HEARING EXAMINER - 5TH AVE TOWNHOMES
MEETING AGENDA

Online via Zoom and In Person at
Tumwater City Hall, Sunset Room, 555
Israel Rd. SW, Tumwater, WA 98501

Monday, October 26, 2026
6:00 PM

The Tumwater Hearing Examiner is an appointed official of the City, and rules upon land use and zoning matters. Within 10 business days of the conclusion of the hearing, the Examiner shall render a decision, including findings and conclusions. Questions on the operation and procedures of the Hearing Examiner may be directed to the Community Development Department at 360-754-4180.

1. Public Hearing
    a. TUM-26-0115, 5th Ave Townhomes, Preliminary Plat
2. Adjourn

Meeting Information
The Hearing Examiner will be attending remotely. Staff and the applicant may attend remotely or in-person. The public is welcome to attend in person, by telephone or online via Zoom.

Attend In Person
Tumwater City Hall, Sunset Room, 555 Israel Rd SW, Tumwater, WA 98501

Watch Online
Go to http://www.zoom.us/join and enter the Webinar ID 833 0293 7682 and Passcode 725836.

Listen by Telephone Call (253) 215-8782, listen for the prompts and enter the Webinar ID: 833 0293 7682 and Passcode 725836.

The City of Tumwater Hearing Examiner will hear testimony from interested parties in person, via computer audio or by telephone by registering in advance to provide comment.

Public Comment – Register in advance for this webinar:
https://us02web.zoom.us/webinar/register/WN_LyjEmC09ROuYquBNqmNa9w

After registering, you will receive a confirmation email containing information about joining the webinar.

Written comments may be submitted to City of Tumwater, Community Development Department, 555 Israel Road SW, Tumwater, WA 98501, or by email at abaruch@ci.tumwater.wa.us or by fax at (360) 754-4138, and must be received by 12:00 p.m. on October 26, 2026.

Post Meeting
Video of this meeting will be recorded and posted on our City Meeting page: https://tumwater-wa.municodemeetings.com.

Accommodations

The City of Tumwater takes pride in ensuring that people with disabilities are able to take part in, and benefit from, the range of public programs, services, and activities offered by the City. To request an accommodation or alternate format of communication, please contact the City's ADA Coordinator directly, call (360) 754-4129 or email ADACoordinator@ci.tumwater.wa.us. For vision or hearing impaired services, please contact the Washington State Relay Services at 7-1-1 or 1-(800)-833-6384.

TO: City of Tumwater Hearing Examiner

FROM: Alex Baruch, Senior Planner

DATE: October 9, 2026

SUBJECT: TUM-26-0115 Preliminary Plat, 5th Ave Townhomes

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1) Recommended Action:
Staff recommends approval of the Preliminary Plat subject to the conditions outlined in this staff report.

2) Background:
Applicant requests approval to construct 11 townhomes along with associated infrastructure, open space and landscaping.

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3) Alternatives:
- Approve Case Nos. TUM-26-0115 with recommended conditions
- Approve Case Nos. TUM-26-0115 with amended conditions
- Deny Case Nos. TUM-26-0115
- Remand Case Nos. TUM-26-0115

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4) Attachments:

Exhibit 1. Staff Report - October 9, 2026
Exhibit 2. Preliminary Plat - July 31, 2026
Exhibit 3. Preliminary Civil Plans – July 31, 2026
Exhibit 4. Vicinity and Zoning Map
Exhibit 5. Public Notice Certification – October 9, 2026
Exhibit 6. Notice of Application - May 8, 2026
Exhibit 6a-bbb. Notice of Application Comments
Exhibit 7. Determination of Non-significance with SEPA Checklist – August 31, 2026
Exhibit 7a-q. SEPA Comments
Exhibit 8. Public Hearing Notice – October 9, 2026
Exhibit 8. Public Hearing Comments
Exhibit 9. Trip Generation Memo – April 7, 2026
Exhibit 10. Response to Concurrency Comments – April 7, 2026
Exhibit 11. Concurrency Ruling – April 28, 2026
Exhibit 12. Slope Evaluation – January 23, 2026
Exhibit 13. Forester Report - January 23, 2026
Exhibit 14. SWPPP Report – January 23, 2026
Exhibit 15. Preliminary Drainage Report - January 23, 2026
Exhibit 16. Soils Report – January 23, 2026
Exhibit 17. Application – February 4, 2026
Exhibit 18. Water and Sewer Availability Letter – April 24, 2026
Exhibit 19. Title Report / Subdivision Guarantee - January 23, 2026
Exhibit 20. City of Tumwater Gopher Administrative Determination

EXHIBIT 1

CITY OF TUMWATER
HEARING EXAMINER STAFF REPORT
Hearing Date: October 26, 2026

Project Name: 5th Ave Townhomes

Case Numbers: TUM-26-0115 Preliminary Plat

Owner: ASH Holdings LLC
3425 Merryman Place SE
Olympia, WA 98501

Project Proponent/ Representative: The Land Developer LLC
Erik Ainsworth
5737 Linderson Way SW
Tumwater, WA 98501

Type of Action Requested: The project proponent is requesting approval of a Preliminary Plat (TUM-26-0115) to construct 11 townhomes on a parcel located in the Low Density Residential (LDR) zone district. The LDR zone allows townhouses as permitted use.

Project Location: A parcel totaling 1.69 acres located at 585 5th Ave SW, Tumwater, WA 98512. Tax Parcel Number 33203200001.

Project Permit: The following have been issued for the project:

1. Notice of Application issued on May 8, 2026 (Exhibit 6)
2. Determination of Non-Significance issued on August 28, 2026 (TUM-26-0117) (Exhibit 7)

Public Notification: Public notification for the October 26, 2026, public hearing was mailed to property owners within 300 feet of the subject property and various agencies, posted on-site and published in *The Olympian* on October 9, 2026, in conformance with Tumwater Municipal Code (TMC) 14.06 (Exhibits 5 and 8).

Staff Recommendation: Approval, subject to conditions identified at the end of the staff report in Section III *Recommendation*.

Staff Planner: Alex Baruch, Senior Planner, AICP
Phone: (360) 754-4180
E-Mail: abaruch@ci.tumwater.wa.us

I. BACKGROUND INFORMATION

A. Application and Review Process

A pre-application conference application was reviewed by the development review committee on May 30, 2025 (TUM-25-0656). The Preliminary Plat (TUM-26-0115) application was submitted on April 24, 2026, and was deemed complete on May 4, 2026.

Under TMC 2.58.090 and TMC 14.16.040, review authority for the preliminary plat review falls under the purview of the Hearing Examiner.

B. Existing Conditions

The site is roughly square in shape and slopes to the west toward 7th Ave SW. Currently the property is mostly brush, weeds and grass and it does not appear that the property has been developed in the past. The earliest aerial imagery the area (1941) shows the site in similar condition as it is today.

C. Project Description

The applicant proposes to subdivide a single parcel totaling 1.69 acres into eleven lots that will include eleven townhomes on individual lots. The development will include infrastructure, frontage improvements, parking and open space.

II. REGULATORY FRAMEWORK

The proposal is subject to the following policies and regulations:

A. **Tumwater Comprehensive Plan:** The project site is located in the Tumwater Hill Neighborhood as designated by the Land Use Element of the City's Comprehensive Plan. The land use designation for the approximately 1.69-acre site is Low Density Residential (Exhibit 4).

The Comprehensive Plan Land Use Element includes the goal to "Reduce the inappropriate conversion of undeveloped land into sprawling low-density development. The Land Use Element contains goals, policies, and implementation actions that encourage compact, efficient urban development and supports higher intensity urban growth to be phased outward from the urban core. These policies include minimum density requirements, clustering in sensitive areas, overall higher residential densities throughout Tumwater, and mixed residential and commercial areas."

The housing chapter (Goal H 1.4) further identifies the need to support the construction of housing on vacant or unused lots to minimize urban sprawl and reuse existing infrastructure.

Staff Response and Recommended Finding:

The goals stated in the Comprehensive Plan encourage development in line with the surrounding area and the Comprehensive Plan designation. Townhouse development is in line with the designation and the surrounding area and by developing along an existing public street the project uses efficient use of existing infrastructure.

The proposal also includes community open space and infrastructure improvements as encouraged by the Comprehensive Plan and required by City Ordinances.

Citywide Design Guidelines (design guidelines) have been adopted to ensure compatibility in the surrounding areas.

Staff finds that the project is consistent with the Comprehensive Plan with the proposed conditions.

B. **Tumwater Transportation Plan:** The Transportation Plan includes language speaking to regional consistency and coordination to address both motorized and non-motorized transportation links and corridor. Goals are to establish a street and road network that provides for the safe and efficient movement of goods and people, neighborhood connectivity, to ensure pedestrian connectivity, and concurrency to meet PM peak hour level of service standards.

Staff Response and Recommended Finding: *A Transportation Concurrency Application along with a Trip Generation Memo was submitted for review. The Engineering Development Review Lead and Transportation and Engineering Director reviewed the trip generation memo and the findings were incorporated as a part of the Transportation Concurrency Ruling.*

The transportation concurrency ruling identified no mitigation measures were required to achieve concurrency. A total of 6 pm peak hour trips are anticipated by the development. Based on the requirements in TMC 15.48.060 a traffic study was not required as the project does not generate fifty or more vehicle trips in the peak hour on the adjacent streets and intersections or generate twenty-five percent or more of peak-hour traffic through a signalized intersection or the critical movement at an unsignalized intersection. This was evaluated by looking at the trip distribution diagram and identifying the critical movements at each intersection as none of the intersections within the project area are signalized intersections. The critical movement for traffic is identified as the left turn movement at intersections where traffic is anticipated to travel through during the PM peak hour. When staff evaluated the intersections based on the trip distribution diagram and site conditions the anticipated traffic was not deemed high enough to trigger this requirement. This is reflected in the DNS issued August 28, 2026 (Exhibit 7).

Staff finds that this project will not adversely affect level of service standards and that the project is consistent with the Tumwater Transportation Plan.

C. **Sustainable Development Plan for Thurston Region:** The Plan indicates that the regional community has set a target to reduce vehicle miles traveled and to preserve sensitive areas, farmland, forest land, prairies and rural lands.

Staff Response and Recommended Finding: *The Plan has a target goal stating that by 2035, 72 percent of all (new and existing) households in our cities, towns, and unincorporated growth areas will be within a half-mile (comparable to a 20-minute walk) of an urban center, corridor, or neighborhood center with access to goods and services to meet some of their daily needs.*

The site is located more than a half-mile from an urban center, however is located in an area anticipated for additional density through infill development. The Plan also includes a goal of preserving environmentally sensitive lands, farmlands, forest lands, prairies, and rural lands and develop compact urban areas.

The project meets this goal by providing compact development in the urban area.

Staff finds the project is consistent with the Sustainable Development Plan for Thurston Region.

D. **Thurston Regional Trail Plan:** The City of Tumwater is a participating member of the Thurston Regional Planning Council (TRPC). TRPC adopted the Thurston Regional Trail Plan in December 2007.

The Regional Trails Plan defines a trail network blueprint and a set of guidelines and recommendations for all of Thurston County and its cities, towns and communities. The Goals and Policies section of the Plan serves to link local trail planning efforts within the broader context of planning the regional transportation network. The plan charts a systematic path creating interconnected corridors that improve access to community destinations.

Staff Response and Recommended Finding: *The project site is not affected by the regional trail network outlined in the Thurston Regional Trail Plan.*

Staff finds that approval of the project will not affect implementation of the Thurston Regional Trail Plan.

E. **Hearing Examiner – TMC 2.58.090:** The Hearing Examiner has authority to review Preliminary Plats.

Staff Response and Recommended Finding: *Preliminary plats require a public hearing and decision by the Tumwater Hearing Examiner. Final plat approval authority is administrative and will be completed by City of Tumwater staff.*

F. **Public Notice Requirements –TMC Chapter 14.16:** TMC Chapter 14.16 requires the City to provide public notification of certain application types by issuing a Notice of Application (TMC 14.16.050) and a Notice of Open Record Hearing (TMC 14.10.050).

Staff Response and Recommended Finding: *A notice of application for the Preliminary Plat was mailed to property owners within 300 feet of the subject property, affected agencies and posted on-site; and published in the Olympian on May 8, 2026. (Exhibits 5 & 6)*

Public comments:
Squaxin Island Tribe commented on the application stating that they did not have any specific cultural resource concerns for the project and recommends an inadvertent discovery plan on-site during the land disturbance.

A variety of community member comments were received. They include comments about stormwater, open space, timeliness of notice of application, removal of trees, traffic, sidewalks and housing policy. The city responded to the different concerns which are included in the response letters.

Public comments received from the Notice of Application are found in Exhibit 6a-bbb.

Public notice for the October 26, 2026, public hearing was mailed to property owners within 300 feet of the subject property, affected agencies, and those who provided comment, posted on-site, and published in the Olympian on Friday, October 9, 2026, in conformance with TMC 14.06.070 (Exhibits 5 and 8).

Public comments received from the Public Hearing notice will be forwarded to the Hearing Examiner and included in the final packet.

G. **State Environmental Policy Act – TMC 16.04:** The City of Tumwater Community Development Department reviewed a SEPA Environmental Checklist and other information submitted by the project proponent and issued a Determination of Non-Significance on August 28, 2026.

Staff Response and Recommended Finding: *The City of Tumwater Community Development Department, as lead agency, completed environmental review in accordance with TMC 16.04, RCW 43-21C and WAC 197-11. The City's SEPA threshold determination was mailed to property owners within 300 feet of the subject property, affected agencies and posted on-site; and published in the Olympian. The City's SEPA threshold determination, a Determination of Non-significance was issued on August 28, 2026 (Exhibit 7).*

Public comments:

Olympia Regional Clean Air Agency (ORCAA) made comments on the requirements for construction dust.

Washington State Department of Ecology provided comments regarding water quality, solid waste management and toxic cleanup. These comments will be addressed with the Site Development Grading permit.

The Confederated Tribes of the Chehalis Reservation requested an inadvertent discovery plan be implemented. Tumwater Municipal Code section 18.40.065 requires that an inadvertent discovery note is included on the cover sheet of all site development grading plans and puts in place a plan if a cultural resource is found.

Community member comments included questions about transportation, pedestrian safety, neighborhood character, managing construction, long term property management, stormwater, density and traffic calming.

Public comments received and city responses to each comment from the Determination of Non-significance are found in Exhibit 7a-q.

H. **Transportation Concurrency – TMC 15.48**: The project is subject to the requirements of the City's transportation concurrency test outlined in TMC Chapter 15.48.

Staff Response and Recommended Finding: *The applicant submitted a trip generation memo for the project. The report was reviewed by the City's Development Review Lead in the Transportation and Engineering Department and the Transportation and Engineering Director who issued a transportation concurrency ruling stating that the project as proposed is concurrent in regard to transportation (Exhibit 9, 10 and 11).*

I. **Tree Protection and Replacement Ordinance – TMC 16.08:** TMC Chapter 16.08 regulates the removal and preservation of existing trees on a site to be developed.

Staff Response and Recommended Finding*: A professional forester's report that included a tree inventory, and tree protection plan in compliance with TMC Chapter 16.08 was submitted. The inventory shows a total of 12 trees located on-site. TMC 16.08 requires retention of 20% or 12 trees per acre, whichever is greater. 12 trees per acre would require retaining 21 trees on-site. When the current amount of trees on a property does not meet the required retention amount the development is required to meet the minimum tree amount in a post development state (TMC 16.08.070.R.4). With the inclusion of street trees and other trees proposed around the storm pond the development will meet this requirement (minimum 21 trees). The landscape plan will be reviewed with the site development grading plan submittal. (Exhibit 13)*

Staff finds that the proposed preliminary plat as conditioned is consistent with TMC 16.08.

J. **Fish and Wildlife Habitat Protection – TMC 16.32:**

TMC Chapter 16.32 regulations fish and wildlife and species.

Staff Response and Recommended Finding: The parcel does not include soil preferred by the Mazama Pocket Gopher and is located north of Trosper Road. Per the City of Tumwater's Mazama Pocket Gopher Administrative Determination no gopher studies are required on properties north of Trosper Road. (Exhibit 20)

K. **Preliminary Plat Design Standards – TMC Title 17:**

The subdivision is required to comply with the following standards of design and development as required by TMC 17.12.010.

1) TMC 17.12.020 – Future Subdivision and Access: All land divisions shall be designed to accommodate the future land division of adjoining land by providing adequate future access and utility service. Pedestrian and bicycle access to schools, parks, shorelines, recreation areas, and open space shall be provided by walkway where street access is unsafe or inadequate.

Staff Response and Recommended Finding: *Proposed access for this project is off of 5th Ave SW with cub-cuts for each townhouse directly accessing 5th Ave SW. Frontage improvements will be required to provide a curb, gutter, planter strip with street trees and sidewalk in-front of the development along 5th Ave for the extent of the property. Due to the topography of the site and development conditions of adjacent properties, access connections to adjacent properties is not proposed or required with this development. Additionally, access and utility connections to each lot already exist and are not dependent on this property/development.*

With these conditions, staff finds that the preliminary plat is consistent with TMC 17.12.020.

2) TMC 17.12.040 – Minimum Lot Size: Lots or tracts shall conform to the size set forth in the zoning district unless dedicated or restricted by covenant for open space, park, recreational or other community or public use. In subdivisions intended for single family dwelling units or townhouse/row house development, a separate lot or tract shall be provided for each dwelling unit, not including accessory dwelling units. If the land division is submitted in phases/divisions of development, each phase/division submitted for approval shall meet all provisions of this section.

Staff Response and Recommended Finding: *The proposal includes townhomes on individual lots. The proposed lots shall meet the required minimum lot sizes as required by the underlying zone district. Townhomes in the LDR zone district have a minimum 2000 sf lot size.*

Staff finds that the preliminary plat is consistent with TMC 17.12.040.

3) TMC 17.12.060 – Residential Lot Building Sites: Each residential lot in low density residential zones shall have a building site no less than 1,600 square feet in area within which a suitable building can be built and served by utilities and vehicular access unless dedicated or restricted by covenant for open space, park, recreation or other public use. The building site area herein required shall not exceed a 25% cross slope or include any very severe development limitation areas. Such building sites shall be indicated on the face of the preliminary land division.

Staff Response and Recommended Finding: *The smallest lot sized proposed by this development is approximately 2,000 sf. The lots will be served by public water and sewer and will be served by public roads. No building site will exceed a 25% cross slope.*

Staff finds that the preliminary plat is consistent with TMC 17.12.060.

4) TMC 17.12.070 – Natural Vegetation and Features: Natural vegetation and

features such as trees, streams, wetlands, and wildlife habitat shall be preserved to the greatest extent possible and in accordance with the requirements of Title 16 TMC and Chapter 18.47 TMC.

Staff Response and Recommended Finding: *A professional forester's report, tree inventory, and tree protection plan that complies with TMC Chapter 16.08 were submitted, reviewed, and are recommended for approval with the proposed preliminary plat. The inventory shows a total of 12 trees located on-site. TMC 16.08 requires retention of 20% or 12 trees per acre, whichever is greater. 12 trees per acre would require retaining 21 trees on-site. When the current amount of trees on a property does not meet the required retention amount the development is required to meet the minimum tree amount in a post development state (TMC 16.08.070.R.4). With the inclusion of street trees and other trees proposed around the storm pond the development will meet this requirement (minimum 21 trees).*

Staff finds that the preliminary plat is consistent with TMC 17.12.070.

5) TMC 17.12.080 – Clearing and Grading: Proposed clearing and grading should be minimized by the use of shared access driveways and careful location of streets and building sites.

Staff Response and Recommended Finding: *Preliminary site development and grading plans have been reviewed by staff and are consistent with the requirements of this section.*

Staff finds that the preliminary plat is consistent with TMC 17.12.080.

6) TMC 17.12.090 – Wetlands and Drainage: Wetlands and natural drainage ways shall be subject to review under Chapters 16.28 (Wetlands) and 16.32 (Fish and Wildlife Conservation Areas) of this code.

Staff Response and Recommended Finding: *No wetlands are located on the subject property.*

Staff finds that the preliminary plat is consistent with TMC 17.12.090.

7) TMC 17.12.100 – Hazards: Where land division and development of land may pose a hazard to the land division and nearby properties because of steep slopes, unstable soils, excessive stormwater runoff or soil erosion, the land divider shall have the burden of presenting the evidence satisfactory to the City of hazard mitigation. In the absence of such evidence, division of such land shall be denied.

Staff Response and Recommended Finding: *A preliminary drainage report, including soils report has been submitted. All stormwater runoff, treatment and release shall meet the minimum standards of the City of Tumwater Drainage Design and Erosion Control Manual. Any retaining walls shall meet the requirements of the Tumwater Municipal Code and most current building code requirements.*

Staff finds that the preliminary plat is consistent with TMC 17.12.100.

8) TMC 17.12.110 – Streets: The size of streets and their associated rights-of-way shall be as shown on the street standards chart for the class of street, which is appropriate to serve the land division, and anticipated community traffic, existing and potential. In areas where the division is adjacent to an existing street, right-of-way dedications shall be made to the existing street centerline.

Staff Response and Recommended Finding: *The development proposal includes frontage improvements along 5th Ave SW. Construction of the improvements are required as a part of the development proposal. The roads shall meet the required widths as conditioned or as required by the Transportation and Engineering Department at the time of site development grading submittal.*

Staff finds that the preliminary plat is consistent with TMC 17.12.110.

9) TMC 17.12.120 – Driving Surfaces and Rights-of-Ways: All roads shall be designed and constructed in accordance with the adopted "Development Standards for the City of Tumwater" in effect at the date of acceptance of the preliminary land division.

Staff Response and Recommended Finding: *As part of the site development/grading permit review, all roads shall be constructed pursuant to the specifications outlined in the City of Tumwater Development Guide.*

Staff finds that the preliminary plat is consistent with TMC 17.12.120 with the proposed conditions.

10) TMC 17.12.130 – Cul-de-sacs: All cul-de-sacs shall be designed in accordance with the adopted "Development Standards for the City of Tumwater" in effect at the date of acceptance of the preliminary land division. Parking is prohibited in the cul-de-sac turnarounds and shall be posted. An improved pathway for pedestrian and bicycle use shall be dedicated to the public to connect cul-de-sac streets to nearby areas where such a pathway is necessary to provide convenient access to schools, parks, public transit stops, shopping centers, other cul-de-sacs or pathways, and other community services, or as otherwise necessary for public convenience and safety. Such pathways shall be designed to maintain the safety of pedestrians and bicyclists and owners of properties adjacent to the pathway.

Staff Response and Recommended Finding: *No cul-de-sacs are proposed with this development.*

Staff finds that the preliminary plat is consistent with TMC 17.12.130..

11) TMC 17.12.140 – Street Signs: Street signs shall be installed by the subdivider as specified by the Community Development Department.

Staff Response and Recommended Finding: *Signage and placement shall be reviewed and approved as part of site development and grading permit review.*

Staff finds that the preliminary plat is consistent with TMC 17.12.140.

12) TMC 17.12.150 – Topography: All streets should be designed to conform to the topography of the site, in order to reduce street grades and minimize the need for cuts and fills.

Staff Response and Recommended Finding: *No new streets are proposed with this development. The street improvements proposed as a part of the frontage improvements will meet this requirement.*

Staff finds that the preliminary plat is consistent with TMC 17.12.150.

13) TMC 17.12.160 – Maximum street grades: Maximum street grades shall be in accordance with the adopted "Development Standards for the City of Tumwater".

Staff Response and Recommended Finding: *All proposed street grades shall be designed in accordance with the adopted standards.*

Staff finds that the preliminary plat is consistent with TMC 17.12.160.

14) TMC 17.12.170 – Street Names: All streets shall be named or numbered as specified by the City. The land divider is encouraged to submit requested street names to the city for its consideration.

Staff Response and Recommended Finding: *The addresses for the preliminary plat shall be assigned by the City of Tumwater Building Official.*

Staff finds that the preliminary plat is consistent with TMC 17.12.170.

15) TMC 17.12.180 – Lot Access: Each lot shall have a minimum of 10 feet of unobstructed access to a street, directly or by access easement.

Staff Response and Recommended Finding: *The proposal shows all parcels fronting a public street.*

Staff finds that the preliminary plat is consistent with TMC 17.12.180.

16) TMC 17.12.190 – Private Streets: Private streets shall be constructed to meet or exceed the design standards established on the street standards chart for the City. Public access to developments or parts of developments containing private streets shall not be limited by the use of gates or other measures.

Staff Response and Recommended Finding: *No private streets are proposed with this development.*

Staff finds that the preliminary plat is consistent with TMC 17.12.190.

17) TMC 17.12.200 – Underground Utilities: Electrical power, telephone, cable television, fiber optics and other transmission lines shall be installed underground.

Staff Response and Recommended Finding: *In accordance with TMC 17.12.200 and Section 3.14 of the Tumwater Development Guide, all utilities associated with this project shall be underground.*

Staff finds that the preliminary plat is consistent with TMC 17.12.200.

18) TMC 17.12.210 –Park and open space area standards for divisions of land.

[…]

A. For residential subdivisions a minimum of fifteen percent of the gross site area shall be set aside for park and open space area.

[…]

D. For the purpose of calculation of the park and open space area, the park and open space area shall be separate and distinct from required yards, setbacks, and landscaped areas.

[…]

K. Maintenance of park and open space areas shall be provided for as described in TMC Chapter 17.22.

Staff Response and Recommended Finding: *The preliminary plat encompasses 1.69 acres and requires .15 acres of open space. The proposal includes a total of 1.13 acres of open space with a combination of active and passive open space. This includes a walking path through the site to community garden and gazebo and open lawn space. The site development grading plan shall include details about all amenities proposed as a part of the active and passive open space.*

Staff finds that the preliminary plat is consistent with TMC 17.12.210.

L. Land Division

1. Preliminary Land Division TMC 17.14 and RCW 58.17: TMC 17.14 and RCW 58.17 regulate the submission, review criteria, and consideration of proposed divisions of land.

Staff Response and Recommended Finding: *The project proponent completed the pre-submission process described in TMC 17.14.020.*

The application submission requirements listed in TMC 17.14.030 have been met.

TMC 17.14.040 and RCW 58.17.110 require the Hearing Examiner to inquire into the public use and interest proposed to be served by the establishment of the proposed land division and any public dedications associated with a project.

Criteria to be considered include if appropriate provisions are made for, but not limited to, the public health, safety and general welfare, for open spaces, drainage ways, streets or roads, alleys, other public ways, other grounds, transit stops, potable water supplies, sanitary wastes, parks and recreation playgrounds, schools and school grounds, fire protection and other public facilities, and shall consider all other relevant facts, including the physical characteristics of the site, and determine whether the public interest will be served by the land division and dedication. Further, consideration shall be given to sidewalks and other planning features that assure safe walking conditions for students who only walk to and from school.

Staff concludes that adequate provisions will be made for public health, safety, and general welfare as follows:

1. The proposal includes both passive and active open spaces *(Exhibit 3).*

2. *A storm drainage system complying with the City of Tumwater's 2022 Drainage Design and Erosion Control Manual will be constructed for the site. A preliminary storm drainage report, including a geotechnical investigation was submitted to support the preliminary design and will be approved as a part of the Site Development/Grading Permit (Exhibits 14, 15 and 16).*

3. *Construction of frontage improvements will occur during the first portion of development. Transportation impact fees are due at building permit issuance (Exhibits 3, 9 and 11).*

4. *The City of Tumwater Water Resources and Sustainability Department has issued a water and sewer availability ruling indicating that the City has the ability to serve the preliminary plat and apartments with water and sewer connections (Exhibit 18).*

5. *The site is within the Tumwater School District and will pay school impact fees at building permit issuance.*

6. *City of Tumwater Fire Department facilities are adequate to service the proposed project.*

M. Tumwater Zoning Code – TMC Title 18:

1. Low Density Residential Zone District TMC 18.12 – Permitted Uses and Development Standards

Staff Response and Recommended Finding: *The project site is located in the Low Density Residential (LDR) zone district.*

TMC 18.12.020 lists townhouses as permitted uses. The development standards require a

minimum of six dwelling units per acre with a maximum of nine dwelling units per acre by-right. Density calculations for the development show that the proposed dwelling units for this development are between six and nine dwelling units per acre.

Minimum lot size for townhome developments is 2000 sf (TMC 18.12.050.E).

Maximum lot coverage is 70 percent of the total area of each lot. At the time of building permit submittal the applicant shall provide a site plan providing this calculation for each lot.

Maximum structure height is 35' and required setbacks are: front: 10', side: 5' and rear: 20'.

Staff finds that the preliminary plat is consistent with the permitted uses and development standards in the Low Density Residential (LDR) Zone.

2. Aquifer Protection Overlay (AQP) zone district - TMC 18.39 – Restricted Land Uses

Staff Response and Recommended Finding: *The intent of the aquifer protection (AQP) overlay zone district is to identify, classify, and protect vulnerable and/or critical aquifer recharge areas within the city and urban growth area. Protection is to be accomplished by controlling the use and handling of hazardous substances.*

The uses proposed with the preliminary plat are not restricted land uses in the aquifer protection (AQP) overlay zone district.

III. RECOMMENDATION

Pursuant to TMC 2.58.110, staff recommends approval of the Preliminary Plat as described herein with the following conditions:

1. The townhomes shall follow the design requirements outlined in Chapter 5 of the design guidelines. Staff will review the elevations and site plans for the structures at the time of building permit review for compliance.

2. Parks and Open Space:
   a. The site development grading plan shall include an open space sheet showing the total amount of open space meeting or exceeding the amount shown on the preliminary site development grading plans (Exhibit 3). The open space sheet shall include details of proposed equipment/infrastructure meeting the requirements in 17.12.210.G and design guidelines. The open space sheet can be combined with the landscape plan if desired. The approved equipment/infrastructure shown on the plans shall be installed prior to site development grading final inspection approval or as allowed through alternative arrangements approved by the Community Development Director.

3. If consolidated postal drop-off facilities are required by U.S.Posatl Service for this project the location shall be coordinated and approved by the U.S. Postal Service

with location shown on the civil engineering plans.

4. Two off-street parking spaces are required for each townhome lot. Driveways and off-street parking spaces must be hard surfaced (asphalt, concrete or turnstone).

5. A landscape and irrigation plan meeting the requirements of TMC 18.47 shall be submitted as part of site development grading submittal.

6. The following condition will be required to be noted on the Final Plat: All landscaped areas in public rights-of-way shall be maintained by the Home Owners Association, owner(s) and his/her successor(s) and may be reduced or eliminated if deemed necessary for or detrimental to City road purposes.

7. Impact fees for traffic, parks and schools will be assessed to each dwelling unit in the subdivision as building permits are issued. The impact fees will be in accordance with the most current fee resolution adopted by the City at the time complete building permit applications are submitted.

8. A Site Development/grading permit will be required for this site. The permit application shall be accompanied by the application checklist and digital plans and specifications and supporting data consisting of a soils engineering report and engineering geology report prepared and signed by a licensed soils engineer. Inspection of the grading shall be provided by the civil engineer and Geotechnical engineer. In addition, special inspectors approved by the building official shall perform inspections of fill placement, compaction testing, and blasting. All special inspections are to be performed by WABO registered labs and inspectors who have expertise in grading and earthwork.

9. The site development grading plans shall show buildable lot pads to verify that the lots proposed will be buildable. If retaining walls are required, they shall be shown on the site development grading plans and include engineering details for the retaining walls.

10. Separate building permits are required for retaining walls or rockeries over four feet in height, measured from the bottom of the footing to the top of the wall or walls supporting a surcharge. A licensed structural engineer shall design the rockeries or retaining walls. In addition to the engineers' design, full-time inspection by a WABO Special Inspector is required during construction. Proposed rockeries shall be shown on the site development grading plans.

11. When the grading work is complete and ready for final inspection the civil engineer of record shall provide a final inspection report which will include the geotechnical engineer and special inspector's reports. In addition, as-built drawings for the site shall be submitted in a PDF format or as required by the Development Guide.

12. Prior to site development grading permit issuance the owner shall submit the name of the WABO registered firm who will conduct the special inspections, to the Building

Official.

13. No vertical or combustible construction will be allowed on the site until the fire hydrants and paved roads are installed, tested and approved by the City of Tumwater. Note: Testing will also include verification of fire flow by the fire department.

14. The required fire flow for this project is derived from Appendix B of the International Fire Code. Type 5B Townhouse buildings of this size are required to have a fire flow of 1000 gallons per minute at 20 psi.

15. The buildings are proposed to be R3/Townhouse occupancies and of type V-B construction. IBC Chapter 3 & IBC Chapter 6. The walls between each unit are required to be of 2- hour fire-rated construction. Each unit in a building over 7500 square feet shall install fire sprinklers with a minimum 13D system per TMC 15.16.015. Water lines shall be shown on the site development grading plans meeting the sprinkler design requirements.

16. The applicant shall be responsible for providing the City with all costs associated with the installation of water, sewer, street and storm systems that are dedicated to the City of Tumwater.

17. All designs/construction shall comply with the City of Tumwater's Development Guide and WSDOT standards.

18. The site development grading plans shall show all existing and proposed utilities and easements including street lights, street trees, water, sewer, storm, gas, cable, power, telephone, signage and striping.

19. All main installation, road design and storm drainage work requires engineered plans certified by a professional engineer.

20. The applicant is responsible for all plan check, inspection and connection fees.

21. Any private or public utility relocation is the responsibility of the applicant.

22. The applicant shall be responsible for the maintenance and timely repair of all public improvements for a period of 30 months following final certification by the City and shall submit a surety for maintenance equal in value to fifteen (15) percent of the total value of the required public improvements certified by the Public Works Director. Please refer to Chapter 3 of the Development Guide for further clarification.

23. The applicant shall provide all easements and bills-of-sale documents with the engineered plans.

24. All legal descriptions must be accompanied with an appropriate drawing that the City Surveyor can use to verify the legal description. All printed engineering drawings will

be on 24" x 36" paper sheets.

25. The owner or owner's representative is also responsible for furnishing the City with electronic files, compatible with release 2020 or newer Auto-CAD format. Drawings shall be in TCHPN (Thurston County High Precision Network) horizontal datum. Provide individual drawings independent of x-refs. Include all non-standard font files and plot files. Electronic PDF files shall be printed from the Auto-CAD files. A storm water maintenance agreement, utility maintenance agreement, easements and bills-of-sale will also be required.

26. Plan modifications may occur as a result of the engineering review process. For engineering issues, the approved engineering plans take precedence over the approved site plan.

27. Please note on the plans that the PLS responsible for the surveying of the project must obtain a permit from DNR before any monuments are disturbed.

28. The vertical datum required to be used is NGVD29. No exceptions.

29. Frontage improvements are required per Tumwater Municipal Code 12.12.010. These improvements include but are not limited to pavement widening, concrete curb and gutter, planter strip, street trees, street lighting, sidewalk, and right-of-way dedication as necessary to contain the improvements. The applicant is responsible to the centerline of the right-of-way and ensuring two way vehicle traffic.

30. Improvements to South 5th Ave include pavement widening to ensure 16' of pavement from center line to face of curb, concrete curb and gutter, 6' planter, street trees, street lighting, 5' sidewalk and dedication as necessary to contain the improvements. The City will also accept 6' sidewalk if it benefits the project. The project shall complete these improvements across the unopened right-of-way of F St where it intersects South 5th Ave and construct an improved concrete driveway.

31. Tumwater Municipal Code 17.12.200 requires the underground installation of all new and relocated electrical and communication facilities. The project shall relocate existing overhead utilities underground. This shall be shown on the site development grading plans.

32. Full lane overlays will be required after patching. This may include improvements on the opposing frontage, such as widening, realigning the crown to centerline of right-of-way or feathering to meet City of Tumwater standards.

33. A drainage design and erosion control plan shall be submitted with the site development grading plans in accordance with the City's 2022 Drainage Design and Erosion Control Manual.

34. Maintenance of the on-site storm water system shall be the responsibility of the property owner/home owners association and a maintenance agreement will be

recorded against the property prior to or at the same time as final plat recordation.

35. This project shall pay a monthly storm water utility fee based on the amount of impervious surface per Tumwater Municipal Code 13.12.060.

36. Test pits conducted for stormwater design will comply with the 2022 Drainage Design and Erosion Control Manual for location and frequency.

37. Sanitary sewer is required to be extended across the properties 5th Ave frontage. The main extension shall be 8" diameter. Manhole spacing is every 300 linear feet. One 6" lateral should be extended to the common property corner/line to serve two units with a 6" cleanout at the edge of right-of-way.

38. The project must meet minimum fire flow requirements. This site is in the 350 pressure zone and cannot achieve fire flow or provide adequate pressure for domestic use with current infrastructure. The applicant's engineer shall coordinate with the City on required off-site water main extension which shall be shown on the approved site development grading plans.

39. Back flow prevention is required on all fire services and irrigation services in accordance with the AWWA Cross Connection Control Manual. A reduced pressure backflow assembly is required on all commercial domestic services per WAC 246-290-490. Please contact maintenance at 754-4150 for more information.

40. Any water main extension will require a minimum of an 8" system. The main size will depend on the fire flow requirements for this project. The system shall be designed for a maximum velocity of 8 feet per second.

41. Water meters need to be placed in the public right-of-way or on site within an easement.

Submitted on Behalf Of the City of Tumwater Community Development Department by/
Staff Contact: Alex Baruch, Senior Planner, AICP
Phone: (360) 754-4180
E-mail: abaruch@ci.tumwater.wa.us

Report Issue Date: October 9, 2026

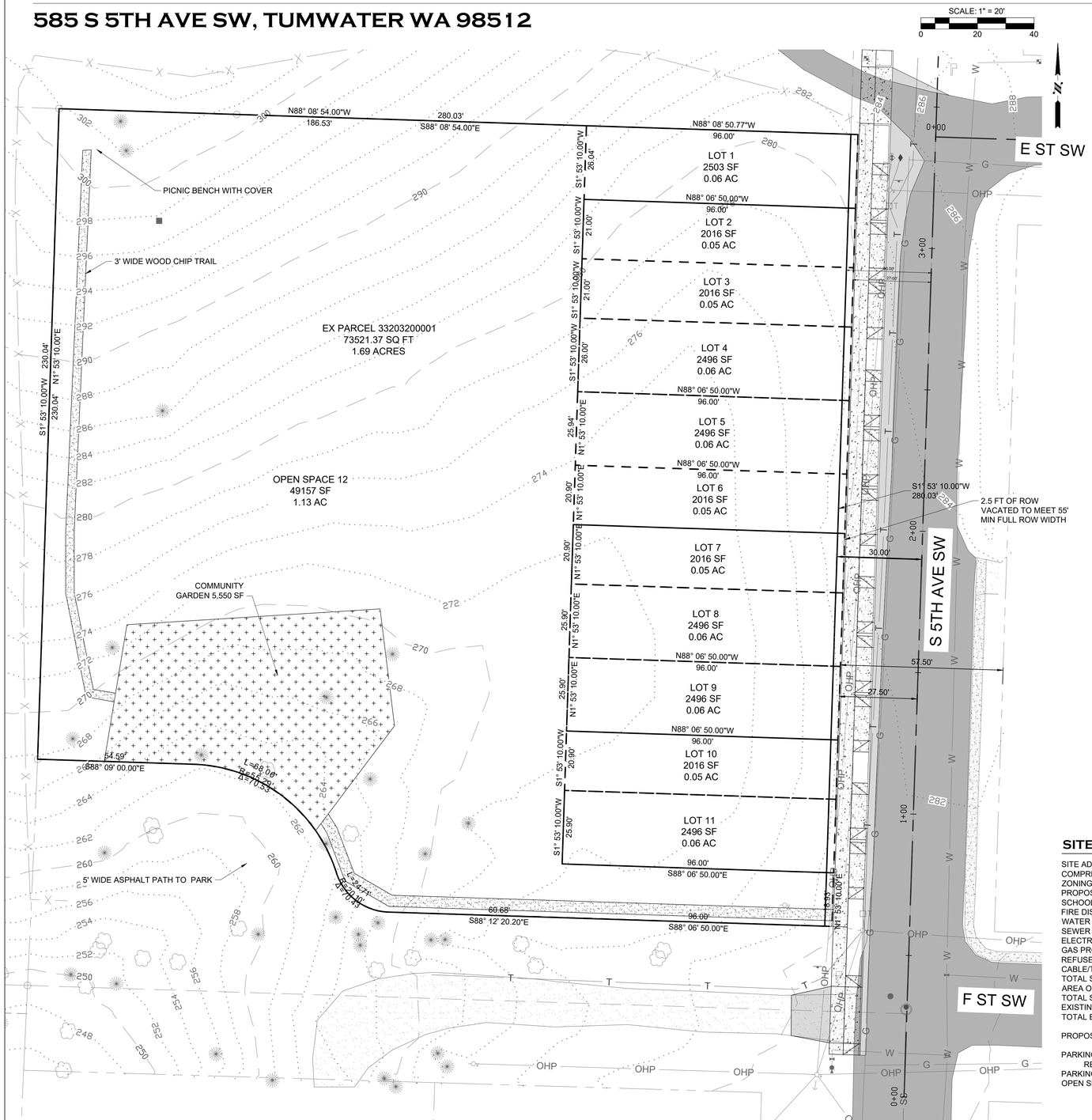
List of Exhibits:
Exhibit 1. Staff Report - October 9, 2026
Exhibit 2. Preliminary Plat - July 31, 2026
Exhibit 3. Preliminary Civil Plans – July 31, 2026

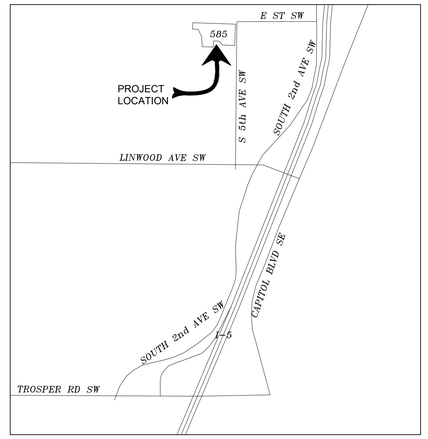
Exhibit 4. Vicinity and Zoning Map
Exhibit 5. Public Notice Certification – October 9, 2026
Exhibit 6. Notice of Application - May 8, 2026
Exhibit 6a-bbb. Notice of Application Comments
Exhibit 7. Determination of Non-significance with SEPA Checklist – August 31, 2026
Exhibit 7a-q. SEPA Comments
Exhibit 8. Public Hearing Notice – October 9, 2026
Exhibit 9. Trip Generation Memo – April 7, 2026
Exhibit 10. Response to Concurrency Comments – April 7, 2026
Exhibit 11. Concurrency Ruling – April 28, 2026
Exhibit 12. Slope Evaluation – January 23, 2026
Exhibit 13. Forester Report - January 23, 2026
Exhibit 14. SWPPP Report – January 23, 2026
Exhibit 15. Preliminary Drainage Report - January 23, 2026
Exhibit 16. Soils Report – January 23, 2026
Exhibit 17. Application – February 4, 2026
Exhibit 18. Water and Sewer Availability Letter – April 24, 2026
Exhibit 19. Title Report / Subdivision Guarantee - January 23, 2026
Exhibit 20. City of Tumwater Gopher Administrative Determination

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.

5TH AVE TOWNHOMES PRELIMINARY PLAT MAP

585 S 5TH AVE SW, TUMWATER WA 98512





VICINITY MAP

NTS

LEGEND

	EXISTING	PROPOSED
SUBJECT PROPERTY LINE		
ADJACENT LOT LINE		
HABITAT BUFFER LINE		
WETLAND BUFFER LINE		
EASEMENT LINE		
RIGHT-OF-WAY LINE		
CENTER LINE		
CONTOUR, MAJOR	160	160
CONTOUR, MINOR	158	158
CONIFEROUS TREE		
DECIDUOUS TREE		
STREET SIGN		
POWER LINE		
OVERHEAD POWER LINE		
POWER POLE	P	P
GUY WIRE		
POWER VAULT	P	P
STREET LIGHT	P	P
NATURAL GAS LINE		
TELEPHONE LINE		
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
CABLE LINE	CTV	
CABLE PEDESTAL	TV	TV
STORM MAIN LINE		
FOOTING DRAIN LINE		
ROOF DRAIN LINE		
CATCH BASIN	CB	R
TYPE I CATCH BASIN	D	YD
YARD DRAIN	YD	DS
DOWNSPOUT	DS	
WATER MAIN LINE		
WATER METER	WM	
BLOWOFF VALVE FIRE HYDRANT	BO	BO
GATE VALVE	GV	
SEWER MANHOLE	S	CO
CLEANOUT	CO	
SEWER MAIN LINE		
CONCRETE		
ASPHALT PAVEMENT		
POROUS ASPHALT		
LANDSCAPING		
GRAVEL		

PROJECT INFO

OWNER:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

APPLICANT:
ERIK AINSWORTH 360-890-4806
5737 LINDERSON WAY SW
OLYMPIA, WA 98501 erik@thelanddeveloper.com

LEGAL DESCRIPTION

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR:

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007, UNDER AUDITOR' FILE NO. 3599306;

IN THURSTON COUNTY, WA.

TOGETHER WITH AND SUBJECT TO EASEMENTS, RESTRICTIONS, RESERVATIONS AND CONDITIONS OF RECORD, IF ANY. (NOT PART OF THIS SURVEY)

BASIS OF BEARING

CITY OF TUMWATER COORDINATE SYSTEM AND BASED ON THURSTON COUNTY CONTROL POINT NO. ARC AND CENTERLINE BEARING ALONG 5TH AVE SW AND "E" ST. SW

VERTICAL DATUM

THURSTON COUNTY CONTROL POINT NO. ARC, FOUND WSDOT MONUMENT WITH 3" ALUMINUM CAP AT THE NW CORNER OF THE INTERSECTION OF LINWOOD AVE SW AND 2ND AVE SW, ELEVATION = 107.53'

PARCEL NUMBER

33203200001

SITE INFO

SITE ADDRESS:	585 S 5th Ave SW, Tumwater, WA 98512
COMPREHENSIVE PLAN DESIGNATION:	RESIDENTIAL
ZONING:	LDR
PROPOSED IBC CONSTRUCTION TYPE:	5V-B
SCHOOL DISTRICT:	TUMWATER SCHOOL DISTRICT
FIRE DISTRICT:	FIRE DISTRICT #03
WATER PROVIDER:	CITY OF TUMWATER
SEWER PROVIDER:	CITY OF TUMWATER
ELECTRICITY PROVIDER:	PSE
GAS PROVIDER:	PSE
REFUSE/RECYCLING PROVIDER:	LeMAY
CABLE/TV PROVIDER:	COMCAST
TOTAL SITE AREA:	1.69 AC OR 73,521 SF
AREA OF ROW VACATION:	700 SF
TOTAL SITE AFTER VACATION:	1.70 AC OR 74,221 SF
EXISTING NUMBER OF UNITS:	VACANT
TOTAL EX RESIDENTIAL UNITS:	0
PROPOSED PROJECT:	11 UNIT TOWNHOME PLAT
PARKING SPACES REQUIRED RESIDENT:	2 SPACES / UNIT
PARKING SPACES PROP:	22 SPACES
OPEN SPACE REQUIRED:	15% OF SITE = 73,521 SF (0.15) = 11,028 SF 47,339 SF PROVIDED 50% SHALL BE ACTIVE RECREATION 5,514 SF OF COMMUNITY GARDEN AREA

CODE REVIEW

TOTAL LOT AREA:	1.69 AC
AREA OF 2.5' ROW VACATION:	700 SF = 0.016 AC
TOTAL LOT AREA FOR ZONING CALCULATIONS:	1.70 AC
ADDITIONAL REGULATIONS:	
MAXIMUM AVERAGE HOUSING DENSITY (units per acre)	(8) 1.70 AC = 14 UNITS
MINIMUM AVERAGE HOUSING DENSITY (units per acre)	(6) 1.70 AC = 11 UNITS
UNITS PROPOSED:	11 TOWN HOME UNITS
MINIMUM LOT SIZE	2,000 SF
MINIMUM FRONT YARD SETBACKS	10' or 20' @ GARAGE
MINIMUM REAR YARD SETBACKS	10'
MINIMUM SIDE YARD SETBACKS	5'
MAXIMUM BUILDING HEIGHT	35'
MAXIMUM IMPERVIOUS COVERAGE	70% (TOWNHOUSE) (1.69AC) = 1.18 AC
INDIVIDUAL LOT MAXIMUM COVERAGE CALCULATION:	
WORST CASE LOT COVERAGE (LOT 2):	
LOT SIZE:	2016 SF
MAX COVERAGE (70%):	1,411 SF
COVERAGE PROPOSED:	1,377 SF PROPOSED THEREFORE OK

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

ERIK A. AINSWORTH
38284
REGISTERED PROFESSIONAL ENGINEER
7/30/26

DATE:
REVISIONS:

5TH AVE TOWNHOMES

COVER SHEET

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 7/30/26
AGENCY NO:
SHEET: 1 OF 2
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.



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(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

ERIK B. ANDERSON
38284
PROFESSIONAL ENGINEER
7/30/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

ORIGINAL LAYOUT

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

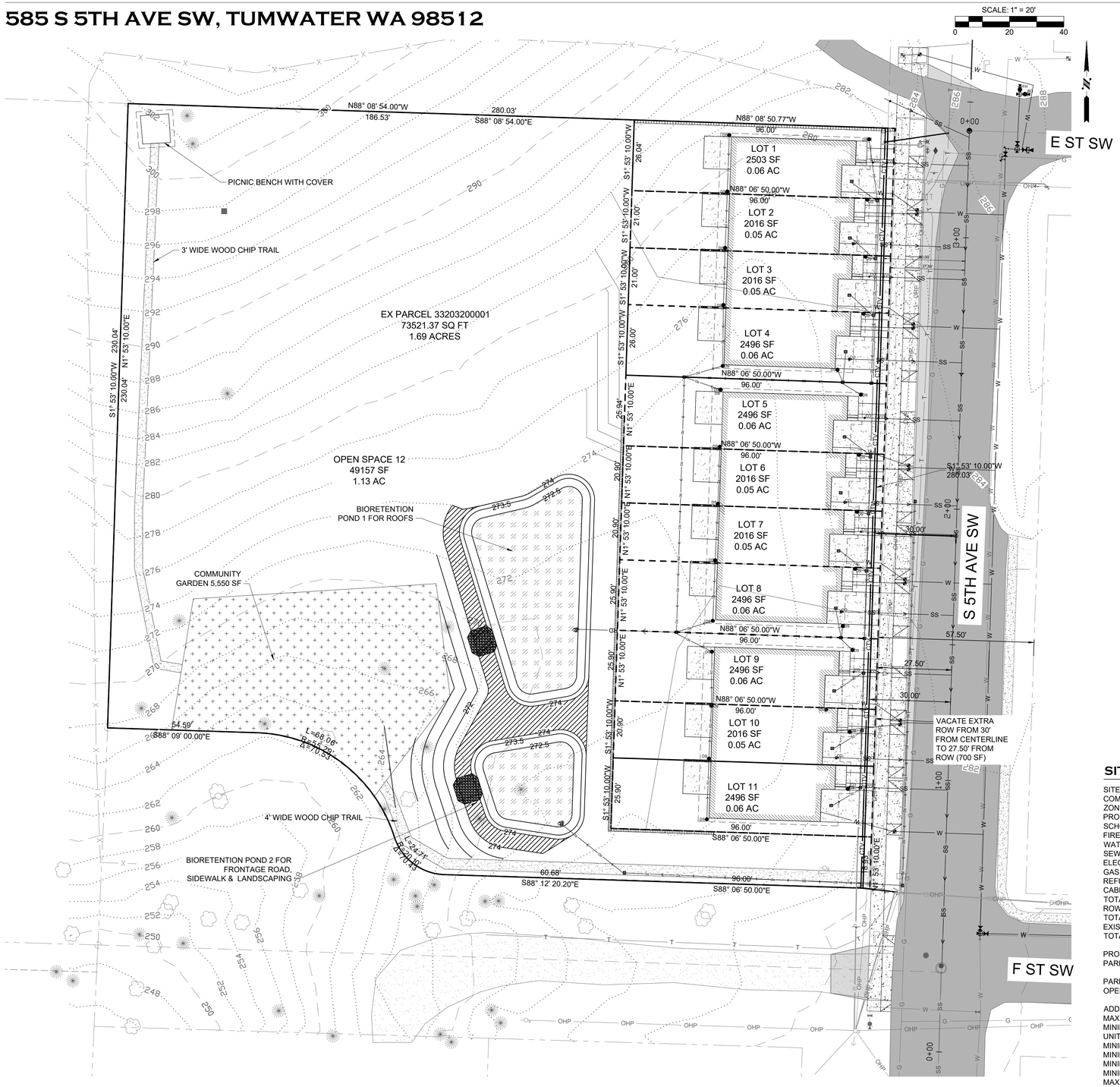
CLIENT:
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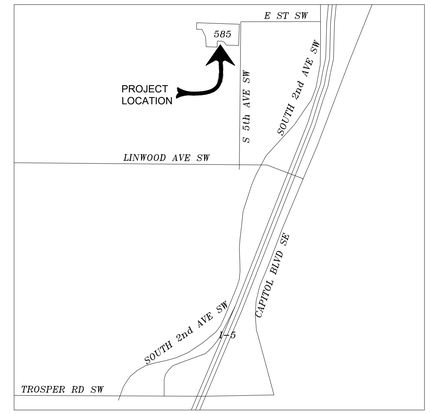
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DATE: 7/30/26
AGENCY NO:
SHEET: 2 OF 2
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.

