section 4.139(4) of the Wilsonville Code.

CONCLUSIONARY FINDING

27. The applicant's traffic report demonstrates that the location, design and uses are such that traffic generated by Project Thunder can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual at the access drives to Town Center Loop West, and at the intersection of Town Center Loop with Parkway Avenue and the intersection with Town Center Loop West with Wilsonville Road. It may also be determined that the location and design of the access drives may be refined to reflect conclusionary findings of the traffic analysis report and of the City Engineering Department. These findings do not take into account traffic impact on the intersection of Wilsonville Road with Parkway Avenue and the Wilsonville interchange from the proposed Phase II development. With respect to the previous statement, the Planning Commission did not analyze traffic congestion levels on the aforementioned intersection in the review of Phase I Wilsonville Town Center. Furthermore, Subsection 4.139(4)(b)WC does not ask the applicant to accommodate traffic safely and without congestion in excess of level service "D" at the Wilsonville Interchange.

TRANSIT FEATURES, SIDEWALKS AND BIKEWAYS

28. Specific transit features such as transit stop locations and right-of-way fixtures for transit uses should be provided in the Stage II Site Development Plan. These findings are also applicable to Stage II site development.

Policies 3.3.11, 3.3.12, 3.3.13 and 3.3.13(b)

29. These policies addresses pathways and bikeways. Written comments received by Myers/Kroker (the architectural firm responsible for master planning Town Center) in case file 90PC15, have the following observations concerning pedestrian pathways:

> "There will need to be a landscape design study of the public right-of-way system defining the nature of plant materials, berm forms, ground cover, public walk systems and street light systems. Design definition of pedestrian overpasses would be developed within the recommended 'Design Review Parameter Study'."

30. The modified Stage I Master Plan shows a bikeway through Phase I to extend through Phase III and connect with the future park. A shoulder-side bikeway is required on the Comprehensive Plan to occur on the south side of Wilsonville Road.

31. The Phase II Stage II submittal plans do not indicate sidewalks along Town Center Loop West as required by Ordinance No. 55 and by Section 4.168 and Subsection 4.167(1)(b) of the Wilsonville Code. Regarding Project Thunder, a five-foot wide concrete sidewalk is required along Town Center Loop West to be off-set five feet from the curb. In order to provide for safe pedestrian access around and on the Phase II site, pedestrian walkways should be extended from Town Center Loop West via the central access drives up to Project Thunder's storefront. It also appears that the applicant has not considered pedestrian sidewalks to link the site with the future park and adjoining businesses.

OPEN SPACE

Policy 3.8.3

32. This policy addresses open space. The proposal, as presented, will have a major impact on the location, size and configuration of the area designated by Ordinance No. 55 shown as lake or open space. Approximately 8.5 acres of lake or open space is conceptually shown on the Town Center Master Plan. The open space depicted on the modified Town Center Master Plan or Ordinance No. 55 does not have the same configuration as shown for the Primary Open Space area depicted on the Comprehensive Plan Map.

33. The modified Stage I Master Plan shows 5.1 acres in open space to be reconfigured to satisfy Capital Realty's site development program, and hopefully, for the City's benefit to develop the property as a public park. The application does not propose a specific open space plan with uses, nor is the applicant proposing a development development schedule. In this regard, the Planning Commission had previously conditioned the applicant in Resolution 90PC15 to perform the following:

Condition No. 8:

> "At Phase II Stage II site development, which shall be the next phase presented, applicant shall submit to the Planning Commission and the Design Review Board a detailed open space plan and development schedule for the development of the 5.4 acre open space shown on the Stage I Master Plan."

With respect to the above issues, the applicant is requesting the Planning Commission to reconsider Condition No. 8 as follows:

"1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions.

2. To formulate a development plan and time frame consistent with the development of Phases II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto."

34. Ordinance No. 55 depicts an open space or lake with a centralized location in Town Center with surrounding development to be oriented and related with it. One can compare this relationship to be similar with the concept of a public square of a small European city or even with an Early American town square. Those kind of public spaces create a sense of place and encourage a community gathering place within an urban context. It also creates a city center environment that involves the pedestrian in its function and design that is not found in retail strip developments designed around automobiles.

35. The proposal, as presented, shows approximately 5.1 acres in open space. The City will require that the open space be dedicated for development of a City park. At issue is the proposed configuration of the open space. In this regard, the proposed open space has a spacial composition that positively responds to the open space concept in Ordinance No. 55. The proposed Master Plan is an assembly of properties that make up a reasonable configuration for future park development. Conversely, the surrounding development plan represents an augmentation of the more traditional strip retail commercial center showing buildings oriented to major collectors and arterials together with large storefront parking areas. Truck delivery activities are then generally found on the sides or at the rear of the stores which attract outside storage of palettes, boxes etc. The applicant has modified the original submittal drawings designed to lessen the impact of Project Thunder's building mass on the proposed open space. Buffering can be accomplished by reducing the mass of Project Thunder with siting a smaller intervening building between Project Thunder and the open space. The revised plan also re-positioned potential building sites to open up the view of the open space to Town Center Loop West.

36. The proposed 5.1 acre open space, combined with approximately 3 acres in open space created for Town Center Park Apartments and Clackamas Community College, will provide a generous area for a future public park.

Policy 4.2.3 and Section 4.139(2)(a) and (b)

37. This policy and zoning section identify the information which must be included in the Site Plan. The information set forth has been submitted in compliance with the Comprehensive Plan and Zoning Ordinance. Landscape and Architectural Plans will be reviewed by the Design Review Board.

Policy 4.2.5

38. This policy requires that development coincide with the provision of public streets, water, sanitary sewer and storm drainage facilities. Such facilities are currently available at the site. Sewer and water are located within the abutting roads. Storm drainage is provided at the eastern portion of the site. The extension of these services will be coordinated with site construction and facilities and will be designed to meet City public works standards.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

40. Ordinance No. 55 is a conceptual plan intended to list recommended uses prescribed by commercial overlay zones. The Ordinance further allows the Planning Commission flexibility to change the plan to reflect changes of community needs, shopping habits, transportation and in social economic needs. Such is the case in this application with proposed changes in building orientation, driveway location, reclassifed uses and reconfigured open space.

41. Condition No. 2 of the Stage I Master Plan approval requires separate Stage II land development applications for review of each pad. Therefore, the buildings proposed on the pads are not part of this application.

BUFFERING and SCREENING

42. Section 4.163 of the Wilsonville Code requires:

A. All outdoor storage and garbage collection areas shall be screened from off-site view with fencing and/or landscaping.

B. Activity areas on commercial and industrial sites shall be buffered and screened from adjacent residential areas. Multi-family developments shall be screened and buffered from single-family areas.

43. The Site Plan illustrates an area between the truck loading area and proposed open space. This site arrangement orientes the massive and mundane backside of Project Thunder to Parkway Court and the proposed open space. The impact can be lessened, as proposed in Finding No. 35, together with innovative design utilizing landscaping, screenage, murals etc.

BUILDING HEIGHT

44. Definition no. 12 of Chapter 4 of the Wilsonville Code (Building of Structural Height) is defined by the following:

> "The term 'height of building' shall be deemed to mean the perpendicular distance from the average elevation of the adjoining ground to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the middle height gable between the eaves and ridge of a pitch or hip roof. If a building is divided into units by means of masonry division walls, each unit shall be considered separately in calculation for height of building."

45. In order to distinguish Project Thunder to the public, the applicant proposes to construct a dome and flag pole atop the main entrance of the store. Section 4.172(1) exempts domes and flag poles from the height limits of the PDC zone. However, the flag pole can only fly the United States and the State of Oregon flags. Just for general information, the top of the dome is shown approximately 55 feet above grade level. The top of the flag pole is approximately 81 feet above grade level.

PARKING ANALYSIS

46. Section 4.150WC:

"Commercial:

Commercial retail, 1,501 square feet or more	1 space/200 sq.ft. @ 63,914 sq. ft. of floor area
Service or repair shops	1 space/200 sq.ft. @ 17,276 sq. ft. of floor area
Eating or drinking establishments	1 space/200 sq.ft. @ 6,096 sq. ft. of floor area
Storage warehouse, wholesale establishment, rail or trucking freight terminal	1 space/2,000 sq.ft. @ 39,336 sq.ft. of floor area up to 40,000 sq.ft.; 1 space/4,000 sq. ft. thereafter
Office	1 space/250 sq.ft. @ 9,117 sq.ft.

These calculations do not include employee lunch rooms, restrooms, HVAC roooms, cat walks, etc.

Building Area - Phase II **Minimum Parking Required:**

Project Thunder approximate floor areas:

Retail Commercial	63,914 / 200 = 320 spaces
Service	17,276 / 200 = 86 spaces
Office	9,117 / 250 = 36 spaces
Restaurant	6,096 / 200 = 31 spaces
Storage	39,336 / 4000 = 10 spaces
Mimimum parking :	**483 spaces**

47. Though the proposed off-street parking count shows 16 handicapped and 856 standard parking spaces for a total of 872 parking spaces, the proposed parking is almost twice the minimum requirement of the Code. This figure does not include parking for the future pads. Those parking areas will not be constructed until each pad is developed.

48. The parking plan specifies dimensions for a typical standard parking space at 9' x 18' with 25'-0" drive aisles. The Zoning Code has a minimum 9' x 18' standard parking space dimension. Compact parking spaces are not proposed and are optional by the Zoning Code.

And to provide an additional finding of fact that says that the traffic signal at the intersection of Town Center Loop West and Wilsonville Road is in process and should be in place by July of 1992, which it appears will alleviate some of the traffic congestion, but the Planning Commission still has significant concerns regarding the traffic at the intersection of Wilsonville Road and Parkway Avenue. (That's a finding of fact and not a Condition of Approval.)

STAGE I MASTER SITE PLAN AND PHASE II STAGE II SITE DEVELOPMENT CONDITIONS OF APPROVAL

1. This approves the subject Stage I Master Plan and Stage II Site Development of Phase II Project Thunder store. Developers shall submit separate applications for Stage II development review and separate applications for Site Design Review for each pad and development phase proposed in the Master Plan.

2. Automotive service stations/centers and automotive wash centers shall not be permitted within the Wilsonville Town Center Master Plan.

3. The owner shall waive right of remonstrance against any local improvement district that may be formed to provide public improvements to serve the subject site.

4. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

5. The developer shall retain an engineer to provide a detailed drainage analysis of the subject property and prepare a 24" x 36" sheet identifying contributing drainage areas to be included with the final design plans.

6. Storm sewer system shall be designed to pass a 25-year frequency storm. Engineer shall provide detailed drainage computations. Applicant's design engineer shall provide runoff protection to downstream property owners. The design may require a detailed erosion control plan.

7. The developer shall coordinate with the City Engineer in preparing grading plans and in the design and location of all public utilities.

8. The developer shall conform with all requirements of the Tualatin Valley Fire District.

9. The developer shall submit to the Design Review Board a pedestrian sidewalk plan showing connections along the access drives through Phase II to the open space. Construct a five-foot wide concrete sidewalk, off-set five feet from the curb along the entire frontage of Town Center Loop West with Phase II and the adjoining pads. Connect all public sidewalks to the on-site sidewalk system. All sidewalks shall be constructed prior to occupancy of Project Thunder.

10. This approval amends Condition No. 16 of Resolution 89PC50 and Condition No. 8 of Resolution 90PC15 to state as follows:

    The applicant shall dedicate 5.1 acres for a public park before issuance of the Certificate of Occupancy for Phase II unless the applicant and the City Council reach an agreement for a later date. The City and the applicant will work toward resolving the access and timing issues of the public park dedication up to including the time of the Certificate of Occupancy.

11. That an association of owners or tenants shall be established which shall adopt such Articles of Incorporation, By-Laws or other appropriate agreement, and shall adopt and impose such Declaration of Covenants and Restrictions on such common areas (landscaped areas) that are acceptable to the Planning Director. Said association shall be formed and continued for the purpose for maintenance. Such an association may undertake other functions. It shall be created in such a manner that tenants or owners of property shall automatically be members and shall be subject to assessments levied to maintain said common areas for the purposes intended. The period of existence of such association shall be not less than twenty years and it shall continue thereafter until other arrangements are made subject to City approval. This condition of approval does not apply to the open space proposed to be dedicated to the City.

12. All final plans shall be submitted on a 24" x 36" format. A title page will be required with a space left in the lower right-hand corner for an 8-1/2" x 11" information sheet to be provided by the City and to be affixed to the final as-built plans before acceptance. The applicant shall provide 3 mil mylar as-builts to the City which must be submitted and approved by the City before the final punch list inspection will be performed by the City.

13. Final utility design shall meet the following general format:

    A. Sanitary sewer shall be aligned on the north and west side of all street centerlines.

    B. Storm sewer shall be aligned on the south and east side of all street centerlines.

    C. Water line shall be aligned on the south and east side of all street centerlines.

    D. Minimum centerline finish grade shall be no less than 1% and the maximum centerline finish grade shall be no more than 12% for local streets. Minimum centerline finish grade shall be no more than 8% for any street above local street in classification and shall be constructed of concrete.

    E. The top of the curb shall equal centerline finish grade unless offset crown design or curb return transition.

F. Composite utility plan shall be part of the final plan set.

G. Detailed grading plan shall be part of the final plan set.

H. Utilities not in the street area shall provide maintenance access acceptable to the City, and shall be centered in a 15-foot easement to be conveyed to the City of Wilsonville.

I. Final design of the public utilities shall be approved at the time of the City's issuance of a Public Works Construction Permit.

J. All on-and-off-site utilities shall comply with the State of Oregon and the City of Wilsonville requirements and Codes.

K. All cul-de-sacs shall have a minimum 45-foot radius to the face of the curb to allow for adequate turning radius.

L. All public streets shall meet design requirements for sight distance - horizontal, vertical and intersectional.

M. Final design plans shall identify locations for street lighting, gas service, power lines, telephone lines, cable television, street trees and mailbox clusters.

14. All survey monuments on the subject site shall be protected. If destroyed by the proposed site construction, the applicant shall retain a professional land surveyor to replace the monuments and file a copy of the record survey with the City.

15. All power and telephone utilities shall be installed underground.

16. Provide the Planning Director crossover reciprocal easements to adjacent properties for ingress and egress of traffic to cross over drives and private roads.

17. The developer shall designate and construct City of Wilsonville Rapid Area Transport transit stops. Coordinate with Tom Barthel, the City Administrative Analyst, on the number and locations of the transit stops.

18. The minimum parking space dimensions shall be 9' x 18' with 25-foot travel lanes.

19. That Phase II be developed in such a manner that traffic generated by the development can be accommodated safely and without congestion in excess of level service D defined in the Highway Capacity Manual published by the National Highway Research Board on access drives at Town Center Loop West and at the intersection of Town Center Loop West with Wilsonville Road.

20. The Phase II Stage II development shall take access at the prescribed access locations approved in Local Improvement District No. 5 along Town Center Loop West, except for the proposed access drive shown to be relocated at the southwest boundary of Phase II and is subject to the approval of the City Attorney and agreement being reached regarding lining up of the access drives on Town Center Loop West and the propety across the street. The City Attorney is going to review the agreements to make sure that we end up with a full intersection on Town Center Loop West and the access drive to Project Thunder unless the property owner and the City Council reach another agreement.

21. At the time the Design Review Board specifically reviews the applicant's plans regarding the east wall of the large structure in Phase II, the applicant shall insure its compatibility with the proposed park. DRB shall also look at the pathway and sidewalk circulation plan.

22. That all construction workers park on site and not within public streets.

23. Prior to site grading, the developer shall coordinate with the Oregon Division of State Lands to investigate the existing storm water detention pond for possible wetlands.

24. The applicant shall coordinate with the City Engineer to consider on-site detention in its submittal to the City. The applicant shall coordinate with the Engineering Department all storm drainage plans with some consideration toward whether or not on-site detention is feasible and meets the engineering standards of the City.

EXHIBITS

The following Exhibits are hereby entered into the public record by the Planning Commission as confirmation of its consideration of the application as submitted.

A. Findings and Conditions of Approval
B. City of Wilsonville Comprehensive Plan
C. Chapter 4 of the Wilsonville Code
D. City Engineering Department Report
E. City Building Official's Report
F. Town Center Master Plan
G. Applicant's submittal documents:
   1. Revised Stage I Master Plan and Master Utilities Plan
   2. Phase II Site Plan
   3. Phase II Exterior Elevations
   4. Phase II Grading Plan and Erosion Control Plan
   5. Phase II Utilities Plan
   6. Phase II Preliminary Landscape Plan
   7. Traffic Report by Wayne Kittelson and addendum letter
   8. Request for Modification of Condition No. 8 of 90PC15
   9. Stage I Master Plan Re-submittal
   10. Phase II Stage II narrative
   11. Alternative Open Space Concept

H. Original Stage I Master Plan - 89PC50.

I. Ordinance no. 55

91PC 43

Item 16.

City of WILSONVILLE in OREGON

30000 SW Town Cente
Wilsonville, Oregon 97070
(503) 682-1011
(503) 682-1015 Fax
(503) 682-0843 TDD

August 16, 1999

Gary M. Graumann
Lumberjack, L.P.
PO Box 7458
Menlo Park, California 94026

Re: 29400 SW Town Center Loop

Dear Mr. Graumann:

Mr. Lashbrook, Wilsonville Planning Director, has asked me to answer your request for a zoning compliance letter. You will find the information you requested as follows:

1. Zoning Classification Code:
   Planned Development Commercial (PDC) (Town Center)

2. Property Owner's Name and Lender's Name
   Lumberjack, L.P. (owner)
   PO Box 7458
   Menlo Park, CA 94026

   GE Capital Business Asset Funding Corp.
   10900 NE 4th St., Suite 500
   Bellevue WA 98004

3. Address of the Property:
   29400 SW Town Center Loop, Wilsonville, Oregon

4. Type of Permitted Use:
   Commercial (Planned Development)

5. Expiration Dated Copy of Conditions or Restrictions of Use:
   Case File 91PC43 approved 12/9/91
   Case File 91DR29 approved 1/27/92
   Case File 92DR21 motion revising condition

N:\annex\plng\hoffman\bh81699graumann\sh

I have researched our records and find that in receiving final occupancy the city found that the development had complied with all plan proposals and conditions of approval. However, the project is now almost seven years old and is beginning to show some wear and deferred maintenance. About a year ago, Mr. Blaise Edmonds wrote you about broken curbs and destroyed landscaping where vehicles have driven over the curb. This is at a major entrance area (Southwest entry drive, between the rug dealer and McDonalds.) This problem area still requires attention.

Sincerely,

Robert G. Hoffman AICP

Robert G. Hoffman AICP
Manager of Current Planning

Attachment: Decision and Conditions of Approval
98PC43
91DR29

RGH:sh

N:\annex\plng\hoffman\bh81699graumann\sh

LUMBERJACK, L.P.
P.O. BOX 7458
MENLO PARK, CALIFORNIA 94026
(650)813-9100 FAX(650)813-9190

August 5, 1999

Mr. Stephan Lashbrook
Planning Director
CITY OF WILSONVILLE
30000 SW Town Center Loop E
Wilsonville, OR 97070

Dear Mr. Lashbrook:

Thank you very much for returning my call with respect to revisions to the Development Codes. I look forward to reviewing the changes and will provide any comments that I may have.

We also discussed the following outline that my lender has requested that I obtain from the city. I have provided the information for items 2) and 3). If you could have someone on your staff complete the rest of the requirements requested by the lender it would be greatly appreciated.

I would like to receive a compliance letter from your office within the next 10 days. Should you have any questions please feel free to call me at the number listed above.

Once again, thank you for your attention to this matter.

Sincerely,

Gary M. Graumann

ZONING COMPLIANCE LETTER REQUIREMENTS

This item should be obtained from the City Planner's, County Clerk's, or Zoning Department's office and should contain the following information:

1) Zoning Classification Code — Planning Development Commercial (PDC (Town Center)

2) Property Owner's Name and Lender's Name

3) Address of the Property

4) Type of Permitted Use. — Commercial (Planned Development)

5) Expiration Dated Copy of Conditions or Restrictions of Use.

91PC43 - Appr. 12-9-91
91DR29 - Appr 1-27-92
92DR21 - Appr 6-22-92

2) Lumberjack, L.P. (owner)
P.O. Box 7458
MENLO PARK, CA 94026

GE Capital Business Asset Funding Corp.
10900 NE 4th St., Suite 500
Bellevue, Wa 98004

3) 29400 SW Town Center Loop
Wilsonville, Or.

Item 16.

Aetna's local presence shrinks after loss of key large clients

Continued from page 1

er away from the Portland market.

Despite a strong national presence, Aetna's local client base has eroded as

market is already dominated by strong HMO players that have left little room for carriers like Aetna.

Stone said the downsizing was planned a national restructuring effort, and not nply because of the lost clients in Portid. Many who watch insurance activis nationally agree. The change reflects nilar strategies by nationwide carriers. tna wants to consolidate offices, rece overhead and gain efficiencies in increasingly competitive health inrance market.

'It is definitely consistent with the nd that we've seen in this industry," id Post. Improvements in electronic tims handling and standardization ross offices have made such changes ssible and even advantageous, he said, gain efficiencies.

'Insurance in general has become more d more of a commodity market," said iss Poll, an insurance analyst with The licago Corp., a Chicago-based investent bank that tracks insurance companies. "Insurance companies, especially the big guys, have a big expense burden. They tend to be big and clumsy."

In Aetna's case, said Poll, the national carrier's life and health business has been its strongest asset. Hartford, Conn.-based Aetna is the third-largest U.S.-based property and casualty insurer, according to Value Line's December 1993 investment survey. Aetna, a public company traded on the New York Stock Exchange, also has been subject to large market fluctuations.

Aetna "peaked" on Nov. 1, 1993, with a per-share price of $60.75, said Poll. The stock closed at $47.75 per share on Oct. 18.

Aetna Health Plans reported $4.5 million in insurance premiums in Oregon during 1993, down from $12.7 million in premiums it wrote in 1991, according to reports filed with the state. It covers an estimated 40,000 enrollees.

Aetna handles about 4.9 million Medicare claims representing some $250 million annually out of the Portland office.

Incredible Universe building sold, leased

Tandy Corp. has sold off its Incredible Universe building in Wilsonville and leased back the facility from the new owner.

Tandy sold the 166,495-square-foot retail property to Pier Set Inc., a Delaware corporation, for $13.5 million, according to a Clackamas County sale deed.

Pier Set is a subsidiary of London-based NatWest bank, said Bill Bousquette, chief financial officer of Fort Worth, Texas-based Tandy.

Tandy also sold three other Incredible Universe buildings to the bank. The four properties sold for about $60 million, Bousquette said.

Selling off store facilities to outside investors is common among large retailers. "We have no interest in tying up our capital in real estate," Bousquette said.

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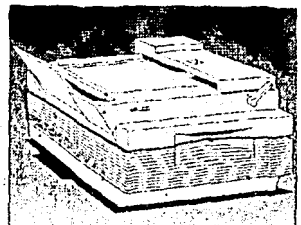

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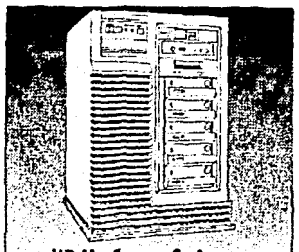

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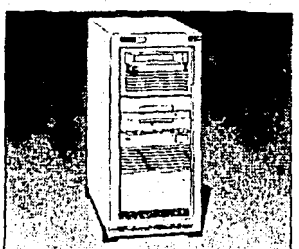

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City of Wilsonville
Community Development Department
30000 S.W. Town Center Loop East
Wilsonville, Oregon 97070
(503) 682-4960
Fax 682-7025

FAX COVER SHEET

DATE: 11-29-93

TO: Mark Whitlow FAX: 721-3666

FROM: Mike Kohlhoff / Wayne Lorenson

SUBJECT: Project Thunder

NUMBER OF PAGES IN THIS TRANSMITTAL (INCLUDING COVER SHEET) 20

COMMENTS:

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

September 29, 1993

Mr. Bryan L. Spain, CSM
Assistant Director State/Local Taxation
Tandy Tax Service
Tandy Corporation
P.O. Box 1643
Fort Worth TX 76101

91PC43

Re: Systems Development Credit - Wilsonville Incredible Universe

Dear Mr. Spain:

The purpose of this letter is to formally close action on an appeal of the discretionary decision concerning the amount of the street systems development charge for the Incredible Universe. Prior to his departure from Tandy Tax Service, Mr. Bryan L. Spain, CSM, had formally appealed the discretionary decision.

On December 7, 1992, I provided an interim response in which we provided a comparison of a number of different calculations of the street systems development charge and in all cases they came very close to the amount that was charged based on the number of employees. Subsequently, on March 2, 1992, I extended the time for submission of any additional data concerning the street systems development charge to April 15, 1993.

Later telephone conversations indicated that you were not going to submit any additional data. Based on the information that has been received, your appeal of the discretionary decision has not been favorably considered. I would like to inform you that we will be using most of the systems development charge for streets that you paid to install an asphalt overlay on Town Center Loop West to increase the structural strength of the road. This should significantly delay deterioration of the street.

I apologize for the delay in providing a formal response; however, other higher priority projects have interfered with a more timely response. Your understanding is appreciated.

Sincerely,

Eldon R. Johansen
Community Development Director

pc: Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Tom Jowaiszas, Finance Director
Wayne Sorensen, Planning Director
Mike Stone, City Engineer
Martin Brown, Building Official

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

Info —
Pam
Blaise
Sally
file
91PC43

December 4, 1992

Mr. Wayne Kittelson
Kittelson & Associates, Inc.
610 SW Alder, Suite 700
Portland OR 97205

Re: Incredible Universe Traffic Issues

Dear Mr. Kittelson:

You provided me with a copy of your letter dated October 27, 1992, to Mr. Wayne Sorensen, Planning Director, concerning the above subject. I appreciate receiving a copy of your letter since it provides an excellent background from the consultant and the developer's perspective.

Your letter addresses several transportation topics which are of current interest to staff and council. Your letter included a copy to Councilor Carter and copies have also been provided to the Mayor and other Councilors to ensure that they all have the same background concerning this topic.

Your letter indicated that you are troubled by several comments in the October 22 issue of the Oregonian, entitled "Traffic Count Zooms at Electronic Store". I also am troubled by several of the statements in your letter of October 27, 1992, and would like to explain my concerns with your letter. Prior to explaining my concerns, I will review the overall traffic information that was provided to the Planning Commission prior to its decision. The Transportation Impact Analysis for the Wilsonville Town Center, dated April, 1990, was submitted to the Planning Commission as background for approval of the Master Plans for Phase I, Phase II and Phase III of the Wilsonville Town Center. Subsequently, the letter dated October 16, 1991, subject Traffic Analysis for Wilsonville Town Center - Phase II was submitted to the Planning Commission prior to approval of the plan for Project Thunder, which subsequently was changed in name to the Incredible Universe. When Project Thunder was approved, the Traffic Impact Analysis Report for the Wilsonville Town Center, dated April, 1990, was not provided to the Planning Commission at the time of the hearing.

Specific sections of your letter which are troublesome to me as well as comments on these sections are as follows:

"Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersection of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted, (April 1990), our engineers pointed out to city staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak-hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> 'As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersection, are anticipated to operate at an acceptable level of service [under projected 1995 peak-hour conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition.'"

The April 1990 Traffic Impact Analysis for Wilsonville Town Center has several tables which give the existing and predicted level of services for the southbound and northbound I-5/Wilsonville Road interchanges. Table 5 on Page 16 gives an existing level of service for both intersections of "B". Table 8 indicates level of service "C" for both intersections for the 1991 total traffic level of service results. These levels of service do not support your statement that the intersections were already operating near peak capacity.

The Project Thunder update, which was included in your October 16, 1991 letter concerning traffic analysis for Wilsonville Town Center Phase II, could be read as you state, "that this update included the I-5 northbound and southbound intersections with Wilsonville Road". If I read it that way, then I concur that the significant findings and recommendations of the October 16, 1991 report state: "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period." This would be contrary to your dire predictions of intersection failure.

On the other hand, I have looked at the October 16, 1991 letter and have found no specific updates for the traffic analysis for Wilsonville Town Center Phase II concerning the I-5 intersections with Wilsonville Road. It was this lack of any data concerning the I-5 northbound and southbound intersections with Wilsonville Road that led me to conclude that the traffic impact analysis for the Incredible Universe did not include information on the I-5 intersections with Wilsonville Road. If I had read the October 16, 1991 report to accept at face value the statement that "the key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period", then I would have concluded that you covered the interchange; however, I would have also felt that your coverage was inaccurate.

"Initial planning for the Incredible Universe Store began in late 1991 and was completed in 1992. It is important to note that throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our

engineers knew only that it was to be a retail development. By their own choice, city staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of city staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that city staff made this decision; for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion."

The April 1990 Traffic Impact Analysis includes three pages to describe the site-generated traffic volume and also a special study by Kittelson & Associates, Inc. to better define the probable breakdown of site-generated vehicle trips among the category of drop-in trips, diverted trips and new trips. There is nothing in the April 1990 report or the October 16, 1991 update to forewarn staff, the Planning Commission or Council that there could be unusual special event nature retail activities which could have a different impact on traffic volumes than is predicted by the transportation impact analysis and the October 16, 1991 update for Wilsonville Town Center Phase II. This lack of information concerning a potential problem area leaves the city staff responsible for prediction of traffic problems which should be left to traffic experts. I also would think that a plan for a commercial building with 160,000 square feet of floor space in a city with less than 10,000 residents would at least cause a question in the mind of the traffic engineer concerning drop-ins of 40%.

"Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the city's transportation system in order to mitigate the traffic impacts we identified. Further, the Incredible Universe store contributed $250,000 in system development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments; it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs."

The newspaper article states in reference to the I-5 and Wilsonville Road interchange "It was that intersection that clogged up at the Incredible Universe opening, September 17, 1992, and caused traffic to back up for miles in both directions." The expenditures by Capital Realty did nothing to improve the intersection of Wilsonville Road and Parkway, and the improvements proved inadequate to handle the traffic at the intersection of Wilsonville Road and Town Center Loop West. The city had county sheriff's deputies available and Tandy Corporation had private security guards. These individuals directed traffic at the Town Center Loop West and Wilsonville Road intersection as well as at the intersection of Wilsonville Road and Parkway during much of the Grand Opening weekend so that traffic was able to get through these intersections. By no stretch of anyone's imagination could the expenditures and improvements by Capital Realty be

considered to be adequate to allow the traffic to freely flow through these intersections at level of service D or better.

"Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering."

Upon reflection, this comment contains a good suggestion in that the city should require a traffic control plan to minimize vehicle disruption and delay during the initial opening of a new store of significant size. We will incorporate this in to our plans review efforts and into our recommended conditions of development for future stores with a major traffic impact.

"In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to city staff since early 1990 at least."

Your October 16, 1991 letter deleted the concerns for the I-5/Wilsonville Road interchange in the third subparagraph under the significant findings and recommendations which reads as follows:

> "Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West will operate within acceptable level of service limits during the evening peak-hour time period."

Based on my reading of a level of service "C" for 1991, and this particular paragraph, I had assumed that we, initially, on the opening of the Incredible Universe would not have any major problems with the I-5 and Wilsonville Road interchange and would not anticipate problems until later. In summary on this particular item, it appears that your April 1990 report did indicate that by 1995 there would be problems; however, the October 16, 1991 report alleviated the concern for these problems.

"Since that time and through all subsequent development reviews, city staff, planning official, and policy makers have had three options available to them:

a) **Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;**

b) **Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or**

c) **Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.**

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision."

It may well be a viable option to consider your suggestion of placing a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5; however, staff feels that it would be premature to present this option to Council at this time. In addition with the October 16, 1991 letter from your organization, subject: Traffic Analysis for Wilsonville Town Center Phase II, including the following significant finding and recommendation:

"Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak-hour time period.".

The record does not reflect a conscious adoption of option c). It reflects that intersections will operate within an acceptable level of service limits.

"We value our reputation for honest, objective, and technically valid analysis very highly, and so it is important to us that this matter be resolved to everyone's satisfaction."

In the comments which staff made at the council meeting, and also in subsequent responses to questions from newspaper reporters, we were careful not to be judgmental concerning particular consulting firms and kept from placing blame on any of the consultants which were involved. I have reread the article which you quoted and still feel that we adhered to the above and avoided incorrectly placing blame.

"If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter."

Your letter very eloquently describes your position with regard to the impact of the Incredible Universe on traffic. I have come to a somewhat different conclusion from reading the applicable reports. Although I would be very happy to meet with you to discuss this issue, it appears that this may be one subject in which we probably will continue to have different opinions which may never be fully resolved. If you do desire

to meet with myself or other members of the Community Development staff on this subject, please contact the undersigned.

Sincerely,

Eldon R. Johansen
Community Development Director

erj:mld

pc: Kim Beach, Capital Realty
Mayor & City Council
Transportation Advisory Commission
Arlene Loble, City Manager
Mike Kohlhoff, City Attorney
Mike Stone, City Engineer
Wayne Sorensen, Planning Director
Steve Starner, Public Works Director

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OR 97205 • (503) 228-5230 • FAX (503) 273-8169

STAFF
Pam
Blaise
Sally

Project file
11/PC 4/3

OCT 29

October 27, 1992

Project No.: P10.00

Mr. Wayne Sorensen
Planning Director
City of Wilsonville
P.O. Box 220
Wilsonville, Oregon 97070

SUBJECT: Incredible Universe Traffic Issues

Dear Wayne,

I read with some concern an article in the October 22 issue of *The Oregonian* titled, "Traffic Count Zooms at Electronic Store". I am enclosing a copy of the article for your information in case you missed it.

I was troubled by several comments in the article which seemed to suggest that, in the eyes of some high-level City officials, our traffic analysis had misled City officials:

> "The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts", said Arlene Loble, city manager.
>
> The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5...If the study were being done today, the city would insist that engineers look at one more intersection down the road, [Eldon Johansen] said.
>
> [Eldon Johansen] said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built. Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic...Finally, the traffic study did not account for the success of the store's marketing effort.

I would like to take this opportunity to clarify the analytic process we followed and the directions we received. Hopefully, this clarification will allow you, Ms. Loble, Mr. Johansen, and other City staff to more confidently and accurately respond should this issue arise again.

The transportation impact analysis that we performed for Capital Realty was begun in 1990 and completed in 1991. The site development plans called for construction of a shopping center containing 450,000 gross square feet of floor area. Given this information, the trip generation rates that we used were entirely appropriate, as was the estimate that 40 percent of the site-generated trips would be drop-in traffic. This is evidenced by the fact that the first phase of the shopping center development, which has already been completed, operates very close to the estimates that we provided.

Contrary to Mr. Johansen's statements in the article, our engineers did investigate the intersections of I-5 and Wilsonville Road as part of this study. As early as 1990, in fact, they predicted the capacity deficiencies that were just recently experienced. At the time that this original traffic impact analysis report was submitted (April 1990), our engineers pointed out to City staff that the intersections of I-5 and Wilsonville Road were already operating near capacity under weekday peak hour conditions, and would continue to operate at or above capacity until planned (but as yet unfunded) interchange improvements are made by ODOT. The following excerpt from the original traffic impact analysis report confirms this observation:

> "As shown in Table 9, all of the intersections within the study area, with the exception of the I-5 northbound and southbound intersections, are anticipated to operate at an acceptable level of service [under projected 1995 peak our conditions]. The projected demand at both of the I-5 ramp intersections will result in an over-capacity condition."

The current best estimate, by the way, is that these improvements will not be completed before 1996. Further, it should be noted that, even at this early date, City staff did not rely solely upon the findings of Kittelson & Associates, who were retained by the applicant. Instead, the City retained its own independent traffic engineering consultant to review the traffic impact analysis report and to critique the analysis assumptions, methodology, and findings. This independent traffic engineering consultant performed the requested review and confirmed every essential element of the report, including the projected capacity deficiency at the I-5/Wilsonville interchange area.

In personal discussions, City staff were informed of this finding of a future capacity deficiency, and were asked to interpret the City's requirement that a level of service equal to or better than "D" be provided at all intersections. City staff informed our engineers that, because the I-5/Wilsonville Road intersections are actually controlled by ODOT and, further, because ODOT has already established plans to improve the interchange and increase the capacity of these intersections, the finding of a capacity deficiency at the interchange would not be considered a fatal flaw. This conclusion by City staff is confirmed by the fact that the project was ultimately recommended for approval, even with the report's recognition of capacity deficiencies on Wilsonville Road near I-5 as noted above. It should also be pointed out that City staff's position was not unique to this project, but has also been recently applied to projects in the vicinity of the Stafford Road interchange.

On this basis, the transportation impact analysis was completed, all other on-site and off-site traffic-related deficiencies were identified, considerable mitigation projects were undertaken, and the necessary approvals were obtained.

Initial planning for the Incredible Universe store began in late 1991, and was completed in 1992. It is important to note that, throughout the planning and traffic impact analysis effort, the Incredible Universe store was known as Project Thunder. City staff will recall that, because the Tandy Corporation wanted to keep the details of the development secret, no specific description of Project Thunder was given; our engineers knew only that it was to be a retail development. By their own choice, City staff elected to allow the Tandy Corporation to keep the details of Project Thunder a secret. Such a decision is entirely at the discretion of City staff and the developer, and without knowing the details of the discussions we cannot question the prudence of this decision. However, at least one effect of this decision should have been obvious even at the time that City staff made this decision: for the purposes of the traffic analysis, our engineers had no additional basis for any more refined assumptions regarding the type of planned retail development other than those used in the original 1990 analysis. In other words, we had no basis on which to forecast the special event nature of Project Thunder, which has to date been the primary cause of the interchange-related congestion.

Even if we had known about the actual retail activity likely to be associated with Project Thunder, it is doubtful that much more could have been done at the traffic impact analysis level. This is not to say that very little was done: in fact, we identified a number of major roadway improvement needs, and Capital Realty expended nearly $650,000 in capital improvements to the City's transportation system in order to mitigate the traffic impacts we

identified. Further, the Incredible Universe store contributed $250,000 in System Development charges for transportation-related improvements. The October 22 newspaper article seems to confirm the effectiveness of these investments: it points out that the congestion on Grand Opening Day was caused by the failure of the Wilsonville Road/I-5 interchange. All other intersections and road segments in the area functioned in an acceptable manner, because they were designed and upgraded by Capital Realty to meet the anticipated travel demand needs.

Had we known of the special event nature of the project during its first few weeks, then it would have been both logical and relatively simple to develop a traffic control plan to minimize vehicle disruption and delay. But it should also be recognized that the Grand Opening effects of a new store, which can extend for three to six months beyond the initial store opening, are only temporary and eventually dissipate. Our traffic impact analyses are based on the long-term equilibrium conditions that develop after the Grand Opening effects have dissipated. This is a reasonable and standard principle of traffic engineering.

In summary, then, the traffic congestion problem that was reported upon in the October 22 newspaper article stemmed from a previously identified capacity deficiency at the I-5/Wilsonville Road interchange. This capacity deficiency has been known to City staff since early 1990 at least. Since that time and through all subsequent development reviews, City staff, planning officials, and policy makers have had three options available to them:

a) Require that the capacity deficiency be mitigated as part of any development proposal in which additional traffic is projected to travel on Wilsonville Road in the vicinity of I-5;

b) Place a moratorium on all new development proposals that add traffic volume to Wilsonville Road in the vicinity of I-5 until after the ODOT interchange improvement project is completed (viz., on or after 1996); or

c) Accept the fact that the interchange's operating characteristics will be considered unacceptable very soon, and will continue to get worse through the time that the ODOT improvement project is completed.

The City of Wilsonville has, in its review and approval of new development projects extending beyond Project Thunder, consciously adopted option c). The effects of the Incredible Universe store during its Grand Opening were the first physical confirmation of this decision. These

effects were temporary in that they will most likely die away after the Christmas season and as the store's novelty begins to fade. Additionally, these effects were exaggerated by the special event nature of the Grand Opening, which did not give patrons a chance to adjust their arrival time or choice of route. Therefore, it is unlikely that the City will again experience extended periods of mile-plus queues caused by the failure of the I-5/Wilsonville Road interchange. Even so, City staff and policy makers should recognize that less visible daily failures of the interchange are already programmed to occur: several already-approved residential and commercial projects have not yet been completed, and the combined future traffic effects of these projects virtually assure periods of peak-hour failure of the interchange during most typical weekdays. Thus, the City no longer has control over *whether* peak hour congestion and failures will occur at the interchange (they will), although future land use decisions can still affect the *duration* of these failures.

We have no quarrel with the prudence of the City's conscious decision to adopt option c) above. We are, however, disappointed that the City would suggest to the public, through articles such as the one published on October 22, that the congestion was not anticipated and that the fault for this lies with the traffic impact analysis process.

If you have any questions, please call me. We value our reputation for honest, objective, and technically valid analyses very highly, and so it is important to us that this matter be resolved to everyone's satisfaction. If you believe it would be appropriate, we would be happy to meet with you personally at a time and location convenient to you in order to further discuss this matter.

Sincerely,

Wayne K. Kittelson

Wayne K. Kittelson, P.E.
Principal

cc: Arlene Loble
Eldon Johansen
Greg Carter
Kim Beach

CITY OF WILSONVILLE
P.O. Box 220
30000 S.W. Town Center Loop East
WILSONVILLE, OREGON 97070

(503) 682-1011

LETTER OF TRANSMITTAL

TO _____

DATE	JOB NO.
10/1/92	
ATTENTION: Arlene Loble	
RE: Inner Loop Driveway	
Copy of letter or decision, and attachments	
One copy of Transportation Impact Analysis prepared by Kittelson & Assoc	

WE ARE SENDING YOU ☐ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Wayne Cherness

PROJECT 7403 NCBS Inc., Grafton, Mass. 01519

If enclosures are not as noted, kindly notify us at once.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E
Wilsonville, Oregon 97070
FAX (503) 682-1015
(503) 682-1011

May 28, 1992

Mr. Rich Hollander
Vice President
Tandy Name Brands
P.O. Box 1643
Fort Worth, TX 76101

Ms. Kim Beach
Capital Realty
101 S.W. Main St. Ste. 905
Portland, OR 97204

Re: Tandy Name Brands dba Project Thunder

Dear Mr. Hollander & Ms. Beach:

The purpose of this letter is to summarize the current status of ongoing actions which must be completed prior to opening the facilities which were previously known as Project Thunder and currently known as the Incredible Universe. An additional purpose is to solicit your continuing assistance in resolving the remaining points of difference so that when the construction is completed, there will be no outstanding actions which would preclude issuance of the Certificate of Occupancy.

Primary items of concern are as follows:

Street Systems Development Charge

On March 2, 1992, Council adopted Resolution No. 902 authorizing deferral of the Systems Development Charges for streets from time of issuance of building permit to time of issuance of occupancy permit for Tandy Name Brand Retail Group. Resolution No. 902 contained an estimate for the Street Systems Development Charges in the amount of approximately $370,880.00. This was based on a total of 160 employees at the site. On March 6, 1992, Mr. Brian L. Spain, Assistant Tax Manager, for Tandy Tax Service, forwarded a check in the amount of $124,592.15 for the Street Systems Development charge. I am concerned that use of peak hour employees is irrelevant to peak hour traffic generation and will correspond directly with Mr. Spain to resolve differences.

Traffic Signal - Town Center Loop West and Wilsonville Road

One of the conditions that was placed on this development was that the signal at the intersection of Wilsonville Road and Town Center Loop West must be installed prior to the occupancy of the Project Thunder site. Plans have recently been received at the Community Development Department for a second review.

Kim Beach, Capital Realty, is pushing to insure that the signal is in place prior to occupancy of the Project Thunder site.

Detention Facility

The Project Thunder site was conditioned to be designed for the 25 year storm. Detailed calculations indicate detention could be deferred until development of the property just north of the Project Thunder site. The condition would appear not to allow staff to administratively transfer the detention requirement to another property. Staff is again working with Capitol Realty to insure that this is resolved.

Construction as Included in the Public Works Permit

The City requires that the Punch List for Public Works items be completed prior to issuance of a Temporary Occupancy Permit.

Maintenance Bond

The City will require a 10% Maintenance Bond for twelve months following acceptance of the work included in the Public Works Permit.

Repair of Town Center Loop West Road

The City has contacted S.D. Deacon, General Contractor, concerning the street repairs to Town Center Loop West Road. Mr. Art L. Bush, Project Manager, has informed the City that S.D. Deacon Corporation will not be held responsible for any road repairs or replacement to existing condition of either north or southbound lanes of Town Center Loop West Road at the conclusion of this project. The contractor has removed the curb along the east side of Town Center Loop West and the asphalt has substantially failed wherever the curb has been removed. The City has no intention of accepting the project until such time as damages caused by the contractor are repaired.

Modification of Median - Town Center Loop West

We have received construction plans for modification of the median. We will be submitting those plans to Council for approval. It appears that this work is necessary prior to having adequate access to parking.

Abandonment of Right-of-Way

The City has received documentation requesting abandonment of right-of-way that was part of the former Parkway Avenue. This is being processed to insure abandonment by August 1, 1992.

As you no doubt realize, I did not begin work in Wilsonville until April 6, 1992, after this project was well under way. My concern is that if we do not keep our attentions focused on resolving all outstanding issues, we will reach a point where the building will have been completed and you will have hired employees to open the facility and will be unable to issue a Certificate of Occupancy because of failure to resolve the above items. Your continued assistance and cooperation will be appreciated.

Sincerely,

Eldon R. Johansen

Eldon R. Johansen
Community Development Director

ej/js

pc: Arlene Loble, City Manager
Michael Kohlhoff, City Attorney
Steve Starner, Public Works Director
Martin Brown, Building Official
Wayne Sorensen, Planning Director

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

Creative Solutions ... Superior Service

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile
- 3 Number Of Pages Including Cover
- ☒ 682-7025

These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment

Copied To:
KIRK BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Margo 5/7
Orig to Angel Thunder file
Copy to Wayne myself
Eldon

Comments

ELDON,
JIM LENHART HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

Signed Rick Martin

W&H PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775

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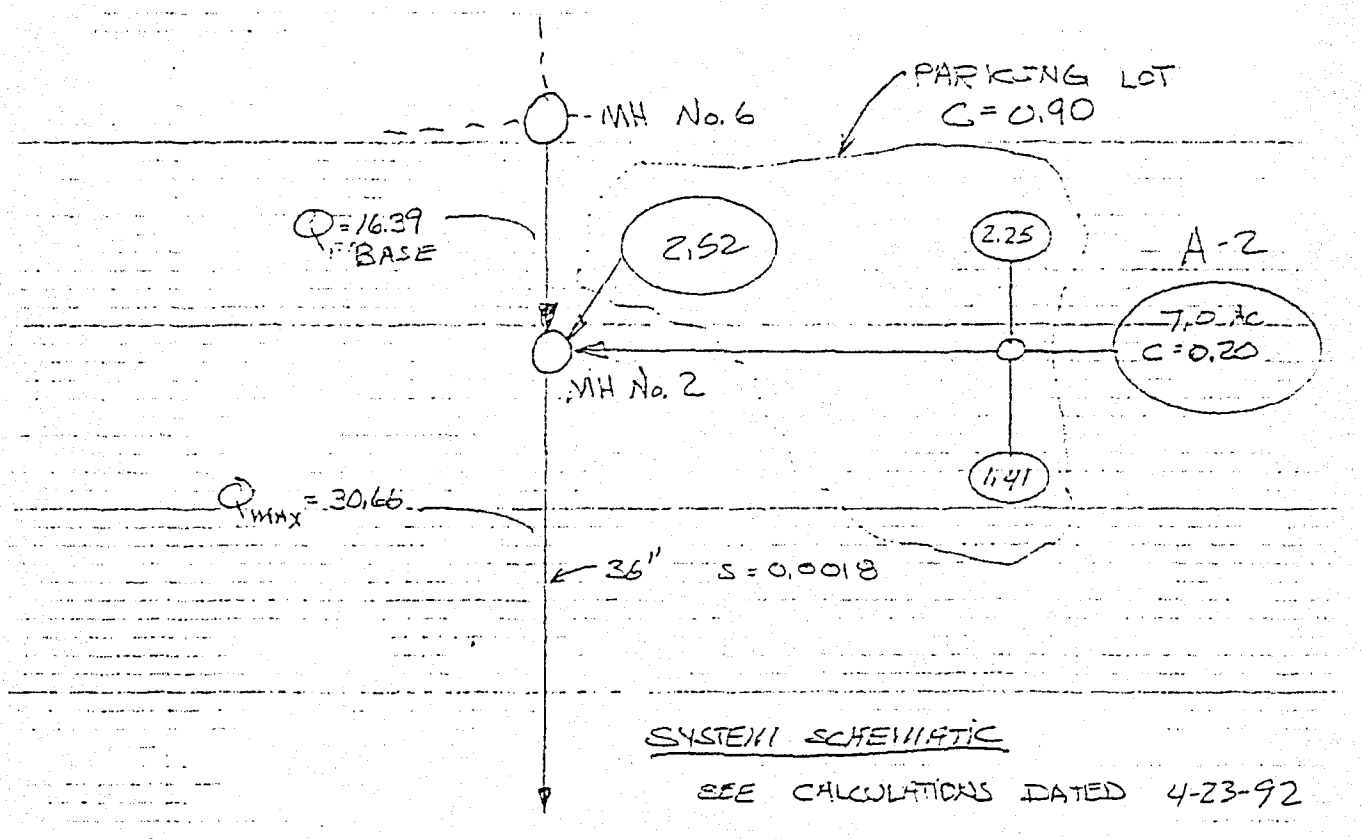
DETENTION REQUIREMENTS FOR A-2 IN HN UNDEVELOPED CONDITION.