5TH AVE TOWNHOMES PRELIMINARY PLAT SITE PLAN

585 S 5TH AVE SW, TUMWATER WA 98512





VICINITY MAP

NTS

LEGEND

	EXISTING	PROPOSED
SUBJECT PROPERTY LINE		
ADJACENT LOT LINE		
HABITAT BUFFER LINE		
WETLAND BUFFER LINE		
EASEMENT LINE		
RIGHT-OF-WAY LINE		
CENTER LINE		
CONTOUR, MAJOR	160	160
CONTOUR, MINOR	158	158
CONIFEROUS TREE		
DECIDUOUS TREE		
STREET SIGN		
POWER LINE	UGP	UGP
OVERHEAD POWER LINE	OHP	OHP
POWER POLE		
GUY WIRE		
POWER VAULT	P	P
STREET LIGHT		
NATURAL GAS LINE	G	G
TELEPHONE LINE	T	T
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
CABLE LINE	CTV	CTV
CABLE PEDESTAL	TV	TV
STORM MAIN LINE	SD	SD
FOOTING DRAIN LINE	FD	FD
ROOF DRAIN LINE	RD	RD
CATCH BASIN	CB	
TYPE I CATCH BASIN	D	
YARD DRAIN	YD	YD
DOWNSPOUT	DS	DS
WATER MAIN LINE	W	W
WATER METER	WM	
BLOWOFF VALVE FIRE HYDRANT	BO	BO
GATE VALVE		
SEWER MANHOLE		CO
CLEANOUT	CO	
SEWER MAIN LINE	SS	SS
CONCRETE		
ASPHALT PAVEMENT		
POROUS ASPHALT		
LANDSCAPING		
GRAVEL		

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ROW VACATION AREA:	0.02 AC OR 700 SF
TOTAL AREA AFTER VACATION:	1.70 AC OR 74,221 SF
EXISTING NUMBER OF UNITS:	VACANT
TOTAL EX RESIDENTIAL UNITS:	0
PROPOSED PROJECT:	TOWNHOME PLAT
PARKING SPACES REQUIRED RESIDENT:	2 SPACES / UNIT = 22 SPACES
PARKING SPACES PROP:	22 SPACES
OPEN SPACE REQUIRED:	15% OF SITE = 73,521 SF (0.15) = 11,028 SF 47,339 SF PROVIDED

ADDITIONAL REGULATIONS:

MAXIMUM AVERAGE HOUSING DENSITY (units per acre)	(8) 1.70 AC = 14 UNITS
MINIMUM AVERAGE HOUSING DENSITY (units per acre)	(6) 1.70 AC = 11 UNITS
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MINIMUM LOT SIZE	2,000 SF
MINIMUM FRONT YARD SETBACKS	10' or 20' @ GARAGE
MINIMUM REAR YARD SETBACKS	10'
MINIMUM SIDE YARD SETBACKS	5'
MAXIMUM BUILDING HEIGHT	35'
MAXIMUM IMPERVIOUS COVERAGE	70% (TOWNHOUSE) (1.69AC) = 1.18 AC

INDIVIDUAL LOT MAXIMUM COVERAGE CALCULATION:

WORST CASE LOT COVERAGE (LOT 2):	
LOT SIZE:	2016 SF
MAX COVERAGE (70%):	1,411 SF
COVERAGE PROPOSED:	1,377 SF PROPOSED THEREFORE OK

APPROXIMATE CUT/FILL GRADING QUANTITIES
CUT: 1,100 YARDS
FILL: 3,500 YARDS
FOR PERMITTING PURPOSED ONLY

PROJECT INFO

OWNER:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

LEGAL DESCRIPTION

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR:

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007, UNDER AUDITOR' FILE NO. 3599306;

IN THURSTON COUNTY, WA.

TOGETHER WITH AND SUBJECT TO EASEMENTS, RESTRICTIONS, RESERVATIONS AND CONDITIONS OF RECORD, IF ANY. (NOT PART OF THIS SURVEY)

BASIS OF BEARING

CITY OF TUMWATER COORDINATE SYSTEM AND BASED ON THURSTON COUNTY CONTROL POINT NO. ARC AND CENTERLINE BEARING ALONG 5TH AVE SW AND "E" ST. SW

VERTICAL DATUM

THURSTON COUNTY CONTROL POINT NO. ARC, FOUND WSDOT MONUMENT WITH 3" ALUMINUM CAP AT THE NW CORNER OF THE INTERSECTION OF LINWOOD AVE SW AND 2ND AVE SW, ELEVATION = 107.53'

PARCEL NUMBER

33203200001

SITE COVERAGE DATA

LOT SIZE: 73,521 SF (1.69 AC)

FRONTAGE (S 5TH AVE SW) COVERAGE:	
TOTAL AREA:	7,019 SF (0.16 AC)
NEW SIDEWALK:	1,543 SF (0.04 AC)
NEW + EX ASPH TO SWALE:	3,298 SF (0.08 AC)
NEW LANDSCAPED AREA:	2,178 SF (0.05 AC)
ONSITE AREA:	
11 LOT TOTAL AREA:	22,123 SF (0.51 AC)
NEW + REPLACED ASPHALT AREA:	1,716 SF (0.04 AC)
PATIO AREA:	792 SF (0.02 AC)
ROOF AREA:	12,312 SF (0.28 AC)
	< 0.56 AC THEREFORE OK)
LANDSCAPED AREA:	8,561 SF (0.20 AC)
TOTAL ONSITE IMP COVERAGE:	14,820 SF (0.34 AC) OR 20% OK IF LESS THAN 60%

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E-MAIL: erik@thelanddeveloper.com

ERIK B. ANDERSON
38284
REGISTERED
PROFESSIONAL ENGINEER
STATE OF WASHINGTON
7/30/26

DATE:
REVISIONS:

5TH AVE TOWNHOMES

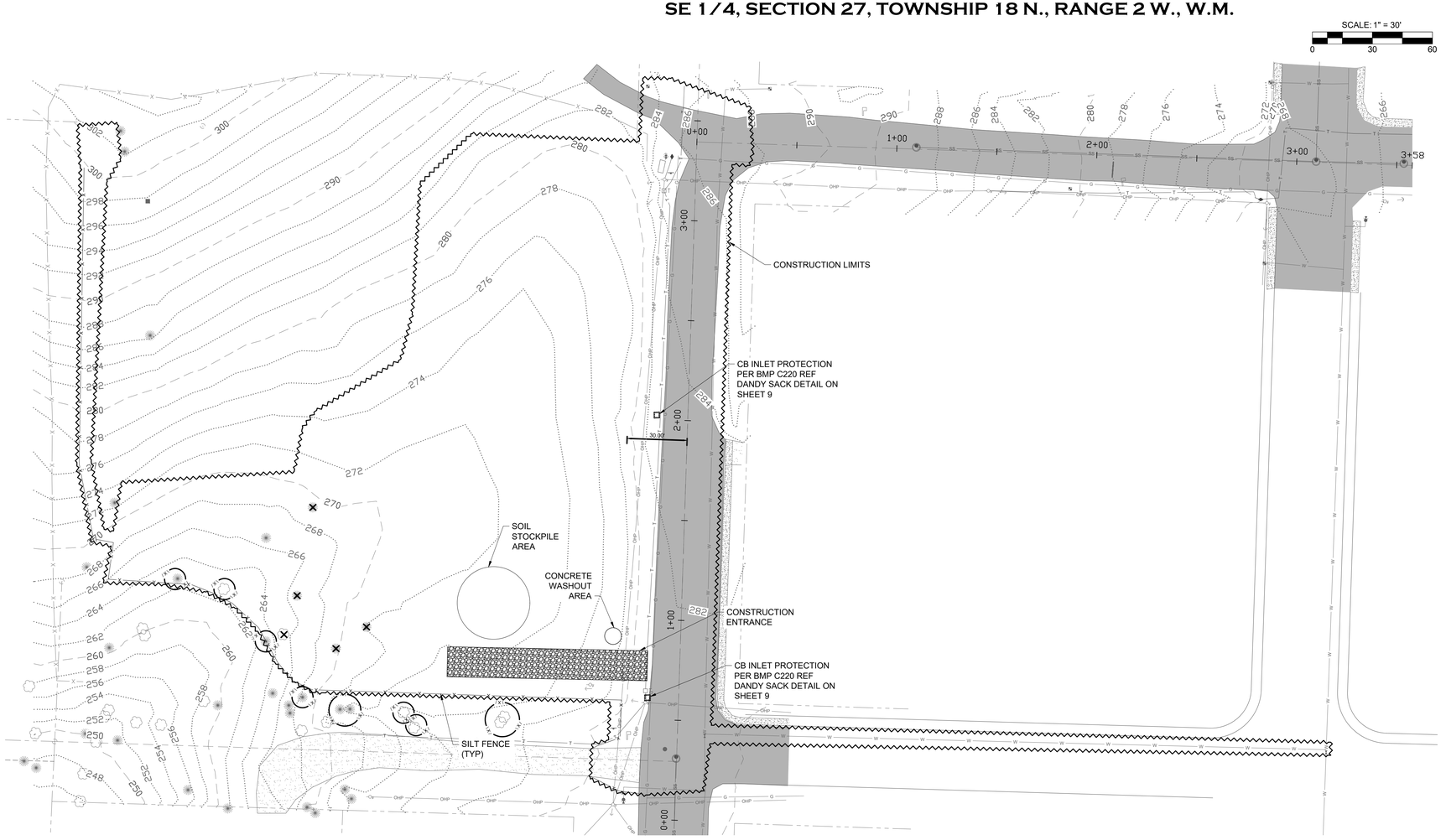
COVER SHEET

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 7/30/26
AGENCY NO:
SHEET: 1 OF 4
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.



NOTES FOR CONSTRUCTION STORMWATER POLLUTION PREVENTION

1. APPROVAL OF THIS CONSTRUCTION SWPPP DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION/ DETENTION/INFILTRATION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THIS CONSTRUCTION SWPPP AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE CONSTRUCTION SWPPP FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
4. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
5. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE CONSTRUCTION SWPPP FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
6. THE CONSTRUCTION SWPPP FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
7. THE CONSTRUCTION SWPPP FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.
8. AT NO TIME SHALL MORE THAN 1 FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
9. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.

TOPOGRAPHIC NOTE:

THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, TLD, LLC CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

SITE CONSTRUCTION NOTES:

1. DEMOLISH ALL EXISTING STRUCTURES WITHIN CLEARING LIMITS EXCEPT AS NOTED.
2. SEE SHEETS 3 & 4 FOR EROSION CONTROL DETAILS

- INDICATES TREES TO BE REMOVED (TYP)

- INDICATES TREES TO BE PROTECTED W/ TREE PROTECTION FENCE INCLUDING A 4' TALL CHAIN LINK OR POLYETHYLENE LAMINAR SAFETY FENCING OR SIMILAR MATERIAL (TYP)

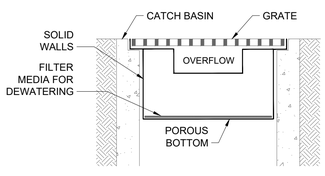
SILT FENCE

LIMITS OF DISTURBANCE

SURVEY MONUMENTS NOTES:

- EXISTING SURVEY MONUMENTS MUST BE SHOWN ON THE PLANS WITH NOTES TO PROTECT.
- DISTURBING EXISTING MONUMENTS REQUIRES A DNR PERMIT.
- NEW MONUMENTS TO BE INSTALLED PER CITY STANDARD PLANS

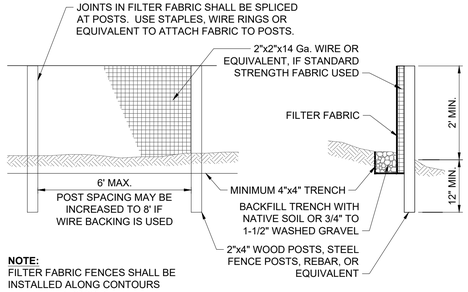
FIGURE D.2.1.5.F CATCH BASIN INSERT



NOTES:
THIS DETAIL IS ONLY SCHEMATIC. ANY INSERT IS ALLOWED THAT HAS:
- A MIN. 0.5 C.F. OF STORAGE,
- THE MEANS TO DEWATER THE STORED SEDIMENT,
- AN OVERFLOW, AND
- CAN BE EASILY MAINTAINED.

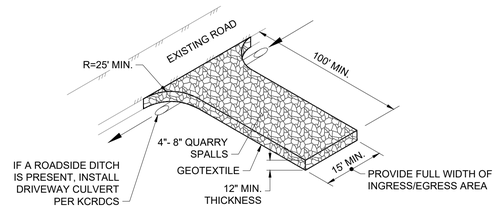
3 CB INLET PROTECTION
SCALE: NTS

FIGURE D.2.1.3.A SILT FENCE



NOTE:
FILTER FABRIC FENCES SHALL BE INSTALLED ALONG CONTOURS WHENEVER POSSIBLE

FIGURE D.2.1.4.A STABILIZED CONSTRUCTION ENTRANCE



NOTES:
- PER KING COUNTY ROAD DESIGN AND CONSTRUCTION STANDARDS (KCRDCS), DRIVEWAYS SHALL BE PAVED TO EDGE OF R-O-W PRIOR TO INSTALLATION OF THE CONSTRUCTION ENTRANCE TO AVOID DAMAGING OF THE ROADWAY.
- IT IS RECOMMENDED THAT THE ENTRANCE BE CROWNED SO THAT RUNOFF DRAINS OFF THE PAD.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

REGISTERED PROFESSIONAL ENGINEER
ERIK B. OLSON
38284
7/30/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

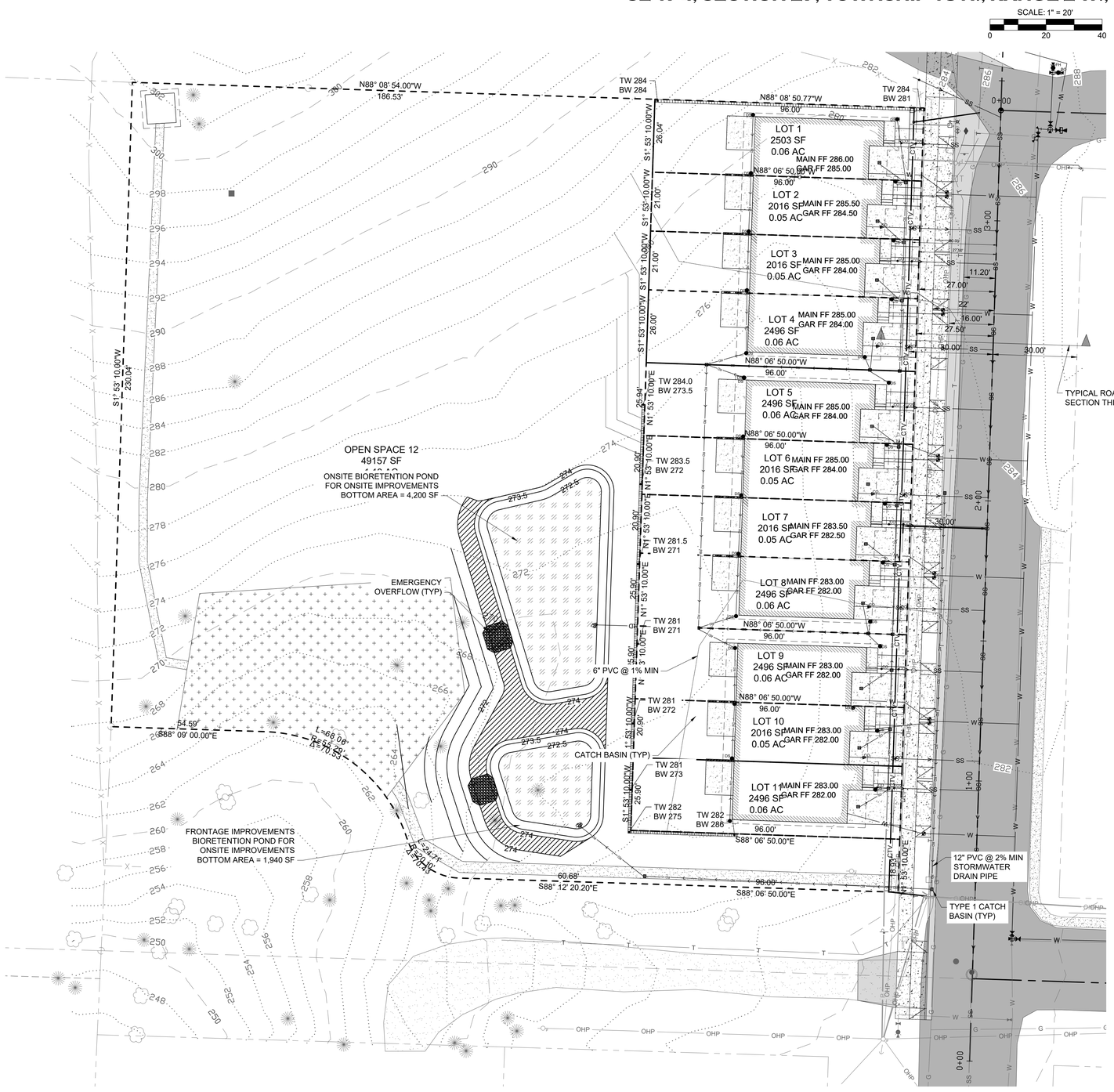
EROSION CONTROL PLAN

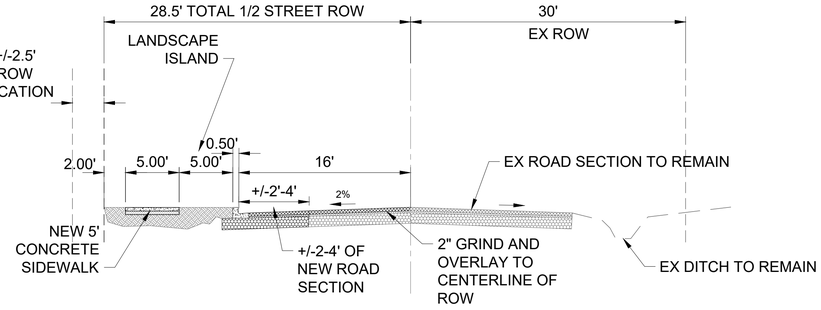
PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 7/30/26
AGENCY NO:
SHEET: 2 OF 4
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

ERIK A. BERGLUND
38284
REGISTERED
PROFESSIONAL ENGINEER
7/30/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

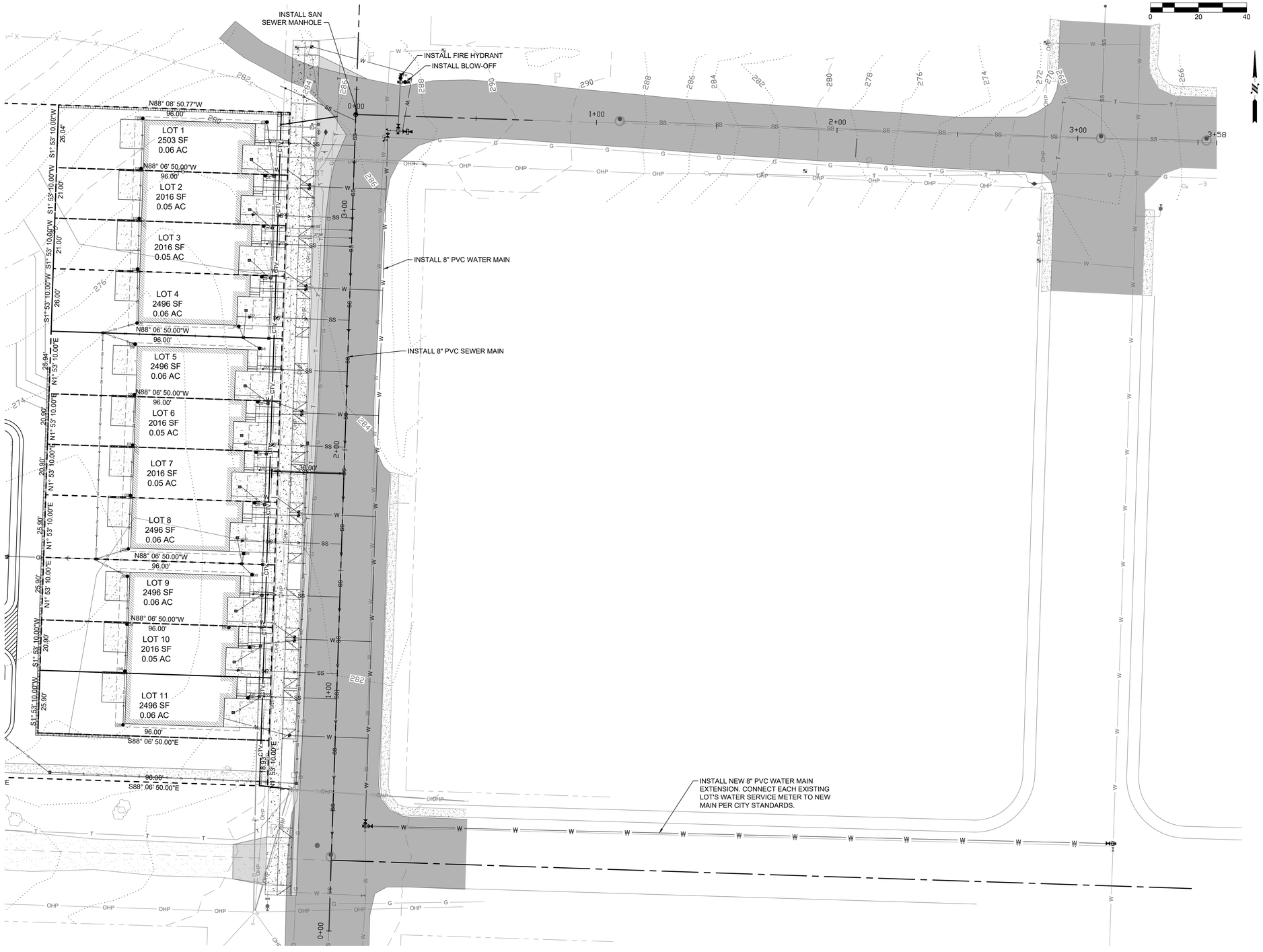
GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 7/30/26
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.



THE LAND DEVELOPER'S ENGINEERED SOLUTION
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5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

REGISTERED PROFESSIONAL ENGINEER
38284
STATE OF WASHINGTON
7/30/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

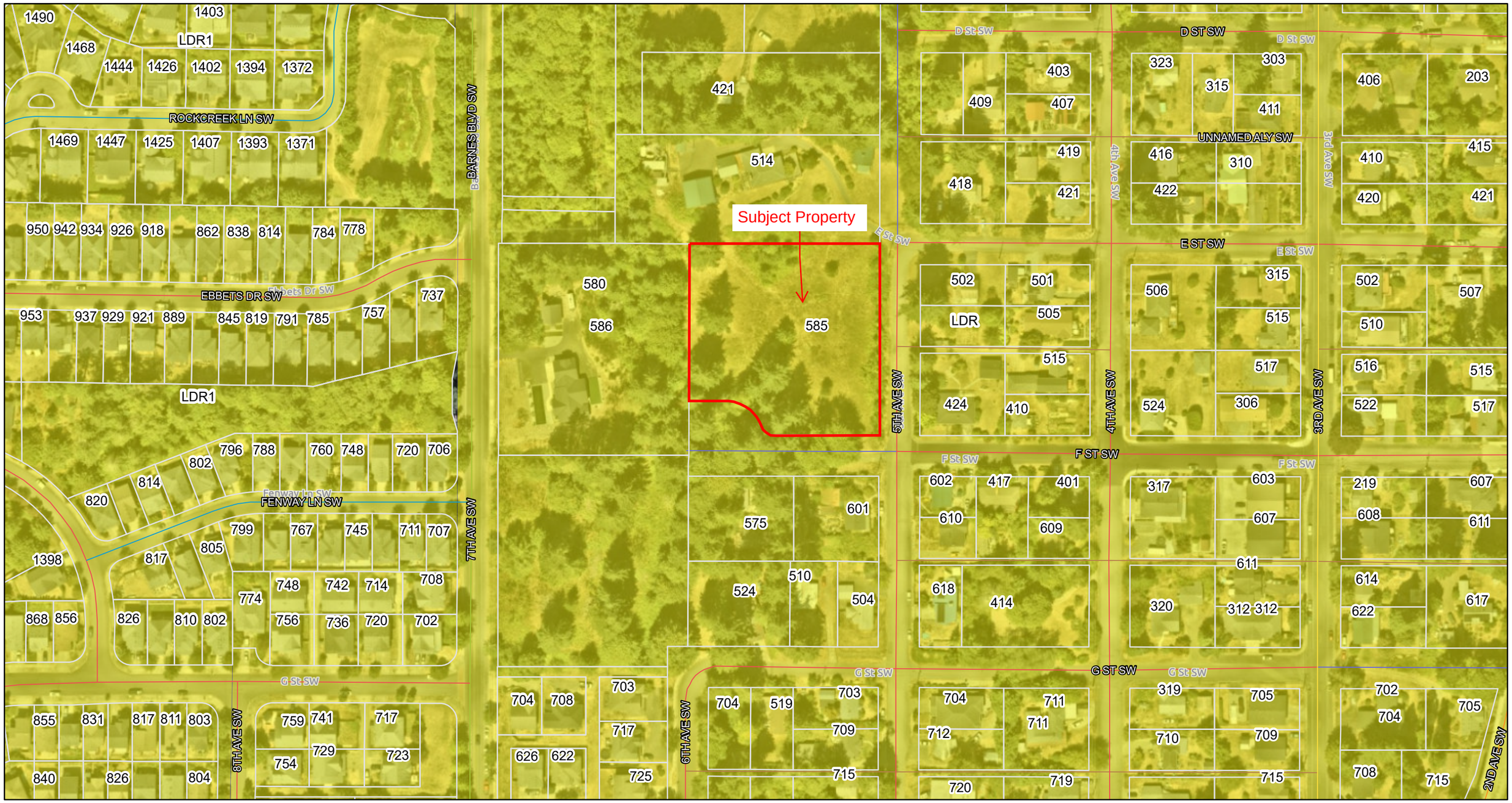
UTILITY PLAN

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 7/30/26
AGENCY NO:
SHEET: 4 OF 4
JOB NO: 21-132

City of Tumwater Vicinity and Zoning Map



9/30/2026, 10:42:57 AM

1:2,466

0 115 230 460 ft

0 30 60 120 m

Tumwater Site Addresses

Tumwater City Limits

Tumwater Parcels

Street Segment

RESIDENTIAL

PRIVATE STREET/ROADWAY

URBAN COLLECTOR

MINOR ARTERIAL

COLLECTOR

ALLEY

UNIMPROVED R/W

Zoning

Low Density Residential

Esri Community Maps Contributors, City of Olympia, City of Tumwater (WA), WA State Parks GIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, US Census

City of Tumwater

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

CERTIFICATION OF PUBLIC NOTICE

I, Alex Baruch, Senior Planner for the City of Tumwater hereby certify that public notice for the Project # TUM-26-0115; 5th Ave Townhomes was given as follows:

APPLICATION

Notice of Application Published in Olympian:	May 8, 2026
Notice of Application Uploaded to Website:	May 8, 2026
Notice of Application Mailed:	May 8, 2026
Notice of Application Posted:	May 8, 2026
Posting Locations:	One sign facing 5th Ave

Environmental Determination Published:	August 28, 2026
Environmental Determination Uploaded to Website:	August 28, 2026
Environmental Determination Mailed:	August 28, 2026
Environmental Determination Posted:	August 28, 2026
Posting Locations:	One sign facing 5th Ave

HEARING

Notice of Public Hearing Published:	October 9, 2026
Notice of Public Hearing Uploaded to Website:	October 9, 2026
Notice of Public Hearing Mailed:	October 9, 2026
Notice of Public Hearing Posted:	October 9, 2026
Posting Locations:	One sign facing 5th Ave

The above is an accurate accounting of the public notice provided for the project.

Alex Baruch, Senior Planner	October 9, 2026
NAME, TITLE	Date

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

NOTICE OF APPLICATION
5th Ave Townhomes Preliminary Plat
Permit No. TUM-26-0115
May 8, 2026

Proposal: The applicant is proposing a subdivision of a parcel totaling 1.69 acres into 11 single family attached lots and one open space/stormwater tract. The development will include infrastructure, frontage improvements, and open space.

Applicant: Erik Ainsworth, 5737 Linderson Way SW, Tumwater, WA 98501.

Representative: Erik Ainsworth, 5737 Linderson Way SW, Tumwater, WA 98501.

Location: One parcel totaling 1.69 acres located at 585 5th Ave SW, Tumwater, WA 98512. Tax Parcel Number 33203200001.

Complete Application: Application submitted: April 24, 2026. Application deemed complete: May 4, 2026.

Project Permit/Approvals: The following permits and approvals may be required: Preliminary Plat Approval, Transportation Concurrency, State Environmental Protection Act Determination, Final Plat Approval, Design Review Approval, Landscape Plan Approval, On-site Lighting Approval, Building Permit Approval, Site Development/Grading Permit, Sign Permits and NPDES Permit.

Environmental Documents Relating to the Project: A completed environmental checklist and related reports were submitted. People receiving this notice will be informed about the City's threshold determination when it is issued.

Determination of Consistency: No determination of consistency with City of Tumwater or State of Washington plans, regulations, or standards has been made. At a minimum, this project will be subject to the following plans and regulations: Tumwater Comprehensive Plan, Tumwater Land Division Code (TMC Title 17), Tumwater Zoning Code (TMC Title 18), Tumwater Environmental Policy Ordinance (TMC 16.04), Tumwater Design Guidelines, Tumwater Drainage Design and Erosion Control Manual, and the International Building Code.

Public Hearing: A public hearing is required for this project. People receiving this notice will also receive the public hearing notice.

Public Comment Period: The 14-day comment period ends at 5:00 p.m. on May 22, 2026. Written comments may be submitted to City of Tumwater Community Development Department, Attn: Alex Baruch, 555 Israel Road SW, Tumwater, WA 98501, or email abaruch@ci.tumwater.wa.us.

If you have any questions or would like additional information, please contact Alex Baruch, Senior Planner, at 360-754-4180.

Exhibit 6a.

Alex Baruch

From: jamesgeluso@yahoo.com
Sent: Friday, May 15, 2026 10:40 AM
To: Alex Baruch
Subject: 5th Ave Townhomes

You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

Mr. Baruch,

Can you provide me with the following information on the 5th Avenue Townhomes proposal?

I've seen a picture of the plat, but can you send it to me? I can't see where the proposed parking is from the picture. Is there off-street parking?

The applicant is listed as being in Tumwater, but neighbors say he is backed by a corporation called Ash Holdings. Do you know what the relationship is between Ash Holdings and this project, if any?

Please add me to the public hearing notification list. This e-mail is sufficient, but my postal address is

James Geluso
917 Comiskey Lane SW
Tumwater WA 98512

Thanks,

James

Exhibit 6b.

Alex Baruch

From: Alex Baruch
Sent: Friday, May 15, 2026 10:49 AM
To: jamesgeluso@yahoo.com
Subject: RE: 5th Ave Townhomes
Attachments: Preiminary Plat Map 01-23-2026.pdf

Hi James,

Thanks for your email. I have added you to the public comment list for future public comment notifications.

I could not provide any insight on the relationship between the applicant and Ash Holdings.

Two off-street parking spaces are proposed for each townhome as required by the ordinance. My understanding is that there will be one garage space and one parking space in the driveway. I've attached the preliminary plat for your reference. If you'd like any other documentation please let me know.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: jamesgeluso@yahoo.com <jamesgeluso@yahoo.com>
Sent: Friday, May 15, 2026 10:40 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: 5th Ave Townhomes

> You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

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Please add me to the public hearing notification list. This e-mail is sufficient, but my postal address is

James Geluso
917 Comiskey Lane SW
Tumwater WA 98512

Thanks,

James

Exhibit 6c.

Alex Baruch

From: Tara Chestnut <tarachestnut@gmail.com>
Sent: Thursday, May 14, 2026 6:23 PM
To: Alex Baruch
Subject: Re: TUM-26-0115 5th Ave Townhomes Preliminary Plat Documents

Good evening Alex,

Thank you for the opportunity to comment on the application for proposed 5th Avenue Townhomes at 585 5th Avenue SW, Tumwater, WA 98512 (TUM-26-0115). I co-own the adjacent property at 575 F Street SW, Tumwater, WA 98512. Welcome to the neighborhood!

I am supportive of this kind of in-filling to existing neighborhoods to reduce urban sprawl and increase housing density, and to make efficient use of existing infrastructure. Overall, this looks like a lovely planned addition to the neighborhood that maintains or improves neighborhood character, leaves open space and gardening opportunities for residents, and on-site treatment of stormwater runoff from added impervious surfaces. I do have questions that were not clear to me after reviewing the Preliminary Plat Plans and Maps and other documents, as well as recommendations for design, based on my professional expertise. Thank you for reviewing this letter and addressing my questions and comments.

Professional Qualifications

Pursuant to TMC 16.32.030(M), I am a qualified wildlife and habitat professional. I hold a B.S. in Wildlife Biology, an M.E.S. in Environmental Policy, an M.E.M. in Aquatic Science, and a Ph.D. in Environmental Sciences. Additionally, I have 30 years of experience working as a professional wildlife biologist and ecologist. I've published more than 50 peer-reviewed journal articles and served as a lead biologist for complex Endangered Species Act Section 7 consultations and National Environmental Policy Act documents. I am also on Pierce County's roster of Wildlife Specialists.

https://scholar.google.com/citations?user=Jz-bHQUAAAAJ&hl=en

https://www.piercecountywa.gov/DocumentCenter/View/4470/Wetland-Specialists-Fisheries--Wildlife-Biologist-Roster

Property Management

Please provide additional information on property management. Is the intent for the units to be rented or owned by occupants?

Sidewalks and Parking

Our neighborhood is enjoyed by many residents for its walkability and access to public transportation, however, many people still rely on personal vehicles, often with two or more vehicles per household.

It wasn't clear to me if sidewalks are included along 5th Avenue. If they are included, please accept my apologies for missing this detail. If they are not, I would like to see sidewalks on 5th Avenue to ensure pedestrian safety. It is also not clear to me how the homes will accommodate parking for residents, guests, and visitors. Adding 11 households to the street will certainly increase traffic and require additional parking. I would like to see off-street parking that will accommodate two vehicles per home. This will ensure both current and new residents will be able to host guests and have events at their homes that will minimize impacts to neighbors. In the lower left quadrant of the plan map, south of the property line, there is a notation "5' wide asphalt path to park" and an arrow pointing to the northeast. Please clarify what this is and the location that arrow is intended to point to – what does "park" refer to? – a park within the property? A city or county park that is off the map? Or to park vehicles?

Accessibility

To ensure disabled residents and community members have access to housing, I request that 1-2 units be designed for accessibility such that units can be occupied and visited by people who use wheelchairs and other assistive devices, per the Americans with Disabilities Act.

Trees, Community Garden and Covered Picnic Area

Large and mature trees are a critical part of a city's infrastructure, reducing temperatures through shade and transpiration, and providing habitat for wildlife in an environment that is extremely habitat limited. I request that the proposed project further reduce the removal of trees to maintain shade for the residents of the property, my property, my neighbor's property and the greater Tumwater Hill neighborhood. Removal of trees in the southwest quadrant of the property will negatively affect my property by decreasing shade and increasing summer heat. Removing these trees will also reduce the quality and quantity of habitat available to wildlife.

I request that the property owners consider switching the locations of the "Community Garden" and the "Picnic Bench with Cover" Relocating the "Community Garden" across from Units 1-4 will ensure the garden has ample sunlight without reducing the benefits and heat trapping ability that the large and mature trees provide to the future residents of the property, my property and my neighbor's property, as well as the greater Tumwater Hill neighborhood. While this will increase the amount of earthwork required for the garden, the benefits outweigh the cost. Retaining the trees will maintain this critical part of our neighborhood's infrastructure and increase benefits to users, who can enjoy picnicking under the shade trees and have more opportunities for wildlife viewing.

Stormwater and Erosion

I applaud the proposed project's commitment to treating stormwater runoff on-site. It does, however, concern me that the response to B.1.f. is that erosion could occur via offsite flows. My property is adjacent to the south and is directly downhill, therefore the most likely to be impacted by erosion and off-site flows. Please provide technical and plain language explanations for how this project will minimize the potential for off-site flows to impact my property and assurances that should these impacts occur, we will be adequately compensated to make repairs.

Bioretention ponds

Bioretention ponds can provide excellent habitat for wetland associated species, including amphibians, however, there are design features that can improve the habitat while maintaining water treatment requirements. Design features can also cause bioretention ponds to become ecological sinks, contributing to amphibian declines. Below, I've provided design recommendations to improve the ecological function of the bioretention ponds based on the findings of Guderyahn and others (2016) and Ostergaard and others (2008).

Hydroperiod: Maintain inundation between February and August. Monitor water level and attempt to limit mean monthly water level fluctuation to less than 30 inches (75 centimeters) during these months. To avoid colonization by invasive American bullfrogs, consider allowing ponds to dry in September or before the winter rains begin.

Vegetation: Within 33 feet (10 meters), plant native vegetation that includes appropriate shrubs, forbs and grasses (e.g., willow, red-osier dogwood, sedges, rushes). If assistance with a planting plan is needed, Thurston County Conservation District or Washington State University Extension Program are excellent resources (https://thurstoncd.com/ ; https://extension.wsu.edu/). Avoid removing trees and native shrubs in the southwest quadrant of the property. This area provides important habitat connectivity to the adjacent greenspace on the south and west sides of the property.

Maintenance: Vegetation clearing and dredging should be scheduled between September and January. Perimeter mowing should be avoided between June and August, when newly metamorphosed juveniles are dispersing to upland habitats. Avoid mowing within 33 feet (10 meters) of the pond edge. Support and initiate Integrated Pest Management practices. Avoid using chemical fertilizers and pesticides, using them only as a last resort for a specific problem or part of a larger invasive species management program. Avoid or prohibit the use of anti-coagulant rodenticides on the property.

Pond structure: Provide a shallow (40–60 cm) shoreline edge that extends at least 3.3 feet (1 meter) with emergent native vegetation. To the greatest extent practicable, avoid steep slopes that form a drop off to deep water.

Access and Signage: Consider providing access for people to observe and explore the ponds while ensuring public safety (e.g., a small observation deck or other feature that allows interaction). Include interpretive signs explaining the multiple functions and purposes of the stormwater ponds, including how they provide habitat for native aquatic species. Highlight species the species that are indicators of wetland health (e.g., Pacific chorus frog, long-toed salamander, common yellowthroat, violet-green swallow, dragonflies, mayflies, diving beetles). Label native plants with English and standard names (e.g., Pacific willow, *Salix lasiandra*).

Guderyahn, L.B., Smithers, A.P. & Mims, M.C. Assessing habitat requirements of pond-breeding amphibians in a highly urbanized landscape: implications for management. *Urban Ecosyst* **19**, 1801–1821 (2016). https://doi.org/10.1007/s11252-016-0569-6

Ostergaard, E. C., Richter, K. O., & West, S. D. (2008). Amphibian use of stormwater ponds in the Puget Lowlands of Washington, USA. *Urban herpetology. Society for the Study of Amphibians and Reptiles, Salt Lake City*, 259-270.

SEPA Checklist

I found the habitat assessment in the proposed project's SEPA environmental checklist to be incomplete and lacking sufficient detail.

4e. The applicant did not disclose how they concluded "None known on site." This response suggests they didn't review the species that could potentially be present or search the property during the appropriate growing seasons. Based on my professional judgement, I would expect hawkweeds (*Pilosella* and *Hieracium* spp.) and tansy ragwort (*Jacobaea vulgaris*) to have the potential to be on-site. I have also observed the following invasive species on or adjacent to the property:

- Common St. Johnswort (*Hypericum perforatum*)
- English holly (*Ilex aquifolium*)
- English ivy (*Hedera helix*)
- Herb-Robert (*Geranium robertianum*)
- Himalayan blackberry (*Rubus armeniacus*)
- Scot's Broom (*Cytisus scoparius*)
- Thistles (*Cirsium* spp.)

I do not believe the presence of these invasive species will affect the outcome of the application – as these species are widespread throughout the county – though it is disappointing to see this lack of attention to detail in preparing the application. I expect future environmental documentation to be thorough and complete.

https://www.thurstoncountywa.gov/departments/public-works/noxious-weeds/noxious-weed-list

https://forestry.wsu.edu/weeds/#baddies

5b. The response to this question "None known" reveals that the applicant did not conduct a basic desktop assessment for threatened or endangered species. Per 16.32.050 – Habitats defined and protected, it does not appear that the applicant consulted with the U.S. Fish and Wildlife Service (USFWS) and Washington Department of Fish and Wildlife (WDFW) to determine the potential for threatened or endangered species to occur within the project area. The first step to determine this, which is usually standard practice for environmental professionals who prepare SEPA checklists, is to visit the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website to obtain a list of threatened and endangered species that may be present in the project area. (https://ipac.ecosphere.fws.gov/location/index). The second step is to review the Washington Department of Fish and Wildlife (WDFW) Priority Species and Habitats (PHS) website to determine if state listed species or species of concern may be present (https://wdfw.wa.gov/species-habitats/at-risk/phs/list).

On May 13, 2026, I conducted an IPaC search which returned nine endangered species, bald eagle and 15 migratory bird species. **Based on the IPaC list, the proximity of this property to known occupied sites, and the habitat and soil conditions on this property, it is possible that Olympia Pocket Gopher (*Thomomys mazama pugetensis*) may be present**. **I recommend that a professional who is experienced in pocket gopher mound identification conduct surveys during the appropriate times of year to determine the likelihood of their presence before any groundbreaking activities occur.** WDFW may be able to provide technical assistance or recommend potential surveyors (https://wdfw.wa.gov/about/regional-offices). **It is also possible, though unlikely, that Streaked horned lark (*Eremophila alpestris strigata*) may be present on this property**. Of the 15 migratory bird species listed in the IPaC report, bald eagle, chestnut-backed chickadee, evening grosbeak, olive-sided flycatcher, Oregon vesper sparrow, and rufous hummingbird may be present. I have personally observed chestnut-backed chickadee, evening

grosbeak, olive-sided flycatcher, and rufous hummingbird on my adjacent property. I have also observed bald eagle flying over my property.

On May 13, 2026, I accessed the WDFW PHS list, which was last updated in 2023. Based on the list and the habitat that may be available on or adjacent to the property, it is my professional judgement that that the following species may be present:

- Band-tailed Pigeon
- Vaux's Swift
- Oregon Vesper Sparrow
- Streaked Horned Lark
- Roosting concentrations of Big Brown Bat and Myotis Bats
- Townsend's Big-eared Bat
- Mazama Pocket Gopher
- Blue-gray Taildropper
- Western Bumblebee
- Puget Blue Butterfly
- Valley Silverspot

I have personally observed big brown bat, myotis bats and Townsend's big-eared bat via Wildlife Acoustics Echo Meter Touch Pro ultrasonic recorder on my property at 575 F Street SW though I am unaware of the locations of roosting concentrations. Additionally, a few years ago, I observed a Townsend's big-eared bat on my property that appeared to be killed by an outdoor cat.

I recommend that professionals experienced in nest searching, invertebrates, and bats conduct surveys following standardized and accepted protocols to document any potential PHS species on the property. To mitigate the potential negative effects to WDFW species of concern and ensure the health and safety of pets, I encourage the townhomes to adopt a "Cats Indoors" posture. (https://abcbirds.org/solutions/keep-cats-indoors/).

5c. This response is incorrect. This property is located within the Pacific Flyway bird migration route. https://www.fws.gov/partner/migratory-bird-program-administrative-flyways

Should the above listed species or other endangered, threatened, and sensitive habitats and species as identified by USFWS or WDFW be detected, the owner is responsible for coordinating with the appropriate jurisdictions. If the City of Tumwater requires a habitat protection plan, pursuant to 16.32.090 Habitat areas – Protection plan, I request that it be approved by WDFW prior to groundbreaking activities.

Thank you for providing the opportunity to provide comments and for your review and response.

Sincerely,

Tara Chestnut

575 F Street SW

Tumwater, WA 98512

360-357-8758

On Wed, May 13, 2026 at 12:59 PM Alex Baruch <ABaruch@ci.tumwater.wa.us> wrote:

> Hi Tara,
>
> It was great speaking with you this afternoon. You can find the documents for the project here. Let me know if you have any follow-up questions.
>
> Sincerely,
>
> **Alex Baruch** | **he/him**
>
> **Senior Planner**, Community Development
>
> City of Tumwater
>
> 555 Israel Rd SW | Tumwater, WA 98501
>
> (360) 754-4180 | ABaruch@ci.tumwater.wa.us
>
> www.ci.tumwater.wa.us

Exhibit 6d.

Alex Baruch

From: jamesgeluso@yahoo.com
Sent: Friday, May 15, 2026 2:49 PM
To: Alex Baruch
Subject: Re: 5th Ave Townhomes

You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

Mr. Baruch,

The notice mentions a stormwater facility, but I don't see one on the plat. The lowest point within the parcel is designated as the community garden, but then there is lower land on the adjacent parcel to the south. Where will the stormwater basin be?

Who will be responsible for maintaining the open space? The plat mentions land conveyed to the city, but I'm assuming that's just the street ROW.

Can you point me to another area in Tumwater with existing residences on lots as narrow as 28 feet? I'm looking for something comparable nearby on Google Maps, but everything nearby seems to have seven rooftops in the same length as this project's frontage.

Thanks,

James Geluso

On Friday, May 15, 2026 at 10:49:12 AM PDT, Alex Baruch <abaruch@ci.tumwater.wa.us> wrote:

Hi James,

Thanks for your email. I have added you to the public comment list for future public comment notifications.

I could not provide any insight on the relationship between the applicant and Ash Holdings.

Two off-street parking spaces are proposed for each townhome as required by the ordinance. My understanding is that there will be one garage space and one parking space in the driveway. I've attached the preliminary plat for your reference. If you'd like any other documentation please let me know.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: jamesgeluso@yahoo.com <jamesgeluso@yahoo.com>
Sent: Friday, May 15, 2026 10:40 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: 5th Ave Townhomes

You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

Mr. Baruch,

Can you provide me with the following information on the 5th Avenue Townhomes proposal?

I've seen a picture of the plat, but can you send it to me? I can't see where the proposed parking is from the picture. Is there off-street parking?

The applicant is listed as being in Tumwater, but neighbors say he is backed by a corporation called Ash Holdings. Do you know what the relationship is between Ash Holdings and this project, if any?

Please add me to the public hearing notification list. This e-mail is sufficient, but my postal address is

James Geluso
917 Comiskey Lane SW
Tumwater WA 98512

Thanks,

James

Exhibit 6e.

Alex Baruch

From: Alex Baruch
Sent: Friday, May 15, 2026 3:04 PM
To: jamesgeluso@yahoo.com
Subject: RE: 5th Ave Townhomes
Attachments: Preliminary Plat Plans 01-23-2026.pdf

Hi James,

I have attached the preliminary civil plans that show the location of the stormwater facility.

The homeowners association will be required to maintain the open space.

You are correct, the right-of-way is the only land proposed to be dedicated to the City.

An example of a similarly dense townhome style project would be up on Tumwater Hill at 3362 MOONLIGHT LN SW. Within approximately 270 feet there are 12 townhome style units similar to the density proposed with this project.

Let me know if you have any follow-up questions.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: jamesgeluso@yahoo.com <jamesgeluso@yahoo.com>
Sent: Friday, May 15, 2026 2:49 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Re: 5th Ave Townhomes

You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

Mr. Baruch,

The notice mentions a stormwater facility, but I don't see one on the plat. The lowest point within the parcel is designated as the community garden, but then there is lower land on the adjacent parcel to the south. Where will the stormwater basin be?

Who will be responsible for maintaining the open space? The plat mentions land conveyed to the city, but I'm assuming that's just the street ROW.

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Thanks,

James Geluso

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Hi James,

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Two off-street parking spaces are proposed for each townhome as required by the ordinance. My understanding is that there will be one garage space and one parking space in the driveway. I've attached the preliminary plat for your reference. If you'd like any other documentation please let me know.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: jamesgeluso@yahoo.com <jamesgeluso@yahoo.com>
Sent: Friday, May 15, 2026 10:40 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: 5th Ave Townhomes

> You don't often get email from jamesgeluso@yahoo.com. Learn why this is important

Mr. Baruch,

Can you provide me with the following information on the 5th Avenue Townhomes proposal?

I've seen a picture of the plat, but can you send it to me? I can't see where the proposed parking is from the picture. Is there off-street parking?

The applicant is listed as being in Tumwater, but neighbors say he is backed by a corporation called Ash Holdings. Do you know what the relationship is between Ash Holdings and this project, if any?

Please add me to the public hearing notification list. This e-mail is sufficient, but my postal address is

James Geluso
917 Comiskey Lane SW
Tumwater WA 98512

Thanks,

James

Exhibit 6f.

May 18, 2026

505 4th Avenue SW
Tumwater, WA 98512

Alex Baruch
Community Development Department
555 Israel Road SW
Tumwater, WA 98501

I write to express my serious concerns about the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115).

First, let me state what my objections are NOT about. I'm not against residential development on the subject property, though if the parcel were to be turned into a conservation zone or public park that would be grand. I understand the policy impulse behind greater residential density or "infill." But as a former member of the Tumwater City Council I am confident in asserting that when the Council, several years ago, amended the zoning ordinance to allow duplexes and town houses in a low density residential zone such as ours, an "infill" dynamic was envisioned wherein a single lot here, a corner lot there, could be developed to host a duplex or perhaps a set of them. There is an excellent example of this kind of development in our neighborhood, two streets away from the subject property. I refer to the two duplexes built just a few years ago at the corner of 3rd Avenue SW and F Street. To my knowledge, no one in the neighborhood objected to the inclusion of those 4 residential units.

When the increased density policy was adopted, no one could have reasonably expected to have it apply to such an anomalous property within this residential zone--the open field adjoining 5th Avenue SW. This property is equivalent to a whole block in this neighborhood. The plat proposes that it consist of 11 townhomes. By comparison, the city block to the immediate east of the subject property, holds 6 houses. The one east of that, also six houses. The block to the southeast of the corner of 5th and F holds seven and the one to the northeast of the corner of 5th and E has six.

Though the number of townhouses seems disproportionate times two based on the neighborhood model, compounding matters and representing perhaps a greater concern, the proposed plat would mass all residential development directly facing 5th Avenue SW, heretofore literally a street "at the edge of town." This is not residential infill it's urbanized inundation, especially when considering the neighboring terrain and streetscapes. South of F Street, 5th Avenue SW is beyond steep; it's vertiginous. Even with the current low residential density neighborhood, drivers are running those stop signs routinely as they head downhill. This street, from the corner of 5th and F southward is a means of access and egress in theory only. There are no sidewalks on either side, all the way to H Street.

To the northeast of the subject property, the corner of E and 5th Avenue SW is a blind curve on a hill. There are no sidewalks at this corner. E Street is also bereft of them until it reaches 4th Avenue SW. In winter time, because of 5th Street's current isolation, the city NEVER plows that street after a snow storm, which speaks to proposed development's outsized impact.

Then consider the construction impact of such concentrated development. The design brief stipulates that to equalize the gradient, 3,500 yards of fill will have to be trucked in. At ten yards of soil per truck load, that means 350 heavy dump truck loads will have to transit either F or (heaven forbid) the blind curve on E Street to access the subject property. It's an open question as to whether the thin overlay that presently constitutes the pavement of 5th Avenue is likely to survive that pounding.

In short, the proposed plat better reflects the pattern of development on the Barnes Boulevard/7th Avenue side of the hill. This fact, plus the site topography, which slopes to the southwest, suggests that road access to the subject property should be oriented in that direction, not the relatively underdeveloped street grid to the east. In the absence of that prospect, and in order to obviate the highly urbanized look of 11 townhomes on one remote street, I would suggest that 6-8 townhouses should be accessed, in part, off of each of 5th, E, and F, with each street brought up to modern standards to the point of interior access to the property. This would be a more visually attractive addition to the neighborhood than a consolidated wall of two story construction facing 5th.

Sincerely,

David L. Nicandri

Exhibit 6g.

Alex Baruch

From: Karen Drimay <karen.drimay.360@gmail.com>
Sent: Tuesday, May 19, 2026 4:13 PM
To: Alex Baruch
Cc: Leatta Dahlhoff
Subject: Feedback on 5th Ave Townhome proposal - TUM-26-0115

You don't often get email from karen.drimay.360@gmail.com. Learn why this is important

To Alex Baruch, senior planner for the City of Tumwater,
With a copy to Mayor Dahlhoff,

I live in the Old Tumwater Hill neighborhood (at 310 E St SW). I learned about the proposed development at the top of 5th Ave* (two blocks up from my house) by driving by there on my way home recently—seeing the signboard. (I did not receive any mailing or notice delivered to my house.)