SYSTEM SCHEMATIC

SEE CALCULATIONS DATED 4-23-92

ASSUME WORST CASE SCENARIO

1.) FLOW FROM MH. No 6 TO MH No 2 is MAXIMUM DUE TO UPSTREAM STORAGE, Q_{BASE} = 16.39 CFS

2.) ASSUME GRASSED AREA FOR A-2 with C = 0.20

3.) ASSUME 150 FEET OVERLAND TRAVEL FROM A-2

1ST 200 FEET = 20 MINUTES

REMAINDER 250' = 4 MINUTES. (SLOPE = 1%)
IN CHANNEL

t_c = 24 MINUTES

Project: DETENTION TRENCH Date: 5-5-92 Sheet No. 1 of 2

Prepared by: [illegible] Checked by: Job No. [illegible]

Creative Solutions ... Superior Service

W&H PACIFIC
8405 S.W. Nimbus Ave.
P.O. Box 80040
Portland, OR 97280

(503) 626-0455
Fax (503) 526-0775

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: ELDON JOHANSEN
CITY OF WILSONVILLE

Date: 5-7-92
Project Number: 755-0202
Project Name: THUNDER
Regarding: TEMP. DETENTION AREA

PLEASE NOTIFY US IMMEDIATELY AT (503) 626-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
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- 3 Number Of Pages Including Cover
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These Are Transmitted:
- ☐ For Your Info/File
- ☐ As Requested
- ☒ For Review And Comment
- ☐

Copied To:
KARL BEACH W/O ENCL
FAX 223-0200

Copies	Description
1	ADD'L STORM CALCS.

Comments

ELDON,

THIS LETTER HAS PREPARED ADD'L STORM RUNOFF CALCS WHICH SHOW THAT A TEMPORARY DETENTION AREA WILL NOT BE REQUIRED UNTIL PHASE III AREA DEVELOPS. PLEASE REVIEW & COMMENT — CONTACT JIM DIRECTLY IF YOU HAVE QUESTIONS.

PARKING DETENTION IS POSSIBLE IN PIT III OR EITHER PROPERTY NORTH OF TANDY.

Signed Rick Martin

3147

PACIFIC
8405 S.W. Nimbus Avenue
P.O. Box 80040
Portland, OR 97280
(503) 626-0455
Fax (503) 526-0775
• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

i_{25} @ 24 MINUTES = 1.6 in/hour.

$Q_{PEAK} = i \Sigma CA_i = (0.2)(7.0\ AC)(1.6) = 2.24$

$(0.9)(6.18)(1.6) = 11.33$

13.57 CFS.

$Q_{ALLOWABLE\ IN\ PIPE} = Q_{MAX} - Q_{BASE} = 30.66 - 16.39$

$Q_{ALLOWABLE} = 14.27$ CFS.

SINCE Q_{PEAK} (13.57) < $Q_{allowable}$

NO DETENTION IS REQUIRED

NOTE! THIS CALCULATION IS FOR UNDEVELOPED CONDITIONS ONLY.

Project: PROJECT THUNDER Date: 5-5-92 Sheet No. 7 of 2

Prepared by: CJL Checked by: Job No. 4657.03-94-11

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: William L. Parks
Division of State Lands
1600 State Street
Salem, OR 97310

Date: 12-16-91
Project Number: 4-755-0202
Project Name: Project Thunder
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- [X] Attached
- [ ] Facsimile
- Number Of Pages Including Cover: [ ]

These Are Transmitted:
- [ ] For Your Info/File
- [ ] As Requested
- [X] For Review And Comment

Copied To:

Copies	Description
1	Vicinity Map 8½×11
1	Site Map 11×17

X No Jurisdiction 10 YR 5/4
A/O Hydrology - Ann Dutton
by Phone

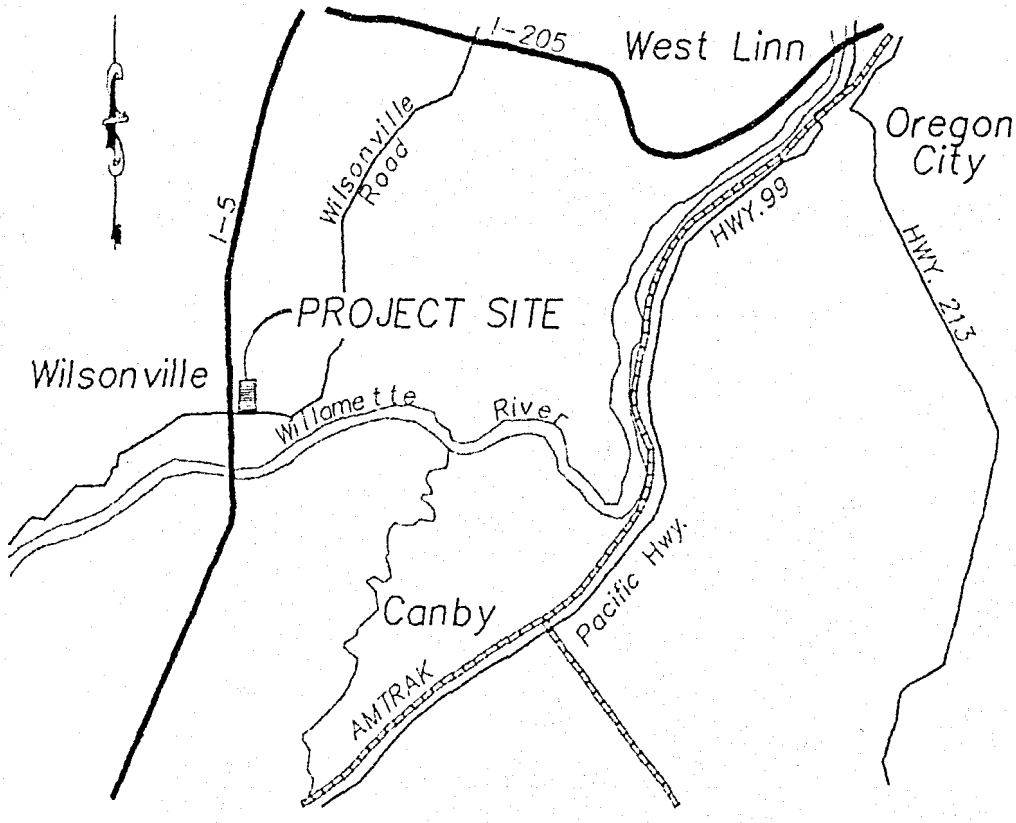
Comments

Bill,

Please make a determination whether or not the existing detention pond is a "wetland" as defined by DSL.

I prefer a response as soon as possible, but no later than January 3, 1992. If this presents a problem, please call me at your earliest.

Signed thanks, Rick Martin



VICINITY MAP

NTS

- EXIT I-5 NORTH @ WILSONVILLE RD
- TURN LEFT @ TOWN CENTER LOOP RD WEST (PORTLANDIA PIZZA ON CORNER)
- SITE IS ± 1/4 MILE NORTH OR RIGHT.

CAPITAL REALTY CORPORATION

December 30, 1991

Mr. Mike Kohlhoff
City Attorney
City of Wilsonville
30000 S.W. Town Ctr. Loop E.
Wilsonville, OR 97070

Please submit the following language for approval by the City Council at the January 6, 1992 regularly scheduled meeting, to clarify Condition #10 of Resolution 91PC43:

The 5.1 acre public park dedication will be required the earlier of the issuance of a builiding permit for Phase III or May 31, 1994. The City and the applicant will work toward resolving the related access issues prior to the land dedication. The applicant will be involved in the Town Center park development planning in an advisory capacity but will not be required to make any financial outlay for the park planning process or its actual development.

For your information I have also enclosed a master site plan, color coded by original ownership. If you have any questions or require additional information please contact me. Thank you in advance for your prompt attention to this matter as we need to resolve this issue by January 7, 1992 to proceed with our contract with Thunder.

Very truly yours,

Kim Beach

Kimberly J. Beach
Vice President

cc. Ms. Arlene Loble (with enclosure)
Mr. Wayne Sorenson (with enclosure)

DIVISION OF STATE LANDS
Environmental Planning and Permits
775 Summer Street, NE
Salem, OR 97310
503/378-3805

RECEIVED
DEC 30 1991
CITY OF WILSONVILLE ANNEX

WETLAND DETERMINATION REPORT

At the request of the landowner or agent, Division staff have conducted an offsite or onsite wetland determination on the property described below.

COUNTY Clac CITY
LOCATION Exit I-5 @ Wilsonville TR. left @ Centaloop R West ¼ mile
T 3S R 1W S 23 TAX LOT(S)
OWNER/AGENT: Rick Martin W&H Pacific
ADDRESS: 1099 S.W. Columbia St. Portland, OR
DATE OF ONSITE INVESTIGATION: 12-19-91

☒ There are no jurisdictional wetlands or waterways on the property. Therefore, no removal-fill permit is required.
Notes: No Hydrology present - soil 10YR 3/4

☐ There are wetlands and/or waterways on the property. Those areas are subject to the State Removal-Fill Law. A permit is required for 50 cubic yards or more of fill, removal, or alteration of substrate.
Notes:

☐ A wetland delineation will be needed to locate and stake the wetland/non-wetland boundary. A list of consultants can be obtained from the Division.
Notes:

☐ A removal-fill permit will be required for

☐ No removal-fill permit will be required for _____ because/if

☐ A permit may be required by the Army Corps of Engineers (326-6995)

Comments:

Determination by: William Parks Date: 12-23-91

Response Copy To:
☒ Owner/Applicant ☒ Enclosures: Request, Site Plan Map
☒ City of Wilsonville Planning Department
☐ _____, Corps of Engineers
☒ DSL file copy
☒ Reading file copy – TO LORNA no Tvs.

City of
WILSONVILLE
in OREGON
30000 SW Town Center Loop E • ~~PO Box 220~~
Wilsonville, OR 97070
(503) 682-1011

December 30, 1991

Mr. Jim Faulkner
Design Forum Architects
3484 Far Hills Avenue
Dayton, OH 45429

Dear Jim:

I appreciated you, Rich Hollander and Jared Chaney taking the time to meet with Blaise and me regarding Project Thunder. I hope that we will be able to find an acceptable compromise in the design of the Incredible Universe project.

Enclosed is a copy of my notes which generally outline the basic issues we discussed at the December 23rd meeting. I am also enclosing material to provide additional insight into our planning process for the Town Center:

1. A copy of the legal opinion prepared by Michael Kohlhoff, City Attorney, that was furnished to the Wilsonville Design Review Board during the hearings on the Les Schwab Tire Center which will also be located in Town Center;

2. Variance criteria contained in our City Code which must be fully met before the DRB can approve a variance request.

I want to assure you that the City will do everything we can to accommodate your schedule, but I want to be sure you understand the legal limitations to fast tracking the review process.

Once again, it was a pleasure to meet with you. I appreciate your cooperation in finding an acceptable design alternative that will do justice to the Town Center, including the future Town Center Park, and still meet your client's needs. If you have any questions, please feel free to contact either Blaise or me at (503) 682-4960.

Sincerely,

Wayne C. Sorensen

Wayne C. Sorensen
Planning Director

wcs:dp
Enclosure

TO: Honorable Mayor and City Council

FROM: Arlene Loble
City Manager

RE: City Manager's Business

DATE: December 12, 1991

SUBJECT: PROJECT THUNDER DEDICATION OF PARK LAND

Project Thunder, which is Phase II of the Town Center development, was approved by the Planning Commission and now goes before the Design Review Board. I have attached a copy of their proposed design and their request for variances from the sign code. I bring it to your attention because it seems so entirely inconsistent with what has been previously approved in Town Center and the architectural proposal was not before Planning Commission for review. They have not seen the design proposals that dealt solely with the land use issues.

There are a couple conditions of approval that need to be brought to Council's attention. One of the conditions of approval requires the dedication of a 5.4 acre public park. The dedication would be required at the time occupancy permits are issued unless the City Council and the applicant agree to a later date. The value of the property to be dedicated is at least $1,000,000, and the developers would like to be involved in the planning for park development but because of the value of the land are not willing to pay for any of the associated development costs. It is my understanding that at Phase I approval one of the conditions included not only the land dedication but financial responsibility for development of the park. That condition has now been removed because of the cost of the park land.

Leaving aside for the moment the inappropriateness of the design of the project, you can see from the attached exhibit that shows the location of the open space and the proposed building pads. This $1,000,000 park is really located in the backyard of the proposed development. Because of the type of business which is some sort of high tech retail, the rear of the building, which faces the park, doesn't even include any windows - just a large expansive blank wall. To help offset that, a smaller building to be developed at a future Phase III has been placed on the property in such a way that it could front into the city park. The development that has already occurred in Phase I, the shopping center, also faces its least attractive areas into the proposed park site. If the open space actually is worth $1,000,000, it will take at least that, in terms of the City's financial commitment, to improve the park. To put that kind of money into something that is really more of an after thought than a planned part of the development seems to me to be a big mistake. This is a

good example of something coming to Council's attention so late in the planning process that you have not had any meaningful input and yet now the City will be asked to make a substantial financial commitment. If the land is to be dedicated the developers justifiably want to know that the property will be developed in the future. What should be a wonderful design feature is really just an after thought. I don't know what, if anything, can be done at this stage, but I wanted to bring it to your attention as we will need to begin negotiations over the actual dedication of the property. Do you want a park in this location under these circumstances?

Another condition of approval that I would like to bring to your attention deals with the handling of storm drainage. Once again, this looks like we could be creating future problems because we have not had an engineer on staff and the project has probably not received the level of review from an engineering perspective that is necessary. So, the Planning Commission has added a requirement that storm sewer plans need to be coordinated with the City Engineer with a possibility of exploring the feasibility of onsight retention. As proposed by the developer, they would be eliminating the existing detention area and paving it over for additional parking. I don't know how this impact as a wetland but the staff report also brings that issue to your attention. Since the detailed engineering won't be done until or unless the plan is approved, we won't know until we get further into it how the developer's engineer plans to handle storm drainage. It is possible that they will actually need to relocate water and sewer lines that have been installed in Phase I in order to accommodate the proposed storm drainage plans for Phase II. Again, this is an area where we truly need the assistance of a City Engineer.

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

MEMORANDUM

TO: Wayne Sorensen, Planning Director
FROM: Steve Starner, Community Development Director
DATE: December 9, 1991
RE: Project Thunder

In keeping with our usual land use process, the engineers associated with the development team for this project have submitted detailed studies to quantify the impacts of traffic volume and storm sewer capacities. Although their conclusions demonstrate compliance with Wilsovnille's development criteria, I am concerned about some of the practical issues raised in the staff report.

A. Traffic - Wilsonville Road/Parkway Avenue intersection

The Wilsonville Code does not require Project Thunder to demonstrate compliance with level of service "D" at the above-referenced intersection. However, for any motorist currently using the intersection during peak hours, it is obvious vehicle congestion is reducing existing traffic management functions to an unacceptable quality. Especially for motorists attempting to enter Wilsonville Road from Parkway Avenue, the City is exploring the following:

1. Increasing the visability of the "Do Not Block Intersection" signage.

2. Placing a pavement stop bar on Wilsonville Road which corresponds with the intersection signage.

3. Controlling ingress and egress to Parkway Avenue north of Wilsonville Road.

4. Investigate the installation of an intersection traffic signal which would operate in sequence with the interchange traffic controls.

5. Investigate the construction elements involved with a new roadway joining Parkway Avenue and Town Center Loop West.

Ultimately, traffic congestion adjacent to the Wilsonville interchange (from Town Center Loop West to Kinsman Road) will only be relieved when ODOT completes the construction of the expanded interchange design.

B. Storm Sewer - Memorial Part

As I understand it, Project Thunder storm drainage will flow into the I-5 storm sewer system. At peak flows, excess water will be diverted into the Phase I (Thriftway/Payless development) storm sewer which flows past the Library and into Memorial Park. In order to accommodate the anti-cipated flows, the following park storm drainage improvements are underway:

November - December, 1991	Surge basin, stilling basin and water quality swale design
January - February, 1992	Complete design
March	Construction bidding
April	Award construction contract
May	Begin construction
September	Complete construction

The estimated cost of this project is $124,420 and is scheduled to be funded in conjunction with Memorial Park improvements. Approximately 52 per cent of the total project cost may be recovered from a payback when the Teufel and Boozier properties develop.

Also, the City will soon be undertaking a City-wide storm sewer Master Plan study in order to identify and plan for infrastructure needs. Under the current storm sewer SDC program, Project Thunder will generate approximately $16,640 to be applied directly against the cost of the new Storm Sewer Master Plan.

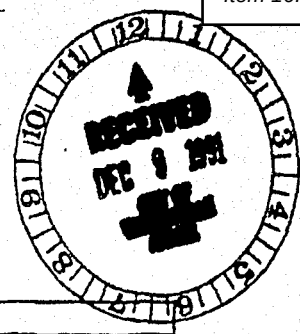
I hope this information is helpful.

ss:jme

PROJECT THUNDER

PEOPLE IN ATTENDANCE

MEETING: PLANNING COMMISSION
DATE: 9 DEC 91



NAME	ADDRESS
Ron Leeta	233 SE Washington St Hillsboro OR 97123
Loyal L Craven	JRS ARCHITECT 1611 SW TAYLOR PORTLAND 97205
JIM FAULKNER	3484 FAR HILLS AV DAYTON, OH 45429 DESIGN FORUM ARCHITECTS
Chris Tope	29025 S.W. town center Loop Wilsonville OR
TOM JONES	1099 SW COLUMBIA PDX 97201
RICK MARTIN	1099 SW COLUMBIA PDX 97201
KIM Beach	101 SW Main Suite 1500 Portland OR 97204
DON MALIN	8755 SW CITIZENS DRIVE WILSONVILLE
VADIC VANDEHEY	610 SW Alder Suite 700 PDX 97205
BOB LAMB	13890 SW BULL MT ROAD TIGARD OR 97224

W&H PACIFIC
Creative Solutions ... Superior Service
1099 S.W. Columbia Street
Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

To: Blaise Edmonds
City of Wilsonville Annex
30470 SW Parkway
Wilsonville, OR.

Date: Dec. 2, 1991
Project Number: 467-0301
Project Name: Wilsonville Town Center
Regarding: Open Space Alternative Concept Plan

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
X Attached	For Your Info/File	KIM BEACH
Facsimile	X As Requested	LOGAN CRAVEN
Number Of Pages Including Cover	For Review And Comment	

Copies	Description
10	FOLDED FULL SIZE REVISED MASTER PLAN (SHT. #1)
1	PMT (8½"x11") OF ABOVE
1	ORIGINAL (8½"x11"): ALTERNATIVE OPEN SPACE CONCEPT.

Comments

Blaise:

Please enclose the attached materials w/in your staff report.

s - again for all your help !!!

Yours,

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

November 26, 1991

Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 SW Elligsen Road
Wilsonville, Oregon 97070

RE: PROJECT THUNDER
DESIGN REVIEW SUBMITTAL
JOB NO. 4-755-0102

Dear Blaise:

Thank you again for taking time this morning to discuss Project Thunder. As per our discussion, the following items were discussed and agreed upon:

1. Approval of Drawing Scales:

   A. Design Review Submittal at 50 scale.

   B. Construction Document Submittal at 30 scale.

2. Approval to omit irrigation design for Design Review Submittal. Notes will be provided.

3. Design Review Submittal will be 50 scale landscape plan showing tree, plant and lawn layout. Plant lists and details will be provided as per City of Wilsonville's Design Review Criteria.

4. W&H Pacific will have 100% complete construction documents by December 27, 1991. We will submit to the City a set of complete drawings for additional information. These drawings will include complete landscape and irrigation plans and can be included for the January 27, 1992 Design Review meeting.

If you have any questions or comments, please give me a call.

Sincerely,

W&H PACIFIC

Matthew P. Simpson, A.S.L.A.
Project Landscape Architect

MPS/kal

STORAGE	SERVICE	RETAIL	RET
6208	4700	47,879	572
9600	900	2,240	1024
22,892	1020	5,880	4500
420	640	7,920	6096
216	1952	63,919	
39,336	5016		
	2048		
	1008		
	17,275		

OFFICE
18156
200
50
5,294
288
912
240
149
128
9,117

EXHIBIT "A"

City of
WILSONVILLE
in OREGON

30000 SW Town Center Loop E • PO Box 220
Wilsonville, OR 97070
(503) 682-1011

ADMINISTRATION DEPARTMENT
MEMORANDUM

DATE: OCTOBER 9, 1990

TO: DESIGN REVIEW BOARD

THROUGH: WAYNE SORENSEN, PLANNING DIRECTOR

FROM: MICHAEL E. KOHLHOFF, CITY ATTORNEY

SUBJECT: REQUESTED OPINION FOR LES SCHWAB TIRE CENTER

INTRODUCTION

At the City of Wilsonville's Design Review Board meeting of September 24, 1990, applicant, Les Schwab Tire Centers (Les Schwab), filed three legal objections to the planning staff's recommendations for revisions to the Les Schwab site plan applications as conditions of approval: violation of U.S. Constitution and Oregon Constitution free speech rights, lack of authority, and arbitrariness. The Design Review Board has requested my review of these objections, which are discussed below. The application was continued for decision only until the next regularly scheduled meeting in October.

The recommended revisions were to proposed material and color to the exterior of the tire center building. The site plan submitted by Les Schwab called for the building to be constructed of concrete block, with a metal roof and metal mansard. The proposed exterior colors of the building were red and white. The revisions recommend the use of red-colored brick instead of the red painted block on the south, east and west elevations, with the north elevation to be painted white. Also, the metal roof trim and mansard were recommended to be repainted with an earth tone color.

BACKGROUND

The City of Wilsonville was incorporated in 1969. Pursuant to state statute it adopted and had acknowledgment by the state its city-wide Comprehensive Land Use Plan and implementing Zoning Ordinance in 1982. As a newly developing city it has placed its emphasis on planning in the form of "planned development" for commercial, industrial and residential uses. In the area of commercial development, the City's Zoning Code provides:

"4.136 (1) (c). Planned Development Commercial shall be planned in the form of centers or complexes as follows:

a. The Town Center
b. Service Centers
c. Office complexes.
d. Commercial recreation.
e. Neighborhood commercial."

The Town Center was zoned and master planned. The Wilsonville Town Center Plan drawing was placed into the Zoning Code at 4.136 (1) (c) (12). The Town Center Plan drawing conceptually locates functional use areas of central commercial, service commercial (includes tire sales and service), food and sundries, fast foods service, office professional, offices for general use, and high density apartments. The zoning text provides for permitted and accessory uses within each of the designated functional use areas.

The purpose of this zone is stated under 4.136 (l) (c) (12) (a).

> "Purpose: (i) The purpose of this zoning is to permit and encourage a City Center, adhering to planned commercial and planned development concepts, including provision for commercial services, sales of goods and wares, business and professional offices, department stores, shopping centers and other customer-oriented uses to meet the needs of the Wilsonville community as well as to meet the general shopping and service needs of an area-wide basis, together with such multiple family residential facilities, open space, recreational and park areas, and public uses facilities as may be approved as part of the City Center compatible with the Comprehensive Plan of the City."

The location of the Les Schwab property application is in the northwest corner of the Town Center commercial area adjacent to Interstate 5. The Town Center is planned as the City's focal center. The property's location is a major viewing point of the City's focal center and identity. Development has occurred in the area with appropriate uses, high quality materials and design, which has provided the city center with uniform and harmonious developments with an aesthetically pleasing visual environment. This development has been and is overseen by the City's Planning Commission and its Design Review Board, pursuant to the city's zoning code.

The Les Schwab application has duly gone through the Planning Commission Planned Development Approval process and is located appropriately in the service commercial area of Town Center Master Plan. Its use approval adheres to the planned commercial/planned development concepts for Town Center. It comes before the Design Review Board for site development approval.

LEGAL REVIEW

"Comprehensive planning is clearly recognized as a proper exercise of municipal police power, often seen as a safeguarding of property values on a broad public basis. The conservation of property values is a very common consideration in comprehensive zoning, ordinarily required by state zoning acts, incorporated in ordinances and sustained by the courts (footnote omitted). Likewise, regulations as to the height and mode of construction

of buildings have been sustained on the ground of the 'safety, comfort and convenience of the people and for the benefit of property owners generally'" (footnote omitted). McQuillan Mun. Corp., § 24.14 (3rd. Ed.)

As also stated in McQuillan Mun. Corp., § 24.10:

"It is well said that the police power is based chiefly on the Latin maxums, salus populi suprema est lex - the welfare of the people is the first law (footnote omitted) and sic utere tuo ut alienum non laedas - so use your property as not to injure the rights of another (footnote omitted). As stated by the United States Supreme Court, the police power 'has its foundation in the maxim of all well-ordered society which requires everyone to use his own property so as not to injure the equal enjoyment of others having equal rights of property'". (*Slaughter House Cases, 16 Wall 36, 21 L. Ed. 394).

However, the power of municipal government in this respect is not unlimited. It is limited by federal and state constitutional guarantees.

Applicant raises issues pertaining to federal and state constitutional rights to free speech, arguing that the proposed color revisions invade its rights to advertise as it chooses. Applicant also raises due process issues which prohibit the unreasonable, arbitrary use of such powers claiming the Design Review Board does not have the authority to limit materials and colors (unreasonable) and is without standards and criteria (arbitrary) to do so.

As previously stated, public necessity and protection of the public welfare forms the basis for the exercise of police power; that every person ought to so use his or her property so as to not injure one's neighbors. The unavoidable consequence of the need to exercise the police power in this regard results in the restriction on the use of property. It should also be noted that the police power is of a dynamic nature. McQuillan Mun. Corp., § 24.08 (3rd ed.) states, "Like equity jurisprudence, the police power has a dynamic or progressive capacity to be applied to new subjects or to be exercised by new or revised measures as economic and social changes require."

Wilsonville adopted its zoning code as an exercise of its police power. The presence of its Design Review Board is an example of the progressive capacity which was brought about by the public necessity and modern day quality of life concerns. Wilsonville as part of its general zoning regulations provides in 4.151 General regulations - signs for signage regulation.

The public necessity to regulate signage in terms of time, place and manner so that the signage chosen is not abusive of the rights of others is clearly recognized. See cases cited in McQuillan Mun. Corp., § 24.384 (footnotes 1-10). Within these general regulations, 4.151 (3) applies to commercial use within the Wilsonville Town Center as follows:

> "(a) The Wilsonville Town Center, as designated in the Wilsonville Code, Section 4.136 et seq., is well suited for the institution of a coordinated signing program because of its geographic unity, focal location, and the fact that it is in the early stage of development. The purpose of Section 4.151(3) of this chapter is to provide the Town Center with a program of coordinated signing which is both functional and aesthetic, and to provide a method of administration which will insure continuity and enforcement. In this manner, the framework will be provided for a comprehensive balanced system of street graphics which provide a clear and pleasant communication between people and their environment..."

"In regulating the use of street graphics and building signage, the following design criteria shall be applied in conjunction with the provisions of this Code: That street graphics and building signage be:

1. Appropriate to the type of activity to which they pertain.

2. Expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole.

3. Legible in the circumstances in which they are seen.

4. Functional as they relate to other graphics and signage."

Wilsonville Code 4.001 (70) defines "sign" as "***painting...or other device that is designed, used or intended for advertising purposes, or to inform or to attract the attention of the public, and includes where applicable...display surfaces and all components of the sign***".

Wilsonville Code 4.151 (3) (b) (2) provides the following definition: "Building Graphics. Signs that are not located within the first 15 feet of a property line that abut a public right-of-way. Building graphics are signs that include building-mounted and roof-mounted signs."

Wilsonville Code 4.151 (3) (d) (3) a. provides for Building Graphics Signage: "The total square foot of all signs except the single address sign and the street graphics sign shall not exceed the width of the building occupied by the use advertised. The width of a building is to be measured as the longest dimension of the width or depth of the building."

Wilsonville Code 4.151 (3) (c) (2) a. provides authority of the Design Review Board "...to administer and enforce all the provisions in Section 4.151(3) as they affect the design function and appearance of the sign."

Therefore, assuming that the applicant painted color schemes are as it proposes "an important element of the company's advertising" that "aid instant customer recognition", then the painted color scheme is a sign under Wilsonville Code 4.001 (70) whose display surface is violative of the size limitations for building graphics under 4.151 (3) (d) 3.a.

The specific criteria of size rationally limits a building by virtue of the amount and color it's painted from becoming a massive, garish sign incompatible with its neighbors. This is a reasonable time, place and manner prohibition to prevent an abusive medium, and is context neutral. The thrust of Art. 1, Section 8 of the Oregon Constitution is that free speech is not to be restricted unless it becomes abusive. See Ackerly v. Multnomah County, 72 Or. App. 617, 696 P2d 1140 (1985). The maxums involved in the police power cited above to not injure the property of others are found in the design criteria also cited that building signage not only be appropriate to the type of activity to which they pertain, but also be expressive of the identity of the individual proprietors and the Wilsonville Town Center as a whole. There is an obvious need to protect the aesthetic nature and character of other properties and the identity of the Town Center. There is no less need to preserve the property values of peaceful and harmonious use from loud and offensive noise than from loud and massive signage. Each is equally abusive.

As referenced above, comprehensive planning is widely recognized as a legitimate exercise of police power to preserve property values. Because of geographic unity, focal location and its early stage of development there is a rational basis to provide for a

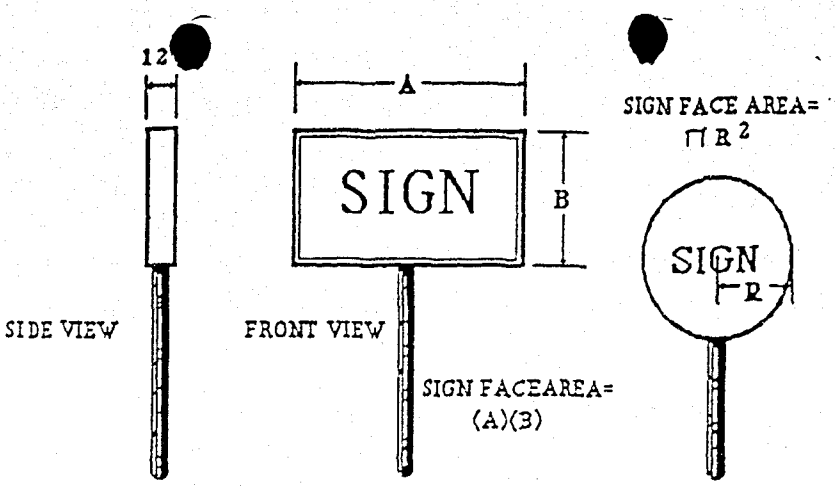
coordinated signage program which is both functional and aesthetic and to provide a method of administration through a Design Review Board for Town Center development. Clearly, this is in keeping with the multiple and often interrelated purposes set forth in 4.440 of the City's Code for Design Review Board. General criteria and standards are set forth to review site development in section 4.421, including color and material and as it relates to advertising medium that they "shall not detract from the design of proposed buildings and structures and the surrounding properties." Aesthetic sensibilities are also recognized as a sole ground and a proper subject for support of zoning regulation. See Oregon City v. Hartke, 240 Or 35, 400 Ord. 255.(1965); Naegele Outdoor Advertising v. City of Waynesville, 833 F.2d 43 (CA4 1987); Don's Porta Signs Inc. v. City of Clearwater, 829 F2d 1051 (CA11 1987).

The dynamic nature of police power is clearly seen in the contemporary, community trends to view aesthetic considerations as valid subjects for the exercise of police power. The very exercise of police power is based upon need. Modern, contemporary society has recognized that advertising in the commercial setting has historically been poorly constructed, grossly disproportionate in size or height, aesthetically disharmonious, located in manners detrimental to traffic safety, and has even obscured the rights of others to be seen, creating a need to establish reasonable time, place and manner restrictions.

On the other hand, such necessity has not risen to the same level of need to regulate the use of homes as signs. The business entrepreneurs who are willing to advertise their commercial product by virtue of using gross advertising structures in commercial areas have not historically turned their private homes into such uses. In short, the need to protect other homeowners from the detrimental effects of having the color schemes of homes turned into speech of a loud and abusive nature has not presented a public need to regulate. (Often, developers have instituted self regulation through homeowners associations in residential subdivisions). Thus, single family dwelling units are exempt from initial Design Review Board development approval. They are not exempt if and when the use involves signage. There are specific regulations which the Design Review Board has authority to govern addressing normal and typical signage within a residential use area, namely residential name plates, 4.151 (l)(a), bulletin boards, 4.151 (l)(b); real estate signs advertising individual lots, 4.151 (l)(c); subdivision signage, 4.151 (l)(d) and home occupation signage, 4.151 (l)(d). Nor is the applicant's comparison of industrial Planned Developments with the commercial developments a justification for not distinguishing the differences in the nature of uses. What may be appropriate to locate and identify industrial users and be harmonious with other surrounding industrial properties may, in fact, not be compatible with commercial uses. That basic recognition between different uses is what allows for zoning districts in the first instance.

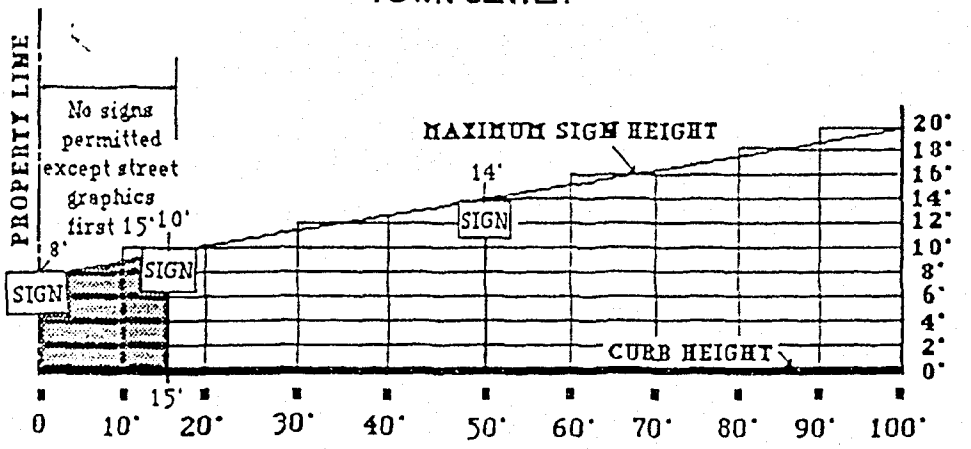
Therefore, I am of the opinion that the recommended revisions submitted by staff are reasonable time, place and manner restrictions, to prevent the use of a building as a grossly, large sign offensive to aesthetic sensibilities, coupled with the use of materials which are not harmonious with existing properties and the focal nature of Town Center to the detriment of the property of others. The regulations provide authority in the Design Review Board to act and neither as set forth or applied, are they arbitrary.

mek:pjm



SIGN FACE MEASUREMENT

TOWN CENTER



The maximum height of a sign is measured from a point 8 feet above the curb at the property line, to a point 20 feet in height or 4 feet above the roof, which ever is less.

MAXIMUM SIGN HEIGHT

EaE1aE1a
abcdefghijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRST
UVWXYZ
123456780&?!$(.,,.)^^><

FIG. 2

CHAPTER 4, ZONING CODE
TOWN CENTER SIGNAGE CODE
EXHIBIT "B"

City of Wilsonville
COMMUNITY DEVELOPMENT DEPARTMENT
Memorandum

November 7, 1991

TO: Blaise Edmonds, Planning
FROM: Martin Brown, Building Official
SUBJECT: DEVELOPMENT REVIEW TEAM

The following is a list of concerns for the proposed Project Thunder and the proposed Liberty Organization office/warehouse. Actual working drawings may expose additional code concerns.

THUNDER PROJECT

1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

LIBERTY ORGANIZATION OFFICE/WAREHOUSE

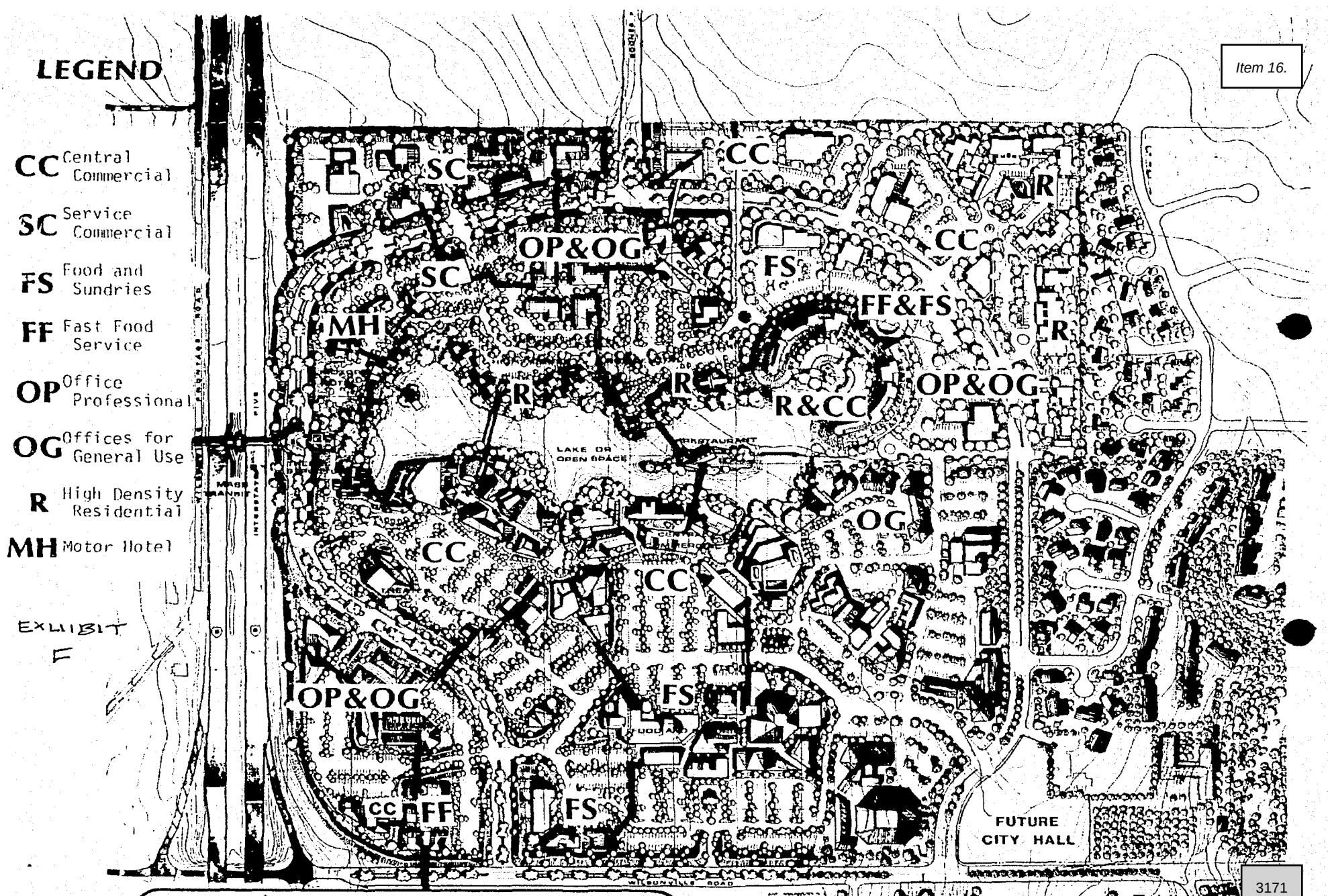
1. Provide a fire hydrant within 250 feet in hose-lay fashion of all exterior walls.

2. Proposed building shall comply with the A.D.A.

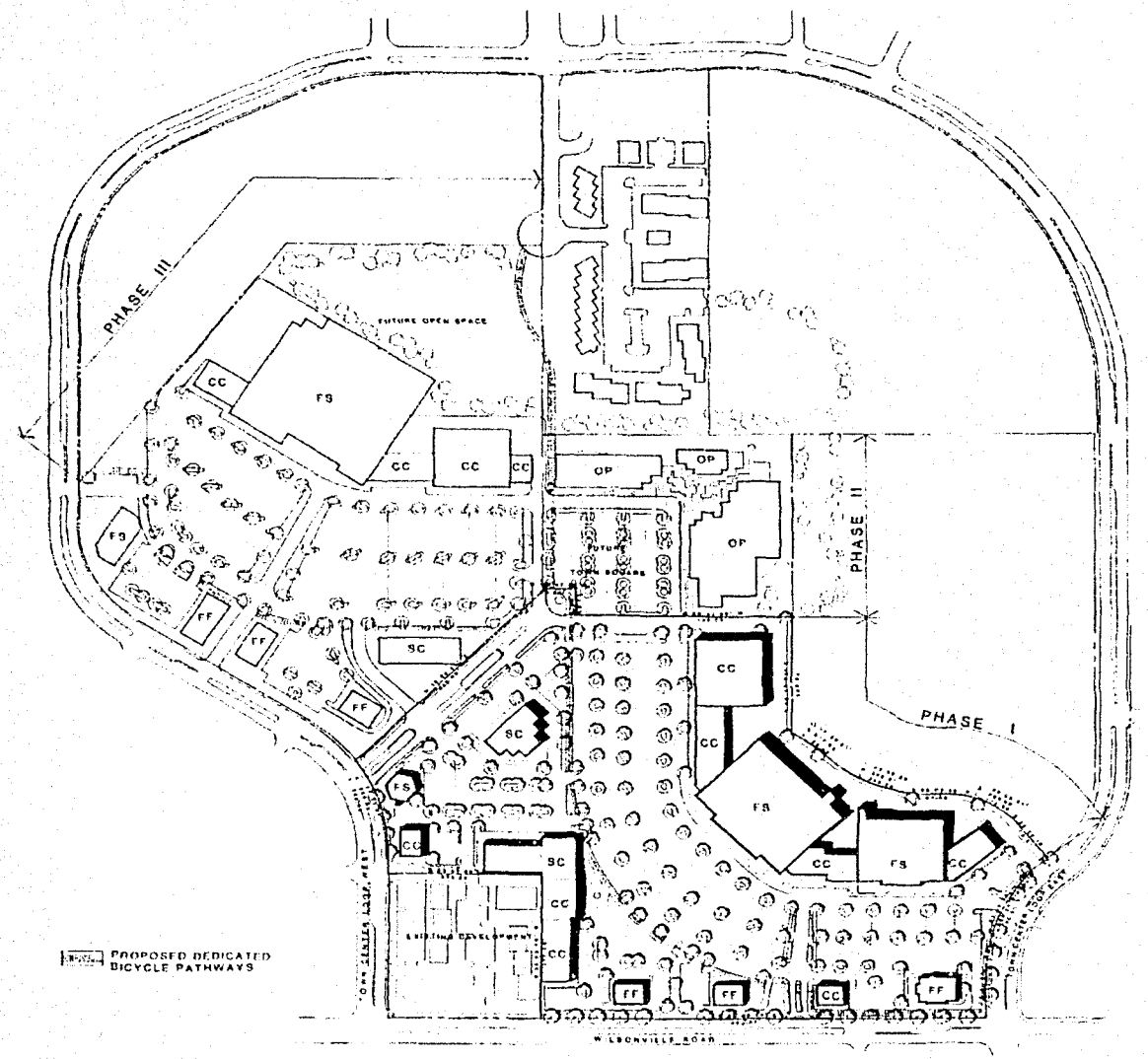
/sf

EXHIBIT E

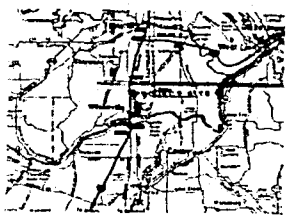
DEFECTS IN ORIGINAL DOCUMENT



Wilsonville City Center Plan



MASTER PLAN: PHASE I, II, & III



VICINITY MAP

ACREAGE

PHASE I	23.17 ACRES
PHASE II	5.41 ACRES
PHASE III	22.02 ACRES
TOTAL	50.60 ACRES

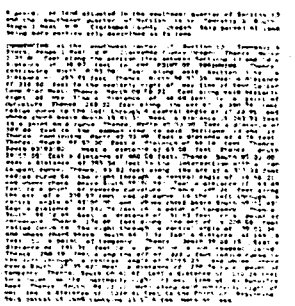


EXHIBIT H

JKS Architects PC

WILSONVILLE MARKETPLACE

1

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION PLANNING/TRAFFIC ENGINEERING
610 S.W. ALDER, SUITE 700 • PORTLAND, OREGON 97205 • (503) 228-5230 • FAX (503) 273-8169

October 16, 1991

Ms. Kim Beach
Capital Realty Corporation
101 SW Main, Suite 1500
Portland, OR 97204

RE: Traffic Analysis for Wilsonville Town Center Phase II

Dear Ms. Beach:

The purpose of this letter is to discuss the results of an update to the April 1990 Traffic Impact Analysis we conducted for the Wilsonville Town Center relative to the current phase II development proposal. Some of the specific issues that this letter addresses include:

- the level of development proposed in the current phase II submittal,
- the level of development analyzed in the April 1990 Traffic Impact Analysis,
- an update of current conditions within the vicinity of the site
- an assessment of projected conditions upon completion of the current development proposal
- an assessment of the need for a traffic signal at the Wilsonville Road/Town Center Loop West intersection upon completion of the proposed development

Based on the results of both the previous and updated analysis, the proposed development can occur while still maintaining acceptable levels of traffic operations and safety at site driveways and nearby key intersections. The significant findings and recommendations are as follows:

- The key unsignalized intersections within the study area are currently operating at an acceptable LOS during weekday evening peak hour conditions.

EXHIBIT G-7 SUPPLEMENTAL

- Upon completion of the development, the site driveways and key off-site intersections, with the exception of Wilsonville Road/Town Center Loop West, will operate within acceptable level of service limits during the evening peak hour time period.

- A traffic signal is warranted to accommodate projected 1992 traffic volumes at the Wilsonville Road/Town Center Loop West intersection. It is therefore recommended that a traffic signal be installed at this location upon completion of the proposed development.

Current Phase II Development Plans

The current phase II development plans call for the construction of a retail facility consisting of approximately 159,000 gross square feet of floor area. This development level (and substantially more) has already been accounted for in the previous traffic impact analysis. The traffic impact analysis conducted in April 1990 considered a Phase I development level of approximately 211,000 gross square feet of floor area, and a combined Phase II and III development level of approximately 451,000 gross square feet of retail space and 40,000 gross square feet of commercial office space. Therefore, the original traffic impact analysis, which evaluated conditions through the year 1995 is considered to be more than adequate in terms of its assessment of traffic impacts of the proposed development for the four year horizon. Included with this letter are 10 copies of the April 1990 Traffic Impact Analysis.

Update of Existing Conditions

Within the last week, Kittelson & Associates, Inc. obtained weekday p.m. peak hour turning movement counts at the intersections of Wilsonville Road/Town Center Loop West, and Wilsonville Road/Town Center Loop East. The results of those counts revealed that compared to the counts conducted in conjunction with the April 1990 study, traffic volumes have increased by approximately 70 percent on Wilsonville Road, by approximately 80 percent on Town Center Loop East, and have remained essentially the same on Town Center Loop West. The growth in traffic on Wilsonville Road and Town Center Loop East is due primarily to the substantial amount of residential development that has occurred within the vicinity of the site (particularly to the east of Town Center Loop East) within the past year, as well as to the development associated with Phase I of the Wilsonville Town Center.

The reason traffic volumes have remained basically the same on Town Center Loop West is likely due to the fact that the majority site-generated traffic associated with Phase I of the Wilsonville Town Center, as well as some of the site-generated traffic from the retail/office development located in the southwest corner of Town Center Loop are using the Wilsonville Town Center access drives on Wilsonville Road and Town Center Loop East. Another contributing factor may be that traffic volumes within the Wilsonville area have re-distributed somewhat since 1990. Table 1 displays a comparison of the 1990 and the current 1991 volumes.

TABLE 1
COMPARISON OF PEAK HOUR VOLUMES

Intersection	Approach	1990 Volume (Veh/Hr)	1991 Volume (Veh/Hr)
Wilsonville Rd./ Town Center Loop W.	Westbound	165	410
	Eastbound	530	785
	Southbound	295	270
Wilsonville Rd./ Town Center Loop E.	Westbound	155	300
	Eastbound	280	435
	Southbound	80	145

Based on the results of the recent p.m. peak hour traffic counts, Level of Service analyses were conducted at each of the intersections following the analytical techniques described in the *1985 Highway Capacity Manual*. Table 2 displays the results of that analysis. As indicated in the table, both intersections are currently operating at Level of Service "D" or better, which is considered acceptable by standards.

Projected 1992 Conditions

The current site plan indicates that three access driveways on Town Center Loop West will serve the proposed retail development, consisting of a main access drive, a secondary access drive, and a service drive on the north end of the development which will be limited to right-turns only. This access scheme is consistent with what was assumed in the 1990 Traffic Impact Analysis, with the exception of the north service drive. In the previous analysis, the two primary access drives were projected to operate at Level of Service "D" or better through the year 1995. Given that traffic volumes will be substantially lower in 1992 than the projected 1995 levels, all three driveways serving

TABLE 2
PM PEAK HOUR LOS
EXISTING TRAFFIC VOLUMES

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	113	D
Wilsonville Rd./ Town Center Loop E.	PM	299	C

the development are anticipated to operate at Level of Service "D" or better upon completion development.

Estimates of site-generated traffic for the Phase II development proposal were added to the existing traffic volumes at the intersections of Wilsonville Road/Town Center Loop W. and Wilsonville Road/Town Center Loop E. Based on that assignment, additional analyses were conducted to assess the level of service at these two intersections upon completion of the development. Table 3 displays the results of that analysis. As shown in the table, the intersection of Wilsonville Road/Town Center Loop West is anticipated to experience an "F" Level of Service, which is considered unacceptable by City standards. An examination of signal warrants contained in the *Manual on Uniform Traffic Control Devices* indicates that at least two warrants for a traffic signal will be met under projected 1992 conditions.

Based on these results, and given that background traffic volumes on Wilsonville Road are likely to continue to increase somewhat, it is recommended that a traffic signal be installed at the Wilsonville Road/Town Center Loop West intersection coinciding with the completion of the current Phase II development proposal. Based on this recommendation officials at Capital Realty Corporation have retained Kittelson & Associates, Inc. to begin the preliminary design of a traffic signal at the Wilsonville Road/Town Center Loop West intersection.

TABLE 3
PM PEAK HOUR LOS
PROJECTED 1992 EXISTING + SITE TRAFFIC

Intersection	Time Period	UNSIGNALIZED	
		Reserve Capacity	LOS
Wilsonville Rd./ Town Center Loop W.	PM	-29	F
Wilsonville Rd./ Town Center Loop E.	PM	113	D

I trust that this letter adequately addresses City staff's traffic related concerns with respect to this development proposal. If in the meantime you have any questions or comments please do not hesitate to contact me.

Sincerely,

Mark A. Vandehey

Mark A. Vandehey
Associate

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: Request for Modification of Condition of Approval No. 90PC15

On behalf of the Owner, Capital Realty Corp., we request a reconsideration of Condition No. 8 of Planning Commission Resolution No. 90PC15 to provide the opportunity for Capital Realty to work with the City to accomplish the following:

1. Develop a design for the conceptual Wilsonville Town Center open space that allows for the participation of the appropriate City staff and commissions,

2. To formulate a development plan and time frame consistent with the development of Phase II and III of the balance of the Wilsonville Town Center property, and

3. Determine Capital Realty's financial obligation and any credits related thereto.

Concurrently submitted to you are Stage I Master Plan Re-submittal and Stage II, Phase II of the Center. We feel that they have a bearing on this condition and warrant review.

Thank you for your consideration, if you have any questions, please call.

Very truly yours,

Richard S. Brooks, AIA
Project Manager

bc

C:\BC\RSB\WTC-1017.PM

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT G-8

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bavinger AIA • Gerald H. Williams AIA • Of Counsel: John F. Jensen AIA • Charles
Associates: Richard S. Brooks AIA • Andrew C. Jacobson AIA • Brian R. Roberts AIA • Warren A. Tyler AIA

Stage I Master Plan Re-submittal
Wilsonville Town Center—Wilsonville, Oregon

1. Nature of Application:

This is a re-submittal for Stage I Master Plan approval for a proposed retail development of 59.79 acres, to be located adjacent to, and north of Wilsonville Road spanning from the southeast portion of Town Center Loop East, the inner portion of Town Center Loop West, north to the intersection of the Loop West and Parkway in that area previously designated as The Wilsonville Town Centre.

The Applicant:

Seeks to develop the site as a community shopping center. The center, at full build out would consist of approximately five larger retail commercial anchor stores, infill retail commercial space and pads located independently from the central retail complex for commercial retail development.

The proposed development includes a total building area of approximately 500,000 square feet constructed in three phases.

Phase I

The existing development of Phase I will include retail commercial space of approximately 207,130 square feet oriented primarily to Wilsonville Road. The Phase I Center consists of three anchor tenants, including major grocery and drugstore tenants, with infill commercial retail shop space and several pads at the periphery for retail uses. Parking for Phase I is 1,063 spaces at a ratio in excess of five spaces per 1,000 square feet of gross leasable area. The third anchor and several of the pads are as yet un-built.

The initial development provides two full-turning accesses along Town Center Loop; one at the eastern end of the development near Wilsonville Road, and the other off Town Center Loop West, which is a heavily landscaped entry boulevard, that in later phases will become the central identified main entry to the fully built-out center. Further, a secondary full turn access is proposed at Town Center Loop West and the Northern boundary of the existing retail center; and finally in Phase I, a right-in-right-out access at mid-site on Wilsonville Road, which is temporarily a full access entry until development to the south of Wilsonville Road completes construction of the final road design.

EXHIBIT 69

1. Nature of Application: (cont'd)

Phase II:

The proposed Phase II development is one retail user of approximately 159,400 square feet located on 14.75 acres primarily fronting Loop Road West. Phase II is to be built and developed by a separate owner other than Capital Realty Corp. Capital Realty, however, maintains its right of review for compliance with the concept and intent of the Town Center retail development. Approximately 872 parking spaces are provided (see Stage II Submittal attached).

Phase III:

The proposed development of Phase III includes retail commercial space of approximately 143,568 square feet completing the connection to Phases I and II. The Phase III development would consist of one large retail anchor tenant, retail pad tenants, and a two-story professional office building oriented at the end of the main entrance boulevard.

The parking development for Phase III, approximately 980 spaces, brings the total parking count to 2,915 spaces, serving the proposed 510,000 square feet of gross building area.

2. Property Description:

The property is located north of Wilsonville Road, east of Interstate 5, and west of City Hall. The property is located on the following parcels:

Parcel 1: 19.73 acres
Tax Lots 600 and 601, Section 13, Township 3 south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

Parcel 2: 4.37 acres
Tax Lot 500, Section 13, Township 3, south, Range 1 west, Willamette meridian, situated in the City of Wilsonville, County of Clackamas, State of Oregon.

2. Description (cont'd)

Parcel 3: 25.96 acres
Tax Lots 200, 300, and 405, Clackamas County Map 3-1W-14D and ownership interests in a triangle of land approximately 6,381 square feet on the west of Tax Lot 200.

Parcel 4: 9.73 acres
Tax Lots 101, 201, and 102 Clackamas County Map 3-1W-14D

3. Plan Designation and Zoning:

The subject site is designated commercial on the comprehensive plan map and zoned Planned Development Commercial on the zoning map. The site, being situated within the Wilsonville Town Center master Plan map, has underlying use designations indicating CC Central Commercial, FS Food and Sundries, OP Office Professional, FF Fast Food Restaurant, R high density residential, and open space.

The intent of our proposal is to accomplish the mix of other desired and designated uses within the boundaries of our development. We feel our plan as submitted is consistent with the comprehensive plan goals and with the Town Center Master Plan.

October 18, 1991

Wayne Sorenson
Planning Director, Wilsonville
City Hall
P. O. Box 270
Wilsonville, OR 92070

Dear Mr. Sorenson:

Re: **Stage I Re-submittal Master Plan Approval Wilsonville Town Center**
Stage II, Phase II Submittal

On behalf of Capital Realty Corp., and the owners of properties so designated as comprising the development area, we are re-submitting this application for a Stage I Master Plan Approval for a 59.79 acre commercial center and Stage II approval for the Phase II 14.75 acre site.

As you may be well aware, Phase I of this plan has been completed in part. The economics of the region and the country have impacted the nature of the project as originally planned. This re-submittal represents those pressures, and at the same time expands the size of the project while maintaining the original intent of mixed uses as outlined in the Wilsonville City Center Plan.

Capital Realty has the opportunity to bring to the Town Center project a major, innovative retail anchor which will comprise all of Phase II. This parcel will be sold to a separate user for which application for Stage II, Phase II is attached. Their progress and subsequent design submittals will be reviewed and monitored by Capital Realty.

The addition of this anchor, at this time will serve as a catalyst for the completion of Phase I buildings as well as increase the desirability of Phase III tenants. This, in effect, will improve the success of the entire City Center Plan to the benefit of Wilsonville as a whole.

JKS Architects PC
1620 S.W. Taylor Street, Suite 200
Portland, Oregon 97205
503-227-5616 • 800-292-5400 • FAX 503-227-3590

EXHIBIT 6-90

Principals: Norman E. Krause AIA • George L. Schoenleber AIA • Jerry R. Bassinger AIA • Gerald H. Williams AIA • Of Counsel: John F. Jensen • Associates: Richard S. Brooks AIA • Andrew C. Jacobson AIA • Brent S. Roberts AIA • Warren A. Tyler AIA

We are always available to answer questions to aid you in your analysis of this re-submission and its compliance with the current conditions of approval. This project represents a long-term commitment on the part of Capital Realty in the development of a strong, successful center for Wilsonville which will serve the needs of all its citizens. Thank you for your's and the City Staff's time, energy and cooperation towards the realization of this project.

Sincerely,

Richard S. Brooks, AIA
Project Manager

bc

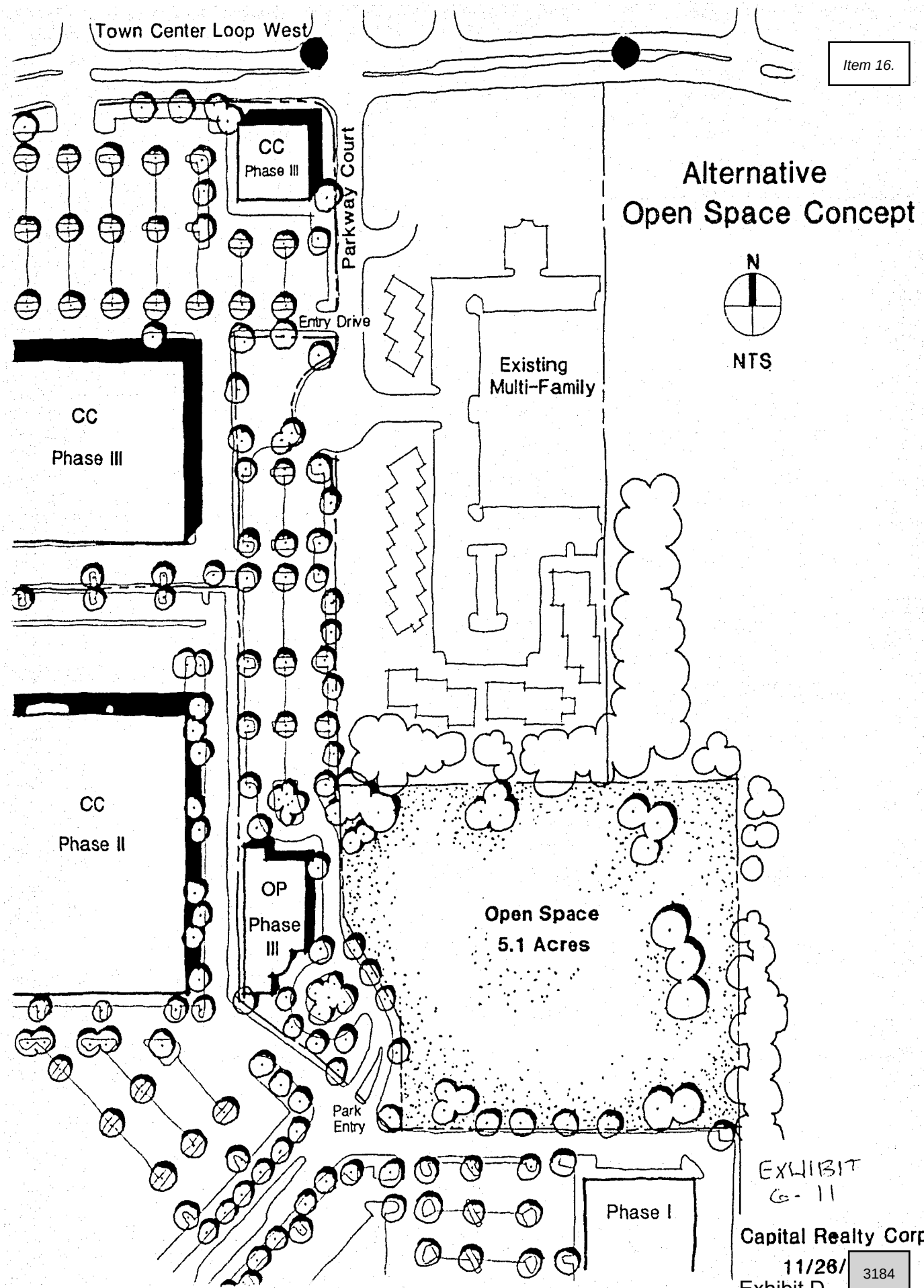


EXHIBIT
G-11

Capital Realty Corp.

11/26/ 3184

AS REVISED
11/19/2

DesignForum
ARCHITECTS

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting **1R**
REVISED GENERAL COMMENTARY:

Project Thunder is a single story building with mezzanine, 166,495 GSF retail sales building, with accessary storage areas. Project Thunder is a new concept in merchandising with this location selected for the pilot program.

Enclosed is data that we believe supports the design concepts expressed, outlines the project exterior signage program; building architecture, materials and colors. The project exterior lighting program, the project landscaping and site improvements information is shown on the revised drawings included with this additional submittal.

As per phone conversations with Blaise Edmonds, Associate Planner, the materials and colors sample board will be presented at the evening of the actual meeting. It will not be forgotten. We will provide a sample board of wall elements, as requested, as soon as we receive material samples from the manufacturers involved.

Enclosed within this booklet are color photocopies of the revised color scheme, two views, plus the proposed parking lot light standards with the directory signage of aisle indicators. Also enclosed is a new drawing titled "View Corridor Concept." Submitted separately are revised drawings DRBC1, DRBC2, DRB1, DRB2, DRB3, and DRBL1.

We believe we meet all known City of Wilsonville ordinances in regards to architecture, landscaping and site improvements. There are no signage variances required. We do request a deviation from the Phase I signage program as explained following. Since our reconsideration of the signage program has eliminated all variances we request reimbursement of the variance fees previously paid.

We request the Design Review Boards consideration of Project Thunder, as resubmitted.

Sincerely,

James L. Faulkner, AIA
Senior Vice President, Architecture

JLF:dr

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 2R
MATERIALS/COLORS DIALOGUE:

The general concept of the project design aesthetic is to create a vibrant and lively shopping environment, having this a "fun place to be". This concept is visualized to the shopper by the dynamic main facade of the building by three means: building form, materials selected and colors used.

The basic building background material is an "Exterior Insulation and Finish System", common name used Dryvit. While proprietary, we will use this term in this discussion. The Dryvit will be in a field color of light beige (neutral) with dark green color Dryvit used as a horizontal accent band on the North and West elevations. Dark green will also be used at the curved wall element of the primary building entry and exit points on the West elevation. The Dryvit will be on all sides of the building, scored in the patterns indicated on the elevations. Use of the dark green color relates this project to the Phase I buildings.

To compliment the Dryvit field, and to help to reduce the scale of this building, a horizontal band of metal siding, in a light bronze color with 50% reflectivity is expressed on the West, North and South elevations. This metal siding is a vertical pattern with vertical "grooves" 6" o.c. On the East elevation, the color and position of the metal siding is simulated by use of Dryvit accent band.

To accent and provide visitor orientation to the entry area, an open "dome" of steel framing, painted red, is mounted on the roof. Coupled with the curved element wall, this designates the building entry area. At grade the curved element concept is carried forward with curved concrete curbs, radial lined concrete walkways and flagpoles/bollards in a circular centerline aligning with the curved wall element at entry. The flagpoles are 25'-0" high, natural aluminum color, and will fly solid color flags or nylon banners. The non-illuminated bollards are 42" high, 10" diameter pipe painted light beige. Bollards around entry points will be internally lighted, and be painted red.

To further designate entry points, clear glass in natural aluminum storefront framing is located adjacent to the curved element entry area, and also occurs at the building service entrance and other secondary entrance points.

The overhead doors will be solid, insulating units without windows, painted light beige. Other secondary doors will be hollow metal painted to match adjacent wall color. Miscellaneous site items such as handrails will be painted black.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 3R

The following are our calculations of area for the Project Thunder Signage Program:

Wall Graphics:

Single face, backlit signs:

Store Name Sign*:	1 Each at 224 SF	=	224 SF
Fascia Sign: "Service":	1 Each at 12 SF	=	12 SF
Fascia Sign: "Customer Pickup":	1 Each at 28.5 SF	=	28.5 SF
Fascia Sign: "Car Stereo Installation":	1 Each at 40.5 SF	=	40.5 SF
TOTAL WALL GRAPHICS AREA			305 SF

* This sign of channelume construction with individual letters for the word "UNIVERSE"; the word "INCREDIBLE" is in script neon.

There are miscellaneous directional signs on site, i.e. stop signs, that are under 2' x 2' in size, single face, non-illuminated and pole mounted. These include the Parking Lot Aisle Indicator Signs: 12 each at 8 SF = 96 SF. These are shown on sheet DRBC1, but are not included in signage area calculations.

DesignForum
ARCHITECTS

PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting 4R

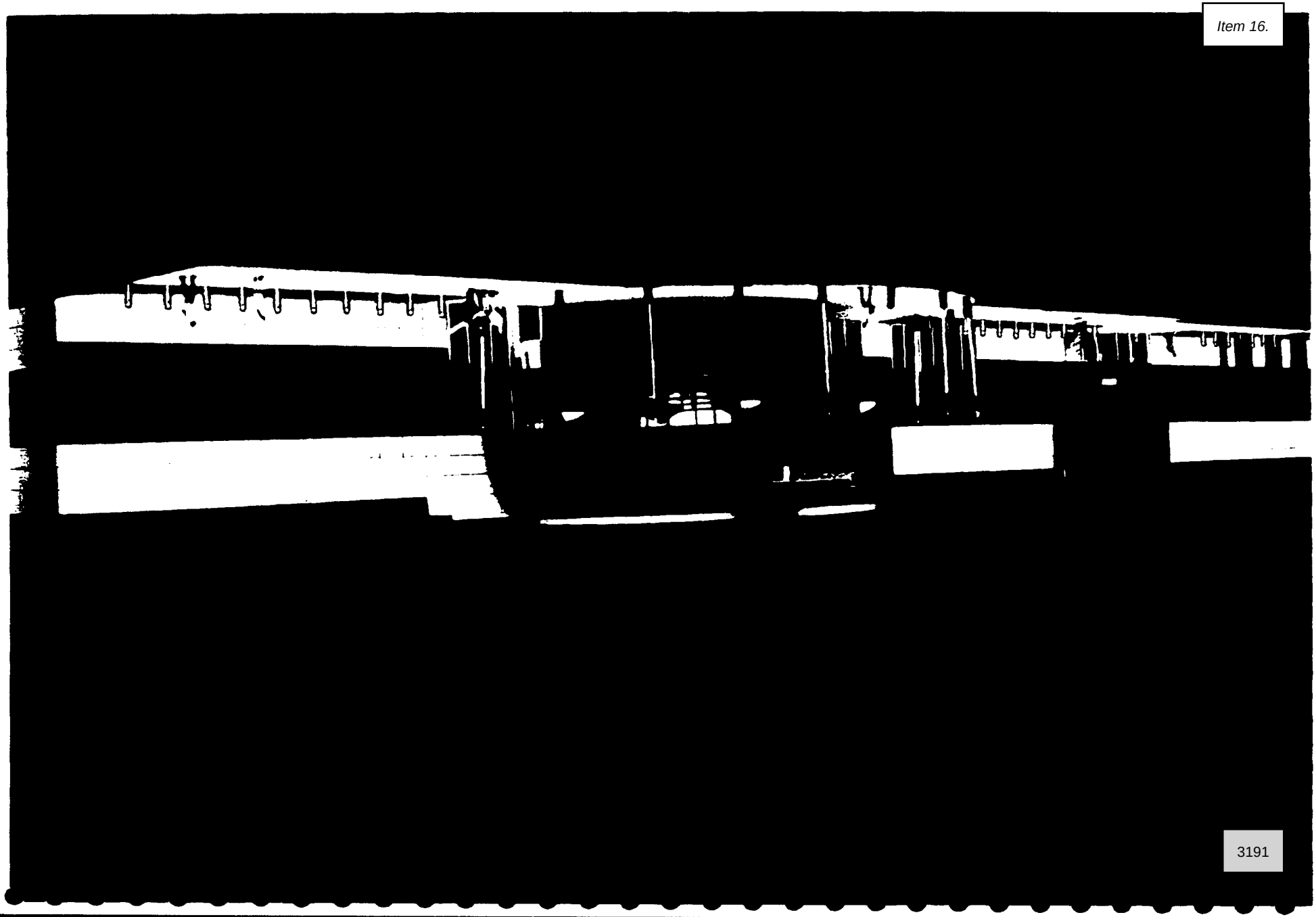
We request the consideration of the Design Review Board for a deviation from the Phase I, Wilsonville Town Center Signage program, as follows:

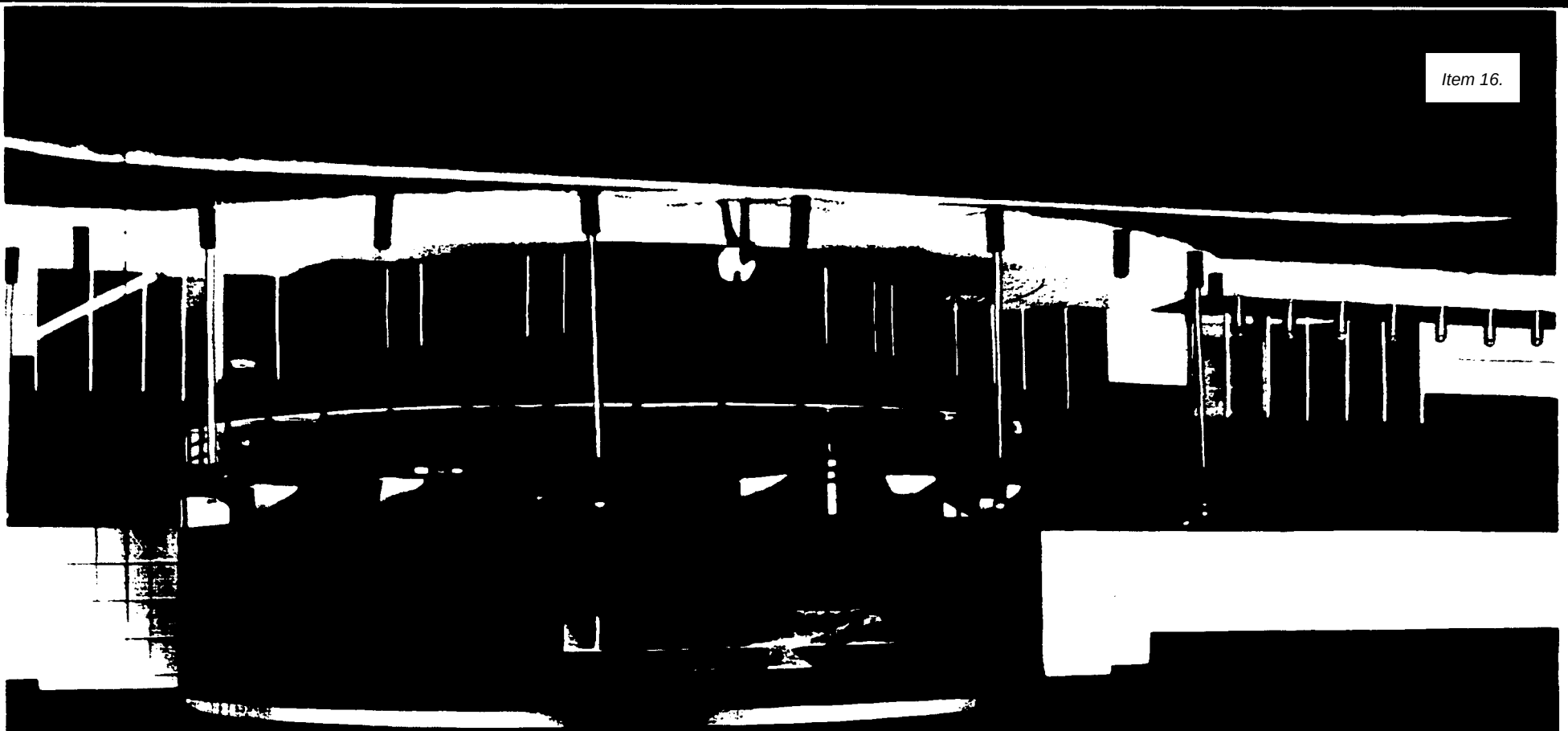
- Deviation #1 from Phase I signage program for sign construction method

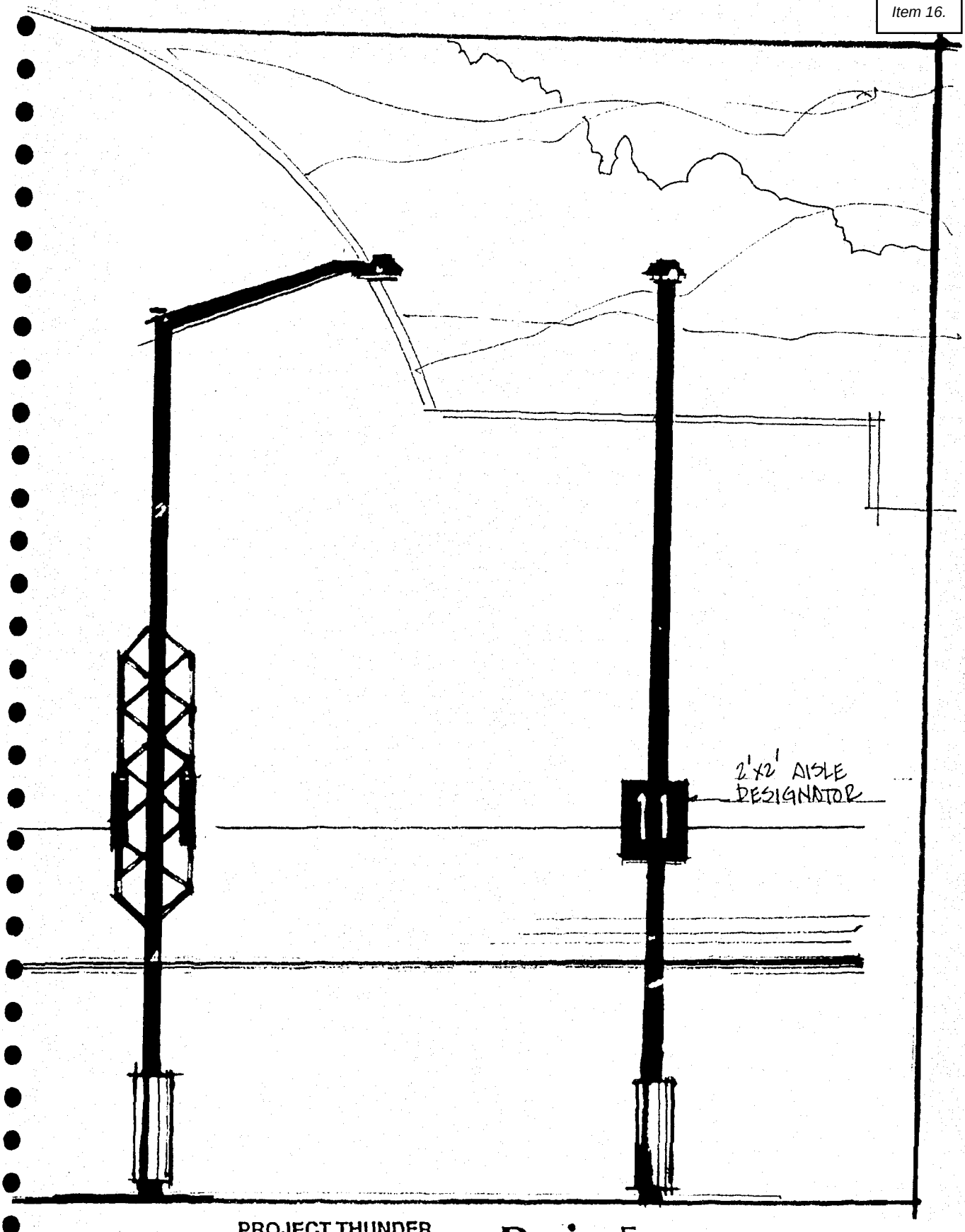
Deviation #1 from Phase I signage program for Wilsonville Town Center

We request this deviation from the approved program for the purpose of changing the method of construction for the 3 fascia signs (aggregate area approximate 81 SF) to be consistent with our design idiom. We feel our approach of a fascia panel type sign, back lit, cutout individual letters, appearing to be in a larger horizontal band to be of more benefit to this architectural design. Individual channel construction is not an appropriate usage in this application.

DEFECTS IN ORIGINAL DOCUMENT

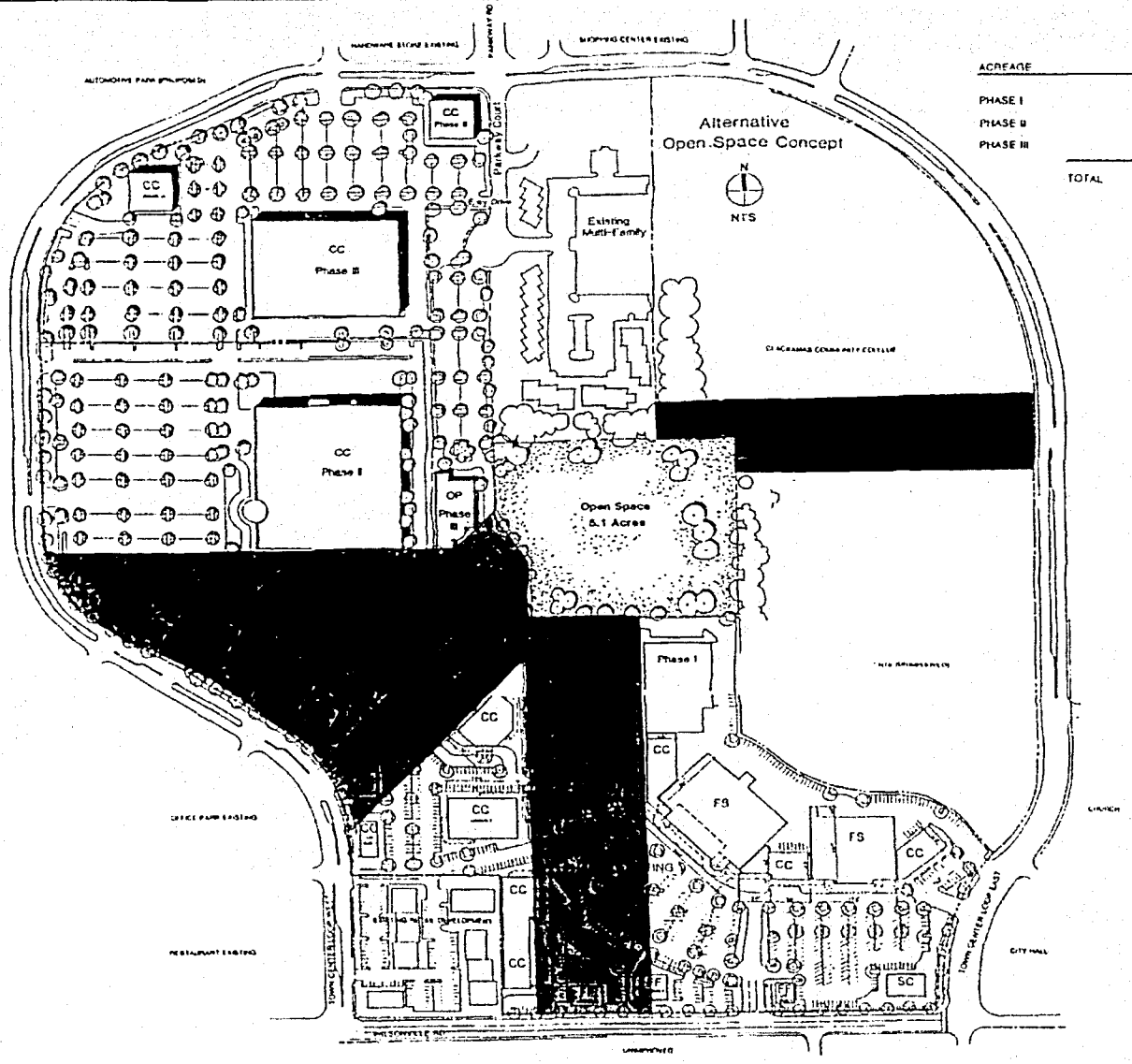




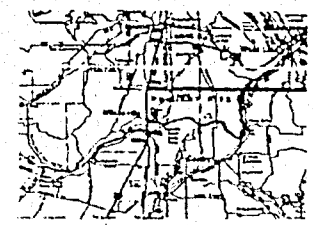


PROJECT THUNDER
Wilsonville, Oregon
Design Review Board
January 27, 1992 Meeting

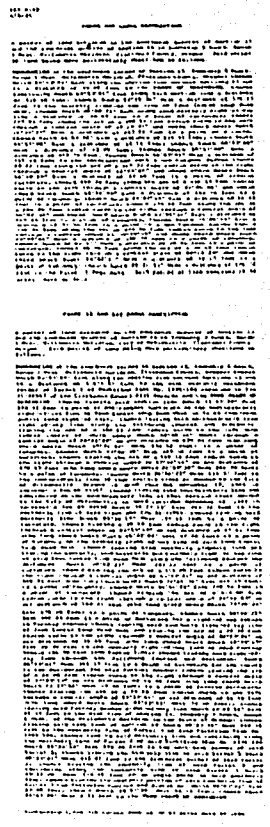
DesignForum
ARCHITECTS



ACREAGE	
PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



VICINITY MAP



SITE MASTER PLAN: PHASE I, II, & III

VIEW CORRIDOR CONCEPT

1-6-92

JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

1

3194

DesignForum

LETTER OF TRANSMITTAL

From: William F. Bergman, AIA
Design Forum
3484 Far Hills Avenue
Dayton, OH 45429

To: Mr. Blaise Edmonds
Associate Planner
City of Wilsonville
8445 S.W. Elligsen Road
Wilsonville, OR 97070

We are sending you:

- [ ] Prints
- [ ] Plans
- [ ] Estimates
- [ ] Shop Drawings
- [ ] Copy of letter
- [ ] Samples
- [ ] Comps Prototypes
- [ ] Photography
- [ ] Specifications
- [ ] Keylines
- [ ] Layouts

COPIES	DATE OR NO.	DESCRIPTION
2	10/28/91	Preliminary Prints of First Floor and Mezzanine Floor Plans

- [X] For your use
- [ ] For approval
- [X] As requested
- [ ] For review & comment
- [ ] Approved & noted
- [ ] Construction approval
- [ ] Returned for corrections
- [ ] Returned after loaned to us
- [ ] Return ____ corrected prints
- [ ] Submit ____ copies for ____
- [ ] Resubmit ____ copies for ____
- [ ] For bids due ____
- [ ] ____

Remarks:

Signed: William F. Bergman
William F. Bergman, AIA
Project Architect

Date: 10/28/91

cc: Rich Hollander
Marla

MEMORANDUM

TO: Development Review Team DATE: October 21, 1991

FROM: Blaise Edmonds, Associate Planner, City of Wilsonville.

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).
2. Office and warehouse, Liberty Organization, applicant.
3. Comprehensive plan amendment, Mr. Marvin Wagner, applicant.

Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

Blai

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

DATE: October 18, 1991

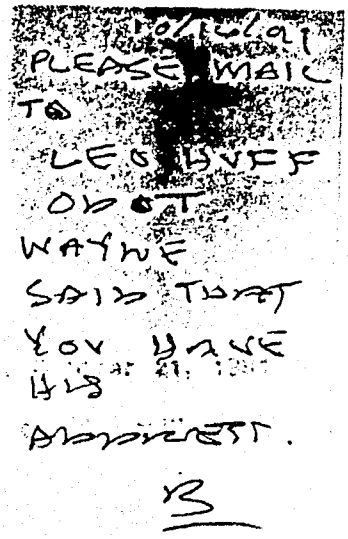
RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

Blaze—
I understand W&H says 150 cfs for Town Center to go into 48" culvert — is there more from other properties if so how does that affect park drainage — if not I think we need to make sure all info is available before abandoning on site retention — could keep a pool as a water feature for Town Center
Mike.
cc. Steve Shaner

(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services



MEMORANDUM

TO: Development Review Team DATE

FROM: Blaise Edmonds, Associate Planner, City

Please review the enclosed Site Development Plans for the following projects:

1. Thunder project (retail anchor store).

~~2. Office and warehouse, Liberty Organization, applicant.~~

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Your review should focus on the technical aspects required for development. In addition, please comment on any other issue that may affect approval as proposed.

Please submit written comments or requirements to the Planning staff by Nov 15, 1991, so that my review can be more complete.

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

TO: Blaze Edmonds, Associate Planner
City of Wilsonville

FROM: Rick Martin, P.E.
W&H Pacific

DATE: October 18, 1991

RE: Phase Two Development - Storm Drainage
Wilsonville Town Center

The Phase Two development will require the existing drainage detention pond be filled due to construction of required parking areas. It should be noted that drainage calculations completed for Phase One development took into account that the detention pond will be eliminated with future development in the proposed Phase Two area.

Final Phase Two development design will provide connections to the existing storm drain system currently terminating at the pond. Refer to the Phase Two Utility Plan submitted with this application.

(503) 227-0455 Fax (503) 274-4607 Planning • Engineering • Surveying • Landscape Architecture • Environmental Services

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1099 S.W. Columbia Street
Portland, Oregon 97201

(503) 227-0455
Fax (503) 274-4607

• Planning • Surveying • Environmental Services
• Engineering • Landscape Architecture

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop East
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 467-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:	These Are Transmitted:	Copied To:
☐ Attached	☒ For Your Info/File	
☒ Facsimile 682-7025	☐ As Requested	
3 Number Of Pages Including Cover	☒ For Review And Comment	
☐	☐	

Copies	Description
1 ea.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Signed Pam Jones

3200

W&H PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201

MEMORANDUM

October 15, 1991

TO: Kim Beach, Capital Realty Corp.
Bill Bergman, Design Form Architects
All in Attendance

FROM: Tom Jones

RE: MINUTES OF MEETING WITH THE CITY OF WILSONVILLE
OCTOBER 14, 1991, 4:00 P.M. TO 5:05 P.M.
PROJECT THUNDER
4-467-0301; 4-755-0101

ATTENDEES: Tom Jones, W&H Pacific
Rick Martin, W&H Pacific
Pat Marquis, W&H Pacific
Logan Cravens, JKS Architects
Blaise Edmonds, City Planner
Pam Emmons, Planning Assistant

The following was discussed regarding the project in preparation for the Friday, October 18th submittal.

STAGE ONE SUBMITTAL

1. The site plan prepared by JKS should show:
   a. Revised project phasing
   b. Open space area as previously shown as a condition of approval from initial submittal.
   c. Specific "Town Center" land use designations must be shown for the northerly portion of the site not previously included and for any changed designations from the original submittal for Phases II and III.

2. Submit ten (10) copies of the original Traffic Report and provide an Executive Summary outlining any revisions to the initial projections and provide a summary that addresses the level of service "D" or better at surrounding intersections. Review the Parkway/Loop Road intersection.

3. Show existing adjacent land uses (i.e., vacant or improved) and the names of key surrounding developments for the Planning Commission orientation. Show only existing improvements not proposed.

4. Capital Realty must provide an updated list of addresses and property owners within 250 feet from the project.

5. Capital Realty must submit the Certification of Assessments and Liens form with the application. This is to determine if the tax lots included owe money to the City. Contact Atta Curser for clarification.

6. All property owners must sign the application.

7. Application fees:
   a. Stage One Submittal: $500.00
   b. Stage Two Submittal: $250.00 plus $25 per acre (Project Thunder is 14.98 acres)
   c. Application fee for Friday: ($500 + $250 + $375 = $1,125)
   d. Design Review: $250 plus a fee for the master signage plan review.

STAGE TWO SUBMITTAL

1. Design of site signs are not required to be submitted until Design Review submittal of December 6th.

2. Landscape design needs to show planting areas, significant trees and plaza areas. Plant list is optional.

3. Grading calculations and storm drainage calculations are not required for Friday's submiual according to Blaise. Grading plan should show existing contours and general grading concept.

4. Utilities design should be kept schematic. Graphically illustrate the utility alignments that will require easement vacations and relocation.

5. Architectural elevations can be conceptual in detail. Planning Commission is only concerned with general massing and quality of appearance. Materials and color board to be submitted at Design Review.

6. If waivers to the City development standards are anticipated, be specific with your request and how it would be consistent with other surrounding project development standards.

GENERAL COMMENT

The two issues that will be of the most interest to the Planning Commission will be traffic and the implementation of the open space. We should develop a clear strategy to present to the Commission prior to the December 9th hearing addressing these two issues.

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

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Portland, Oregon 97201
(503) 227-0455
Fax (503) 274-4607
• Planning
• Engineering
• Surveying
• Landscape Architecture
• Environmental Services

FAXED 10/17/91

Item 16.

To: Blaise Edmonds
Pam Emmons
City of Wilsonville, Annex
30000 SW Town Center Loop ~~EAST~~
Wilsonville, OR. 97070

Date: 10/16/91
Project Number: 967-6301
Project Name: PROJECT THUNDER
Regarding:

PLEASE NOTIFY US IMMEDIATELY AT (503) 227-0455 IF THERE ARE ANY PROBLEMS RECEIVING THIS TRANSMISSION

We Are Sending:
- ☐ Attached
- ☒ Facsimile 682-7025
- 3 Number Of Pages Including Cover

These Are Transmitted:
- ☒ For Your Info/File
- As Requested
- ☒ For Review And Comment

Copied To:

Copies	Description
1 es.	Minutes of 10/14/91 Meeting

Comments

Blaise & Pam

We'll see ya tomorrow w/13 FOLDED sets of drawings ...

Please call if you have any questions during the review/application acceptance. This submittal date & scheduling of hearings is vitally important ... Thanks

Pam Jones

Signed

3203

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

In Attendance:

Pam Emmons	City of Wilsonville, Associate Planner	WSV	503-682-4960
Martin Brown	City of Wilsonville, Building Official	WSV	503-682-4960
Steven Starner	City of Wilsonville, Community Development Dir.	WSV	503-682-4960
Jim Long	City of Wilsonville, Design & Survey Technician	WSV	503-682-4960
Doug Seely	Real Estate Investment and Sales	REI	503-655-7631
Jim Parsons	Grubb & Ellis	GEI	503-241-1155
Jim Faulkner	Design Forum Architects	DFA	800-835-4401

Item No.	Action	Item
1.10	CAP/WHP	Storm drainage is an issue. Calculations and 25 year storm design for Phase II master plan must be submitted with application by October 18, 1991 deadline. The connection for metered release to interstate highway from existing retention pond and the retention pond itself will be eliminated. According to Wayne Bauer of Wilsey & Ham Pacific, Civil Engineers for Phase I development of the site, the new storm sewer system was designed to accommodate this. The city would like to see calculations supporting this.
1.2	CAP/KAI	According to the city, a traffic light at Wilsonville Road and Town Center Loop West is now warranted. The north intersection at Town Center Loop East and West at Parkway Avenue needs to be addressed in traffic study.
1.3	DFA	The currently approved master plan calls for "Food and Sundries" (FS) and "Central Commercial" (CC). These zoned uses are compatible with the desired development of Project Thunder. No rezoning is necessary, however, currently approved uses will have to be redistributed on the site.

3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400 Fax: (513) 294-2842

DesignForum
ARCHITECTS

Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.4	ALL	The Stage I and Stage II planning review applications will be made simultaneously on October 8, 1991, and be reviewed simultaneously at the Planning Commission on December 9, 1991.
1.5	GEI	Hearing notification list for all property owners of record within 250 foot of any point on property (not including street widths) must be presented with October 18, 1991 submittal. Notification does not have to cross interstate highway. The city will send the notices. Jim Parsons will obtain list from assessors office or from a title company.
1.6	DFA	The signage theme from Phase I should be carried through Phase II. Sign issues are handled by the Design Review Board. Setback issues are handled by the Planning Commission.
1.7	DFA/WHP	The building is designed utilizing the "unlimited area" provision of the code. A sixty (60) foot minimum distance from all property lines and an approved automatic sprinkler system throughout will be provided to accommodate this provision.
1.8	TNB	There is a ten (10) day appeal period following design review approval. Normal procedure is such that no work should be commenced during the appeal period. Due to the tight schedule for this project and the need to utilize every available good weather period for site escavation, an option for work during the appeal period was discussed. A "hold harmless" agreement from owner in favor of the City of Wilsonville, enabling work to start immediately after design review approval during the appeal period at the sole risk of the owner has been used in the past to facilitate an early start.

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Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

1.9	WHP	For any construction to begin, fire hydrants must be installed to within 250 feet of any point of the exterior wall of the building. Work should begin immediately to obtain Public Works approval and have installation complete by scheduled start of construction, February 1, 1992.
1.10	ALL	The required completion date of construction necessitates a start date for construction of February 1, 1992. For this to happen, working drawings and specifications would have to be accomplished prior to design review hearing date of January 27, 1992. To minimize risk of changes to completed documents, a partial permit (foundation permit) can be applied for at a cost of $250.00. This would allow work to begin while balance of documents are being prepared. The review time for foundation and underground utilities permit is approximately three weeks, so documents should be submitted by January 10, 1992 for a February 1, 1992 start of construction.
1.11	DFA	The zoning height limitation for any point of the building is 35'-0". Design Forum will check with Blaise Edmonds regarding height of dome feature with center pole.
1.12	DFA	Elevations and material, color and finish boards must be submitted with Design Review Board application by December 6, 1991 deadline for hearing date of January 27, 1992.