One of my main concerns is about the special character of that lot. It is a natural water catchment area, being mostly concave and having a spring in the northeast section. In the rainy season, the basin holds water and animals come there to drink.

When you are standing there looking at it, you see something that looks like a natural reservoir, or at least a swale, not a building site. A construction project would be very disruptive to the contours of the land and to the animals that live there.

I wish this parcel could be set aside as an open space preserve.

Karen Gudmundsson
360-972-5597

*according to the information in the notice:

5th Ave Townhomes Preliminary Plat
Permit No. TUM-26-0115
585 5th Ave SW, Tumwater, WA 98512
Tax Parcel Number 33203200001

Exhibit 6h.

Alex Baruch

From: Alex Baruch
Sent: Tuesday, May 19, 2026 4:33 PM
To: 'Karen Drimay'
Cc: Leatta Dahlhoff
Subject: RE: Feedback on 5th Ave Townhome proposal - TUM-26-0115

Good afternoon Karen,

Thank you for providing comment on this application. The noticing requirements for this process requires that letters are sent out to properties within 300' of the property, the notice is also posted in the paper and on-site. Since you have made comment on the application I will add you to the public comment list so you will receive future public notices for this application.

The applicant submitted preliminary geotechnical and preliminary drainage reports for the project. Staff is still reviewing the preliminary documents before making an environmental determination on the application (SEPA Determination). I have added your comments to the file and they will be included with the staff report to the hearing examiner. Let us know if you have any follow-up comments or questions.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Karen Drimay <karen.drimay.360@gmail.com>
Sent: Tuesday, May 19, 2026 4:13 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Cc: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: Feedback on 5th Ave Townhome proposal - TUM-26-0115

You don't often get email from karen.drimay.360@gmail.com. Learn why this is important

To Alex Baruch, senior planner for the City of Tumwater,
With a copy to Mayor Dahlhoff,

I live in the Old Tumwater Hill neighborhood (at 310 E St SW). I learned about the proposed development at the top of 5th Ave* (two blocks up from my house) by driving by there on my way home recently—seeing the signboard. (I did not receive any mailing or notice delivered to my house.)

One of my main concerns is about the special character of that lot. It is a natural water catchment area, being mostly concave and having a spring in the northeast section. In the rainy season, the basin holds water and animals come there to drink.

When you are standing there looking at it, you see something that looks like a natural reservoir, or at least a swale, not a building site. A construction project would be very disruptive to the contours of the land and to the animals that live there.

I wish this parcel could be set aside as an open space preserve.

Karen Gudmundsson
360-972-5597

*according to the information in the notice:

5th Ave Townhomes Preliminary Plat
Permit No. TUM-26-0115
585 5th Ave SW, Tumwater, WA 98512
Tax Parcel Number 33203200001

Exhibit 6i.

Alex Baruch

From: brodrick coval <covalbro@gmail.com>
Sent: Wednesday, May 20, 2026 4:57 PM
To: Alex Baruch
Subject: Fwd: [Records Center] Public Records Request :: P012571-051226

You don't often get email from covalbro@gmail.com. Learn why this is important

Alex,

I plan to submit public comment regarding the 5th Ave. Townhomes notice. To inform my comments I requested public records related to the parcel. Unfortunately the city won't be fulfilling those records requests before the end of the comment period (see above). To facilitate an informed and transparent process, I'd like to request that the comment period be extended.

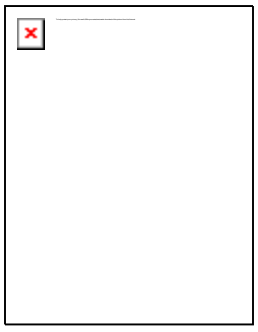
Thank you for your attention to this matter, I look forward to your response.

Best,

Brody Coval

---------- Forwarded message ---------
From: **Tumwater Public Records Center** <tumwaterwa@govqa.us>
Date: Mon, May 18, 2026 at 4:02 PM
Subject: [Records Center] Public Records Request :: P012571-051226
To: covalbro@gmail.com <covalbro@gmail.com>

--- Please respond above this line ---



05/18/2026

Brodrick Coval

504 G St. SW
Tumwater WA 98512

Re: Notice of Need for Extension of Time - Public Records Request No. P012571-051226

Dear Brodrick Coval:

I am writing to update you on the status of your public records request. The City of Tumwater requires additional time to identify and assemble responsive records.

At this time, the City believes records responsive to your request will be available on or before 5/27/2026. We will provide you with the records or a status update on your request on or before that date.

If you have any questions, please contact me.

Sincerely,

Tracie Core
Deputy City Clerk
3602525478

To monitor the progress or update this request please log into the Tumwater Public Records Center



Exhibit 6j.

Alex Baruch

From: Alex Baruch
Sent: Thursday, May 21, 2026 8:00 AM
To: brodrick coval
Subject: RE: [Records Center] Public Records Request :: P012571-051226

Hi Brody,

The Notice of Application comment period is the initial opportunity for adjacent property owners, the public and agencies to provide comments after the application is noticed through mailed notice, newspaper publication, and on-site posting. The end of this comment period does not mean the City will stop accepting public comment on the proposal.

Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices.

Over the coming weeks, the applicant will also be responding to public comments and completing environmental review materials before the City issues a SEPA determination. Any comments submitted will be included in the public comment record and attached to the staff report for Hearing Examiner consideration. Comments will also be reviewed by staff and the applicant so that responses can be provided where appropriate. We look forward to receiving your comments on this application.

Please let us know if you have any follow-up questions and we will be happy to help.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: brodrick coval <covalbro@gmail.com>
Sent: Wednesday, May 20, 2026 4:57 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Fwd: [Records Center] Public Records Request :: P012571-051226

> You don't often get email from covalbro@gmail.com. Learn why this is important

Alex,

I plan to submit public comment regarding the 5th Ave. Townhomes notice. To inform my comments I requested public records related to the parcel. Unfortunately the city won't be fulfilling those records requests before the end of the comment period (see above). To facilitate an informed and transparent process, I'd like to request that the comment period be extended.

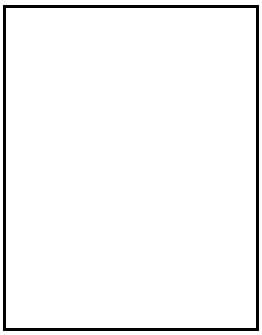
Thank you for your attention to this matter, I look forward to your response.

Best,

Brody Coval

---------- Forwarded message ---------
From: **Tumwater Public Records Center** <tumwaterwa@govqa.us>
Date: Mon, May 18, 2026 at 4:02 PM
Subject: [Records Center] Public Records Request :: P012571-051226
To: covalbro@gmail.com <covalbro@gmail.com>

--- Please respond above this line ---



05/18/2026

Brodrick Coval
504 G St. SW
Tumwater WA 98512

Re: Notice of Need for Extension of Time - Public Records Request No. P012571-051226

Dear Brodrick Coval:

I am writing to update you on the status of your public records request. The City of Tumwater requires additional time to identify and assemble responsive records.

At this time, the City believes records responsive to your request will be available on or before 5/27/2026. We will provide you with the records or a status update on your request on or before that date.

If you have any questions, please contact me.

Sincerely,

Tracie Core
Deputy City Clerk
3602525478

To monitor the progress or update this request please log into the Tumwater Public Records Center

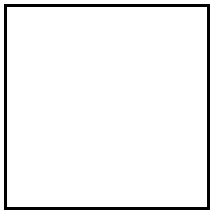


Exhibit 6k.

5/20/26

Dear Alex,

I have lived in the old Tumwater hill neighborhood for over 25 years. Tumwater Hill recently received notice of a development proposal for eleven townhouses at 585 5th Ave SW.

I am opposed to this because of the hurt it will bring to my neighbors, their families and friends. This proposal will cause flooding, safety issues, traffic problems and noise.

Our streets are narrow!! there are lots people walking around the neighborhood as well as their dogs, ~ kids on bikes, ~~skate~~ boards and playing with their friends. There would be ~~no~~ safe place for anyone.

The city did not review this proposal very well or get the proper information to OK this proposal. This land could be used as a park for everyone to enjoy it.

We all love Tumwater hill

over

and you should listen to all of us. Its our community with great friends and neighbors. Do not take this away from us.

Sincerely

Linda L. Miller
514 E St SW
Tumwater Wa
360-357-5097

Exhibit 6l.

Alex Baruch

From: Alex Baruch
Sent: Wednesday, May 27, 2026 1:16 PM
To: 'Dave Nicandri'
Cc: Leatta Dahlhoff
Subject: RE: 5th Avenue Plat proposal

Good afternoon David,

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration.

As background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates included changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted “middle housing” types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater.

With respect to site access and circulation, staff has evaluated the property’s steep topography, particularly toward the southwest near 7th Avenue. Constructing roadway access through that grade would require substantial site disturbance and infrastructure improvements that are not required under the current development standards. The proposal is able to utilize the existing public right-of-way on 5th Avenue SW for access, which is consistent with City subdivision standards requiring developments with more than four dwelling units to access a public road. In general, the City seeks to utilize and improve existing public infrastructure where feasible rather than require the construction of additional public streets that would increase long-term maintenance obligations.

In addition, the area near the unimproved portion of F Street is the proposed location for the project’s stormwater facilities. Based on the site’s topography and underlying soil conditions, this appears to be one of the more feasible areas on the property for stormwater management. Significant changes to the site layout or access configuration could require relocation and redesign of those facilities.

Regarding concerns about vehicles running stop signs and roadway safety on 5th Avenue SW, staff recognizes these as important neighborhood concerns. However, the issues described appear to relate primarily to existing traffic behavior and roadway conditions rather than impacts uniquely attributable to this proposal. Concerns regarding traffic operations and enforcement may be directed to the City’s Traffic Safety Team for further evaluation and tracking.

Similarly, concerns regarding snow removal operations and visibility at the curve near E Street and 5th Avenue SW appear to relate to existing public roadway conditions and operational practices. Staff would encourage coordination with the City’s Operations Department regarding snow plow routing and maintenance concerns in this area.

Staff agrees that portions of the sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City’s pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

Finally, regarding concerns about the condition of the existing pavement on 5th Avenue SW during construction, the project will be required to complete significant utility improvements along its frontage. As part of those improvements, the City anticipates requiring full resurfacing of the affected street frontage, which should address pavement impacts associated with construction activities.

Thank you again for taking the time to submit comments and share your perspective on the proposal.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Monday, May 18, 2026 3:37 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Cc: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: 5th Avenue Plat proposal

You don't often get email from nicandri@comcast.net. Learn why this is important

please include my comments in the public record

Exhibit 6m.

Alex Baruch

From: Jansen Morgan <jansenmorgan@gmail.com>
Sent: Monday, May 18, 2026 5:06 PM
To: Alex Baruch
Subject: Permit No. TUM-26-0115

You don't often get email from jansenmorgan@gmail.com. Learn why this is important

Good day Alex,

My name is Jansen Morgan, I have lived at the top of Old Tumwater Hill (5th&F) for a little over five years and it has been the most wonderful neighborhood I have ever lived in.
Recently I discovered, not via post but in the form of a big yellow sign just to the left of my driveway, the plans for development of 11 town homes in what is now the beautiful pasture at the top of the hill. I say pasture because there is such an abundance of wildlife, it seems a vital part of the food chain, mating and migratory patterns of dozens of species.

Understanding that ‘progress’ is inevitable and things like protecting animal corridors, and the migratory bird treaty are often ignored or skirted by big out of town companies such as the one proposing this project I would like to point out some more human concerns.

It is my understanding that this is a ‘Dark Sky’ community, it does not seem to reason that in keeping with the safety concerns of 11 new units that we will maintain our standard of light quality to maintain this.

There are 11 units, that is more than likely 22 people, 22 toilets, 22 cars, 22 sinks and showers etc.

Let's think about water. I personally find the drainage ponds to be abhorrent as they trap and promote wildlife and then suddenly dry decimating and/or sickening animal populations.

There is already natural ponding there, which includes seasonal stream flow. I highly doubt that exploratory fieldwork went on(especially in wet season)as I would have noticed, if you can prove otherwise I would be happy to review.

The strain on the plumbing cannot be discounted, will the city now be installing new service lines and valves throughout the neighborhood, or wait until it fails and there is catastrophe?

Now the cars; the top of the hill has narrow streets and only about a dozen automobiles, this project would increase that amount by 22.That on its nose is lunacy, imagine wherever you live traffic up 200%! Plus all the kids that roam freely in that neighborhood.

These kinds of increases in infrastructure and population density are not keeping in good spirit of ordinances created to promote housing growth. If I was wealthy I would buy this land to promote green space within our communities, alas sushi doesn't pay like it should. I would love to see movement from my favorite city in that direction, but I know that money talks…If housing is the endgame I find the amount of building and distribution to be obscene and would urge a 60% reduction in impact.

So please think about the trees, the woodpeckers, the owls, the mated osprey, the red-tailed hawks, the rabbits, the gophers, and the deer.
Think about the water and the land, the night sky, safe passage and good sleep.
Think about the people who just want peace, who pay their taxes and vote for you.
Try to see past the greasy money from wealthy texans who don't have the time of day for you.

thank you for your time,

-jm

P.S. Below are notes from a community meeting of about 20 of my most immediate neighbors, these neighbors are spreading concerns throughout the community and submit the following.

Questions for the city and the contractor

- Is the proposed housing “owner-occupied?”
- How are you dealing with the sewage issues? Runoff? One-way valves? How are you protecting those of us downhill?
- How will you deal with boil water notices?
- Where is the water coming from?
- How are you in compliance with the Migratory Bird Treaty Act?
- What is your process for notification? Why were some of our neighbors not notified?
- How will this impact the local electrical grid? We already experience outages five times a year.
- Have you done an assessment on an animal corridor?
- Conduits for the Verizon tower go directly through the yard where the proposed units would be, including conduits for fiber optic cable.
- What is the plan?

Issues

- Loss of tree cover
- Traffic and parking issues
- Safety on the hill
- Winter freezing for road issues
- No walkable areas
- Birds, pocket gophers, deer, bears, coyotes, possums, woodpecker, hawk, osprey
- Watershed impact for wildlife downstream
- Loss of animal corridor
- Star gazing at night
- Loss of quiet zone
- Safe walking area (goes away with development)
- Loss of green space
- Amount of fill necessary to make this area stable for building

Exhibit 6n.

Alex Baruch

From: Vanessa Butler <vinoly@comcast.net>
Sent: Tuesday, May 19, 2026 5:48 PM
To: Alex Baruch; Leatta Dahlhoff
Subject: Proposed Development on Tumwater Hill

You don't often get email from vinoly@comcast.net. Learn why this is important

Dear Alex:

I live in the old Tumwater hill neighborhood (506 4th Ave SW, Corner of 4th and E Streets) and recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. First, I am requesting that the City notify ALL property owners in the neighborhood. I had to call to request that I be added to the mailing list for the information that affects MY NEIGHBORHOOD. Please do a more thorough distribution. Your lack of notification makes it appear as though it is purposeful; no notification = no comment. I expect better from my City.

I am opposed to this development for several reasons. They are stated as follows:

- I understand that more housing is necessary for Tumwater, however, **placing 11 townhomes in an older established neighborhood in the only open space will appear out of place and destroy the current "old neighborhood feel."** I moved to the Hill 40 years ago for this very reason. A whole new generation of children are now living on the Hill and we enjoy the fact we can safely walk our pets and stroller our children and grandchildren on 5th Avenue to view the Osprey nest, pick blackberries, observe the birds and wildlife that occupy this animal corridor.

- Speaking of the Osprey nest, what is the impact on our neighborhood Osprey family that returns annually? I don't believe the developer has addressed impact to our Osprey family. It is an amazing site to see an Osprey carry a fish from the Deschutes River to their nest on the top of the Hill. Will the Osprey relocate? **I want to see the impact statement to the wildlife corridor and our Osprey family.**

- **Traffic will be a huge issue.** Currently, I am at the mercy of drivers speeding up 4th Avenue while backing out of my driveway. I am just over the crest of the hill on 4th (between F and E Streets). Most drivers DO NOT adhere to the 25 mph speed limit, and THEY become angry when they reach the hill crest and must slow down due to me backing out of my driveway. In the very least, 22 additional vehicles joining the neighborhood traffic will only increase the danger of accidents. Where will the traffic be directed in and out of this development? Down 5th Avenue or 4th Avenue? Once it snows, I don't believe the City will suddenly be plowing and de-icing 5th Avenue or the side streets. The city DOES NOT currently maintain these streets in the winter. It is simply too steep and the curve down E Street is already dangerous.

- I am also aware that **city water and sewer systems** are spotty to the west of 5th Avenue. How will the addition of 11 townhomes affect OUR current water supply and runoff?

- How will this new development **affect my taxes?** It will most likely increase the property taxes that I already struggle to pay.

- This effort to "in-fill" for the goal to create more housing **DOES NOT fit the definition of "in fill"** as it currently stands for the City of Tumwater or my neighborhood on Tumwater Hill. Eleven townhomes versus a duplex here and there?

I cannot see any advantage to this proposed development except to line the pockets of OUT OF STATE CORPORATIONS. I respectfully request that this development be thrown back to Texas to seek another location. Leave my neighborhood as it is...a safe, quiet neighborhood.

Thank you for your consideration of these issues and assurance that the developer will address these issues appropriately and completely.

Sincerely,

Vanessa A. Butler

cc: Leatta Dahlhoff, Mayor, City of Tumwater
Tumwater City Council Members

Vanessa A. Butler%0D%0Avinoly%40comcast.net%0D%0Acell%3A 360-528-9179%0D%0Ahome%3A 360 357-3179

Exhibit 6o.

Alex Baruch

From: City of Tumwater, WA <no-reply@ci.tumwater.wa.us>
Sent: Wednesday, May 20, 2026 11:44 AM
To: Alex Baruch
Subject: Email contact from City of Tumwater, WA

Message submitted from the <City of Tumwater, WA> website.

Site Visitor Name: Debi Bodett
Site Visitor Email: debibodett2@comcast.net

May 20, 2026

Alex Baruch, Community Development
555 Israel Road SW
Tumwater, WA 98501

Re: Tumwater Hill / Neighborhood Development Proposal

Dear Alex,

I live in the old Tumwater Hill neighborhood and have been a resident/homeowner for 20+ years.

I recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. I am opposed to this primarily because it is the last large green space between the historic old neighborhood on lower Tumwater Hill and the multitude of developments on Tumwater Hill beyond 5th Avenue. The green space is a natural habitat for animals, including the osprey population. The proposed development would increase traffic, noise, and light in a small, local neighborhood and ultimately decrease community safety.

We recently met with our neighbors to discuss our opposition, and the community is deeply hurt. Some of our most affected neighbors weren't even notified. We expect the city to do a thorough review of this proposal. This land should either remain green space, be purchased by the City of Tumwater for a park, or be placed under private ownership.

We love this community and expect to make decisions about its future democratically. We want our local representatives to listen to the neighbors who will have to bear the brunt of decisions that directly affect them. We chose this community for its own sake. Please don't take that away from us.

Sincerely,
Debi Bodett

33 Image Design

Exhibit 6p.

Alex Baruch

From: Karma Hugo <karma@portnw.com>
Sent: Thursday, May 21, 2026 7:27 AM
To: Alex Baruch
Subject: 5th Ave. Townhomes

You don't often get email from karma@portnw.com. Learn why this is important

Good morning, Mr. Baruch,

I am writing to formally object to the proposed subdivision of the parcel near my home into 11 single-family residential lots.

I recognize the need for housing development; however, I believe this proposal raises significant environmental and neighborhood concerns.

First, the subdivision would result in a substantial loss of existing tree cover and green space in an area that currently serves as important habitat for birds, pollinators, and other local wildlife. The property functions as part of a broader natural corridor that supports biodiversity and provides ecological balance within the neighborhood. Fragmenting habitat would permanently diminish the environmental character of the area and negatively impact species that rely on it.

Second, I am concerned about watershed and stormwater impacts associated with replacing permeable land and vegetation with roads, driveways, rooftops, and additional impervious surfaces. Increased runoff has the potential to affect drainage patterns, erosion, downstream water quality, and overall watershed health. Given increasing concerns about flooding and environmental resilience, preserving natural absorption areas should be prioritized whenever possible.

Additionally, the proposal would significantly increase traffic through an existing residential neighborhood that was not designed to accommodate this level of density or vehicle activity. Increased traffic volume raises concerns regarding pedestrian safety, noise, congestion, speeding, and the overall livability of the neighborhood, particularly for families, children, and residents who walk or bicycle in the area.

Finally, the cumulative loss of open green space in our community deserves careful consideration. Once natural land and mature tree canopy are removed, they cannot realistically be replaced within a meaningful timeframe. Developments of this scale should be evaluated not only for short-term growth objectives, but also for their long-term impacts on environmental quality, neighborhood character, and quality of life for current residents.

For these reasons, I respectfully request that the proposal be denied, substantially reduced in scale, or subjected to additional environmental review and mitigation requirements before any approval is considered.

Thank you for considering my comments.

Sincerely,

Karma Hugo

222 4th Avenue SW
Tumwater, WA 98512

Exhibit 6q.

Alex Baruch

From: Sheelagh McCarthy <sheelaghmc09@gmail.com>
Sent: Thursday, May 21, 2026 10:58 AM
To: Alex Baruch; Leatta Dahlhoff; cdenny@ci.tumwater.wa.us
Subject: Concerning old Tumwater Hill development

You don't often get email from sheelaghmc09@gmail.com. Learn why this is important

Dear Alex, Chuck, and Leatta,

I am reaching out regarding the development proposal on old Tumwater Hill that will bring 11 townhomes just a block away from my current home. This undeveloped space is important to our community including my family. I am opposed to this because of increased traffic, safety, and the degradation of this cherished green space.

My family walks past this green space on every walk with our dogs and small child. It is peaceful, quiet, and protected from traffic. We love watching the wildlife and foliage change throughout the seasons.

I am deeply concerned about the impact to safety the increased traffic and noise will create. Because of the location near the top of the hill, the construction of 11 townhomes with an expected 22 vehicles will significantly increase the traffic patterns creating hazardous conditions to my family and many of our neighbors that walk and bike along this space with their dogs and small children. There is a lack of sidewalks in our neighborhood, and this space is deeply valued by us because of its relative safety due to the low traffic.

I would love to see this land continue to be a green space, either undeveloped or as a park, so that it can continue to be enjoyed by members of our community.
Thank you for the opportunity to allow our voices to be heard regarding the impacts to your community from these proposed changes.

Sincerely —
Sheelagh McCarthy

--
Sheelagh M. McCarthy

Exhibit 6r.

Alex Baruch

From: Victoria Ryan <victoria.ryan@comcast.net>
Sent: Thursday, May 21, 2026 8:46 PM
To: Alex Baruch
Subject: Tumwater Hill Townhomes

You don't often get email from victoria.ryan@comcast.net. Learn why this is important

Good day.
I am a 30 year resident of Tumwater Hill. I love the quality of life I have here.
I am strongly opposed to the proposed development of the property on the north west side of F and 5th.(585 5th Ave SW)
This is a very unique property, it is basically a large hole. I can hardly imagine the immense physical and financial cost to bring this development to fruition. This development would destroy the environment and the habit that is now there..
Mother nature has claimed this place , it is home to many creatures large and small. We have Deer, Possum, Rabbits and Coyote as well as many ground dwellers. This area with its old growth trees ,shrubs and grasses are home to many birds. We have a pair of Osprey that nest on the cell tower every year. There are Owls that nest in the tree behind my home, that hunt in that pasture.. There is a Wood pecker nest in the power pole on the corner.
This is a quiet and safe place, where you can stargaze on clear nights and walk the streets that have very little traffic.
As someone that lives in an older home (as do many of the people in the neighborhood)I worry about how the physical destruction will impacted my home and quality of life. In this era of slap-dash building ,I am sure that no thought has been given (past just a minimum) of how construction could damage existing homes. How are they going to get water to the new construction? How will this effect my quality of water ,or water pressure? Where will the sewer waste go? Is the city going to invest in one-way values to protect the homes down hill from this high density development? Will they have to jack hammer or use explosives to put in sewer and water lines? How much heavy equipment will be moving on our streets, and how much damage will be done?
This is an older neighborhood. There surly are better places to build. places that will not displace and destroy nature.
This place has been claimed by Mother Nature and should remain a green space.

Sincerely, Victoria Ryan
30 year resident of a safe, quiet and beautiful neighborhood on Tumwater Hill

Exhibit 6s.

Alex Baruch

From: Shaun Dinubilo <sdinubilo@squaxin.us>
Sent: Friday, May 22, 2026 8:52 AM
To: Alex Baruch
Cc: Doyle Foster
Subject: RE: Notice of Application - 5th Ave Townhomes Preliminary Plat - TUM-26-0115

Hello Alex,

Thank you for contacting the Squaxin Island Tribe Cultural Resources Department regarding the above listed project (NOA) for our review and comment. We have no specific cultural resource concerns for this project. However, if DAHP recommends a survey, or any other additional recommendations, we concur with DAHP's recommendations. We would prefer to receive an electronic copy by email once completed. We also strongly recommend that the applicant and contractors have a copy of the Inadvertent Discovery Plan (IDP) on the project site at all times. If any archaeological or cultural resources are uncovered during implementation, please halt work in the area of discovery and contact DAHP and the Squaxin Island Tribe's CRD Archaeologist, Shaun Dinubilo via email at sdinubilo@squaxin.us.

Shaun Dinubilo
Archaeologist
FAA Certified (Section 107) sUAS Remote Pilot
Cultural Resource Department
Squaxin Island Tribe
200 S.E. Billy Frank Jr. Way
Shelton, WA 98584
Phone: 360-432-3998
Email: sdinubilo@squaxin.us
Office Hours: 7:30 am to 4:00 pm

Email is my preferred method of communication.

As per 43 CFR 7.18[a][1]) of the Archaeological Resource Protection Act, Section 304 of the National Historic Preservation Act, and RCW 42.56.300 of the Washington State Public Records Act- Archaeological Sites, all information concerning the location, character, and ownership of any cultural resource is exempt from public disclosure.

From: Jessica Lee <JLee@ci.tumwater.wa.us>
Sent: Friday, May 8, 2026 8:00 AM
Subject: Notice of Application - 5th Ave Townhomes Preliminary Plat - TUM-26-0115

The Notice of Application for, 5th Ave Townhomes Preliminary Plat - TUM-26-0115 is ready to view HERE. If you have any questions or would like additional information, please contact Alex Baruch at 360-754-4180 or abaruch@ci.tumwater.wa.us.

Jessica Lee | Administrative Assistant
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
jlee@ci.tumwater.wa.us | www.ci.tumwater.wa.us

Exhibit 6t.

Alex Baruch

From: Teri Buccarelli <teribuccarelli@gmail.com>
Sent: Friday, May 22, 2026 9:43 AM
To: Alex Baruch
Subject: Purposed 11 Townhome units on 5th Ave

You don't often get email from teribuccarelli@gmail.com. Learn why this is important

Dear Alex,

I have lived in the Old Tumwater Hill neighborhood for 16 years, and I am writing to express my serious concerns about the proposed 11-townhome development.

I received the Notice of Application on Thursday, 5/14, which did not appear to allow the full 14-day comment period referenced in the "Public Comment Period" section. While I understand that notice may only be required for homeowners within 300 feet of the site, this proposal will affect the entire Old Tumwater Hill neighborhood. Out of fairness, courtesy, and respect for the community, all nearby residents should have been notified. I am also concerned that some homeowners within the 300-foot notification area, including those who may be most directly affected, were not notified.

After speaking with several neighbors, I know I am not alone in these concerns. Many residents care deeply about preserving this land as green space. We would strongly support a park-like setting with trails for public enjoyment, along with preserving the tree cover and open field areas that local wildlife depend on. This kind of use would better reflect the character and needs of our neighborhood than development driven primarily by outside financial interests.

I am also deeply concerned about safety. This project would permanently increase traffic on narrow roads with blind corners that are already used daily by walkers, joggers, children, and people walking their dogs. Because of current detours related to the roundabout construction, traffic has already increased in nearby areas. While working in my yard, I have personally witnessed four near misses at the intersection of 4th Avenue and E Street. Adding 11 townhomes will likely bring significantly more vehicles, in addition to visitor traffic, and will increase the safety risks for everyone in the neighborhood.

The environmental impact also deserves careful review. Wildlife currently uses this area as habitat and as a corridor for movement. I have personally seen deer and fawns, hawks, osprey, and red-headed woodpeckers in this space. Has a wildlife corridor assessment been completed? Will this project comply with protections under the Migratory Bird Treaty Act?

In addition to these concerns, my neighbors have raised several other important questions that should be addressed before this project moves forward:

1. How will the development affect parking in an already limited area?
2. What impacts will it have on watershed function and drainage?
3. How will the loss of this wildlife corridor affect the surrounding environment?
4. How much fill will be required to make the site buildable and stable?
5. What protections will be provided for neighboring homeowners who may experience increased water runoff because of that fill?

6. How will this project affect the local electrical grid, especially given the outages we already experience?
7. Where will the water supply for these additional homes come from, and will there be sufficient pressure for all households?
8. How will the city address the risk of sewage backups for downhill homes that do not have one-way valves?

I understand the need to address housing challenges, and I do not want to dismiss those concerns. However, this project does not appear to be the right solution for this location. Placing additional housing on this site would create long-term impacts on safety, infrastructure, drainage, wildlife, and neighborhood character without meaningfully solving affordability issues.

Old Tumwater Hill is a historic, quiet, family-oriented neighborhood that residents value deeply. I chose to live here because of its history, its older homes, its sense of community, and its natural surroundings. Those same qualities are why I remain here today. This proposal may seem like a convenient opportunity for development, but for those of us who live here, it would mean a lasting loss.

I respectfully ask that the city listen carefully to the residents who will be most directly affected and reconsider this proposal. Our neighborhood deserves thoughtful planning that protects both current residents and the character of this community.

Sincerely,

Teri Buccarelli
421 4th Ave SW
Tumwater, WA 98512
(360) 259-3861
Email: teribuccarelli@gmail.com

Exhibit 6u.

Alex Baruch

From: Graham Clumpner <yeahneil@gmail.com>
Sent: Friday, May 22, 2026 10:15 AM
To: Alex Baruch
Cc: Chuck Denney; Leatta Dahlhoff
Subject: Old Tumwater Hill development proposal

You don't often get email from yeahneil@gmail.com. Learn why this is important

Hello Mr. Baruch,

I was just notified by my neighbors that a second awful development process has been started just up the hill from my house. I was involved in opposing the last one in 2020 and am disgusted to see this process starting again.

I have received no notice by email or mail from the city. My home is directly in line with this property and will suffer from over forty vehicles driving down our steep graded hill if this is approved by the city. My dog has already been hit by a car on this road and this would make our community un-liveable.

I am very supporting of attempting to solve the housing crisis but this hideous proposal is not in line with the types of families and craftsman homes we have in our community.

What is the city's plan for flooding and runoff? We already lose power multiple times throughout the year. What will this do to the grid on our hill?

How is the city prioritizing housing for people who don't live here to benefit a company from Texas when your very own citizens are demanding that this be made into a park. We have no green-space within walking distance. I am a disabled veteran and this street(that is being proposed to turn into another ugly condo-like structure) will destroy the only safe area that I can walk.

I am opposed strongly to this and the positiion of city council will determine my support or opposition in the future on all other issues. There is plenty of other places to build if the city wants to give money to Texas instead of supporting local community efforts for long term housing.

Finally I want to know why myself and other neighbors have received ZERO notification from the city. I am also aware that a public records request has not been produced by the city and yet our time to comment is almost over? Where is the EIS? What about the bears, deer, gophers, osprey and other creatures that live in that area?

We have multiple veterans, disabled children and elderly folks who live on this block. This will make our community unsafe. I hope the city council is aware of how opposed our entire neighborhood is to this proposal.

Exhibit 6v.

Alex Baruch

From: Tom Boucher <tomboucher58@gmail.com>
Sent: Friday, May 22, 2026 11:31 AM
To: Alex Baruch
Subject: 5th Ave Townhomes comment

Dear Alex,

I live in the old Tumwater hill neighborhood on 4th and F SW. I'm concerned about:

1. The **density** of the proposed construction of 11(!) residences, so out of character in our neighborhood whose density is more like 3(?) for that footprint.
2. The **traffic increase** in a very quiet neighborhood that is a) often stranded during snow events and b) not liking the sound of how many dump trucks will be needed to fill this sunken lot.
3. The **lack of notification to parties down the likely exit streets** to the freeway, who wished they had been when told.
4. Will **ospreys** tolerate the disturbance only a few hundred feet away? Although relatively tolerant birds, there are very few local nests and stress can cause failed nests and unsuccessful breeding.

A way to ameliorate some of this might be to have the increased traffic exit to 7th, a much busier street.

Sincerely, Tom

Tom Boucher | 410 F St SW | Tumwater WA 98512 | 360-951-2395
A simple rule to live by: "Everybody needs to both know and feel they have been heard."

Exhibit 6w.

Alex Baruch

From: Delani Holland <delanibugg@gmail.com>
Sent: Friday, May 22, 2026 12:34 PM
To: Alex Baruch
Subject: Concerns Regarding Proposed Development

[You don't often get email from delanibugg@gmail.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

Dear Alex,

I am writing to express my strong concerns regarding the proposed development planned for the large green space on 5th Ave between E St. and F St. My family and many of our neighbors are deeply opposed to this project and feel that the impacts on our community have not been adequately considered.
As a parent of four young daughters and a family of six, one of my biggest concerns is safety. Our neighborhood streets and surrounding green space are currently used daily by families walking, riding bikes, and enjoying outdoor activities. A major increase in traffic would create significant safety risks for children and pedestrians, while also worsening parking issues in the area.

Additionally, this green space serves as an important wildlife corridor and natural buffer that contributes greatly to the peaceful character of our neighborhood. Losing this space would negatively impact local wildlife, reduce privacy, and eliminate the quiet environment that many residents specifically chose this community for.

We are also concerned about the strain this development could place on infrastructure, particularly the electrical grid. Our area already experiences multiple power outages each year, and many residents question whether the current infrastructure can support additional development without further reliability issues.
Another major concern is that some nearby residents were not properly notified about this proposal. Given the significant impact this project would have on the surrounding community, we believe all affected homeowners and residents should have been fully informed and given the opportunity to voice their concerns.

Please understand that there is substantial opposition within the community regarding this development. We respectfully ask that these concerns be taken seriously and fully considered before any approvals move forward.

Thank you for your time and consideration.
Sincerely,
Delani Holland
515 S 4th Ave SW
Tumwater, WA 98512

Exhibit 6x.

Alex Baruch

From: Cody Holland <codyw.o.holland@gmail.com>
Sent: Friday, May 22, 2026 12:34 PM
To: Alex Baruch
Subject: Public Comment - South 5th Ave E St and F St

You don't often get email from codyw.o.holland@gmail.com. Learn why this is important

Hello Alex

I live in the old Tumwater hill neighborhood and I recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. I am opposed to this because of the increased traffic and corresponding street safety, as well as other environmental factors.

We recently met with our neighbors to discuss our opposition to this. It seems that some of our most affected neighbors weren't even notified. A more thorough review of this proposal should be considered. Given the character of the neighbor hood but also considering need for housing, I believe the density should be reduced to 4-5 dwelling units and that maximum green space be left, as many of these spaces are being developed throughout the county.

Tumwater hill was not always where we wanted to plant our family, but after growing closer in our community we have come to love the character of the area. I think planting an uncharacteristically large development right in the middle of our quiet area could have lasting damage on what we have grown to love.

Thank you for your service to us as city representatives.

Sincerely,

Cody Holland

Exhibit 6y.

Alex Baruch

From: Nancy <nancycstevenson@comcast.net>
Sent: Friday, May 22, 2026 4:38 PM
To: Alex Baruch
Subject: Comments on the 5th Ave Townhomes Preliminary Plat

You don't often get email from nancycstevenson@comcast.net. Learn why this is important

Alex Baruch
555 Israel Roda SW
Tumwater, WA 98512

Dear Alex,

My neighbors recently brought to my attention a preliminary plat proposal for eleven single family attached lots on 5th Avenue between E street and F street. I live on the corner of E street and 3rd Avenue just 2 blocks away. I'm grateful to have found out about this plat proposal so I have time to comment. The deadline appears to be today.

As a former Planning Commissioner, I understand the need for infill development in existing neighborhoods to help with our community's housing needs and make efficient use of urban land. However, with a wall of eleven two story housing units all in a row spanning the entire block between E and F streets, the development appears to me to be too far out of scale. And, as such does not fit within the character of the neighborhood.

Also, one of the wonderful characteristics of our older neighborhood is the many mature trees. On this property specifically there is one maple that I estimate to be 100 years old and there are several very large fir trees I'd say are at least as old. These trees protect this environmentally sensitive area, provide wildlife habitat, and prevent erosion. They should not be cut down. They appear to me to qualify, given their age and size, as trees worthy to be protected under Tumwater's Tree Protection Code.

In closing, I've heard that state law prevents this plat from being downsized. Is this true? In my mind, if this proposal can't be rescaled to a more appropriate number of units and the mature trees protected, it should not move forward. In which case... is there a way of keeping this property as open space and/ or a community park?

With Respect and Hope,

Nancy

Nancy Stevenson
420 3rd Ave SW
Tumwater, WA 98512

Exhibit 6z.

Alex Baruch

From: Taylor <taylor.lee.werner@gmail.com>
Sent: Friday, May 22, 2026 4:57 PM
To: Alex Baruch; Leatta Dahlhoff
Subject: Proposed 11-Unit Housing on 5th Ave

You don't often get email from taylor.lee.werner@gmail.com. Learn why this is important

Dear Mr. Alex Baruch and Mayor Leatta Dahlhoff,

I live on 5th Ave in the Old Tumwater Hill neighborhood, just down the hill from the proposed 11-unit housing development on 5th Ave SW and E St. I daily and nightly walk my dog past the blackberry brambles, where he loves to sniff out the rabbits and deer that we very regularly see there. I shudder to think of truck after truck bringing in literal tons of fill dirt, excavators digging trenches for duct banks, street closures, and et cetera during construction, but if 11 new dwellings materialize when it's all done, and at least 11 new vehicles (likely many more) traffic 5th Ave as a result, our quiet walks in the moonlight will be permanently lost. The animals for whom that land is habitat will wander through neighbor's yards, disoriented. And I will feel that the world has gotten a little worse.

I understand the challenge representatives of the City of Tumwater face, balancing the many interests of its constituents. But almost everyone I've spoken to who lives on Old Tumwater Hill (20+ neighbors in the immediate vicinity of the proposed development) feels that this is not the appropriate place to build dense housing. Many of my neighbors felt blindsided. Some were not notified at all, and everyone I've talked to felt like the time to learn about the proposal and respond was inadequate. We are desperate for you to carefully scrutinize the proposal and consider whether it's truly in the common good, or if it's a payday for a developer who is not invested in our community. I would love to see the city purchase that land, and make it a park or conservation site. There are many young children in the neighborhood, and we want them to have something that's not ruined.

The need for housing is real, but our community's housing crisis is a *class* crisis. Affluent people do not struggle to find housing where they'd like to live; every day, there are abundant new listings for housing that's unaffordable for those who truly *need* it. I have doubts that this development would alleviate the problem of housing at all. Who will own these units? Will they be owner-occupied, or rentals?

All my life, I've watched the quiet, spacious places I love be subsumed by the unsustainable expansion of projects that enrich developers, *briefly* employ unrepresented, underpaid workers who don't have benefits like healthcare, and reduce the quality of life for everyone else. I appreciate the City of Tumwater's diligence about sustainable development — I previously served on the CPAT and I was proud of my city — but I think this development is a misstep that does not make sense. So very often, development feels like something imposed on community members by people who are not a part of the community, and also happen to profit handsomely.

The community on Old Tumwater Hill is cohesive, and kind, and we communicate skillfully with each other. We love this neighborhood, and expect that if a vast majority of us do not want it permanently changed in this way, then it will not happen. It would be happening against our will. We want our local representatives to *represent us* as we grapple with the potential outcomes of this extremely consequential proposal.

Please do not let a developer permanently destroy the character of my neighborhood!

~Taylor Werner

Exhibit 6aa.

Alex Baruch

From: Jon-Mikel Gates <jonmikel.gates@gmail.com>
Sent: Friday, May 22, 2026 4:57 PM
To: Alex Baruch
Subject: Development plan at 585 5th Ave

[You don't often get email from jonmikel.gates@gmail.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification]

Hello Alex,

I'm a resident and homeowner in the Tumwater Hill neighborhood and I'm writing to express my opposition to the construction of the proposed townhomes at 585 5th Ave.

My husband and I urge you and the City of Tumwater to do a thorough review of this development—it represents a significant risk to the safety and quality of life in our neighborhood. The street (5th Ave) on which it will be situated already lacks safe sidewalks for people to navigate the neighborhood on foot; the increase in traffic will put pedestrians, children, and pets at risk. In fact, the streets feeding to the address are simply inadequate to accommodate the increased traffic. Additionally, this large open space will now be separated from the community; we lose tree cover and wildlife habitat while gaining no appreciable community good.

We urge the city to consider purchasing this lot and convert it into a much-needed neighborhood park. The absence of such amenities has contributed, and will continue to contribute, to the gradual decline of an excellent community.

We love this neighborhood, and look forward to participating in the process of civil government to help the city come to the right decision for the neighborhood we call home.

Thank you,

Jon-Mikel and John Tuttle-Gates
416 4th Ave SW

Exhibit 6bb.

Alex Baruch

From: brodrick coval <covalbro@gmail.com>
Sent: Friday, May 22, 2026 8:45 PM
To: Leatta Dahlhoff; cdenny@ci.tumwater.wa.us; Alex Baruch
Subject: Concerning Old Tumwater Hill Development

You don't often get email from covalbro@gmail.com. Learn why this is important

Hello,

As a longtime resident, new parent, Tumwater small business owner, Tumwater Tree Board Member, and community advocate I am writing to you in response to the notice of application to develop Old Tumwater Hill by clearing mature naturally regenerated mixed open conifer habitat and adding 11 townhomes. **I am opposed to this development for several reasons.**

The municipal code governing this notice (TMC 14.16.050) does not promote open and transparent process and is being poorly executed. The notices my neighbors and I received came over the span of eight days and none were mailed using certified mail. Why should some of us have an additional *half* of the comment period with actual notification? **This process is not being executed equitably.**

Additionally, upon receipt of my notice I took action as soon as feasible to submit records requests from the City to better understand the application process and recent failed attempts to develop the parcel. I was told by the city that my requests were going to take longer to respond to than the comment period window. I was denied a request to extend the comment period to allow for adequate transparency via the requested documents. **This is not transparent government, nor does it promote educated and meaningful engagement by the impacted community.**

Further, from a long term planning perspective the City is well-positioned to delay the application review. The following city planning and execution documents/projects are nearing completion; municipal code update regarding urban forestry and tree canopy removal, Parks and Recreation elements of the long-awaited Comprehensive Plan. Each of these cost the City and its voters a significant investment of time and resources. The proposed development would likely run counter to many of the strategies they outline. The city owes its community the options that this parcel offers when those documents are complete--**developing it ahead of time is short-sighted.**

I look forward to continuing engagement on this matter.

Best,

Brody Coval
Tumwater Tree Board Member
Owner South Sound Wood Co.

Exhibit 6cc.

Alex Baruch

From: Roni Rogers <ronirogers82@gmail.com>
Sent: Tuesday, May 26, 2026 5:08 PM
To: Alex Baruch
Subject: 5th Ave Townhomes

You don't often get email from ronirogers82@gmail.com. Learn why this is important

Thank you for taking my call today regarding the proposed townhouses that will be developed directly across the street from my property.

I have a few concerns:
1. Parking: you said there will be 2 spots/unit but it is still a concern that I will see cars lined up outside my windows
2. The development on property that will likely require "fill": curious about the materials that will be used to create a flatter land
3. Protection for the osprey that nest on the cell tower adjacent to construction
4. Road maintenance during snow and ice (we are usually the last to be plowed IF we get plowed)

Please add me to the email list so I can be kept current on the project and upcoming public meetings

Thank you,

Roni Rogers
ronirogers82@gmail.com

Exhibit 6dd.

Alex Baruch

From: Dave Nicandri <nicandri@comcast.net>
Sent: Friday, May 29, 2026 10:18 AM
To: Alex Baruch
Cc: Leatta Dahlhoff
Subject: 5th Avenue development

Alex:

Since there doesn't appear to be a public hearing on the proposed project in the immediate future, I decided that I would take you up on your offer to consider a reply to your reply to my original submission. I trust this email will also become a part of the relevant record. I will take up your points in the order you raised them.

In paragraph three you demurr on the prospect of access to the subject property from the back side (7th/Barnes), citing the developer's ability to get access from "existing public right of way [5th] . . . which is consistent with City subdivision standards requiring . . . access [to] a public road," rather than building new right of way. In the abstract this is a completely sensible policy, but it ignores the the very limited nature and remote nature of the 5th Avenue streetscape. You can indeed spruce up the adjoining street front, which now sees very limited traffic because of its said remote location, but all the traffic generated by the development still has to traverse extremely problematic street environments coming and going to the subject property. The city is on the verge of permitting a significantly higher density residential development on what would be come an "urban island" on 5th avenue, within a sea of adjoining streets that have nowhere need the capability of safely serving this dense 5th Avenue island.

In the 4th paragraph you reject the practicability of breaking up the intensity of the proposed 5th Avenue street front citing the need to keep the F street corridor for stormwater rentention. Fair enough, but you ignore the prospect of dividing points of access (driveways and the like) between 5th Avenue and a possible E street extension. The redevelopment of that corner (that is, 5th and E) allows you to mitigate the impact of the current blind curve, which is narrow and without sidewalks. You need to expand the scope of street improvements to include this extension and the subject corner.

In the 5th paragraph you dismiss the impact of an 11 development unit by stipulating that current driver behavior relative to the stop signs on the steep hillside of 5th heading to the south is already problematic. So, because a street is already relatively undeveloped on steep hillside, adding 3x or 4x the amount of traffic does not present an issue?

In your 7th paragraph you recognize that the sidewalk network in the surrounding neighborhood is "incomplete" and that the city requires "infill projects such as this proposal" to warrant improvements. But given the remote nature of 5th Avenue any additional improvements to the network are an extremely remote prospect. The truth is, the residents of this neighborhood use the low trafficked streets as their walking path; streets that, again, will see 3x or 4x the amount of traffic, to say nothing of the prospect of the 3rd vehicle per unit which will inevitably have to park on 5th Avenue, dissipating the value of any street widening adjoining the property.

Sincerely,

Dave Nicandri

Exhibit 6ee.

Alex Baruch

From: Alex Baruch
Sent: Friday, June 5, 2026 4:53 PM
To: Jansen Morgan
Subject: RE: Permit No. TUM-26-0115
Attachments: Soils Report 01-23-2026.pdf; Slope Evaluation 01-23-2026.pdf; Preliminary Drainage Report 01-23-2026.pdf

Hi Jansen,

Thank you for providing public comment on this application. I would like to provide some background on the application and how the City processes land use applications. Washington State has mandated through the growth management act that Cites must provide for growth in our urban areas to accommodate growth closest to our excising infrastructure and resources. 11 units is within the allowed density for this project zoned low density residential as the minimum density is 6 dwelling units per acre and the maximum density allowed is 9 dwelling units per acre. This development is proposing just over 6 dwelling units per acre which is on the lower end of the potential developability of the site. As a part of development requirements for sites that are developing for the first time, the City requires frontage improvements which require improvements such as sidewalks, street trees, curb and gutter along the frontage of the project. Additionally, this project will be completing some improvements to the road in front of the project as a part of the required utility connections.

The City ordinance requires new lighting to be fully shielded which means that lighting is shielded or constructed so that all light emitted is projected below a horizontal plane running through the lowest part of the fixture as determined by a photometric test or certified by the manufacturer. With the building permit for each of the units we will make sure fixtures meet these requirements as outlined in Tumwater Municipal Code 18.40.035.

The applicant provided a soils report, preliminary drainage report, and slope evaluation report. Materials testing for the drainage report were completed in December of 2025.

Service lines on private property are the responsibility of each individual homeowner. This development will need to complete an off-site watermain extension to bring water to this area that has enough capacity to serve the proposed townhomes. Right now the proposed route would extend water from F Street and 4th Ave SW through the frontage of the proposed development.

The project impacts for the amount of trips proposed by this development does not trip the City's threshold for requiring a traffic study as it is proposing less than fifty peak hour trips. A trip generation analysis was provided by the applicant which showed an anticipated 6 trips during the PM peak hour. Each townhome is accounting for two parking spaces per lot.

I have provided comments to your other questions below:
Is the proposed housing "owner-occupied?"

- There is no requirement in the ordinance for the housing to be owner-occupied. Each of the townhomes will be on their own parcel.

How are you dealing with the sewage issues? Runoff? One-way valves? How are you protecting those of us downhill?

- The current plan is to install a new 8" sewer main within 5th Ave that would connect into the sewer main at the corner of 5th Ave and E Street. All stormwater is required to be retained on-site of the development. The development is proposing to use bioretention ponds for the impervious surface improvements to the site and drywells for the roof runoff.

How will you deal with boil water notices?

- Based on conversations with the operations department the City has not notified community members of the need to boil water and has not identified a water quality or quantity issue with serving this project.

Where is the water coming from?

- The water will come from one of the City's production wells. A water line extension from F Street and 4th Ave SW is proposed to serve the townhomes.

How are you in compliance with the Migratory Bird Treaty Act?

- City staff have not reviewed the applicant's SEPA Checklist at this time. The SEPA Checklist is the primary environmental component for the project that would show compliance with Washington State Code as it relates to endangered or threatened species.

What is your process for notification? Why were some of our neighbors not notified?

- The Tumwater Municipal Code requires that properties within 300' of the project are provided mailed notice, the property is required to have a public notice sign placed on it and the public notice must be in a local newspaper. If community members would like to be added to the email notice list we would be happy to add them to ensure they receive notice of future stages of this project as it moves forward.

How will this impact the local electrical grid? We already experience outages five times a year.

- Puget Sound Energy will provide power for this project. The project will be required to underground their utility lines.

Have you done an assessment on an animal corridor?

- The Tumwater Municipal Code does not require an assessment for animal corridors.

Conduits for the Verizon tower go directly through the yard where the proposed units would be, including conduits for fiber optic cable.

- Developments are required to mark the location of utilities that exist on-site to ensure conflicts do not exist when construction is proposed. These markings will typically be completed by 811 prior to any work being completed on-site.

Please let me know if you have any follow-up questions, I'd be happy to discuss further or setup a time to discuss over the phone.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Jansen Morgan <jansenmorgan@gmail.com>
Sent: Monday, May 18, 2026 5:06 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Permit No. TUM-26-0115

You don't often get email from jansenmorgan@gmail.com. Learn why this is important

Good day Alex,

My name is Jansen Morgan, I have lived at the top of Old Tumwater Hill (5th&F) for a little over five years and it has been the most wonderful neighborhood I have ever lived in.
Recently I discovered, not via post but in the form of a big yellow sign just to the left of my driveway, the plans for development of 11 town homes in what is now the beautiful pasture at the top of the hill. I say pasture because there is such an abundance of wildlife, it seems a vital part of the food chain, mating and migratory patterns of dozens of species.

Understanding that ‘progress’ is inevitable and things like protecting animal corridors, and the migratory bird treaty are often ignored or skirted by big out of town companies such as the one proposing this project I would like to point out some more human concerns.

It is my understanding that this is a ‘Dark Sky’ community, it does not seem to reason that in keeping with the safety concerns of 11 new units that we will maintain our standard of light quality to maintain this.

There are 11 units, that is more than likely 22 people, 22 toilets, 22 cars, 22 sinks and showers etc.

Let's think about water. I personally find the drainage ponds to be abhorrent as they trap and promote wildlife and then suddenly dry decimating and/or sickening animal populations.

There is already natural ponding there, which includes seasonal stream flow. I highly doubt that exploratory fieldwork went on(especially in wet season)as I would have noticed, if you can prove otherwise I would be happy to review.

The strain on the plumbing cannot be discounted, will the city now be installing new service lines and valves throughout the neighborhood, or wait until it fails and there is catastrophe?

Now the cars; the top of the hill has narrow streets and only about a dozen automobiles, this project would increase that amount by 22.That on its nose is lunacy, imagine wherever you live traffic up 200%! Plus all the kids that roam freely in that neighborhood.

These kinds of increases in infrastructure and population density are not keeping in good spirit of ordinances created to promote housing growth. If I was wealthy I would buy this land to promote green space within our communities, alas sushi doesn't pay like it should. I would love to see movement from my favorite city in that direction, but I know that money talks…If housing is the endgame I find the amount of building and distribution to be obscene and would urge a 60% reduction in impact.

So please think about the trees, the woodpeckers, the owls, the mated osprey, the red-tailed hawks, the rabbits, the gophers, and the deer.
Think about the water and the land, the night sky, safe passage and good sleep.
Think about the people who just want peace, who pay their taxes and vote for you.
Try to see past the greasy money from wealthy texans who don't have the time of day for you.

thank you for your time,

-jm

P.S. Below are notes from a community meeting of about 20 of my most immediate neighbors, these neighbors are spreading concerns throughout the community and submit the following.

Questions for the city and the contractor

-
-
- Is the proposed housing “owner-occupied?”
-
-
-

- How are you dealing with the sewage issues? Runoff? One-way valves? How are you protecting those of us downhill?
- How will you deal with boil water notices?
- Where is the water coming from?
- How are you in compliance with the Migratory Bird Treaty Act?
- What is your process for notification? Why were some of our neighbors not notified?
- How will this impact the local electrical grid? We already experience outages five times a year.
- Have you done an assessment on an animal corridor?
- Conduits for the Verizon tower go directly through the yard where the proposed units would be, including conduits for fiber optic cable.
- What is the plan?

Issues

- Loss of tree cover
- Traffic and parking issues
- Safety on the hill
- Winter freezing for road issues

- No walkable areas
- Birds, pocket gophers, deer, bears, coyotes, possums, woodpecker, hawk, osprey
- Watershed impact for wildlife downstream
- Loss of animal corridor
- Star gazing at night
- Loss of quiet zone
- Safe walking area (goes away with development)
- Loss of green space
- Amount of fill necessary to make this area stable for building

Exhibit 6ff.

Alex Baruch

From: Jim Oberlander <jimo201@comcast.net>
Sent: Thursday, June 11, 2026 11:52 AM
To: Alex Baruch
Subject: TUM-26-0115, 5th Ave. Townhomes, Preliminary Plat

You don't often get email from jimo201@comcast.net. Learn why this is important

Hello, Alex –

I realize my comments are past the deadline, but please include them in the project file. Also, please add me to the any project notices and scheduled public meeting(s) notice.

- This project will change the character of Tumwater Hill from quiet, single family homes to a bustling urban environment. This new trend will be contagious. Local traffic and parking will be an issue! Here on Tumwater Hill, look around at any current cluster of duplexes, apartments, dense multi-family dwellings. Parking overwhelms the neighborhood. Residents park on the street, even when they have garages homes with garages or adequately-sized driveways.
- If this project proceeds, complete sidewalks and curbs to improve pedestrian safety, and clear flow for school buses and emergency vehicles
    - 5th Street, between E and F Streets
    - Between 4th and 5th Streets, along E and F Streets

Thank you.

Respectfully,
Jim Oberlander
715 Ferry Street SW (former address 818 C St SW)

Exhibit 6gg.

Alex Baruch

From: Alex Baruch
Sent: Thursday, June 11, 2026 1:47 PM
To: 'Jim Oberlander'
Subject: RE: TUM-26-0115, 5th Ave. Townhomes, Preliminary Plat

Good afternoon Jim,

Thank you for your comment. I will add this to the project file and include you on future notices. Would you prefer to receive the notice via email or USPS mail?

I would like to provide some background on the application and how the City processes land use applications. Washington State has mandated through the growth management act that Cites must provide for growth in our urban areas to accommodate growth closest to our excising infrastructure and resources.

11 units is within the allowed density for this project zoned low density residential as the minimum density is 6 dwelling units per acre and the maximum density allowed is 9 dwelling units per acre. This development is proposing just over 6 dwelling units per acre which is on the lower end of the potential developability of the site.

As a part of development requirements for sites that are developing for the first time, the City requires frontage improvements which require improvements such as sidewalks, street trees, curb and gutter along the frontage of the project. The City is not able to require road or infrastructure improvements beyond the frontage of the lot unless it meets specific nexus and proportionality requirements for new development proposals. For this proposal, the project does not exceed the threshold for additional road improvements based on our review to date. Connecting sidewalks would either need to be completed through a different development application for an adjacent parcel or the City in the future.

Please let us know if you have any follow-up questions and I would be happy to help.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Jim Oberlander <jimo201@comcast.net>
Sent: Thursday, June 11, 2026 11:52 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: TUM-26-0115, 5th Ave. Townhomes, Preliminary Plat

You don't often get email from jimo201@comcast.net. Learn why this is important

Hello, Alex –

I realize my comments are past the deadline, but please include them in the project file. Also, please add me to the any project notices and scheduled public meeting(s) notice.

- This project will change the character of Tumwater Hill from quiet, single family homes to a bustling urban environment. This new trend will be contagious. Local traffic and parking will be an issue! Here on Tumwater Hill, look around at any current cluster of duplexes, apartments, dense multi-family dwellings. Parking overwhelms the neighborhood. Residents park on the street, even when they have garages homes with garages or adequately-sized driveways.
- If this project proceeds, complete sidewalks and curbs to improve pedestrian safety, and clear flow for school buses and emergency vehicles
    - 5th Street, between E and F Streets
    - Between 4th and 5th Streets, along E and F Streets

Thank you.

Respectfully,
Jim Oberlander
715 Ferry Street SW (former address 818 C St SW)

Exhibit 6hh.

Alex Baruch

From: Alex Baruch
Sent: Friday, June 12, 2026 4:34 PM
To: Debi Bodett
Subject: RE: Email contact from City of Tumwater, WA

Good afternoon Debi,

I hope you are doing well. I would like to provide some background on the application and how the City processes land use applications. Washington State has mandated through the growth management act that Cites must provide for growth in our urban areas to accommodate growth closest to our existing infrastructure and resources.

11 units is within the allowed density for this project zoned low density residential as the minimum density is 6 dwelling units per acre and the maximum density allowed is 9 dwelling units per acre. This development is proposing just over 6 dwelling units per acre which is on the lower end of the potential developability of the site. For this proposal, the project does not exceed the threshold for additional road improvements based on our review to date. The city is required to review and analyze land use applications based on the applicable code and regulations in place. If an application meets all of the development regulations staff will need to recommend approval of the application to the hearing examiner. The hearing examiner is a land use attorney that looks at the regulations and verifies that staff took into consideration all of the requirements and all impacts have been mitigated per the municipal code.

The Tumwater Municipal Code requires that properties within 300' of the project are provided mailed notice, the property is required to have a public notice sign placed on it and the public notice must be in a local newspaper. If community members would like to be added to the email notice list we would be happy to add them to ensure they receive notice of future stages of this project as it moves forward.

Please let me know if you have any follow-up questions and I would be happy to help.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: City of Tumwater, WA <no-reply@ci.tumwater.wa.us>
Sent: Wednesday, May 20, 2026 11:44 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Email contact from City of Tumwater, WA

Message submitted from the <City of Tumwater, WA> website.

Site Visitor Name: Debi Bodett
Site Visitor Email: debibodett2@comcast.net

May 20, 2026

Alex Baruch, Community Development
555 Israel Road SW
Tumwater, WA 98501

Re: Tumwater Hill / Neighborhood Development Proposal

Dear Alex,

I live in the old Tumwater Hill neighborhood and have been a resident/homeowner for 20+ years.

I recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. I am opposed to this primarily because it is the last large green space between the historic old neighborhood on lower Tumwater Hill and the multitude of developments on Tumwater Hill beyond 5th Avenue. The green space is a natural habitat for animals, including the osprey population. The proposed development would increase traffic, noise, and light in a small, local neighborhood and ultimately decrease community safety.

We recently met with our neighbors to discuss our opposition, and the community is deeply hurt. Some of our most affected neighbors weren't even notified. We expect the city to do a thorough review of this proposal. This land should either remain green space, be purchased by the City of Tumwater for a park, or be placed under private ownership.

We love this community and expect to make decisions about its future democratically. We want our local representatives to listen to the neighbors who will have to bear the brunt of decisions that directly affect them. We chose this community for its own sake. Please don't take that away from us.

Sincerely,
Debi Bodett

33 Image Design

Exhibit 6ii.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 1:43 PM
To: Graham Clumpner
Cc: Alex Baruch; Leatta Dahlhoff; Chuck Denney
Subject: Re: Old Tumwater Hill development proposal

Hello Mr. Clumpner
Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications. As you are aware, the proposal includes 11 townhomes and includes stormwater, community gardens and open space on 1.09 acres of the 1.69 acre parcel.

As background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates include changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted "middle housing" types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices.

Over the coming weeks, the applicant will be responding to public comments and completing environmental review materials before the City issues a SEPA determination. Any comments submitted will be included in the public comment record and attached to the staff report for Hearing Examiner consideration. Comments will also be reviewed by staff and the applicant so that responses can be provided where appropriate.

In response to your question regarding runoff; The project will create additional impervious surfaces from the development and improvements to 5th Avenue. All water runoff from the new surfaces will be sent to a stormwater facility on their parcel to treat prior to infiltration back into the ground. Puget Sound Engergy will provide power to the development. Power will be installed underground to the new units as part of infrastructure improvements.

Staff agrees that portions of the sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally

expand and improve the City's pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

The project as proposed does not require an Environmental Impact Statement (EIS) but does require an environmental review of the proposal and its impacts. The applicant has provided an Environmental Checklist and supporting reports to evaluate the projects' impacts. The City will review the checklist and the proposed mitigation to determine if the development has addressed all adverse impacts. You will receive notice of this and future actions regarding the proposal.

Thank you again for your comments.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Graham Clumpner
Sent: Friday, June 5, 2026 10:04 AM
To: Alex Baruch
Cc: Chuck Denney; Leatta Dahlhoff
Subject: Re: Old Tumwater Hill development proposal

> You don't often get email from yeahneil@gmail.com. Learn why this is important

Hello Mr. Baruch,

I was just notified by my neighbors that a second awful development process has been started just up the hill from my house. I was involved in opposing the last one in 2020 and am disgusted to see this process starting again.

I have received no notice by email or mail from the city. My home is directly in line with this property and will suffer from over forty vehicles driving down our steep graded hill if this is approved by the city. My dog has already been hit by a car on this road and this would make our community un-liveable.

I am very supporting of attempting to solve the housing crisis but this hideous proposal is not in line with the types of families and craftsman homes we have in our community.

What is the city's plan for flooding and runoff? We already lose power multiple times throughout the year. What will this do to the grid on our hill?

How is the city prioritizing housing for people who don't live here to benefit a company from Texas when your very own citizens are demanding that this be made into a park. We have no green-space within walking distance. I am a disabled veteran and this street(that is being proposed to turn into another ugly condo-like structure) will destroy the only safe area that I can walk.

I am opposed strongly to this and the positiion of city council will determine my support or opposition in the future on all other issues. There is plenty of other places to build if the city wants to give money to Texas instead of supporting local community efforts for long term housing.

Finally I want to know why myself and other neighbors have received ZERO notification from the city. I am also aware that a public records request has not been produced by the city and yet our time to comment is almost over? Where is the EIS? What about the bears, deer, gophers, osprey and other creatures that live in that area?

We have multiple veterans, disabled children and elderly folks who live on this block. This will make our community unsafe. I hope the city council is aware of how opposed our entire neighborhood is to this proposal.

Exhibit 6jj.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 2:02 PM
To: Cody Holland
Cc: Alex Baruch
Subject: Re: Public Comment - South 5th Ave E St and F St

Good afternoon Cody

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications.

To provide a little background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates include changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted "middle housing" types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices.

As you are aware, the proposal includes 11 townhomes. It may be interesting to note that the proposal includes a stormwater facility, community gardens, and open space on 1.09 acres of the 1.69 acre parcel.

Staff agrees that portions of the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City's pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

Thank you again for your comments, we look forward to your continued participation during project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Cody Holland
Sent: Friday, June 5, 2026 10:17 AM
To: Alex Baruch
Subject: Re: Public Comment - South 5th Ave E St and F St

You don't often get email from codyw.o.holland@gmail.com. Learn why this is important

Hello Alex

I live in the old Tumwater hill neighborhood and I recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. I am opposed to this because of the increased traffic and corresponding street safety, as well as other environmental factors.

We recently met with our neighbors to discuss our opposition to this. It seems that some of our most affected neighbors weren't even notified. A more thorough review of this proposal should be considered. Given the character of the neighbor hood but also considering need for housing, I believe the density should be reduced to 4-5 dwelling units and that maximum green space be left, as many of these spaces are being developed throughout the county.

Tumwater hill was not always where we wanted to plant our family, but after growing closer in our community we have come to love the character of the area. I think planting an uncharacteristically large development right in the middle of our quiet area could have lasting damage on what we have grown to love.

Thank you for your service to us as city representatives.

Sincerely,

Cody Holland

Exhibit 6kk.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 2:25 PM
To: delanibugg@gmail.com
Cc: Alex Baruch
Subject: Re: Concerns Regarding Proposed Development

Good Afternoon Delani

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

Staff agrees that portions of the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City's pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

As you are aware, the proposal is for 11 townhomes, but interesting to note the proposal also includes a stormwater facility, community gardens and open space on 1.09 acres of the 1.69-acre parcel. Most of which will be left in its natural state.

Puget Sound Energy will provide power to the development. Power will be installed underground to the new units as part of infrastructure improvements. If you are concerned about the reliability of power in this area, you may want to reach out to Puget Sound Energy.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices. As stated above, you will be included in all future notices and determinations, as well as receiving a public hearing notice to provide testimony to the Hearing Examiner.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

Exhibit 6ll.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 3:19 PM
To: Jon-Mikel Gates
Cc: Alex Baruch
Subject: Re: Development plan at 585 5th Ave

Good afternoon Jon-Mikel

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

Staff agrees that portions of the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City's pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

The proposal is for 11 townhomes, but interesting to note the proposal also includes a stormwater facility, community gardens and open space on 1.09 acres of the 1.69-acre parcel. Most of which will be left in its natural state. The tree survey report shows that of the 12 trees located on the parcel, 7 are able to be retained, of which 4 are very large, over 24" in diameter. The project will be required to plant trees that equal a minimum of 21 trees on site. These trees will be planted as street trees and landscaping in select areas.

There is further review for this project to include environmental review, transportation concurrency, and a public hearing. You will be included in all future notices.

Thank you again for your comments, and we look forward to your continued participation in this project review.

Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Jon-Mikel Gates
Sent: Friday, June 5, 2026 10:09 AM
To: Alex Baruch
Subject: Re: Development plan at 585 5th Ave

[You don't often get email from jonmikel.gates@gmail.com. Learn why this is important at https://aka.ms/LearnAboutSenderIdentification] Hello Alex, I'm a resident and homeowner in the Tumwater Hill neighborhood and I'm writing to express my opposition to the construction of the proposed townhomes at 585 5th Ave. My husband and I urge you and the City of Tumwater to do a thorough review of this development—it represents a significant risk to the safety and quality of life in our neighborhood. The street (5th Ave) on which it will be situated already lacks safe sidewalks for people to navigate the neighborhood on foot; the increase in traffic will put pedestrians, children, and pets at risk. In fact, the streets feeding to the address are simply inadequate to accommodate the increased traffic. Additionally, this large open space will now be separated from the community; we lose tree cover and wildlife habitat while gaining no appreciable community good. We urge the city to consider purchasing this lot and convert it into a much-needed neighborhood park. The absence of such amenities has contributed, and will continue to contribute, to the gradual decline of an excellent community. We love this neighborhood, and look forward to participating in the process of civil government to help the city come to the right decision for the neighborhood we call home. Thank you, Jon-Mikel and John Tuttle-Gates 416 4th Ave SW

Outlook

Exhibit 6mm.

Re: 5th Ave. Townhomes

From Tami Merriman <TMerriman@ci.tumwater.wa.us>
Date Tue 6/16/2026 3:50 PM
To Karma Hugo <karma@portnw.com>
Cc Alex Baruch <ABaruch@ci.tumwater.wa.us>

Good afternoon Karma

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

The proposal is for 11 townhomes, but interesting to note the proposal also includes a stormwater facility, community gardens and open space on 1.09 acres of the 1.69-acre parcel. The homes are located at the street, so the open space and hillside behind will mostly stay in its natural state. The tree survey report shows that of the 12 trees located on the parcel, 7 are able to be retained, of which 4 are very large, over 24" in diameter. The project will be required to plant trees that equal a minimum of 21 trees on site. These trees will be planted as street trees and landscaping in select areas.

The project will create additional impervious surfaces from the development and improvements to 5th Avenue. All water runoff from the new surfaces will be sent to a stormwater facility on their parcel to treat prior to infiltration back into the ground.

Staff agrees that the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City’s streets and pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

The applicant has provided an Environmental Checklist and supporting reports to evaluate the projects' impacts. The City will review the checklist and the proposed mitigation to determine if the development has addressed all adverse impacts. You will receive notice of this and future actions regarding the proposal.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development

555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Karma Hugo
Sent: Friday, June 5, 2026 10:00 AM
To: Alex Baruch
Subject: Re: 5th Ave. Townhomes

You don't often get email from karma@portnw.com. Learn why this is important

Good morning, Mr. Baruch,

I am writing to formally object to the proposed subdivision of the parcel near my home into 11 single-family residential lots.

I recognize the need for housing development; however, I believe this proposal raises significant environmental and neighborhood concerns.

First, the subdivision would result in a substantial loss of existing tree cover and green space in an area that currently serves as important habitat for birds, pollinators, and other local wildlife. The property functions as part of a broader natural corridor that supports biodiversity and provides ecological balance within the neighborhood. Fragmenting habitat would permanently diminish the environmental character of the area and negatively impact species that rely on it.

Second, I am concerned about watershed and stormwater impacts associated with replacing permeable land and vegetation with roads, driveways, rooftops, and additional impervious surfaces. Increased runoff has the potential to affect drainage patterns, erosion, downstream water quality, and overall watershed health. Given increasing concerns about flooding and environmental resilience, preserving natural absorption areas should be prioritized whenever possible.

Additionally, the proposal would significantly increase traffic through an existing residential neighborhood that was not designed to accommodate this level of density or vehicle activity. Increased traffic volume raises concerns regarding pedestrian safety, noise, congestion, speeding, and the overall livability of the neighborhood, particularly for families, children, and residents who walk or bicycle in the area.

Finally, the cumulative loss of open green space in our community deserves careful consideration. Once natural land and mature tree canopy are removed, they cannot realistically be replaced within a meaningful timeframe. Developments of this scale should be evaluated not only for short-term growth objectives, but also for their long-term impacts on environmental quality, neighborhood character, and quality of life for current residents.

For these reasons, I respectfully request that the proposal be denied, substantially reduced in scale, or subjected to additional environmental review and mitigation requirements before any approval is considered.

Thank you for considering my comments.

Sincerely,

Karma Hugo

222 4 th Avenue SW
Tumwater, WA 98512

Outlook

Exhibit 6nn.

Re: Comments on the 5th Ave Townhomes Preliminary Plat

From Tami Merriman <TMerriman@ci.tumwater.wa.us>
Date Tue 6/16/2026 4:07 PM
To Nancy <nancycstevenson@comcast.net>; Alex Baruch <ABaruch@ci.tumwater.wa.us>

Good afternoon Nancy

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that “a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing.” In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner’s pre-decision hearing: the SEPA determination and the public hearing notices. You will continue to receive notices of all future actions and the public hearing.

The proposal is for 11 townhomes, but interesting to note the proposal also includes a stormwater facility, community gardens and open space on 1.09 acres of the 1.69-acre parcel. The homes are located at the street, so the open space and hillside behind will mostly stay in its natural state. The tree survey report shows that of the 12 trees located on the parcel, 7 are able to be retained, of which 4 are very large douglas fir trees, over 24" in diameter. The project will be required to plant trees that equal a minimum of 21 trees on site. These trees will be planted as street trees and landscaping in select areas. I am not sure if the maple you refer to may be located adjacent to the site, not on the parcel?

You are correct in that we cannot require a development to not meet minimum density requirements. This parcel is zoned Low Density Residential which requires a minimum density of 6 units per acre, and a maximum of 9 units per acres. 11 dwelling units is the minimum density requirement for this parcel.

The question has been raised to have the City purchase the land for a public park; however, it is not supported in the Parks plan for that area.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Nancy
Sent: Friday, June 5, 2026 10:08 AM
To: Alex Baruch
Subject: Re: Comments on the 5th Ave Townhomes Preliminary Plat

You don't often get email from nancycstevenson@comcast.net. Learn why this is important

Alex Baruch
555 Israel Roda SW
Tumwater, WA 98512

Dear Alex,

My neighbors recently brought to my attention a preliminary plat proposal for eleven single family attached lots on 5th Avenue between E street and F street. I live on the corner of E street and 3rd Avenue just 2 blocks away. I'm grateful to have found out about this plat proposal so I have time to comment. The deadline appears to be today.

As a former Planning Commissioner, I understand the need for infill development in existing neighborhoods to help with our community's housing needs and make efficient use of urban land. However, with a wall of eleven two story housing units all in a row spanning the entire block between E and F streets, the development appears to me to be too far out of scale. And, as such does not fit within the character of the neighborhood.

Also, one of the wonderful characteristics of our older neighborhood is the many mature trees. On this property specifically there is one maple that I estimate to be 100 years old and there are several very large fir trees I'd say are at least as old. These trees protect this environmentally sensitive area, provide wildlife habitat, and prevent erosion. They should not be cut down. They appear to me to qualify, given their age and size, as trees worthy to be protected under Tumwater's Tree Protection Code.

In closing, I've heard that state law prevents this plat from being downsized. Is this true? In my mind, if this proposal can't be rescaled to a more appropriate number of units and the mature trees protected, it should not move forward. In which case… is there a way of keeping this property as open space and/ or a community park?

With Respect and Hope,

Nancy

Nancy Stevenson
420 3rd Ave SW
Tumwater, WA 98512

Exhibit 6oo.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 4:15 PM
To: Roni Rogers; Alex Baruch
Subject: Re: 5th Ave Townhomes

Hello Roni
Thank you for providing your follow-up concerns. These will be included in the continued review of the project.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Roni Rogers
Sent: Friday, June 5, 2026 10:12 AM
To: Alex Baruch
Subject: Re: 5th Ave Townhomes

> You don't often get email from ronirogers82@gmail.com. Learn why this is important

Thank you for taking my call today regarding the proposed townhouses that will be developed directly across the street from my property.

I have a few concerns:
1. Parking: you said there will be 2 spots/unit but it is still a concern that I will see cars lined up outside my windows
2. The development on property that will likely require "fill ": curious about the materials that will be used to create a flatter land
3. Protection for the osprey that nest on the cell tower adjacent to construction
4. Road maintenance during snow and ice (we are usually the last to be plowed IF we get plowed)

Please add me to the email list so I can be kept current on the project and upcoming public meetings

Thank you,

Roni Rogers
ronirogers82@gmail.com

Exhibit 6pp.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 4:31 PM
To: Sheelagh McCarthy
Cc: Alex Baruch; Leatta Dahlhoff; Chuck Denney
Subject: Re: Concerning old Tumwater Hill development

Good Afternoon Sheelagh

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

Staff agrees that the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City's streets and pedestrian network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing. Continued review of the project includes environmental impacts and transportation concurrency.

The question has been raised to have the City purchase the land for a public park; That would indeed be lovely, however, it is not supported in the Parks plan for that area.

Thank you again for your comments, and we look forward to your continued participation in this project review.

Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Sheelagh McCarthy
Sent: Friday, June 5, 2026 10:01 AM
To: Alex Baruch; Leatta Dahlhoff; cdenny@ci.tumwater.wa.us
Subject: Re: Concerning old Tumwater Hill development

You don't often get email from sheelaghmc09@gmail.com. Learn why this is important

Dear Alex, Chuck, and Leatta,

I am reaching out regarding the development proposal on old Tumwater Hill that will bring 11 townhomes just a block away from my current home. This undeveloped space is important to our community including my family. I am opposed to this because of increased traffic, safety, and the degradation of this cherished green space.

My family walks past this green space on every walk with our dogs and small child. It is peaceful, quiet, and protected from traffic. We love watching the wildlife and foliage change throughout the seasons.

I am deeply concerned about the impact to safety the increased traffic and noise will create. Because of the location near the top of the hill, the construction of 11 townhomes with an expected 22 vehicles will significantly increase the traffic patterns creating hazardous conditions to my family and many of our neighbors that walk and bike along this space with their dogs and small children. There is a lack of sidewalks in our neighborhood, and this space is deeply valued by us because of its relative safety due to the low traffic.

I would love to see this land continue to be a green space, either undeveloped or as a park, so that it can continue to be enjoyed by members of our community.
Thank you for the opportunity to allow our voices to be heard regarding the impacts to your community from these proposed changes.

Sincerely —
Sheelagh McCarthy

--
Sheelagh M. McCarthy

Exhibit 6qq.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 4:50 PM
To: Taylor
Cc: Alex Baruch; Leatta Dahlhoff
Subject: Re: Proposed 11-Unit Housing on 5th Ave

Good Afternoon Taylor
Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

As background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates include changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted "middle housing" types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater.

When a project is proposed to the City, it is our responsibility to assure that the development meets the intent of the comprehensive plan for the City as well as the development regulations adopted by code. The site is zoned low density residential and the project is required to provide 11 dwelling units.

There will be further review to address an mitigation for adverse impacts to the environment and after that, the proposal presented to the Hearing Examiner to consider approval of the development.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices. You will be included in future notifications including the environmental determination and the public hearing notice where you may provide testimony to the hearing examiner.

As for your home ownership question, each dwelling unit will be located on its own parcel, which could be individually owned. It is up to the property owner of the individual unit to determine if they wish to occupy or use as a rental.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
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tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Taylor
Sent: Friday, June 5, 2026 10:08 AM
To: Alex Baruch; Leatta Dahlhoff
Subject: Re: Proposed 11-Unit Housing on 5th Ave

You don't often get email from taylor.lee.werner@gmail.com. Learn why this is important

Dear Mr. Alex Baruch and Mayor Leatta Dahlhoff,

I live on 5th Ave in the Old Tumwater Hill neighborhood, just down the hill from the proposed 11-unit housing development on 5th Ave SW and E St. I daily and nightly walk my dog past the blackberry brambles, where he loves to sniff out the rabbits and deer that we very regularly see there. I shudder to think of truck after truck bringing in literal tons of fill dirt, excavators digging trenches for duct banks, street closures, and et cetera during construction, but if 11 new dwellings materialize when it's all done, and at least 11 new vehicles (likely many more) traffic 5th Ave as a result, our quiet walks in the moonlight will be permanently lost. The animals for whom that land is habitat will wander through neighbor's yards, disoriented. And I will feel that the world has gotten a little worse.

I understand the challenge representatives of the City of Tumwater face, balancing the many interests of its constituents. But almost everyone I've spoken to who lives on Old Tumwater Hill (20+ neighbors in the immediate vicinity of the proposed development) feels that this is not the appropriate place to build dense housing. Many of my neighbors felt blindsided. Some were not notified at all, and everyone I've talked to felt like the time to learn about the proposal and respond was inadequate. We are desperate for you to carefully scrutinize the proposal and consider whether it's truly in the common good, or if it's a payday for a developer who is not invested in our community. I would love to see the city purchase that land, and make it a park or conservation site. There are many young children in the neighborhood, and we want them to have something that's not ruined.

The need for housing is real, but our community's housing crisis is a *class* crisis. Affluent people do not struggle to find housing where they'd like to live; every day, there are abundant new listings for housing that's unaffordable for those who truly *need* it. I have doubts that this development would alleviate the problem of housing at all. Who will own these units? Will they be owner-occupied, or rentals?

All my life, I've watched the quiet, spacious places I love be subsumed by the unsustainable expansion of projects that enrich developers, *briefly* employ unrepresented, underpaid workers who don't have benefits like healthcare, and reduce the quality of life for everyone else. I appreciate the City of Tumwater's diligence about sustainable development — I previously served on the CPAT and I was proud of my city — but I think this development is a misstep that does not make sense. So very often, development feels like something imposed on community members by people who are not a part of the community, and also happen to profit handsomely.

The community on Old Tumwater Hill is cohesive, and kind, and we communicate skillfully with each other. We love this neighborhood, and expect that if a vast majority of us do not want it permanently changed in this way, then it will not happen. It would be happening against our will. We want our local representatives to *represent us* as we grapple with the potential outcomes of this extremely consequential proposal.

Please do not let a developer permanently destroy the character of my neighborhood!

~Taylor Werner

Exhibit 6rr.

Tami Merriman

From: Tami Merriman
Sent: Tuesday, June 16, 2026 5:37 PM
To: Teri Buccarelli; Alex Baruch
Subject: Re: Purposed 11 Townhome units on 5th Ave

Good Afternoon Teri
Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, published in the newspaper, and on-site posting. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices. As stated above, you will be included in all future notices and determinations, as well as receiving a public hearing notice to provide testimony to the Hearing Examiner.

Staff agrees that the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City's pedestrian and vehicular network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

Over the coming weeks, the applicant will also be responding to public comments and completing environmental review materials before the City issues a SEPA determination. Any comments submitted will be included in the public comment record and attached to the staff report for Hearing Examiner consideration. Comments will also be reviewed by staff and the applicant so that responses can be provided where appropriate.

I have provided comments to your other questions below:

1. How will the development affect parking in an already limited area?

   Each unit will be provided 2 parking spaces. One in the garage, and a driveway space. The frontage improvements that will be completed will also provide improved on street parking.

2. What impacts will it have on watershed function and drainage?

All runoff from new impervious surfaces (streets, parking, etc) will be conveyed to an onsite stormwater facility which treats the runoff prior to infiltrating back into the ground.

3. How will the loss of this wildlife corridor affect the surrounding environment?

   Staff has not yet reviewed the SEPA environmental checklist which requires compliance with state and local codes in regards to endangered and/or threatened species.

4. How much fill will be required to make the site buildable and stable?

   The exact amount has not been determined yet, but the assumption is that there will be approximately 3,500 yards of fill.

5. What protections will be provided for neighboring homeowners who may experience increased water runoff because of that fill?

   The Stormwater report and approved system should prevent any increased runoff to neighbors. The City requires a maintenance agreement to be recorded to assure the system is maintained and corrective actions if there is any problems.

6. How will this project affect the local electrical grid, especially given the outages we already experience?

   Electric service is provided by Puget Sound Energy (PSE). If you are experiencing difficulites, you need to contact PSE.

7. Where will the water supply for these additional homes come from, and will there be sufficient pressure for all households?

   Water is provided by the City of Tumwater. Your question regarding water pressure will be forwarded to our utility department.

8. How will the city address the risk of sewage backups for downhill homes that do not have one-way valves?

   This question will be forwarded to our utility department.

Thank you again for your comments, and we look forward to your continued participation in this project review.

Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Teri Buccarelli
Sent: Friday, June 5, 2026 10:03 AM
To: Alex Baruch
Subject: Re: Purposed 11 Townhome units on 5th Ave

You don't often get email from teribuccarelli@gmail.com. Learn why this is important

Dear Alex,
I have lived in the Old Tumwater Hill neighborhood for 16 years, and I am writing to express my serious concerns about the proposed 11-townhome development.
I received the Notice of Application on Thursday, 5/14, which did not appear to allow the full 14-day comment period referenced in the "Public Comment Period" section. While I understand that notice may only be required for homeowners within 300 feet of the site, this proposal will affect the entire Old Tumwater Hill neighborhood. Out of fairness, courtesy, and respect for the community, all nearby residents should have been notified. I am also concerned that some homeowners within the 300-foot notification area, including those who may be most directly affected, were not notified.

After speaking with several neighbors, I know I am not alone in these concerns. Many residents care deeply about preserving this land as green space. We would strongly support a park-like setting with trails for public enjoyment, along with preserving the tree cover and open field areas that local wildlife depend on. This kind of use would better reflect the character and needs of our neighborhood than development driven primarily by outside financial interests.

I am also deeply concerned about safety. This project would permanently increase traffic on narrow roads with blind corners that are already used daily by walkers, joggers, children, and people walking their dogs. Because of current detours related to the roundabout construction, traffic has already increased in nearby areas. While working in my yard, I have personally witnessed four near misses at the intersection of 4th Avenue and E Street. Adding 11 townhomes will likely bring significantly more vehicles, in addition to visitor traffic, and will increase the safety risks for everyone in the neighborhood.

The environmental impact also deserves careful review. Wildlife currently uses this area as habitat and as a corridor for movement. I have personally seen deer and fawns, hawks, osprey, and red-headed woodpeckers in this space. Has a wildlife corridor assessment been completed? Will this project comply with protections under the Migratory Bird Treaty Act?

In addition to these concerns, my neighbors have raised several other important questions that should be addressed before this project moves forward:

1. 1. How will the development affect parking in an already limited area?
2. 2. What impacts will it have on watershed function and drainage?
3. 3. How will the loss of this wildlife corridor affect the surrounding environment?
4. 4. How much fill will be required to make the site buildable and stable?

5. 5. What protections will be provided for neighboring homeowners who may experience increased water runoff because of that fill?
6. 6. How will this project affect the local electrical grid, especially given the outages we already experience?
7. 7. Where will the water supply for these additional homes come from, and will there be sufficient pressure for all households?
8. 8. How will the city address the risk of sewage backups for downhill homes that do not have one-way valves?

I understand the need to address housing challenges, and I do not want to dismiss those concerns. However, this project does not appear to be the right solution for this location. Placing additional housing on this site would create long-term impacts on safety, infrastructure, drainage, wildlife, and neighborhood character without meaningfully solving affordability issues.

Old Tumwater Hill is a historic, quiet, family-oriented neighborhood that residents value deeply. I chose to live here because of its history, its older homes, its sense of community, and its natural surroundings. Those same qualities are why I remain here today. This proposal may seem like a convenient opportunity for development, but for those of us who live here, it would mean a lasting loss.

I respectfully ask that the city listen carefully to the residents who will be most directly affected and reconsider this proposal. Our neighborhood deserves thoughtful planning that protects both current residents and the character of this community.

Sincerely,

Teri Buccarelli
421 4th Ave SW
Tumwater, WA 98512
(360) 259-3861
Email: teribuccarelli@gmail.com

Exhibit 6ss.

Tami Merriman

From: Tami Merriman
Sent: Wednesday, June 17, 2026 10:36 AM
To: 'Victoria Ryan'; Alex Baruch
Subject: RE: Tumwater Hill Townhomes

Hello Victoria

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

To provide a little background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates include changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted “middle housing” types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater. The development as proposed is a permitted use on this site.

The site is a bit challenging with the existing slopes. The applicant is proposing to construct the homes near the road, leaving 1.09 acres of the 1.69 acre parcel as open space, community gardens and stormwater facilities. The tree survey provided shows 12 trees located on the parcel, with 7 to be retained. The new development will be planting several more trees on site. Many of the trees visible from the street are located on adjoining parcels or within unimproved city owned Right-of-way and are not part of the development.

This project is required to provide frontage improvements as a part of their development which will include improving 5th Ave along the parcel frontage, to include drive lane, curb, gutter, sidewalk, and street trees. City water and sewer lines will be installed in the ROW as part of this improvement. City infrastructure is designed to protect all users by the type of construction, valves, and backflow preventing devices.

Unfortunately, road construction can be a bit disturbing for short periods of time, but I am not aware of any requirement for blasting. Road work will be inspected by the City and bonding is required to assure proper construction and warrantee.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Victoria Ryan <victoria.ryan@comcast.net>
Sent: Thursday, May 21, 2026 8:46 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Tumwater Hill Townhomes

You don't often get email from victoria.ryan@comcast.net. Learn why this is important

Good day.
I am a 30 year resident of Tumwater Hill. I love the quality of life I have here.
I am strongly opposed to the proposed development of the property on the north west side of F and 5th.(585 5th Ave SW)
This is a very unique property, it is basically a large hole. I can hardly imagine the immense physical and financial cost to bring this development to fruition. This development would destroy the environment and the habit that is now there..
Mother nature has claimed this place , it is home to many creatures large and small. We have Deer, Possum, Rabbits and Coyote as well as many ground dwellers. This area with its old growth trees ,shrubs and grasses are home to many birds. We have a pair of Osprey that nest on the cell tower every year. There are Owls that nest in the tree behind my home, that hunt in that pasture.. There is a Wood pecker nest in the power pole on the corner.
This is a quiet and safe place, where you can stargaze on clear nights and walk the streets that have very little traffic.
As someone that lives in an older home (as do many of the people in the neighborhood)I worry about how the physical destruction will impacted my home and quality of life. In this era of slap-dash building ,I am sure that no thought has been given (past just a minimum) of how construction could damage existing homes. How are they going to get water to the new construction? How will this effect my quality of water ,or water pressure? Where will the sewer waste go? Is the city going to invest in one-way values to protect the homes down hill from this high density development? Will they have to jack hammer or use explosives to put in sewer and water lines? How much heavy equipment will be moving on our streets, and how much damage will be done?
This is an older neighborhood. There surly are better places to build. places that will not displace and destroy nature.
This place has been claimed by Mother Nature and should remain a green space.

Sincerely, Victoria Ryan
30 year resident of a safe, quiet and beautiful neighborhood on Tumwater Hill

Exhibit 6tt.

Tami Merriman

From: Tami Merriman
Sent: Wednesday, June 17, 2026 11:01 AM
To: 'Vanessa Butler'; Alex Baruch; Leatta Dahlhoff
Subject: RE: Proposed Development on Tumwater Hill

Hello Vanessa

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

To provide a little background, in December 2025 the City completed a two-year process to update the Comprehensive Plan and associated development regulations in response to new State housing requirements. Those updates include changes to allowable housing density (increased previously allowed density from 6-8 dwelling units per acre in Single Family Medium zone to 6-9 dwelling units per acre in Low Density Residential zone) and the expansion of permitted “middle housing” types—such as duplexes, triplexes, quadplexes, and townhomes—in order to help address housing needs within Tumwater. The development as proposed is a permitted use on this site.

The city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed, but it is also published in the newspaper, and posted on-site to reach more citizens than just a mailing. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that “a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing.” In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner’s pre-decision hearing: the SEPA determination and the public hearing notices. You will continue to receive notices of all future actions and the public hearing.

The proposal is for 11 townhomes, but interesting to note the proposal also includes a stormwater facility, community gardens and open space on 1.09 acres of the 1.69-acre parcel. The homes are located at the street, so the open space and hillside behind will mostly stay in its natural state. The tree survey report shows that of the 12 trees located on the parcel, 7 are able to be retained, of which 4 are very large Douglas fir trees, over 24" in diameter. The project will be required to plant trees that equal a minimum of 21 trees on site. These trees will be planted as street trees and landscaping in select areas.

There will be further review to address any mitigation for adverse impacts to the environment. This includes review of traffic impacts to the transportation system. Staff agrees that the street and sidewalk network on Tumwater Hill remain incomplete. One of the primary mechanisms for extending sidewalk infrastructure is through redevelopment and infill projects such as this proposal. As development occurs, required frontage improvements help incrementally expand and improve the City’s pedestrian

and vehicular network. This project is required to provide frontage improvements as a part of their development which will include street trees, sidewalk and curbing.

The street infrastructure include installation of and connection to City water and sewer services. The City currently has capacity to serve this development. Runoff from all new impervious surfaces, (streets, driveways, etc) will be directed to an onsite stormwater facility which will treat the runoff prior to infiltration.

Please contact the Thurston County Assessors Office regarding how taxes are assessed after new development occurs in local areas (neighborhoods). New development may increase property values. The Assessor also has different programs to assist homeowners who struggle to afford their taxes.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Vanessa Butler <vinoly@comcast.net>
Sent: Tuesday, May 19, 2026 5:48 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>; Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: Proposed Development on Tumwater Hill

You don't often get email from vinoly@comcast.net. Learn why this is important

Dear Alex:

I live in the old Tumwater hill neighborhood (506 4th Ave SW, Corner of 4th and E Streets) and recently learned from my neighbors of a development proposal that will bring 11 townhomes to our community. First, I am requesting that the City notify ALL property owners in the neighborhood. I had to call to request that I be added to the mailing list for the information that affects MY NEIGHBORHOOD. Please do a more thorough distribution. Your lack of notification makes it appear as though it is purposeful; no notification = no comment. I expect better from my City.

I am opposed to this development for several reasons. They are stated as follows:

- I understand that more housing is necessary for Tumwater, however, **placing 11 townhomes in an older established neighborhood in the only open space will appear out of place and destroy the current "old neighborhood feel."** I moved to the Hill 40 years ago for this very reason. A whole new generation of children are now living on the Hill and we enjoy the

fact we can safely walk our pets and stroller our children and grandchildren on 5th Avenue to view the Osprey nest, pick blackberries, observe the birds and wildlife that occupy this animal corridor.

- Speaking of the Osprey nest, what is the impact on our neighborhood Osprey family that returns annually? I don't believe the developer has addressed impact to our Osprey family. It is an amazing site to see an Osprey carry a fish from the Deschutes River to their nest on the top of the Hill. Will the Osprey relocate? **I want to see the impact statement to the wildlife corridor and our Osprey family.**

- **Traffic will be a huge issue.** Currently, I am at the mercy of drivers speeding up 4th Avenue while backing out of my driveway. I am just over the crest of the hill on 4th (between F and E Streets). Most drivers DO NOT adhere to the 25 mph speed limit, and THEY become angry when they reach the hill crest and must slow down due to me backing out of my driveway. In the very least, 22 additional vehicles joining the neighborhood traffic will only increase the danger of accidents. Where will the traffic be directed in and out of this development? Down 5th Avenue or 4th Avenue? Once it snows, I don't believe the City will suddenly be plowing and de-icing 5th Avenue or the side streets. The city DOES NOT currently maintain these streets in the winter. It is simply too steep and the curve down E Street is already dangerous.

- I am also aware that **city water and sewer systems** are spotty to the west of 5th Avenue. How will the addition of 11 townhomes affect OUR current water supply and runoff?

- How will this new development **affect my taxes?** It will most likely increase the property taxes that I already struggle to pay.

- This effort to "in-fill" for the goal to create more housing **DOES NOT fit the definition of "in fill"** as it currently stands for the City of Tumwater or my neighborhood on Tumwater Hill. Eleven townhomes versus a duplex here and there?

I cannot see any advantage to this proposed development except to line the pockets of OUT OF STATE CORPORATIONS. I respectfully request that this development be thrown back to Texas to seek another location. Leave my neighborhood as it is...a safe, quiet neighborhood.

Thank you for your consideration of these issues and assurance that the developer will address these issues appropriately and completely.

Sincerely,

Vanessa A. Butler

cc: Leatta Dahlhoff, Mayor, City of Tumwater
Tumwater City Council Members

Vanessa A. Butler%0D%0Avinoly%40comcast.net%0D%0Acell%3A 360-528-9179%0D%0Ahome%3A 360 357-3179

Exhibit 6uu.

Tami Merriman

From: Tami Merriman
Sent: Wednesday, June 17, 2026 12:22 PM
To: 'brodrick coval'; Leatta Dahlhoff; cdenny@ci.tumwater.wa.us; Alex Baruch
Subject: RE: Concerning Old Tumwater Hill Development

Hello Brody

Thank you for your comments regarding the proposed 5th Avenue Townhomes Preliminary Plat (Permit No. TUM-26-0115). Your comments will be included in the public record and provided to the applicant for consideration. You have been added to the public comment list for future public comment notifications as well.

As you read in Title 14, the city is required to mail public notices to property owners within 300 feet of the site. The notice provides an initial opportunity for property owners, the public, and agencies to provide comments. The notice is mailed as required, but it is also published in the newspaper of record, and posted on-site to reach more citizens than just a mailing. The end of this comment period from this notice does not mean the City will stop accepting public comment on the proposal. Per TMC 14.16.050(C)(5) and state law, the notice is required to include a comment deadline. However, RCW 36.70B.110(2)(e) states that "a local government may accept public comments at any time prior to the closing of the record of an open record pre-decision hearing." In addition to the current comment period, there will be two additional noticed public comment periods prior to the Hearing Examiner's pre-decision hearing: the SEPA determination and the public hearing notices. You will continue to receive notices of all future actions and the public hearing.

I appreciate your thoughts about postponing review of development as certain plans and codes are under review to be updated. That would be considered a development moratorium which the city is only allowed to do under very limited circumstances and requires a very specific city council process.

I trust that you have received the responsive documents for your public records request. Please feel free to contact this department with any questions you may have after review of the application materials and past records. There will be further review to address an mitigation for adverse impacts to the environment and after that, the proposal presented to the Hearing Examiner to consider approval of the development. Both of these processes provide additional comment opportunities.

Thank you again for your comments, and we look forward to your continued participation in this project review.



Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501

(360) 754-4180
tmerriman@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: brodrick coval <covalbro@gmail.com>
Sent: Friday, May 22, 2026 8:45 PM
To: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>; cdenny@ci.tumwater.wa.us; Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Concerning Old Tumwater Hill Development

You don't often get email from covalbro@gmail.com. Learn why this is important

Hello,

As a longtime resident, new parent, Tumwater small business owner, Tumwater Tree Board Member, and community advocate I am writing to you in response to the notice of application to develop Old Tumwater Hill by clearing mature naturally regenerated mixed open conifer habitat and adding 11 townhomes. **I am opposed to this development for several reasons.**

The municipal code governing this notice (TMC 14.16.050) does not promote open and transparent process and is being poorly executed. The notices my neighbors and I received came over the span of eight days and none were mailed using certified mail. Why should some of us have an additional *half* of the comment period with actual notification? **This process is not being executed equitably.**

Additionally, upon receipt of my notice I took action as soon as feasible to submit records requests from the City to better understand the application process and recent failed attempts to develop the parcel. I was told by the city that my requests were going to take longer to respond to than the comment period window. I was denied a request to extend the comment period to allow for adequate transparency via the requested documents. **This is not transparent government, nor does it promote educated and meaningful engagement by the impacted community.**

Further, from a long term planning perspective the City is well-positioned to delay the application review. The following city planning and execution documents/projects are nearing completion; municipal code update regarding urban forestry and tree canopy removal, Parks and Recreation elements of the long-awaited Comprehensive Plan. Each of these cost the City and its voters a significant investment of time and resources. The proposed development would likely run counter to many of the strategies they outline. The city owes its community the options that this parcel offers when those documents are complete--**developing it ahead of time is short-sighted.**

I look forward to continuing engagement on this matter.

Best,

Brody Coval
Tumwater Tree Board Member
Owner South Sound Wood Co.

Exhibit 6vv.

Alex Baruch

From: Jared Crews
Sent: Tuesday, June 23, 2026 8:46 AM
To: nicandri@comcast.net
Cc: Alex Baruch
Subject: RE: Traffic levels of service

Dave,

This is Jared with the City of Tumwater, Alex forwarded your question on to me as I am completing the majority of traffic study review for the City at the moment.

Unfortunately there has not been any level of service analysis on the portions of streets you mentioned. Traffic analysis is typically generated by private development projects over a certain size. There has been little substantial development in this area that would trigger that level of analysis.

We have two forms of analysis. A trip distribution summary which looks at the project location, identifies the land use code (apartments/commercial/single family homes/etc.) and then shows where those trips distribute to. No level of service analysis is required with this type of study. A transportation impact analysis is our more in depth analysis, required when a project is predicted to generate more than 50 trips during the peak hour of traffic (typically 8 to 9 AM or 5 to 6 PM) or is predicted to increase traffic at an intersection by 25%. That impact analysis is when we require a level of service analysis for intersections. Obviously it has been some time since we have had a project large enough to generate 50 new trips in the vicinity you are interested in.

The 5th Ave Townhomes project did complete a trip distribution summary.

Jared Crews | Engineer III
Development Review Lead
City of Tumwater
555 Israel Road SW | Tumwater, WA 98501
O 360-754-4140
jcrews@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Sent: Tuesday, June 23, 2026 8:00 AM
To: Jared Crews <JCrews@ci.tumwater.wa.us>
Subject: FW: Traffic levels of service

Hey Jared,

Would you be able to respond to this one and copy me on the response?

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Thursday, June 18, 2026 11:01 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Traffic levels of service

Alex: has there been an analysis of levels of traffic service on the following streets: 4th Ave SW between C and Linwood, 5th Avenue SW from E and Linwood, E Street from 5th to 2nd or F Street from 5th to 2nd. If such a study has been completed heretofore can you provide a link. Also, was a traffic study conducted for the 5th Avenue Townhouse project?

Dave Nicandri

Exhibit 6ww.

Alex Baruch

From: Jared Crews
Sent: Wednesday, June 24, 2026 12:31 PM
To: Dave Nicandri
Cc: Alex Baruch; Leatta Dahlhoff
Subject: RE: Traffic levels of service

Dave,

Good questions.

The peak hour is identified as the hour time frame a specific use or development is expected to generate the most trips. It varies depending on the type of project (single family home, apartments, commercial, etc.). For most projects it is either the 8 to 9 AM or 4 to 5 PM window. For this project, you are correct that the 4 to 5 PM window is the peak hour.

I don't think you are misunderstanding anything, the background math is complicated and at first glance does not always make sense.

When we review transportation/traffic impacts we established how many trips a new project is going to create based on guidelines set by the Institute of Transportation Engineer's (ITE). ITE maintains a document called the Trip Generation Manual which is essentially a composite of traffic studies, vehicles counts, distribution data, etc. on a multitude of development types or "land use codes". Projects are designated a land use code and then the trips they are predicted to generate are a factor of the size of the project/how many units they are proposing, and the data recorded in the Trip General Manual.

For this particular project Land Use Code 215 (LUC 215) single family attached housing was selected and is the appropriate designation. The number of units proposed are then multiplied by the factors in the Trip Distribution Manual and that is how the PM Peak Hour trips are calculated.

Single family attached housing does have a surprisingly low factor, but many of the other land use codes do as well. Singla family home detached (what the majority of the existing home on Tumwater Hill would be considered) only predicts a peak hour trip of about 1 hour per home.

There are several reasons why this number might seem low even if a particular home has numerous vehicles. Not all residents are leaving or returning from work during the peak hours, some may be students and are coming/going at off peak hours, individuals may take the bus, walk, or bike locally during the peak hour (and their trips would not count towards new vehicle trips), homes could have multiple vehicles that are used for specific needs rather than daily commuters, people in the home could carpool, etc. The Trip Generation Manual takes this into account and much more when establishing the rates for various land use codes.

Jared Crews | Engineer III
Development Review Lead
City of Tumwater
555 Israel Road SW | Tumwater, WA 98501
O 360-754-4140
jcrews@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Wednesday, June 24, 2026 12:02 PM
To: Jared Crews <JCrews@ci.tumwater.wa.us>
Cc: Alex Baruch <ABaruch@ci.tumwater.wa.us>; Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: RE: Traffic levels of service

Jared:

Thanks for the prompt reply. As a citizen and taxpayer I appreciate the responsiveness.

I have to ask you to unpack the analysis, noting that you did not prepare it but the developer's agent did. What defines "peak hour"? The most trips any one hour, or is peak hour a specific time, like from 4 to 5 p.m.? Do I read the report further to mean that an 11 home (22 car allotment) development (to say nothing of the third vehicles that will park on 5th or elsewhere in the neighborhood) will only generate 6 extra trips during the "peak hour"? Flattering myself as an educated layman when it comes to trip analysis, I don't understand how that number can be so low. What do you suppose I'm not understanding?

Dave

On 06/24/2026 11:32 AM PDT Jared Crews <jcrews@ci.tumwater.wa.us> wrote:

Dave,

I am happy to share the report for the project. See attached.

I believe the Hearing Examiner will see this report, or at least our ruling on the report, but Alex can confirm.

Regarding the new trips, this project is only expected to generate 6 new trips during the peak hour.

Let me know if you have any additional questions.

Jared Crews | Engineer III

Development Review Lead

City of Tumwater

555 Israel Road SW | Tumwater, WA 98501

O 360-754-4140

jcrews@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Wednesday, June 24, 2026 11:18 AM
To: Jared Crews <JCrews@ci.tumwater.wa.us>
Cc: Alex Baruch <ABaruch@ci.tumwater.wa.us>; Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: RE: Traffic levels of service

thanks, Jared.

I have several follow up questions. Can you share the 5th Avenue Townhomes summary completed by the developer's agent with me in PDF form? Will the hearings examiner see that report? For what it's worth, as a 50 year resident of this neighborhood (and former city councilmember) I can attest that the intersections of 5th and E and 5th and F will see a 200% or 300% increase in traffic if the project is developed as proposed and easily meet the 50 new trips threshold.

Dave

> On 06/23/2026 8:46 AM PDT Jared Crews <jcrews@ci.tumwater.wa.us> wrote:
>
> Dave,
>
> This is Jared with the City of Tumwater, Alex forwarded your question on to me as I am completing the majority of traffic study review for the City at the moment.
>
> Unfortunately there has not been any level of service analysis on the portions of streets you mentioned. Traffic analysis is typically generated by private development projects over a certain size. There has been little substantial development in this area that would trigger that level of analysis.

We have two forms of analysis. A trip distribution summary which looks at the project location, identifies the land use code (apartments/commercial/single family homes/etc.) and then shows where those trips distribute to. No level of service analysis is required with this type of study. A transportation impact analysis is our more in depth analysis, required when a project is predicted to generate more than 50 trips during the peak hour of traffic (typically 8 to 9 AM or 5 to 6 PM) or is predicted to increase traffic at an intersection by 25%. That impact analysis is when we require a level of service analysis for intersections. Obviously it has been some time since we have had a project large enough to generate 50 new trips in the vicinity you are interested in.