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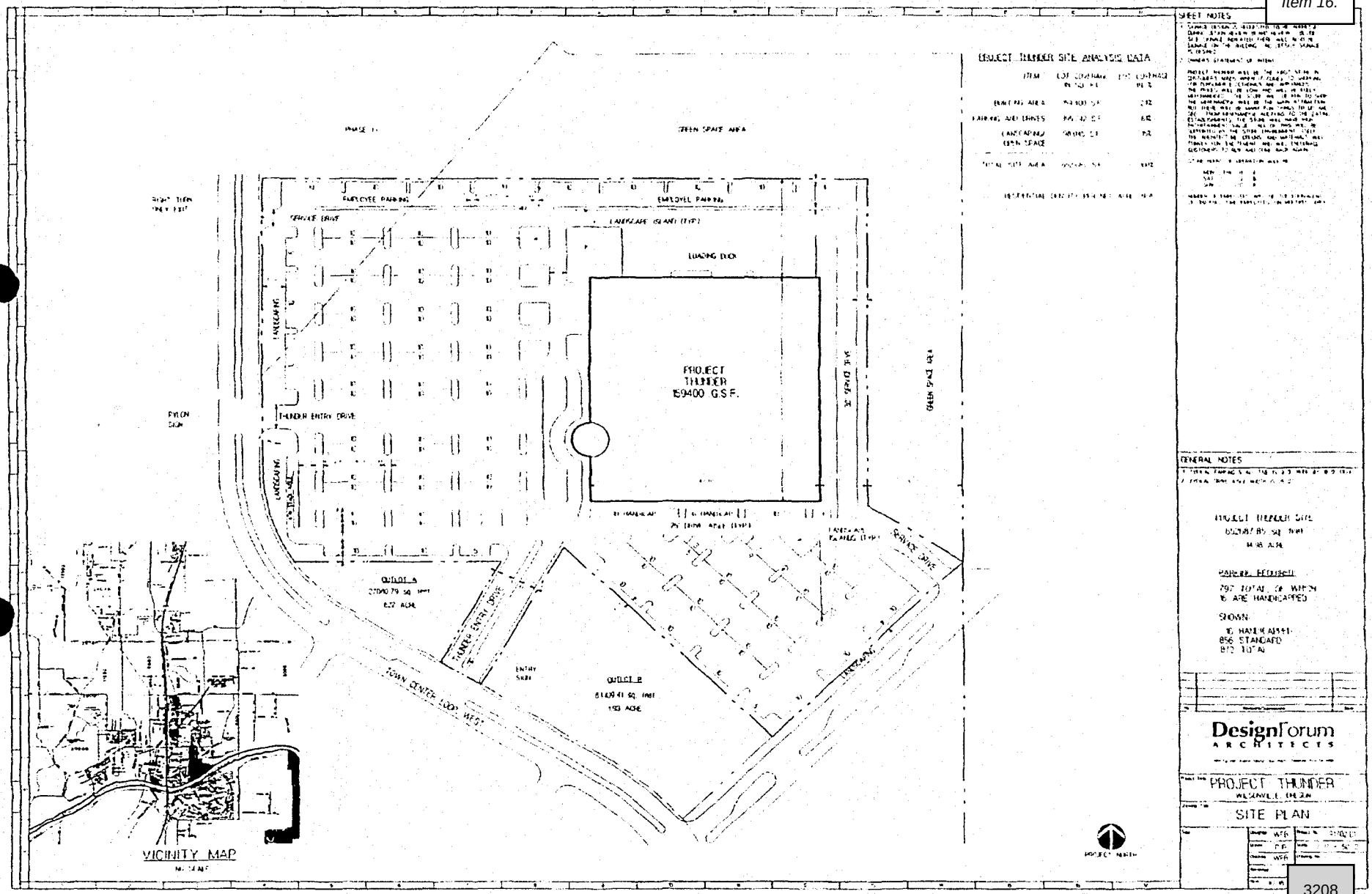
Project Thunder
Wilsonville, Oregon
Project No. 91702.03
Pre-Application Conference
October 8, 1991

The meeting notes represent comments that have been paraphrased as accurately as possible. The notes will be held as an accurate and true account as to intent unless notice to the contrary is set forth within 10 days of the date above.

Respectfully submitted,

James L. Faulkner, AIA
Vice President, Architecture

cc: All in Attendance
Rich Hollander, Tandy Name Brand (TNB)
Blaise Edmonds, City of Wilsonville, Associate Planner (WSV)
Kimberly Beach, Capital Realty Corporation (CAP)
Tom Jones, Wilsy & Ham Pacific (WHP)
Wayne Kittelson, Kittelson & Associates, Inc. (KAI)
D. Lee Carpenter, Design Forum
Bruce Dybvad, Design Forum
Marla Halley, Design Forum
Bill Bergman, Design Forum Architects


PROJECT THUNDER
159400 G.S.F.
EMPLOYEE PARKING
SERVICE DRIVE
LANDSCAPE ISLAND (TYP.)
LOADING DOCK
LANDSCAPING
THUNDER ENTRY DRIVE
PYLON SIGN
OUTLOT A
27040.79 SQ. FEET
0.62 ACRE
OUTLOT B
81409.41 SQ. FEET
1.93 ACRE
TOWN CENTER LOOP WEST
ENTRY SIGN
GREEN SPACE AREA
PROJECT THUNDER SITE ANALYSIS DATA
ITEM
LOT COVERAGE IN SQ. FT.
LOT COVERAGE IN %
BUILDING AREA
PARKING AND DRIVES
LANDSCAPING / OPEN SPACE
TOTAL LOT AREA
SHEET NOTES
GENERAL NOTES
PROJECT THUNDER SITE
PARKING REQUIRED
797 TOTAL, 28 WHICH 16 ARE HANDICAPPED
SHOWN:
16 HANDICAPPED
856 STANDARD
872 TOTAL
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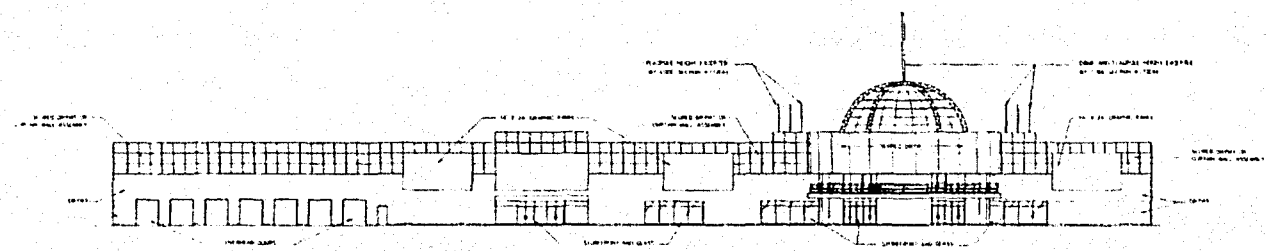
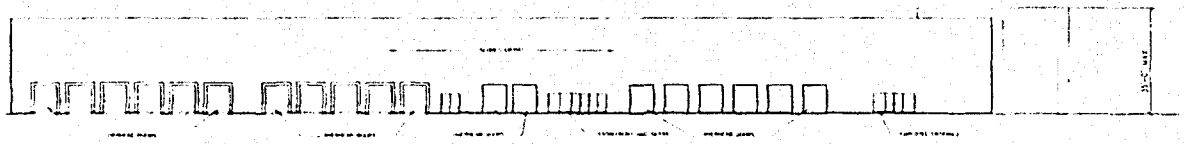
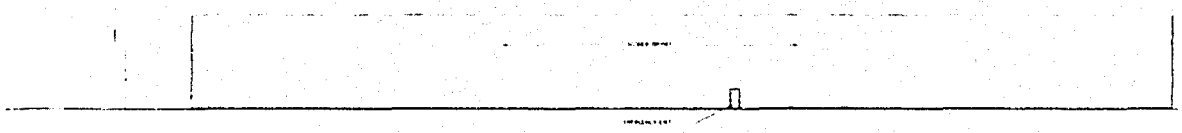
ARCHITECTS
PROJECT THUNDER
WILSONVILLE, OREGON
SITE PLAN
VICINITY MAP
NO SCALE
PROJECT NORTH







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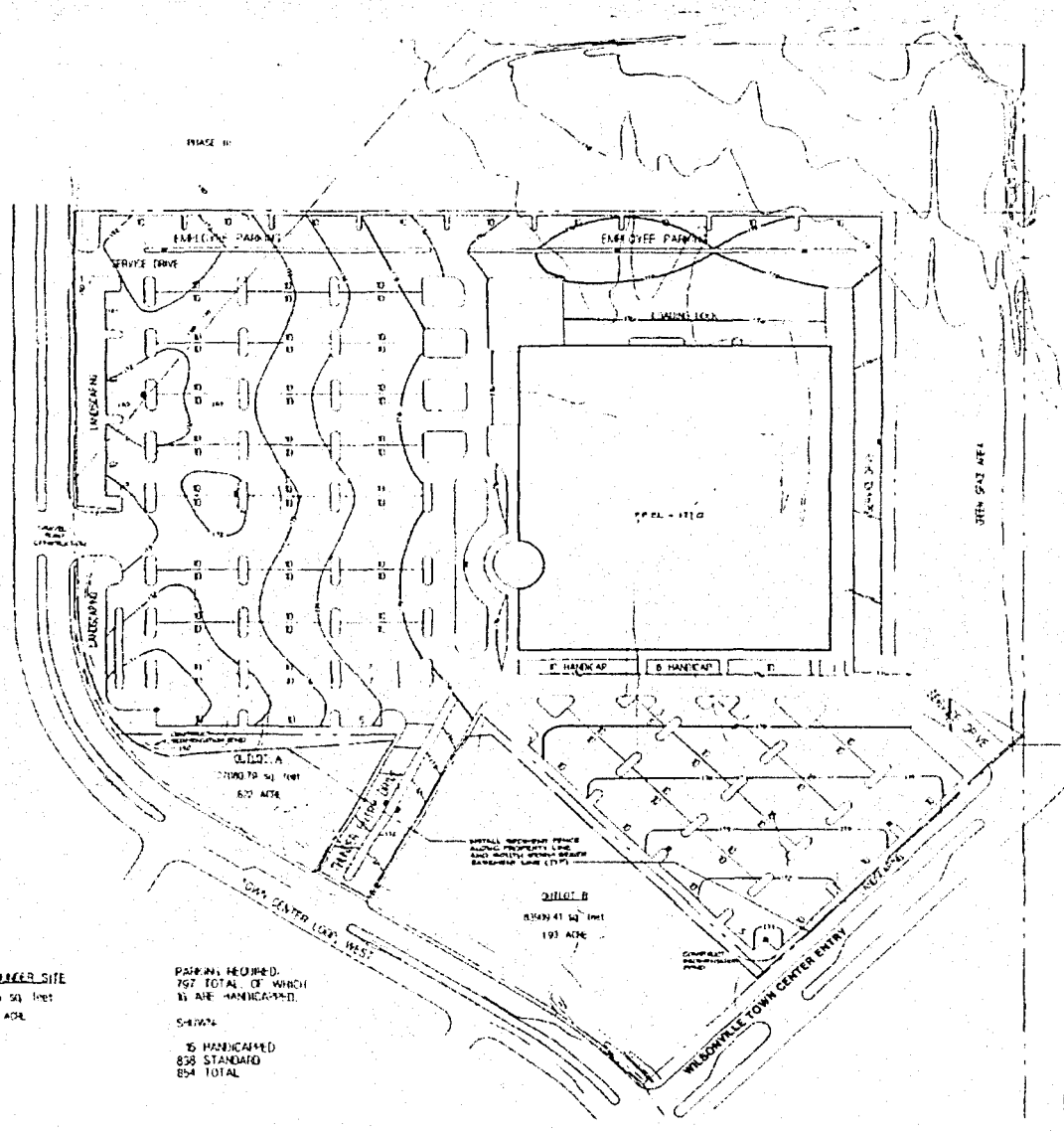
ARCHITECTS

PROJECT THUNDER
MCMINNVILLE, OREGON

EXTERIOR ELEVATIONS

3209



SHEET NOTES

GENERAL NOTES

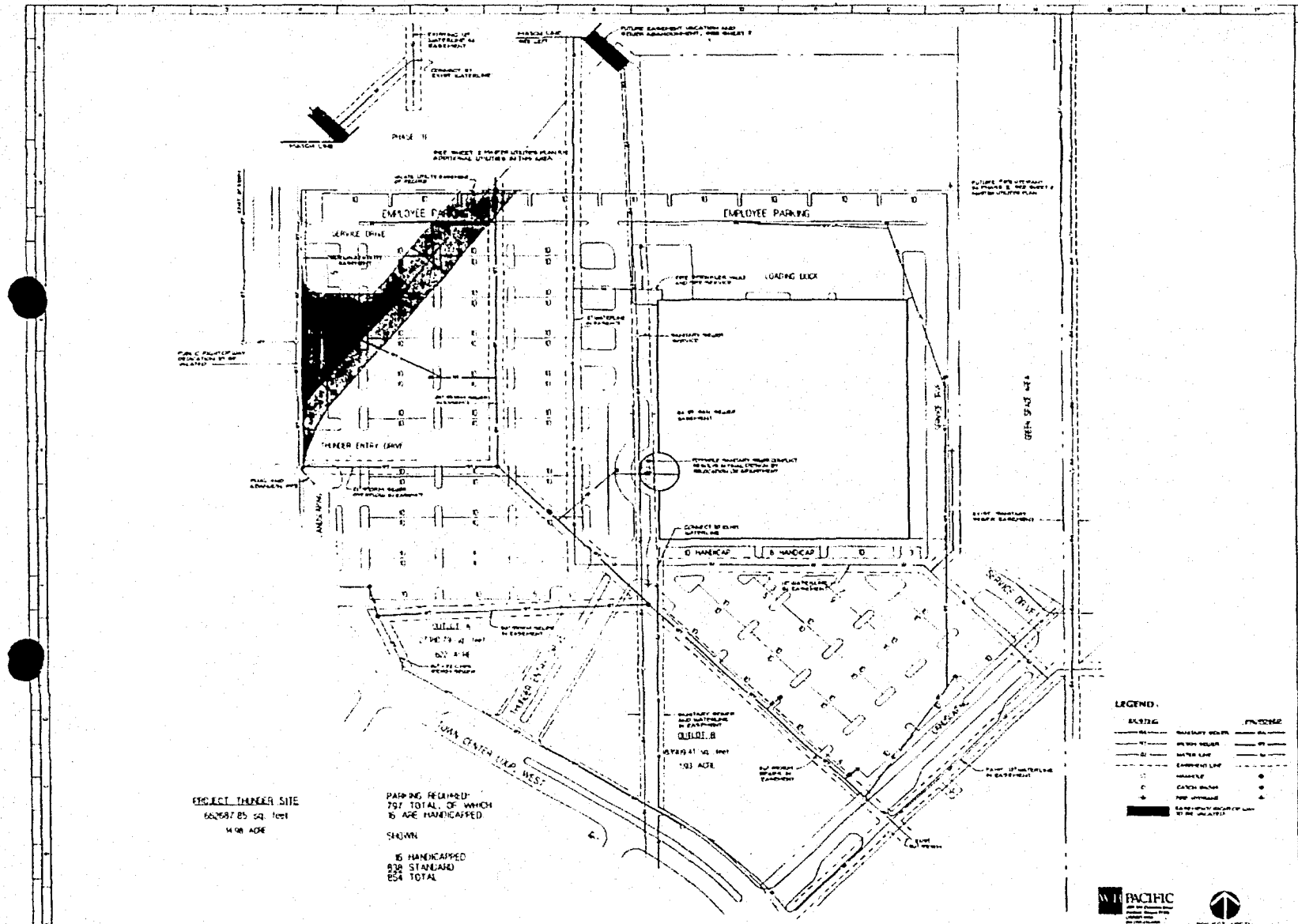
DesignForum ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II GRADING/EROSION CONTROL PLAN

1" = 50'-0"

3210



SHEET NOTES

GENERAL NOTES

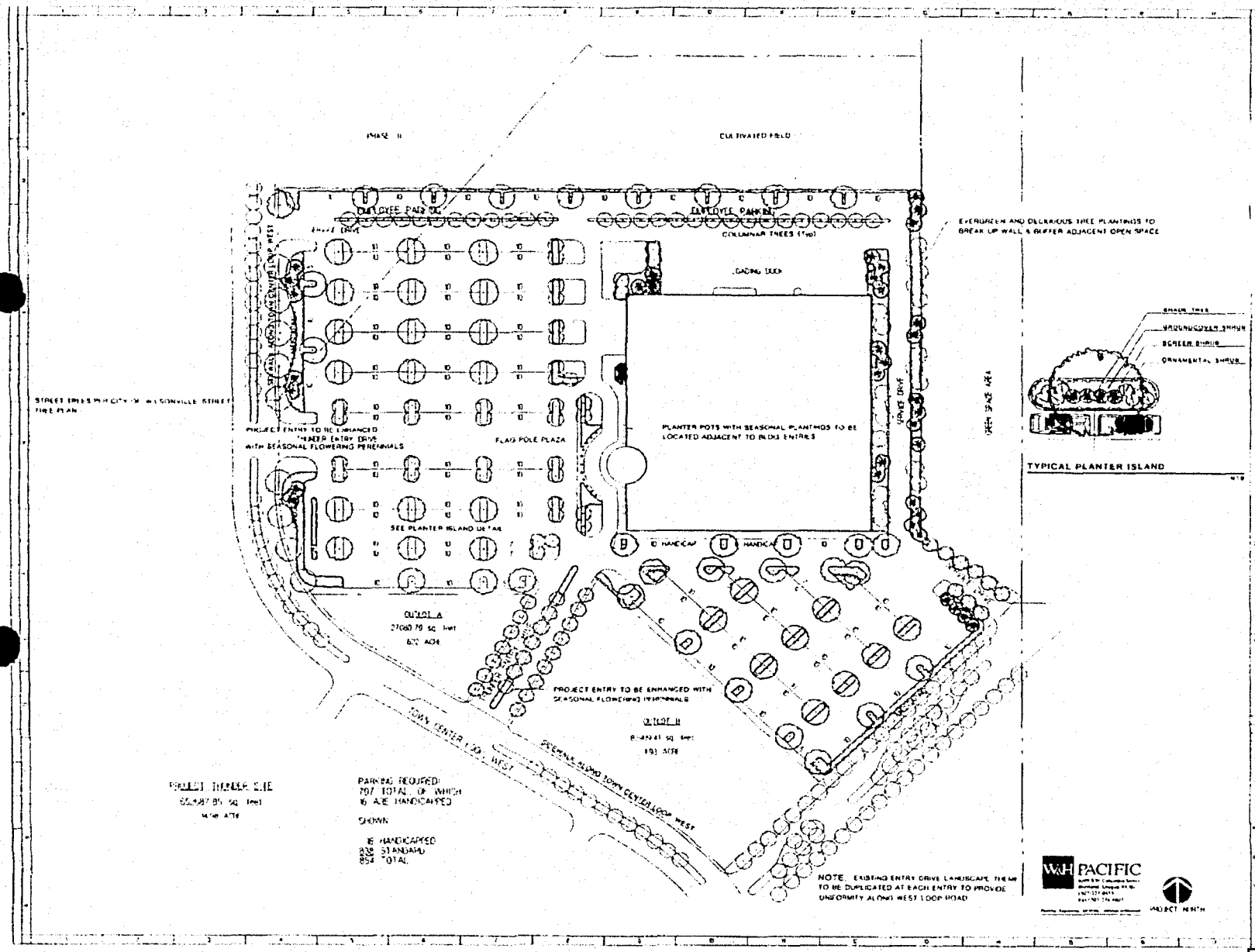
Key Plan

DesignForum ARCHITECTS

PROJECT THUNDER
WILSONVILLE, OREGON

PHASE II UTILITIES PLAN

3211



TYPICAL PLANTER ISLAND

LEGEND

- SHADE TREES
- FLOWERING TREES
- EVERGREEN CONIFER TREES
- ORNAMENTAL LANDSCAPE SHRUBS & GROUNDCOVER
- LAWN
- EXISTING STREET TREES

GENERAL NOTES

- AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED

DesignForum ARCHITECTS

PROJECT TUNNEL
WILSONVILLE, OREGON

PHASE II LANDSCAPE PLAN

W&H PACIFIC

ASSIGNMENT

FOR VALUABLE CONSIDERATION, receipt and sufficiency of which are hereby acknowledged, SFS INVESTMENT CORP., an Oregon corporation (Assignor), hereby assigns, transfers and conveys to CAPITAL REALTY CORP., an Oregon corporation (Assignee), all of Assignor's right, title and interest in each option agreement, offer and other document described in Exhibit A attached hereto, the real property described in any such option agreement or offer, and all rights which Assignor now has or may hereafter acquire with respect thereto.

February 1, 1990.

SFS INVESTMENT CORP.

By _____
President

STATE OF OREGON)
) ss.
County of Multnomah)

On this 1st day of February, 1990, before me personally appeared Steven F. Stiles who, being duly sworn, did say that he is the president of SFS INVESTMENT CORP., an Oregon corporation, and acknowledged that the foregoing instrument was executed on behalf of the corporation by authority of its board of directors as its voluntary act and deed.

Before me:

_____
NOTARY PUBLIC for Oregon
My Commission Expires 10/31/92

AGREEMENT AND OPTION

THIS AGREEMENT AND OPTION is between E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as Marlene A. Young Rifai, the Estate of Harold J. Laswell, Deceased, and FRED A. ANDERSON, hereinafter collectively referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-14D, are E. Jean Young, Sherilyn J. Young, David S. Young, Marlene A. Young, also known as Marlene A. Young Rifai, and Jack L. Lozo.

B. The owner of Parcel II, i.e. tax lot 300, MAP 3-1W-14D is Jack L. Lozo.

C. Grantee has options to purchase Parcel I and II by documents respectively dated August 17, 1989 and August 23, 1989; said options are valid through December 21, 1989.

D. Grantor's offer to option Parcel III is contingent upon Grantee's obtaining extensions of the options to purchase Parcel I and II.

E. Grantors own Parcel III, i.e. Tax Lot 200, 300 & 401, Clackamas County MAP 3-1W-14D and ownership interests in a triangle of land approximately 6381 square feet on the west of Tax Lot 200 , described in Exhibit A. Parcel III shall refer to the

be made in full upon closing and a statutory warrenty deed provided at that time.

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

~~ion.~~ The Option to purchase Phase 2 in its enti er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel III unless Grantees pay to Grantors $50,000 for an extension of the Option for one year. Payment for such extension is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or be[illegible]vember 2, 1992, at the purchase price of ent on an additional $50,000, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantor's name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors prior to formal application to the City of Wilsonville. Grantors shall retain the right of review during the planning process with the City,

Grantee may not agree to any request to increase the Open Space requirements on any Phase of any Parcel.

11. Real Property Taxes. The Option Property has been specifically assessed as Farm Use Land. Therefore, portions of the annual taxes are deferred until the Option Property becomes disqualified for that purpose. If Grantee exercises the Option as

preliminary agreements. This Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 31 day of October, 1989.

E. Jean Young
E. JEAN YOUNG

SFS INVESTMENT CORP.

11-8-89

SHERILYNN J. YOUNG

By _____
SFS President
Steven F. Styles

David S. Young
DAVID S. YOUNG

SFS INVESTMENT CORP.

Marlene A. Young
by _____, attorney in fact
MARLENE A. YOUNG

By _____
SFS Officer

ESTATE OF HAROLD J. LASWELL
DECEASED

GRANTEES

By _____
Emma D. Laswell
Personal Representative

By _____
Eugene L. Deffler
Personal Representative

_____
FRED A. ANDERSON

GRANTORS

ST IDES PROPERTIES LTD.
by _____

EXHIBIT A

I
Wilsonville Property

Option dated November 16, 1989 granted by Jack L. Lozo for property generally known as Tax Lot 500, Map 3-1W-13, Clackamas County, Oregon.

Agreement and Option dated October 31, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Estate of Harold J. Laswell, Deceased, and Fred A. Anderson for property generally known as Tax Lots 200, 300 and 405, Map 3-1W-14D, Clackamas County, Oregon, togther with a triangular parcel containing approximately 6,381 square feet on the westerly side of Tax Lot 200.

Option dated November 15, 1989 from E. Jean Young, Sherilynn J. Young, David S. Young, Marlene A. Young, Jack L. Lozo, and Anne S. Lozo, Trustee for Claude F. Smith Trust, for property generally known as Tax Lots 600 and 601, Map 3-1W-13, Clackamas County, Oregon.

Attached hereto is a plot map showing the general location of the three parcels.

II
Gresham Property

Earnest Money Agreement dated August 1, 1989, amended by Memorandum of Agreement dated September 20, 1989, with Leonard P. Holfman and Kenneth G. Holfman, Trustees of the Olive H. Holfman 1979 Trust dated May 7, 1979, for the purchase of a tract of land in the Robert P. Wilmot DLC and being Sections 19 and 30, Township 1 North, Range 3 East of the Willamette Meridian, Multnomah County, Oregon (Tax Lot #32), containing approximately 21.3 acres on the north side of N. E. Sandy Boulevard west of Northeast 181st Avenue.

III
Salem Property

Offer dated November 1, 1989, accepted by Anita Hager Conley, Trustee, on November 29, 1989, for a parcel containing approximately 9.38 acres in the southwest quarter of Section 31, Township 7 South, Range 2 West, known as Tax Lot 200, Salem, Marion County, Oregon.

AGREEMENT AND OPTION

PARCEL II

THIS AGREEMENT AND OPTION is between JACK L. LOZO, hereinafter referred to as Grantors, and SFS INVESTMENT CORP., an Oregon corporation, hereinafter referred to as Grantee.

RECITALS

A. The owners of Parcel I, i.e. tax lot 600 & 601, MAP 3-1W-13, are E. JEAN YOUNG, SHERILYN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, JACK L. LOZO, and the CLAUDE F. SMITH TRUST, ANN S. LOZO Trustee.

B. The owner of Parcel III, i.e. tax lot 200, 300 & 405, Clackamas County MAP 3-1W-14D and a triangle of land approximately 6,381 square feet on the west of tax lot 200 are E. JEAN YOUNG, SHERILYNN J. YOUNG, DAVID S. YOUNG, MARLENE A. YOUNG, also known as MARLENE A. YOUNG RIFAI, the estate of HAROLD J. LASWELL, Deceased, and FRED A. ANDERSON.

C. Grantors own Parcel II, i.e. Tax Lot 500, MAP 3-1W-13. Parcel II shall also be referred to as the Option property.

D. Grantee has options to purchase Parcel I & II by documents dated August 17, 1989 and August 23, 1989, said options are valid through December 31, 1989.

E. Grantors' offer to option Parcel II is contingent upon Grantee's obtaining an extension of the option to purchase Parcel

3.4 Notice of Intent to Close must be given at least 15 days before closing. In any event notice of intent to close must be received by October 2, 1990 or the terms of this Option shall be Null and Void.

With notice of intent to close, Grantee shall specify which Phases are to be purchased in closing and changes, if any, in the boundaries of the Phases referencing the survey, to be completed as specified below, the written legal descriptions and acreage/footage specifications.

4. Extension. The Option to purchase Phase 1b and 2 in its ent er square foot shall terminate on July 16, 1990 or at closing of sale of any portion of Parcel II unless Grantee pays to Grantors $5,000 for an extension of the Option to purchase Phase 1b property, ~~and pays to Grantor an additional $5,000 for an extension of the Option to purchase Phase 2 property if owned by Grantors~~. Payment for such extension shall be for one year, is nonrefundable and not applicable to the purchase price.

If the above extension of Option is purchased, Grantee may purchase further extension of the Option providing that any sale must close on or before November 2, 199 at the purchase price of payment on an additional $5,000, s, nonrefundable and not applicable

In event of such extensions, notice of intent to close shall be provided not less than 15 days before closing, and closing shall occur not more than 30 days thereafter. A Statutory

authority to grant the Option and to sell their interest in the Option Property in accordance herewith.

7. Reciprocal Easements: Grantors and Grantee agree that each will enter into reciprocal easements with the owners of Parcels I and III as agreed upon by the parties.

8. Right of Entry. Grantee may, at its risk and expense during the term of the Option, enter upon the Option Property at any time to make engineering tests, soil tests and for any other lawful purpose in pursuit of the purchase and development of said property. Grantee may, at its expense, make such grading plans, architectural and land planning studies and services, traffic engineering studies, economic and commercial benefit studies, and other surveys, services and studies which it deems reasonably necessary for its development of the Option Property.

9. Land Use Applications. Grantors agree to cooperate fully with Grantee in making all applications which Grantee deems necessary for Grantee's use and development of the Option Property, including but not limited to site plan approval, partition and other land use determinations which relate to Grantee's use and development of the property.

Grantors authorize Grantee to execute any such application in Grantors' name and as Grantors' representative. Grantee shall pay all expenses relating to any such application. Grantors shall bear no expense associated herewith.

10. Land use changes such as but not limited to size and location of Open Space and roads shall be presented to Grantors

the entire agreement among the parties with respect to the subject matter hereof, superseding all negotiations, prior discussions and preliminary agreements. This Agreement and Option may not be changed except in writing, executed by both parties.

IN WITNESS WHEREOF, the parties have executed this Option this 11th day of November, 1989.

JACK L. LOZO

ANN S. LOZO, Trustee for
CLAUDE F. SMITH TRUST

GRANTORS

SFS INVESTMENT CORP.

By _____
SFS President
Steven F. Stiles

SFS INVESTMENT CORP.

By _____
SFS Officer

GRANTEES

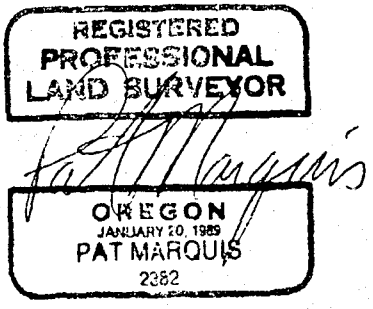
PROJECT THUNDER LEGAL DESCRIPTION

A parcel of land situated in the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southeast corner of Section 14, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon: thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**: thence leaving said section line and tracing the following courses and distances: South 45°03'00" West 400.00 feet; thence North 44°57'00" West 435.01 feet to a point of non-tangent curvature; thence tracing the arc of a 2,000.00 foot radius curve to the right (the radial center of which bears North 65°07'50" West) through a central angle of 07°23'12" an arc distance of 257.84 feet (the long chord bears South 28°33'46" West 257.66 feet) to the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line North 57°44'38" West 72.00 feet to a point of radial intersection with a 1,928.00 foot radius curve; thence leaving said northeasterly right-of-way line and tracing the arc of a 1,928.00 foot radius curve to the left through a central angle of 05°32'12" an arc distance of 186.31 feet (the long chord bears North 29°29'16" East 186.23 feet); thence South 89°52'55" West 304.91 feet to a point of non-tangent curvature on the said northeasterly right-of-way line of Town Center Loop Road West; thence tracing said right-of-way line along a 268.16 foot radius curve to the right (the radial center bears North 56°01'43" East) through a central angle of 33°55'55" an arc distance of 158.81 feet (the long chord bears North 17°00'19" West 156.50 feet) to a point of tangency; thence continuing along said right-of-way line North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing said right-of-way line North 00°02'22" West 121.76 feet; thence leaving said right-of way line and tracing the following

courses and distances: North 89°52'55" East 894.39 feet to a line being parallel with and 140.00 feet westerly of the said section line common to sections 13 and 14; thence tracing said parallel line South 00°03'01" West 528.73 feet; thence South 56°23'33" East 168.00 feet to the **TRUE POINT OF BEGINNING**. Said parcel contains 642,427 square feet or 14.75 acres more or less.

755-0101
10/16/91



Jim Parsons
Jim Faulkner
Doug Seely

Phase
~~Stage~~ I, II, III → Cap. Realty will submit

Phase II →
Cap. Realty △ master plan modification
Site plan I, II

Landy - Thunder 120+ thou ☐ footprint
Electronics +

Parkway / TC (E) + (W)

~~Park~~ → Open Space.

Submit Stage I + II ~~Simultaneously~~

Blaise
what else?

* Gave Stage I + II + application x2
250' radius map owners

Topo - 1' intervals - (map has readings)

~~Blaise - 50' top dam~~

Ø phase

CITY

100 - 120 DWELLING UNITS.

- DOUG SEELY TALKED TO BOB DANT -
- ABOUT DENSITY TRANSFER TO BRIDGE CREEK.
- P.O.S.

- CONTOUR SURVEY - 20'
- TREE SURVEY
  >6" caliper
- MAJOR DRAINAGEWAY.

STAKE THE PROPERTY - SITE VISIT TO VERIFY P.O.S LINE - AMBIGUITY - GO TO P.C TO C.C. FOR INTERPRETATION.

~~CALC. MINE - 120 ONLY~~

CITY of WILSONVILLE
PLANNING COMMISSION
SITE MASTER PLAN (STAGE I)
GENERAL SUBMISSION REQUIREMENTS

1. Completed application form, with appropriate fee, signed by property owner.
2. Set forth the professional coordinator and professional design team.
3. State whether the development will include mixed land uses, and if so, what uses and in what proportions and locations.
4. The application shall include conceptual and quantitatively accurate representation of the entire development sufficient to judge the scope, size and impact of the development on the community; and, in addition, shall be accommodated be the following information:

   13 FOLDED copies of Site Master Plan dimensioned at a scale of 1" = 20 ft. (or as determined by the Planning Director) showing the following:

   a. Vicinity map.
   b. The entire lot as described by the legal description.
   c. Location and size if all public facilities, utilities and easements.
   d. Location and dimension of site improvements such as roads, buildings, driveways, parking, loading and landscaping.
   e. All adjacent rights-of-way and improvements.
   f. Any surrounding development, i.e., existing buildings, property lines, driveways, etc.
   g. Development phasing. A stage development schedule demonstrating that the developer intends to commence construction within (1) One year after the approval of the development plan, and will proceed diligently to completion.
   h. Topographic information at one-foot intervals up to 5% slope; two-foot intervals, 6% - 12%; five-foot intervals. 12% - 20%; ten-foot intervals, 20% and above.

5. One copy of Site Plan reduced to 8-1/2" x 11". This must be a legible photo-mechanical transfer (PMT).
6. Site Analysis Data.

Item	Lot Coverage in sq. ft.	Lot Coverage in %.
Building area	458,771 sq. ft.	.18 %
Parking and Drives	1,394,390 sq. ft.	.53 %
Landscaping/Open Space	751,291.4 sq. ft.	.29 %
Residential density per net acreage.		
TOTAL SITE AREA	2,604,452.4 sq. ft. 59.79 ACRES	100 %

Planning Department 682-4960

INCOMPLETE SUBMITTALS WILL NOT BE SCHEDULED FOR A PUBLIC MEETING !

Traffic count zooms at electronic store

■ Wilsonville's projections for vehicle flow at the Incredible Universe fall woefully short

By JOHN M. GRUND
Correspondent, The Oregonian

WILSONVILLE — When it comes to predicting how much traffic a new development will bring, Wilsonville officials always have gone by the book.

But going by the book has not worked for some recently opened projects — in particular the Incredible Universe electronics store. In some cases, traffic is already at levels predicted for 2010.

Now city officials are looking at ways to refine the city's traffic projections.

Eldon Johansen, community development director, told the City Council early this month that traffic on Town Center Loop West near the new electronics store is averaging 1,227 vehicles an hour northbound at 2 p.m. That's 550 more vehicles per hour than anticipated in projections for 1995, he said.

"As far as the traffic counts go, we've had a real eye-opener on our traffic projections. We're already up past (the year) 2010 on some of our traffic projections," Johansen said.

"The traffic analysis prepared by Capital Realty and the Incredible Universe's traffic consultants, Kittelson and Associates, has greatly underestimated the traffic impacts," said Arlene Loble, city manager.

The city has changed its procedure for getting traffic analysis done on proposed developments. This fall, it switched from having a developer hire a traffic engineering firm to requiring applicants to pay for a study by D.K.S. Associates, the firm chosen by the city to handle all of its traffic analysis.

Planning Director Wayne Sorensen said the move should not be interpreted as a criticism of the firms that have done studies in the past. All of them, in fact, bid on the city contract, he said.

"I think we feel better now (that) the traffic engineer is working for the city," he said. "When the applicant hires the engineer, they're working for the client, and the city's not the client."

Johansen said the city also would expand the scope of some studies.

The Incredible Universe study analyzed traffic flows through the adjoining intersection, at Town Center Loop West and Wilsonville Road. But it did not reach to the next intersection to the west, at Wilsonville Road and Interstate 5.

It was that intersection that clogged up at the Incredible Universe opening Sept. 17 and caused traffic to back up for miles in both directions.

If the study were being done today, the city would insist that engineers look at one more intersection down the road, Johansen said.

City Councilor Greg Carter asked if the traffic effects of some recent developments meant that the city should consider a moratorium on some new construction.

"I'm not willing to say that yet," Johansen said.

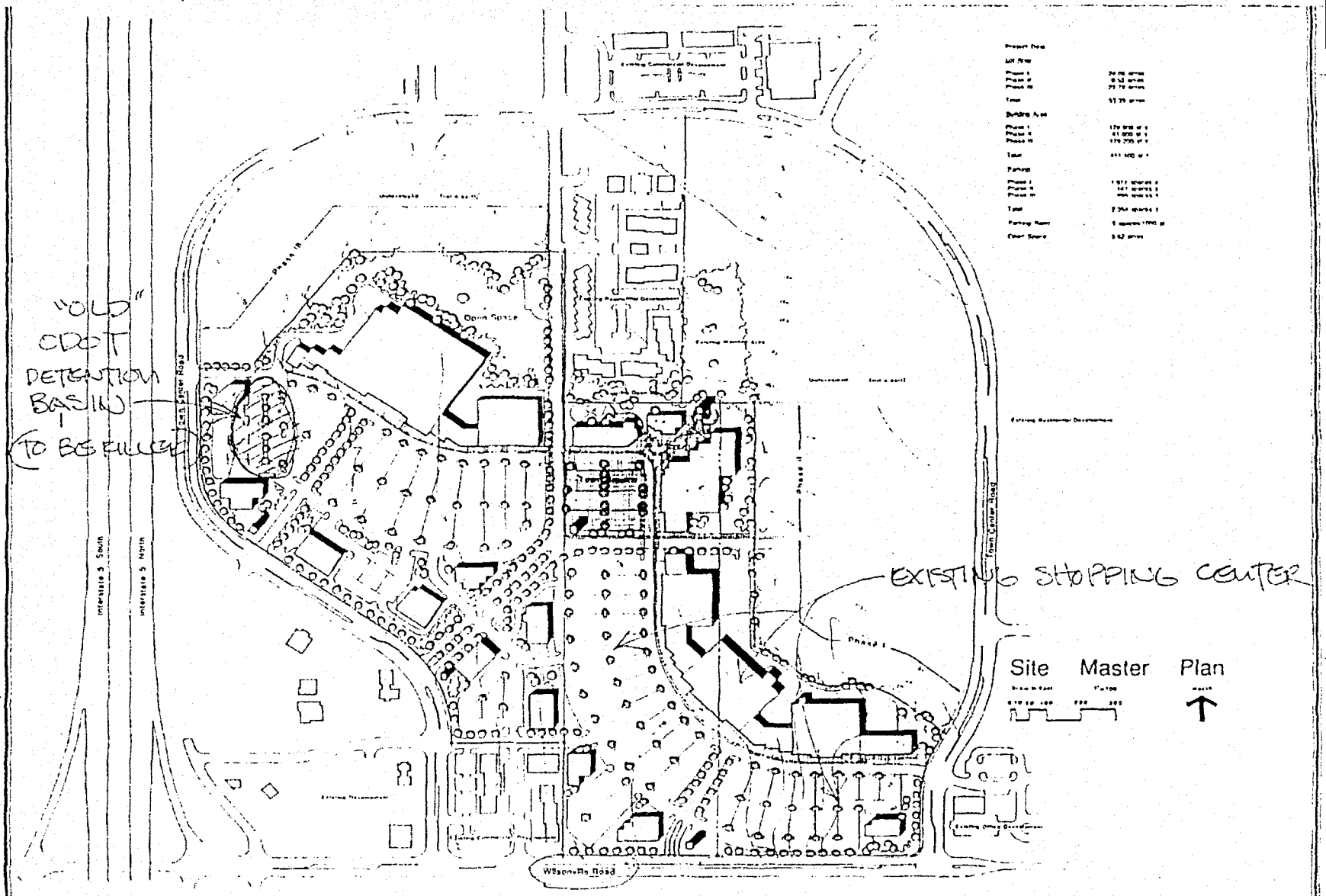
He said three things went wrong with the Incredible Universe traffic study. First, the predictions were made as if the city's Transportation Plan was already in place, but many roads are yet to be built.

Second, the study assumed that 40 percent of the flow into the Incredible Universe would be "drop-in" traffic — that is, traffic already on the streets for other reasons. But the store has become a regional draw, and "drop-in" traffic is a tiny percentage of traffic it attracts. Finally, the traffic study did not account for the success of the store's marketing effort.

"At a minimum, we need to be broadening the assumptions on which decisions are made," Loble said. "We've recognized that the traffic situation is beyond anything anticipated in the rational decision-making model."

Sorensen, however, later said there are no plans to tinker with the engineering manual — he called it "the bible" — that predicts how many new trips will be generated by a particular use.

Sorensen would not hazard a guess about whether any of the changes will mean that developments will have a tougher time getting planning approval in Wilsonville. But he said that at least one major development was turned down as long as two years ago because it would have brought too much traffic to an overburdened street.

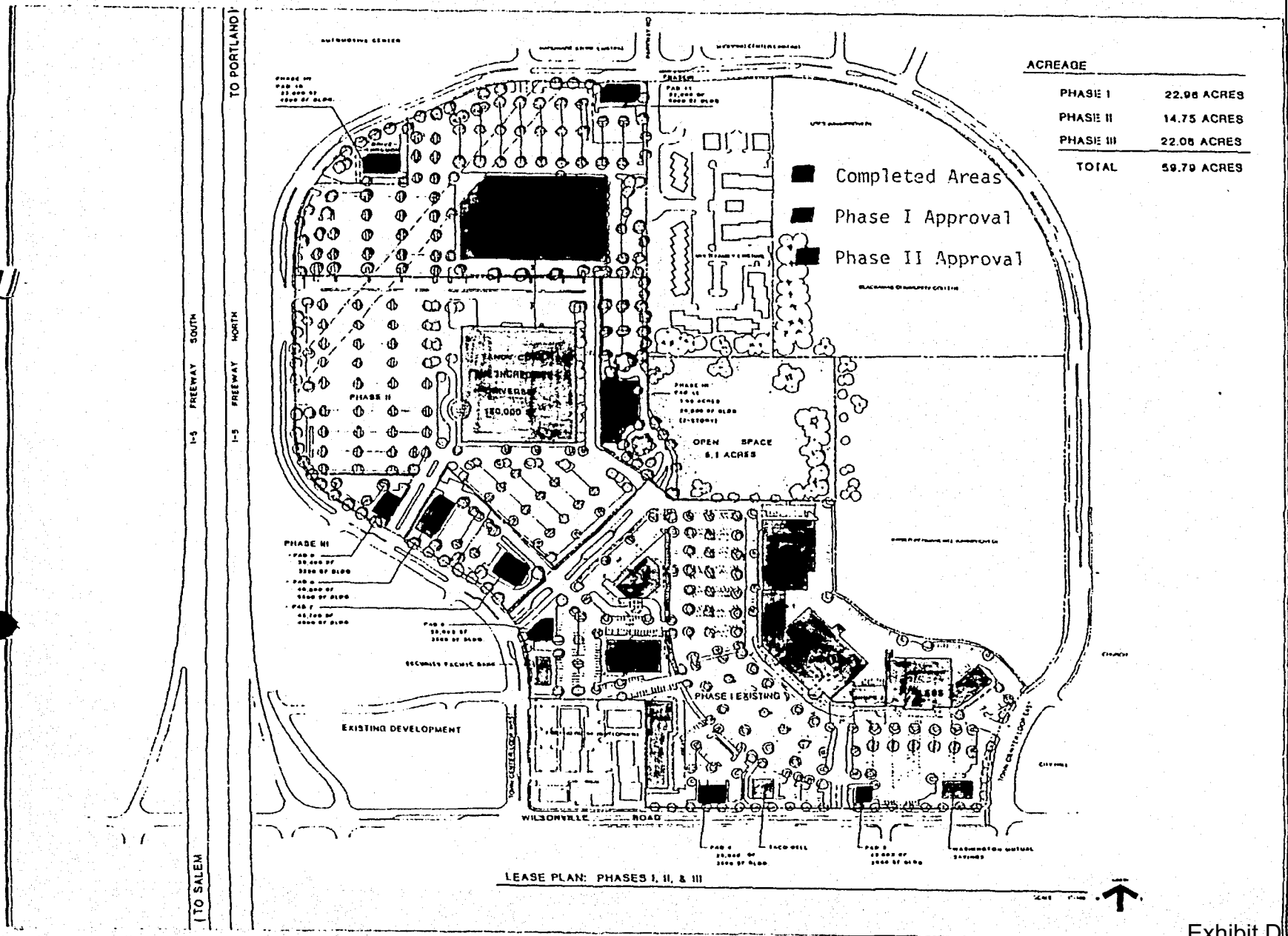


JKS Architects P.C.

Wilsonville Town Centre

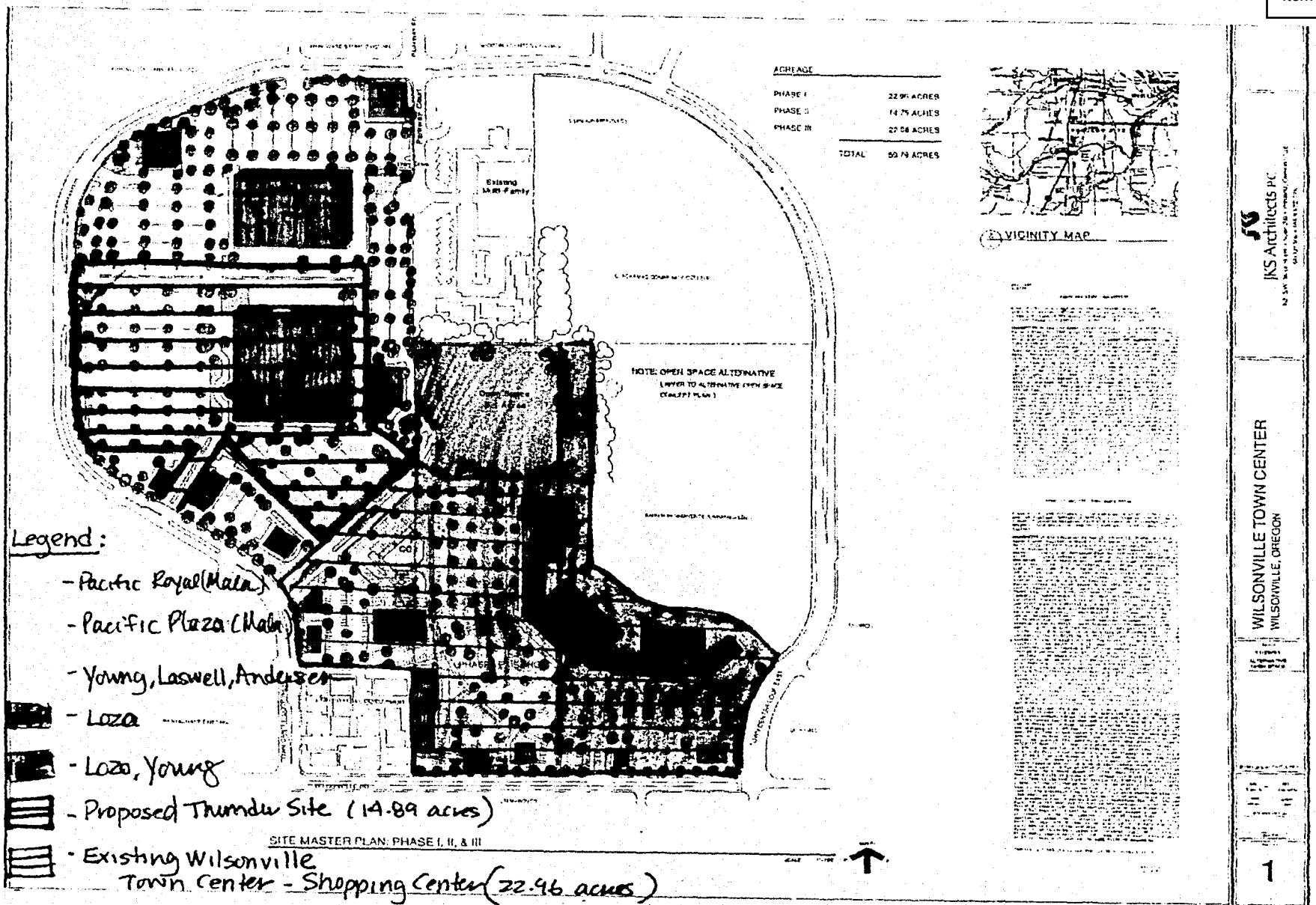
P1

3229



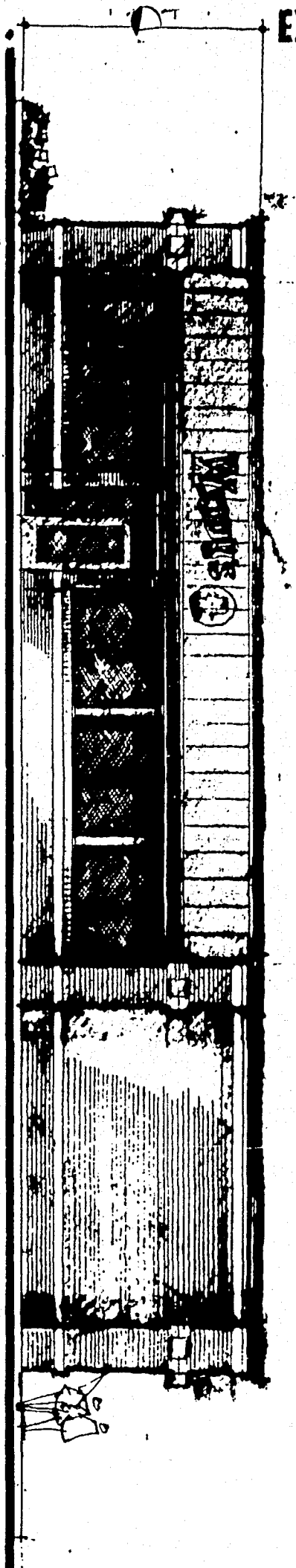
JKS Architects PC

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON


ACREAGE
PHASE I 22.96 ACRES
PHASE II 14.75 ACRES
PHASE III 22.08 ACRES
TOTAL 59.79 ACRES
NOTE: OPEN SPACE ALTERNATIVE
VICINITY MAP
Legend:
- Pacific Royal (Mall)
- Pacific Plaza (Mall)
- Young, Laswell, Andersen
- Loza
- Loza, Young
- Proposed Thunder Site (14.89 acres)
- Existing Wilsonville Town Center - Shopping Center (22.96 acres)
SITE MASTER PLAN: PHASE I, II, & III
JKS Architects PC
WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON
1

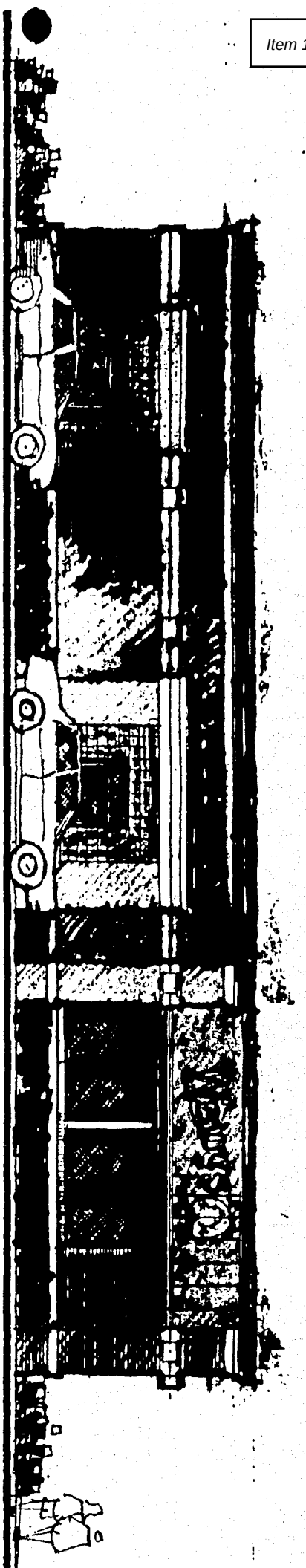
DEFECTS IN ORIGINAL DOCUMENT

EXHIBIT F



NORTH ELEVATION

1/8" = 1'-0"



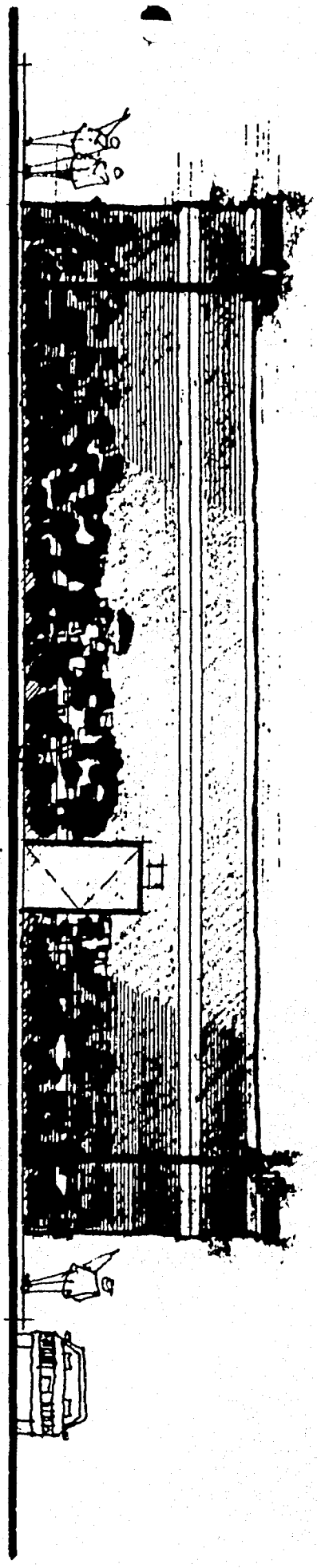
SOUTH ELEVATION

1/8" = 1'-0"

DRAWING NO: 1	PROJECT NAME: **Wendy's Restaurant**	DATE: **2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

WEST ELEVATION

1/8" = 1'-0"



EAST ELEVATION

1/8" = 1'-0"

DRAWING NO:	PROJECT NAME:	DATE:
2	**Wendy's Restaurant**	**2/5/93**
	DRAWING TITLE: **Elevations**	REVISION:

CITY OF WILSONVILLE

30445 S.W. Boones Ferry Road
P.O. Box 220 Wilsonville, OR 97070-0220
(503) 682-4960

PLANNING DEPARTM

SITE DEVELOPMENT APPLICATION A

Item 16.

File No. 91 PC 43 1/4 Sec.

Final action on application or zone change is required within 120 days in accordance with provisions of ORS 227.178.

Pre-App. ____ No. ____ Day ____ Yr.

A preapplication conference normally is required prior to submittal of an application. Please contact the Planning Department at 682-4960 for an appointment.

APPLICANT - COMPLETE

Owner's Name CAPITAL REALTY CORP. Contact Person Kim Beach

Address 101 S.W. MAIN SUITE 1500 Address ____

Portland OR. 97204

Phone 223-1200 Phone SAME

Owner's Signature Kimberlin J. Beach, Vice President Capital Realty Corp
Plaza Royal Officials Certifying Representative

Property Description: T 3 R ____ Map 3 1 W 12 Tax Lot(s) 200, 201, 101 See ON 13 102, 300

Request STAGE I MASTER PLAN REVISION
STAGE II PHASE II - WILSONVILLE Town Center
SITE PLAN - MOBILEY CONDITION #8 OF 90 PC 15

Please attach a plot plan (scale: 1"=40') and any other documents to this application. Please review the Planning Department submittal requirements to ensure that your application is complete.

—OFFICE USE ONLY—

Complete Application Accepted: Date 10/18/91 Public Hearing Date 12/9/91

Staff Signature Blair Edwards

☐ Class I ☐ Class II ☒ Class III

☐ PLAN AMENDMENT	☐ MAJOR PARTITION	☐ DESIGN REVIEW
☐ ZONE CHANGE	☐ MINOR PARTITION	☐ TEXT AMENDMENT
☐ PRELIMINARY PLAT	☐ CONDITIONAL USE	☐ SIGN REVIEW
☐ FINAL PLAT	☐ VARIANCE	☐ TEMPORARY USE
☒ PLANNED DEVELOPMENT	☒ OTHER REGNSIDER CONDITION OF 90 PC 15	

SITE FINDINGS

1. Zoning: PDC Town Center
2. Area of Lot: SEE FILE
3. Building or Sign Height: (Max) ____
4. Zoning Code Minimum Setbacks: Front ____ Side ____ Rear ____
5. Building Area ____
6. Access to Property TOWN CENTER LOOP WEST
7. Other: ____

☐ Approved ☐ Denied ☐ Approved with Conditions (see attached)

Conditions of Development ____

Approval of this development permit is submitted in reliance upon information submitted by the applicant as called out above. Any change of plans or incorrect information upon which this may rest is the revocation of permit. This decision may be appealed in accordance with the provisions of the Wilsonville Code and ORS 227.180.

Fee Amount Paid $1315.00 Check No. SEE ⇨ Cash 1205 PAY $ SEE FEE 1
1206 PAY $625.00 11
1207 PAY $315.00 - CASH 4

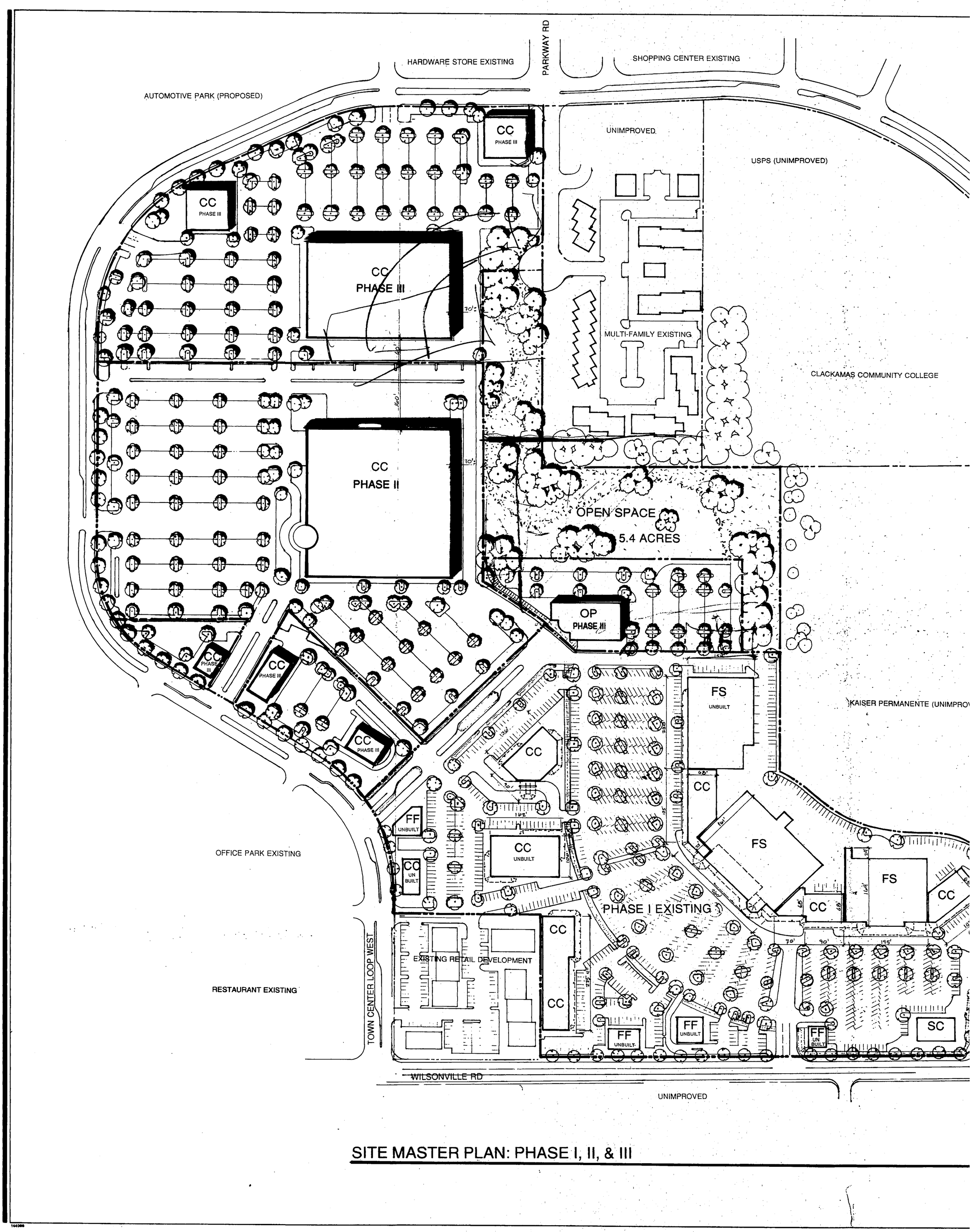
Permit Approval: Planner's Signature ____ Date: ____

City Council or Planning Commission Approval ☐ Yes ☐ No

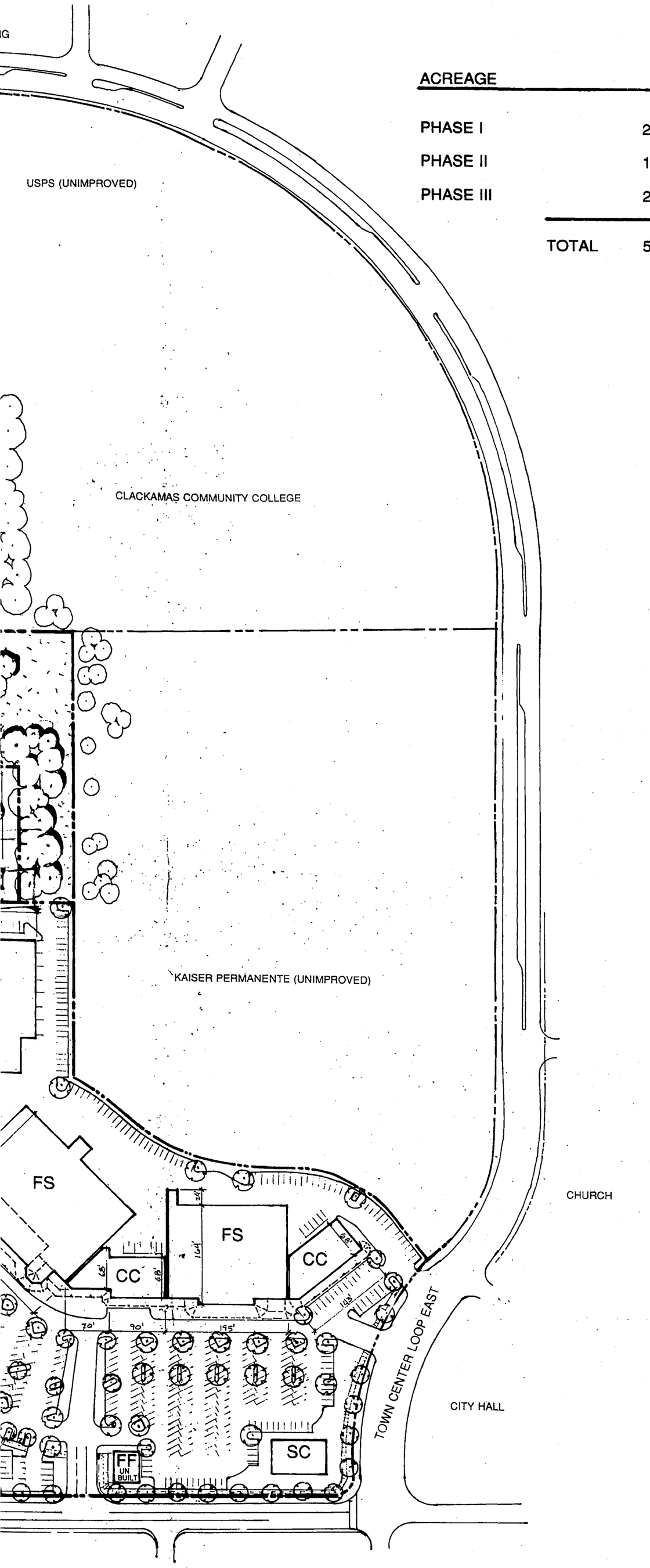
Order/Resolution ____

3238

White — Applicant's Receipt Canary — File Pink — Finance Goldenrod — Applicant's Receipt

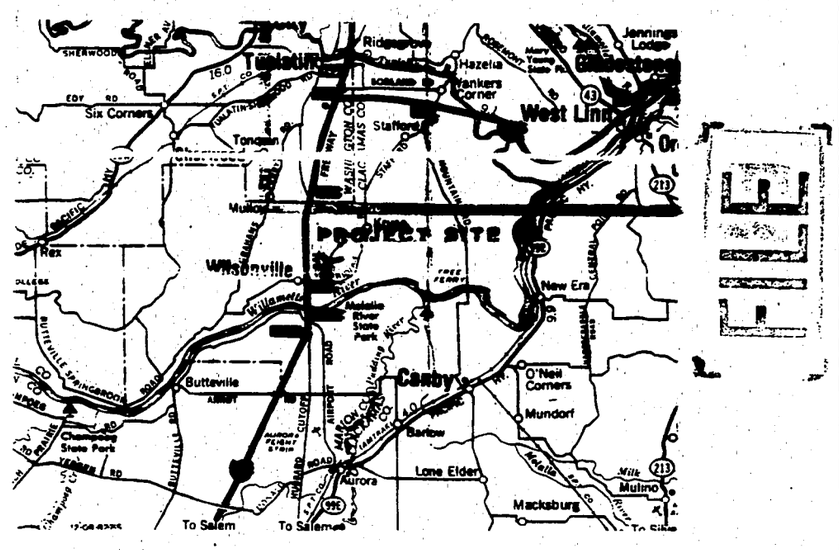


SITE MASTER PLAN: PHASE I, II, & III



ACREAGE

PHASE I	22.96 ACRES
PHASE II	14.75 ACRES
PHASE III	22.08 ACRES
TOTAL	59.79 ACRES



(2/1) VICINITY MAP

467-0102
5/6/91

PHASE ONE LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'31" East along the section line between Sections 13 and 14 a distance of 44.00 feet to the **POINT OF BEGINNING**; thence continuing North 00°03'01" East along said section line a distance of 339.50 feet; thence South 89°59'30" West a distance of 338.63 feet to the easterly right-of-way line of Town Center Loop Road West; thence North 00°00'22" East along said easterly right-of-way line a distance of 44.55 feet to a point of curvature; thence 247.91 feet along the arc of a 360.54 foot radius curve to the left through a central angle of 39°23'37" and whose chord bears North 18°39'27" West a distance of 243.05 feet to a point on a curve; thence North 46°03'00" East a distance of 594.01 feet; thence South 89°57'00" East a distance of 66.14 feet; thence South 00°03'00" West a distance of 63.00 feet; thence South 89°57'00" East a distance of 479.78 feet; thence South 00°03'01" West a distance of 285.68 feet to the intersection with a non-tangent curve; thence 93.82 feet along the arc of a 317.33 foot radius curve to the right through a central angle of 16°56'21" and whose chord bears South 55°30'59" East a distance of 93.48 feet to a point of reverse curvature; thence 248.26 feet along the arc of a 338.67 foot radius curve to the left through a central angle of 42°00'00" and whose chord bears South 68°02'49" East a distance of 242.74 feet to a point of tangency; thence South 89°02'49" East a distance of 51.65 feet to a point of curvature; thence 174.68 feet along the arc of a 200.00 foot radius curve to the right through a central angle of 50°02'34" and whose chord bears South 64°01'32" East a distance of 169.15 feet to a point of tangency; thence South 39°00'15" East a distance of 97.50 feet to a point on a non-tangent curve; thence 328.21 feet along the arc of 494.00 foot radius curve to the left through a central angle of 38°04'18" and whose chord bears South 19°42'06" West a distance of 331.74 feet to a point of tangency; thence South 00°42'57" West a distance of 99.46 feet to a point of curvature; thence 48.14 feet along the arc of a 30.00 foot radius curve to the right through a central angle of 91°56'29" and whose chord bears South 44°40'11" West a distance of 43.17 feet to a point of tangency; thence South 89°21'26" West a distance of 375.16 feet to the Point of Beginning. Said parcel of land contains 22.96 acres, more or less.

PHASE II AND III LEGAL DESCRIPTION

A parcel of land situated in the southwest quarter of Section 13 and the southeast quarter of Section 14 in Township 3 South, Range 1 West, Willamette Meridian, City of Wilsonville, Clackamas County, Oregon. Said parcel of land being more particularly described as follows:

COMMENCING at the southwest corner of Section 13, Township 3 South, Range 1 West, Willamette Meridian, Clackamas County, Oregon; thence North 00°03'01" East along the section line between Sections 13 and 14 a distance of 1,077.07 feet to the most westerly northwest corner of Parcel 1 of **Partition Plat No. 1991-164** recorded in Fee 91-48507 of the Clackamas County Plat Records and the **TRUE POINT OF BEGINNING**; thence leaving said section line South 45°03'00" West 589.42 feet to point of non-tangent curvature on the northeasterly right-of-way line of Town Center Loop Road West (a 72.00 foot-wide public road right-of-way); thence tracing said northeasterly road right-of-way line along the following courses and distances: tracing the arc of a 360.54 foot radius curve to the left (the radial center of which bears South 53°40'44" West) through a central angle of 20°25'22" an arc distance of 135.64 feet (the long chord bears North 47°31'56" West 134.92 feet) to a point of tangency; thence North 57°44'38" West 463.30 feet to a point of curvature; thence tracing the arc of a 258.16 foot radius curve to the right through a central angle of 57°42'16" an arc distance of 270.07 feet (the long chord bears North 28°53'30" West 258.80 feet) to a point of tangency; thence North 00°02'22" West 151.37 feet to the southeasterly line of that certain tract as deeded to the City of Wilsonville, Oregon in deed recorded November 12, 1986 in recorder's fee 86-44957; thence tracing said southeasterly line and continuing on the southeasterly line of that certain tract deeded to the City of Wilsonville in deed recorded November 12, 1986 in recorder's fee 86-44959 North 38°37'19" East 215.39 feet to the northerly line of said tract per fee 86-44959; thence tracing said northerly line South 89°58'19" West 104.56 feet to a point of curvature; thence tracing a 30.00 foot radius curve to the right through a central angle of 89°59'19" an arc distance of 47.12 feet (the long chord bears North 45°02'02" West 42.42 feet) to a point of tangency on the easterly right-of-way line of said Town Center Loop Road West; thence leaving said northerly property line and tracing the easterly, southeasterly and southerly right-of-way line of said Town Center Loop Road West along the following courses and distances: North 00°02'22" West 211.31 feet to a point of curvature; thence tracing the arc of a 444.00 foot radius curve to the right through a central angle of 64°55'44" an arc distance of 468.91 feet (the long chord bears North 32°24'30" East 444.85 feet) to a point of tangency; thence North 64°52'22" East 286.54 feet to a point of curvature; thence tracing the arc of a 414.00 foot radius curve to the right through a central angle of 24°58'03" an arc distance of 180.41 feet (the long chord bears North 77°20'24" East 178.96 feet) to a point of tangency; thence North 89°49'25" East 300.93 feet to a point of curvature for a right-of-way return to Parkway Avenue; thence leaving said southerly right-of way line of Town Center Loop Road West and tracing the arc of a 20.00 foot radius curve to the right through a central angle of 90°13'35" an arc distance of 31.49 feet (the long chord bears South 45°03'47" East 28.34 feet to the westerly right-of-way line of said Parkway Avenue (31.00 feet from center line); thence tracing said right-of-way line through the following courses and distances: South 00°03'01" West 311.17 feet to a point of curvature for the return to the cul-de-sac for said Parkway Avenue; thence tracing the arc of a 20.00 foot radius curve to the right through a central angle of 47°09'23" an arc distance of 16.46 feet (the long chord bears South 23°37'42" West 16.00 feet) to a point of reverse curvature; thence tracing the arc of a 55.00 foot radius curve to the left through a central angle of 87°59'01" an arc distance of 84.46 feet (the long chord bears South 03°12'53" West 76.40 feet); thence leaving said Parkway Avenue right-of-way line North 89°52'55" East 41.62 feet to the east line of section 14, Township 3 South, Range 1 West, of the Willamette Meridian in the State of Oregon; thence tracing said east line of section 14 South 00°03'01" West 446.55 feet to the northerly line of Parcel 3 of said **Partition Plat No. 1991-164**; thence tracing said northerly line and continuing along the northerly line of Parcel 2 of said **Partition Plat No. 1991-164** North 89°26'52" East 549.20 feet to the northeast corner of said Parcel 2; thence tracing the easterly line of said Parcel 2 South 00°03'01" West 440.61 feet to the southeast corner of said Parcel 2; thence tracing the southerly line of said Parcel 2 and continuing along the southerly line of said Parcel 3 North 89°57'00" West 479.78 feet to an angle point in said southerly line; thence tracing the westerly portion of said southerly line of Parcel 3 the following courses and distances: North 00°03'01" East 63.00 feet; thence North 89°57'00" West 66.14 feet; thence South 45°03'00' West 4.59 feet to the **TRUE POINT OF BEGINNING.**

Containing 1,604,349 square feet or 36.83 acres more or less.

467-0301
10/16/91

JKS Architects PC
1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503-227-5616 • FAX 503-227-3590

WILSONVILLE TOWN CENTER
WILSONVILLE, OREGON

Revisions

KJD	RSB
Drawn By	Checked By
8963	10/18/91
Job No.	Date

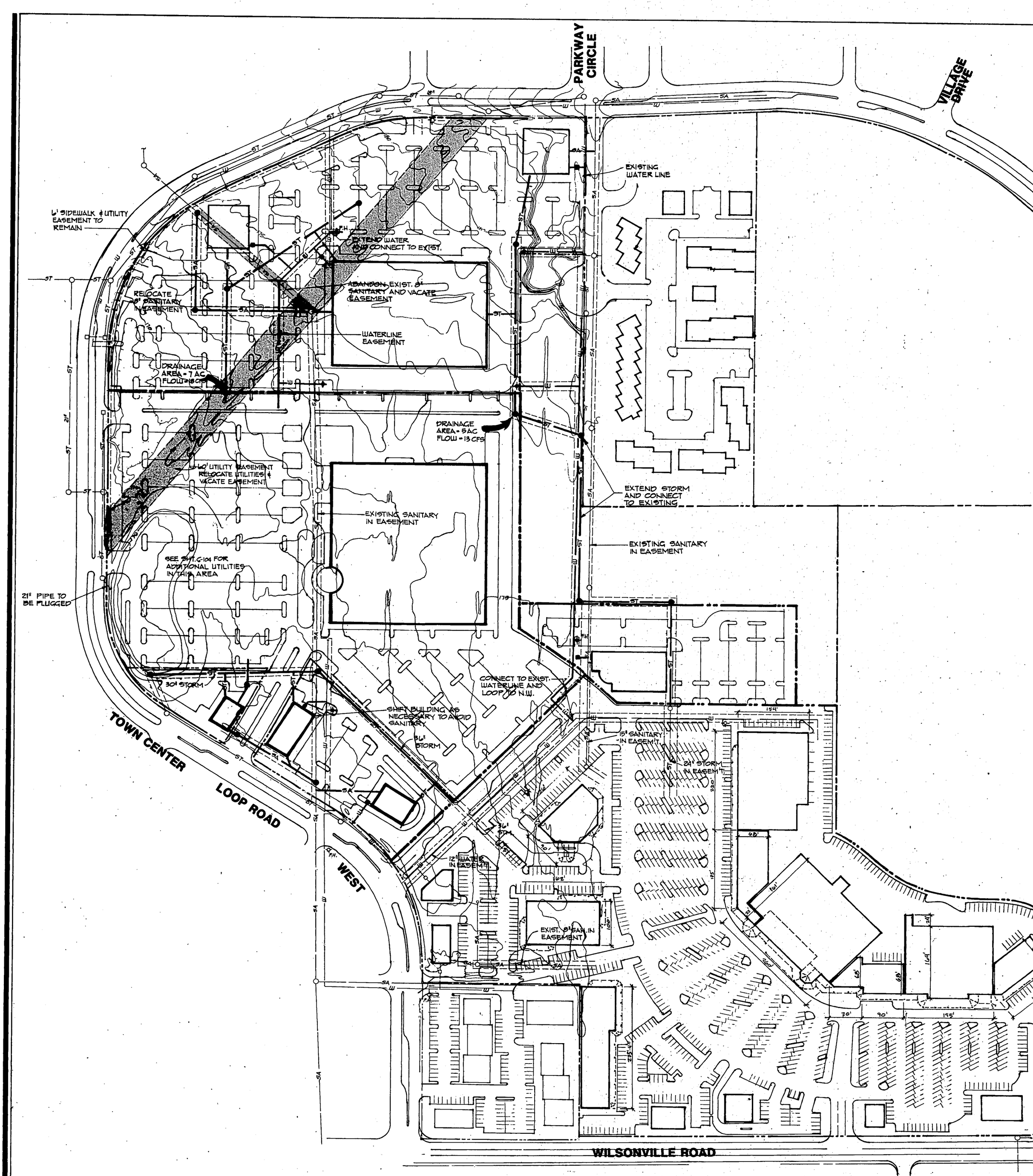
SITE MASTER PLAN

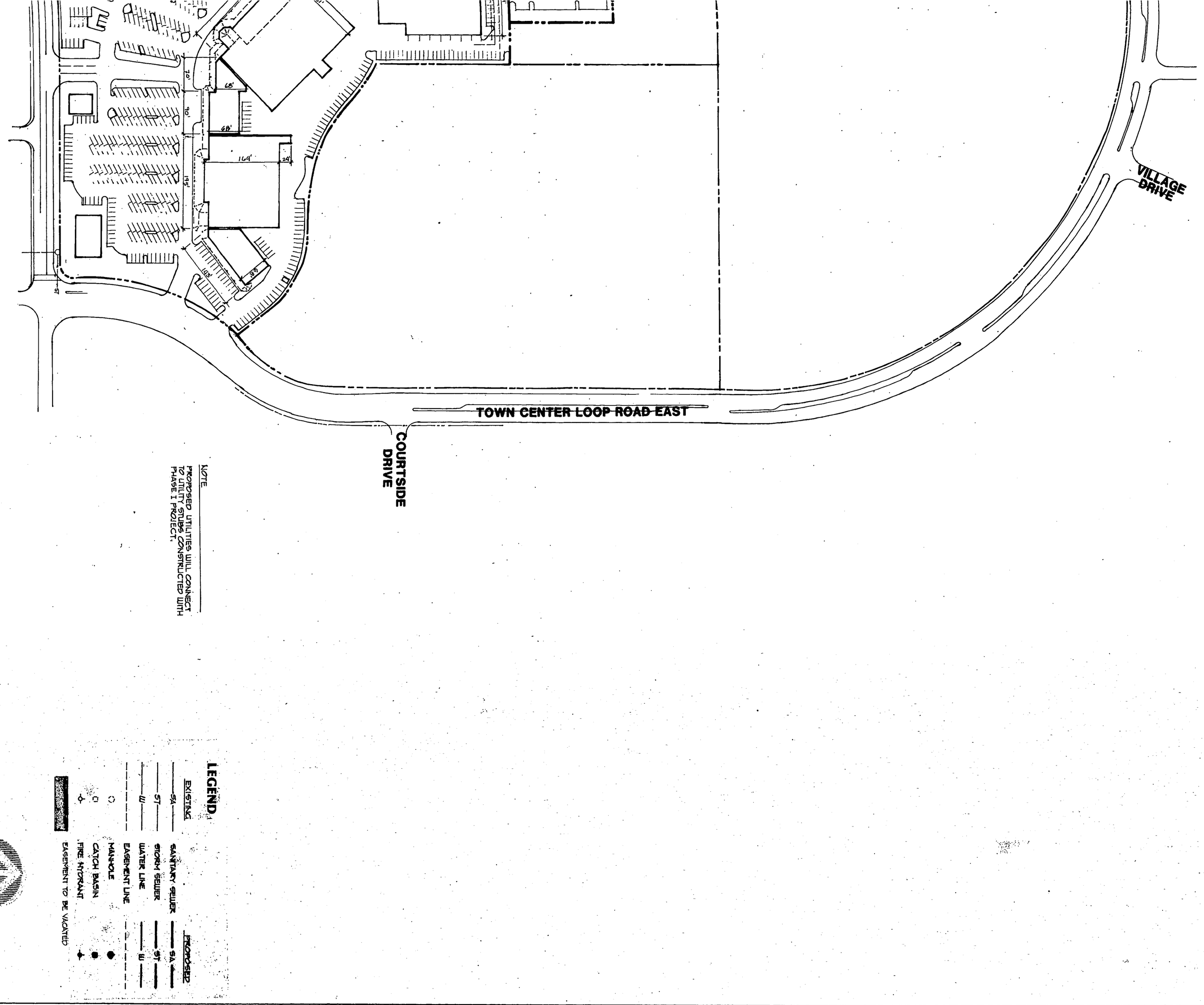
Sheet Title

Sheet No.

1

of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6' SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER AND CONNECT TO EXIST.
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA = 7 AC FLOW = 18 CFS
DRAINAGE AREA = 5 AC FLOW = 13 CFS
60' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
TOWN CENTER LOOP ROAD
WEST
12" WATER IN EASEMT.
EXIST. 8" SAN. IN EASEMENT
15" SANITARY IN EASEMT
24" STORM IN EASEMT
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE I PROJECT.

LEGEND

EXISTING		PROPOSED
SA	SANITARY SEWER	SA
ST	STORM SEWER	ST
W	WATER LINE	W
	EASEMENT LINE	
○	MANHOLE	●
□	CATCH BASIN	■
⊕	FIRE HYDRANT	●
	EASEMENT TO BE VACATED	

1" = 100'

Revisions

WILSONVILLE TOWN CENTER
Wilsonville, Oregon

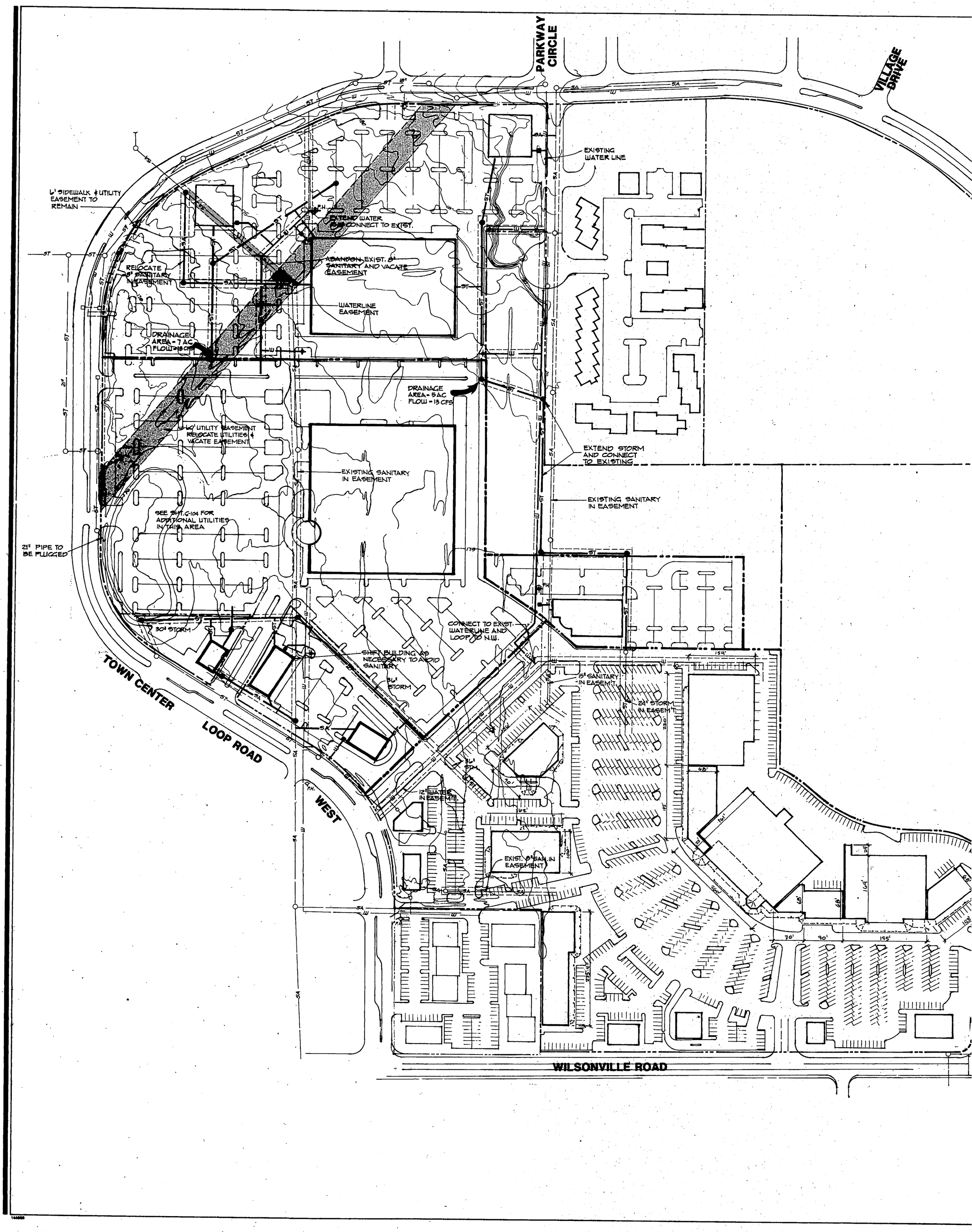
PACIFIC
1099 S.W. Columbia Street
Portland, Oregon 97201
(503)227-0455
Fax (503)274-4607
Planning • Engineering • Surveying • Landscape Architecture

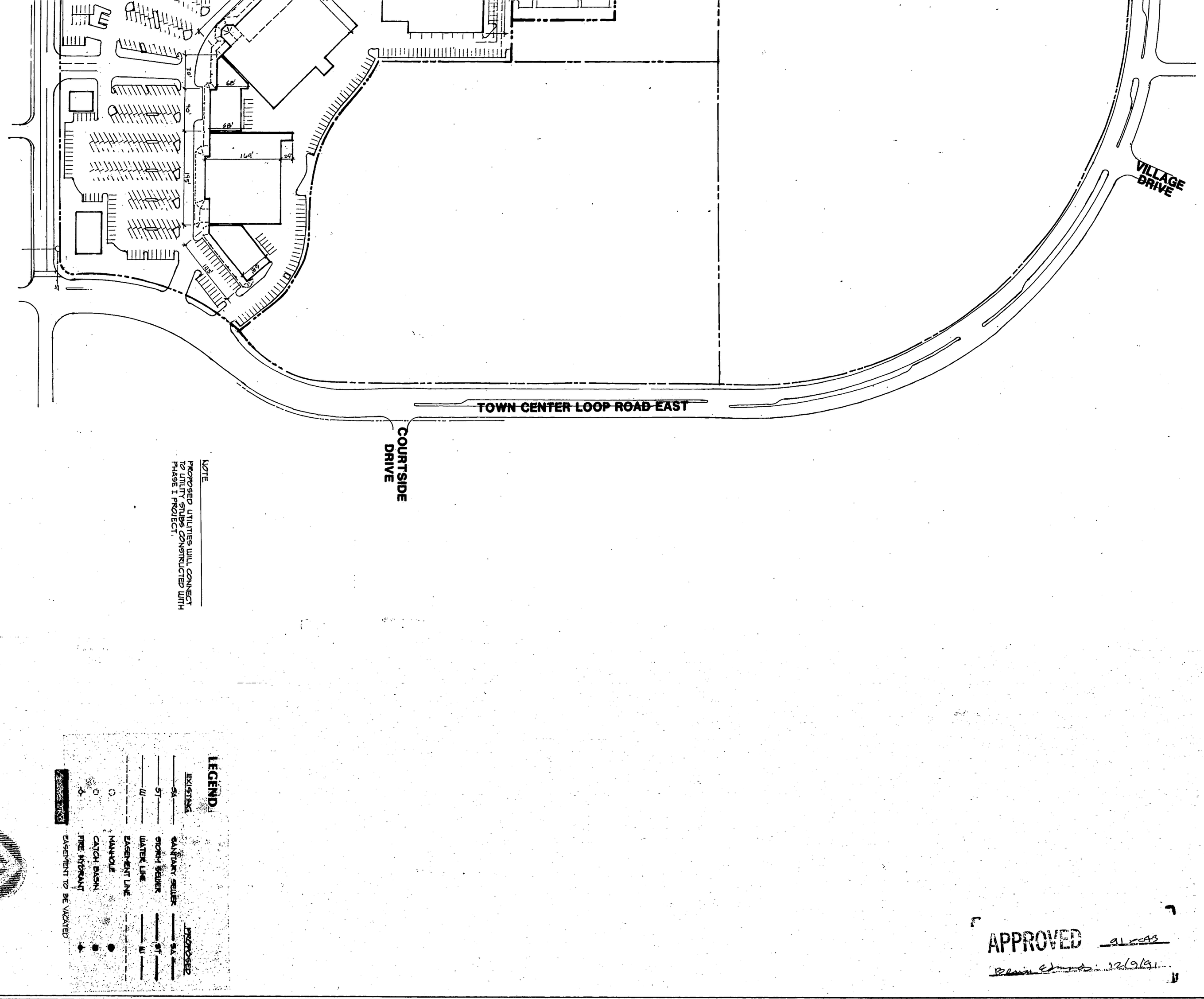
JKS Architects PC
1620 S.W. Taylor Street ▪ Suite 200 ▪ Portland, Oregon 97205
503-227-5616 ▪ FAX 503-227-3590

Job No. 4-4-0501 Date 4-4-01
MASTER UTILITIES PLAN
Sheet Title

Drawn By | Checked By

Sheet No. **2** of


PARKWAY CIRCLE
VILLAGE DRIVE
EXISTING WATER LINE
6" SIDEWALK & UTILITY EASEMENT TO REMAIN
EXTEND WATER & CONNECT TO EXIST.
ABANDON EXIST. 8" SANITARY AND VACATE EASEMENT
RELOCATE 8" SANITARY IN EASEMENT
WATERLINE EASEMENT
DRAINAGE AREA - 7 AC FLOW = 18 CFS
DRAINAGE AREA - 5 AC FLOW - 13 CFS
10' UTILITY EASEMENT RELOCATE UTILITIES & VACATE EASEMENT
EXISTING SANITARY IN EASEMENT
EXTEND STORM AND CONNECT TO EXISTING
EXISTING SANITARY IN EASEMENT
SEE SHT. C-104 FOR ADDITIONAL UTILITIES IN THIS AREA
21" PIPE TO BE PLUGGED
30" STORM
CONNECT TO EXIST. WATERLINE AND LOOP TO N.W.
SHIFT BUILDING AS NECESSARY TO AVOID SANITARY
36" STORM
15" SANITARY IN EASEM'T.
24" STORM IN EASEM'T.
12" WATER IN EASEMENT
EXIST. 8" SAN. IN EASEMENT
TOWN CENTER LOOP ROAD
WEST
WILSONVILLE ROAD



NOTE

PROPOSED UTILITIES WILL CONNECT TO UTILITY STUBS CONSTRUCTED WITH PHASE 1 PROJECT.

LEGEND

	EXISTING	PROPOSED
SANITARY SEWER	SA	SA
STORM SEWER	ST	ST
WATER LINE	W	W
EASEMENT LINE		
MANHOLE	○	●
CATCH BASIN	□	■
FIRE HYDRANT		●
EASEMENT TO BE VACATED		

1" = 100'

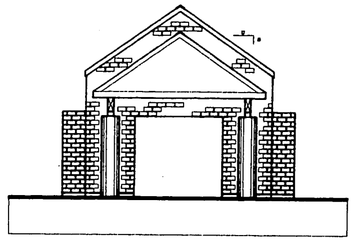
APPROVED 9/25/93
Bruce Edmonds 12/9/91

Revisions	WILSONVILLE TOWN CENTER Wilsonville, Oregon	W&H PACIFIC 1099 S.W. Columbia Street Portland, Oregon 97201 (503)227-0455 Fax (503)274-4607 Planning • Engineering • Surveying • Landscape Architecture	JKS Architects PC 1620 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205 503-227-5616 • FAX 503-227-3590

Drawn By | Checked By

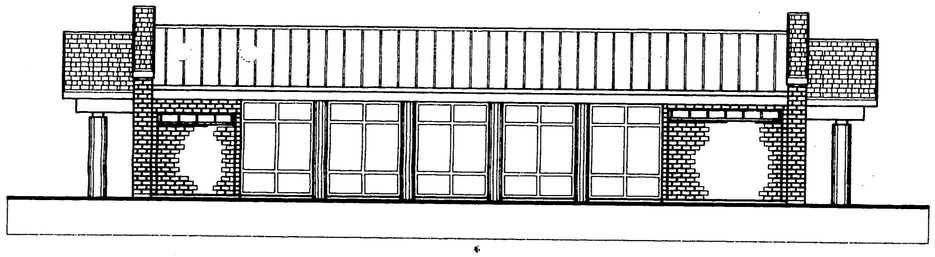
Job No. 4240.30
Date 9/91
Sheet Title: MASTER UTILITIES PLAN

Sheet No. 2 of



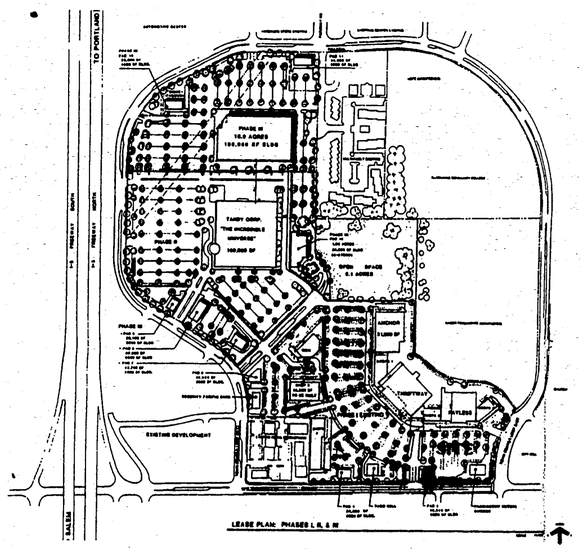
END ELEVATION

1/8" = 1'-0"



FRONT ELEVATION

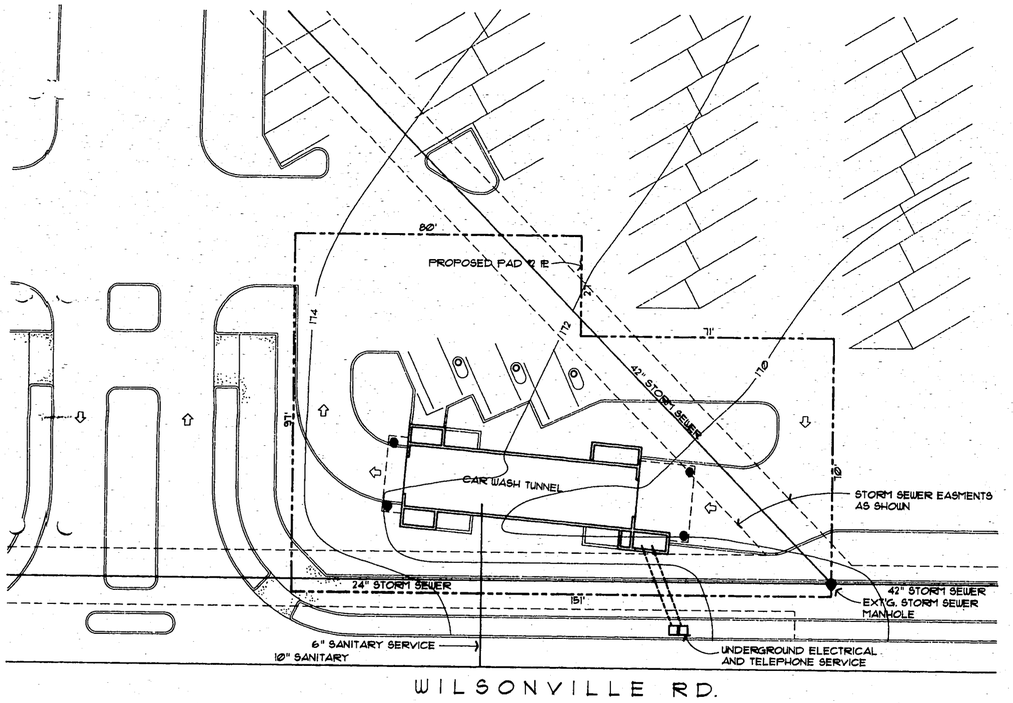
1/8" = 1'-0"



VICINITY MAP

SITE DATA

	LOT COVERAGE IN SQ. FT.	LOT COVERAGE IN %
BUILDING AREA	1,500±	12%
PARKING & DRIVES	8,293±	65%
LANDSCAPING/OPEN SPACE	2,937±	23%
TOTAL SITE AREA	12,730±	100%



NORTH

PRELIMINARY SITE PLAN

1" = 20'

NICOLI ENGINEERING
and Construction Services Inc
9025 S.W. Center Street • P.O. Box 23784
Tigard, Oregon 97223
Phone: (503) 620-2086
FAX: (503) 684-3636

WILSONVILLE TOWN CENTER
PROPOSED CAR WASH

WILSONVILLE, OREGON

CLIENT:
DENNIS THOMPSON

REVISIONS:

Date:	11-20-92
Scale:	AS SHOWN
Drawn by:	SET
Checked by:	JDA
Job No.:	2023
Drawing No.:	2023TITL

SHEET 1 OF 1

Exhibit D
3246

3 | CED ATL 'GLAUCA'

30 | PPU LAU 'OTTO LUYKEN'

7 | EUO ALA 'COMPACTA'

36 | JUN HOP 'BAR HARBOR' 4 PER ISLAND

LIMIT OF WORK

14 | RHO 'JEAN MARIE'

78 | PPU LAU 'OTTO LUYKEN'

11 | ACE PUB 1 3/4" 'APPLETPONG'

22 | RHO 'JEAN MARIE'

6 | ACE PLA 3" 'EMERALD QUEEN' SEE PLTG. NOTES.