The 5th Ave Townhomes project did complete a trip distribution summary.

Jared Crews | Engineer III

Development Review Lead

City of Tumwater

555 Israel Road SW | Tumwater, WA 98501

O 360-754-4140

jcrews@ci.tumwater.wa.us | www.ci.tumwater.wa.us

From: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Sent: Tuesday, June 23, 2026 8:00 AM
To: Jared Crews <JCrews@ci.tumwater.wa.us>
Subject: FW: Traffic levels of service

Hey Jared,

Would you be able to respond to this one and copy me on the response?

Sincerely,

Alex Baruch | **he/him**

Senior Planner, Community Development

City of Tumwater

555 Israel Rd SW | Tumwater, WA 98501

(360) 754-4180 | ABaruch@ci.tumwater.wa.us

www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Thursday, June 18, 2026 11:01 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Traffic levels of service

Alex: has there been an analysis of levels of traffic service on the following streets: 4th Ave SW between C and Linwood, 5th Avenue SW from E and Linwood, E Street from 5th to 2nd or F Street from 5th to 2nd. If such a study has been completed heretofore can you provide a link. Also, was a traffic study conducted for the 5th Avenue Townhouse project?

Dave Nicandri

Exhibit 6xx.

Alex Baruch

From: Alex Baruch
Sent: Thursday, July 2, 2026 8:49 AM
Subject: TUM-26-0115, 5th Ave Townhome Project Next Steps

Good morning,

I hope you are doing well. Thank you for providing comments on the 5th Avenue Townhome project. We appreciate the feedback we have received to date. All comments have been forwarded to the applicant for review. Most comments should have already received a response from City of Tumwater staff or the applicant, but I wanted to provide an update on the status of the application and the next steps in the review process.

The applicant is currently considering the comments received. Once staff receives the updated materials from the applicant, we will review them and issue a SEPA determination, which will begin the environmental review comment period. When the SEPA determination is issued, staff will provide notice by email or mail to everyone who has submitted comments on the project. Properties within 300' of the project site may receive both. The SEPA review process includes a 14-day public comment period followed by a 6-day appeal period. Everyone on this email will at a minimum receive an email for any public notices moving forward with this project.

Following completion of the SEPA process, staff will prepare a staff report and schedule a public hearing before the Hearing Examiner. Notice of the hearing will be provided at least 10 days in advance. Written comments may be submitted up to noon on the day of the hearing, and members of the public will also have the opportunity to provide testimony during the hearing.

If you have any questions about the project or the review process, please feel free to reach out. I would be happy to discuss the application with you.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

Exhibit 6yy.

Alex Baruch

From: Alex Baruch
Sent: Wednesday, July 8, 2026 10:04 AM
To: Alex Baruch
Subject: FW: 5th Avenue Townhomes meeting summary for 6.28.26

From: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Sent: Monday, June 29, 2026 11:55 AM
To: nancycstevenson@comcast.net
Cc: Paul Simmons <PSimmons@ci.tumwater.wa.us>; Kelly Adams <KAdams@ci.tumwater.wa.us>; Brad Medrud <BMedrud@ci.tumwater.wa.us>; Kelly Von Holtz <KVonHoltz@ci.tumwater.wa.us>
Subject: 5th Avenue Townhomes meeting summary for 6.28.26

Hi Nancy,

Please share this email with your neighbors.

First, Nancy, thank you for reaching out. It was great to meet so many of your neighbors. It warms my heart to hear about how you all love Tumwater! Thank you for sharing your feelings and thoughts and concerns and fears with me yesterday. I summarized my notes below. Also...when you receive the distribution list, please share with staff so we can make sure we add everyone to our distribution list for this development moving forward.

Positives about neighborhood shared with me

star gazing	nature	pond
quiet	backstreet	ospreys
less traffic	kids riding around	deer
views	tight-knit community	coyote
walking	open space	ravens
sense of community	stream	rabbits
quail	safe place	kids can learn to drive and ride bikes on backstreet
kids from other neighborhoods coming over to play	private	owners

Concerns shared with me

density	environmental concerns	delivery drivers	too many homes
number of cars	renters	blind curve	no sidewalk
using space as park and losing access	taking yards away	cutting trees	safety concerns of pets and kids
family and friends visiting new homes	traffic	bad corner	parking during fireworks
low density	no utilities	destroying road	destroying neighborhood
city maintains nothing	failing retention ponds	speeding	construction
explosives	cracked foundations	PTSD	erosion
ADA challenges	climate change	SEPA	coyotes
no park	traffic	noise	accessibility
lose access to open space	SEPA application elementary	staff haven't walked property	didn't hear about this development

My summary

Thank you for making space and time for me and Mayor Pro Tem Kelly Von Holtz to visit with you yesterday at 1pm. Thank you for sharing your feelings, thoughts, concerns, and fears with us. We appreciate the time you took to speak openly and thoughtfully.

I heard clearly that this neighborhood is deeply valued by those who live there. Many of you spoke about the quiet, the open space, the pond and stream, the views, the wildlife, and the ability for children and families to enjoy the area. You shared appreciation for star gazing, walking, nature, deer, osprey, ravens, rabbits, coyotes, less traffic, and the feeling of being part of a tight-knit community.

Next steps

I am meeting with applicable City staff this afternoon to share the information I heard from you and to receive more information about the timeline for the proposed development. I will continue to listen, ask questions, and share what we learn as more information becomes available.

Leatta Dahlhoff (she/her)
Tumwater Mayor
City of Tumwater
555 Israel Road SW | Tumwater, WA 98501
C 360-358-1915
ldahlhoff@ci.tumwater.wa.us | www.ci.tumwater.wa.us

My schedule may vary, and I don't expect responses outside of your regular working hours. Please respond at a time that works best for you.

Exhibit 6zz.

Alex Baruch

From: Nancy <nancycstevenson@comcast.net>
Sent: Tuesday, June 30, 2026 11:48 AM
To: Leatta Dahlhoff
Cc: Paul Simmons; Kelly Adams; Brad Medrud; Kelly Von Holtz; Alex Baruch
Subject: Re: 5th Avenue Townhomes meeting summary for 6.28.26
Attachments: Old Tumwater Hill Group.pdf

Thank you Mayor for meeting with the Old Tumwater Hill Neighborhood. I've shared your notes accordingly, attached our distribution list, and added staff member Alex Baruch as a cc.

With Respect and Appreciation,

Nancy

> On Jun 29, 2026, at 11:55 AM, Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us> wrote:
>
> Hi Nancy,
>
> Please share this email with your neighbors.
>
> First, Nancy, thank you for reaching out. It was great to meet so many of your neighbors. It warms my heart to hear about how you all love Tumwater! Thank you for sharing your feelings and thoughts and concerns and fears with me yesterday. I summarized my notes below. Also…when you receive the distribution list, please share with staff so we can make sure we add everyone to our distribution list for this development moving forward.
>
> **Positives about neighborhood shared with me**

star gazing	nature	pond
quiet	backstreet	ospreys
less traffic	kids riding around	deer
views	tight-knit community	coyote
walking	open space	ravens
sense of community	stream	rabbits
quail	safe place	kids can learn to drive and ride bikes on backstreet

kids from other neighborhoods coming over to play	private	owners

Concerns shared with me

density	environmental concerns	delivery drivers	too many homes
number of cars	renters	blind curve	no sidewalk
using space as park and losing access	taking yards away	cutting trees	safety concerns of pets and kids
family and friends visiting new homes	traffic	bad corner	parking during fireworks
low density	no utilities	destroying road	destroying neighborhood
city maintains nothing	failing retention ponds	speeding	construction
explosives	cracked foundations	PTSD	erosion
ADA challenges	climate change	SEPA	coyotes
no park	traffic	noise	accessibility
lose access to open space	SEPA application elementary	staff haven't walked property	didn't hear about this development

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Leatta Dahlhoff (she/her)
Tumwater Mayor

City of Tumwater
555 Israel Road SW | Tumwater, WA 98501
C 360-358-1915
ldahlhoff@ci.tumwater.wa.us | www.ci.tumwater.wa.us

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OLD TUMWATER HILL NEIGHBORHOOD GROUP

Last Name	First Name (s)	Address	Email
Bailey	Maurine	4th and F	reiniebailey@gmail.com
Boucher	Tom	F St	Tomboucher58@gmail.com
Buccarelli	Teri	4th and E	teribuccarelli@gmail.com
Butler	Vanessa	4th and E	vinoly@comcast.net
Chestnut	Tara Trevor Donnelly Kimi Willison	5th and F	tarachestnut@gmail.com tnut143143@gmail.com
Clumpner	Graham Taylor	5th and G	yeahneil@gmail.com taylor.lee.werner@gmail.com
Drimay	Karen	3rd and E	karen.drimay.360@gmail.com
Eden	Carrie	4th and I	carrieeden@yahoo.com
Hardy	Patty Joe	E St (Between 4 and 5th)	patomex76@gmail.com Bonnyjoe66@gmail.com
Holland	Cody and Delani	4th Ave (between E and F)	delanibugg@gmail.com codyw.o.holland@gmail.com
Johnson	Lori	3rd St and F	drexlou@icloud.com
Marshall	Rebecca	4th and E	Rkmarshall12@gmail.com
Miller	Linda	5th and E	imri.linda@gmail.com
Morgan	Jansen and Eve	5th and F	jansenmorgan@gmail.com
Nicandri	Dave	4th Ave (between E and F)	nicandri@comcast.net
Prescott	Justin	4 & E	noturkhakis@gmail.com
Ryan	Victoria	5th and F	victoria.ryan@comcast.net
Stevenson	Nancy	3rd and C	Nancycstevenson@comcast.net

June 28, 2026

Exhibit 6aaa.

Alex Baruch

From: Alex Baruch
Sent: Thursday, July 2, 2026 8:49 AM
Subject: TUM-26-0115, 5th Ave Townhome Project Next Steps

Good morning,

I hope you are doing well. Thank you for providing comments on the 5th Avenue Townhome project. We appreciate the feedback we have received to date. All comments have been forwarded to the applicant for review. Most comments should have already received a response from City of Tumwater staff or the applicant, but I wanted to provide an update on the status of the application and the next steps in the review process.

The applicant is currently considering the comments received. Once staff receives the updated materials from the applicant, we will review them and issue a SEPA determination, which will begin the environmental review comment period. When the SEPA determination is issued, staff will provide notice by email or mail to everyone who has submitted comments on the project. Properties within 300' of the project site may receive both. The SEPA review process includes a 14-day public comment period followed by a 6-day appeal period. Everyone on this email will at a minimum receive an email for any public notices moving forward with this project.

Following completion of the SEPA process, staff will prepare a staff report and schedule a public hearing before the Hearing Examiner. Notice of the hearing will be provided at least 10 days in advance. Written comments may be submitted up to noon on the day of the hearing, and members of the public will also have the opportunity to provide testimony during the hearing.

If you have any questions about the project or the review process, please feel free to reach out. I would be happy to discuss the application with you.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

Exhibit 6bbb.

Alex Baruch

From: Alex Holtze <aholtze@gmail.com>
Sent: Tuesday, August 18, 2026 3:49 PM
To: Tara Chestnut
Cc: Alex Baruch; Erik Ainsworth; Alex Holtze
Subject: Comment Response - Tara Chestnut
Attachments: Gopher Administrative Determination 7-25-2018.pdf

Thank you, Tara, for your questions and your support for infill.

Property Management

The intention is for these units to be sold individually and owner occupied. However, there is no requirement in the ordinance for the housing to be owner occupied and each townhome will be on its own parcel.

Sidewalks and Parking

Each unit is designed with a two car garage and a driveway that will accommodate another two vehicles. The "park" is a public space within the development for all neighborhood community members to enjoy.

Accessibility
All of the units will be built to all relevant rules and regulations including the ADA.

Trees, Community Garden and Covered Picnic Area
Our intention is to keep as many mature trees as is possible. There are a few unhealthy trees that will have to be removed for safety reasons, but the vast majority will remain. We also plan to only cut any designated trees down during non-migrating time of the year or a biologist will be hired to ensure that no endangered species are nesting.

Stormwater and Erosion & Bioretention ponds
Thank you for your suggestions. We agree to comply with all city development and building codes for all construction.

SEPA
The SEPA has been updated. It will show compliance with Washington State Code as it relates to endangered or threatened species.

Gophers
Please see attached.

-Regards,

Alex Holtze
Managing Partner

CITY OF TUMWATER

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

DETERMINATION OF NON-SIGNIFICANCE (DNS)
TUM-26-0115
5th Ave Townhomes Preliminary Plat

Description of proposal: The applicant is proposing a subdivision of a parcel totaling 1.69 acres into 11 single family attached lots and one open space/stormwater tract. The development will include infrastructure, frontage improvements, and open space.

Applicant Representative: Erik Ainsworth, 5737 Linderson Way SW, Tumwater, WA 98501.

Location of proposal: One parcel totaling 1.69 acres located at 585 5th Ave SW, Tumwater, WA 98512. Tax Parcel Number 33203200001.

Lead agency: City of Tumwater, Community Development Department.

As provided by RCW 43.21C.240 and WAC 197-11-158, the lead agency has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the applicable development regulations and comprehensive plan adopted under RCW 36.70A and in other local, state, or federal laws or rules. Therefore, this proposal is not likely to have a probable significant adverse impact on the environment. An Environmental Impact Statement is not required under RCW 43.21C.030(2)(c), and the lead agency will not require additional mitigation measures under SEPA. This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request. The lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted no later than September 11, 2026, by 5:00 p.m.

Date: August 28, 2026

Responsible official:

Brad Medrud, AICP
Community Development Director

Contact person: Alex Baruch, Senior Planner 360-754-4180
555 Israel Road SW Tumwater, WA 98501

Appeals of this DNS must be made to the City Clerk, no later than September 17, 2026, by 5:00 p.m. All appeals shall be in writing, be signed by the appellant, be accompanied by a filing fee of $2,000.00, and set forth the specific basis for such appeal, error alleged and relief requested.

CITY OF TUMWATER
555 ISRAEL RD. SW, TUMWATER, WA 98501
Email: cdd@ci.tumwater.wa.us
(360) 754-4180

TUM-26 -0117

07-31-2026
DATE STAMP
RESUB

RECEIVED BY: Kerri

Any person proposing to develop in the incorporated limits of the City of Tumwater is required to submit an environmental checklist unless the project is exempt as specified in WAC 197-11-800 (Categorical Exemptions) of the State Environmental Policy Act Rules. **SUBMITTAL REQUIREMENTS** are as follows:

1. **A COMPLETE ENVIRONMENTAL CHECKLIST.** If the project is located within the Port of Olympia property, the checklist must also be signed by a representative of the Port.
2. **FEE OF $880.00 TO BE PAID UPON SUBMITTAL.** This includes the Public Notice fee.
3. **NAME AND ADDRESS LIST OF PROPERTY OWNERS WITHIN 300 FEET OF THE SUBJECT PROPERTY.**

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization, or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. **You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown.** You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to **all parts of your proposal,** even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for lead agencies

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold

determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B, plus the Supplemental Sheet for Nonproject Actions (Part D). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in “Part B: Environmental Elements” that do not contribute meaningfully to the analysis of the proposal.

A. Background Find help answering background questions

1. Name of proposed project, if applicable:

5TH AVE TOWNHOMES PLAT

2. Name of applicant:

ASH HOLDINGS LLC

3. Address and phone number of applicant and contact person:

3425 MERRYMAN PL SE OLYMPIA, WA 98501

4. Date checklist prepared:

7/31/26

5. Agency requesting checklist:

City of Tumwater

6. Proposed timing or schedule (including phasing, if applicable):

One phase starting March, 2027 completed July, 2027

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

Critical slope evaluation and geotechnical report. Tree report.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None known

10. List any government approvals or permits that will be needed for your proposal, if known.

None other than applied for through the city of Tumwater

City of Tumwater Approvals Needed: Preliminary Plat, Environmental Review, Site Development Grading, Right-of-Way, Building Permits.

11. Give a brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

The existing lot appears to be a undeveloped property zoned LDR. The existing lot is approximately 1.69 acres. The townhome plat proposal includes the subdivision of the lot into a 11-townhome lots (THP) plat with associated utilities, access roadway, frontage improvements and landscaping.

The proposed 11-unit townhome lots are planned to be located on the eastern edge of the parcel.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

This project is located off of South 5th Avenue SW. The legal description is shown on the preliminary plat map.

B. Environmental Elements

1. Earth Find help answering earth questions

a. General description of the site:

The project site is 1.72 acres in size and roughly square in shape. The site slopes gently to the southeast between 8 and 10 degrees for roughly 160 feet then levels out to between 0 and 5 degrees to a gentle swale at the approximate of the center of the site. The gully trends to the southwest towards the lowest point of the property. Immediately to the west of the site is a heavily forested slope that trends to the southwest. The slope descends from the northwest corner of the property at approximately 10 degrees for 130 feet then steepens to 20 degrees for 150 feet then continues to descend at between 6 and 15 degrees for 170 feet to Barnes Boulevard. The site is generally void of large vegetation covered primarily in rough cut grass. At the southwest quadrant of the property the property has a few large evergreen trees.

Slopes on site are typically inclined at a 3H:1V or less, with few localized areas exceeding 40 percent. Those localized areas that may be oversteepened are typically less than 10 feet in vertical extent, tapering above and below. Shallow soils do not display any evidence of recent or historic slides. In consideration of the available information, and our direct observations, at this time QG does not consider the site or subject slopes to be an active landslide hazard area. From a

geotechnical standpoint, no portions of the subject slopes are considered “unbuildable”. Some areas may require greater effort and engineered solutions, such as deeper foundations, or retaining walls, with generally conventional construction techniques.

The entire site is sloped to some degree, and therefore QG does not impose any specific slope crest or toe setback. Setbacks instead should be considered more as embedment requirements to protect

Circle or highlight one: Flat, rolling, hilly, steep slopes, mountainous, other:

b. What is the steepest slope on the site (approximate percent slope)?

Less than 3:1

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them, and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.

Undifferentiated Glacial Deposits – Sandy Silt (ML):

Beneath a thin (0.5 and 1 foot thick) organic-rich topsoil cover, native shallow soils over the entirety of the site are undifferentiated glacial deposits is composed of silty sand with trace to some gravel. The material was typically dry to slightly moist, tan to gray to red-brown, and appeared generally medium dense to very dense. The unit also composed of several sandy layers. No seepage was noted within this unit. Percolation of stormwater is anticipated to be minimal due to the elevated fine-grained content.

Weathered Bedrock – Poorly-Graded Gravel with Sand and Silt (GP):

Soils interpreted as weathered bedrock was found within the southwest and the northeast quadrant of the property. Weathered bedrock was composed of poorly-graded gravel with sand and silt that was found in dense and slightly moist conditions. Soils were found a 5.8 feet BPG within the southwest corner within test pit TP-3 and 4.0 feet BPG within the northeast quadrant of the site within test pit TP-3. Weathered bedrock was immediately underlain by competent intact bedrock similar to the Crescent Formation described above.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

According to geotechnical report None.

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

The area proposed to be disturbed as part of this project is 0.84 acres including approximately

3,500 cy of fill and 1100 cy of cut. Structural fill source has not been determined yet. The source will be approved prior to bringing fill to site.

f. Could erosion occur because of clearing, construction, or use? If so, generally describe.

Yes via offsite flows.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

19% of roof driveway, sidewalk and frontage improvements.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any.

Utilize SWPPP and maintain during construction.

2. Air Find help answering air questions

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.

Those typical of residential construction.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

None known.

c. Proposed measures to reduce or control emissions or other impacts to air, if any.

Follow city and IBC construction standards.

3. Water Find help answering water questions

a. Surface Water: Find help answering surface water questions

1. **Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

No

2. **Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

No

3. **Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

None

4. **Will the proposal require surface water withdrawals or diversions? Give a general description, purpose, and approximate quantities if known.**

No

5. **Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

No

6. **Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No

b. Ground Water: Find help answering ground water questions

1. **Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give a general description, purpose, and approximate quantities if known.**

No

2. **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (domestic sewage; industrial, containing the following chemicals…; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

No waste will be discharged to the ground.

c. Water Runoff (including stormwater):

a) **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

Stormwater runoff will be collected with catch basins, gutters and stormwater pipe and route it to the adjacent bioretention ponds for treatment and infiltration.

b) **Could waste materials enter ground or surface waters? If so, generally describe.**

It is possible but not likely.

c) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

General stormwater drainage patterns are being held generally consistent with the original drainage patterns.

d) Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any.

Comply with current stormwater manual.

4. Plants Find help answering plants questions

a. Check the types of vegetation found on the site:

- ☒ **deciduous tree: alder, maple, aspen, other**
- ☒ **evergreen tree: fir, cedar, pine, other**
- ☒ **shrubs**
- ☒ **grass**
- ☐ **pasture**
- ☐ **crop or grain**
- ☐ **orchards, vineyards, or other permanent crops.**
- ☐ **wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other**
- ☐ **water plants: water lily, eelgrass, milfoil, other**
- ☐ **other types of vegetation**

b. What kind and amount of vegetation will be removed or altered?

0.84 acres of mainly grass with a few trees and shrubs is proposed to be removed as part of this project. The remainder of the site is proposed to be maintained in their current vegetated state.

c. List threatened and endangered species known to be on or near the site.

No known endangered species are located on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.

Comply with current

Comply with required tree retention and landscape code.

e. List all noxious weeds and invasive species known to be on or near the site.

Some potential plants such as St. Johnswort, English holly, English ivy, Herb-Robert, Himalayan blackberry, Scot's Broom, Thistles may be present on site.

5. Animals Find help answering animal questions

a. List any birds and other animals that have been observed on or near the site or are known to be on or near the site.

Hawk, songbirds, deer, osprey, ravens, rabbits, coyotes,

Examples include:

- **Birds: hawk, heron, eagle, songbirds, other:**
- **Mammals: deer, bear, elk, beaver, other:**
- **Fish: bass, salmon, trout, herring, shellfish, other:**

b. List any threatened and endangered species known to be on or near the site.

Per the WDFW PHS list the following animals are listed that could be present in the are of this project. Band-tailed Pigeon, Vaux's Swift, Oregon Vesper Sparrow, Streaked Horned Lark, Big Brown Bat and Myotis Bats, Townsend's Big-eared Bat, Mazama Pocket Gopher, Blue-gray Taildropper, Western Bumblebee, Puget Blue Butterfly, Valley Silverspot. None of these have been observed onsite to our knowledge.

c. Is the site part of a migration route? If so, explain.

This property is located within the Pacific Flyway bird migration route.

d. Proposed measures to preserve or enhance wildlife, if any.

Comply with city and building codes for construction. We will cut the designated trees down during non-migrating time of the year or a biologist will be hired to insure that no endangered species are nesting in the trees to be removed. The project will also comply with city development and building code. This site is not located in a Mazama Pocket Gopher habitat per the cities Mazama Pocket Gopher Screening Determination (see attached).

e. List any invasive animal species known to be on or near the site.

None known.

6. Energy and Natural Resources Find help answering energy and natural resource questions

1. **What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

Electric, natural gas and solar for residential use.

2. **Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.**

No the residential house construction will not block sunlight from neighboring properties.

3. **What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.**

The project proposes to comply with the current energy code that includes energy conservation.

7. Environmental Health Find help with answering environmental health questions

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur because of this proposal? If so, describe.

Chemicals consistent with residential landscaping and cleaning.

1. **Describe any known or possible contamination at the site from present or past uses.**

None known on the site.

2. **Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

None known on site.

3. **Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

Fuel and lubricants used for construction equipment and those consistent with residential land use.

4. **Describe special emergency services that might be required.**

No special emergency services are likely to be needed for this project.

5. **Proposed measures to reduce or control environmental health hazards, if any.**

b. Noise

Comply with work being performed during business hours allowed per city ordinance.

1. **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

Noise typical of residential neighborhoods.

2. **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site)?**

Noise typical of construction equipment to build the infrastructure for the project and construct the homes.

3. **Proposed measures to reduce or control noise impacts, if any.**

Comply with work being performed during business hours allowed per city ordinance.

8. Land and Shoreline Use Find help answering land and shoreline use questions

a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.

Residential lots and neighborhood road grid.

b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses because of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?

No farming is known to occur on this property.

1. Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how?

No

c. Describe any structures on the site.

No existing structure on site

d. Will any structures be demolished? If so, what?

No

e. What is the current zoning classification of the site?

LDR Low Density Residential

f. What is the current comprehensive plan designation of the site?

LDR Low Density Residential

g. If applicable, what is the current shoreline master program designation of the site?

Not Applicable

h. Has any part of the site been classified as a critical area by the city or county? If so, specify.

No

i. Approximately how many people would reside or work in the completed project?

30-40

j. Approximately how many people would the completed project displace?

0

k. Proposed measures to avoid or reduce displacement impacts, if any.

Not Applicable

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

Comply with city and IBC codes.

m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any.

Not Applicable

9. Housing Find help answering housing questions

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

11 middle income units.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any.

No impacts need mitigation.

10. Aesthetics Find help answering aesthetics questions

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

35 ft per Zoning Code

b. What views in the immediate vicinity would be altered or obstructed?

None

c. Proposed measures to reduce or control aesthetic impacts, if any.

Build units per building code requirements.

11. Light and Glare Find help answering light and glare questions

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

Area lights on residential homes during night hours.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

Not likely since lighting will comply with building code.

Will also comply with lighting ordinance limiting glare off-site.

c. What existing off-site sources of light or glare may affect your proposal?

None known.

d. Proposed measures to reduce or control light and glare impacts, if any.

Lighting will comply with building code.

Will also comply with lighting ordinance limiting glare off-site.

12. Recreation Find help answering recreation questions

a. What designated and informal recreational opportunities are in the immediate vicinity?

An active rec walking trail and picnic bench will be constructed on the open space tract in back of the units.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any.

No impacts are expected.

13. Historic and Cultural Preservation Find help answering historic and cultural preservation questions

a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers? If so, specifically describe.

No

b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.

No

c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.

Review of GIS and County Maps.

d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

Not Applicable

14. Transportation Find help with answering transportation questions

a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

5th Ave SW Local Residential Access Route

E St SW Local Residential Access Route

F St SW Local Residential Access Route

b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?

Yes a bus stop is withing ¼ mile of site.

c. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle, or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).

Frontage improvements are required.

d. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No

e. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?

6 PM peak trips

Approximately 61 daily trips are anticipated.

f. Will the proposal interfere with, affect, or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.

Not likely.

g. Proposed measures to reduce or control transportation impacts, if any.

Pay appliable permit and impact fees.

15. Public Services Find help answering public service questions

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe.

Yes the project will increase public service requirements for fire protection, police protection, public transit, health care, schools.

b. Proposed measures to reduce or control direct impacts on public services, if any.

The residents pay taxes and impact fees that fund the services.

16. Utilities Find help answering utilities questions

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

electricity, natural gas, water, refuse service, telephone, sanitary sewer

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

electricity, natural gas, water, refuse service, telephone, sanitary sewer

C. Signature Find help about who should sign

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

x Erik Ainsworth

Type name of signee: Erik Ainsworth, PE

Position and agency/organization: Civil Engineer

Date submitted: 7/31/2026

Reviewed by Alex Baruch, Senior Planner, 08-20-2026

Exhibit 7a.

Alex Baruch

From: SEPA <SEPA@orcaa.org>
Sent: Monday, August 31, 2026 8:31 AM
To: Alex Baruch
Subject: ORCAA Comments on File# TUM-26-0115 - 5th Ave Townhomes Preliminary Plat - SEPA#202603602

Good morning,

Olympic Region Clean Air Agency (ORCAA) reviewed the proposal for the 5th Avenue Townhomes Preliminary Plat at 585 5th Ave SW in Tumwater and has the following comments:

Construction

For construction projects please refer to this guide for handling fugitive dust from construction projects: https://wsdot.wa.gov/sites/default/files/2024-09/Handling-FugitiveDust-%20from-ConstructionProjects-Guide.pdf.

Thank you for the opportunity to comment.

Best Regards,

Abi Roberts, Engineer I
++++++++++++++++++++++++++++++++
Olympic Region Clean Air Agency
2940 Limited Lane NW Olympia, WA 98502 Office – (360) 539-7610
www.orcaa.org
Please take notice that any records or communications with ORCAA are subject to public disclosure under the Public Records Act (RCW 42.56) unless exempt under applicable law. *Please consider the environment before printing this email.*

Exhibit 7b.

Alex Baruch

From: Dave Nicandri <nicandri@comcast.net>
Sent: Monday, August 31, 2026 3:08 PM
To: Alex Baruch
Cc: Leatta Dahlhoff
Subject: SEPA Review 5th Avenue Townhomes TUM-26-0115

Dear Alex:

I am in receipt of the set of documents recently released relative to the above named project. I was dismayed to see, in reviewing the material, that little if anything has been done by the applicant (or the city) in consideration of the formidable negative reaction to the project by the neighborhood. In fact, tragically from my perspective, the compendium included a potential layout of lots on the subject property that must have been an earlier iteration of the project used by one of the developer's sub-consultants. This design would have been far preferable to the one we now face, even though it entailed three more lots. I will return to this matter in due course.

My focus, as it has been from the beginning, and notwithstanding other concerns that my neighbors may raise, is the short-sighted nature of traffic planning associated with this project. With your help, after viewing a host of Hearing Examiners sessions, you may recall, I inquired into what traffic analysis had been done prior to the city giving the green light to the current proposal. Through your good office I received a message from Jared Crews, Development Review Lead for the City.

In this message (dated 6/23/26), Mr. Crews stipulated that the city employs two forms of analysis for such situations. The "more in depth analysis, required when a project is predicted to generate more than 50 trips during the peak hour of traffic (typically 8 to 9 AM or 5 to 6 PM), or is predicted to increase traffic at an intersection by 25%. [emphasis added] Obviously it has been been some time since we have had a project large enough to generate 50 new trips in the vicinity your are interested in." Thereby, my concern was dismissed.

As the absence of subject relevant SEPA documentation now confirms, the city continues to demur on the merits of a level of service traffic analysis by only citing one of two metrics. Aside and apart from the matter as to whether peak hour traffic alone should trigger a thorough going traffic study, clearly the proposed project will result in far more than a 25% increase in traffic at the intersection of 5th Avenue SW and F Street. How could it not? There is not a single residence on the subject block on the west side of 5th between E and F Street. Mrs. Miller lives on E Street (extended) and there are a couple of houses accessed off of F Street (extended). Yet, we are to believe, a five-fold+ increase (11 new units to the west, compared just just two houses on the east of 5th) will not result in a 25% increase at either 5th and E or 5th and F intersection?

In the foregoing I emphasized the salience of 5th and F because the natural flow of existing neighborhood traffic is to the south, toward the Linwood east-west axis, but the argument applies equally to the intersection of 5th and E. The new set of documents seem to make no allowance for the fact that the intersection of 5th and E is a blind, negative camber turn, without sidewalks on either side. Nor will there be as a consequence of the new development. Worse, whereas the west side of 5th between E and F will be brought up to modern road standards, only the southern half of the east side will correspond to the standard of new construction across the street. That is to say, as things now stand, only the southern half 5th Avenue SW, between E and F, will be built to standard, but now

with multiples of additional traffic. Any overflow on-street parking attendant upon the residents of the 5 or 6 most northern of the new town homes will necessarily be parking on the north end of 5th Avenue that will be subject to to increased traffic on a sub-standard street width.

Nor are things much better in the opposite direction. The new roundabout sequence on Linwood, because of the way in constrains access to 3rd and 4th Avenues, drives current traffic levels, to say nothing of the new townhome traffic, toward the 5th Avenue corridor. This is a street, I assert with confidence, so steep that the city would never allow such a grade to be built anew. It has no sidewalks for blocks on a natural pathway for children walking to and from Michael T. Simmons Elementary School. Yet, we are to believe that these topographic and other idiosyncrasies are not worthy of full traffic analysis. This is a major failure of the developer's and city's SEPA review.

Two last thoughts. The developer"s first intentions were more conducive to neighborhood residential and traffic patterns. As the SEPA packet discloses, the original plan was to extend E Street westward to a point where it could intersect with new a dead-end collector/distribution street running north and south interior to the property. This would have made better use of the property by allowing the creation of view lots on the upper or west side of the property and obviated the problematic traffic congestion problems on 5th that I adumbrated above.

Lastly, I have the nagging feeling that the city's review of this project has taken the narrowest perspective possible, merely checking off standards in the city's code, without precious regard given to the actual topography in question.

Sincerely,

David L. Nicandri

Exhibit 7c.

Alex Baruch

From: Tami Merriman
Sent: Tuesday, September 1, 2026 2:48 PM
To: imri.linda@gmail.com
Cc: Alex Baruch
Subject: City of Tumwater 5th Ave Townhome Project TUM-26-0115

Linda
Thank you for chatting on the phone with me last week. As promised, I followed up with our engineering team to make sure that we were aware of the "under ground stream" that you referred to, and as I had suspected, it is considered ground water. City engineering staff is aware of the water, and it was reported by the applicant.

The soils report submitted for the project indicated groundwater was encountered in one of the soil exploration pits and all of the pits picked up fractured/weathered basalt. Not unique for this area of Tumwater Hill. The stormwater facilities are required to meet certain minimum separation to groundwater or other low permeability layers (rock, hardpan, till, etc.). That will be something we will review during site development and grading permitting. If stormwater runoff in the undeveloped condition is collecting here, then the developed condition is going to mimic that pretty closely. The proposed stormwater facility is located in roughly the same area as the low spot on the site.

Runoff that would normally sheet flow across the pasture is going to be largely collected now by roofs, routed to downspouts, and then directed to the new stormwater facility. Any runoff coming from the road similarly will pass into catch basins and make its way through the storm main system and into this new stormwater facility.

In more simple terms, water runoff from streets, parking and rooftops will be treated prior to infiltrating back into the ground. Groundwater expression during rainy months will also enter to this stormwater facility to be treated and released back into the ground.

Also, I understand that you received the SEPA Determination in the mail. This is a copy of the document that was referenced in the email that you received. I am happy to hear that both our forms of communication reached you.

I hope this answers your questions. Please feel free to reach out to us if you have any further questions. Have a wonderful evening.

Tami Merriman | Permit Manager
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501

PLEASE NOTE: New Permit Counter Hours
Walk Ins: Monday - Thursday 8 a.m. - 1 p.m. Closed Friday
Appointments: Monday -Thursday 1:30 p.m. - 4:00 p.m.
Call (360) 754-4180 to schedule or if you have questions

Exhibit 7d.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

September 11, 2026

Alex Baruch, Senior Planner
City of Tumwater
Development Services Department
555 Israel Road Southwest
Tumwater, WA 98501

Dear Alex Baruch:

Thank you for the opportunity to comment on the determination of non-significance for the 5th Ave Townhomes Preliminary Plat Project (TUM-26-0115) located at 585 5th Avenue Southwest as proposed by Erik Ainsworth. The Department of Ecology (Ecology) reviewed the environmental checklist and has the following comment(s):

SOLID WASTE MANAGEMENT: Derek Rockett (360) 995-3176

All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from your local jurisdictional health department prior to filling. All removed debris resulting from this project must be disposed of at an approved site. Contact the local jurisdictional health department or Department of Ecology for proper management of these materials.

TOXICS CLEANUP: Thomas Middleton (360) 999-9594

If contamination is suspected, discovered, or occurs during the proposed SEPA action, testing of the potentially contaminated media must be conducted. If contamination of soil or groundwater is readily apparent, or is revealed by testing, Ecology must be notified. Contact the Environmental Report Tracking System Coordinator for the Southwest Regional Office (SWRO) at (360) 407-6300. For assistance and information about subsequent cleanup and to identify the type of testing that will be required, contact Thomas Middleton with the SWRO, Toxics Cleanup Program at the phone number provided above.

WATER QUALITY/General Permit Unit:
Jacob Neuharth (360) 742-9751

Erosion control measures must be in place prior to any clearing, grading, excavation, or construction. These control measures must be effective to prevent stormwater runoff from carrying soil and other pollutants into surface water or storm drains that lead to waters of the state. Discharges must not cause or contribute to a violation of surface water quality standards, groundwater quality standards, sediment management standards, and human

health-based criteria. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered to be pollutants.

If there are known contaminated soils and/or groundwater present on site, additional information will be required to be submitted. Contamination includes sites with known, remediated, or historically contaminated groundwater and/or soil. For contaminated construction sites, contact Evan Wood at evan.wood@ecy.wa.gov, or by phone at (360) 706-4599.

Construction Stormwater General Permit:

The following construction activities require coverage under the Construction Stormwater General Permit:
1. Clearing, grading, excavation, construction support activity, and other soil disturbing activity that results in the disturbance of one or more acres (including off-site disturbance acreage related to construction-support activity) and discharges stormwater to surface waters of the State; and
2. Clearing, grading and/or excavation on sites smaller than one acre that are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more and discharge stormwater to surface waters of the State.
a) This includes forest practices (including, but not limited to, class IV conversions) that are part of a construction activity that will result in the disturbance of one or more acres, and discharge to surface waters of the State (that is, forest practices that prepare a site for construction activities); and
3. Any size construction activity discharging stormwater to waters of the State that Ecology:
a) Determines to be a significant contributor of pollutants to waters of the State of Washington.
b) Reasonably expects to cause a violation of any water quality standard.

Some projects may be eligible for coverage under an Erosivity Waiver if they result in the disturbance of under five acres, are not a portion of a common plan of development, and the entire period of construction activity occurs between June 15 – September 15. Additional requirements about the Erosivity Waiver may be found in Section S1.F of the Construction Stormwater General Permit.

Construction site operators must apply for a permit at least 60 days prior to discharging stormwater from construction activities and must submit it on or before the date of the first public notice. Applicants may apply online or obtain an application from Ecology's website at: https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Stormwater-general-permits/Construction-stormwater-permit. v

Ecology’s comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology

Southwest Regional Office

(JKT:202603602)

cc: Derek Rockett, SWM
Thomas Middleton, TCP
Jacob Neuharth, WQ

Exhibit 7e.

Update on Tumwater Hill Townhomes

My name is Linda Miller and I live @ 514 E St SW. Tumwater

TO: Alex Baruch

We have a friendly, caring neighborhood ~ we all look out for each other. My house sit up off the road and I can see all the neighbors walking with kids and dogs. Its a happy neighborhood.

The townhouses will NOT WORK in our neighborhood !!

1. the roads are too narrow and traffic would be heavy
2. During the day many people are walking along with their dogs
3. Children playing in the street
4. Many animals ~ deer, rabbits squirels and birds
5. This is a single family home area
6. there will be a problem with 22 extra

cars going by ~ Not to mention the extra noise

(7) Already things have changed with the road construction going on ~ TOO much traffic ~ speeders and not paying attention to traffic There have been lots of close calls

I do not want townhouses here Also these buildings will affect our views

Also there is the issue of water! We get a lot of rain in the winter a big pond will form in the field with a stream that flows diagonally across the property to the corner @ F+4 Because of an underground stream this happens every winter

Linda Miller
514 E 54th SW
360-357-5097

Exhibit 7f.

Alex Baruch

From: Nancy Stevenson <nancycstevenson@comcast.net>
Sent: Friday, September 11, 2026 6:46 PM
To: Alex Baruch
Cc: Leatta Dahlhoff
Subject: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Dear Alex:

I understand the need for infill development in existing neighborhoods to address our city's growing need for housing of all types. However, the drive to meet this need should not override the importance of preserving the livability and character as the neighborhood changes.

Old Tumwater Hill is a modest neighborhood of older single-family homes with a couple duplexes in the mix. The streets are steep and the sidewalks are unconnected. The proposed plat for 5th Avenue adds 11 townhomes all in a row along the west side of the street spanning the entire block between E and F street on 5th Avenue. On the east side of the street there are two homes…one hidden behind trees. There are no driveways no garages no cars. The 11 townhomes will be built in what used to be a horse pasture.

Impacts on Pedestrian Safety: With the addition of 22 cars that are not there now the traffic will substantially increase. I think the trip generation report in the DNS document underestimates this increase in traffic. Further, the streets most impacted by this traffic are E and F, which lead to the bus stop on 2nd Avenue and 5th which leads the way to Michael T Simmons Elementary school. The pedestrian infrastructure on these streets is random…one side or the other and not connected.

If the developer is only responsible for sidewalks on the plat property, then I recommend the city address these safety issues and improve pedestrian infrastructure by:

- Plan for and connect existing sidewalks.
- Adding traffic calming features - vegetation triangles on E, F, and 5th Ave.
- Obtain funding for safe routes to school – from 5th to Michael T Simmons
- Possibly use the current right away for F street add a pedestrian trail/ connection to 7th and Barnes.
- Providing covered bus stops on 2nd and 7th.

Maintaining the character of the neighborhood: The townhomes are a different look and feel from the current neighborhood because of the scale, type of housing, the configuration all in a row, as well as the placement on the property*. The intent being to put all the homes on the street and leaving more open space.

While I disagree with all the units being placed on the street because it becomes a visual barrier for residents to see the open space. I'm encourage to learn when we spoke recently that the city will be requiring the developer to use the city's design guidelines. Design options like the use of front porches, angles of the roof, use of siding, gables, so the units are not just a box. These features are fit better into the character of the neighborhood.

Managing the construction phase: As the city oversees the building permit process it's important to recognize our neighborhood's concern over the use of explosives. In constructing water lines, sewer lines, and foundations, blasting should not be relied upon in our neighborhood of predominately older homes. Surrounding houses are too close and there are residents close by with PTSD.

Long term management of the property: As I understand it the plat property both the townhomes and the open space will be managed by a home-owners association ensuring that there will be long- term management plans for the stormwater pond, the prevention of invasive species, and the community garden. While there will be no public access to the open space since it's private property, it's my hope that as the new neighbors get to know current residents, friendships will form and invitations to the open space property will be made.

These are my thoughts and suggestions regarding the city's DNS of the 5th Avenue Townhomes plat proposal.

With Hope and Respect,

Nancy

Nancy Stevenson
420 3rd Ave SW
Tumwater, WA 98512

*Document 8 in the DNS material shows a different configuration and placement of the housing units on the property. I prefer this option even though it has 13 housing units instead of 11. The reason being the units are clustered in two rows with a private road in between… fewer cars on the street … and the south portion of the open space could be seen by nearby residents….it has a more open look and feel.
Unfortunately, as I understand it, this option is no longer available because of a regulation change eliminating private roads in such developments.

Exhibit 7g.

Alex Baruch

From: Teri Buccarelli <teribuccarelli@gmail.com>
Sent: Friday, September 11, 2026 2:18 PM
To: Alex Baruch
Subject: 5th Ave Townhome project

You don't often get email from teribuccarelli@gmail.com. Learn why this is important

Dear Alex,

After receiving the Determination of Non-significance letter, I was disheartened to find that the Lead Agency determined that there was not enough reason to do an Environmental Impact Statement and that the SEPA, that was filled out by the applicant for this project, who benefits greatly, was all the information that the Lead Agency needed.

From researching what an Environmental Impact Statement is and how important it is to the development public trust, protects public health, prevents environmental harm and ensuring public safety for the neighborhood and other people who use this hill for walking, with or without dogs, joggers, bikers, people training for hiking and general fitness and children playing or walking to and from school.

Why wouldn't anyone not want to have an Environmental Impact Assessment done?

From the SEPA Environmental checklist provided by the applicant there were a couple of sections that, to me, should be looked at:

1. Earth, f. page 6- asked the question "Could erosion occur because of clearing, construction, or use? **The answer was** "Yes, via offsite flows". What exactly does this mean? Is this talking about rainfall from the surrounding land adjacent to this proposed site? If/when erosion occurs, would homeowners, who may have damage caused by this erosion, be compensated by the city who approved this development or the applicant?

14. Transportation, e. page 14- asked the question: How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and non-passenger vehicles). What data or transportation models were used to make these estimates? **The answer was** "6 PM peak trips." The applicant neglected to provide how he came to this conclusion. I heard that a 25% increase in traffic was all that this project would generate. For 11 units, with a probability of 2+ drivers, family, friends, and deliveries, it seems that an increase of only 25% extra traffic does not seem adequate.

The streets 4th ave E st to 5th ave, connected by a corner that provides a road that is not adequate in width and does not provide safety for the public with the added vehicle traffic that each home adds to this area. Then there is the hill on 5th street with no sidewalks and narrow roads. Safety should be the #1 priority for any development!

Correct me if I am wrong, to squeeze 11 units along the road, these homes will need to be of a block box type and would not blend in with the surrounding neighborhood and diminish the surrounding area. I did hear that there was another project design that would have been more beneficial to the landscape. Unfortunately, I have not seen it.

I am asking the Lead Agency reconsider requiring an Environmental Impact Statement.

Sincerely,

Teri Buccarelli

421 4th Ave SW

Tumwater, 98512

Email: teribuccarelli@gmail.com

Exhibit 7h.

Alex Baruch

From: Karen Drimay <karen.drimay.360@gmail.com>
Sent: Thursday, September 10, 2026 9:32 AM
To: Alex Baruch
Subject: Feedback on SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

To Alex Baruch,

I live in the Old Tumwater Hill neighborhood. My neighbor and I went over the updated documents linked-to in the email sent to us by Jessica Lee on August 27 (2026) – "SEPA Determination - 5th Avenue Townhomes - TUM-26-0115."

I have two qualms:

1. Density requirements
2. Trip generation (21-132 Trip-Gen ltr 04-07-2026.pdf)

Housing Demand

My question is: Do the new regulations **require?** or **allow?** the developer to build 11 units on the 5th Avenue parcel. Can the developer be allowed to build fewer units? What is causing them to build so many units?

I asked about the density requirements when we had our street meeting with Mayor Dahlhoff, but I'm not sure I got an answer. I think someone was going to check into it. Apparently the City of Tumwater has adopted some statewide guidelines for housing density. The mayor told us that the city has a target for new homes to be added.

However, a recent article in The JOLT suggested that there is an increase in available homes for sale in Thurston County now.

> **Active residential, condo listings heat up in Thurston County**
> Posted Wednesday, September 2, 2026 3:30 pm
> https://www.thejoltnews.com/stories/hold-active-listings-heat-up-in-thurston-county-housing-market,31377?

In the Old Tumwater Hill neighborhood, there are currently 5 houses for sale (with another across the street from me going on the market soon), and 3 empty lots for sale—within a few blocks of the 5th Avenue parcel under discussion.

Traffic

The Trip-Gen report says: "The development is anticipated to generate 6 new weekday PM peak-hour trips." That doesn't seem right. The development is for 11 new dwellings, allowing for 2 cars per dwelling (equaling 22 additional cars) at the top of the 5th Avenue hill). Maybe there is some engineering math that I don't understand. How can 22 additional cars add only 6 new trips (even accounting for the peak hour)?

I still have my original concern (emailed to you in May) about the destruction of the natural setting.

Sincerely,

Karen Gudmundsson
360-972-5597

Exhibit 7i.

Alex Baruch

From: Alex Baruch
Sent: Monday, September 14, 2026 3:35 PM
To: Dave Nicandri
Cc: Leatta Dahlhoff
Subject: RE: SEPA Review 5th Avenue Townhomes TUM-26-0115

Good afternoon Dave,

I hope you are doing well. Thank you for your detailed comments and for taking the time to review the recently released project documents. I understand your concerns regarding traffic, pedestrian safety, and the existing conditions along S 5th Avenue and the surrounding streets.

Regarding the 25 percent traffic threshold, the applicable standard in TMC 15.48.060 is based on whether a development generates 25 percent or more of the peak-hour traffic through a signalized intersection **or** through the critical movement at an unsignalized intersection. For an unsignalized intersection such as S 5th Avenue and F Street, the critical movement is westbound F Street to southbound S 5th Avenue, because vehicles making that movement must wait for an acceptable gap in cross traffic.

The project's trip distribution analysis indicates that the development is not expected to add any peak-hour trips to that critical movement. As a result, the project does not meet the 25 percent threshold that would require a traffic impact analysis under TMC 15.48.060.

That does not mean the City has disregarded the existing conditions in this area. The City reviewed the proposed traffic circulation, frontage improvements, and anticipated trip generation as part of the development review. The project is required to provide frontage improvements along its frontage, including pavement widening, curb and gutter, and sidewalk improvements, while maintaining two-way vehicle traffic. Based on the current plans, the narrowest portion of S 5th Avenue would provide approximately 28 feet of pavement, which is sufficient for two 11-foot travel lanes and a 6-foot parking lane.

With respect to traffic and pedestrian safety, the City also reviewed the available collision history. There have been no reported collisions where S 5th Avenue turns into E Street in the past five years. The project is anticipated to add approximately two trips through this area during the peak hour. While any increase in traffic warrants consideration, the available data does not indicate that the project would create a significant new safety concern at this location.

I also understand your broader concern regarding incomplete sidewalks and other existing deficiencies in the Tumwater Hill area. Those are legitimate long-standing infrastructure issues, but they are not conditions created by this particular development. The improvements required of a development must be proportional to its size and impacts. The City has been addressing these broader deficiencies through its capital improvement efforts and will continue to do so as funding allows.

Finally, regarding the earlier site configuration, the previous proposal contemplated 16 units, compared with 11 units in the current proposal. Although that configuration included an internal roadway and a potential connection to E Street, an internal roadway that did not connect to another City street would not have changed the basic traffic pattern when compared to the 11 unit configuration.

I appreciate your concerns and your willingness to engage with the City’s review process. The City’s review is based on the applicable development regulations, adopted traffic standards, and the project-specific information

available to us. While those standards do not allow the City to require improvements unrelated or disproportionate to the impacts of a particular development, we recognize the importance of considering how new development fits within the existing conditions of the surrounding neighborhood.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Dave Nicandri <nicandri@comcast.net>
Sent: Monday, August 31, 2026 3:08 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Cc: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: SEPA Review 5th Avenue Townhomes TUM-26-0115

Dear Alex:

I am in receipt of the set of documents recently released relative to the above named project. I was dismayed to see, in reviewing the material, that little if anything has been done by the applicant (or the city) in consideration of the formidable negative reaction to the project by the neighborhood. In fact, tragically from my perspective, the compendium included a potential layout of lots on the subject property that must have been an earlier iteration of the project used by one of the developer's sub-consultants. This design would have been far preferable to the one we now face, even though it entailed three more lots. I will return to this matter in due course.

My focus, as it has been from the beginning, and notwithstanding other concerns that my neighbors may raise, is the short-sighted nature of traffic planning associated with this project. With your help, after viewing a host of Hearing Examiners sessions, you may recall, I inquired into what traffic analysis had been done prior to the city giving the green light to the current proposal. Through your good office I received a message from Jared Crews, Development Review Lead for the City.

In this message (dated 6/23/26), Mr. Crews stipulated that the city employs two forms of analysis for such situations. The "more in depth analysis, required when a project is predicted to generate more than 50 trips during the peak hour of traffic (typically 8 to 9 AM or 5 to 6 PM), or is predicted to increase traffic at an intersection by 25%. [emphasis added] Obviously it has been been some time since we have had a project large enough to generate 50 new trips in the vicinity your are interested in." Thereby, my concern was dismissed.

As the absence of subject relevant SEPA documentation now confirms, the city continues to demur on the merits of a level of service traffic analysis by only citing one of two metrics. Aside and apart from the matter as to whether peak hour traffic alone should trigger a thorough going traffic study, clearly the proposed project will result in far more than a 25% increase in traffic at the intersection of 5th Avenue SW and F Street. How could it not? There is not a single residence on the subject block on the west side of 5th between E and F Street. Mrs. Miller lives on E Street (extended) and there are a couple of houses accessed off of F Street (extended). Yet, we are to believe, a five-fold+ increase (11 new units to the west, compared just just two houses on the east of 5th) will not result in a 25% increase at either 5th and E or 5th and F intersection?

In the foregoing I emphasized the salience of 5th and F because the natural flow of existing neighborhood traffic is to the south, toward the Linwood east-west axis, but the argument applies equally to the intersection of 5th and E. The new set of documents seem to make no allowance for the fact that the intersection of 5th and E is a blind, negative camber turn, without sidewalks on either side. Nor will there be as a consequence of the new development. Worse, whereas the west side of 5th between E and F will be brought up to modern road standards, only the southern half of the east side will correspond to the standard of new construction across the street. That is to say, as things now stand, only the southern half 5th Avenue SW, between E and F, will be built to standard, but now with multiples of additional traffic. Any overflow on-street parking attendant upon the residents of the 5 or 6 most northern of the new town homes will necessarily be parking on the north end of 5th Avenue that will be subject to to increased traffic on a sub-standard street width.

Nor are things much better in the opposite direction. The new roundabout sequence on Linwood, because of the way in constrains access to 3rd and 4th Avenues, drives current traffic levels, to say nothing of the new townhome traffic, toward the 5th Avenue corridor. This is a street, I assert with confidence, so steep that the city would never allow such a grade to be built anew. It has no sidewalks for blocks on a natural pathway for children walking to and from Michael T. Simmons Elementary School. Yet, we are to believe that these topographic and other idiosyncrasies are not worthy of full traffic analysis. This is a major failure of the developer's and city's SEPA review.