2 | PYR CAL 'REDSPIRE'

11 | EUO ALA 'COMPACTA'

EQ. EQ.

16 | PYR CAL 1 3/4" 'REDSPIRE'

5'-0" MIN. (TYP.)

TOWN CENTER LOOP ROAD WEST

50'-0" TYP.

LAWN - SEED (FINE) SEE SPECS.

45'-0"

SHOVEL CUT EDGE SEE PLTG. NOTES.

5 | CED ATL 'GLAUCA'

533 | PPU LAU 'OTTO LUYKEN'

LAWN - SEED SEE SPEC'S.

6 | PSL

AS REQ | AZALEA 'PURPLE SPLENDOR' 30" O.C.

AS REQ | PIN MUG 2 GAL | 36" O.C.

61 | RHO 'UNIQUE'

9 | SYR VUL 2 GAL. 'LAVENDER LAD

31 | PIE 'FOREST FLAME'

4 | VIB DAV

1 | QUE PUB

BARK MULCH SEE SPEC'S.

12 | BER THU 'ROSY GLOW'

2 | PYR CAL 'REDSPIRE'

LAWN - SEED SEE SPEC'S.

EQ. EQ.

1

5

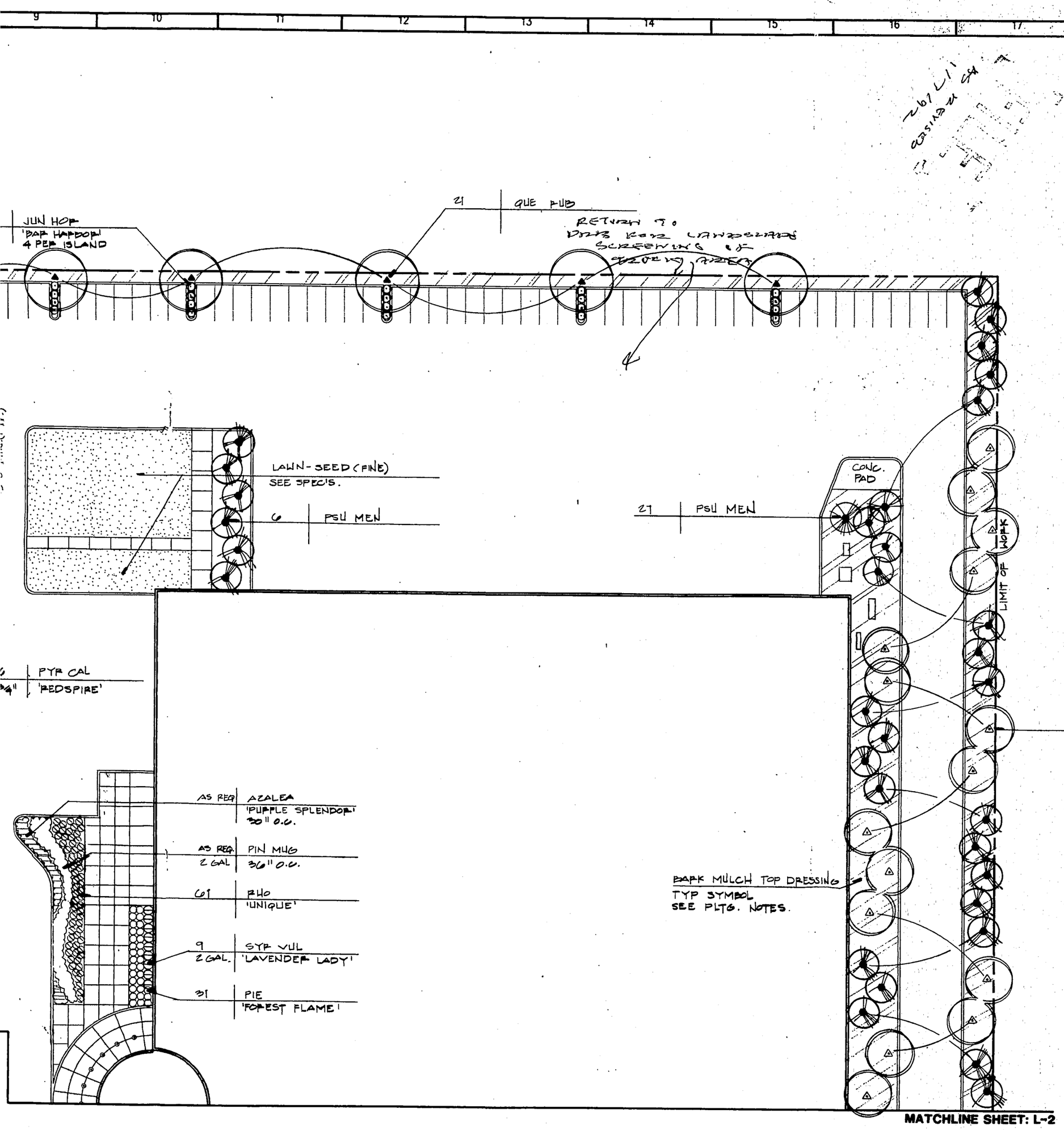
A PLANTING ISLAND 'A' DETAIL N.T.S.

B PLANTING ISLAND 'B' DETAIL N.T.S.

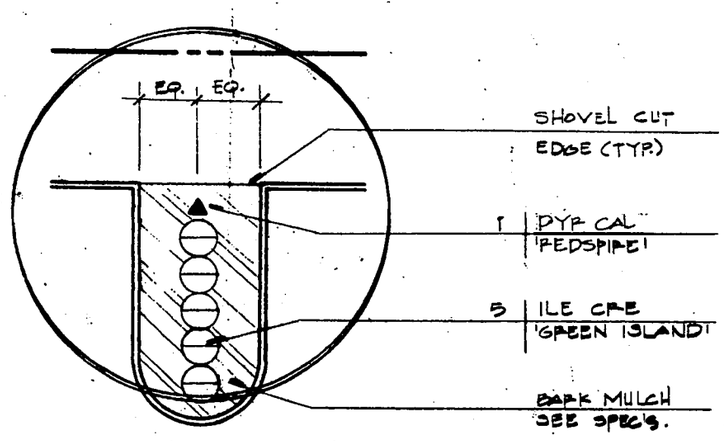
C PLANTING ISLAND 'C' DETAIL

PEN WTS. 1 2 3 4 1 3 1 6 8 8 8 8 8 8 8

PROJECT NO. 4-755-0202
CADD FILE '0775LS01.DWG'



MATCHLINE SHEET: L-2



C PLANTING ISLAND 'C' DETAIL N.T.S.

SHEET NOTES

PLANTING GENERAL NOTES:

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES IN PLANTING AREAS PRIOR TO PLANTING. CONTRACTOR SHALL CONTACT THE FOLLOWING AGENCIES 48 HOURS PRIOR TO BEGINNING EXCAVATION WORK FOR UTILITY LOCATION INFORMATION:

TELEPHONE:	503 246 6699	
GAS:	503 246 6699	
ELECTRIC:	503 246 6699	
SEWER:	503 682 4960	ATTN: MARTIN BROWN
WATER:	503 682 4960	ATTN: MARTIN BROWN

LIGHT STANDARDS ARE SHOWN FOR REFERENCE ONLY. REFER TO DRAWING NUMBER DRBC2 FOR ADDITIONAL LIGHTING INFORMATION.

PLANTING IN PARKING LOT ISLANDS AS SHOWN IN ENLARGEMENTS ON SHEET L-1.0.

ALL SHRUB AND GROUNDCOVER PLANTING AREAS TO RECIEVE MINIMUM 2" DEPTH OF BARK MULCH. SEE SPECIFICATIONS 02950.

REFER TO CIVIL'S FOR FINISH GRADES IN PLANTING AREAS.

STREET TREES ON TOWN CENTER LOOP ROAD WEST SHALL BE PLANTED PER CITY OF WILSONVILLE STANDARD PLAN. IF NONE EXISTS, INSTALL PER DETAIL 1, L-2.0.

ALL LAWN EDGES AT SHRUB PLANTING AREAS SHALL BE SHOVEL CUT. CONTRACTOR SHALL MAINTAIN ALL SHOVEL CUT EDGES IN A SMOOTH AND EVEN CONDITION UNTIL FINAL ACCEPTANCE.

CONTRACTOR SHALL SUPPLY AND INSTALL ANNUAL COLOR, 4" POT SIZE AT 10" O.C.. COLOR MATERIALS TO BE SELECTED BY CONTRACTOR AND APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO PLANTING. ANNUAL COLOR MATERIAL SHALL BE IN SEASON (FULL BLOOM) AT TIME OF INSTALLATION.

NOT FOR CONSTRUCTION

PRINTED JAN 06 1992 W & H PACIFIC

APPROVED

PROJECT NORTH

W&H PACIFIC
1999 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title: PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title: LANDSCAPE PLAN

Seal: REGISTERED 261 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L1.0
Reviewed MH	
Date 12-27-91	

c 1991 DESIGN FORUM ARCHITECTS

MATCHLINE SHEET: L-1

TOWN CENTER LOOP ROAD WEST

3 | 3" | ACE CIP

20 | RHO 'JEAN MARIE'

SHOVEL CUT EDGE (TYP.) SEE PLTG. NOTES.

30 | VIB DAV

5 | CED ATL. 'GLAUCA'

61 | PRU LAU 'OTTO LUYKEN'

56 | EUO ALA 'COMPACTA'

4 | 3" | ACE PLA 'EMERALD QUEEN' SEE PLTG. NOTES

LAWN - SEED (FINE) SEE SPEC'S.

6 | 2"CAL | QUE RUB

ROUGH SEEDED AREA
See Grading Plans for Limits

15 | 1 3/4" | PPY CAL 'REDSPIRE'

ANNUAL COLOR
4" POT | SEE PLTG. NOTES

EQ. EQ. 5'-0" MIN.

AS REQ. | 2 GAL. | AZALEA 'PURPLE SPL.' 30" O.C.

AS REQ. | 2 GAL. | PIN MUG 30" O.C.

61 | RHO 'UNIQUE'

31 | PIE 'FOREST FLAME'

9 | 2 GAL | SYR VUL 'LAVENDER LADY'

10 | ILE CRE 'GREEN ISLAND'

25 | VIB DAV

13 | AZA 'PURPLE SPL.'

42 | AZA 'PURPLE SPL.'

AS REQ. | 4" POT | HED HEL 'GLACIER'

6 | ACE CIP

SIDEWALK N.I.C.

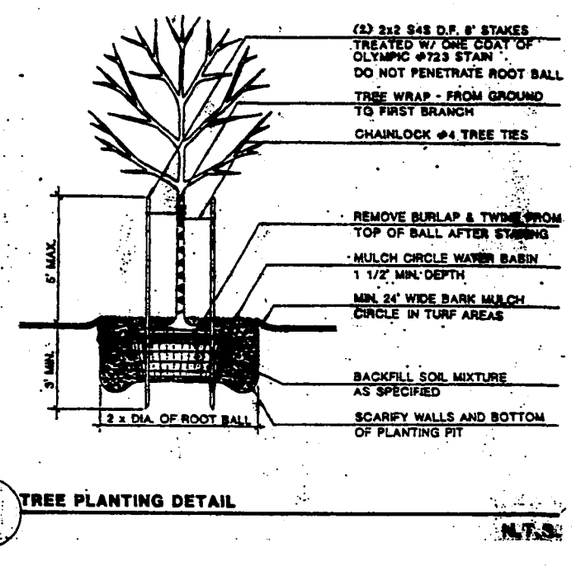
9 | 2" CAL | QUE RUB

ROUGH SEEDED AREA
See Grading Plans for Limits

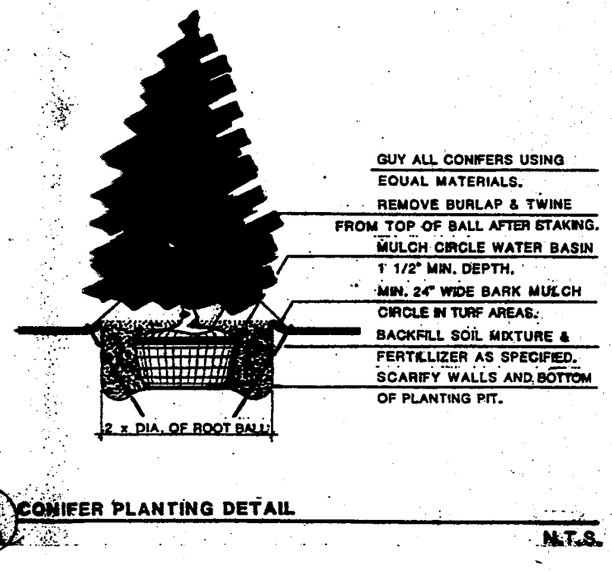
LAWN - SE
SEE SPEC'

PLANT LEGEND

QTY	CODE	BOTANICAL NAME	COMMON NAME	SIZE
TREES				
9	Ace Cir	Acer circinatum	Vine Maple	7'- 8'
10	Ace pla	Acer platanoides 'Emerald Queen'	Emerald Queen Maple	3" Cal.
11	Ace rub	Acer rubrum 'Armstrong'	Armstrong Columnar Maple	1-3/4" Ca
10	Ced atl	Cedrus atlantica 'Glauca'	Blue Atlas Cedar	8'- 10'
19	Pyr cal	Pyrus calleryana 'Chanticleer'	Chanticleer Pear	1-3/4" Ca
40	Pse men	Pseudotsuga menziesii	Douglas Fir	8'- 10'
26	Que rub	Quercus rubra	Red Oak	2" Cal.
70	Pyr cal	Pyrus calleryana 'Redspire'	Redspire Pear	1 3/4" C
SHRUBS				
210	Aza	Azalea 'Purple Splendor'	Purple Splendor Azalea	12-15"
12	Ber thu	Berberis thunbergii 'Rosy Glow'	Rosy Glow Japanese Barberry	2 Gal.
184	Euo ala	Euonymous alata 'Compacta'	Compact Winged Euonymous	12-15"
53	I le cre	Ilex crenata 'Green Island'	Japanese Holly	2 Gal.
31	Pie	Pieris 'Forest Flame'	Forest Flame Pieris	12-15"
151	Pin mug	Pinus mugo Pumilio	Dwarf Mugo Pine	2 Gal.
240	Pru lau	Prunus laurocerasus 'Otto Luyken'	Otto Luyken Laurel	12-15"
56	Rho	Rhododendron 'Jean Marie'	Rhododendron	12-15"
122	Rho	Rhododendron 'Unique'	Rhododendron	12-15"
18	Syr vul	Syringa vulgaris 'Lavender Lady'	Lavender Lilac	2 Gal.
85	Vib dav	Viburnum davidii	David Viburnum	12-15"
GROUNDCOVER				
2,230	Hed hel	Hedera helix 'Glacier'	Glacier Ivy	4" Pots
66	Jun hor	Juniperus horizontalis 'Bar Harbor'	Bar Harbor Juniper	1 Gal.
216		Annual Color		4" Pots

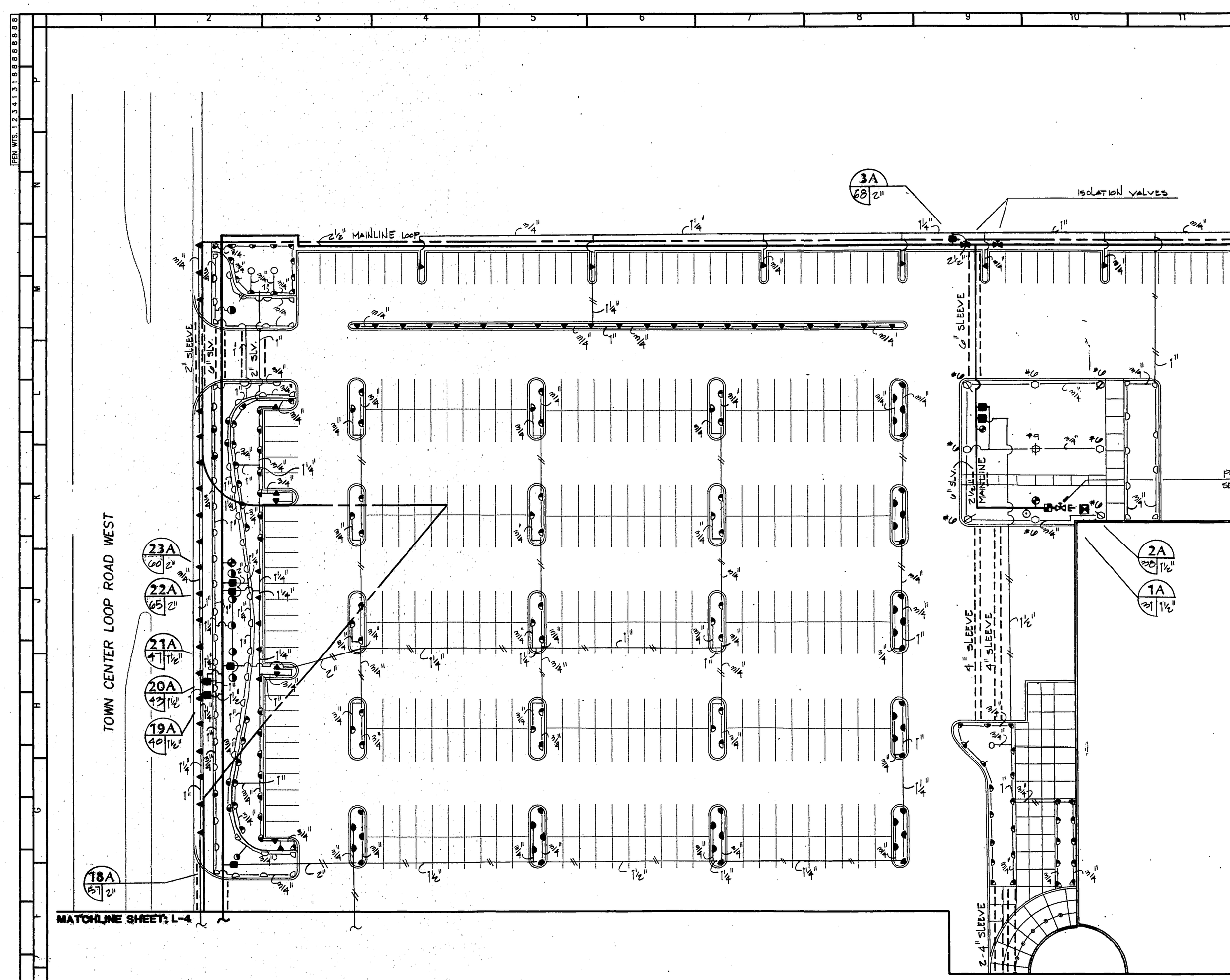


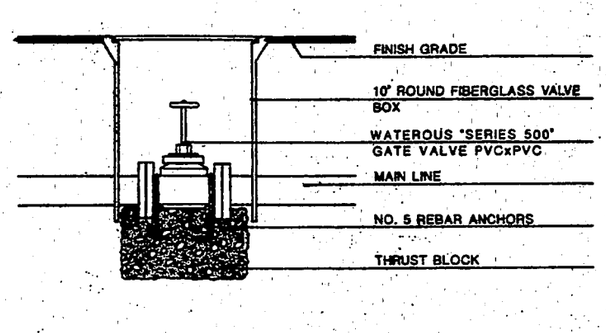
1 TREE PLANTING DETAIL N.T.S.



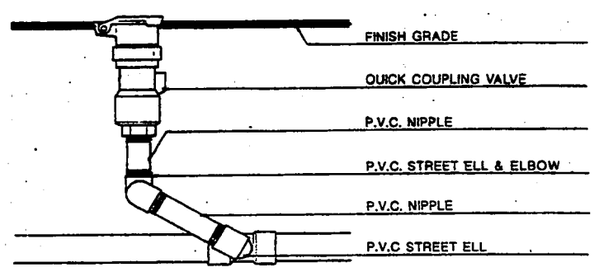
2 CONIFER PLANTING DETAIL N.T.S.

PROJECT NO. 4-755-0202
CADD FILE 07751502.DWG

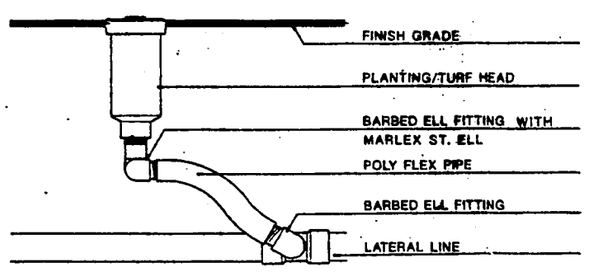




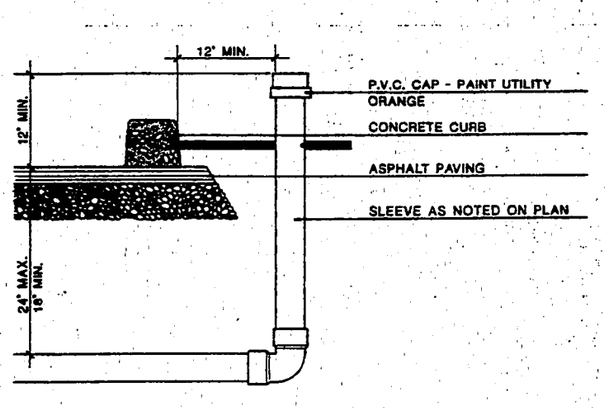
MAINLINE GATE VALVE



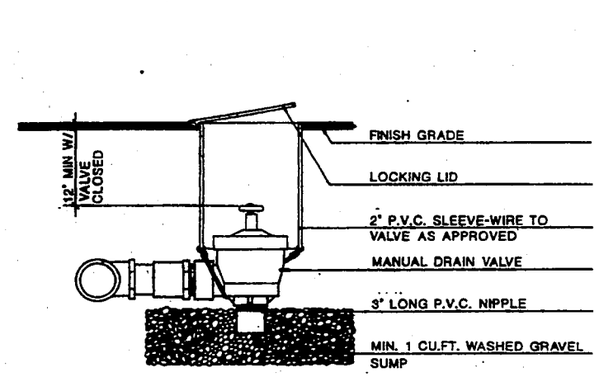
QUICK COUPLING VALVE DETAIL



POLY FLEX RISER DETAIL

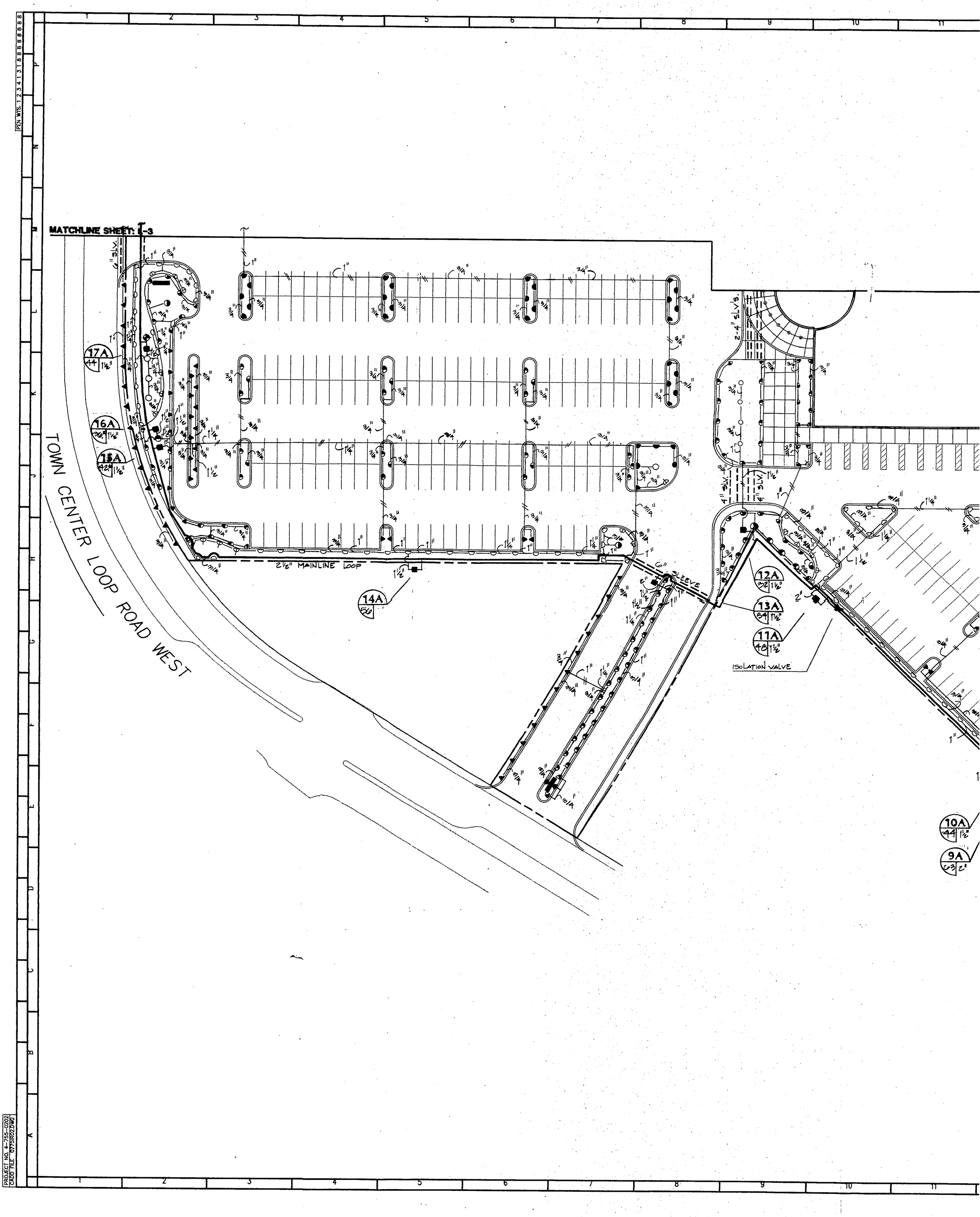


SLEEVING DETAIL



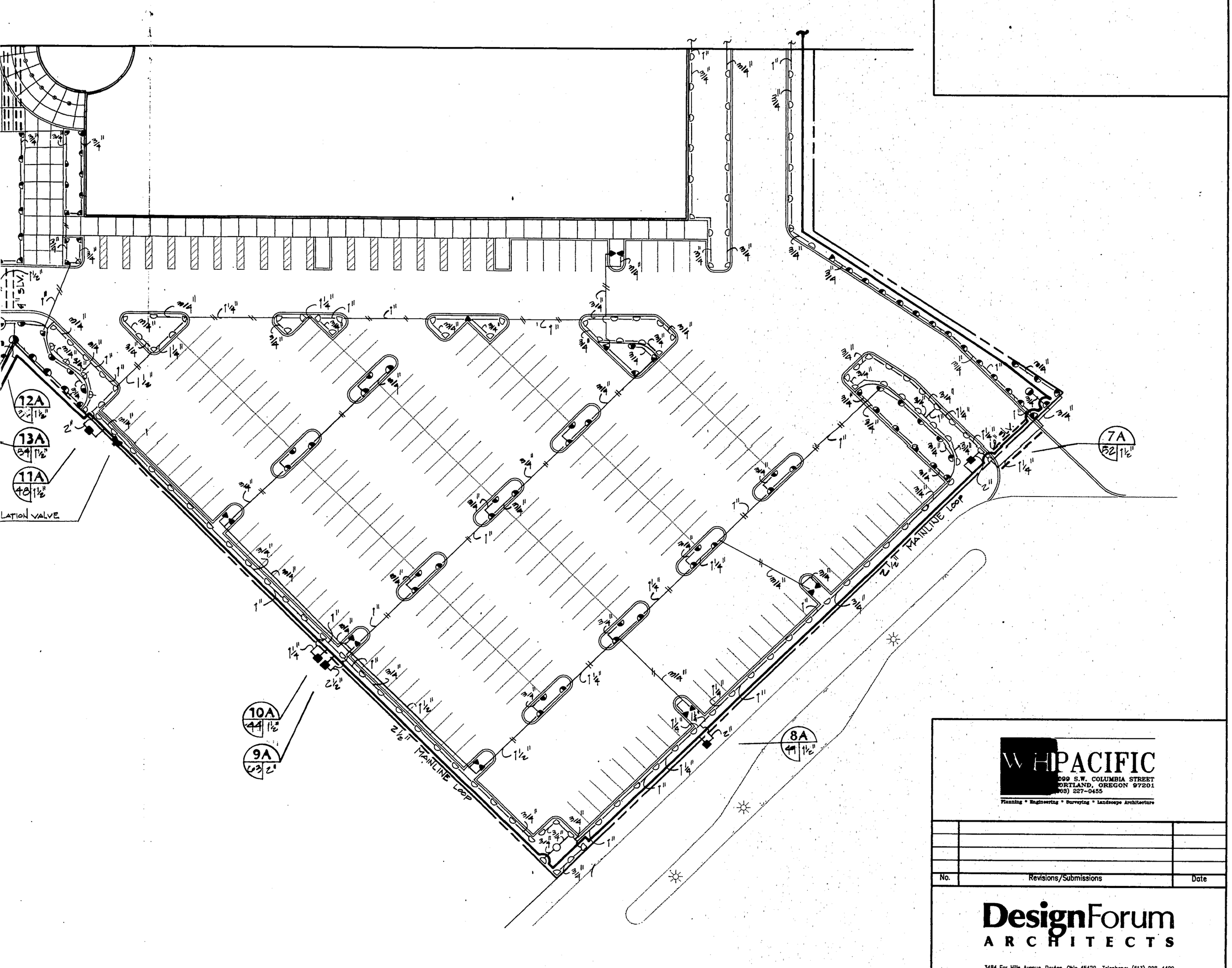
MANUAL DRAIN VALVE DETAIL

PROJECT NO. 4-755-0202
CADD FILE 0775IR01.DWG


MATCHLINE SHEET: C-3
TOWN CENTER LOOP ROAD WEST
2½" MAINLINE LOOP
6" SLEEVE
ISOLATION VALVE
17A
16A
15A
14A
12A
13A
11A
10A
9A
2-4" SLVs.
4" SLV.
PEN WTS. 1 2 3 4 1 3 1 8 8 8 8 8 8 8 8
PROJECT NO. 4-755-0202
CADD FILE 0775IR02.DWG

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

SHEET NOTES



WHPACIFIC
2099 S.W. COLUMBIA STREET
PORTLAND, OREGON 97201
(503) 227-0455
Planning • Engineering • Surveying • Landscape Architecture

No.	Revisions/Submissions	Date

DesignForum
ARCHITECTS
3484 Far Hills Avenue, Dayton, Ohio 45429 Telephone: (513) 298-4400

Project Title
PROJECT THUNDER
WILSONVILLE, OREGON

Drawing Title
IRRIGATION PLAN

Seal: REGISTERED 2861 MATTHEW P. SIMPSON OREGON LANDSCAPE ARCHITECT

Designed MDS MPS	Project No. 4-755-0202
Drawn MDS	Scale 1" = 30'-0"
Checked MPS	Drawing No. L4.0
Reviewed MH	
Date 12-27-91	© 1991 DESIGN FORUM ARCHITECTS

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

DEVELOPMENT REVIEW BOARD PANEL B – SPECIAL MEETING
VERBATIM MINUTES EXCERPT
Appeal of Administrative Decision ADMN23-0029
March 14, 2024 at 4:30 PM
City Hall Council Chambers & Remote Video Conferencing

CALL TO ORDER

A special meeting of the Development Review Board Panel B was held at City Hall beginning at 4:30 p.m. on Thursday March 14, 2024. Chair Rachelle Barrett called the meeting to order at 4:31 p.m.

ROLL CALL

Present for roll call were: Rachelle Barrett, Alice Galloway, John Andrews, and Kamran Mesbah. Megan Chuinard was absent.

Staff present: Daniel Pauly, Stephanie Davidson, Kimberly Rybold, Amanda Guile-Hinman, Miranda Bateschell, and Mandi Simmons

CONTINUING BUSINESS

Resolution No. 429. Appeal of Administrative Decision. The applicant is appealing the Planning Director's determination of non-conformance in Case File ADMN23-0029.

Case File:
DB24-0002 Appeal of Administrative Decision

On February 26, 2024, the Development Review Board closed the public hearing and moved to keep the record open until March 4, 2024. This item will be for deliberation and decision only based on the evidence in the record. No further testimony or written comments will be accepted.

[Verbatim transcript begins 0:19]

Chair Barrett: With the public hearing and record closed, it is time for the Board to entertain a motion to deliberate and make a decision on the application before us. As part of these proceedings, the Board will also need to establish the record. I will begin by calling for a motion regarding the record, then the Staff report, and finally the Resolution.

So that paper we have is the Resolution, just so everyone's clear.

Roll Call was taken at this time.

Chair Barrett: Okay. So, I'm starting with the record. If there's been evidence provided that is outside of the scope of the appeal before the Board, a Board member can make a motion to reject such evidence from the record. If no motion or action is taken on the record, all information, exhibits, materials, and

testimony by all parties placed before the Board during the public hearing will become part of the record.

Do I have a motion regarding any of the evidence submitted on this appeal?

Alice Galloway: Madam Chair, I would like to make the following additional finding. The following evidence submitted is not relevant to the DRB appeal of ADMN23-0029:

Any oral testimony or written material regarding the 1991 Planning Department approvals, including Slides Nos. 3 and 5 of Applicant's PowerPoint presentation, because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.

B. Any oral testimony or written material regarding "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property because this information is not relevant to a determination of the actual use of the subject property at the time the more restrictive land use regulation was enacted in July 2019.

I move to reject from the record the following evidence, anywhere in the record it appears:

1. Oral testimony or written evidence that refers to "The Home Depot" or any potential future user or continuation of use or a change of use for the subject property, including the image of Home Depot on Slide No. 1 of Applicant's PowerPoint presentation and Slide Nos. 9 through 17 of the Applicant's PowerPoint presentation and including the materials attached as Exhibits A and B to Applicant's written materials submitted on March 4th, 2024.
2. The documents and the testimony submitted by the Applicant that pertain to the Class 2 application under review as outlined in Pages 13 and 14 of the Staff report, anywhere in the record that they appear.
3. Any material from the 1991 Planning Department approvals related to calculation of parking requirements, including Slide No. 4 of the Applicant's PowerPoint presentation.

Chair Barrett: Do I have a second?

John Andrews: I'll second that.

Chair Barrett: Do we need to have some discussion on that motion?

Alice Galloway: No discussion.

Chair Barrett: I would like to clarify that we are not removing the original 1991 application, just the parking from the record.

Stephanie Davidson: Okay, that's correct.

Chair Barrett: All right. Any other discussion that we need to have?

All right. I will call to vote. All in favor of this motion, say 'Aye'.

Voices Heard: Aye. Aye. Aye. Aye.

Chair Barrett: The motion carries 4 to 0.

Okay, next I will call for a motion to adopt the Staff report, including all findings and exhibits, except those listed before, and enter it into the record. If a Board member wishes to amend the Staff report in any way, including adding a new condition, removing a condition, or modifying a condition, it should be included in the motion.

Do I have a motion on the Staff report?

Alice Galloway: I move to adopt the Staff report as presented.

Kamran Mesbah: Second.

Chair Barrett: Did you hear the second? Okay. Is there discussion that needs to happen on the Staff report?

Alice Galloway: No.

John Andrews: No

Kamran Mesbah: No.

Chair Barrett: No. Okay. I'm going to call the vote for adopting the Staff report into the record. All in favor?

Voices Heard: Aye. Aye. Aye.

Chair Barrett: Aye. The motion carries 4 to 0.

It is moved and seconded that the Staff report was entered into the record. Do we need to have any further discussion on making a different motion to adopt the Resolution before us?

Okay. Do I hear a motion on the Resolution before us today? On Resolution No. 429.

Kamran Mesbah: I move that we adopt Resolution No. 429.

John Andrews: I'll second it.

Chair Barrett: Okay. It has been moved and seconded that we adopt Resolution 429. Any discussion now?

Alice Galloway: No.

John Andrews: No.

Kamran Mesbah: None.

Chair Barrett: Can I have that?

Kamran Mesbah: Absolutely.

Chair Barrett: I want to specifically call out that on No. 1 of this Resolution, down at the bottom, the second page, last paragraph, it says, "Now, therefore, it be resolved that the Development Review Board of the City of Wilsonville does hereby affirm the Planning Director's determination of nonconformance dated December 28th, 2023, attached hereto with findings and recommendations contained therein, determining that there is a legally established non-conforming use at the location, specifically that the protected use is a 159,400 square foot electronics related retail store."

I just wanted to clarify that it says that and not Fry's, so that we have that clear in our record. So are we—that's all the discussion I wanted to have. Any further discussion?

Alice Galloway: No.

Kamran Mesbah: No.

Chair Barrett: Okay. Hearing no further discussion, I will call it to a vote. All in favor of adopting the Resolution and the Staff report on Resolution 429?

Alice Galloway: Aye.

John Andrews: Aye.

Chair Barrett: Aye.

Kamran Mesbah: Aye.

Chair Barrett: The motion carries 4 to 0.

If you desire to appeal this decision to the City Council, you must file an application stating the grounds for the appeal to the City Council and submit any applicable fee within 14 days of mailing of the decision of notice.

[End of Verbatim Transcription 9:25]

STAFF COMMUNICATION

Daniel Pauly, Planning Manager, confirmed that Chair Barrett, John Andrews, and Kamran Mesbah were available to attend the DRB Panel B meeting, which was rescheduled to the 2nd Monday next month, on April 8th. DRB Panel A would meet on the 4th Monday of April.

ADJOURNMENT

The meeting adjourned at 4:42 p.m.

APPELLANT'S MATERIALS

Notice of Appeal (DRB Resolution No. 429) with Exhibits A-E

Link:
https://www.ci.wilsonville.or.us/sites/default/files/fileattachments/city_council/meeting/128079/appellants_materials_-_notice_of_appeal_drb_res._no._429_with_exhibits_a-e.pdf

Resolution No. 429: Appeal of Administration Decision

INTERNAL USE

ADMN23-0029 Findings

- The original approval for development of the subject property in 1991 (Case File Nos. 91PC43 and 91DR29) characterized the use as “a retail business with the anonymous name “Project Thunder” “**a 159,400 square foot electronics-related retail store**.” Decision, at 2.
- The existing use on the subject property, per the original approval as described above, is a **large format (159,400 square feet), single-story with partial mezzanine, single-user electronics retail store** that exceeds a footprint of 30,000 square feet.” Decision, at 3.
- “It is the determination of the Planning Director that **Fry’s Electronics**, on the subject property at 29400 SW Town Center Loop West, **is a legally established Non-Conforming Use** in a Non-Conforming Structure with Non-Conforming Site Conditions in the TC zone.

1991 Decision Findings

(Case File Nos. 91PC43 and 91DR29)

PLANNING DEPARTMENT
STAFF REPORT

DATE: December 9, 1991

TO: Planning Commission PREPARED BY: Blaise Edmonds

REQUEST: 91PC43 Modification to Stage I Site Master Plan, reconsider Conditon of Approval 8 of Resolution 90PC15; Stage II Phase II Site Development review for a 159,400 square foot retail commercial building - Project Thunder - Capital Realty Corp., applicant.

---

4. Building Use	Code Std.	Proposed	Code Compliance Yes	Code Compliance No	Additional Findings
a. Office	sq. ft.	9,117 SF	●	○	
b. Warehouse	sq. ft.	39,330 SF	●	○	
c. Manufacturing/SERVICE	sq. ft.	17,276 SF	●	○	
d. Other/RETAIL	sq. ft.	63,914 SF	●	○	

- "It is apparent that the remaining undeveloped property has become very desirable as reflected by this application for a **159,400 square foot commercial retail store**." 1991 Decision, at 13.

CONCLUSIONARY FINDING

14. That the location, design and uses are such that the retail commercial center will be adequately served by existing or immediately planned facilities and services.

Sections 4.130 to 4.140

39. The proposed use is authorized by, and consistent with, the Comprehensive Plan and the official City Zoning Map. The proposed commercial/office uses are permitted in overlay zones as part of the Town Center Master Plan. An approval of this Master Plan, however, will amend overlay zones of Ordinance No. 55.

The lawfully established nonconforming use at the subject property is a **commercial retail use** consistent with the 1991 Decision and the property's 1991 Planned Development — Commercial zoning designation.

Wilsonville is not Entitled to Deference in Interpreting the 1991 Decision

- ORS 197.829(1) generally does not require LUBA to affirm a local government's interpretation of a prior land use decision or conditions of approval attached to a prior land use decision. *Gould v. Deschutes County*, 79 Or LUBA 561 (2019) (*Gould VIII*), *aff'd without opinion*, 310 Or App 868, 484 P.3d 1073 (2021).

Requested Relief

- Home Depot respectfully requests that the Development Review Board find that the legally established nonconforming use at the subject property is a **commercial retail use** as approved in the 1991 Decision, not a “Fry’s Electronics” or “single-user electronics retail store.”

Future Development

TABLE 3.1 POTENTIAL FUTURE DEVELOPMENT BY LAND USE TYPE IN TOWN CENTER

	COMMERCIAL (SQ. FT.)	RETAIL (SQ. FT.)	OFFICE (SQ. FT.)	RESIDENTIAL (UNITS)
EXISTING	299,240	321,340	178,950	80
NET NEW DEVELOPMENT (20 YEAR)	130,230	31,860	297,440	880
NET NEW DEVELOPMENT (40 YEAR)	204,595	50,000	541,050	1,600
NET TOTAL	**503,835**	**371,340**	**720,000**	**1,680**
PROJECTED EMPLOYEES	1,000	740	2,880	n/a

Note: Commercial land uses includes a broad category of real estate. For this analysis, commercial land uses are typically larger types of development, such as grocery stores, restaurants, larger retail (non-main street type uses) and entertainment uses. Retail, as defined for Town Center, are typically smaller scale uses typical of a main street development pattern. Residential unit calculations assume units of approximately 750 square feet, although the expectation is that a variety of housing unit sizes (studio, one, two and three bedroom) would be constructed over time. Square footage and housing units were determined using GIS analysis, market feasibility, and proposed zoning district density allowances. Approximately 40 percent of the square footage of developable parcels was removed to accommodate for landscaping, new streets, off-street parking (including loading and circulation), public spaces, stormwater retention and treatment.

THE FUTURE TOWN CENTER

Town Center's evolution will take time and there are many steps to reach the ultimate vision the Wilsonville community has developed. Land uses, transportation connections, and parks described in this chapter are all pieces in creating a walkable hub and heart of the community. The focus should always be on achieving the vision and goals of the Plan, while acknowledging that many of these transformational steps are incremental, both publicly and privately funded, and complex in nature.

INTERNAL USE

Town Center Future Scenario

INTERNAL USE

Aerial Right

3269

INTERNAL USE

Aerial Left

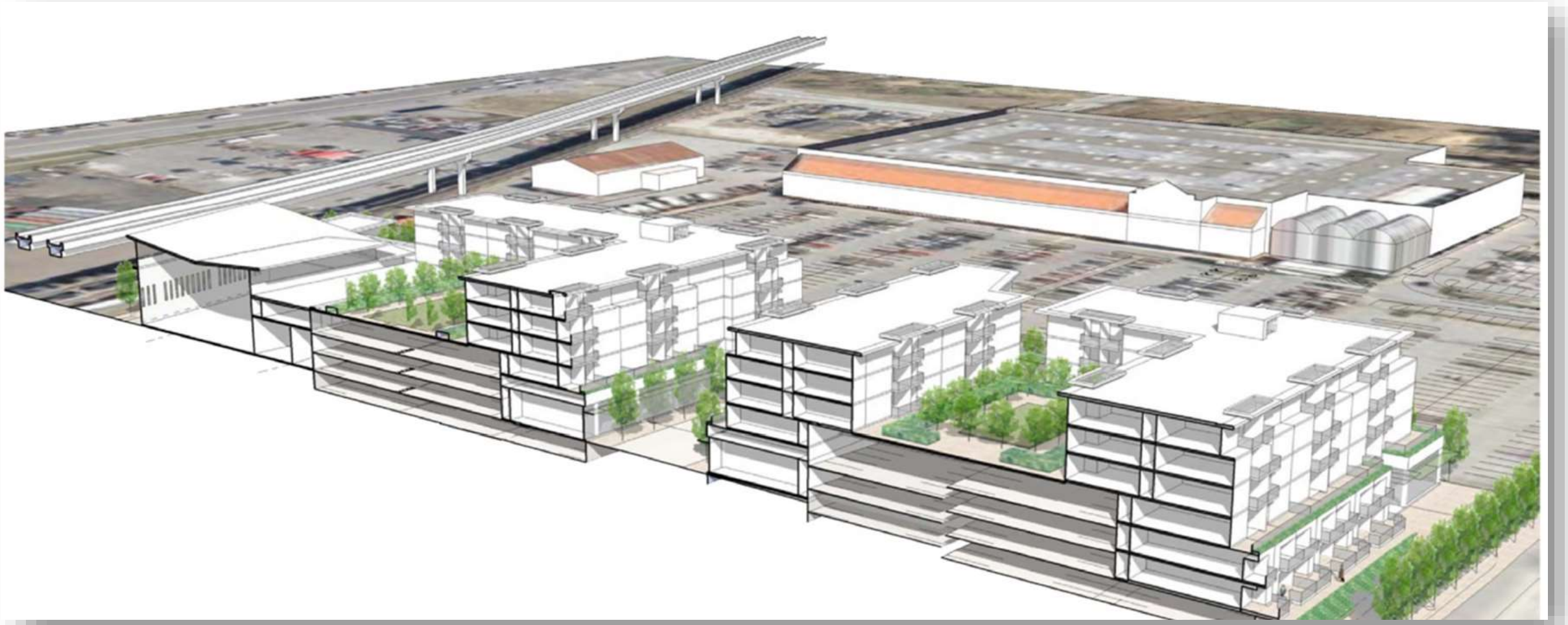
The Home Depot - Wilsonville Town Center

29400 Town Center Loop W
Wilsonville, Oregon

Atlanta, Georgia

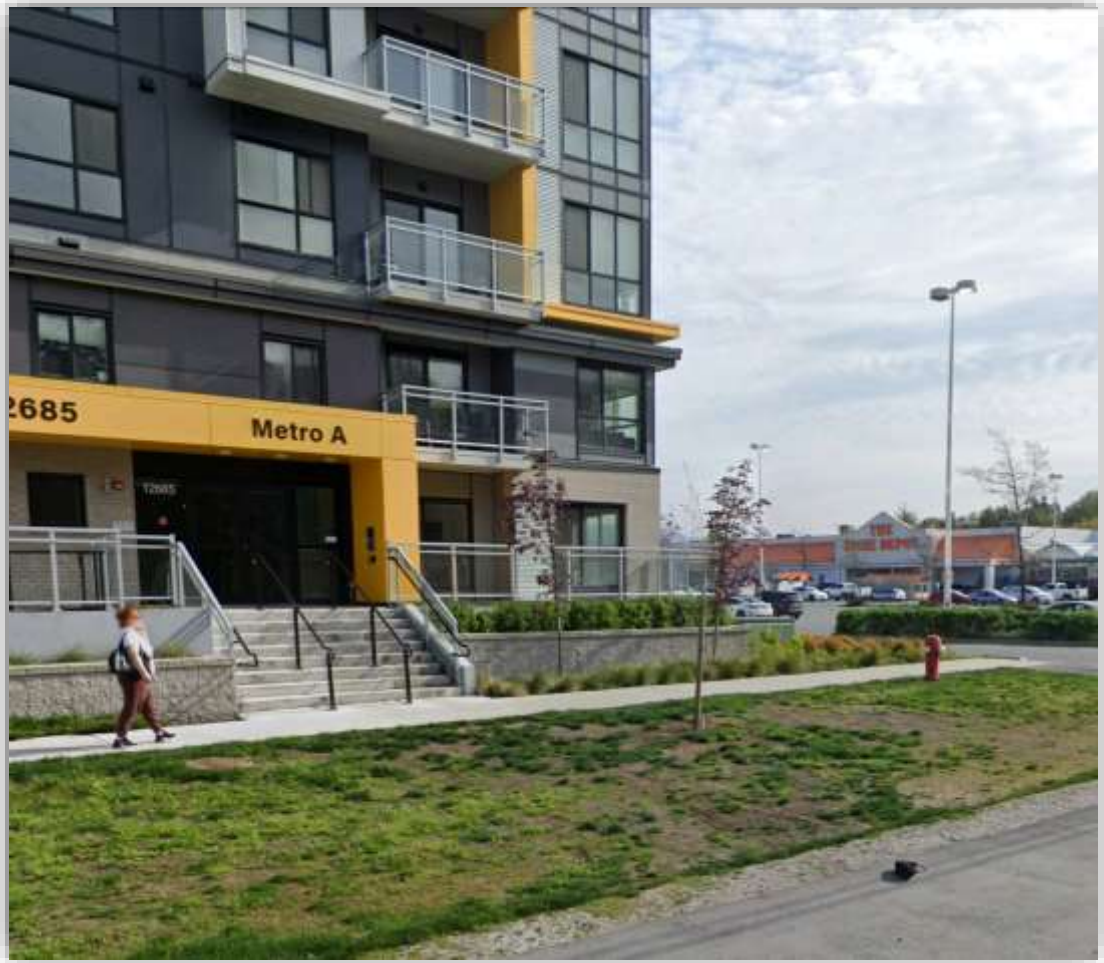
INTERNAL USE

N. Surrey, Canada



INTERNAL USE

N. Surrey, Canada



INTERNAL USE

Lynwood, Washington

INTERNAL USE

Economic Impact:

Oregon

INTERNAL USE

City of Wilsonville
2024 Earth Day Proclamation

WHEREAS, this year marks the 54th anniversary of Earth Day, which began in 1970 as a long-term endeavor to make the planet clean, healthy, and sustainable; and

WHEREAS**,** Earth Day is celebrated around the globe by people of all backgrounds, faiths and nationalities; and

WHEREAS, the global community faces challenges such as environmental degradation, extreme weather events, health issues, resource shortages, and economic struggles; and

WHEREAS, all people, regardless of race, gender, income, or geography, have a right to a healthy, sustainable environment with economic growth and opportunity; and

WHEREAS**,** Wilsonville has always recognized the importance of protecting, conserving, and restoring our natural resources, which ensures a livable and vibrant community; and

WHEREAS**,** community members of all ages can contribute to building a healthy society through the wise use and protection of our natural resources, including our air, water, and natural habitats; and

WHEREAS**,** this year's Earth Day theme is "Planet vs. Plastics," which unites individuals, businesses, organizations, and governments in reducing the use of plastics and building a plastic-free future for generations to come.

NOW, THEREFORE**,** I, Julie Fitzgerald, Mayor of the City of Wilsonville, urge all citizens to celebrate Earth Day and to support efforts to raise environmental awareness and protect our environment; and

Further, I encourage all citizens to participate in Wilsonville's Earth Day celebration on April 20, 2024, 10 am – 2 pm, at the Center for Research in Environmental Sciences and Technologies (CREST).

Dated this 15th day of April 2024

_____

Julie Fitzgerald, Mayor

City of Wilsonville
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Dated this 15th day of April 2024

Julie Fitzgerald

Julie Fitzgerald, Mayor

WILSONVILLE
COMMUNITY DEVELOPMENT

March 2024 Monthly Report

From The Director's Office

Greetings,

On March 6, Mayor Fitzgerald, City Manager Bryan Cosgrove and Economic Development Manager Matt Lorenzen hosted four principals from the Kitakata Ramen Ban Nai Company (aka Mensyoku Co. LTD.) on what was our first international economic development trade mission. The Kitakata Ramen Ban Nai Company has seven restaurants in North America and they are interested in potentially expanding their brand to Oregon as an extension of our Sister City relationship.

Spurred by the Council's recent visit to Kitakata where initial contacts were made, the local tour of Wilsonville included meeting with regional food production, manufacturing and distribution industries including representatives of Business Oregon, the Wheat Marketing Center, Shin Shin Foods, Food Guys, and the Oregon State University Food Innovation Center. The purpose of the meetings was to make connections within various food industries to explore opportunities for Mensyoku Co. LTD. to manufacture Kitakata's unique ramen brand right here in Oregon.

Mr. Nakahara, founder of Kitakata Ramen Ban Nai Company, noted that many meaningful connections were made during the tour with people in the food manufacturing and distribution industries setting the stage for future conversations. You never know how these relationships and efforts will bear fruit in the future, but taking the time to communicate what is available in Wilsonville from an industrial production and retail/restaurant perspective is surely worth the time that was taken to host our guests.

Cheers to future connections with the citizens of Kitakata and the country of Japan, as we look forward to the opportunity to enjoy their world famous ramen right here in Wilsonville.

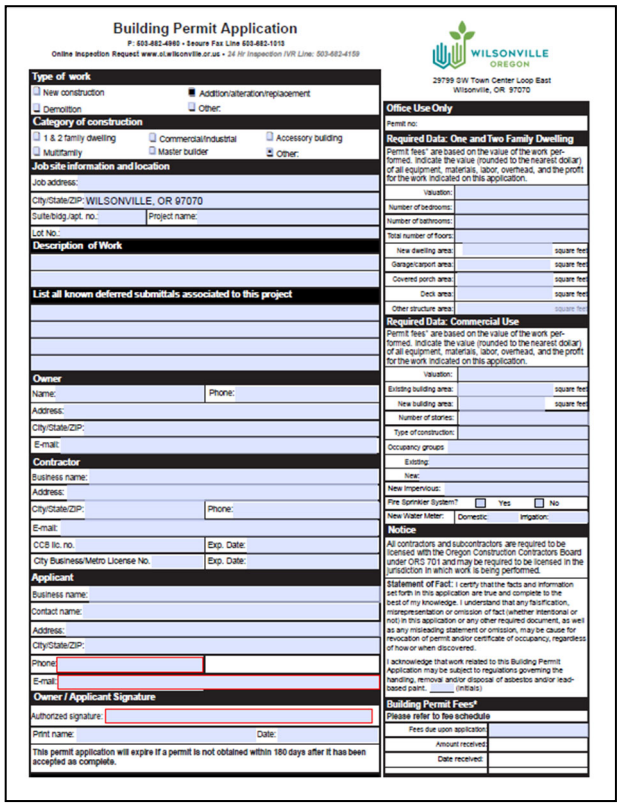
Respectfully submitted,

Chris Neamtzu, AICP

Building Division

Navigating the Permit Process: A Pathway to Successful Construction Projects

Permitting is a crucial step in the construction process, ensuring compliance with safety standards and building codes.



Building Permit Application

P: 503-682-4960 • Secure Fax Line 503-682-1015

Online Inspection Request www.ci.wilsonville.or.us • 24 Hr Inspection IVR Line: 503-682-4159

WILSONVILLE OREGON

29799 SW Town Center Loop East
Wilsonville, OR 97070

Type of work
New construction | Addition/alteration/replacement | Demolition | Other:

Category of construction
1 & 2 family dwelling | Commercial/industrial | Accessory building | Multifamily | Master builder | Other:

Job site information and location
Job address:
City/State/ZIP: WILSONVILLE, OR 97070
Suite/bldg./apt. no.: Project name:
Lot No.:

Description of Work

List all known deferred submittals associated to this project

Owner
Name: Phone:
Address:
City/State/ZIP:
E-mail:

Contractor
Business name:
Address:
City/State/ZIP: Phone:
E-mail:
CCB lic. no. Exp. Date:
City Business/Metro License No. Exp. Date:

Applicant
Business name:
Contact name:
Address:
City/State/ZIP:
Phone:
E-mail:

Owner / Applicant Signature
Authorized signature:
Print name: Date:
This permit application will expire if a permit is not obtained within 180 days after it has been accepted as complete.

Office Use Only
Permit no:

Required Data: One and Two Family Dwelling
Permit fees* are based on the value of the work performed. Indicate the value (rounded to the nearest dollar) of all equipment, materials, labor, overhead, and the profit for the work indicated on this application.
Valuation:
Number of bedrooms:
Number of bathrooms:
Total number of floors:
New dwelling area: square feet
Garage/carport area: square feet
Covered porch area: square feet
Deck area: square feet
Other structure area: square feet

Required Data: Commercial Use
Permit fees* are based on the value of the work performed. Indicate the value (rounded to the nearest dollar) of all equipment, materials, labor, overhead, and the profit for the work indicated on this application.
Valuation:
Existing building area: square feet
New building area: square feet
Number of stories:
Type of construction:
Occupancy groups
Existing:
New:
New impervious:
Fire Sprinkler System? Yes No
New Water Meter: Domestic: Irrigation:

Notice
All contractors and subcontractors are required to be licensed with the Oregon Construction Contractors Board under ORS 701 and may be required to be licensed in the jurisdiction in which work is being performed.

Statement of Fact: I certify that the facts and information set forth in this application are true and complete to the best of my knowledge. I understand that any falsification, misrepresentation or omission of fact (whether intentional or not) in this application or any other required document, as well as any misleading statement or omission, may be cause for revocation of permit and/or certificate of occupancy, regardless of how or when discovered.

I acknowledge that work related to this Building Permit Application may be subject to regulations governing the handling, removal and/or disposal of asbestos and/or lead-based paint. (mitlas)

Building Permit Fees*
Please refer to fee schedule
Fees due upon application:
Amount received:
Date received:

- Application Submission: It all begins with submitting a complete application that details the proposed construction. Accuracy and thoroughness in the application are key to avoiding delays.
- Plan Review: Our team meticulously reviews the plans to ensure compliance with building codes, zoning regulations, and safety standards. This step is essential to identify potential issues before construction begins.
- Permit Issuance: Once the plans are approved, the permit is issued, allowing the construction project to commence. This document signifies that the proposed work meets the necessary requirements.
- Inspections: Throughout the construction phase, inspections are conducted to verify that the work is being executed as per the approved plans and meets safety standards.
- Final Approval: After successful inspections, the project receives final approval, indicating that it aligns with the approved plans and complies with building codes.

Understanding the Permit Process:

The permit process is more than just paperwork. It's a vital checkpoint in the construction journey. Here's an overview:

Significance of Building Permits:

Building permits serve several critical purposes:

- Safety and Compliance: Permits ensure that construction meets safety standards, safeguarding the well-being of occupants and preserving property values.
- Quality Control: Compliance with building codes and regulations guarantees quality construction, protecting against potential hazards.
- Community Development: Permitted construction contributes to planned community growth, aligning with zoning ordinances and development guidelines.

Tips for a Smoother Permitting Experience:

- Early Planning: Engage with the Building Division early in the planning phase. Seek guidance before submitting applications to ensure completeness.
- Complete Applications: Submit thorough and accurate applications. Incomplete or inaccurate information can cause delays in the permit issuance.
- Communication: Maintain open communication with the Building Division throughout the process. Ask questions and seek clarifications whenever needed.
- Adherence to Regulations: Ensure that the construction complies with building codes, zoning ordinances, and other regulations to avoid potential setbacks.

Economic Development Division

Aurora Economic Opportunities Analysis

Economic Development Manager (EDM) Matt Lorenzen is participating on the Technical Advisory Committee (TAC) for the City of Aurora's Economic Opportunities Analysis (EOA). Cities are required to complete an EOA in order to remain in compliance with Goal 9 of Oregon's land use program. In theory, an EOA ensures cities have adequate lands to accommodate economic/ employment growth, for the health of the city and for the health of the State of Oregon.

The City of Aurora is completing an EOA at this time in order to realize economic potential around the Aurora Airport. They are exploring the possibility of incorporating the area and providing urban services for more sustainable and healthy economic growth through a diversified tax base.

The TAC is a well-balanced group, and we are pleased to have been invited to participate. We are in attendance to provide insight, where appropriate, and to protect Wilsonville's interests. So far, in the two meetings that have already occurred, there has been no discussion of airport expansion as this is a separate issue. Some participants have been keen to discuss the topic, but the chair of the committee has been quick to remind participants that issue is separate and subject to other legally-required master-planning processes, with which Wilsonville's government affairs staff is well-acquainted.

Elections Review of Measure 3-605 Public Outreach

The question of Town Center Urban Renewal will be on the May 2024 ballot for an advisory vote, as has been directed by the City Council. In order to inform the public about the effect of the ballot measure (3 -605), if passed, staff has been working diligently since January to create three(3) core pieces of public outreach collateral—an informational website, an informational video, and a script for the video voiceover. After drafts had been reviewed internally by Community Development and Legal staff, EDM submitted the materials to the Secretary of State's Elections Division for review under the "Safe Harbor" program, which provides limited protection to public agencies if their public outreach materials are reviewed and approved before publication.

ORSOS Elections

Leaning on Partners

On March 25, staff had a working lunch with technical assistance non-profit, the Oregon Manufacturing Extension Partnership (OMEP). OMEP operates on a "fee for service" basis, providing consulting services to Oregon manufacturers that request assistance as they navigate a host of issues, including workforce development, supply chain, "Lean" manufacturing implementation, sustainable growth, and more.

OMEP

Staff is exploring the possibility of creating a program that would offset some of the costs businesses incur when they contract with OMEP, in order to support and grow local industry.

Economic Development Division

Mayor welcomes Mensyoku Co. (Kitakata Ramen)

On March 6, Mayor Fitzgerald, City Manager Bryan Cosgrove, and EDM Matt Lorenzen, hosted executive leadership from Mensyoku Co. of Japan. Mensyoku is the parent company of Kitakata Ramen Ban Nai, which is a small chain of restaurants located in both the Japan and the United States—California and Illinois. Kitakata Ramen is also sold in retail grocery stores and manufactured and sold on a wholesale basis.

Mayor Fitzgerald and the City Council first met the Mensyoku Company during their recent visit to Kitakata, Wilsonville's sister city, in February 2024. Company leaders were visiting California to celebrate the opening of a new retail store/restaurant in Torrance, CA. They gladly accepted the Mayor's invitation to visit us in Oregon to learn more about how they could advance their company—both manufacturing and restaurant—in our region. The Mayor's agenda included presentations from the Wheat Marketing Center, the Japan-America Society of Oregon, Business Oregon, and contract manufacturers and distributors of Asian foods in the region.

Our friends at Mensyoku appreciated our efforts and they look forward to exploring Oregon business opportunities more in the near future.

Small Business Support

EDM met with a local business owner (name withheld for privacy) who shares a concern expressed by an increasing number of other local business owners in the City: high commercial rents and property managers whose practices seem to contribute to business tenant turnover and the erosion of profits for tenants.

This is not an issue the City can readily address, but it is something to watch and be aware of. While local businesses, whose products and services mainly reach residents only, are not often key drivers of the City's economy and tax base, they do serve an important economic function—providing jobs, services, and amenities that are important for inviting and retaining both residents and businesses. A thriving retail, service, and restaurant sector is critical to the overall health of the City. The Council may hear from business owners during public comment at future Council meetings and should be aware of this growing concern, particularly in certain areas of the City.

Westside Economic Alliance (WEA) Policy Conference

Mayor Fitzgerald attended the WEA Policy Conference on March 14, accompanied by Economic Development staff. The title for the conference was "Directing our growth through collaboration." Key themes discussed by panelists included infrastructure, land readiness (residential and employment), and intra-regional collaboration.

There was balanced discussion about the need to remain economically relevant in the western United States. Land availability and infrastructure were identified as both barriers and opportunities. There was consensus that neither municipalities nor private developers/businesses could bear the costs to prepare lands and build infrastructure alone—or together, for that matter. More state and/or federal support is needed, and more strategic thinking at the regional level to direct growth and development where it is desired and where it makes the most sense, as it pertains to tying into existing or planned infrastructure. Ronler Acres of Hillsboro was held up as a case study of what is possible when infrastructure planning, available land, and visionary collaboration between the public and private sectors come together.

Engineering Division, Capital Projects

2023 Street Maintenance (4014/4118/4717)

The following improvements were performed by S-2 Contractors:

- Boeckman Road (near I-5 Overpass): Road base reconstruction, paving and re-striping.
- Wilsonville Road (between I-5 and Kinsman Road): Road base reconstruction, all paving and striping.
- Wilsonville Road (near Rose Lane): Road base reconstruction, all paving and striping.

Staff has performed a final inspection; however, the bike and crosswalk striping did not fully meet the obligations of the contract and will need to be fixed. Because the work is on Wilsonville Road, the City is requiring this work to be performed at night and is waiting for temperatures to come up so that the final product can be applied.

2024 Street Maintenance (4014/4717)

On November 6, Council awarded a contract to Century West Engineering for the design of:

Boones Ferry Road (Wilsonville Road to Bailey Street)

- Rehabilitation of pavement section
- Updating of all non-compliant ADA pedestrian ramps
- Pedestrian signal improvements at Boones Ferry Road at the entrance to Fred Meyer
- Updating of the mid-block pedestrian crossing near Killer Burger

Bailey Street (Boones Ferry Road to cul-de-sac near Subaru Dealership)

- Reconstruction of pavement section
- Updating of all non-compliant ADA pedestrian ramps

Boberg Road (Boeckman Road to Barber Road)

- Reconstruction of pavement section

This project is working through design with a goal of bidding in Spring and construction in June-August 2024.

Boberg (Sewer) Manhole Replacement

This project just completed replacement of a sewer manhole and installation of an internal diversion structure adjacent to the new Public Works campus. This diversion structure will send flows from one sewage basin that sees high stormwater flows through inflow and infiltration (I&I) during rain events, to be diverted to a lower flow sewage basin. This diversion will reduce the potential of any sewage backups in the higher flow basin.

Boeckman Creek Flow Mitigation (7068)

This project will look at storm water flows coming off the Siemens site towards Boeckman Creek. Historically, these flows were directed towards the Coffee Creek wetlands, but with development of the Siemens site, flows were altered to head towards Boeckman Creek in the 1980s. These flows are needed to return to their natural waterways with the installation of the new Boeckman bridge. The contract is in the final stages of being executed, and two site meetings have occurred to help define work for subcontractors. Additionally, the rights of entry to start work are nearly complete.

Engineering Division, Capital Projects

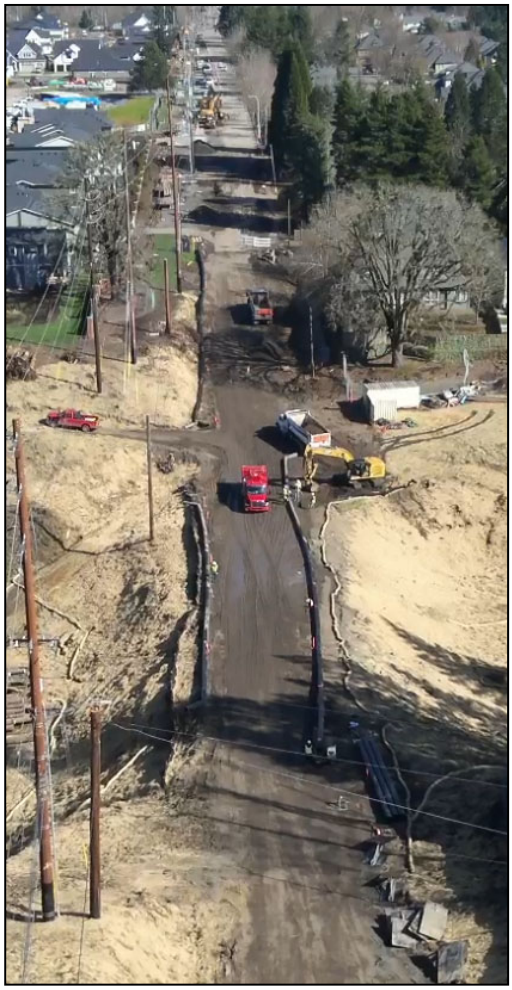
Boeckman Creek Interceptor (2107)

This project will upsize the existing Boeckman Creek Interceptor sewer collection pipeline in order to support the development of the Frog Pond area. A regional trail will be installed as a part of the maintenance path from Boeckman Road to Memorial Park. Field investigations of the original area are finished, however, it was determined additional field investigations are needed to complete the routing study. CIP 7054, Gesellschaft Water Well Channel Restoration, will also be brought into this project to minimize City design and construction costs. Consultant proposal for additional work was accepted, and data is being gathered near the west side of the Wilsonville Bridge at Boeckman Creek. Once additional information is collected, analyzed, and reviewed, a public open house will be held to seek input on the design to refine the layout. The dates for events will be set at appropriate times and advertised in advance of the events.

Boeckman Road Corridor Project (4212/4206/4205/2102/7065)

This project involves the design and construction of the Boeckman Dip Bridge, Boeckman Road Improvements (Canyon Creek Road – Stafford Road), Canyon Creek Traffic Signal, and Boeckman Road Sanitary Sewer projects. The Tapani-Sundt Joint Venture is nearly complete with design, with minor cleanup remaining. Property acquisitions are advancing, and very nearly complete. This project has been divided into several guaranteed maximum price (GMP) packages. The entire project is expected to be complete in Fall 2025.

- **GMP 1: Temporary Traffic Signal at Stafford Road and 65th Ave**
  - ◊ Work is complete on this package. Public feedback on the signal has been significantly positive.
- **GMP 2: Meridian Creek Culverts, House Demo**
  - ◊ Work is complete on this package (pictured). Recent heavy rain events were easily conveyed under the road through these culverts.
- **GMP 3: Bridge, Roundabout, and Road Widening**
  - ◊ All site clearing has been completed.
  - ◊ Sewer line installation is under way, with flagging in each direction.
  - ◊ Work in the roundabout at Canyon Creek and Boeckman have begun.
  - ◊ Pile driving activities are expected this spring. This activity is expected to generate significant noise. Outreach activities have been targeting informing the public well in advance of this work.
  - ◊ A temporary waterline has been installed as a part of this (pictured).



Road closure started on January 22, with extensive public communication and information distributed prior to the closure. Tree removal and overhead utility relocation work is underway, with deep sewer installation from the dip to Stafford Road starting this month. Pile driving activities are expected this spring.

Engineering Division, Capital Projects

Charbonneau Lift Station (2106)

This project involves replacing the Charbonneau wastewater lift station with a submersible lift station and replacing the force main from the station to the I-5 bridge. The design contract was awarded to Murraysmith in December 2021, and final design was completed in October 2023. A construction contract with Tapani, Inc. was awarded by City Council in December 2023, with construction anticipated for completion in September 2024.

West Side Level B Reservoir and Transmission Main (1149)

This project will design and construct a new three million gallon water reservoir just west of City limits, along with a 24-inch transmission main connecting to the City water system. City Council awarded the design contract to Consor in February 2023. Design will be completed in spring of 2024, followed by construction in 2024-2025.

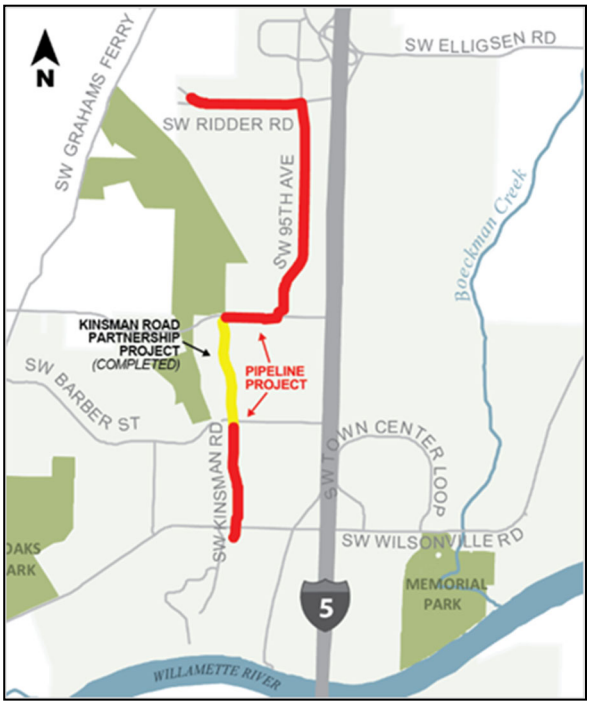
Water Treatment Plant (WTP) Expansion to 20 MGD (1144)

This project will expand the WTP capacity to 20 MGD and incorporate related WTP capital improvements. A Construction Manager/ General Contractor (CMGC) alternative contracting method was approved by City Council in March 2020. An engineering contract was awarded to Stantec in July 2020. The CMGC contract was awarded to Kiewit in August 2021. Final design was completed in coordination with the CMGC in March 2022. Construction began in June 2022, with completion expected in June 2024.

WWSP Coordination (1127)

Ongoing coordination efforts continue with the Willamette Water Supply Program (WWSP). Here are the updates on major elements within Wilsonville:

- **Phase 1, Wilsonville Road (PLM_1.1)** Arrowhead Creek Lane to Wilsonville Road—**COMPLETE**
- **Phase 2, Garden Acres Road to 124th (PLM_1.2)** Ridder Road to Day Road—**COMPLETE**
- **Phase 3, Wilsonville Road to Garden Acres Road (PLM_1.3)** The WWSP's last section of transmission pipeline to be constructed in the City of Wilsonville began in fall 2022, with completion planned for 2024. It will connect the remaining portion of the pipeline through Wilsonville and has an alignment along Kinsman Road, Boeckman Road, 95th Avenue, and Ridder Road (see image). The Engineering Division is currently in the process of reviewing final plans and coordinating construction. The trenchless crossing under Wilsonville Road has been completed. Pipe install on the northern half of 95th Avenue to Ridder Road has been completed and restoration of the sidewalk and curb and gutter on the east side of the road is ongoing. The east side of 95th Avenue from Hillman Court to Ridder Road has been temporarily paved and is opened to two way traffic, with permanent concrete road panel restoration to follow in Spring 2024. Pipe installation and water main relocation began on 95th Avenue from Hillman Court to Boeckman Road at the end of February 2024. Pipe installation has been completed on Kinsman Road between Wilsonville Road and Barber Street, and the contractor has begun preparation for restoring the concrete road panels on the west side of Kinsman Road. The trenchless crossing under Boeckman Road has begun.



Engineering Division, Private Development

Residential Construction Activities

Canyon Creek South Phase 3

The contractor paved at the beginning of December (pictured). The City awaits submittal of construction drawings for the open space improvements.

Frog Pond West

Frog Pond West continues to see significant construction activities. Housing construction in the Frog Pond Ridge, Frog Pond Crossing, Frog Pond Oaks and Frog Pond Vista subdivisions is on-going.

- Frog Pond Crossing subdivision, a 29-lot subdivision located north of Frog Pond Lane, was paved at the end of July. The contractor is working on punchlist items for project closeout. Home construction is underway.
- Frog Pond Estates, a 22-lot subdivision located south of Frog Pond Lane and west of Frog Pond Ridge, is working with the private utilities companies to have overhead utilities along Frog Pond Lane placed underground so that street improvements can be completed.
- Frog Pond Oaks subdivision, a 41-lot subdivision located to the west of Frog Pond Crossing, was is continuing to work on punchlist items for project closeout. Home construction is anticipated to start in spring 2024.
- Frog Pond Overlook, a 24-lot subdivision located north of Frog Pond Lane and west of Frog Pond Vista, is anticipated to start construction in spring 2024.
- Frog Pond Primary, the new West Linn-Wilsonville School District primary school on Boeckman Road, working primarily onsite. Work on the utilities (sewer, storm, and water) located in Brisband Lane is continuing.
- Frog Pond Terrace, a 19-lot subdivision located north of Morgan Farms, is anticipated to start construction in spring 2024.
- Frog Pond Vista subdivision, a 44-lot subdivision to the west of Frog Pond Oaks, is continuing to work on punchlist items for project closeout. Home construction underway.

Villebois Clermont

The contractor is continuing to work on punchlist items at Regional Parks 5 and 6. Home construction continues.

Natural Resources Division

Arrowhead Creek Park Pollinator Habitat

On March 9, 2024, the City and Friends of Trees hosted a pollinator-planting event at Arrowhead Creek Park. A total of sixty-one volunteers participated in the planting event, which included the installation of 1,100 native plants important to a variety of pollinators.

Since 2002, the City of Wilsonville has partnered with Friends of Trees Green Space program on a wide variety of natural resource plantings, restoration, and maintenance activities. Founded in 1989, Friends of Trees is a regional leader in improving the urban tree canopy and restoring sensitive natural areas through programs delivered by thousands of volunteers.

Planning Division, Current

Administrative Land Use Decisions Issued

- 7 Type A Tree Permits
- 1 Type B Tree Permit
- 5 Class 1 Administrative Reviews
- 1 Class 2 Administrative Review
- 1 Class 1 Sign Permit

Construction Permit Review, Development Inspections, and Project Management

In March, Planning staff worked with developers and contractors to ensure construction of the following projects are consistent with Development Review Board and City Council approvals:

- Industrial development on Day Road
- New gas station and convenience store on Boones Ferry Road
- Residential subdivisions in Frog Pond West

Development Review Board (DRB)

DRB Panel A met on March 11. At the meeting, the Board approved a new industrial building at the ParkWorks (former Xerox) campus along Parkway Avenue. The board also approved a new electronic reader board sign at Boeckman Creek Primary School.

DRB Panel B had a special meeting on March 14 where they upheld, based on a hearing held February 26 and subsequent information placed in the record, the Planning Director's determinations regarding non-conforming use, structure, and site conditions on the property that was formerly Fry's Electronics in Town Center.

DRB Panel B met for their regular meeting on March 25. Following a public hearing, the board approved the proposed new office building for City County Insurance Services (CIS Oregon) at the Kinsman Road and Wilsonville Road intersection.

DRB Projects Under Review

During March, Planning staff actively worked on the following major projects in preparation for potential public hearings before the Development Review Board:

- Appeal of Administrative Decision RE: Non-Conformance Status
- Digital changeable copy sign on Boeckman Creek Primary School
- New electric substation along Parkway Avenue north of Boeckman Road
- New industrial building at ParkWorks off Parkway Avenue
- New Office Building for City County Insurance Services (CIS) at Wilsonville and Kinsman Roads
- Planning Director's Referral of a Continuation of Non-Conforming Use Determination
- Site improvement on the OrePac campus south of Kinsman Road south of Wilsonville Road
- Warehouse expansion on Boberg Road

Perspective of Proposed CIS Collaboration Center at Kinsman and Wilsonville Roads

Planning Division, Long Range

Frog Pond East and South Master Plan

With the Frog Pond East and South Master Plan adopted in December 2022, the City is now focusing on implementation. Two outstanding implementation steps are in process: (1) Development Code amendments, and (2) an infrastructure funding plan. During March, the project team continued work on testing and refining draft code concepts. Also during March, work continued on the infrastructure funding plan, including meeting with the development community for feedback.

Housing Our Future

This multi-year project will analyze Wilsonville's housing capacity and need followed by developing strategies to produce housing to meet the identified housing needs. This will build upon previous work, including the 2014 Housing Needs Analysis and 2020 Equitable Housing Strategic Plan. In March, the project team held work sessions with Planning Commission and City Council to provide an update on the project and select representatives to the Project Advisory Committee (PAC). The PAC will review technical data and community input, providing input on new housing strategies the City can pursue in the future. The project team also posted a short survey on Let's Talk, Wilsonville!, open through mid-May, to gather the community's stories about how high housing costs impact quality of life. These stories will provide additional context to the City's housing needs identified in the project's technical analysis.

Industrial Readiness Project

During March, the project team also worked on scoping and identifying consultants for the next phases of the project, which will include specific work on the Basalt Creek industrial area between current City limits and Tualatin, as well as a citywide look at industrial land availability and readiness. The City has secured $390,000 in grant funds from Business Oregon ($100,000) and Metro ($290,000) to support this project.

Oregon White Oak Response Coordination and Leadership

In March, Associate Planner Georgia McAlister continued as a key member of the Mediterranean Oak Borer (MOB) task force, continuing to coordinate efforts between various City Divisions and Departments, as well as contract arborists, property owners, and others to diagnose and make a plan to address the declining health of a number of the City's Oregon White Oak trees. The City hosted Oregon Community Trees (OCT) quarterly meeting in early March and presented to the group on the City's experience discovering and dealing with MOB. Georgia met with representatives of ODA and ODF at the end of the month to discuss any new information and plan for the upcoming spring and fall. Trapping efforts by ODA and ODF is already adding to the growing knowledge about MOB behavior in Oregon. OCT also announced their Organization Award will be given to Wilsonville's Park and Recreation team for their incredible efforts and work with trees and specifically acknowledged the work on MOB throughout the City.

At their monthly meeting, the MOB Task force discussed current process for removal, potential improvements, and revisions to removal and disposal criteria. The MOB task force continues to focus on planning for the spring season, coordinating with ODA, ODF, and other interested parties on research efforts.

Planning Division, Long Range

Planning Commission

The Planning Commission met on March 13. The Commission held a hearing on proposed amendments to the Stormwater System Master Plan and unanimously forwarded a recommendation for adoption to City Council. The Commission also held a work session to get updates on the Housing Our Future project and selected Commissioner Willard to serve on the advisory committee with Commissioner Scull serving as alternate.

Transit-Oriented Development at the Wilsonville Transit Center

The Equitable Housing Strategic Plan identified exploration of Transit-Oriented Development (TOD) at the Wilsonville Transit Center as a near-term implementation action. Throughout 2023, the City worked with the project's selected developer, Palindrome, to refine development plans for the site. The proposed project includes 121 units of housing affordable to households making between 30% and 80% of Area Median Income, along with ground-floor tenants including a welcome center for SMART, a new home for Wilsonville Community Sharing, and a coffee house/ taproom space. In March, the City continued its review of construction permit documents consistent with the Development Review Board's approval of the project in January.

General project information is available on the project website:

https://ci.wilsonville.or.us/planning/page/wilsonville-transit-center-tod

Wilsonville Town Center Plan Implementation

During March, City staff continued implementation of a communications plan for the May advisory vote on the establishment of an Urban Renewal District in Town Center. The project team also continued planning for implementation activities in 2024, including additional development opportunity studies and parking management strategies. These activities are anticipated to begin later this year.

WILSONVILLE
FINANCE

March Monthly Report

FINANCE—The department where everyone counts

- **Budget 2024-25**: The Finance Team is in the home stretch, busily putting together the final touches to the budget document, which is on track for delivery to the printer by mid April. Public notices will post in the Wilsonville Spokesman, and in the May addition of the Boones Ferry Messenger, for budget committee meetings to be held May 9, 15, and 16 (if needed).

- **Ongoing Professional Development**: In early March, both our Assistant Finance Director and Senior Accountant attended the Oregon Government Finance Officers Association (OGFOA) Spring Conference. This is consistently an invaluable opportunity to network with other organizations, stay up-to-date with recommended best practices, rules, and regulations, in addition to the benefit of our team's ongoing professional development. Some of the key topics, to name just a few, surrounded: financial forecasts, reserves, internal controls, investments, and the increasing benefits of leveraging artificial intelligence (AI).

- **Staff Development**: The Finance Department is continuing to cross-train in each of our core functional areas, to ensure coverage for each of our core, critical functions. This includes, most notably: Accounts Payable, Payroll, Municipal Court, and Utility Billing.

- **Energy Management:** The City is participating in a strategic energy management team led by the Energy Trust of Oregon. The Finance Operations Supervisor is on the team to help collect billing history for PGE and NW Natural for all City facilities, identify ways to save energy, and then help implement the changes.

- **Attached Financials**: Finance continues to monitor all departments for on-going budget compliance.

City of Wilsonville - Fund Summaries
Reporting Month: March FY 2024

		Current Year Budget	Year to Date Activity	*Remaining Balance*	*% Used*
110 - General Fund					
	Taxes	$ 15,090,000	$ 11,792,202	$ 3,297,798	*78%*
	Intergovernmental	4,102,373	1,897,785	2,204,588	*46%*
	Licenses and permits	242,800	114,733	128,067	*47%*
	Charges for services	413,164	323,239	89,925	*78%*
	Fines and forfeitures	250,000	124,856	125,144	*50%*
	Investment revenue	304,600	769,161	(464,561)	*253%*
	Other revenues	681,450	733,167	(51,717)	*108%*
	Transfers in	5,604,388	3,861,960	1,742,428	*69%*
	TOTAL REVENUES	**$ 26,688,775**	**$ 19,617,104**	**$ 7,071,671**	***74%***
	Personnel services	$ 12,185,032	$ 8,388,338	$ 3,796,694	*69%*
	Materials and services	12,910,094	6,420,639	6,489,455	*50%*
	Capital outlay	311,177	217,577	93,600	*70%*
	Debt service	1,134,284	1,129,631	4,653	*100%*
	Transfers out	10,388,870	3,571,584	6,817,286	*34%*
	TOTAL EXPENDITURES	**$ 36,929,457**	**$ 19,727,769**	**$ 17,201,688**	***53%***
610 - Fleet Fund					
	Charges for services	$ 1,722,180	$ 1,291,635	$ 430,545	*75%*
	Investment revenue	8,200	38,352	(30,152)	*468%*
	Other revenues	-	4,972	(4,972)	-
	TOTAL REVENUES	**$ 1,730,380**	**$ 1,334,959**	**$ 395,421**	***77%***
	Personnel services	$ 985,470	$ 661,765	$ 323,705	*67%*
	Materials and services	801,417	475,293	326,124	*59%*
	Capital outlay	303,800	181,292	122,508	*60%*
	Transfers out	2,400	1,800	600	*75%*
	TOTAL EXPENDITURES	**$ 2,093,087**	**$ 1,320,150**	**$ 772,937**	***63%***
230 - Building Inspection Fund					
	Licenses and permits	$ 1,204,000	$ 1,243,474	$ (39,474)	*103%*
	Investment revenue	71,700	114,512	(42,812)	*160%*
	TOTAL REVENUES	**$ 1,275,700**	**$ 1,357,987**	**$ (82,287)**	***106%***
	Personnel services	$ 1,076,940	$ 668,061	$ 408,879	*62%*
	Materials and services	198,774	116,350	82,424	*59%*
	Transfers out	346,058	259,551	86,507	*75%*
	TOTAL EXPENDITURES	**$ 1,621,772**	**$ 1,043,962**	**$ 577,810**	***64%***
231 - Community Development Fund					
	Licenses and permits	$ 852,302	$ 720,252	$ 132,050	*85%*
	Charges for services	743,714	335,908	407,806	*45%*
	Intergovernmental	21,713	-	21,713	*0%*
	Investment revenue	44,400	62,377	(17,977)	*140%*
	Other revenues	-	25	(25)	-
	Transfers in	3,443,935	1,846,144	1,597,791	*54%*
	TOTAL REVENUES	**$ 5,106,064**	**$ 2,964,707**	**$ 2,141,357**	***58%***
	Personnel services	$ 3,685,060	$ 2,479,315	$ 1,205,745	*67%*
	Materials and services	803,584	365,284	438,300	*45%*
	Transfers out	729,639	455,949	273,690	*62%*
	TOTAL EXPENDITURES	**$ 5,218,283**	**$ 3,300,549**	**$ 1,917,734**	***63%***
240 - Road Operating Fund					
	Intergovernmental	$ 2,240,600	$ 882,419	$ 1,358,181	*39%*
	Investment revenue	52,200	99,048	(46,848)	*190%*
	Other revenues	-	14,698	(14,698)	-
	TOTAL REVENUES	**$ 2,292,800**	**$ 996,166**	**$ 1,296,634**	***43%***
	Personnel services	$ 524,370	$ 306,440	$ 217,930	*58%*
	Materials and services	616,212	476,390	139,822	*77%*
	Capital outlay	300,000	8,950	291,050	*3%*
	Debt service	358,000	356,448	1,552	*100%*
	Transfers out	2,795,962	2,000,497	795,465	*72%*
	TOTAL EXPENDITURES	**$ 4,594,544**	**$ 3,148,725**	**$ 1,445,819**	***69%***

City of Wilsonville - Fund Summaries
Reporting Month: March FY 2024

	Current Year Budget	Year to Date Activity	*Remaining Balance*	*% Used*
241 - Road Maintenance Fund				
Charges for services	$ 2,249,000	$ 1,797,897	$ 451,103	*80%*
Investment revenue	87,100	105,000	(17,900)	*121%*
TOTAL REVENUES	**$ 2,336,100**	**$ 1,902,897**	**$ 433,203**	***81%***
Transfers out	$ 4,235,000	$ 2,561,988	$ 1,673,012	*60%*
TOTAL EXPENDITURES	**$ 4,235,000**	**$ 2,561,988**	**$ 1,673,012**	***60%***
260 - Transit Fund				
Taxes	$ 6,000,000	$ 4,507,299	$ 1,492,701	*75%*
Intergovernmental	4,174,500	3,621,391	553,109	*87%*
Charges for services	40,000	6,063	33,937	*15%*
Fines and forfeitures	5,000	3,269	1,731	*65%*
Investment revenue	425,100	489,781	(64,681)	*115%*
Other revenues	16,000	948	15,053	*6%*
TOTAL REVENUES	**$ 10,660,600**	**$ 8,628,750**	**$ 2,031,850**	***81%***
Personnel services	$ 5,058,100	$ 2,759,890	$ 2,298,210	*55%*
Materials and services	3,239,530	1,878,671	1,360,859	*58%*
Capital outlay	2,060,000	608,201	1,451,799	*30%*
Transfers out	1,043,990	671,308	372,682	*64%*
TOTAL EXPENDITURES	**$ 11,401,620**	**$ 5,918,070**	**$ 5,483,550**	***52%***
510 - Water Operating Fund				
Charges for services	$ 10,104,780	$ 7,479,944	$ 2,624,836	*74%*
Fines and forfeitures	-	12,355	(12,355)	-
Investment revenue	324,500	733,409	(408,909)	*226%*
Other revenues	1,168,080	1,171,565	(3,485)	*100%*
TOTAL REVENUES	**$ 11,597,360**	**$ 9,397,272**	**$ 2,200,088**	***81%***
Personnel services	$ 687,800	$ 382,579	$ 305,221	*56%*
Materials and services	5,050,863	2,983,256	2,067,607	*59%*
Capital outlay	695,000	74,037	620,963	*11%*
Debt service	371,000	370,454	546	*100%*
Transfers out	13,039,912	3,490,388	9,549,524	*27%*
TOTAL EXPENDITURES	**$ 19,844,575**	**$ 7,300,714**	**$ 12,543,861**	***37%***
520 - Sewer Operating Fund				
Charges for services	$ 8,477,900	$ 5,399,100	$ 3,078,800	*64%*
Investment revenue	114,900	445,991	(331,091)	*388%*
Other revenues	31,500	27,142	4,358	*86%*
Transfers in	600,000	600,000	-	*100%*
TOTAL REVENUES	**$ 9,224,300**	**$ 6,472,233**	**$ 2,752,067**	***70%***
Personnel services	$ 449,960	$ 308,106	$ 141,854	*68%*
Materials and services	4,121,454	2,347,103	1,774,351	*57%*
Capital outlay	125,509	125,509	-	*100%*
Debt service	2,880,000	393,199	2,486,801	*14%*
Transfers out	12,208,940	1,769,580	10,439,360	*14%*
TOTAL EXPENDITURES	**$ 19,785,863**	**$ 4,943,497**	**$ 14,842,366**	***25%***
550 - Street Lighting Fund				
Charges for services	$ 540,540	$ 378,231	$ 162,309	*70%*
Investment revenue	17,000	37,059	(20,059)	*218%*
TOTAL REVENUES	**$ 557,540**	**$ 481,707**	**$ 75,833**	***86%***
Materials and services	$ 366,450	$ 181,897	$ 184,553	*50%*
Transfers out	661,954	32,128	629,826	*5%*
TOTAL EXPENDITURES	**$ 1,028,404**	**$ 214,026**	**$ 814,378**	***21%***
570 - Stormwater Operating Fund				
Charges for services	$ 3,678,840	$ 2,377,396	$ 1,301,444	*65%*
Investment revenue	55,100	195,594	(140,494)	*355%*
TOTAL REVENUES	**$ 3,733,940**	**$ 2,572,991**	**$ 1,160,949**	***69%***
Personnel services	$ 324,810	$ 266,544	$ 58,266	*82%*
Materials and services	830,350	404,675	425,675	*49%*
Debt service	838,000	836,422	1,578	*100%*
Transfers out	7,246,822	1,664,543	5,582,279	*23%*
TOTAL EXPENDITURES	**$ 9,239,982**	**$ 3,172,183**	**$ 6,067,799**	***34%***

City of Wilsonville - SDC Fund Summaries
Reporting Month: March FY 2024

		Current Year Budget	Year to Date Activity	*Remaining Balance*	*% Used*
336 - Frog Pond Development					
	Licenses and permits	$ 2,000,000	$ 2,127,627	$ (127,627)	*106%*
	Investment revenue	28,300	141,759	(113,459)	*501%*
	TOTAL REVENUES	**$ 2,028,300**	**$ 2,269,386**	**$ (241,086)**	***112%***
	Materials and services	$ 36,180	$ 6,258	$ 29,922	*17%*
	Transfers out	4,557,454	1,174,886	3,382,568	*26%*
	TOTAL EXPENDITURES	**$ 4,593,634**	**$ 1,181,144**	**$ 3,412,490**	***26%***
348 - Washington County TDT					
	Washington County TDT	$ 250,000	$ -	$ 250,000	*0%*
	Investment revenue	44,700	48,250	(3,550)	*108%*
	TOTAL REVENUES	**$ 294,700**	**$ 48,250**	**$ 246,450**	***16%***
346 - Roads SDC					
	System Development Charges	$ 1,800,000	$ 2,382,819	$ (582,819)	*132%*
	Investment revenue	40,000	359,882	(319,882)	*900%*
	TOTAL REVENUES	**$ 1,840,000**	**$ 2,742,701**	**$ (902,701)**	***149%***
	Materials and services	$ 43,130	$ 8,224	$ 34,906	*19%*
	Transfers out	11,449,559	1,397,590	10,051,969	*12%*
	TOTAL EXPENDITURES	**$ 11,492,689**	**$ 1,405,815**	**$ 10,086,874**	***12%***
396 - Parks SDC					
	System Development Charges	$ 550,000	$ 466,881	$ 83,119	*85%*
	Investment revenue	12,000	62,322	(50,322)	*519%*
	TOTAL REVENUES	**$ 562,000**	**$ 529,203**	**$ 32,797**	***94%***
	Materials and services	$ 17,570	$ 1,126	$ 16,444	*6%*
	Transfers out	1,506,903	54,099	1,452,805	*4%*
	TOTAL EXPENDITURES	**$ 1,524,473**	**$ 55,224**	**$ 1,469,249**	***4%***
516 - Water SDC					
	System Development Charges	$ 1,515,000	$ 1,416,358	$ 98,642	*93%*
	Investment revenue	50,000	316,201	(266,201)	*632%*
	TOTAL REVENUES	**$ 1,565,000**	**$ 1,732,560**	**$ (167,560)**	***111%***
	Materials and services	$ 26,980	$ 4,328	$ 22,652	*16%*
	Debt service	452,000	450,702	1,298	*100%*
	Transfers out	9,515,220	2,213,545	7,301,675	*23%*
	TOTAL EXPENDITURES	**$ 9,994,200**	**$ 2,668,575**	**$ 7,325,625**	***27%***
526 - Sewer SDC					
	System Development Charges	$ 725,000	$ 606,765	$ 118,235	*84%*
	Investment revenue	9,900	36,017	(26,117)	*364%*
	TOTAL REVENUES	**$ 734,900**	**$ 642,783**	**$ 92,117**	***87%***
	Materials and services	$ 22,930	$ 1,884	$ 21,046	*8%*
	Transfers out	1,905,265	818,638	1,086,627	*43%*
	TOTAL EXPENDITURES	**$ 1,928,195**	**$ 820,522**	**$ 1,107,673**	***43%***
576 - Stormwater SDC					
	System Development Charges	$ 690,000	$ 333,061	$ 356,939	*48%*
	Investment revenue	109,700	110,685	(985)	*101%*
	TOTAL REVENUES	**$ 799,700**	**$ 443,745**	**$ 355,955**	***55%***
	Materials and services	$ 5,980	$ 1,126	$ 4,854	*19%*
	Transfers out	1,154,332	702,335	451,997	*61%*
	TOTAL EXPENDITURES	**$ 1,160,312**	**$ 703,461**	**$ 456,851**	***61%***

City of Wilsonville - URA Fund Summaries
Reporting Month: March FY 2024

	Current Year Budget	Year to Date Activity	*Remaining Balance*	*% Used*
800 - Year 2000 Program Income				
Investment revenue	$ 800	$ 1,289	$ (489)	*161%*
Other revenues	-	7,000	(7,000)	-
TOTAL REVENUES	**$ 800**	**$ 8,289**	**$ (7,489)**	***1036%***
Materials and services	$ 5,000	$ 1,183	$ 3,817	*24%*
Transfers out	25,000	25,000	-	*100%*
TOTAL EXPENDITURES	**$ 30,000**	**$ 26,183**	**$ 3,817**	***87%***
805 - Year 2000 Capital Projects				
Investment revenue	$ 476,000	$ 396,788	$ 79,212	*83%*
TOTAL REVENUES	**$ 476,000**	**$ 396,788**	**$ 79,212**	***83%***
Materials and services	$ 295,572	$ 148,017	$ 147,555	*50%*
Capital outlay	14,410,972	3,193,292	11,217,680	*22%*
TOTAL EXPENDITURES	**$ 14,706,544**	**$ 3,341,309**	**$ 11,365,235**	***23%***
810 - Westside Program Income				
Investment revenue	$ 3,715	$ 4,042	$ (327)	*109%*
TOTAL REVENUES	**$ 3,715**	**$ 4,042**	**$ (327)**	***109%***
815 - Westside Capital Projects				
Investment revenue	$ 165,000	$ 183,371	$ (18,371)	*111%*
TOTAL REVENUES	**$ 165,000**	**$ 183,371**	**$ (18,371)**	***111%***
Materials and services	$ 277,178	$ 84,272	$ 192,906	*30%*
Capital outlay	710,000	-	710,000	*0%*
TOTAL EXPENDITURES	**$ 987,178**	**$ 84,272**	**$ 902,906**	***9%***
817 - Westside Debt Service				
Taxes	$ 1,672,200	$ 1,428,175	$ 244,025	*85%*
Investment revenue	20,630	86,062	(65,432)	*417%*
TOTAL REVENUES	**$ 1,692,830**	**$ 1,514,237**	**$ 178,593**	***89%***
Debt service	$ 4,702,025	$ 4,187,519	$ 514,506	*89%*
TOTAL EXPENDITURES	**$ 4,702,025**	**$ 4,187,519**	**$ 514,506**	***89%***
825 - Coffee Creek Capital Projects				
Investment revenue	$ 3,095	$ 3,393	$ (298)	*110%*
Transfers in	500,000	500,000	-	*100%*
TOTAL REVENUES	**$ 503,095**	**$ 503,393**	**$ (298)**	***100%***
Materials and services	$ 136,500	$ 101,000	$ 35,500	*74%*
TOTAL EXPENDITURES	**$ 136,500**	**$ 101,000**	**$ 35,500**	***74%***
827 - Coffee Creek Debt Service				
Taxes	$ 566,800	$ 636,228	$ (69,428)	*112%*
Investment revenue	8,510	14,775	(6,265)	*174%*
TOTAL REVENUES	**$ 575,310**	**$ 651,003**	**$ (75,693)**	***113%***
Debt service	$ 782,000	$ 639,313	$ 142,687	*82%*
TOTAL EXPENDITURES	**$ 782,000**	**$ 639,313**	**$ 142,687**	***82%***
830 - Wilsonville Investment Now Program				
Taxes	$ 1,005,000	$ 871,262	$ 133,738	*87%*
Investment revenue	10,300	585	9,715	*6%*
TOTAL REVENUES	**$ 1,015,300**	**$ 871,847**	**$ 143,453**	***86%***
Materials and services	$ 1,005,000	$ -	$ 1,005,000	*0%*
TOTAL EXPENDITURES	**$ 1,005,000**	**$ -**	**$ 1,005,000**	***0%***

WILSONVILLE PUBLIC LIBRARY

March 2024 Monthly Report

The Tiny Art Show was on display in the Library lobby through the month of March.