Two last thoughts. The developer"s first intentions were more conducive to neighborhood residential and traffic patterns. As the SEPA packet discloses, the original plan was to extend E Street westward to a point where it could intersect with new a dead-end collector/distribution street running north and south interior to the property. This would have made better use of the property by allowing the creation of view lots on the upper or west side of the property and obviated the problematic traffic congestion problems on 5th that I adumbrated above.

Lastly, I have the nagging feeling that the city's review of this project has taken the narrowest perspective possible, merely checking off standards in the city's code, without precious regard given to the actual topography in question.

Sincerely,

David L. Nicandri

Exhibit 7j.

Alex Baruch

From: Alex Baruch
Sent: Monday, September 14, 2026 4:05 PM
To: 'Karen Drimay'
Subject: RE: Feedback on SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

Hi Karen,

I hope you are doing well. Thank you for your detailed comments and for taking the time to review the recently released project documents.

Regarding density, the number of units permitted on the property is regulated by the Tumwater Municipal Code (TMC). Last December, the City updated the TMC to comply with statewide housing requirements and Thurston County's housing allocation projections as a part of the Comprehensive Plan update. These changes increased densities in certain residential zone districts and expanded the types of housing that may be developed in those districts, including duplexes, triplexes, quadplexes, and townhomes.

The property is currently zoned Low Density Residential, which requires a density of 6–9 dwelling units per acre under TMC 18.12.050. Density is calculated using the property's net developable acreage, which is the total acreage less applicable critical areas and right-of-way dedications.

The property is approximately 1.69 acres. There are no critical areas requiring a reduction in the developable acreage, and approximately 0.02 acres is proposed for right-of-way dedication. This results in approximately 1.67 acres of net developable acreage.
At the minimum required density:

1.67 acres × 6 dwelling units/acre = 10.02 dwelling units

The applicable density calculation requires the resulting fractional unit to be rounded up to the next whole dwelling unit. Therefore, 11 units is the minimum number of units that could be approved based on the current zoning and the project's net developable acreage. The developer could propose more than 11 units, up to the maximum density allowed by the zoning.

At the maximum density:
1.67 acres × 9 dwelling units/acre = 15.03 dwelling units

That calculation results in a maximum of 15 dwelling units.

It is also worth noting that the change in density requirements did not, by itself, result in a substantially higher number of units being required on this property. Under the previous zoning, the property was subject to a density range of 6–8 dwelling units per acre. Thus, a development of a similar number of units could have been permitted under the previous zoning as well. The recent code changes did, however, expand the types of residential housing that can be developed in this zone, including townhomes.

Regarding trip generation, the 6 PM peak-hour trips identified in the trip-generation letter are not intended to represent the total number of vehicles associated with the development. They represent the number of new vehicle trips expected to occur during the peak hour.

Trip generation for development projects is calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, which is the standard methodology used to estimate traffic generated by different land uses. For this proposed 11-unit townhome development, the ITE methodology estimates approximately 6 new trips during the weekday PM peak hour.

The distinction between vehicles and trips is important. Even if each of the 11 dwelling units had two vehicles, that would not mean that all 22 vehicles would be entering or leaving the development during the same peak hour. A "trip" represents a vehicle movement to or from the development, and those movements occur throughout the day. The ITE methodology estimates approximately 61 average daily trips for the development, compared with the 6 trips expected during the PM peak hour.

The peak-hour figure is particularly important for evaluating traffic impacts because transportation systems experience their highest levels of congestion during those periods. It is the peak-hour traffic, rather than the total number of vehicles associated with the development, that is used for the City's evaluation of whether additional traffic analysis is required under the applicable code.

I hope this helps clarify how the density and trip-generation figures in the project documents were determined. I appreciate you taking the time to review the materials and raise these questions, and I hope this information provides some additional context regarding how the City has evaluated the project.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Karen Drimay <karen.drimay.360@gmail.com>
Sent: Thursday, September 10, 2026 9:32 AM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: Feedback on SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

To Alex Baruch,

I live in the Old Tumwater Hill neighborhood. My neighbor and I went over the updated documents linked-to in the email sent to us by Jessica Lee on August 27 (2026) – "SEPA Determination - 5th Avenue Townhomes - TUM-26-0115."

I have two qualms:

1. Density requirements
2. Trip generation (21-132 Trip-Gen ltr 04-07-2026.pdf)

Housing Demand

My question is: Do the new regulations **require?** or **allow?** the developer to build 11 units on the 5th Avenue parcel. Can the developer be allowed to build fewer units? What is causing them to build so many units?

I asked about the density requirements when we had our street meeting with Mayor Dahlhoff, but I'm not sure I got an answer. I think someone was going to check into it. Apparently the City of Tumwater has adopted some statewide guidelines for housing density. The mayor told us that the city has a target for new homes to be added.

However, a recent article in The JOLT suggested that there is an increase in available homes for sale in Thurston County now.

> **Active residential, condo listings heat up in Thurston County**
> Posted Wednesday, September 2, 2026 3:30 pm
> https://www.thejoltnews.com/stories/hold-active-listings-heat-up-in-thurston-county-housing-market,31377?

In the Old Tumwater Hill neighborhood, there are currently 5 houses for sale (with another across the street from me going on the market soon), and 3 empty lots for sale—within a few blocks of the 5th Avenue parcel under discussion.

Traffic

The Trip-Gen report says: "The development is anticipated to generate 6 new weekday PM peak-hour trips." That doesn't seem right. The development is for 11 new dwellings, allowing for 2 cars per dwelling (equaling 22 additional cars) at the top of the 5th Avenue hill). Maybe there is some engineering math that I don't understand. How can 22 additional cars add only 6 new trips (even accounting for the peak hour)?

I still have my original concern (emailed to you in May) about the destruction of the natural setting.

Sincerely,

Karen Gudmundsson
360-972-5597

Exhibit 7k.

Alex Baruch

From: Alex Baruch
Sent: Monday, September 14, 2026 5:24 PM
To: 'Teri Buccarelli'
Subject: RE: 5th Ave Townhome project

Hi Teri,

I hope you are doing well. Thank you for taking the time to review the SEPA materials and for sharing your concerns regarding the project.
State requirements under SEPA establish specific standards for when an Environmental Impact Statement (EIS) is required. An EIS is generally required when the lead agency determines that a proposal is likely to have significant adverse environmental impacts that cannot be adequately addressed through mitigation. Following its review of the proposal and the environmental information provided, the City determined that the project would not result in significant adverse environmental impacts and issued a Determination of Non-Significance (DNS).

The DNS does not mean that the City determined there would be no environmental impacts from the project. Rather, it means the City determined that the anticipated impacts would not rise to the level of significance requiring an EIS under SEPA.

As it relates to your questions about the responses within the SEPA checklist:

1. Earth, f., page 6: The referenced “off-site flows” relate to the normal movement of stormwater during rain events. The project is required to address stormwater generated by the development and associated frontage improvements. Under the proposed design, stormwater from the street improvements and the development, including roof runoff, will be collected and conveyed through the project's stormwater system. The system will be designed to control and manage the stormwater in accordance with the City's applicable stormwater requirements and will be maintained by the homeowners association.

The purpose of these requirements is to prevent the development from creating or worsening drainage and erosion problems on adjacent properties as there is a requirement to collect and infiltrate stormwater on the project property.

14. Transportation, e., page 14: Trip generation for development projects is calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, which is the standard methodology used to estimate traffic generated by different land uses. For this proposed 11-unit townhome development, the ITE methodology estimates approximately 6 new trips during the weekday PM peak hour.

The distinction between vehicles and trips is important. Even if each of the 11 dwelling units had two vehicles, that would not mean that all 22 vehicles would be entering or leaving the development during the same peak hour. A “trip” represents a vehicle movement to or from the development, and those movements occur throughout the day. The ITE methodology estimates approximately 61 average daily trips for the development, compared with the 6 trips expected during the PM peak hour.

The peak-hour figure is particularly important for evaluating traffic impacts because transportation systems experience their highest levels of congestion during those periods. The City uses the peak-hour traffic projections, rather than the total number of vehicles associated with the development, when evaluating whether additional traffic analysis is required under the applicable code.

I also understand your concerns regarding the existing road conditions, pedestrian safety, and the character of the surrounding neighborhood. Those are important considerations in reviewing a development proposal. The City's review considers the applicable zoning, development, transportation, stormwater, and environmental requirements when determining whether a project can proceed and what conditions are necessary to address its impacts. Any improvements or mitigation required as part of the development review must also be proportional to the size and impacts of the proposed development. While the City recognizes that there are existing infrastructure and pedestrian safety deficiencies in the surrounding area, those longstanding conditions are not necessarily impacts created by this particular project and therefore would not automatically warrant requiring the applicant to address them.

I hope this provides some additional context regarding the City's SEPA determination and the information provided in the environmental checklist. I appreciate you taking the time to review the materials and raise these questions.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Teri Buccarelli <teribuccarelli@gmail.com>
Sent: Friday, September 11, 2026 2:18 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: 5th Ave Townhome project

You don't often get email from teribuccarelli@gmail.com. Learn why this is important

Dear Alex,

After receiving the Determination of Non-significance letter, I was disheartened to find that the Lead Agency determined that there was not enough reason to do an Environmental Impact Statement and that the SEPA, that was filled out by the applicant for this project, who benefits greatly, was all the information that the Lead Agency needed.

From researching what an Environmental Impact Statement is and how important it is to the development public trust, protects public health, prevents environmental harm and ensuring public safety for the neighborhood and other people who use this hill for walking, with or without dogs, joggers, bikers, people training for hiking and general fitness and children playing or walking to and from school.

Why wouldn't anyone not want to have an Environmental Impact Assessment done?

From the SEPA Environmental checklist provided by the applicant there were a couple of sections that, to me, should be looked at:

1. Earth, f. page 6- asked the question "Could erosion occur because of clearing, construction, or use? **The answer was** "Yes, via offsite flows". What exactly does this mean? Is this talking about rainfall from the surrounding land adjacent to this proposed site? If/when erosion occurs, would homeowners, who may have damage caused by this erosion, be compensated by the city who approved this development or the applicant?

14. Transportation, e. page 14- asked the question: How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and non-passenger vehicles). What data or transportation models were used to make these estimates? **The answer was** "6 PM peak trips." The applicant neglected to provide how he came to this conclusion. I heard that a 25% increase in traffic was all that this project would generate. For 11 units, with a probability of 2+ drivers, family, friends, and deliveries, it seems that an increase of only 25% extra traffic does not seem adequate.

The streets 4th ave E st to 5th ave, connected by a corner that provides a road that is not adequate in width and does not provide safety for the public with the added vehicle traffic that each home adds to this area. Then there is the hill on 5th street with no sidewalks and narrow roads. Safety should be the #1 priority for any development!

Correct me if I am wrong, to squeeze 11 units along the road, these homes will need to be of a block box type and would not blend in with the surrounding neighborhood and diminish the surrounding area. I did hear that there was another project design that would have been more beneficial to the landscape. Unfortunately, I have not seen it.

I am asking the Lead Agency reconsider requiring an Environmental Impact Statement.

Sincerely,

Teri Buccarelli

421 4th Ave SW

Tumwater, 98512

Email: teribuccarelli@gmail.com

Exhibit 7I.

Alex Baruch

From: Alex Baruch
Sent: Tuesday, September 15, 2026 5:25 PM
To: Nancy
Cc: Leatta Dahlhoff
Subject: RE: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Hi Nancy,

I hope you are doing well. It was a pleasure speaking with you last week. Thank you for taking the time to review the SEPA materials and for sharing your thoughtful concerns and suggestions regarding the project.

I wanted to provide some additional information regarding the traffic anticipated to the development. Trip generation for development projects is calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, which is the standard methodology used to estimate traffic generated by different land uses. For this proposed 11-unit townhome development, the ITE methodology estimates approximately 6 new trips during the weekday PM peak hour.

The distinction between vehicles and trips is important. Even if each of the 11 dwelling units had two vehicles, that would not mean that all 22 vehicles would be entering or leaving the development during the same peak hour. A “trip” represents a vehicle movement to or from the development, and those movements occur throughout the day. The ITE methodology estimates approximately 61 average daily trips for the development, compared with the approximately 6 trips expected during the PM peak hour.

The peak-hour figure is particularly important for evaluating potential traffic impacts because transportation systems generally experience their highest levels of congestion during those periods. The City uses peak-hour traffic projections, along with other applicable transportation criteria, when evaluating whether additional traffic analysis is required under the applicable code. In this case, the project does not meet the threshold requiring additional traffic analysis under the City's code.

I also understand your concerns regarding the existing road conditions, pedestrian safety, and the character of the surrounding neighborhood. Those are important considerations when reviewing a development proposal. The City's review considers the applicable zoning, development guidelines, transportation, stormwater, and environmental requirements when determining whether a project can proceed and what conditions are necessary to address its impacts.

The City also recognizes that there are existing infrastructure and pedestrian safety deficiencies in the surrounding area. However, improvements or mitigation required as part of a particular development must be proportional to the size and impacts of that development. As a result, longstanding infrastructure deficiencies that were not created by the project would not necessarily be improvements that could appropriately be required of this applicant. The City continues to evaluate and pursue opportunities to address broader transportation and pedestrian infrastructure needs through its capital improvement and other planning processes. I have also forwarded your email to the Transportation and Engineering Department for their consideration.

I also appreciate your comments regarding the design of the townhomes and the use of the City's design guidelines. The project will be reviewed for compliance with the applicable design requirements, including provisions intended to address building form, exterior materials, porches, and other architectural features.

I hope this provides some additional context regarding the City's review of the project and the concerns raised in your email. I appreciate you taking the time to review the materials and provide thoughtful suggestions regarding both this project and the broader neighborhood.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Nancy Stevenson <nancycstevenson@comcast.net>
Sent: Friday, September 11, 2026 6:46 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Cc: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Dear Alex:

I understand the need for infill development in existing neighborhoods to address our city's growing need for housing of all types. However, the drive to meet this need should not override the importance of preserving the livability and character as the neighborhood changes.

Old Tumwater Hill is a modest neighborhood of older single-family homes with a couple duplexes in the mix. The streets are steep and the sidewalks are unconnected. The proposed plat for 5th Avenue adds 11 townhomes all in a row along the west side of the street spanning the entire block between E and F street on 5th Avenue. On the east side of the street there are two homes…one hidden behind trees. There are no driveways no garages no cars. The 11 townhomes will be built in what used to be a horse pasture.

Impacts on Pedestrian Safety: With the addition of 22 cars that are not there now the traffic will substantially increase. I think the trip generation report in the DNS document underestimates this increase in traffic. Further, the streets most impacted by this traffic are E and F, which lead to the bus stop on 2nd Avenue and 5th which leads the way to Michael T Simmons Elementary school. The pedestrian infrastructure on these streets is random…one side or the other and not connected.

If the developer is only responsible for sidewalks on the plat property, then I recommend the city address these safety issues and improve pedestrian infrastructure by:

- Plan for and connect existing sidewalks.
- Adding traffic calming features - vegetation triangles on E, F, and 5th Ave.
- Obtain funding for safe routes to school – from 5th to Michael T Simmons
- Possibly use the current right away for F street add a pedestrian trail/ connection to 7th and Barnes.
- Providing covered bus stops on 2nd and 7th.

Maintaining the character of the neighborhood: The townhomes are a different look and feel from the current neighborhood because of the scale, type of housing, the configuration all in a row, as well as the placement on the property*. The intent being to put all the homes on the street and leaving more open space.

While I disagree with all the units being placed on the street because it becomes a visual barrier for residents to see the open space. I'm encourage to learn when we spoke recently that the city will be requiring the developer to use the city's design guidelines. Design options like the use of front porches, angles of the roof, use of siding, gables, so the units are not just a box. These features are fit better into the character of the neighborhood.

Managing the construction phase: As the city oversees the building permit process it's important to recognize our neighborhood's concern over the use of explosives. In constructing water lines, sewer lines, and foundations, blasting should not be relied upon in our neighborhood of predominately older homes. Surrounding houses are too close and there are residents close by with PTSD.

Long term management of the property: As I understand it the plat property both the townhomes and the open space will be managed by a home-owners association ensuring that there will be long- term management plans for the stormwater pond, the prevention of invasive species, and the community garden. While there will be no public access to the open space since it's private property, it's my hope that as the new neighbors get to know current residents, friendships will form and invitations to the open space property will be made.

These are my thoughts and suggestions regarding the city's DNS of the 5th Avenue Townhomes plat proposal.

With Hope and Respect,

Nancy

Nancy Stevenson
420 3rd Ave SW
Tumwater, WA 98512

*Document 8 in the DNS material shows a different configuration and placement of the housing units on the property. I prefer this option even though it has 13 housing units instead of 11. The reason being the units are clustered in two rows with a private road in between… fewer cars on the street … and the south portion of the open space could be seen by nearby residents….it has a more open look and feel.
Unfortunately, as I understand it, this option is no longer available because of a regulation change eliminating private roads in such developments.

Exhibit 7m.

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

September 16, 2026

Linda Miller
514 E Street SW
Tumwater, WA 98512

RE: Tumwater Hill Townhomes SEPA Determination Comments

Hi Linda,

I hope you are doing well. Thank you for taking the time to review the SEPA materials and for sharing your concerns regarding the project.

The City is required to review development proposals based on the applicable codes and development regulations in effect at the time of review. The documentation submitted for this project, including the materials supporting the SEPA determination, provided the City with sufficient information to evaluate the anticipated impacts and determine that they could be addressed through applicable conditions, including on-site and frontage improvements.

I also want to address your concerns regarding stormwater and the seasonal ponding you have observed on the property. The project is required to address stormwater generated by the development and associated frontage improvements. Under the proposed design, stormwater from the street improvements and the development, including roof runoff, will be collected and conveyed through the project's stormwater system. The system will be designed to control and manage stormwater in accordance with the City's applicable stormwater requirements, including requirements related to collection and infiltration, and will be maintained by the homeowners association.

These requirements are intended to prevent the development from creating or worsening drainage and erosion problems on adjacent properties. The City's review of the proposed stormwater system will consider how stormwater is managed on the site, including the potential effects of runoff from the development and frontage improvements.

Trip generation for development projects is calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, which is the standard methodology used to estimate traffic generated by different land uses. For this proposed 11-unit townhome development, the ITE methodology estimates approximately 6 new trips during the weekday PM peak hour.

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

The distinction between vehicles and trips is important. Even if each of the 11 dwelling units had two vehicles, that would not mean that all 22 vehicles would be entering or leaving the development during the same peak hour. A “trip” represents a vehicle movement to or from the development, and those movements occur throughout the day. The ITE methodology estimates approximately 61 average daily trips for the development, compared with approximately 6 trips expected during the PM peak hour.

The peak-hour figure is particularly important for evaluating potential traffic impacts because transportation systems generally experience their highest levels of congestion during those periods. The City uses peak-hour traffic projections, along with other applicable transportation criteria, when evaluating whether additional traffic analysis is required under the applicable code. In this case, the project does not meet the threshold requiring additional traffic analysis under the City's code.

I also understand your concerns regarding the existing road conditions and pedestrian safety of the surrounding neighborhood. Those are important considerations when reviewing a development proposal. The City's review considers the applicable zoning, development guidelines, transportation, stormwater, and environmental requirements when determining whether a project can proceed and what conditions are necessary to address its impacts.

The City recognizes that there are existing infrastructure and pedestrian safety deficiencies in the surrounding area. However, improvements or mitigation required as part of a particular development must be proportional to the size and impacts of that development. As a result, longstanding infrastructure deficiencies that were not created by the project would not necessarily be improvements that could appropriately be required of this applicant. The City continues to evaluate and pursue opportunities to address broader transportation and pedestrian infrastructure needs through its capital improvement and other planning processes.

I hope this provides some additional context regarding the City's SEPA determination and the information provided in the environmental checklist. I appreciate you taking the time to review the materials and share your concerns regarding the project and the broader neighborhood.

Sincerely,
Alex Baruch, Planner, City of Tumwater

Exhibit 7n.

Alex Baruch

From: Brinn Marri <bmarri@chehalistribe.org>
Sent: Thursday, September 17, 2026 12:42 PM
To: Alex Baruch
Subject: RE: SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

Good afternoon!

Thank you for sharing this project information! For the future ground disturbance work related to this project, an Inadvertent Discovery Plan (IDP) should be implemented.

Thank you!

Brinn Marri, M.A.
Tribal Historic Preservation Officer (THPO)
Confederated Tribes of the Chehalis Reservation
Oakville, WA
Office: (360) 709-1768
bmarri@chehalistribe.org



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Records, maps, or other information identifying the location and details of archaeological sites, in order to avoid the looting or depredation of such sites, are exempt from public disclosure (RCW 42.56.300).

From: Jessica Lee <JLee@ci.tumwater.wa.us>
Sent: Thursday, August 27, 2026 8:45 AM
Subject: SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

The City of Tumwater has issued the SEPA Determination for the proposed 5th Avenue Townhomes TUM-26-0115 project. Written comments may be submitted to Alex Baruch abaruch@ci.tumwater.wa.us through September 11th 2026.

The Notice of Application is available to view HERE.

If you have any questions or would like additional information, please contact Alex Baruch at 360-754-4180 or abaruch@ci.tumwater.wa.us .

Thank you for your interest in development projects within the City of Tumwater.

Jessica Lee | Administrative Assistant
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
jlee@ci.tumwater.wa.us | www.ci.tumwater.wa.us
Permit Counter Hours - Walk Ins: Monday - Thursday 8 a.m. - 1 p.m. Closed Friday
Appointments: Monday -Thursday 1:30 p.m. - 4:00 p.m.

Exhibit 7o.

Alex Baruch

From: Alex Baruch
Sent: Thursday, September 17, 2026 12:43 PM
To: 'Brinn Marri'
Subject: RE: SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

Thank you Brinn!

We will make sure the inadvertent discovery note is required on the cover sheet of the site development grading permit and the applicant is aware of the requirements.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Brinn Marri <bmarri@chehalistribe.org>
Sent: Thursday, September 17, 2026 12:42 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Subject: RE: SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

Good afternoon!

Thank you for sharing this project information! For the future ground disturbance work related to this project, an Inadvertent Discovery Plan (IDP) should be implemented.

Thank you!

Brinn Marri, M.A.
Tribal Historic Preservation Officer (THPO)
Confederated Tribes of the Chehalis Reservation
Oakville, WA
Office: (360) 709-1768
bmarri@chehalistribe.org



CONFIDENTIALITY NOTICE:
The contents of this email message and any attachments are intended solely for the addressee(s) and may contain confidential and/or privileged information and may be legally protected from disclosure. If you are not the intended recipient of this message or their agent, or if this message has been addressed to you in error, please immediately alert the sender by reply email and then delete this message and any attachments. If you are not the intended recipient, you are hereby notified that any use, dissemination, copying, or storage of this message or its attachments is strictly prohibited.

Records, maps, or other information identifying the location and details of archaeological sites, in order to avoid the looting or depredation of such sites, are exempt from public disclosure (RCW 42.56.300).

From: Jessica Lee <JLee@ci.tumwater.wa.us>
Sent: Thursday, August 27, 2026 8:45 AM
Subject: SEPA Determination - 5th Avenue Townhomes - TUM-26-0115

The City of Tumwater has issued the SEPA Determination for the proposed 5th Avenue Townhomes TUM-26-0115 project. Written comments may be submitted to Alex Baruch abaruch@ci.tumwater.wa.us through September 11th 2026.

The Notice of Application is available to view HERE.

If you have any questions or would like additional information, please contact Alex Baruch at 360-754-4180 or abaruch@ci.tumwater.wa.us .

Thank you for your interest in development projects within the City of Tumwater.

Jessica Lee | Administrative Assistant
City of Tumwater Community Development
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180
jlee@ci.tumwater.wa.us | www.ci.tumwater.wa.us
Permit Counter Hours - Walk Ins: Monday - Thursday 8 a.m. - 1 p.m. Closed Friday
Appointments: Monday -Thursday 1:30 p.m. - 4:00 p.m.

Exhibit 7p.

Alex Baruch

From: Nancy Stevenson <nancycstevenson@comcast.net>
Sent: Sunday, September 20, 2026 1:27 PM
To: Alex Baruch
Cc: Leatta Dahlhoff
Subject: Re: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Hi Alex,

My point is the 22 cars that will generate 61 average daily trips. This is a huge increase in traffic on very steep streets — this was not acknowledged in the documentation. This much traffic is a pedestrian safety issue and a parking issue, not necessarily a congestion issue.

At a minimum the city should evaluate putting in traffic calming measures as a result of this project. Currently there's hardly any traffic on E and F streets or 5th but there will be with an additional 61 average daily trips. I understand longstanding infrastructure deficiencies not created by the project - like sidewalks - can't be paid for by the applicant. Yet this isn't an issue today but will be in the future because of the project.

For me it's hard to imagine 11 townhomes fitting on this street between the telephone poles. Assume half of the garages will be filled with stuff, one car parked in the driveway and one car on the street. That would be 11 + 5 =16 cars in this picture along with the 11 townhomes. It's unfortunate in this case that the housing units couldn't be clustered with a private road as in the 2021 proposal...it would have fit into the neighborhood better and kept more cars off the street.


LAND USE ACTION
Public Notice
575

I appreciate being able to comment. Thanks for your time. Best,

Nancy

On Sep 15, 2026, at 5:25 PM, Alex Baruch <ABaruch@ci.tumwater.wa.us> wrote:

Hi Nancy,

I hope you are doing well. It was a pleasure speaking with you last week. Thank you for taking the time to review the SEPA materials and for sharing your thoughtful concerns and suggestions regarding the project.

I wanted to provide some additional information regarding the traffic anticipated to the development. Trip generation for development projects is calculated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, which is the standard methodology used to estimate traffic generated by different land uses. For this proposed 11-unit townhome development, the ITE methodology estimates approximately 6 new trips during the weekday PM peak hour.

The distinction between vehicles and trips is important. Even if each of the 11 dwelling units had two vehicles, that would not mean that all 22 vehicles would be entering or leaving the development during the same peak hour. A “trip” represents a vehicle movement to or from the development, and those movements occur throughout the day. The ITE methodology estimates approximately 61 average daily trips for the development, compared with the approximately 6 trips expected during the PM peak hour.

The peak-hour figure is particularly important for evaluating potential traffic impacts because transportation systems generally experience their highest levels of congestion during those periods. The City uses peak-hour traffic projections, along with other applicable transportation criteria, when evaluating whether additional traffic analysis is required under the applicable code. In this case, the project does not meet the threshold requiring additional traffic analysis under the City's code.

I also understand your concerns regarding the existing road conditions, pedestrian safety, and the character of the surrounding neighborhood. Those are important considerations when reviewing a development proposal. The City's review considers the applicable zoning, development guidelines, transportation, stormwater, and environmental requirements when determining whether a project can proceed and what conditions are necessary to address its impacts.

The City also recognizes that there are existing infrastructure and pedestrian safety deficiencies in the surrounding area. However, improvements or mitigation required as part of a particular development must be proportional to the size and impacts of that development. As a result, longstanding infrastructure deficiencies that were not created by the project would not necessarily be improvements that could appropriately be required of this applicant. The City continues to evaluate and pursue opportunities to address broader transportation and pedestrian infrastructure needs through its capital improvement and

other planning processes. I have also forwarded your email to the Transportation and Engineering Department for their consideration.

I also appreciate your comments regarding the design of the townhomes and the use of the City's design guidelines. The project will be reviewed for compliance with the applicable design requirements, including provisions intended to address building form, exterior materials, porches, and other architectural features.

I hope this provides some additional context regarding the City's review of the project and the concerns raised in your email. I appreciate you taking the time to review the materials and provide thoughtful suggestions regarding both this project and the broader neighborhood.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
www.ci.tumwater.wa.us

From: Nancy Stevenson <nancycstevenson@comcast.net>
Sent: Friday, September 11, 2026 6:46 PM
To: Alex Baruch <ABaruch@ci.tumwater.wa.us>
Cc: Leatta Dahlhoff <LDahlhoff@ci.tumwater.wa.us>
Subject: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Dear Alex:

I understand the need for infill development in existing neighborhoods to address our city's growing need for housing of all types. However, the drive to meet this need should not override the importance of preserving the livability and character as the neighborhood changes.

Old Tumwater Hill is a modest neighborhood of older single-family homes with a couple duplexes in the mix. The streets are steep and the sidewalks are unconnected. The proposed plat for 5th Avenue adds 11 townhomes all in a row along the west side of the street spanning the entire block between E and F street on 5th Avenue. On the east side of the street there are two homes…one hidden behind trees. There are no driveways no garages no cars. The 11 townhomes will be built in what used to be a horse pasture.

Impacts on Pedestrian Safety: With the addition of 22 cars that are not there now the traffic will substantially increase. I think the trip generation report in the DNS document underestimates this increase in traffic. Further, the streets most impacted by this traffic are E and F, which lead to the bus stop on 2nd Avenue and

5th which leads the way to Michael T Simmons Elementary school. The pedestrian infrastructure on these streets is random…one side or the other and not connected.

If the developer is only responsible for sidewalks on the plat property, then the city needs to address these safety issues and improve pedestrian infrastructure by:

- Plan for and connect existing sidewalks.
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Maintaining the character of the neighborhood: The townhomes are a different look and feel from the current neighborhood because of the scale, type of housing, the configuration all in a row, as well as the placement on the property*. The intent being to put all the homes on the street and leaving more open space.

While I disagree with all the units being placed on the street because it becomes a visual barrier for residents to see the open space. I'm encourage to learn when we spoke recently that the city will be requiring the developer to use the city's design guidelines. Design options like the use of front porches, angles of the roof, use of siding, gables, so the units are not just a box. These features are fit better into the character of the neighborhood.

Managing the construction phase: As the city oversees the building permit process it's important to recognize our neighborhood's concern over the use of explosives. In constructing water lines, sewer lines, and foundations, blasting should not be relied upon in our neighborhood of predominately older homes. Surrounding houses are too close and there are residents close by with PTSD.

Long term management of the property: As I understand it the plat property both the townhomes and the open space will be managed by a home-owners association ensuring that there will be long- term management plans for the stormwater pond, the prevention of invasive species, and the community garden. While there will be no public access to the open space since it's private property, it's my hope that as the new neighbors get to know current residents, friendships will form and invitations to the open space property will be made.

These are my thoughts and suggestions regarding the city's DNS of the 5th Avenue Townhomes plat proposal.

With Hope and Respect,

Nancy

Nancy Stevenson
420 3rd Ave SW
Tumwater, WA 98512

*Document 8 in the DNS material shows a different configuration and placement of the housing units on the property. I prefer this option even though it has 13 housing units instead of 11. The reason being the units are clustered in two rows with a private road in between… fewer cars on the street … and the south portion of the open space could be seen by nearby residents….it has a more open look and feel. Unfortunately, as I understand it, this option is no longer available because of a regulation change eliminating private roads in such developments.

Exhibit 7q.

Alex Baruch

From: Alex Baruch
Sent: Monday, September 21, 2026 4:46 PM
To: 'Nancy Stevenson'
Cc: Leatta Dahlhoff
Subject: RE: SEPA Review 5th Avenue Townhomes. TUM-26-0115

Hi Nancy,

I appreciate the comment and will make sure it is included in the record and passed along to city staff and the applicant.

Sincerely,

Alex Baruch | **he/him**
Senior Planner, Community Development
City of Tumwater
555 Israel Rd SW | Tumwater, WA 98501
(360) 754-4180 | ABaruch@ci.tumwater.wa.us
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LAND USE ACTION
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City of Tumwater

Notice of Public Hearing

Hearing Examiner –

TUM-26-0115, **5th Ave Townhomes**

Notice is hereby given that the Tumwater Hearing Examiner will hold a public hearing at or about 6:00 p.m., on Monday, October 26th, 2026, for the purpose of considering a development proposal to subdivide a single parcel totaling approximately 1.69 acres into eleven lots that will include eleven townhouses on individual lots at 585 5th Ave SW. The development will include infrastructure, frontage improvements, parking and open space. The meeting and public hearing will be held remotely online via Zoom and in person at Tumwater City Hall, 555 Israel Rd. SW, Tumwater, WA 98501.

The public is invited to attend this public hearing remotely or in person to provide comments on the application.

Public Comment – In Person:
Tumwater City Hall
555 Israel Road SW
Tumwater, WA 98501

Public Comment via Zoom - Register in advance for this webinar:
https://us02web.zoom.us/webinar/register/WN_LyjEmC09ROuYquBNqmNa9w

Public Comment – via email:
Prior to the meeting, send an email to: abaruch@ci.tumwater.wa.us no later than 12:00 p.m. on Monday, October 26, 2026.

For more information, contact Community Development, (360) 754-4180 or email abaruch@ci.tumwater.wa.us.

City of Tumwater
Alex Baruch, Senior Planner

Published: October 9, 2026
Posted: October 9, 2026

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, Inc.
• BECAUSE RESULTS MATTER •

April 7, 2026

Alex S Holtze
ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501
aholtze@gmail.com

Re: Traffic Trip Generation Worksheet - 5th Ave Townhomes Plat
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001

Dear Mr. Holtze:

At your request, I have prepared this traffic generation worksheet in accordance with City of Tumwater traffic impact guidelines. This analysis will provide trip generation information for the project.

PROJECT DESCRIPTION

The existing lot appears to be a undeveloped property zoned SFMD. The existing lot is approximately 1.69 acres. The townhome plat proposal includes the subdivision of the lot into a 11-townhomes (TH) Plat with associated utilities, access roadway, frontage improvements and landscaping.

This project is located off of South 5th Avenue SW. The legal description is shown on the preliminary plat map.

The proposed 11-unit townhome units are planned to be located on the eastern edge of the parcel.

Figure 1 is a vicinity map showing the location of the proposed site and the surrounding road network.

Figure 2 shows the proposed plat for the project.

Full development and occupancy of the proposed plat is anticipated to occur by December of 2026.

EXISTING PHYSICAL CONDITIONS

Roadway Facilities

The primary roads in the vicinity of the proposed project and the City classifications are as follows:

5th Ave SW	Local Residential Access Route
E St SW	Local Residential Access Route
F St SW	Local Residential Access Route

TRIP GENERATION

Roadway Facilities

A vehicle trip is defined as a single or one direction vehicle movement with either the origin or destination (exiting or entering) inside the proposed development.

Pass-By Trips:	Trips made as intermediate stops on the way from an origin to a primary trip destination.
Diverted Link Trips:	Trips attracted from the traffic volume on roadways within the vicinity of the generator but require a diversion from that roadway to another roadway to gain access to the site.
Captured Trips:	Trips shared by more than one land use on a single development site.
Primary (New) Trips:	Trips made for the specific purpose of using the services of the project.

Project Generated Traffic

Table 1 presents the proposed typical weekday and Sunday peak-hour trip generation for the 11-townhome lot plat development. The trip generation calculations are based on average trip generation rates for the ITE Land Use Code 215 (Single-Family Attached Housing) counts. The peak-hour trip generation of the 11 lot townhome plat development is summarized in Table 1. The existing site use does not include any single family residences.

Table 1: Trip Generation Summary

Land Use	Size	Weekday PM Peak-Hour Trips		
		In	Out	Total
ITE LUC 215 (Single-Family Attached Housing)	11 DU	4	2	6

The development is anticipated to generate 6 new weekday PM peak-hour trips.

There are no pass-by trips being accounted for with this report. The total net increase in PM peak hour trips is 6 trips.

These proposed trip values account for all site trips made by all vehicles for all purposes, including commuter, visitor, recreation, service and delivery vehicles trips.

Once again, thank you for the opportunity to work with you on this project. Please feel free to give me a call if you have any questions.

Sincerely,

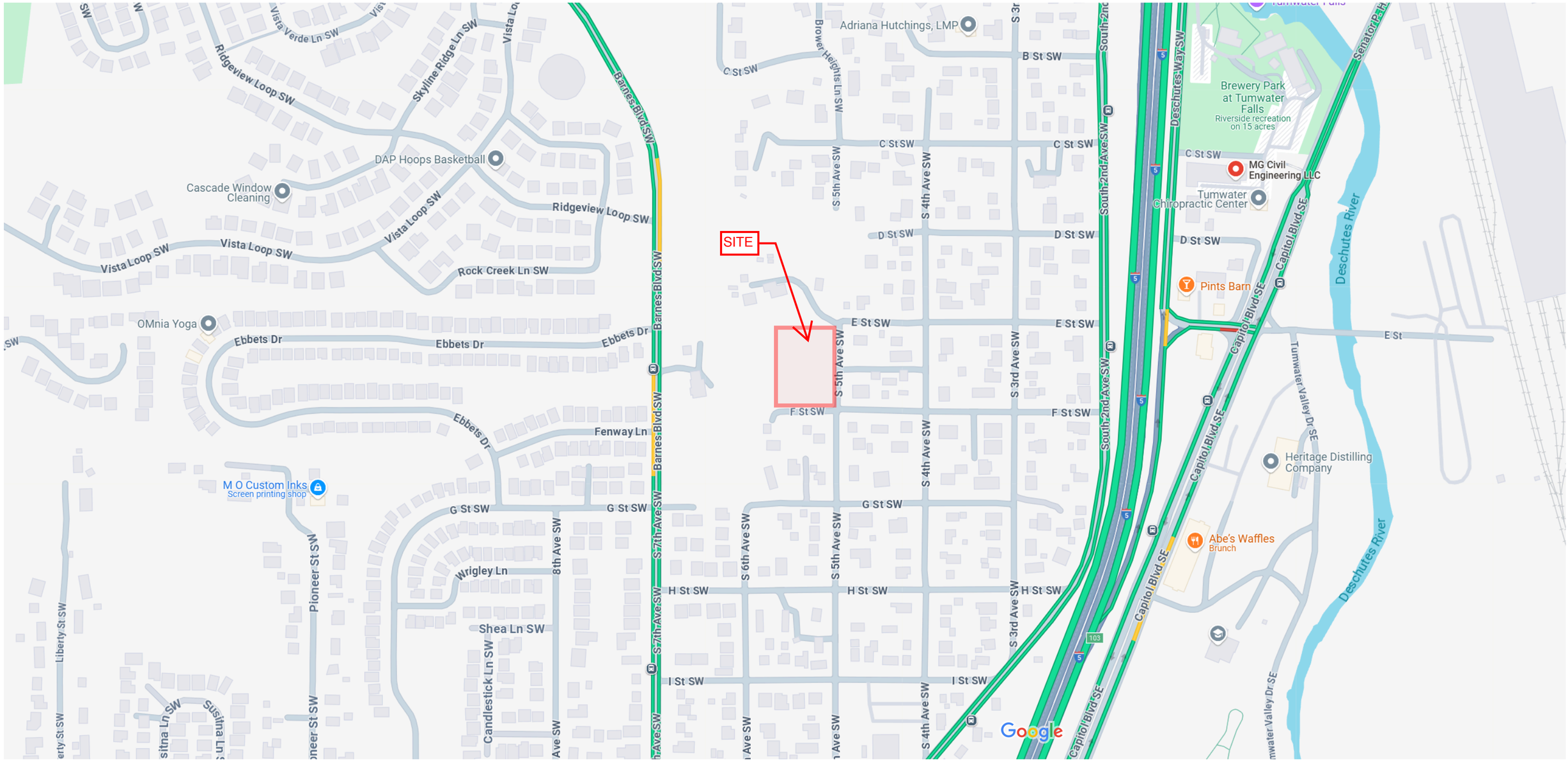
The Land Developer, Inc.

Erik B. Ainsworth, PE
President



Attachments:
Figure 1- Vicinity Map
Figure 2- Preliminary Site Plan

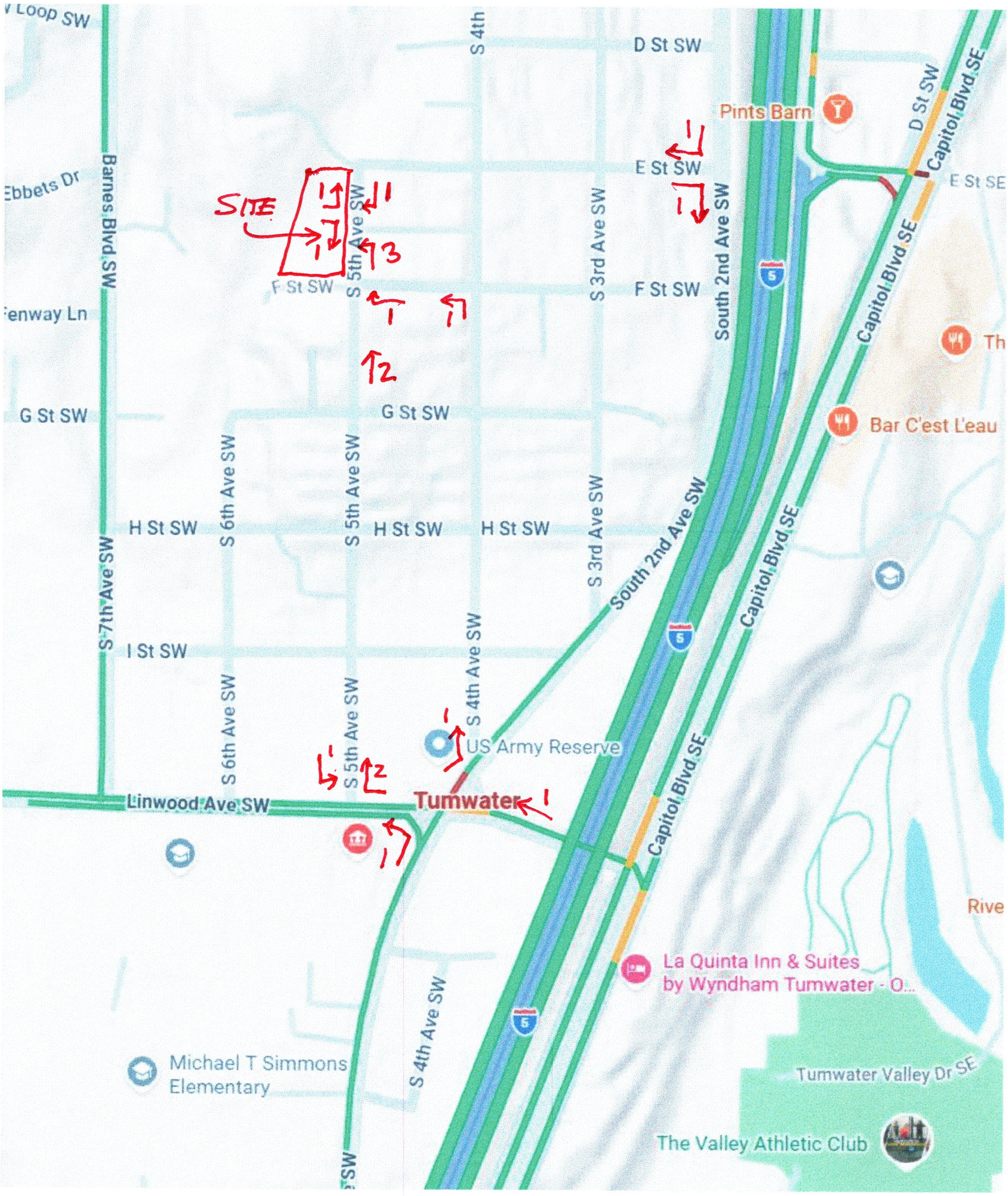
VICINITY MAP



Map data ©2025 Google 200 ft

Rating Hours All filters

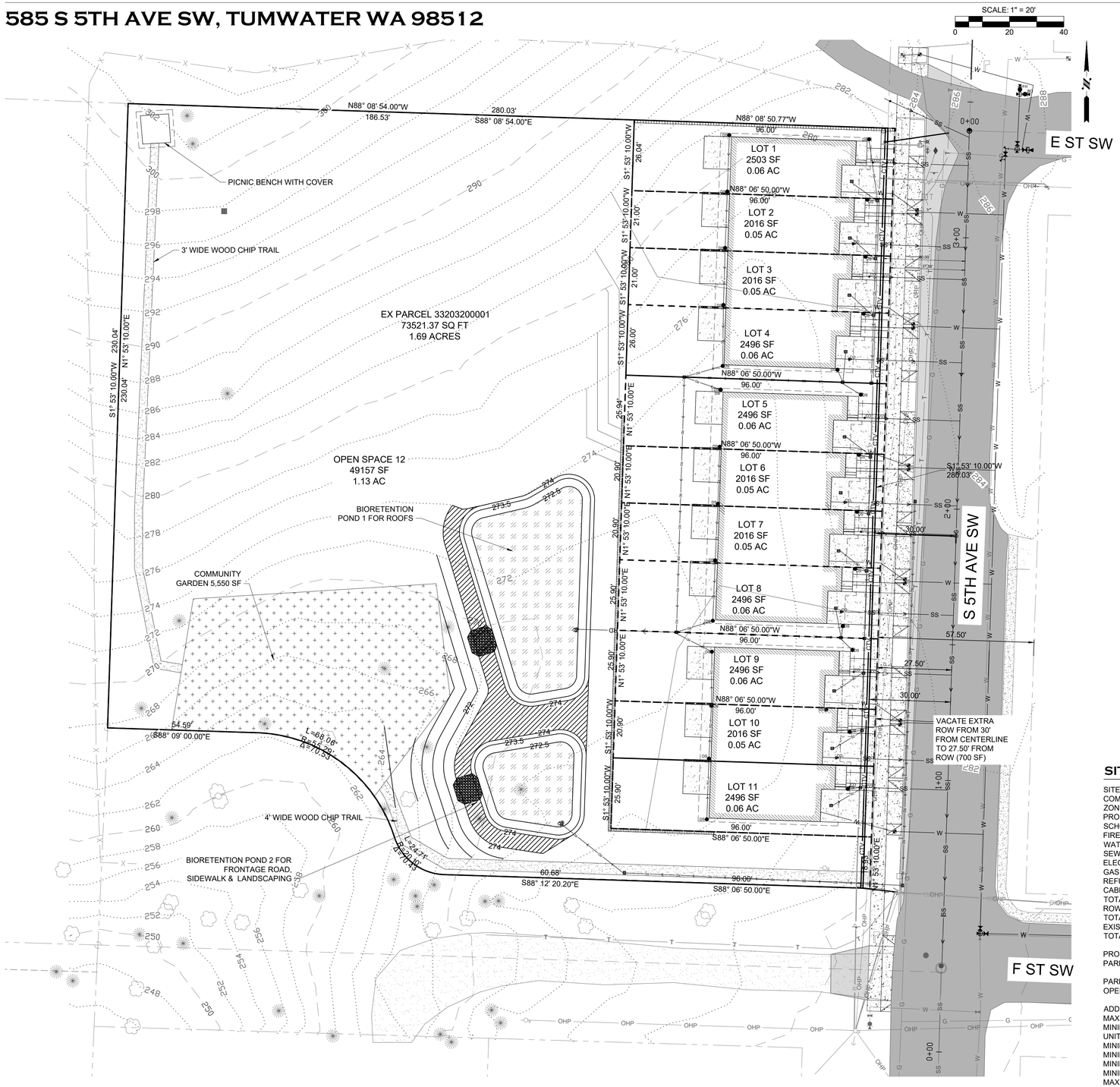
5th Avenue Townhomes Traffic Distribution Map


SITE
1
1
1
3
1
1
2
1
1
2
1
1
1

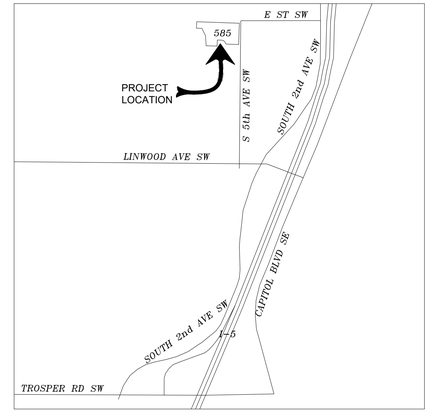
SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.

5TH AVE TOWNHOMES PRELIMINARY PLAT SITE PLAN

585 S 5TH AVE SW, TUMWATER WA 98512



APPROXIMATE CUT/FILL GRADING QUANTITIES
CUT: 1,100 YARDS
FILL: 3,500 YARDS
FOR PERMITTING PURPOSED ONLY



VICINITY MAP

NTS

LEGEND

	EXISTING	PROPOSED
SUBJECT PROPERTY LINE		
ADJACENT LOT LINE		
HABITAT BUFFER LINE		
WETLAND BUFFER LINE		
EASEMENT LINE		
RIGHT-OF-WAY LINE		
CENTER LINE		
CONTOUR, MAJOR	160	160
CONTOUR, MINOR	158	158
CONIFEROUS TREE		
DECIDUOUS TREE		
STREET SIGN		
POWER LINE	UGP	UGP
OVERHEAD POWER LINE	OHP	OHP
POWER POLE		
GUY WIRE		
POWER VAULT	P	P
STREET LIGHT		
NATURAL GAS LINE	G	G
TELEPHONE LINE	T	T
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
CABLE LINE	CTV	CTV
CABLE PEDESTAL	TV	TV
STORM MAIN LINE	SD	SD
FOOTING DRAIN LINE	FD	FD
ROOF DRAIN LINE	RD	RD
CATCH BASIN	CB	
TYPE I CATCH BASIN	D	
YARD DRAIN	YD	YD
DOWNSPOUT	DS	DS
WATER MAIN LINE	W	W
WATER METER	WM	
BLOWOFF VALVE FIRE HYDRANT	BO	BO
GATE VALVE		
SEWER MANHOLE		CO
CLEANOUT	CO	
SEWER MAIN LINE	SS	SS
CONCRETE		
ASPHALT PAVEMENT		
POROUS ASPHALT		
LANDSCAPING		
GRAVEL		

SITE INFO

SITE ADDRESS:	585 S 5th Ave SW, Tumwater, WA 98512
COMPREHENSIVE PLAN DESIGNATION:	RESIDENTIAL
ZONING:	LDR
PROPOSED IBC CONSTRUCTION TYPE:	5V-B
SCHOOL DISTRICT:	TUMWATER SCHOOL DISTRICT
FIRE DISTRICT:	FIRE DISTRICT #03
WATER PROVIDER:	CITY OF TUMWATER
SEWER PROVIDER:	CITY OF TUMWATER
ELECTRICITY PROVIDER:	PSE
GAS PROVIDER:	PSE
REFUSE/RECYCLING PROVIDER:	LeMAY
CABLE/TV PROVIDER:	COMCAST
TOTAL SITE AREA:	1.69 AC OR 73,521 SF
ROW VACATION AREA:	0.02 AC OR 700 SF
TOTAL AREA AFTER VACATION:	1.70 AC OR 74,221 SF
EXISTING NUMBER OF UNITS:	VACANT
TOTAL EX RESIDENTIAL UNITS:	0
PROPOSED PROJECT:	TOWNHOME PLAT
PARKING SPACES REQUIRED RESIDENT:	2 SPACES / UNIT = 22 SPACES
PARKING SPACES PROP:	22 SPACES
OPEN SPACE REQUIRED:	15% OF SITE = 73,521 SF (0.15) = 11,028 SF 47,339 SF PROVIDED

ADDITIONAL REGULATIONS:

MAXIMUM AVERAGE HOUSING DENSITY (units per acre)	(8) 1.70 AC = 14 UNITS
MINIMUM AVERAGE HOUSING DENSITY (units per acre)	(6) 1.70 AC = 11 UNITS
UNITS PROPOSED:	11 TOWN HOME UNITS
MINIMUM LOT SIZE	2,000 SF
MINIMUM FRONT YARD SETBACKS	10' or 20' @ GARAGE
MINIMUM REAR YARD SETBACKS	10'
MINIMUM SIDE YARD SETBACKS	5'
MAXIMUM BUILDING HEIGHT	35'
MAXIMUM IMPERVIOUS COVERAGE	70% (TOWNHOUSE) (1.69AC) = 1.18 AC

INDIVIDUAL LOT MAXIMUM COVERAGE CALCULATION:

WORST CASE LOT COVERAGE (LOT 2):	
LOT SIZE:	2016 SF
MAX COVERAGE (70%):	1,411 SF
COVERAGE PROPOSED:	1,377 SF PROPOSED THEREFORE OK

PROJECT INFO

OWNER:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

LEGAL DESCRIPTION

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR:

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007, UNDER AUDITOR' FILE NO. 3599306;

IN THURSTON COUNTY, WA.

TOGETHER WITH AND SUBJECT TO EASEMENTS, RESTRICTIONS, RESERVATIONS AND CONDITIONS OF RECORD, IF ANY. (NOT PART OF THIS SURVEY)

BASIS OF BEARING

CITY OF TUMWATER COORDINATE SYSTEM AND BASED ON THURSTON COUNTY CONTROL POINT NO. ARC AND CENTERLINE BEARING ALONG 5TH AVE SW AND "E" ST. SW

VERTICAL DATUM

THURSTON COUNTY CONTROL POINT NO. ARC, FOUND WSDOT MONUMENT WITH 3" ALUMINUM CAP AT THE NW CORNER OF THE INTERSECTION OF LINWOOD AVE SW AND 2ND AVE SW, ELEVATION = 107.53'

PARCEL NUMBER

33203200001

SITE COVERAGE DATA

LOT SIZE: 73,521 SF (1.69 AC)

FRONTAGE (S 5TH AVE SW) COVERAGE:	
TOTAL AREA:	7,019 SF (0.16 AC)
NEW SIDEWALK:	1,543 SF (0.04 AC)
NEW + EX ASPH TO SWALE:	3,298 SF (0.08 AC)
NEW LANDSCAPED AREA:	2,178 SF (0.05 AC)
ONSITE AREA:	
11 LOT TOTAL AREA:	22,123 SF (0.51 AC)
NEW + REPLACED ASPHALT AREA:	1,716 SF (0.04 AC)
PATIO AREA:	792 SF (0.02 AC)
ROOF AREA:	12,312 SF (0.28 AC)
	< 0.56 AC THEREFORE OK)
LANDSCAPED AREA:	8,561 SF (0.20 AC)
TOTAL ONSITE IMP COVERAGE:	14,820 SF (0.34 AC) OR 20% OK IF LESS THAN 60%

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com



7/30/26

DATE:

REVISIONS:

5TH AVE TOWNHOMES

COVER SHEET

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA

DATE: 7/30/26

AGENCY NO:

SHEET: 1 OF 4

JOB NO: 21-132

Community Development
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-4180

March 30, 2026

The Land Developer, Inc.