From the Director

March at the library means the wrap-up of our winter programs, and a short break as we plan and prepare for spring and summer.

Circulation is on the rise over this time last year. We are seeing a steady 6% increase in circulation of print books for all ages, with the greatest increase in circulation for our Library of Things at an increase of 63% over last year.

Program attendance is also on the rise compared to last year, with a 14% increase in teen attendance and a 54% increase in adult attendance. If it seems like we are busier, it's because we are!

-Shasta Sasser, Library Director

Children's Services

Developmental and Hearing Screenings for children

A Community Engagement and Referral Assistant with Clackamas Education Service District provided free developmental and hearing screenings for children ages birth through 5 years at the library on March 15.

Saturday events:

- "LEGO Masters" contestant Kelly Bartlett shared her experience on the TV show *LEGO Masters* on March 2, to a crowd of 80 kids and adults.
- Artist Elisa Mack taught children in 2nd-5th grades how to paint with watercolors to create their favorite book character on March 16.
- On March 23, we had Spanish Storytime and "Saturday Classic Movie & Family Board Games".

Storytime on March 13 starred a puppet show and a bunny ear craft.

A teen assembling his worm bin at the Early Release Day teen event on March 6.

Teen Services

Teen After School Activities special event: Worm Bin Making

On the Early Release Day (March 6), teens built worm bins for composting food scraps, with assistance from Chris Delk, Parks Maintenance Specialist.

UPCOMING:

- Teen After-School Activities Early Release Day Event: Teen STEAM Activities on Wednesday, April 24, at 3pm.

Adult Services

Space Talk about SpaceX

The March 2 Space Talk featured a presentation about SpaceX. Thirty adults attended the talk, many of them from outside Wilsonville, thanks to a regular attendee's posts on Reddit.com.

New Beginning Spanish class

Due to popular demand, we held a Beginning Spanish class. Registration was required, and the class was full within one week of announcing it, with a lengthy waiting list.

UPCOMING:

- National Poetry Month and a PROFILES online presentation about the sonnet on Wednesday, April 3, at 11am on Zoom.
- Space Talk about "The Search for Life in the Universe" on Saturday, April 6, at 11am.
- Book Notes Concert on Saturday, April 13, at 2pm features The Early Music Guild of Oregon performing music of 1800s Oregon.
- Repair Fair on Saturday, April 27, from 10am-1pm. Bring your broken items for volunteers to attempt to repair.

Reggae group Rhythm Culture performed at the Book Notes concert on Saturday, March 9.

Just one of the 15 tropical sheep hidden around the library for the Spring Break Scavenger Hunt.

Around the Library

Tiny Art Show winners decided

With over 185 votes submitted, the Tiny Art Show winners for all six age categories were decided. The winners' artwork will be on display in the Library lobby in April.

Spring Break Scavenger Hunt

The popular Scavenger Hunt returned, starring a tropical sheep. Over 100 participants of all ages searched the library for clues to solve the Scavenger Hunt's riddle. Participants who solved the riddle chose from a variety of small prizes.

MARCH

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 **Tiny Art Show on display through March** **Play Group** 10:30am-12pm **First Friday Films** Barbie PG-13 3pm	2 **Space Talks** SpaceX's Game Changing Starship 11am **Lego Masters: Kelly Bartlett** 3-5:45pm
3	4 **Terrific Toddlers** 10:30am **Beginnning English Class** 11am	5 **ODHS Drop-in** 10am-12pm 1-3pm **Toddler & Baby Time** 10:30am and 11:15am **Intermediate English Class** 10am	6 **Family Storytime** 10:30am **Profiles** 11am **Steam Stuff** 1-2:30pm **Teen After School Drop-in** 3-6pm	7 **Family Storytime** 10:30am	8 **Play Group** 10:30am-12pm	9 **Booknotes Concerts** Rhythm Culture 2pm
10	11 **Terrific Toddlers** 10:30am **Beginnning English Class** 11am **Teen TAB Meeting** 4:15pm	12 **ODHS Drop-in** 10am-12pm 1-3pm **Toddler & Baby Time** 10:30am and 11:15am **Intermediate English Class** 10am	13 **Family Storytime** 10:30am **Teen After School Drop-in** 3-6pm	14 **Family Storytime** 10:30am	15 **Free Hearing and Developmental Screenings for Children Birth to 5 years** 10:30am-12pm **Play Group** 10:30am-12pm	16 **Paint Your Favorite Book Character with Elisa Mack** 1-3pm
17	18 **Terrific Toddlers** 10:30am **Beginnning English Class** 11am **Genealogy Club** 1pm **Beginning Spanish** 6pm	19 **ODHS Drop-in** 10am-12pm 1-3pm **Toddler & Baby Time** 10:30am and 11:15am **Intermediate English Class** 10am	20 **Family Storytime** 10:30am **Steam Stuff** 1-2:30pm **Teen After School Drop-in** 3-6pm	21 **Family Storytime** 10:30am **Walking Bookclub** 1pm	22 **Play Group** 10:30am-12pm	23 **Spanish Storytime with Adventures in Spanish** 11am **Saturday Classic Movie & Family Board Games** 1:15-5pm
24 31	25 **Beginnning English Class** 11am **Beginning Spanish** 6pm	26 **ODHS Drop-in** 10am-12pm 1-3pm **Intermediate English Class** 10am	27 **Last day to vote for favorites in the Tiny Art Show**	28	29 **Red Cross Blood Drive** 11am-4pm	30

Address
8200 SW Wilsonville Rd
Wilsonville, OR 97070

Hours
Monday - Thursday 10-8
Friday - Saturday 10-6
Sunday 1-6

More Information
(503) 682-2744
wilsonvillelibrary.org
reference@wilsonvillelibrary.org

WILSONVILLE PUBLIC LIBRARY

Parks and Recreation Report | March 2024

Director's Report

Spring has sprung and as always the Parks and Recreation Department is excited for this time of year. Our facility reservations have opened up and our team has been very busy with tours, reservations, and scheduling. This time of year our focus is on planning and preparation to ensure that residents and visitors enjoy their experience and return with their friends and family members.

Beyond their normal maintenance routines the parks team has been working on a replanting project in Murase Plaza. They were also able to install the City's first ADA accessible bags/board game (AKA corn hole) in Memorial Park. The team has also been busy prepping for the new playground and restroom at Boones Ferry Park. Both projects will break ground shortly and are expected to be completed this spring/summer.

The recreation team has been busy planning for upcoming spring/summer activities. All those details can be found in the Spring/Summer Activity Guide, which will be mailed to all Wilsonville residents in early April.

The Community Center will receive a $25,000 grant from the Oregon Department of Human Services to fund a new oven, steam table, and refrigerator. The nutrition program at the community center continues to grow as well as other programs such as 'Sit, Stand and Be Fit', Life 101 Lecture Series, yoga ,and tai-chi.

Finally, the Arts, Culture, and Heritage Commission reviewed artists for the Memorial Park skate park mural. The review panel selected four artists to move forward to the next stage in the process.

-Kris Ammerman

Recreation Updates

Community Egg Hunt

March was a month full of prepping for the Community Egg Hunt, which was held on Saturday, March 30 at 10 am in Memorial Park. This year's sponsors included J. Hill Property Group (title sponsor), Edward Jones Financial (Silver Sponsor) Therapeutic Associated of Wilsonville, Wilsonville Orthodontics, and Wilsonville Cub Scouts (supporting sponsors). Eighteen thousand eggs were dispersed among the fields, and our very special Bailey the Bunny spread cheer during the event. Egg Hunts are separated into different age categories. Those categories being 1-3, 4-5, 6-7, and 8-11. Each age range gets their own space on the field, and age appropriate prize eggs are hidden amongst the rest. This year, the special prize eggs held one of the following prize tickets; a Lego set, a squishmallow, a parks and rec gift card, a Skyhawk's sports academy gift card, sports equipment, and a prize basket! This event continues to be one of the largest community events for the department with an estimated 3,000 people in attendance.

Community Garden

The Wilsonville Community Garden provides year-round gardening opportunities for garden enthusiasts. 2023 gardeners had first right of refusal to their plots, and were able to renew their current plot in February and March. Registration will open to new gardeners on Monday, April 8 for all remaining plots. Garden plots are limited to one per household in an effort to provide as many gardeners access to plots as possible. At this time, there are available plots for 2024 growing. Join us in the garden this year!

Memorial Park Field and Shelter Reservations

The Parks and Recreation team is getting ready for a fun summer with the community using various amenities in Memorial Park. On March 11, shelter and field reservations opened for Wilsonville residents. Registrations then opened the following week on March 18 for non-residents. The River Shelter, Forest Shelter, Grove Shelter, and Splash Shelter are popular spots for the community to hold private events such as birthday parties, company picnics, family reunions, weddings, celebration of life services, and gradation parties.

Stein-Boozier Barn Open House

On Saturday, March 9, Parks and Recreation held an open house at the Stein-Boozier Barn. Wilsonville's own event venue, the barn is a popular spot for weddings, receptions, company events, and other private events. The open house allowed those interested in renting the barn to tour it on a weekend, as well as curious park-goers to explore the inside of the barn while it was open. Private tours are also available during the week when Parks and Recreation offices are open. The next open house is schedule for Sunday, April 7 from 10 am-noon.

Athletic Fields Busy with Spring Sports

The recent stretch of (mostly) sunny weather has allowed local sports organizations to use the athletic fields for practices and games. Once again, the Parks and Recreation team saw the continuing trend of resident organizations filling all available time slots on the ballfields during the spring season for the three fields with lights and as much of the field time as possible on the two ballfields without lights. Currently, youth softball, youth baseball, and little league are playing on the ballfields, while an adult soccer league plays on the soccer fields on the weekends.

Community Center Updates

Nutrition Program

The month of March saw 118 different community members attend lunch at the Community Center. The total meal count for in-person lunch at the Center was 822. The home delivered meal program served nearly 1,800 meals to homebound seniors. Recently, lanyards were purchased for home delivered meal drivers in an effort to help better identify themselves. The lanyards, in addition to the car door magnets, attempt to make the clients as comfortable as possible when opening their door to accept their lunch delivery.

AARP Taxes

During the month of March, trained volunteers from AARP helped 80 local seniors file their 2023 State and Federal income taxes. This program is provided at no charge and is a great benefit to those in the community.

Life 101 Lecture Series

The lecture series continued in March with The Alzheimer's Association presenting an educational lecture which shared details on: when the right time to go to the doctor for a dementia diagnosis or medical treatment is, deciding when to stop driving, and steps for making legal and financial plans for future care. Chinese Medicine Physician PK Melethil shared two lectures "Daily Choices Promote Personal Health" and "The Grocery is the Pharmacy". Both lectures included information on small changes in lifetstyle and nutrition that can lead to a number of health benefits. Finally, Renee James, MSPT, OCS, CMP presented on what can be done to keep bones healthy and strong as individuals age.

Program Participant Numbers On The Rise

Programs at the Community Center continue to build momentum. 'Sit, Stand and Be Fit' is back after a brief hiatus due to an instructor change and is averaging 22 people three days per week. Drop-in participation for yoga and tai-chi has also seen recent increases. The drop-in Virtual Reality Fitness Group (at right) sees steady attendance with attendees competing against each other playing Beat Sabre.

Community Center Awarded $25,000 Grant

The Community Center was recently notified their application had been awarded the full ask of $25,000 to fund the replacement of three major kitchen appliances. The grant from Oregon Department of Human Services will fund the replacement of the Center's oven, steam table and standalone refrigerator.

Board Highlights

Arts, Culture, and Heritage Commission (ACHC)

At the March ACHC meeting the Selection Panel, consisting of the ACHC and two dedicated members from the Skate Community, met to discuss the top eight request of qualifications (RFQ) submissions that were received from the Memorial Park Skatepark Mural RFQ. The original RFQ received 50 applications and an internal team narrowed those down to the top eight. The Panel made a motion and voted, recommending four of the eight artists to advance to a design proposal round. The Panel will review those designs in May and select an artist to be awarded the project.

Kitakata Sister City Advisory Board

The Kitakata Sister City Advisory Board hosted "A Morning Among the Blossoms" Cherry Blossom viewing event in Town Center Park on Saturday, March 23. The event was well received by the community. The event featured Japanese tea and snacks, cherry blossom themed coloring pages, an origami station, a cherry blossom themed library story time, and info about the Kitakata-Wilsonville Sister City relationship. The board met on March 13 to begin outlining goals for the 2024-2025 fiscal year. That process will continue at the April 10 meeting.

Parks and Recreation Advisory Board

The Parks and Recreation Advisory Board did not meet in March.

Upcoming Events

Open House: Sunday, April 7 from 10am-12pm, Stein-Boozier Barn

Spring/Summer Registration: Monday, April 8 – WilsonvilleParksandRec.com

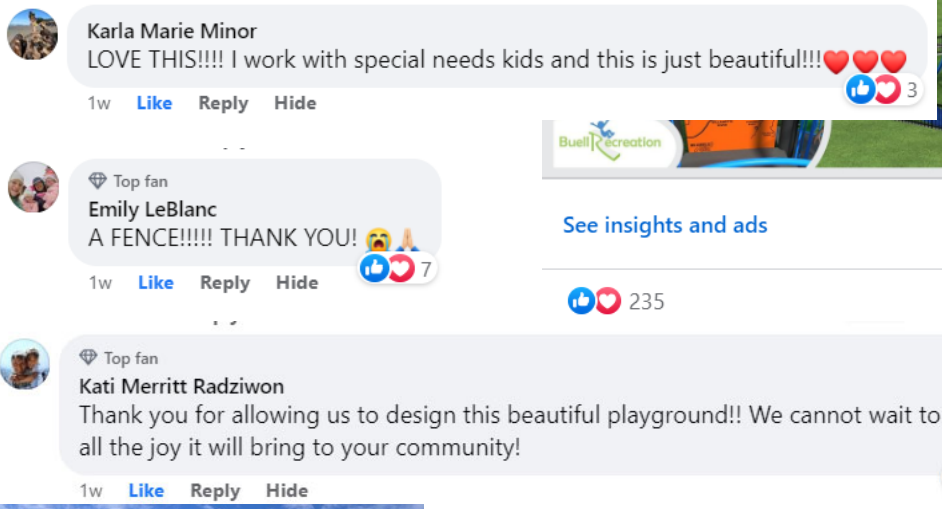
Arboretum Grand Opening Event: Saturday, April 20, 9:30-11am, Murase Plaza Pollinator Garden

Parks Team Updates

Community Responds Well on Social Media to Update about Boones Ferry Inclusive Playground

Social Media users responded well to a recent posting on March 13th about the coming Boones Ferry Inclusive Playground. The post got over 200 likes, 33 comments, and 30 shares– one of the most liked posts today on the departments Facebook page.

Comments included:



Restroom Replacement in Boones Ferry Underway

The Parks Team works to prep for the construction of a new restroom in Boones Ferry Park. The Boones Ferry Restroom Project is partially grant funded.

Park Amenity Improvements

This month the team worked to replant landscaping areas in Murase, with more drought tolerant plants. The team also installed the City's first ADA accessible bags board game in lower Memorial Park.

City of Wilsonville Police

MARCH 2024

Little win of the night

Wilsonville Police assisted Oregon State Police (OSP) early in March. OSP troopers was readying to contact the driver of vehicle they'd pulled over, when he took off, crashed into several cars, and then maneuvered onto I-5, headed the wrong direction. Wilsonville Police officers responded quickly with assistance. Deputies located the suspect's vehicle crashed, and OSP troopers found the suspect a short distance away. We later learned the vehicle has been associated with several cases open in Portland. Hats off to deputies M. Wagner, T. Wolf, S. Bowman, and K9 units S. Krause and B. Lee.

Public Works moved out and the Police Department will be undergoing a remodel

During February and March, Public Works vacated 30000 SW Town Center Loop E. The building's space was assessed through collaborative meetings with City, Police, and Architects. A renovation will begin soon to best meet the immediate needs of our Wilsonville Police department.

Look for us to be operating "business as usual" sometime during the Summer—without construction soot and noise! Until then, thank you for your patience.

Overall, March was a low-key month

Looking back over the month of March and the types of crime Wilsonville Police responded to, data showed most of what filtered through the police department was civil in nature—parking and neighborhood complaints, and general assistance needed. The sun was starting to flirt with us and the City's schools went on Spring Break.

City of Wilsonville
Call Activity

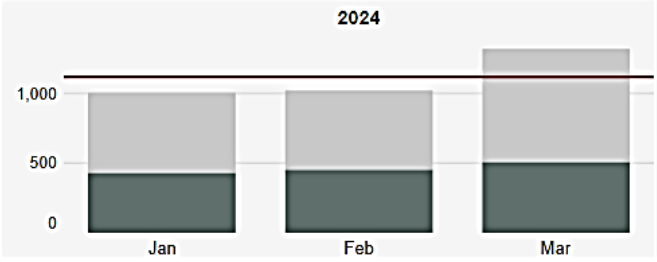
3,335
Total Calls

YEAR 2024

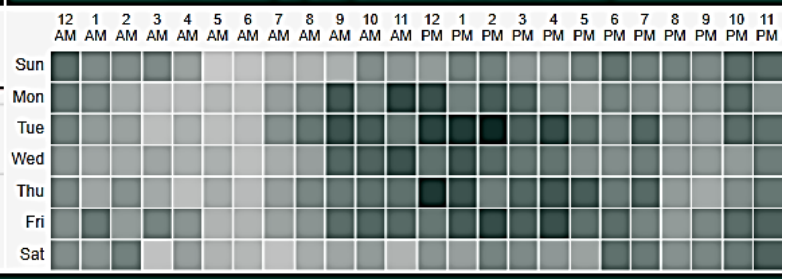
High Priority • 297	Medium Priority • 2,206	Low Priority • 832

Public-Initiated • 1,384	Deputy-Initiated • 1,951

Call Activity by Month and Year



Call Activity by Day of Week and Hour of Day



This dashboard is maintained by CCSO's Strategic Analysis Unit
Data source: Clackamas County Communication's Computer Aided Dispatch (CAD) software
Updated: 4/1/2024 3:20:55 PM (UTC)

MARCH 2024

55	82	74	171	405	122	90	316
Alarm	Assist	Civil	Crime	Disorder	Follow-up	Other	Traffic

Alarm	Alarm	55
Assist	Assist Public	53
	Assist Fire/Medical	13
	Assist Other Agency	8
	Warrant	4
	Assist Law Enforcement	3
	Missing Person	1
Civil	Civil	54
	Behavioral Health	20
Crime	Harassment/Menacing	26
	Theft	24
	Domestic Violence	22
	Trespass	17
	Assault/Abuse	15
	Fraud	15
	Criminal Mischief	14
	Stolen Vehicle	13
	Burglary	7
	Vice	5
	Hit & Run	4
	Sex Offense	3
	Violation of Restraining Order	3
	Robbery	2
	Escape/Pursuit	1

Disorder	Suspicious Activity	113
	Parking Disorder	96
	Welfare Check	67
	Premise Check	46
	Extra Patrol	22
	Subject Contact	18
	Animal Disorder	9
	Distrurbance	7
	Noise Disorder	7
	Recovered Stolen Vehicle	7
	Juvenile Disorder	5
	Unwanted Person	5
	Ordinance Disorder	2
	Shots Fired	1
Follow-Up	Follow-Up	122
Other	Other	90
Traffic	Traffic Stop	272
	Traffic Crash	17
	Traffic Disorder	15
	Hazard	8
	DUII	4

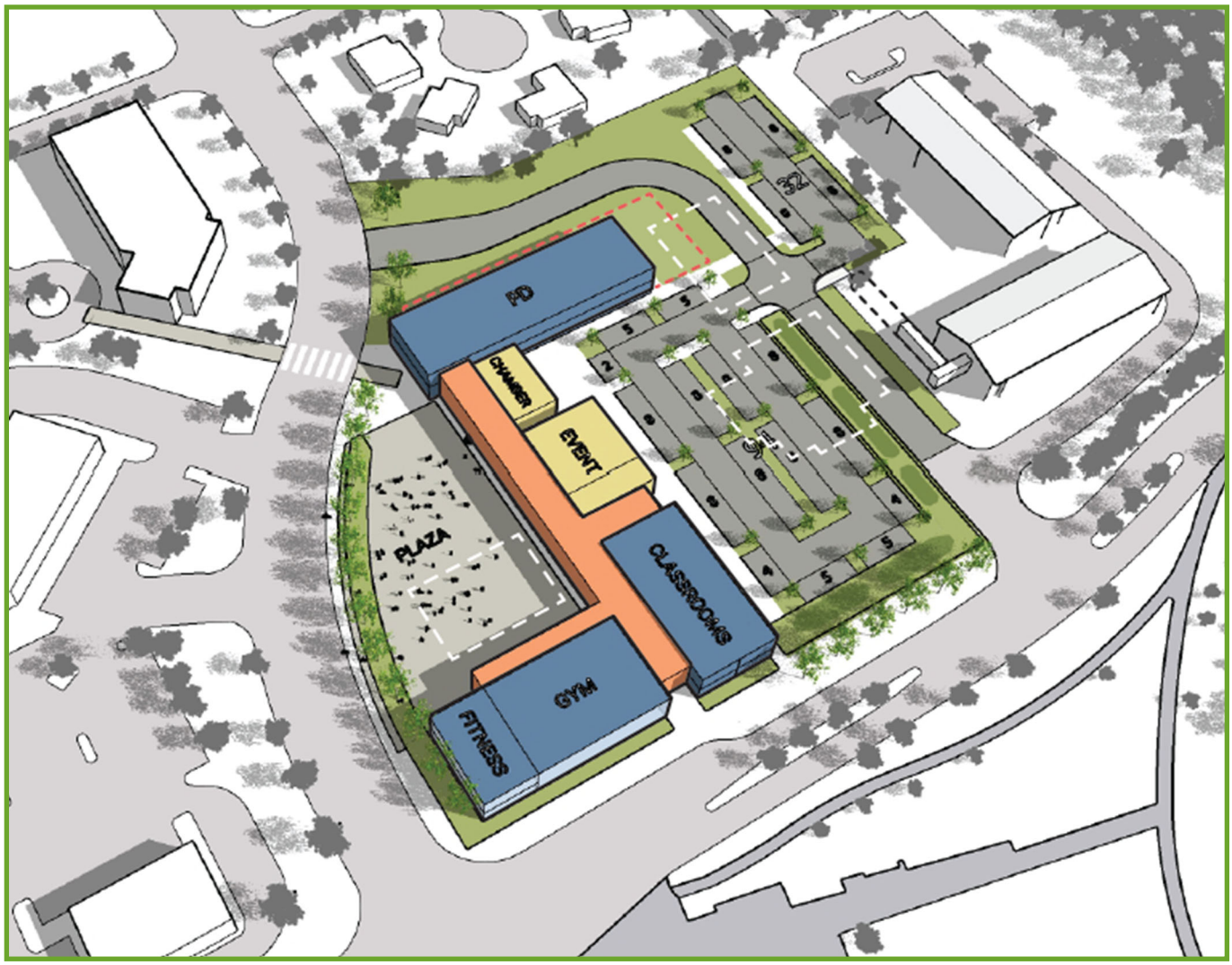
Dashboards | Clackamas County

WILSONVILLE
PUBLIC WORKS

MARCH 2024 MONTHLY REPORT

From The Director's Office:

The internal stakeholder group met with the architectural team to discuss Community Service Block Master Plan site layout and participate in a Building Character Workshop. Feedback gathered during these discussion will be used to develop three conceptual designs for review and comment. In the drawing below the white dash outlines shown the footprint of the existing Police, Community Center and Art Tech buildings to be used for scale and placement comparisons.



PUBLIC WORKS

FIRST RESPONDER

Best Regards,

Delora Kerber, Public Works Director

Utilities

Out with the old

In March the water crew focused on water meter replacements. Every year the crew aims to replace approximately 250 to 300 meters that are 20 years and older. The crew has primarily been working around Thornton Drive off of Canyon Creek Road. In addition to replacing old meters, the crew is regularly called out to install new meters at residential and commercial developments.

Utilities

Go with the flow

The Utilities crew performed a hydrant rebuild in Villebois this month, the hydrant was not closing properly. The crew dismantled the hydrant and removed an obstruction lodged in a gasket. Once the rock was removed and the gaskets were replaced, the hydrant was reassembled and put back into service. The crew also repaired a hydrant at the intersection of Town Center Loop West and Citizens drive that was damaged by a vehicle. The repair involved taking the hydrant apart and replacing the breakaway components.

Facilities

Springin' In the rain

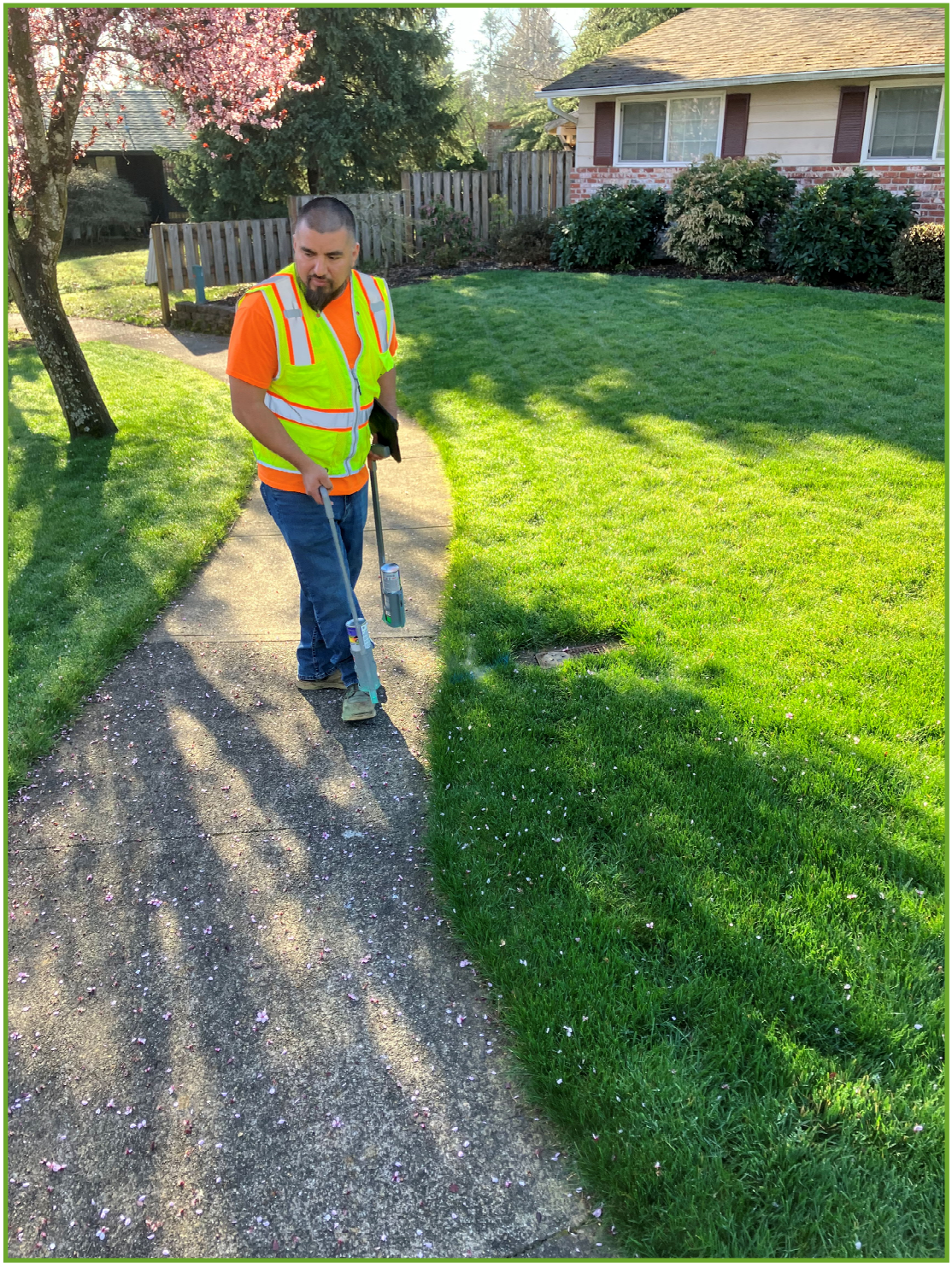
The Library Rose Garden received a full refresh beginning with a thorough cleaning, weed prevention and special mulch to ensure the beds enjoy blooms all summer long. Luke, James, Reynaldo and Trey worked through the rain and enjoyed a few sun breaks at the completion of the project.

Utilities

Now where could that be

As we approach spring and summer the number of utility locate requests increases as construction projects start to pick up. The utilities crew works hard to quickly respond to locate tickets as they come in throughout the day.

The sewer crew continues its cleaning and city inspection efforts; wrapping up line segments near Wood Middle School and making their way towards Old Town.



Facilities

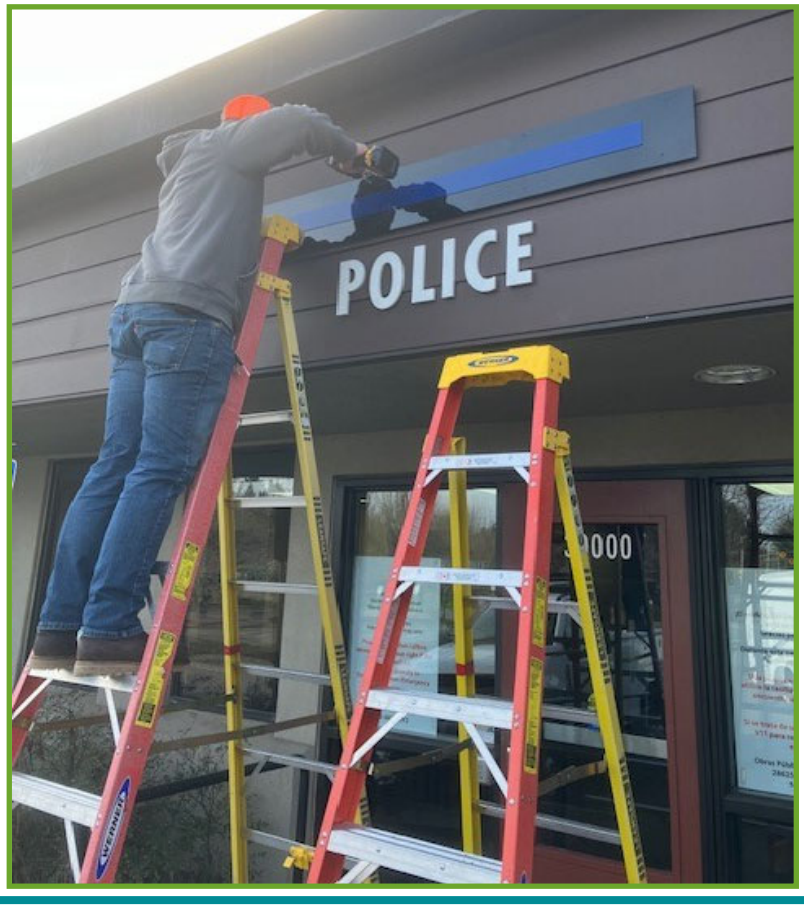
What lies beneath

While conducting an annual irrigation audit, Luke and Reynaldo found a broken irrigation pipe at City Hall. They made tidy work of the messy and muddy process of repairing the pipe.

Facilities

An ounce of prevention

With the change of season we are at more risk of insects and pollen polluting our facilities. This month our janitors Morgan and Taylor have been extra focused on keeping our floors clean and free of debris. Speaking of change, Konnen and Trevor updated the previous Public Works building by installing a sign to prevent any confusion for guests visiting the Police Department.



Roads

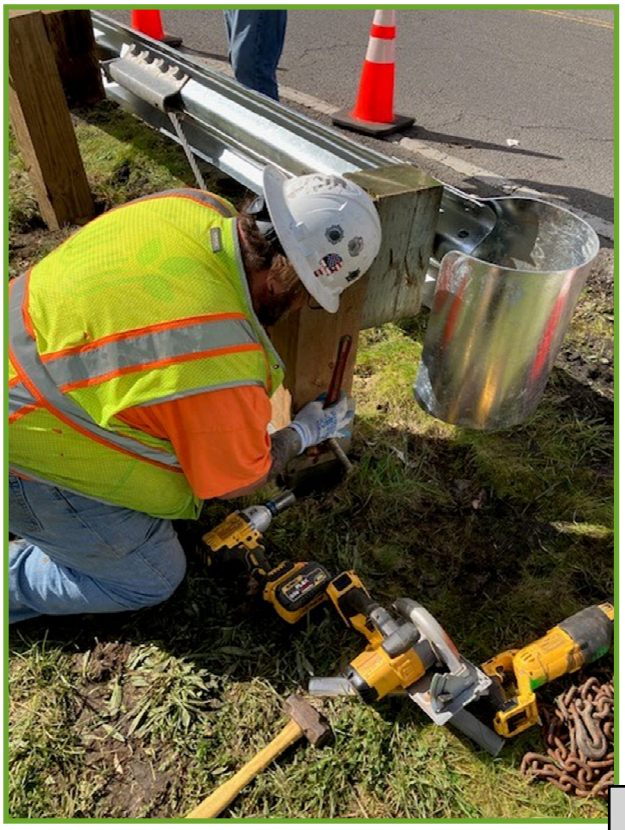
Spring cleaning

The Roads crew had a busy month keeping up with an uptick in graffiti around the city, repairing signage and sightline trimming for signs and signals. The crew also filled several potholes, though there will always be more to keep them busy!

Roads

Saving money, building skillsets

The Roads team completed a long-awaited guardrail repair along the Boeckman Road corridor. By planning, working together and utilizing the teams skillset, repairs were made by the Roads crew rather than by using a private contractor. The Roads team is refining their expertise on this task and are all excited to add this to our list of Can-Do repairs.



Stormwater

Farewell to Winter

Stormwater crew removed debris and invasive plants from low impact development swales, removed sidewalk moss along the Boeckman corridor, and cleared debris and invasive plants from the Library Pond in preparation of the Spring season

Stormwater

Keeping our water supply safe

In Mid– March the Stormwater crew began their second year of inspections on every publicly owned catch basin for debris and repair. The crew inspected nearly 3,000 catch basins, ensuring that chemicals and debris do not reach our creeks and rivers via the catch basins. This project preserves our #1 natural resource and all who depend on it.

SMART

SOUTH METRO AREA REGIONAL TRANSIT

2024 March Report

Transit/Fleet

It is said – "March comes in like a lion and goes out like a lamb." But what do we actually know about the month of March? We know that it is the third month of the year. We know it has 31 days, as does January, May, July, August, October, and December. We know that March ushers in spring and that March opens its doors to Daylight Saving Time, which results in one less hour of sleep for the sleepy.

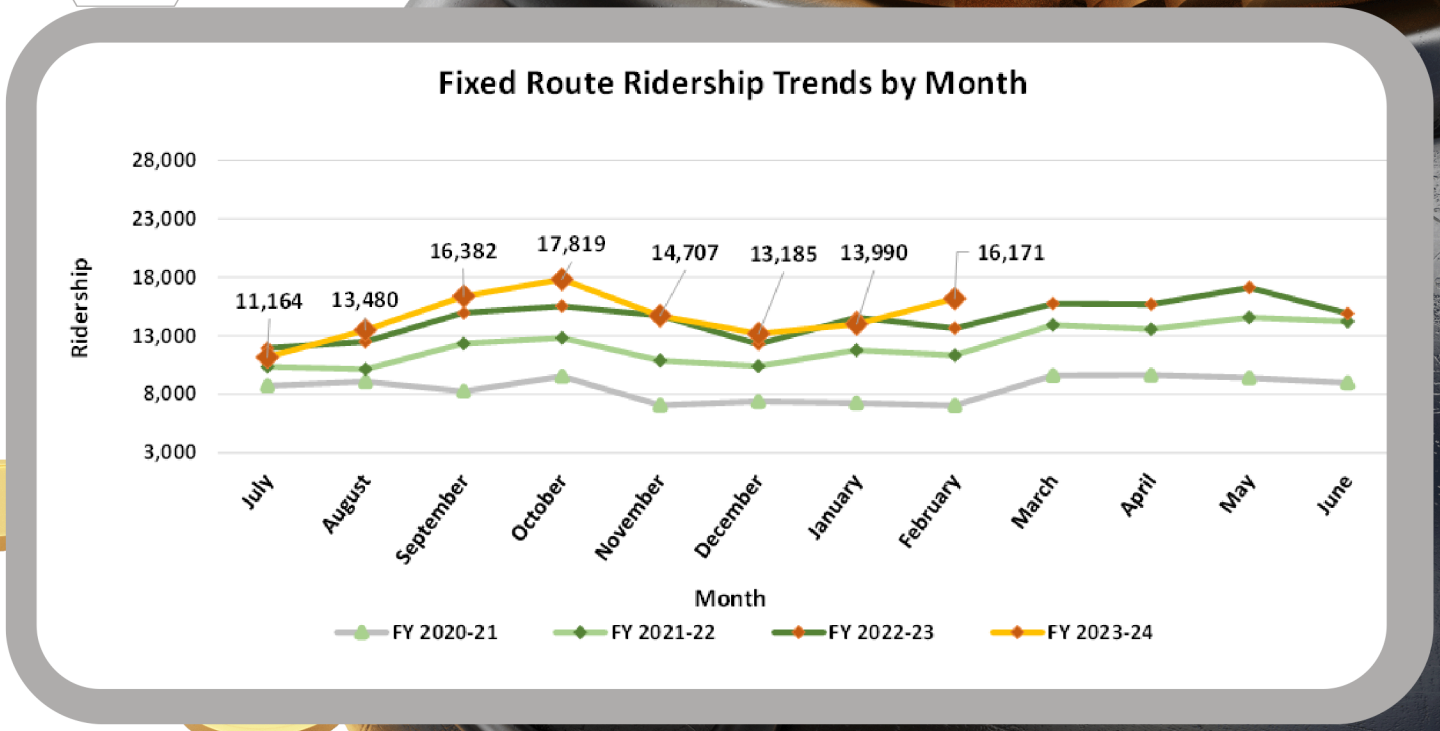
What don't we know about matius mensis (the month of Mars)? March was named for Mars, the Roman god of war. Until circa 153 BC, March represented the first month in the ancient Roman 10-month calendar. March always begins on the same day of the week as November, the same applies to February in common years. March is the best month for basketball, but when it comes to worker productivity, March is the worst. I'm thinking both of these realities are directly tied to College March Madness. Finally, since 1988, March has been designated Women's History Month, which makes March a month worth celebrating. Here's to all the women that make Wilsonville City government run like a well-oiled machine.

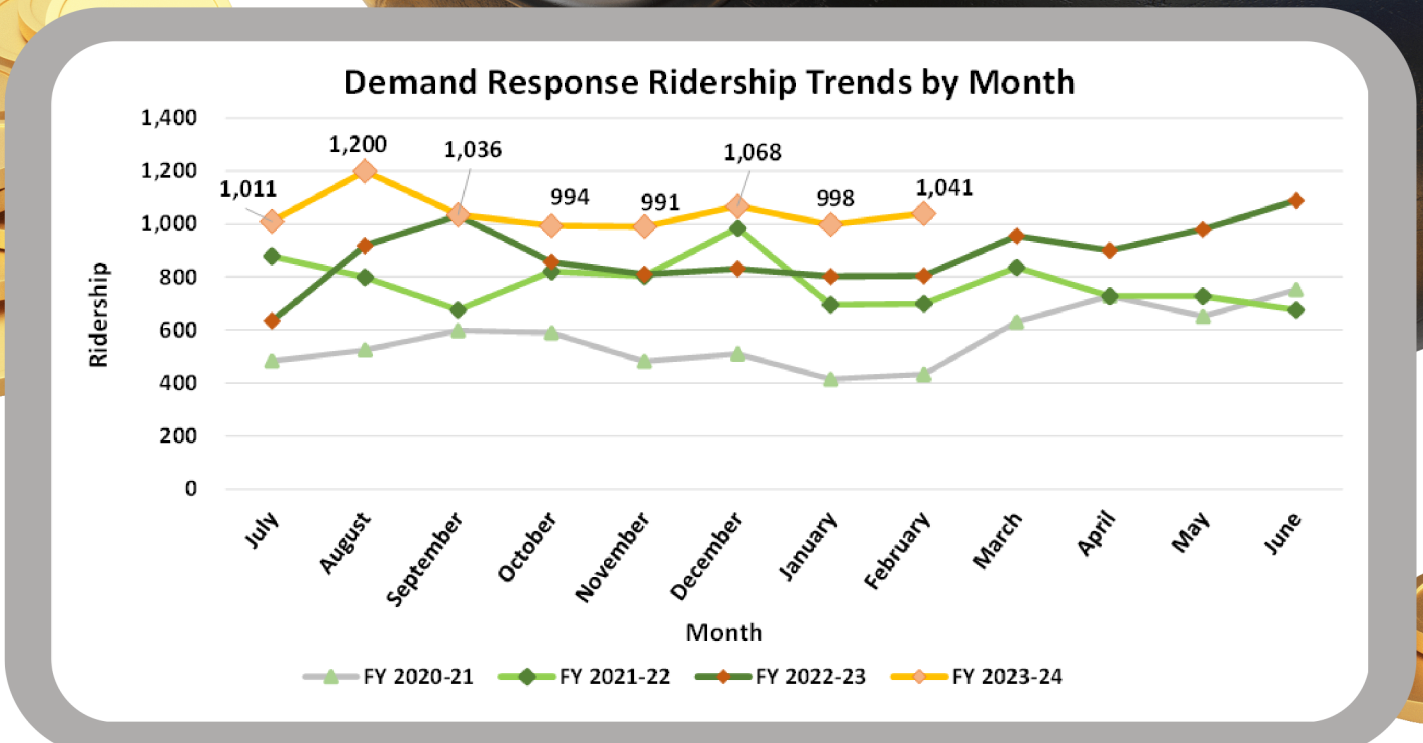
Happy vernal equinox,

Dwight Brashear
Transit Director

RIDERSHIP TRENDS

Anne MacCracken





FLEET SERVICES

Scott Simonton

We are happy to announce a new employee in Fleet. Peter Young has joined us as a Service Worker. Peter's primary focus will be cleaning and maintenance of bus stops. He will also assist with the daily cleaning of buses, and minor repair tasks around the maintenance shop.

Notably, he will provide coverage on Saturdays. This will be the first time Fleet has provided weekend coverage, which will allow bus stop maintenance work to occur at a time causing less impact to customers.

OPERATIONS

Brad Dillingham

We are optimistic that we will be able to expand and begin to implement some of the changes outlined in our 2023 Transit Master Plan soon. In March we were able to add a new driver to our ranks but we also had one leave.

Other than that, there haven't been any significant hiccups in service. We have been able to adjust to the delays caused by the new water pipeline being built in the northwest section of town. Most recently, we had to rearrange our Route 5, which runs between our Transit Center and Commerce Circle, where we connect to TriMet to the north. In order to safely and effectively avoid the work along 95th Avenue, the 5's temporary route now crosses over to the east side of I-5 via Parkway Avenue.

Much like building a water pipeline, improving upon a service that is already reliable and dependable, takes time. We'll get there!

COMMUTE OPTIONS

Michelle Marston

A new site specific Spring Commute Challenge launched March 15 and will run through April 12. Vision Plastics agreed to be our first pilot worksite commute challenge participant. With over 100 employees this site was selected to pilot a smaller scale challenge rather than the annual statewide Get There Challenge. Vision Plastics human resources will help promote internally through the challenge period.

The goal of this challenge is to encourage Vision Plastics employees to reduce single occupancy vehicles and explore alternate commute choices. With a solid participation rate, the plan is to offer these incentive commuter programs on a quarterly basis, to line up with the grant funding available.

GRANTS & PROGRAMS

Kelsey Lewis

Each year, as part of the City's annual budget, SMART staff compiles potential projects that utilize Federal Transit Administration (FTA) funding for the upcoming fiscal year. The list of projects and associated costs is known as the Program of Projects, or POP. The POP provides a window into a small piece of the City's overall budget, with more detail about individual projects we plan to complete. Members of the public have opportunities to comment on these projects at the Budget Committee and June City Council meeting when the budget is adopted, as well as submitting comments via email beforehand. For the last few years, we have been translating and publishing the POP in Spanish. This year's POP will be published in the Wilsonville Spokesman and on our website. We also present the POP at Metro's Transportation Policy Advisory Committee (TPAC) for more visibility in a regional context. We are continuing to look for ways to make the POP more engaging and accessible for our community members.

SAFE ROUTES TO SCHOOL

Patty Tiburcio

Boeckman Creek Primary's Walking School Bus continued to gain momentum as more families learned about the program and the benefits that come with a morning walk to school. There was a short hiatus due to Spring Break. The Walking School Bus resumes in April.

Boeckman Creek Walking School Bus.

During spring break, SMART staff held a week-long Learn-to-Ride Bike Clinic for students who are eager to learn a skill that will last a lifetime. There are many benefits to a child learning to ride a bicycle such as promoting self-confidence and independence.

Isaiah and William at Bike Clinic.

Participants learned to ride at Wilsonville's Transit Center which provides a non-traffic environment and allows students to receive safety education and support to encourage biking to school and around Wilsonville.

Holden at end of Bike Clinic.

Savannah and Holden at Bike Clinic.