Sent via email to: erik@thelanddeveloper.com, and aholtse@gmail.com

RE: 5th Ave Townhomes
City of Tumwater Transportation Concurrency Permit No. TUM-26-0116

The City of Tumwater has reviewed your Trip Generation Assessment, and presents the following comments:

1. The report incorrectly proposed Land Use Code 230 as Residential Townhomes when Land Use Code 230 is actually Low-Rise Residential with Ground-Floor Commercial. The report should be updated with the correct land use code.

   Response: The land use code was revised.

2. The report needs to show the distribution of new trips to the street system down to one new trip.

   Response: Added teh distribution map

Please provide a response to these comments along with an updated Transportation Impact Analysis. If you have any questions please contact either myself via email at jcrews@ci.tumwater.wa.us or by calling 360.754.4140, or Brandon Hicks via email at bhicks@ci.tumwater.wa.us or by calling 360.754.4140.

Sincerely,

Jared Crews | Engineer III
Development Review Lead
City of Tumwater
555 Israel Road SW | Tumwater, WA 98501

MEMO

Date: April 28, 2026
To: Tami Merriman, Permit Manager
Alex Baruch, Senior Planner
From: Jared Crews, Engineer II
CC: Brandon Hicks, TED Director

RE: Transportation Concurrency – 5th Avenue Townhomes
TUM-26-0116

Based on the Trip Generation Assessment prepared for the 5th Avenue Townhomes project, dated April 7, 2026, and the City of Tumwater Capital Facilities Plan, The City finds that the 5th Avenue Townhomes project is concurrent in regards to Transportation conditioned as follows:

1. Shall Pay Transportation Impact Fees per the Fee Resolution in effect at time of building permit application.

2. Shall construct frontage improvements per the approved civil plans.

8/4/2021

Alex Holtze
3425 Merrymen Place SE
Olympia, WA 98501

Subject: **Holtze Multi-family Consultation**
585 North 5th Avenue SW, Tumwater, WA
QG Project No.: QG21-088

Dear Mr. Holtze:

At your request, Quality Geo NW, PLLC (QG) has completed a follow-up critical slope review of the above referenced property's existing site conditions, including mapped slope analysis and review of existing geologic literature for the site. The project site consists of a vacant and partly forested property partly comprising a portion of a regional slope. It is our understanding that the client intends to construct new multi-family structures within an area designated by the permitting authority to be a potential critical slope and a potential landslide hazard area.

QG understands that the client is considering the purchase of the western adjacent lot in an effort to expand proposed structural and stormwater developments. The permitting authority requires a geotechnical consultation to confirm that current conditions are favorable, and to provide any additional and necessary recommendation regarding critical slope considerations including necessary setbacks if applicable. The following report provides additional geotechnical recommendations for planning and design intended to reduce the inherent risks associated with site development on or adjacent to slopes.

A site region and vicinity map are provided in Appendix A, and a site map is presented in Appendix B.

GEOTECHNICAL LITERATURE REVIEW

Previously in 2020, QG completed a geotechnical consultation and critical slope analysis (project # QG20-070) for Angel Larson, the owner of the eastern adjacent parcel (TPN 3323200002). Our report evaluated the slopes on site and offered construction recommendations for constructing a

house on (or adjacent to) the slopes. Of note, the highest concern for the site is the presence of a shallow seasonal perched water table, with seepage at the base of the slope. Any structural elements were specified to incorporate robust drainage controls to reduce the overall influx of stormwater into the soils of the slopes and prevent erosion from any possible discharge.

Additionally, QG was provided an existing geotechnical report (project #19S222) performed by Materials Testing & Consulting, Inc. in 2019 (herein referred to as "the MTC report"). The report included extensive subsurface soil explorations and slope characterization. Our review of the report concludes that the evaluation was completed adequately, and appears to be well prepared, addressing the same items required by the current critical area ordinance. The MTC report provides a slope crest setback as a conservative measure in support of previous construction proposals that did not anticipate possibly expanding towards other portions of the slope, or other adjacent parcels.

DISCUSSION & SLOPE RECOMMENDATIONS

The findings of QG's site reconnaissance at the subject site appear broadly consistent with available literature and do not indicate any excessively prohibitive conditions exist for the proposed development, assuming appropriate site management efforts are maintained.

Critical Area Ordinance Considerations

Failure mechanisms related to possible future deep-seated slides can be described as a series of complex interactions between groundwater and geologic contacts between sedimentary units, decreasing slope safety factors at depth across wide extents of the land, as a natural process of mass wasting in coastal sedimentary deposits. Failure mechanisms of these deep-seated landslide events are commonly at depths well beneath the depth and scope of most residential construction projects, which are generally of a weight and impact that is insignificant to global stability and safety factors.

Slopes on site are typically inclined at a 3H:1V or less, with few localized areas exceeding 40 percent. Those localized areas that may be oversteepened are typically less than 10 feet in vertical extent, tapering above and below. Shallow soils do not display any evidence of recent or historic slides. In consideration of the available information, and our direct observations, at this time **QG does not consider the site or subject slopes to be an active landslide hazard area.** From a geotechnical standpoint, no portions of the subject slopes are considered "unbuildable". Some areas may require greater effort and engineered solutions, such as deeper foundations, or retaining walls, with generally conventional construction techniques.

The entire site is sloped to some degree, and therefore QG does not impose any specific slope crest or toe setback. Setbacks instead should be considered more as embedment requirements to protect

foundations and preserve existing slope stability. These requirements are described in the following section.

At this point, QG does not recommend any further investigation be conducted. Based on the information herein, QG provides the following development- and site-specific recommendations that will minimize the inherent risks of developing in a sloped area.

Setback Recommendations:

Considering the inclination and conditions of the lower slope specific slope face setback requirements must be followed for successful construction at this location. The local critical area ordinance delineates minimum slope toe setbacks for slopes inclined greater than 40% (~22°), which may be further reduced upon review by a licensed geotechnical professional. QG's reviewed existing topographic data and general site observations made during our previous visit to infer general slope face setbacks based on height and inclination of the typical slopes present on the site in proximity to the proposed structure.

Horizontal foundation embedment/setbacks were determined based on two standard methods:

- First, standard International Building Code (IBC) requirements as accepted by the State of Washington. The IBC details required setback delineations for slopes with an overall inclination less than or equal to 45 degrees. Structures in the vicinity of slopes shall maintain a minimum horizontal slope face setback the lesser of H/3 or 40 feet. QG made limited inclination measurements in the field and reviewed existing topographic data, in comparison to our general site observations made during our visit, to evaluate the adjusted setback requirements. With the typical continuous slope height of up to 75 feet (H=75) the **minimum required horizontal embedment would equal 25 feet (H/3).**
- Second, QG considered a simplified slope stability evaluation based on methods described in Landslides: Investigation and Mitigation, Turner and Schuster, 1996.

  Factor of Safety (FS) = Tan (ϕ) / Tan (α)

  Where ϕ = Internal Angle of Friction

  α = Angle of Slope or Projection Plane

  An overly conservative ϕ = 27.5-degree friction angle was assigned to the overriding native soils for use in assessing slope factor of safety and determining a suitable building setback. Target factor of safety for residential structures is typically FS = 1.5 for static analysis. Factor of safety is an indication of stability; an FS = 1.0 or below corresponds to the point of failure. The setback projection angle for a suitable factor of safety is found by using:

Factor of Safety (FS) = Tan (ϕ) / Tan (α) = Tan (41) / Tan (α) = **1.5+**

ϕ = 27.5 degrees

α = 19 degrees

GQ's profile estimates were used to create a projection from the slope base for an α = 19-degree projection angle, as shown on Figure 2. This geometry meets typical factor of safety requirements for residential development. **To maintain embedment beneath this safety projection, a minimum vertical foundation embedment of 6 feet below adjacent grade shall be utilized.**

Results for both methods were found to closely correlate the expected slope inclinations with specified minimum embedments, suggesting their overall suitability for the proposed project. **So long as these recommendations are followed, existing slope safety factors will not be reduced.**

Foundation Design and Construction Recommendations:

For general foundation design considerations, QG recommends referring to guidelines and parameters of the International Building Code (IBC, 2015; or most recent edition at the time of construction). Footings should be placed to a minimum depth in accordance with the setback and factor of safety criteria above, as well as meeting minimum IBC (2015) requirements.

The proposed buildings may utilize either stepped or continuous footings with crawl space or slab-on-grade, depending on the chosen development style. Due to the reported presence of shallow bedrock and hardpan conditions in areas across the site, cuts deeper than 7 to 8 feet are expected to be difficult. For structures planned along the steeper slopes, stepped foundations with taller stem walls and crawl spaces may be more desirable than daylight basement foundations.

For foundation elements, upon reaching bearing strata, we recommend benching foundation lines flat, followed by moisture conditioning of the soil, and vibratory compaction to a firm and unyielding condition. Continuous perimeter and strip foundations may be stepped as needed to accommodate variations in final subgrade level. We recommend maximum vertical steps of 18 inches with horizontal spacing of at least 5 feet be constructed unless specified otherwise by the design engineer. Structural fill may then be placed as needed to reestablish final foundation grade. Any areas where footing subgrades are found to be directly over bedrock shall be separated from the bedrock by a minimum 6" lift of imported structural fill, compacted to a firm and unyielding condition.

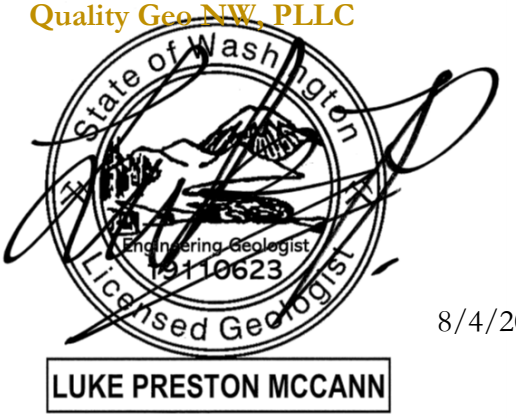
CLOSING:

The information included in this letter should be considered supplemental to the information contained in the original geotechnical reports. This letter should be used in conjunction with the above referenced documents. The design and conclusions presented in this letter are intended solely for the purposes of design and construction of multi-family residential structures as detailed to us by the client prior to the issuance of this letter. All other design, conclusions, and recommendations outlined in the previous reports remain unchanged. Furthermore, the sight design and civil engineering project plans and previous documents have not been inspected for accuracy beyond a cursory informational level. Any changes to the plans will need to be approved by the new project engineer of record. It shall also be noted that QG is not a licensed surveyor,

We trust this letter satisfies your project needs currently and thank you for the opportunity to be of service. QG wishes you the best while completing the project.

Respectfully Submitted,

Quality Geo NW, PLLC



8/4/2021

LUKE PRESTON MCCANN

Luke Preston McCann, L.E.G.
Principal Licensed Engineering Geologist

Attachments: *Limitations*
Appendix A. Site Map
Appendix B. Slope Profile

LIMITATIONS

Upon acceptance and use of this report, and its interpretations and recommendations, the user shall agree to indemnify and hold harmless QG, including its owners, employees and subcontractors, from any adverse effects resulting from development and occupation of the subject site. Ultimately, it is the owner's choice to develop and live in such an area of possible geohazards (which exist in perpetuity across the earth in one form or another), and therefore the future consequences, both anticipated and unknown, are solely the responsibility of the owner. By using this report for development of the subject property, the owner must accept and understand that it is not possible to fully anticipate all inherent risks of development. The recommendations provided above are intended to reduce (but may not eliminate) such risks.

This report does not represent a construction specification or engineered plan and shall not be used or referenced as such. The information included in this report should be considered supplemental to the requirements contained in the project plans & specifications and should be read in conjunction with the above referenced information. The selected recommendations presented in this report are intended to inform only the specific corresponding subjects. All other requirements of the above-mentioned items remain valid, unless otherwise specified.

Recommendations contained in this report are based on our understanding of the proposed development and construction activities, field observations and explorations, and laboratory test results. It is possible that soil and groundwater conditions could vary and differ between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, or If the scope of the proposed construction changes from that described in this report, QG should be notified immediately in order to review and provide supplemental recommendations.

The findings of this study are limited by the level of scope applied. We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the subject region. No warranty, expressed or implied, is made. The recommendations provided in this report assume that an adequate program of tests and observations will be conducted by a WABO approved special inspection firm during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the Client and their design consultants and only for the purposes stated within a reasonable time from its issuance, but in no event later than 18 months from the date of the report. It is the Client's responsibility to ensure that the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. Note that if another firm assumes Geotechnical Engineer of Record responsibilities they need to review this report and either concur with the findings, conclusions, and recommendations or provide alternate findings, conclusions and recommendation.

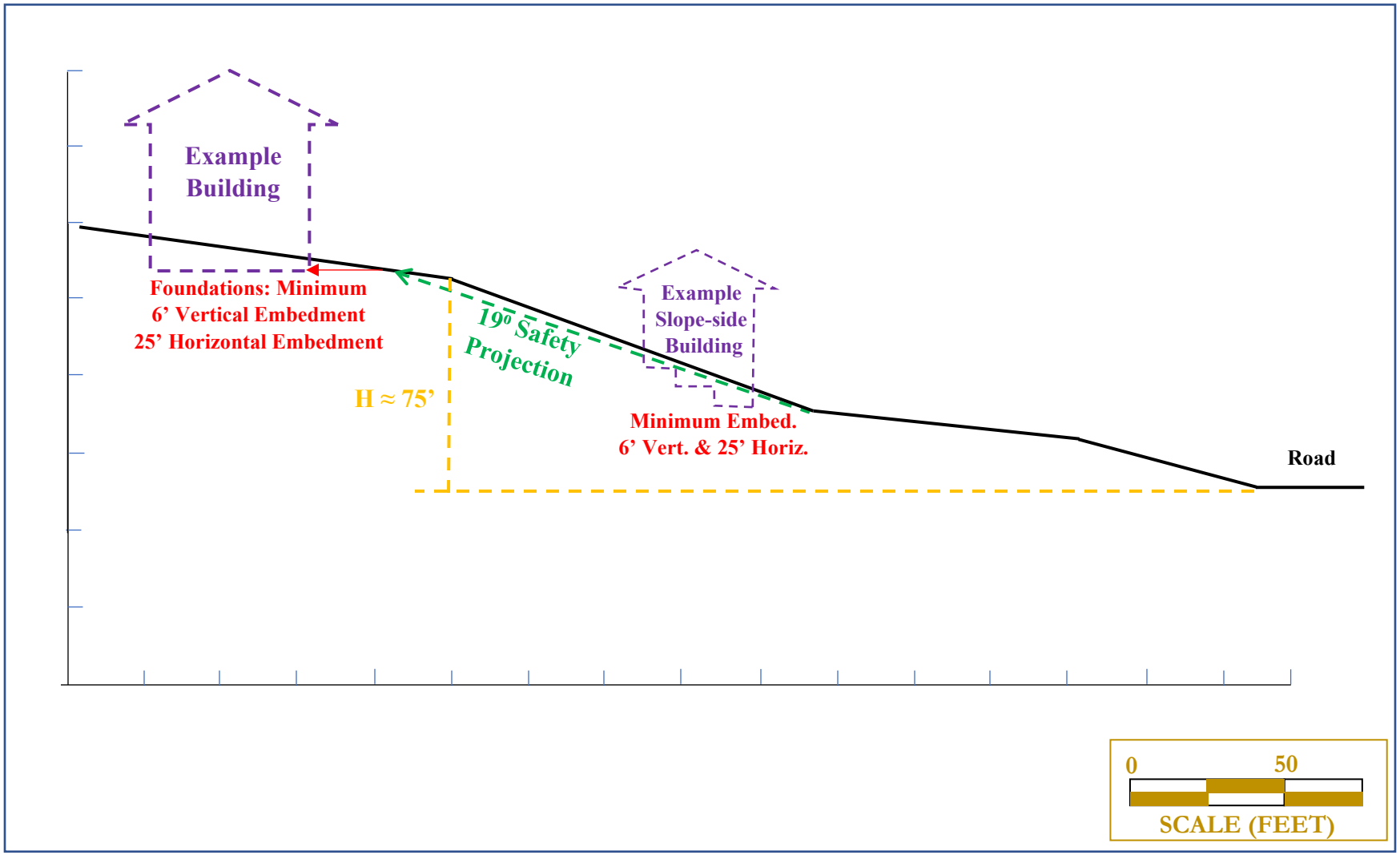
Land or facility use, on- and off-site conditions, regulations, or other factors may change over time, and additional work may be required. Based on the intended use of the report, QG may recommend that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release QG from any liability resulting from the use of this report. The Client, the design consultants, and any unauthorized party, agree to defend, indemnify, and hold harmless QG from any claim or liability associated with such unauthorized use or non-compliance. We recommend that QG be given the opportunity to review the final project plans and specifications to evaluate if our recommendations have been properly interpreted. We assume no responsibility for misinterpretation of our recommendations.

Appendix A. Site Map



Quality Geo NW, PLLC	Site Map Holtze Consultation	Source: Client provided site plan **Scale & Locations are approx.** **Not for Construction**	Figure 1

Appendix B. Slope Profile



Quality Geo NW, PLLC	**Site Map** Holtze Consultation	Source: MTC Report #19S222, 11/4/19 **Scale & Locations are approx.** **Not for Construction**	**Figure 2**

Professional Forestry Services, Inc.

Since 1960

100 Ruby St. SE, Suite B
Tumwater, WA 98501

Phone (360) 943-1470

December 15, 2025

Erik Ainsworth, PE
The Land Developer, Inc.
5737 Linderson Way SW
Tumwater, WA 98501
Email: erik@thelandeveloper.com

Re: Tree Plan for Preliminary Plat of 5th Avenue Townhouses,
City of Tumwater, Washington

Dear Mr. Ainsworth:

As you authorized, Professional Forestry Services Inc. has updated the trees on the site where the proposed project is to take place. The following information should satisfy your requirement for a tree plan, as needed for submission before land-clearing begins.

1. **LOCATION**

All trees involved are on portions of Parcel No. 33203200001, which total 1.72 acres. All within portions of SE¼ of Section 27, T18N, R2W, W.M., Thurston County, Washington.

2. **TREES ON-SITE**

Approximately 10% of the area would be considered forested. The trees are in west portion of the property.

The current inventory of trees on the site are:

Douglas-fir		10
Western Hemlock		1
Alder		1
Total Trees On-site	=	12

20% x 12 = 3 Tree Units

forests for the future

3. TREES OFF SITE

No off-site trees will be affected by this project.

4. TREES TO BE RETAINED

As outlined in Chapter 16.08.070R of the Tumwater Tree Ordinance, at least twelve trees per acre, or 20% of the trees on the site whichever is greater shall be retained. If this number cannot be met by existing trees, a 5% tree tract is required. The Tree Protection Open Space is indicated on the map exhibit.

Required Trees: 1.72 x 12/acre = 21 Tree Units

Trees to be Retained Within:

	DF	RA	WH	DF > 24"
Open Space "A"	1	1	1	4

		Total Tree Units
Trees <24" DBH =	3 x 1 =	3
Trees >24" DBH =	4 x 2 =	8

Trees to be Mitigated: 21 – 11 = 10

5. TREE TRACT REQUIREMENT

The area where trees have been retained on Open Space A will be 71% of the buildable area as defined by TMC 16.08.030.A.

6. PROTECTION OF TREES BEING RETAINED

In our opinion, a four-foot-high protection fence would protect the proposed trees from any entry by equipment. Six-foot steel fence posts need to be placed at 6-8' intervals along the fence to keep the fence erect during land-clearing.

7. ADDITIONAL TREES TO BE PLANTED

The 10 trees to be mitigated and street trees will be addressed in the landscape plan, contracted by the developer.

8. DEPARTMENT OF NATURAL RESOURCES PERMIT

All land clearing permits will need to be approved by the City of Tumwater.

Once the land-clearing permit is approved by the City of Tumwater and **before land-clearing begins**, PFSI will meet on-site with the owner or owner's representative to make sure there is ample protection of the trees being retained.

If further information is needed regarding the trees on this site, please contact us.

Sincerely,

Michael D. Jackson, CF, ACF
Professional/Certified Forester #1244

Enclosures: Map Exhibit I
PFS Invoice #18-26

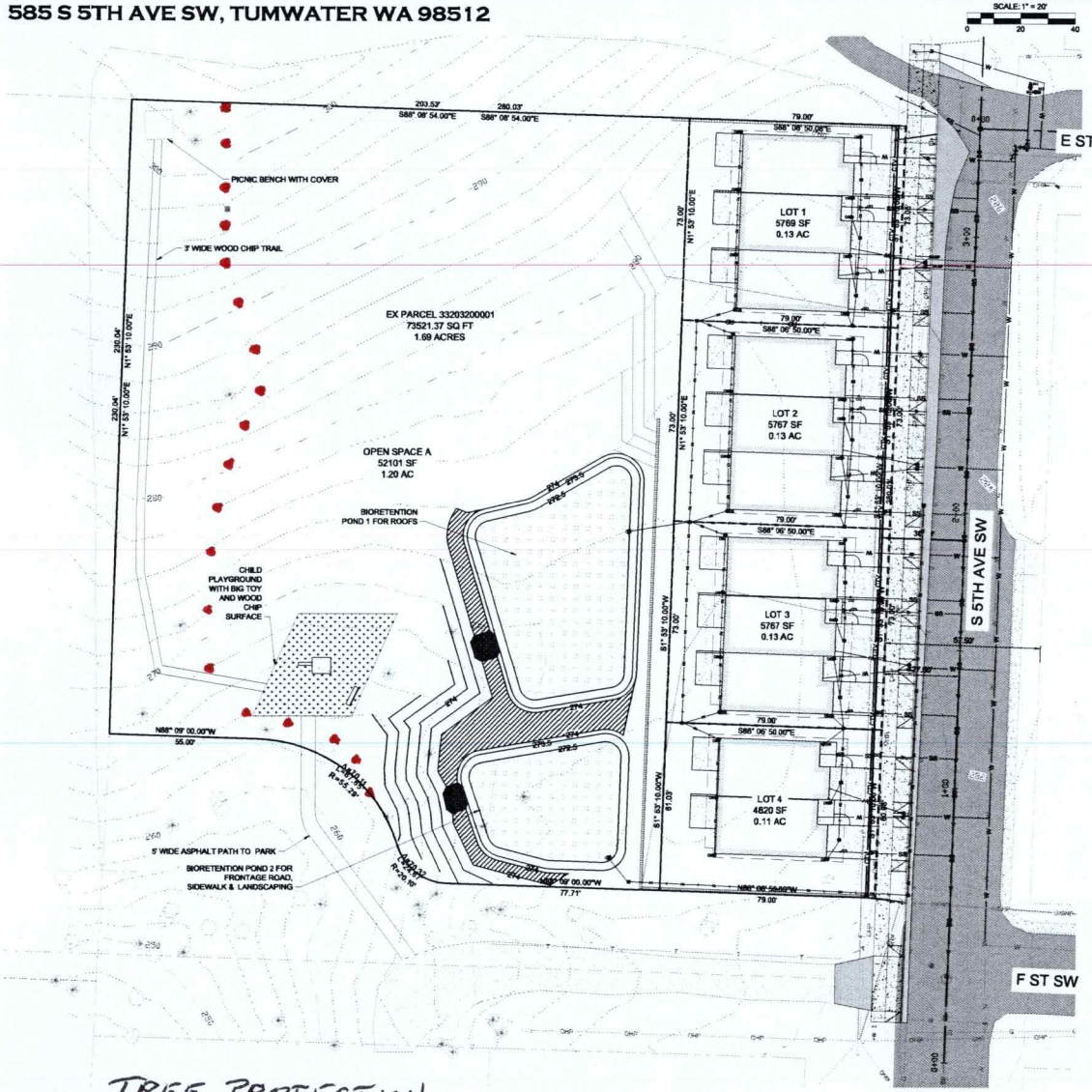
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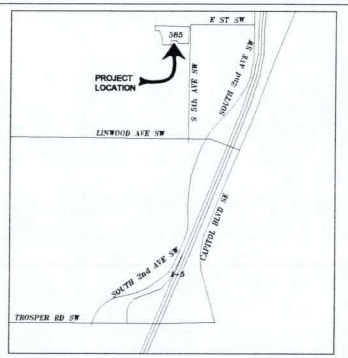
EXHIBIT I

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.

5TH AVE TOWNHOMES PREL BINDING SITE PLAN

585 S 5TH AVE SW, TUMWATER WA 98512





VICINITY MAP

NTS

LEGEND

	EXISTING	PROPOSED
SUBJECT PROPERTY LINE		
ADJACENT LOT LINE		
HABITAT BUFFER LINE		
WETLAND BUFFER LINE		
EASEMENT LINE		
RIGHT-OF-WAY LINE		
CENTER LINE		
CONTOUR, MAJOR	160	160
CONTOUR, MINOR	158	158
CONIFEROUS TREE		
DECIDUOUS TREE		
STREET SIGN		
POWER LINE		
OVERHEAD POWER LINE		
POWER POLE		
GUY WIRE		
POWER VAULT		
STREET LIGHT		
NATURAL GAS LINE	G	G
TELEPHONE LINE	T	T
TELEPHONE MANHOLE		OT
TELEPHONE PEDESTAL		OT
CABLE LINE		CTV
CABLE PEDESTAL		CTV
STORM MAIN LINE	SD	SD
FOOTING DRAIN LINE	FD	FD
ROOF DRAIN LINE	RD	RD
CATCH BASIN		CB
TYPE I CATCH BASIN		CB
YARD DRAIN		YD
DOWNSPOUT		DS
WATER MAIN LINE	W	W
WATER METER		
BLOWOFF VALVE/ FIRE HYDRANT		BO
GATE VALVE		
SEWER MANHOLE		SD
CLEANOUT		SD
SEWER MAIN LINE	SS	SS
CONCRETE		
ASPHALT PAVEMENT		
POROUS ASPHALT		
LANDSCAPING		
GRAVEL		

SITE INFO

SITE ADDRESS:	585 S 5th Ave SW, Tumwater, WA 98512
COMPREHENSIVE PLAN DESIGNATION:	RESIDENTIAL
ZONING:	SFM
PROPOSED IBC CONSTRUCTION TYPE:	5V-B
SCHOOL DISTRICT:	TUMWATER SCHOOL DISTRICT
FIRE DISTRICT:	FIRE DISTRICT #03
WATER PROVIDER:	CITY OF TUMWATER
SEWER PROVIDER:	CITY OF TUMWATER
ELECTRICITY PROVIDER:	PSE
GAS PROVIDER:	PSE
REFUSE/RECYCLING PROVIDER:	LeMAY
CABLE/TV PROVIDER:	COMCAST
TOTAL SITE AREA:	1.69 AC OR 73,521 SF
EXISTING NUMBER OF UNITS:	VACANT
TOTAL EX RESIDENTIAL UNITS:	0
PROPOSED PROJECT:	TOWNHOME BINDING SITE PLAN - PUD
PARKING SPACES REQUIRED RESIDENT:	2 SPACES / UNIT = 22 SPACES
PARKING SPACES PROP:	22 SPACES
OPEN SPACE REQUIRED:	15% OF SITE = 73,521 SF (0.15) = 11,028 SF
	50,257 SF PROVIDED

ADDITIONAL REGULATIONS:

MAXIMUM AVERAGE HOUSING DENSITY (units per acre) (NO DEVELOPMENT RIGHT PURCHASE REQUIRED)	(8) 1.70 AC = 14 UNITS
MAXIMUM AVERAGE HOUSING DENSITY (units per acre) (MUST PURCHASE 1 DEVELOPMENT RIGHTS FOR THE ADDITIONAL UNIT PER ACRE OF DENSITY)	(9) 1.70 AC = 15 UNITS
MINIMUM AVERAGE HOUSING DENSITY (units per acre)	(6) 1.70 AC = 11 UNITS
UNITS PROPOSED:	11 TOWN HOME UNITS
MINIMUM LOT SIZE:	3,200 SF
MINIMUM FRONT YARD SETBACKS	10' or 20' @ GARAGE
MINIMUM REAR YARD SETBACKS	10'
MINIMUM SIDE YARD SETBACKS	5'
MAXIMUM BUILDING HEIGHT	35'
MAXIMUM IMPERVIOUS COVERAGE	70% (TOWNHOUSE) (1.69AC) = 1.18 AC

PROJECT INFO

OWNER:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

LEGAL DESCRIPTION

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR;

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02095-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3667120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

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TOTAL ONSITE IMP COVERAGE:	14,829 SF (0.34 AC) OR 20% OK IF LESS THAN 80%

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: eric@thelanddeveloper.com

11/26/25

REVISIONS: DATE:

5TH AVE TOWNHOMES

COVER SHEET

PROJECT:
HOLTZE TOWNHOMES
9 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 1 OF 4
JOB NO: 21-132

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) (REQUIREMENT #2) REPORT

of

5th Ave Townhomes Binding Site Plan (BSP)
585 5th Ave SW
Tumwater, WA 98512

for

ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501
aholtze@gmail.com

by

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
A Division of THE LAND DEVELOPER, Inc.

Erik B. Ainsworth, PE
PO Box 4420
Tumwater, WA 98501
(360) 250-3973

September 24, 2025

TABLE OF CONTENTS

I. SWPPP (REQUIREMENT 2) CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP) 3

Element 1: Preserve vegetation/Mark Clearing Limits 3
Element 2: Establish Construction Access 3
Element 3: Control Flow Rates (Not required this project, threshold not met) 4
Element 4: Install Sediment Controls 4
Element 5: Stabilize Soils 4
Element 6: Protect Slopes 6
Element 7: Protect Drain Inlets 6
Element 8: Stabilize Channels and Outlets (Not applicable) 7
Element 9: Control Pollutants 7
Element 10: Control Dewatering (Not applicable) 8
Element 11: Maintain BMPs 8
Element 12: Manage the Project 8
Element 13: Protect Low Impact Development BMP's 10

II. CONSTRUCTION PHASING AND BMP IMPLEMENTATION 11

III. SITE INSPECTION AND MONITORING 12

VIII. APPENDICES

Appendix A Erosion Control Best Management Practices (BMP)

I. SWPPP (REQUIREMENT 2) CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Please reference Appendix A for construction plan sheets and Appendix B for applicable Erosion and Sediment Control Best Management Practices (BMP).

Element 1: Preserve vegetation/Mark Clearing Limits

• Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area. These shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

• Plastic, metal, or stake wire fence may be used to mark the clearing limits.

• The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable. If it is not practicable to retain the duff layer in place, it should be stockpiled on site, covered to prevent erosion, and replaced immediately upon completion of the ground disturbing activities.

• Suggested BMPs:

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones
- BMP C103: High Visibility Plastic Fence.

Element 2: Establish Construction Access

• Construction vehicle access and exit shall be limited to one route, if possible, or two for linear projects such as roadways where more than one access is necessary for large equipment maneuvering.

• Access points shall be stabilized with a pad of quarry spalls, crushed rock, or equivalent BMP prior to traffic leaving the construction site to minimize the tracking of sediment onto all roads and accesses.

• Wheel wash or tire baths should be located on site, if the stabilized constructions entrance is not effective in preventing sediment from being tracked onto roads/accesses.

• If sediment is tracked off site, roads/accesses shall be cleaned thoroughly at the end of each day, or more frequently during wet weather, if necessary to prevent sediment from entering waters of the state. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner.

• Street wash wastewater shall be controlled by pumping back on site to an approved infiltration facility, or otherwise must be prevented from discharging into systems tributary to state surface waters. Options include discharge to the sanitary sewer, or discharge to an approved offsite

treatment system. For discharges to the sanitary sewer, permits must be obtained from the County Industrial Pretreatment Program at (253) 798-3013.

• Suggested BMPs:
- BMP C105: Stabilized Construction Entrance
- BMP C107: Construction Road/Parking Area Stabilization.

Element 3: Control Flow Rates (Not required this project, threshold not met)

Element 4: Install Sediment Controls

• Prior to leaving a construction site or prior to discharge to an infiltration facility, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas (see Element #5 second bullet item) may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Element #3 (first bullet item).

• Sediment ponds, vegetated buffer strips, sediment barriers or filters, dikes, and other BMPs intended to trap sediment on site shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.

• Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing indicated in Element #5.

• BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.

• Suggested BMPs:
- BMP C233: Silt Fence
- BMP C234: Vegetated Strip
- BMP C235: Straw Wattles

Element 5: Stabilize Soils

• All exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrop impact, flowing water, and wind.

• Full stabilization means all soil disturbing activities at the site have been completed and areas where the soil or natural vegetative cover has been disturbed have been properly covered and accepted to meet permanent erosion control. Permanent erosion control can include concrete or asphalt paving; quarry spalls used as ditch lining; application of thick layers of gravel or mulch; or vegetative cover in a manner that will fully prevent soil erosion. Where the term "fully established" is used to describe vegetative cover or plantings, it shall be understood to mean that healthy vegetation covers 90 percent of exposed bare soil. The application of hydroseeding, even in conjunction with a bonded fiber matrix (BFM) or rolled erosion product, will not be accepted as fully established permanent erosion control before the necessary development and ground cover requirements of the plantings are met. The strong root structures of well established

vegetation are an essential mechanism in controlling soil erosion. The county will inspect and must approve all areas as fully stabilized before the release of financial guarantees.

• Temporary erosion control measures shall remain in place until permanent measures are established.

• From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This condition applies to all soils on site, whether at final grade or not.

• Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

• Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.

• Soil stabilization measures should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or groundwater.

• Soil stockpiles must be stabilized from erosion, protected with sediment trapping measures, and when possible, be located away from storm drain inlets, waterways and drainage channels.

• Linear construction activities, including right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and restabilize the disturbed soils so that:

- From October 1 through April 30 no soils shall remain exposed
- and unworked for more than 2 days, and
- From May 1 to September 30, no soils shall remain exposed
- and unworked for more than 7 days.

• Permanent site stability will be achieved by hydroseeding, mulch and placing beauty bark on disturbed areas. Coordinate with owner for location of each permanent BMP.

Suggested BMPs:

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C122: Nets and Blankets
- BMP C123: Plastic Covering
- BMP C124: Sodding
- BMP C125: Topsoiling
- BMP C130: Surface Roughening
- BMP C131: Gradient Terraces
- BMP C140: Dust Control.

Element 6: Protect Slopes

• Design and construct cut and fill slopes in a manner that will minimize erosion. Cover slopes with plastic covering BMP C123 as necessary to minimize erosion.

• Consider soil type and its potential for erosion.

• Reduce slope runoff velocities by reducing continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.

• Offsite stormwater (run-on) shall be diverted away from slopes and disturbed areas with interceptor dikes and/or swales. Offsite stormwater must be managed separately from stormwater generated on the site.

• At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains shall handle the peak flow from a 10-year, 24-hour event assuming a Type 1A rainfall distribution. Alternatively, the 10-year, 1-hour time step flow rates indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. If a 15-minute (or less) time step is used, no correction factor is required. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis shall use the temporary or permanent project land cover condition, whichever will produce the highest flow rates.

• Permanent pipe slope drains shall be sized for the 100-year, 24-hour event.

• Provide drainage to remove groundwater intersecting the slope surface of exposed soil areas.

• Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.

• Check dams shall be placed at regular intervals within channels that are cut down a slope.

• Stabilize soils on slopes, as specified in Element #5.

• Suggested BMPs:
- BMP C120: Temporary and Permanent Seeding
- BMP C130: Surface Roughening
- BMP C131: Gradient Terraces

Element 7: Protect Drain Inlets

• All storm drain inlets made operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

• All approach roads shall be kept clean. Sediment and street wash wastewater shall be controlled as specified above in Element #2.

• Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

• Suggested BMPs:
- BMP C220: Storm Drain Inlet Protection.

Element 8: Stabilize Channels and Outlets (Not applicable)

Element 9: Control Pollutants

• All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site.

• Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. Onsite fueling tanks shall include secondary containment.

• Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on site using temporary plastic placed beneath and, if raining, over the vehicle.

• Wheel wash or tire bath wastewater shall be discharged to a separate onsite treatment system or to the sanitary sewer. • Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed.

• BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water.

• Construction sites shall adjust the pH of stormwater if necessary to prevent violations of water quality standards. Projects must obtain written approval from the Department of Ecology prior to using chemical treatment other than CO_2 or dry ice to adjust pH.

• Suggested BMPs:
- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- See Volume IV – Source Control BMPs.

Element 10: Control Dewatering (Not applicable)

• Foundation, vault, and trench dewatering water, which have similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels must be stabilized, as specified in Element #8.

• Clean, non-turbid dewatering water, such as well-point groundwater, can be discharged to systems tributary to state surface waters, as specified in Element #8, provided the dewatering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.

• Highly turbid or contaminated dewatering water from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam, shall be handled separately from stormwater.

• Other disposal options, depending on site constraints, may include:

- Infiltration
- Transport offsite in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters
- Ecology-approved onsite chemical treatment or other suitable treatment technologies
- Sanitary sewer discharge with local sewer district approval, if there is no other option
- Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

Element 11: Maintain BMPs

• All temporary and permanent ESC BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMP specifications.

• All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs
or vegetation shall be permanently stabilized.

Element 12: Manage the Project

Phasing of Construction

• Development projects shall be phased where feasible in order to prevent soil erosion and, to the maximum extent practicable, the transport of sediment from the site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

• Clearing and grading activities for developments shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance/compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas,

buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

• Seasonal Work Limitations:
From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the county that silt-laden runoff will be prevented from leaving the site through a combination of the following:

- Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters
- Limitations on activities and the extent of disturbed areas
- Proposed ESC measures.

• Based on the information provided and/or local weather conditions, the county may expand or restrict the seasonal limitation on site disturbance. The county shall take enforcement action – such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

- If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard
- If clearing and grading limits or ESC measures shown in the approved plan are not maintained.

• The following activities are exempt from the seasonal clearing and grading limitations:

- Routine maintenance and necessary repair of ESC BMPs
- Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil
- Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed ESC facilities.

Coordination with Utilities and Other Contractors
• The primary project applicant shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.
• Inspection and Monitoring:

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of ESC. The person must have the skills to: 1) assess the site conditions and construction activities that could impact the quality of stormwater and 2) assess the effectiveness of ESC measures used to control the quality of stormwater discharges.
- For construction sites that will disturb 1 acre or more and that discharge stormwater to surface waters of the state, a Certified Erosion and Sediment Control Lead (CESCL) shall be identified in the Construction SWPPP and shall be on site or on-call at all times. Certification may be obtained through an approved training program that meets the ESC training standards established by Ecology.
- Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

• Maintaining an updated Construction SWPPP:

- The Construction SWPPP shall be retained on site or within reasonable access to the site.
- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within 7 days following the inspection.

Element 13: Protect Low Impact Development BMP's

Phasing of Construction

- Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of Construction SWPPP BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/Rain Garden soils, and replacing the removed soils with soils meeting the design specification.

- Prevent compacting Bioretention and Rain Garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements, including permeable pavement subgrade, reservoir course, or wearing course.

- Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures shown in Volume III of this manual or the manufacturer's procedures.

- Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

- See Section 3.3 for more details on protecting LID BMPs.

- **Suggested BMPs:**
    - BMP C102: Buffer Zone
    - BMP C103: High Visibility Fence
    - BMP C200: Interceptor Dike and Swale
    - BMP C201: Grass-Lined Channels
    - BMP C207: Check Dams
    - BMP C208: Triangular Silt Dike (TSD) (Geotextile-Encased Check Dam)
    - BMP C231: Brush Barrier
    - BMP C233: Silt Fence
    - BMP C234: Vegetated Strip
    - BMP C235: Straw Wattles
    - BMP C236: Vegetated Filtration

II. CONSTRUCTION PHASING AND BMP IMPLEMENTATION

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the Cascade Mountain Crest. As such, the dry season is considered to be from May 1 to September 30 and the wet season is considered to be from October 1 to April 30.

Estimated construction start date (during wet season): _____

Estimated construction end date: _____

Mobilize equipment on-site: _____

Mobilize and store all ESC and soil stabilization products _____

Install ESC measures: _____

Install stabilized construction entrance: _____

Begin clearing and grading: _____

Begin site grading: _____

Site inspections and monitoring conducted weekly and for applicable rain events: _____

Implement Element #12 BMP's and manage site to minimize soil disturbance during the wet season: none

Final landscaping and planting begins: _____

Permanent erosion control measures: _____

III. SITE INSPECTION AND MONITORING

Monitoring includes visual inspection and monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book shall be maintained for all on-site construction activities and shall include:

1. A record of the implementation of the erosion control plan BMP's.
2. Site Inspections.

SITE INSPECTION

All BMP's shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function.

Site inspection shall occur in all areas disturbed by construction activities and at all stormwater discharge points. The site inspection shall evaluate and document the effectiveness of the installed BMP's and determine if it is necessary to repair or replace any of the BMP's to improve the quality of stormwater discharges. All maintenance and repairs shall be documented in the site log book or forms provided in this document. All new BMP's or design changes shall be documented as soon as possible.

SITE INSPECTION FREQUENCY

Site inspections shall be conducted at least once a week and within 24 hours following any rainfall event which causes a discharge of stormwater from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduce to once every month.

APPENDIX B – EROSION CONTROL BMP'S

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by local governments.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local governments may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

  Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be

laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2-3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24-hours.

  Backfill the trench as soon as possible.

  Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of Grand fir, Pacific silver fir, Noble fir, Sitka spruce, Western red cedar, Western hemlock, Pacific dogwood, and Red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots,

and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

- If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or lopers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-areas buffer zones should not be used as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

BMP C103: High Visibility Fence

Purpose

Fencing is intended to:

1. Restrict clearing to approved limits.
2. Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
3. Limit construction traffic to designated construction entrances, exits, or internal roads.
4. Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 lbs./ft. using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233 to act as high visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Entrance / Exit

Purpose

Stabilized Construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

Conditions of Use

Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential construction provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size/configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

See Figure 4.1.1 for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction entrances with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products raise pH levels in stormwater and concrete discharge to surface waters of the State is prohibited.

A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.

- Fencing (see BMP C103) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMP C103) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

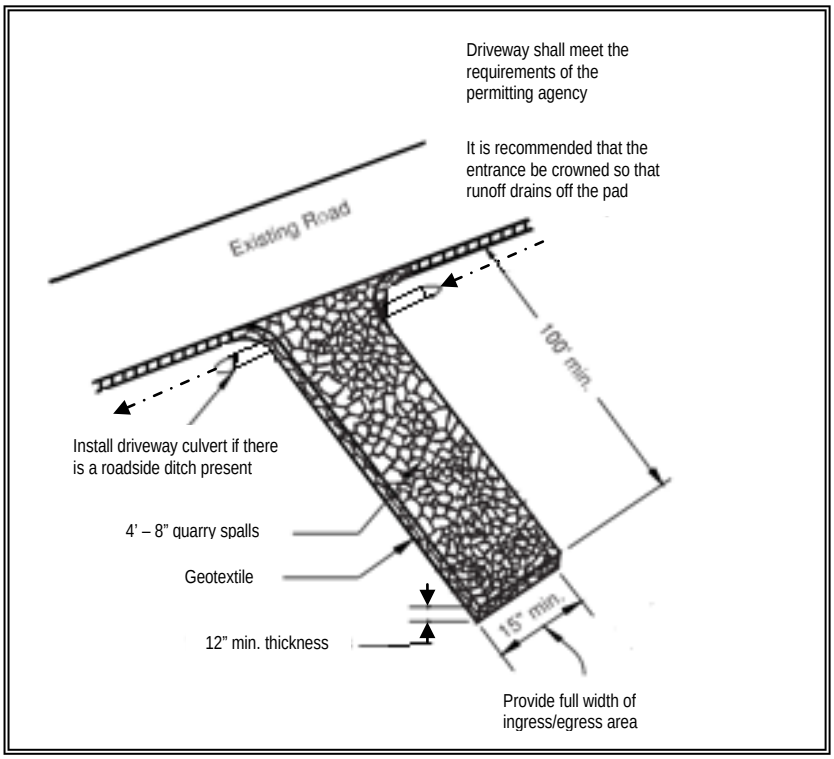


Figure 4.1.1 – Stabilized Construction Entrance

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C105. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Conditions of Use

When a stabilized construction entrance (see BMP C105) is not preventing sediment from being tracked onto pavement.

- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.

- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.
- Wheel wash or tire bath wastewater should not include wastewater from concrete washout areas.

Design and Installation Specifications

Suggested details are shown in Figure 4.1.2. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 1-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out the day with fresh water.

The wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wash water will need to be changed more often.

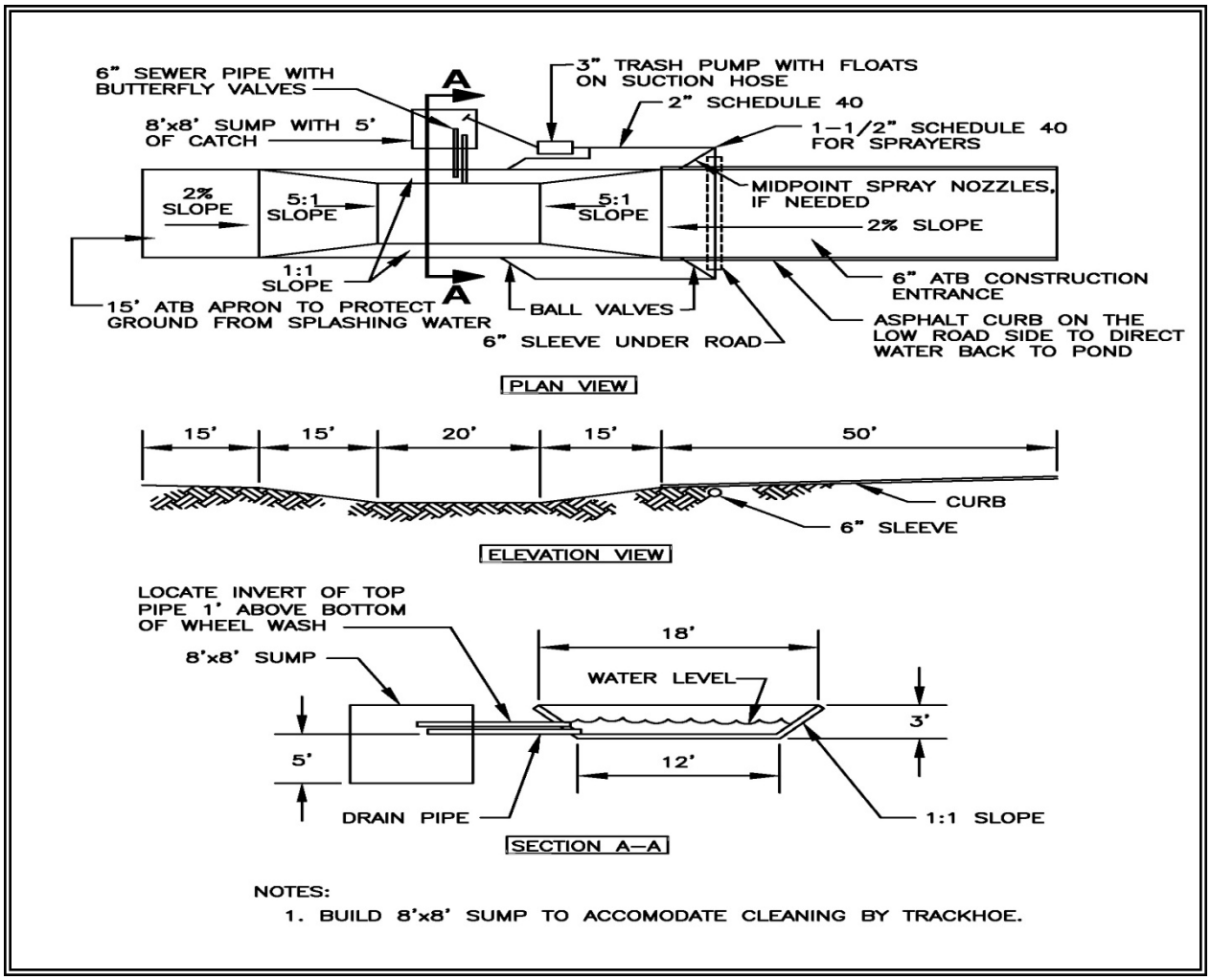


Figure 4.1.2 – Wheel Wash

Notes:

1. Asphalt construction entrance 6 in. asphalt treated base (ATB).
2. 3-inch trash pump with floats on the suction hose.
3. Midpoint spray nozzles, if needed.
4. 6-inch sewer pipe with butterfly valves. Bottom one is a drain. Locate top pipe's invert 1 foot above bottom of wheel wash.
5. 8 foot x 8 foot sump with 5 feet of catch. Build so the sump can be cleaned with a trackhoe.
6. Asphalt curb on the low road side to direct water back to pond.
7. 6-inch sleeve under road.
8. Ball valves.
9. 15 foot. ATB apron to protect ground from splashing water.

BMP C107: Construction Road/Parking Area Stabilization

Purpose

Stabilizing subdivision roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Conditions of Use

Roads or parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.

- High Visibility Fencing (see BMP C103) shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for roadbase stabilization, pH monitoring and BMPs (BMPs C252 and C253) are necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall not exceed 15 percent. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a super-elevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheet-flows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has at least 50 feet of vegetation that water can flow through, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands or their buffers. If runoff is allowed to sheetflow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water entering the storm drain system (see BMP C220).

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc. shall be added as required to maintain a

stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch with straw or an erosion control blanket until 75 percent grass cover is established.

Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.

- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch, all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion.

Design and Installation Specifications

Seed retention/detention ponds as required.

Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If vegetated channels cannot be established by seed before water flow; install sod in the channel bottom—over hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:

  1. Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
  2. Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:

  1. Installing the mulch, seed, fertilizer, and tackifier in one lift.
  2. Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
  3. Hold straw in place with a standard tackifier.

  Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

  - Irrigation.
  - Reapplication of mulch.
  - Repair of failed slope surfaces.

  This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM/MBFMs (3,000 pounds per acre minimum).
- Seed may be installed by hand if:
  - Temporary and covered by straw, mulch, or topsoil.
  - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in the tables below include recommended mixes for both temporary and permanent seeding.

- Apply these mixes, with the exception of the wetland mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used.
- Consult the local suppliers or the local conservation district for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used.
- Other mixes may be appropriate, depending on the soil type and hydrology of the area.

- Table 4.1.2 lists the standard mix for areas requiring a temporary vegetative cover.

Table 4.1.2
Temporary Erosion Control Seed Mix

	% Weight	% Purity	% Germination
Chewings or annual blue grass *Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye - *Lolium perenne*	50	98	90
Redtop or colonial bentgrass *Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

- Table 4.1.3 lists a recommended mix for landscaping seed.

Table 4.1.3
Landscaping Seed Mix

	% Weight	% Purity	% Germination
Perennial rye blend *Lolium perenne*	70	98	90
Chewings and red fescue blend *Festuca rubra var. commutata* or *Festuca rubra*	30	98	90

- Table 4.1.4 lists a turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.

Table 4.1.4
Low-Growing Turf Seed Mix

	% Weight	% Purity	% Germination
Dwarf tall fescue (several varieties) *Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay) *Lolium perenne var. barclay*	30	98	90
Red fescue *Festuca rubra*	20	98	90
Colonial bentgrass *Agrostis tenuis*	5	98	90

- Table 4.1.5 lists a mix for bioswales and other intermittently wet areas.

Table 4.1.5
Bioswale Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	92	85
Redtop bentgrass *Agrostis alba* or *Agrostis gigantea*	5-10	90	80

* *Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.6 lists a low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Apply this mixture at a rate of 60 pounds per acre. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.

Table 4.1.6
Wet Area Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	98	85
Meadow foxtail *Alepocurus pratensis*	10-15	90	80
Alsike clover *Trifolium hybridum*	1-6	98	90
Redtop bentgrass *Agrostis alba*	1-6	92	85

** Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.7 lists a recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.

Table 4.1.7
Meadow Seed Mix

	% Weight	% Purity	% Germination
Redtop or Oregon bentgrass *Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue *Festuca rubra*	70	98	90
White dutch clover *Trifolium repens*	10	98	90

- **Roughening and Rototilling:**
  - The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
  - Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.
- **Fertilizers:**
  - Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
  - Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
  - In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
  - There are numerous products available that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.
- **Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix:**
  - On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre of mulch with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Installed products per manufacturer's instructions. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils.

Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.

- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
  - BFM and MBFMs do not require surface preparation.
  - Helicopters can assist in installing BFM and MBFMs in remote areas.
  - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
  - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C120. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and

during the hot summer months.

- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

- For seeded areas mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table 4.1.8. Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Maintenance Standards

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

Table 4.1.8
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Composted Mulch and Compost	No visible water or dust during handling. Must be produced in accordance with WAC 173-350, Solid Waste Handling Standards. .	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Composted mulch has a coarser size gradation than compost. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use composted mulch near wetlands or near phosphorous impaired water bodies.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" thick min.;	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch or Wood Straw	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2” thick min.; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called “hog or hogged fuel.” The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.	2” thick min.	Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and ⅜-inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT specification (9-14.4(4))

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows. Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (for example, coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap. 100 percent synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of blankets include:

- Surface preparation required.
- On slopes steeper than 2.5H:1V, blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000-6,000 per acre installed.

Advantages of blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training
- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

Design and Installation Specifications

- See Figure 4.1.3 and Figure 4.1.4 for typical orientation and installation of blankets used in channels and as slope protection. Note: these are typical only; all blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Installation of Blankets on Slopes:
    1. Complete final grade and track walk up and down the slope.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the blanket into the small trench and staple approximately every 18 inches. NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the blanket slowly down the slope as installer walks backwards. NOTE: The blanket rests against the installer's legs. Staples are installed as the blanket is unrolled. It is critical that the proper staple pattern is used for the blanket being installed. The blanket is not to be allowed to roll down the slope on its own as this stretches the blanket making it impossible to maintain soil contact. In addition, no one is allowed to walk on the blanket after it is in place.
    6. If the blanket is not long enough to cover the entire slope length, the trailing edge of the upper blanket should overlap the leading edge of the lower blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.
- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the design engineer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available at the following web sites:
    1. WSDOT (Section 3.2.4):

       http://www.wsdot.wa.gov/NR/rdonlyres/3B41E087-FA86-4717-932D-D7A8556CCD57/0/ErosionTrainingManual.pdf
    2. Texas Transportation Institute:

       http://www.txdot.gov/business/doing_business/product_evaluation/erosion_control.htm

- Use jute matting in conjunction with mulch (BMP C121). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- 100-percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning they break down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

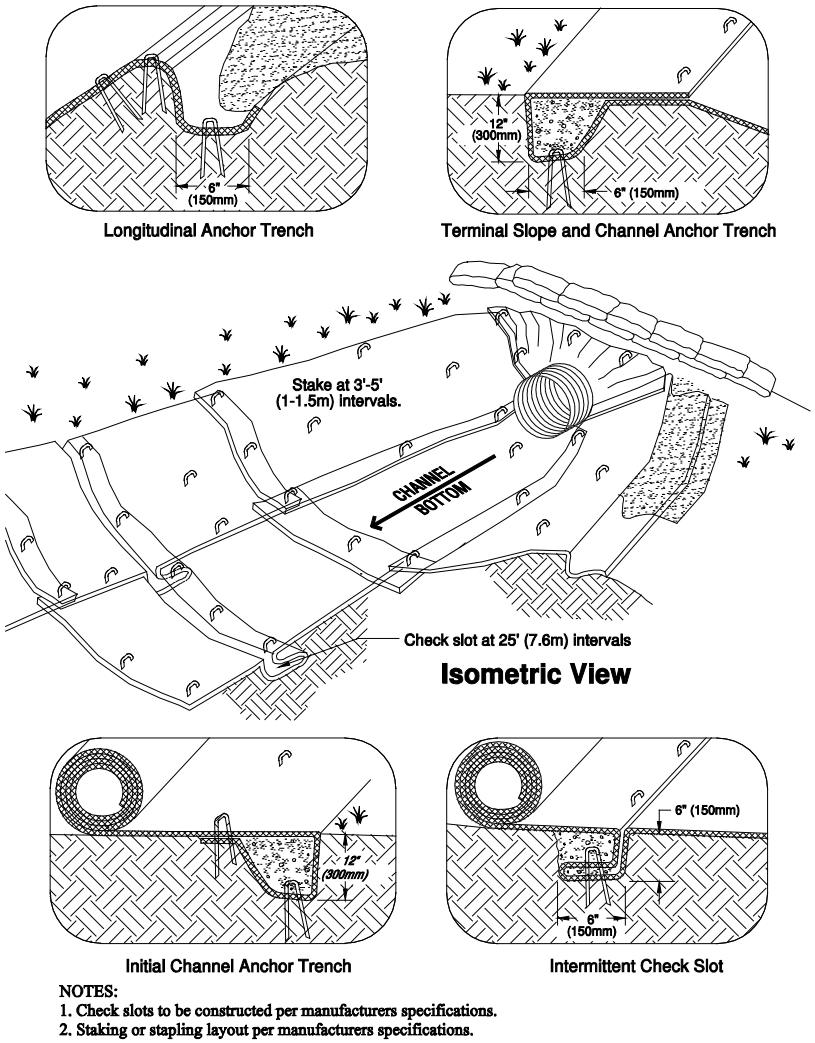


Figure 4.1.3 – Channel Installation

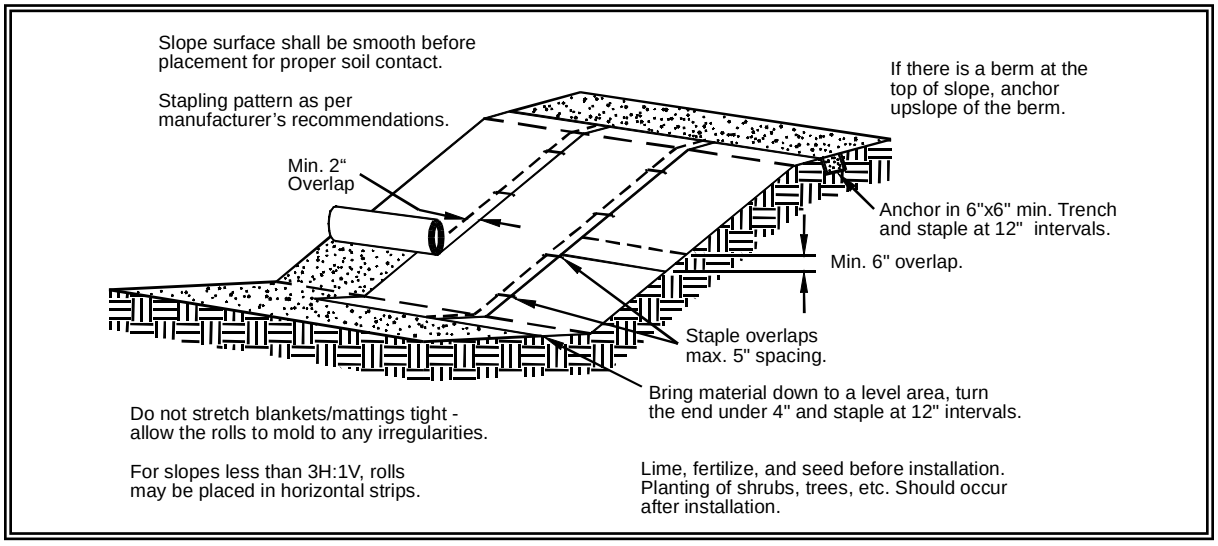


Figure 4.1.4 – Slope Installation

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to $1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    1. Temporary ditch liner.
    2. Pond liner in temporary sediment pond.
    3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    4. Emergency slope protection during heavy rains.
    5. Temporary drainpipe (“elephant trunk”) used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down slope, not across slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
    3. Minimum of 8-inch overlap at seams.

4. On long or wide slopes, or slopes subject to wind, tape all seams.
5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C123. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C124: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, of uniform thickness (approximately 1-inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

- Shape and smooth the surface to final grade in accordance with the approved grading plan. The swale needs to be overexcavated 4 to 6 inches below design elevation to allow room for placing soil amendment and sod.
- Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than ten percent or the permeability is less than 0.6 inches per hour. See http://www.ecy.wa.gov/programs/swfa/organics/soil.html for further information.
- Fertilize according to the supplier's recommendations.
- Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
- Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
- Roll the sodded area and irrigate.
- When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.

BMP C125: Topsoiling / Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support

installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from, and what vegetation was on site before disturbance, invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhiza products when using off-site topsoil.

Design and Installation Specifications

Meet the following requirements for areas requiring disruption and topsoiling:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
  - A minimum depth of 8-inches. Scarify subsoils below the topsoil layer at least 4-inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or re-structuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system.

- A minimum organic content of 10% dry weight, and 5% organic matter content in turf areas. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
- A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
- If blended topsoil is imported, then fines should be limited to 25 percent passing through a 200 sieve.

- Accomplish the required organic content and pH by either returning native topsoil to the site and/or incorporating organic amendments.
  - To meet the organic content use compost that meets the definition of "composted materials" in WAC 173-350-220. This code is available online at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350-220.

    The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25H:1V.

    The carbon to nitrogen ratio may be as high as 35H:1V for plantings composed entirely of plants native to the Puget Sound Lowlands region.
  - For till soils use a mixture of approximately two parts soil to one part compost. This equates to 4 inches of compost mixed to a depth of 12 inches in till soils. Increasing the concentration of compost beyond this level can have negative effects on vegetal health, while decreasing the concentrations can reduce the benefits of amended soils.
  - Gravel or cobble outwash soils, may require different approaches. Organics and fines easily migrate through the loose structure of these soils. Therefore, the importation of at least 6 inches of quality topsoil, underlain by some type of filter fabric to prevent the migration of fines, may be more appropriate for these soils.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.
- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to

establish vegetation. The best method to prevent a lack of bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.

- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and clay loam). Avoid areas of natural ground water recharge.
- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Stockpiled topsoil is to be reapplied to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.

Stockpiling of topsoil shall occur in the following manner:

- Side slopes of the stockpile shall not exceed 2H:1V.
- Between October 1 and April 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil.
  - Within 2 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- Between May 1 and September 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.
  - Within 7 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- When native topsoil is to be stockpiled and reused the following should apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:
  1. Re-install topsoil within 4 to 6 weeks.

2. Do not allow the saturation of topsoil with water.
3. Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection

Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion.

Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body.

In areas that drain to a sediment pond, PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- In Staging areas.
- Balanced cut and fill earthwork.
- Haul roads prior to placement of crushed rock surfacing.
- Compacted soil roadbase.
- Stockpiles.
- After final grade and before paving or final seeding and planting.
- Pit sites.

- Sites having a winter shut down. In the case of winter shut down, or where soil will remain unworked for several months, PAM should be used together with mulch.

Design and Installation Specifications

PAM may be applied with water in dissolved form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of 2/3 pound PAM per 1,000 gallons water (80 mg/L) per 1 acre of bare soil. Table 4.1.9 can be used to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM **do not** provide any additional effectiveness.

Table 4.1.9
PAM and Water Application Rates

Disturbed Area (ac)	PAM (lbs)	Water (gal)
0.50	0.33	500
1.00	0.66	1,000
1.50	1.00	1,500
2.00	1.32	2,000
2.50	1.65	2,500
3.00	2.00	3,000
3.50	2.33	3,500
4.00	2.65	4,000
4.50	3.00	4,500
5.00	3.33	5,000

The Preferred Method:

- Pre-measure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate (2/3 pound PAM/1000 gallons/acre).
- PAM has infinite solubility in water, but dissolves very slowly. Dissolve pre-measured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight. Mechanical mixing will help dissolve the PAM. Always add PAM to water - not water to PAM.
- Pre-fill the water truck about 1/8 full with water. The water does not have to be potable, but it must have relatively low turbidity – in the range of 20 NTU or less.
- Add PAM /Water mixture to the truck
- Completely fill the water truck to specified volume.
- Spray PAM/Water mixture onto dry soil until the soil surface is uniformly and completely wetted.

An Alternate Method:

PAM may also be applied as a powder at the rate of 5 lbs. per acre. This must be applied on a day that is dry. For areas less than 5-10 acres, a hand-held “organ grinder” fertilizer spreader set to the smallest setting will work. Tractor-mounted spreaders will work for larger areas.

The following shall be used for application of powdered PAM:

- Powered PAM shall be used in conjunction with other BMPs and not in place of other BMPs.
- Do not use PAM on a slope that flows directly into a stream or wetland. The stormwater runoff shall pass through a sediment control BMP prior to discharging to surface waters.
- Do not add PAM to water discharging from site.
- When the total drainage area is greater than or equal to 5 acres, PAM treated areas shall drain to a sediment pond.
- Areas less than 5 acres shall drain to sediment control BMPs, such as a minimum of 3 check dams per acre. The total number of check dams used shall be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam shall be spaced evenly in the drainage channel through which stormwater flows are discharged off-site.
- On all sites, the use of silt fence shall be maximized to limit the discharges of sediment from the site.
- All areas not being actively worked shall be covered and protected from rainfall. PAM shall not be the only cover BMP used.
- PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.
- PAM will work when applied to saturated soil but is not as effective as applications to dry or damp soil.
- Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in three months after exposure to sunlight and air.
- Proper application and re-application plans are necessary to ensure total effectiveness of PAM usage.
- PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent over-spray from reaching pavement as pavement will become slippery. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water-this only makes cleanup messier and take longer.
- Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.

The specific PAM copolymer formulation must be anionic. **Cationic PAM shall not be used in any application because of known aquatic toxicity problems.** Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, will be used for soil applications. Recent media attention and high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer." All PAM are polymers, but not all polymers are PAM, and not all PAM products comply with ANSI/NSF Standard 60. PAM use shall be reviewed and approved by the local permitting authority.

- PAM designated for these uses should be "water soluble" or "linear" or "non-crosslinked". Cross-linked or water absorbent PAM, polymerized in highly acidic (pH<2) conditions, are used to maintain soil moisture content.
- The PAM anionic charge density may vary from 2-30 percent; a value of 18 percent is typical. Studies conducted by the United States Department of Agriculture (USDA)/ARS demonstrated that soil stabilization was optimized by using very high molecular weight (12-15 mg/mole), highly anionic (>20% hydrolysis) PAM.

- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5-1 lb. per 1000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at a rate of 3 –5 lbs. per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM treated soil is left undisturbed a reapplication may be necessary after two months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are

created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding..
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 4.1.5 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are graded in this manner should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-graded and re-seeded immediately.

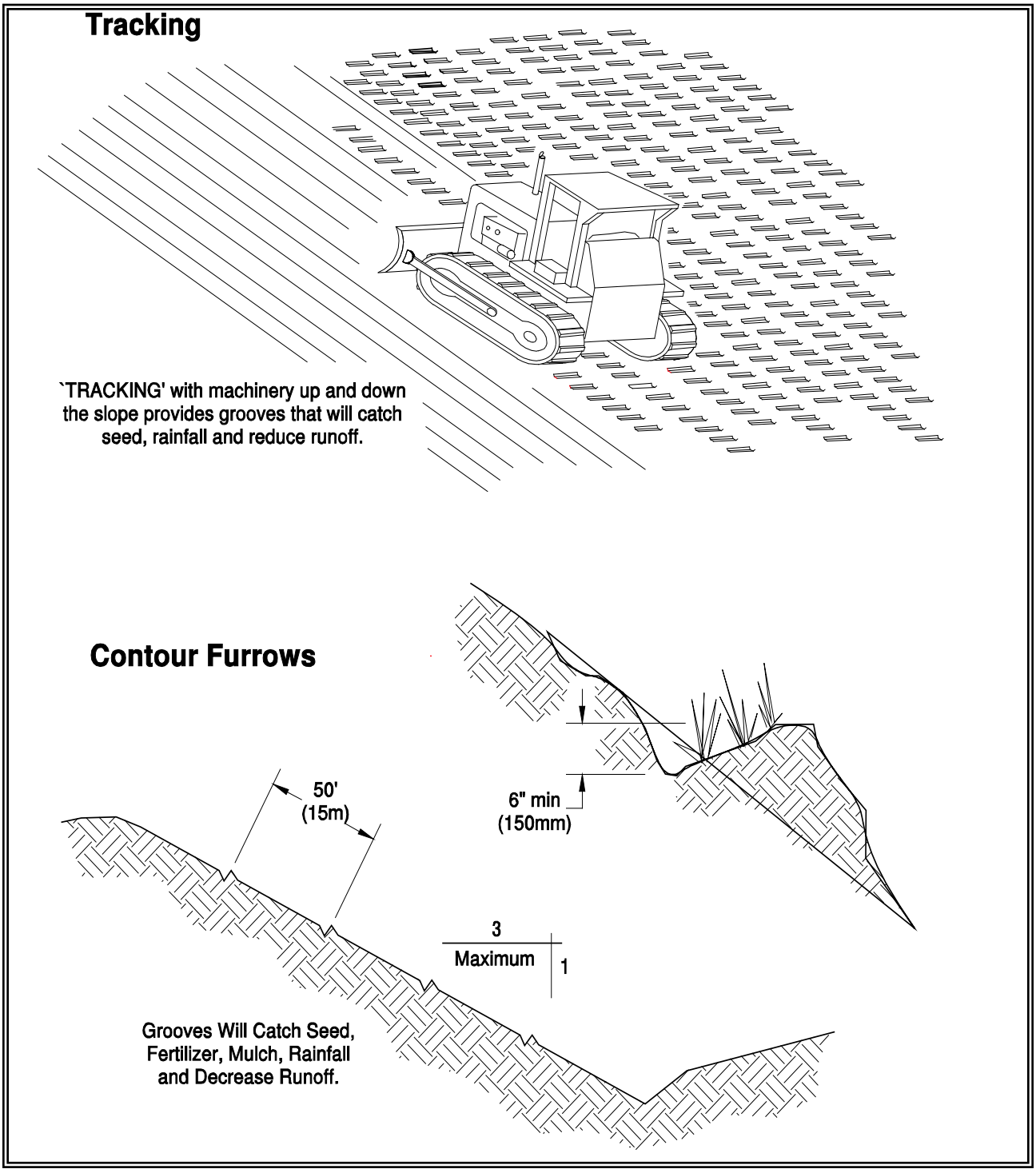


Figure 4.1.5 – Surface Roughening by Tracking and Contour Furrows

BMP C131: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Conditions of Use

- Gradient terraces normally are limited to denuded land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may be used only where suitable outlets are or will be made available. See Figure 4.1.6 for gradient terraces.

Design and Installation Specifications

- The maximum vertical spacing of gradient terraces should be determined by the following method:

  VI = (0.8)s + y

  Where: VI = vertical interval in feet

  s = land rise per 100 feet, expressed in feet

  y = a soil and cover variable with values from 1.0 to 4.0

  Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1½ tons of straw/acre equivalent) is on the surface.

- The minimum constructed cross-section should meet the design dimensions.
- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.
- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length (0.6%). For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type.
- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover should be used in the outlet channel.
- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow.

- Vertical spacing determined by the above methods may be increased as much as 0.5 feet or 10 percent, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet. The drainage area above the terrace should not exceed the area that would be drained by a terrace with normal spacing.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross-section should be proportioned to fit the land slope. The ridge height should include a reasonable settlement factor. The ridge should have a minimum top width of 3 feet at the design height. The minimum cross-sectional area of the terrace channel should be 8 square feet for land slopes of 5 percent or less, 7 square feet for slopes from 5 to 8 percent, and 6 square feet for slopes steeper than 8 percent. The terrace can be constructed wide enough to be maintained using a small vehicle.

Maintenance Standards

- Maintenance should be performed as needed. Terraces should be inspected regularly; at least once a year, and after large storm events.

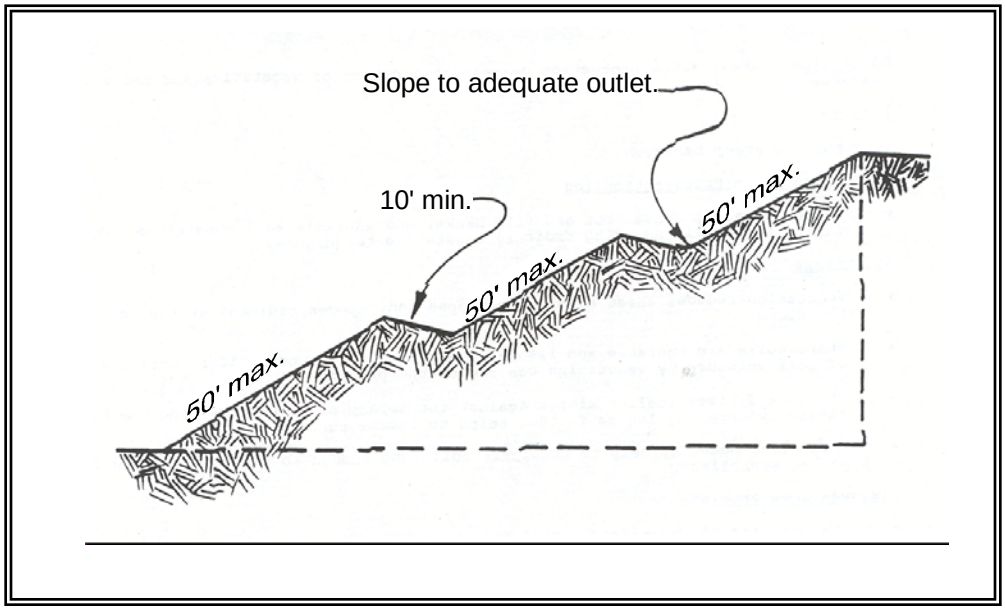


Figure 4.1.6 – **Gradient Terrace**s

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

- In areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126) added to water at a rate of 0.5 lbs. per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control. Use of PAM could be a cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.

- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Restrict use of paved roadways by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.
- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP.

Maintenance Standards Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy summer rains. Having these materials on-site reduces the time needed to implement BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel “T” posts.
- Materials are stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or developer could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

Material
Clear Plastic, 6 mil
Drainpipe, 6 or 8 inch diameter
Sandbags, filled
Straw Bales for mulching,
Quarry Spalls
Washed Gravel
Geotextile Fabric
Catch Basin Inserts
Steel "T" Posts
Silt fence material
Straw Wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel "T" posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials used as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the state.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Design and Installation

- Wash out concrete truck chutes, pumps, and internals into formed areas only. Assure that washout of concrete trucks is performed off-

Specifications

site or in designated concrete washout areas. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Refer to BMP C154 for information on concrete washout areas.

- Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas.
- Wash off hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels into formed areas only.
- Wash equipment difficult to move, such as concrete pavers in areas that do not directly drain to natural or constructed stormwater conveyances.
- Do not allow washdown from areas, such as concrete aggregate driveways, to drain directly to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no formed areas are available,. Dispose of contained concrete in a manner that does not violate ground water or surface water quality standards.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMPs C252 and C253 for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit for pH monitoring requirements if the project involves one of the following activities:
  - Significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete used over the life of a project).
  - The use of engineered soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
  - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and vacuum trucks.

BMP C153: Material Delivery, Storage and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g. Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, and within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

Material Storage Areas and Secondary Containment Practices:

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1-Water Resistant Nylon Bag
    - 3-Oil Absorbent Socks 3”x 4’
    - 2-Oil Absorbent Socks 3”x 10’
    - 12-Oil Absorbent Pads 17”x19”
    - 1-Pair Splash Resistant Goggles
    - 3-Pair Nitrile Gloves
    - 10-Disposable Bags with Ties
    - Instructions

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout off-site, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or ground water.

Conditions of Use

Concrete washout area best management practices are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete trucks, pumpers, or other concrete coated equipment are washed on-site.
- Note: If less than 10 concrete trucks or pumpers need to be washed out on-site, the washwater may be disposed of in a formed area awaiting concrete or an upland disposal site where it will not contaminate surface or ground water. The upland disposal site shall be at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.

Design and Installation Specifications

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Perform washout of concrete trucks off-site or in designated concrete washout areas only.
- Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate washout area at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.
- Allow convenient access for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access washout, prevent track-out with a pad of rock or quarry spalls (see BMP C105). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of facilities you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, washouts should be placed in multiple locations for ease of use by concrete truck drivers.

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- Temporary concrete washout facilities shall be located a minimum of 50 ft from sensitive areas including storm drain inlets, open drainage facilities, and watercourses. See Figures 4.1.7 and 4.1.8.
- Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Approximately 7 gallons of wash water are used to wash one truck chute.
- Approximately 50 gallons are used to wash out the hopper of a concrete pump truck.

- Washout of concrete trucks shall be performed in designated areas only.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of off-site.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.
- Temporary Above-Grade Concrete Washout Facility
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Temporary Below-Grade Concrete Washout Facility
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material shall be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Liner seams shall be installed in accordance with manufacturers' recommendations.
  - Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

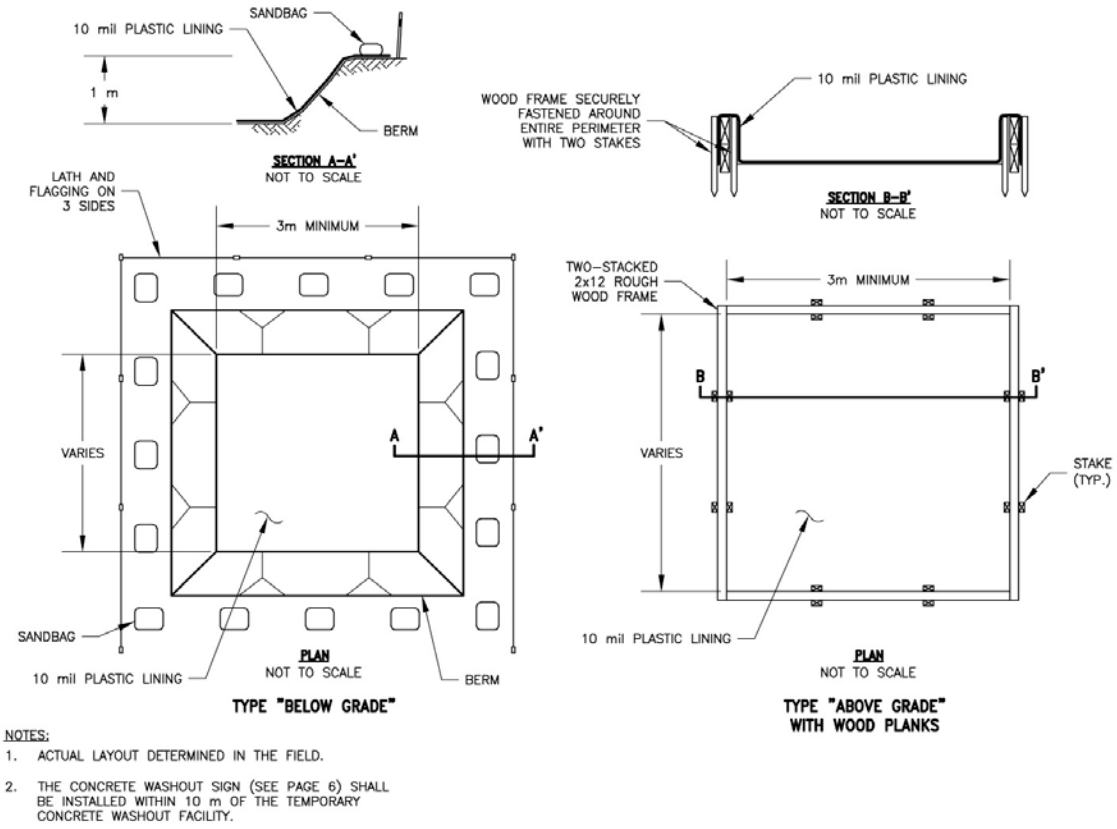
Inspection and Maintenance

- Inspect and verify that concrete washout BMPs are in place prior to the commencement of concrete work.
- During periods of concrete work, inspect daily to verify continued performance.
  - Check overall condition and performance.
  - Check remaining capacity (% full).

  - If using self-installed washout facilities, verify plastic liners are intact and sidewalls are not damaged.
  - If using prefabricated containers, check for leaks.
- Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- If the washout is nearing capacity, vacuum and dispose of the waste material in an approved manner.
  - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
  - Do not use sanitary sewer without local approval.
  - Place a secure, non-collapsing, non-water collecting cover over the concrete washout facility prior to predicted wet weather to prevent accumulation and overflow of precipitation.
  - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct temporary concrete washout facilities shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, repaired, and stabilized to prevent erosion.



NOTES:

1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN (SEE PAGE 6) SHALL BE INSTALLED WITHIN 10 m OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Figure 4.1.7a – Concrete Washout Area

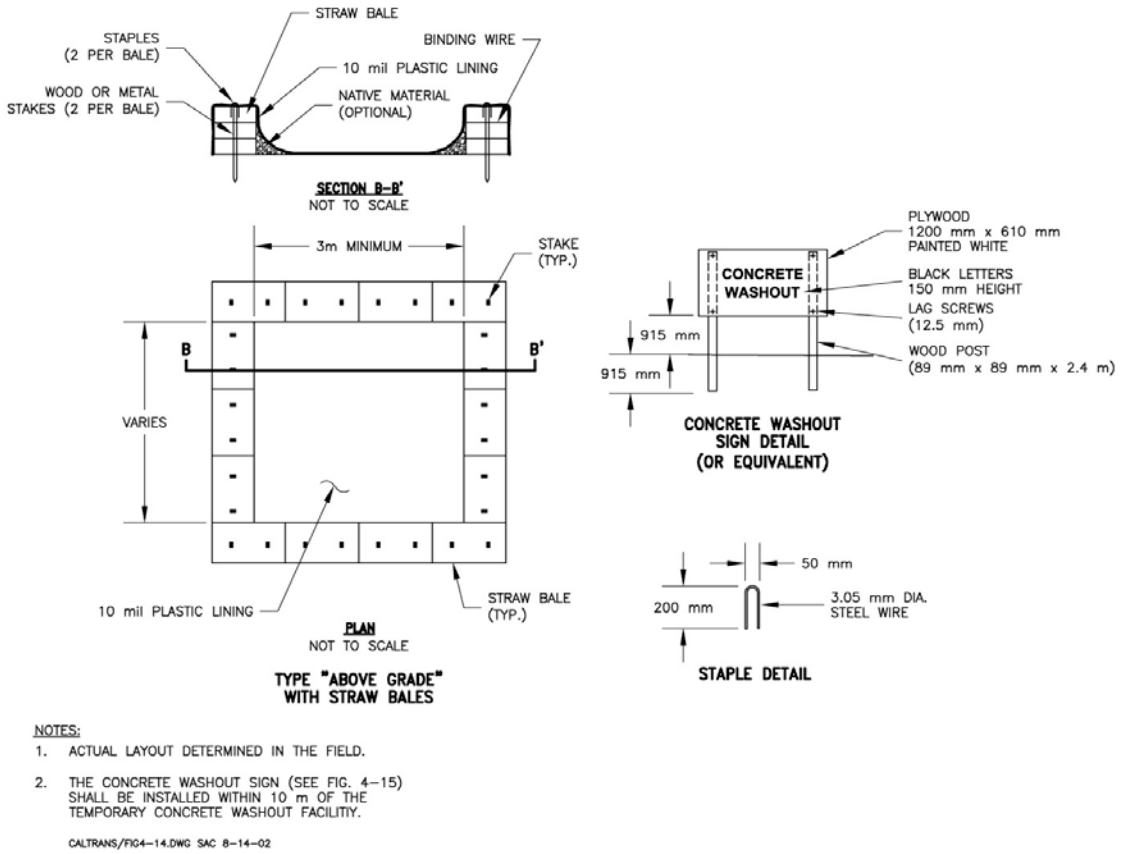


Figure 4.1.7b – Concrete Washout Area

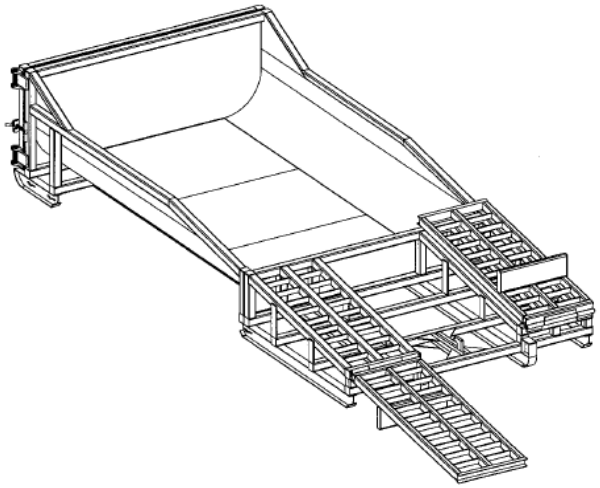


Figure 4.1.8 – Prefabricated Concrete Washout Container w/Ramp

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC), and water quality protection. The designated person shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements.

Conditions of Use

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections; sampling is not required on sites that disturb less than an acre.

- The CESCL shall:
  - Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology (see details below).

    Ecology will maintain a list of ESC training and certification providers at:
    http://www.ecy.wa.gov/programs/wq/stormwater/cescl.html

    OR

  - Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: www.cpesc.net

Specifications

- Certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:

- Maintaining permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.

- Updating all project drawings and the Construction SWPPP with changes made.
- Completing any sampling requirements including reporting results using WebDMR.
- Keeping daily logs, and inspection reports. Inspection reports should include:
    - Inspection date/time.
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
    - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
        1. Locations of BMPs inspected.
        2. Locations of BMPs that need maintenance.
        3. Locations of BMPs that failed to operate as designed or intended.
        4. Locations of where additional or different BMPs are required.
    - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
    - Any water quality monitoring performed during inspection.
    - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.

BMP C162: Scheduling

Purpose Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of surface ground cover leaves a site vulnerable to accelerated

erosion. Construction procedures that limit land clearing provide timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

4.2 Runoff Conveyance and Treatment BMPs

This section contains the standards and specifications for Runoff Conveyance and Treatment BMPs. Table 4.2.1, below, shows the relationship of the BMPs in Section 4.2 to the Construction Stormwater Pollution Prevention Plan (SWPPP) Elements described in Section 3.3.3.

Table 4.2.1 Runoff Conveyance and Treatment BMPs by SWPPP Element

BMP or Element Name	Element #1 Preserve Vegetation/Mark Clearing Limits	Element #2 Establish Construction Access	Element #5 Stabilize Soils	Element #6 Protect Slopes	Element #8 Stabilize Channels and Outlets	Element #9 Control Pollutants	Element #11 Maintain BMPs	Element #12 Manage the Project	Element #13 Protect Low Impact Development
BMP C101: Preserving Natural Vegetation	✓								
BMP C102: Buffer Zones	✓								✓
BMP C103: High Visibility Plastic or Metal Fence	✓								✓
BMP C105: Stabilized Construction Entrance / Exit		✓							
BMP C106: Wheel Wash		✓							
BMP C107: Construction Road/Parking Area Stabilization		✓							
BMP C120: Temporary and Permanent Seeding			✓	✓					
BMP C121: Mulching			✓	✓					
BMP C122: Nets and Blankets			✓	✓	✓				
BMP C123: Plastic Covering			✓						
BMP C124: Sodding			✓						
BMP C125: Topsoiling / Composting			✓						
BMP C126: Polyacrylamide for Soil Erosion Protection			✓						
BMP C130: Surface Roughening			✓	✓					
BMP C131: Gradient Terraces			✓	✓					
BMP C140: Dust Control			✓						
BMP C150: Materials On Hand							✓	✓	
BMP C151: Concrete Handling						✓			
BMP C152: Sawcutting and Surfacing Pollution Prevention						✓			
BMP C153: Material Delivery, Storage and Containment						✓			
BMP C154: Concrete Washout Area						✓			
BMP C160: Certified Erosion and Sediment Control Lead							✓	✓	
BMP C162: Scheduling								✓	

BMP C200: Interceptor Dike and Swale

Purpose

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Where the runoff from an exposed site or disturbed slope must be conveyed to an erosion control facility which can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct water to a sediment basin.

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Channel requires a positive grade for drainage; steeper grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Sub-basin tributary area should be one acre or less.
- Design capacity for the peak flow from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution, for temporary facilities. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model. For facilities that will also serve on a permanent basis, consult the local government's drainage requirements.

Interceptor dikes shall meet the following criteria:

Top Width	2 feet minimum.
Height	1.5 feet minimum on berm.
Side Slope	2H:1V or flatter.
Grade	Depends on topography, however, dike system minimum is 0.5%, and maximum is 1%.
Compaction	Minimum of 90 percent ASTM D698 standard proctor.

Horizontal Spacing of Interceptor Dikes:

Average Slope	Slope Percent	Flowpath Length
20H:1V or less	3-5%	300 feet
(10 to 20)H:1V	5-10%	200 feet
(4 to 10)H:1V	10-25%	100 feet
(2 to 4)H:1V	25-50%	50 feet

Stabilization depends on velocity and reach

Slopes <5% Seed and mulch applied within 5 days of dike construction (see BMP C121, Mulching).

Slopes 5 - 40% Dependent on runoff velocities and dike materials. Stabilization should be done immediately using either sod or riprap or other measures to avoid erosion.

- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment trapping facility.
- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.

Interceptor swales shall meet the following criteria:

Bottom Width	2 feet minimum; the cross-section bottom shall be level.
Depth	1-foot minimum.
Side Slope	2H:1V or flatter.
Grade	Maximum 5 percent, with positive drainage to a suitable outlet (such as a sediment pond).
Stabilization	Seed as per BMP C120, *Temporary and Permanent Seeding*, or *BMP C202*, *Channel Lining*, 12 inches thick riprap pressed into the bank and extending at least 8 inches vertical from the bottom.

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.

Check outlets and make timely repairs as needed to avoid gully formation. When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C201: Grass-Lined Channels

Purpose

To provide a channel with a vegetative lining for conveyance of runoff. See Figure 4.2.1 for typical grass-lined channels.

Conditions of Use

This practice applies to construction sites where concentrated runoff needs to be contained to prevent erosion or flooding.

- When a vegetative lining can provide sufficient stability for the channel cross section and at lower velocities of water (normally dependent on grade). This means that the channel slopes are generally less than 5 percent and space is available for a relatively large cross section.
- Typical uses include roadside ditches, channels at property boundaries, outlets for diversions, and other channels and drainage ditches in low areas.
- Channels that will be vegetated should be installed before major earthwork and hydroseeded with a bonded fiber matrix (BFM). The vegetation should be well established (i.e., 75 percent cover) before water is allowed to flow in the ditch. With channels that will have high flows, erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch in lieu of hydromulch and blankets.

Design and Installation Specifications

Locate the channel where it can conform to the topography and other features such as roads.

- Locate them to use natural drainage systems to the greatest extent possible.
- Avoid sharp changes in alignment or bends and changes in grade.
- Do not reshape the landscape to fit the drainage channel.
- The maximum design velocity shall be based on soil conditions, type of vegetation, and method of revegetation, but at no times shall velocity exceed 5 feet/second. The channel shall not be overtopped by the peak runoff from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution." Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model to determine a flow rate which the channel must contain.
- Where the grass-lined channel will also function as a permanent stormwater conveyance facility, consult the drainage conveyance requirements of the local government with jurisdiction.

- An established grass or vegetated lining is required before the channel can be used to convey stormwater, unless stabilized with nets or blankets.
- If design velocity of a channel to be vegetated by seeding exceeds 2 ft/sec, a temporary channel liner is required. Geotextile or special mulch protection such as fiberglass roving or straw and netting provides stability until the vegetation is fully established. See Figure 4.2.2.
- Check dams shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- If vegetation is established by sodding, the permissible velocity for established vegetation may be used and no temporary liner is needed.
- Do not subject grass-lined channel to sedimentation from disturbed areas. Use sediment-trapping BMPs upstream of the channel.
- V-shaped grass channels generally apply where the quantity of water is small, such as in short reaches along roadsides. The V-shaped cross section is least desirable because it is difficult to stabilize the bottom where velocities may be high.
- Trapezoidal grass channels are used where runoff volumes are large and slope is low so that velocities are nonerosive to vegetated linings. (Note: it is difficult to construct small parabolic shaped channels.)
- Subsurface drainage, or riprap channel bottoms, may be necessary on sites that are subject to prolonged wet conditions due to long duration flows or a high water table.
- Provide outlet protection at culvert ends and at channel intersections.
- Grass channels, at a minimum, should carry peak runoff for temporary construction drainage facilities from the 10-year, 24-hour storm without eroding. Where flood hazard exists, increase the capacity according to the potential damage.
- Grassed channel side slopes generally are constructed 3H:1V or flatter to aid in the establishment of vegetation and for maintenance.
- Construct channels a minimum of 0.2 foot larger around the periphery to allow for soil bulking during seedbed preparations and sod buildup.

Maintenance Standards

During the establishment period, check grass-lined channels after every rainfall.

- After grass is established, periodically check the channel; check it after every heavy rainfall event. Immediately make repairs.
- It is particularly important to check the channel outlet and all road crossings for bank stability and evidence of piping or scour holes.

- Remove all significant sediment accumulations to maintain the designed carrying capacity. Keep the grass in a healthy, vigorous condition at all times, since it is the primary erosion protection for the channel.

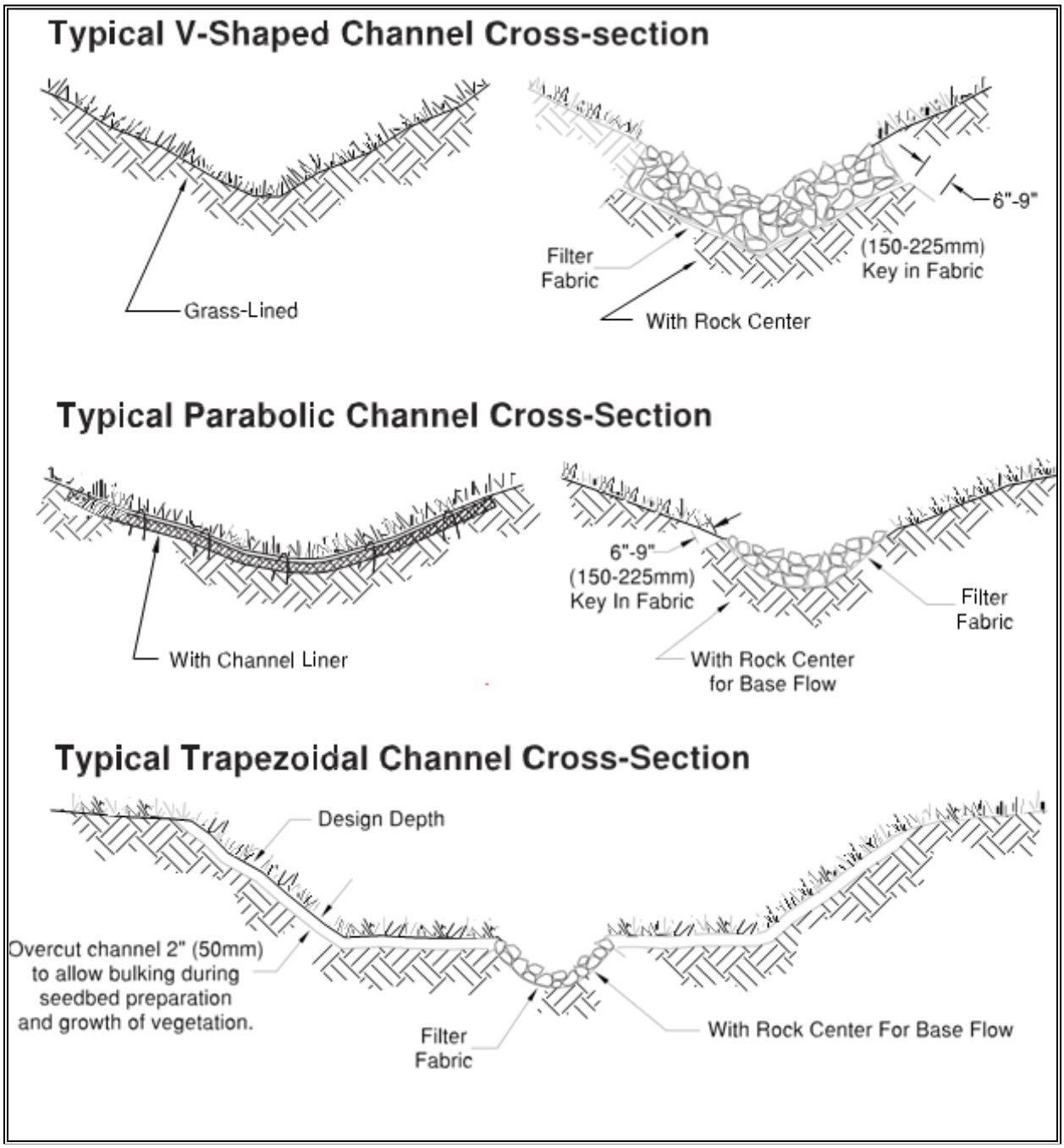
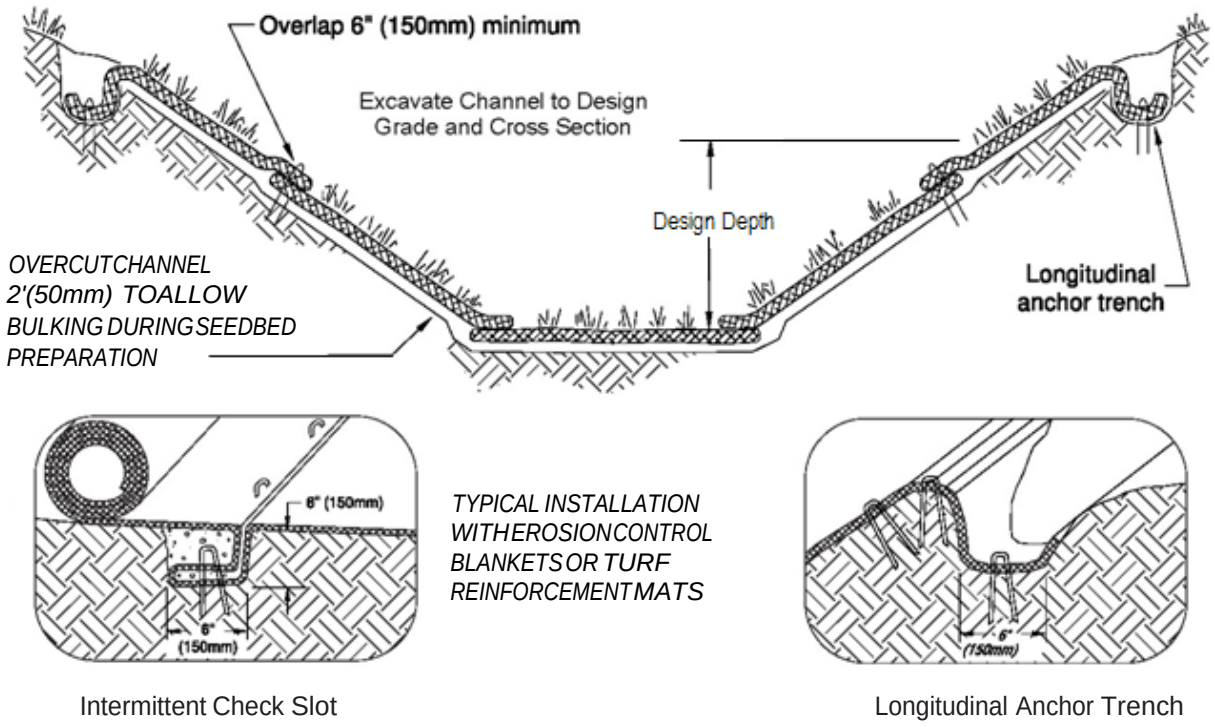
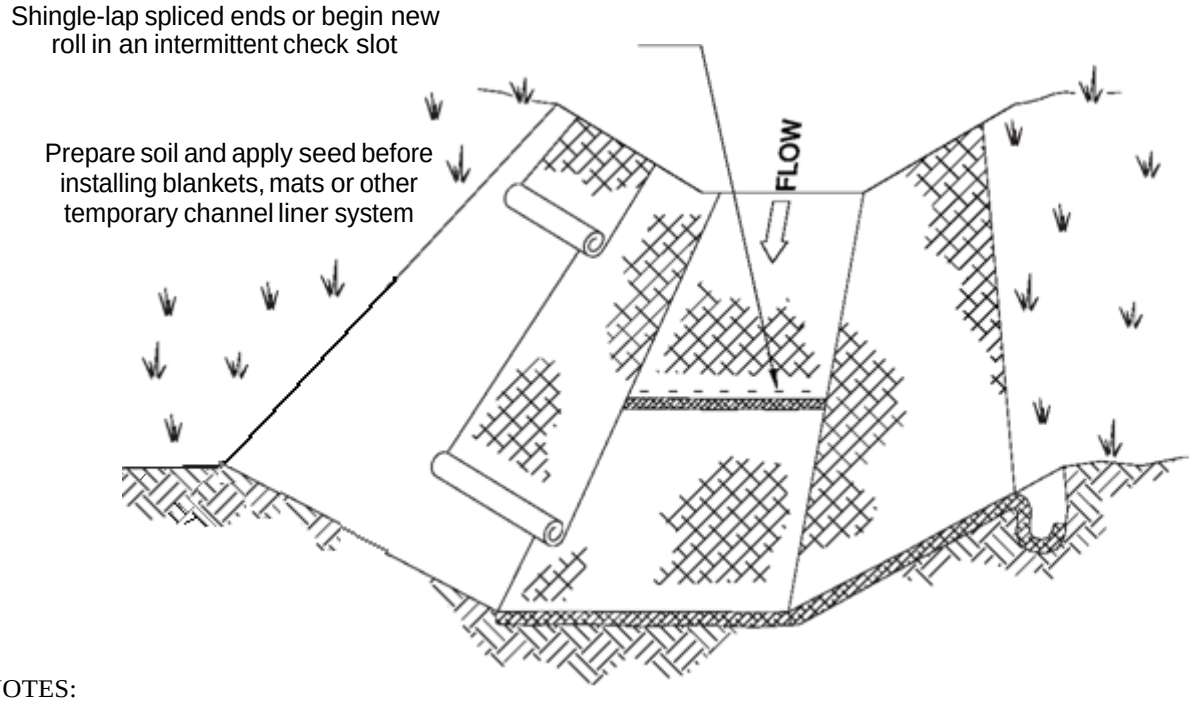


Figure 4.2.1 – Typical Grass-Lined Channels





NOTES:

1 Design velocities exceeding 2 ft/sec (0.5m/sec) require temporary blankets, mats or similar liners to protect seed and soil until vegetation becomes established.

2 Grass-lined channels with design velocities exceeding 6 ft/sec (2m/sec) should include turf reinforcement mats.

Figure 4.2.2 – Temporary Channel Liners

BMP C202: Channel Lining

Purpose

To protect channels by providing a channel liner using either blankets or riprap.

Conditions of Use

When natural soils or vegetated stabilized soils in a channel are not adequat to prevent channel erosion.

- When a permanent ditch or pipe system is to be installed and a temporary measure is needed.
- In almost all cases, synthetic and organic coconut blankets are more effective than riprap for protecting channels from erosion. Blankets can be used with and without vegetation. Blanketed channels can be designed to handle any expected flow and longevity requirement. Some synthetic blankets have a predicted life span of 50 years or more, even in sunlight.
- Other reasons why blankets are better than rock include the availability of blankets over rock. In many areas of the state, rock is not easily obtainable or is very expensive to haul to a site. Blankets can be delivered anywhere. Rock requires the use of dump trucks to haul and heavy equipment to place. Blankets usually only require laborers with hand tools, and sometimes a backhoe.
- The Federal Highway Administration recommends not using flexible liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 lbs/ft^2.

Design and Installation Specifications

See BMP C122 for information on blankets.

Since riprap is used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.

- Disturbance of areas where riprap is to be placed should be undertaken only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.
- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by children shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.
- Stone for riprap shall consist of field stone or quarry stone of approximately rectangular shape. The stone shall be hard and angular

and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended.

- A lining of engineering filter fabric (geotextile) shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.
- Filter fabric shall not be used on slopes greater than 1-1/2H:1V as slippage may occur. It should be used in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

BMP C203: Water Bars

Purpose

A small ditch or ridge of material is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure 4.2.3.

Conditions of use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long narrow right-of-ways over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

- Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicular traffic is anticipated.

Design and Installation Specifications

Height: 8-inch minimum measured from the channel bottom to the ridge top.

- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross.
- Base width of ridge: 6-inch minimum.
- Locate them to use natural drainage systems and to discharge into well vegetated stable areas.
- Guideline for Spacing:

Slope %	Spacing (ft)
< 5	125
5 - 10	100
10 - 20	75
20 - 35	50
> 35	Use rock lined ditch

- Grade of water bar and angle: Select angle that results in ditch slope less than 2 percent.
- Install as soon as the clearing and grading is complete. Reconstruct when construction is complete on a section when utilities are being installed.
- Compact the ridge when installed.
- Stabilize, seed and mulch the portions that are not subject to traffic. Gravel the areas crossed by vehicles.

Maintenance Standards

Periodically inspect right-of-way diversions for wear and after every heavy rainfall for erosion damage.

- Immediately remove sediment from the flow area and repair the dike.
- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary right-of-way diversion is permanently stabilized, remove the dikes and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

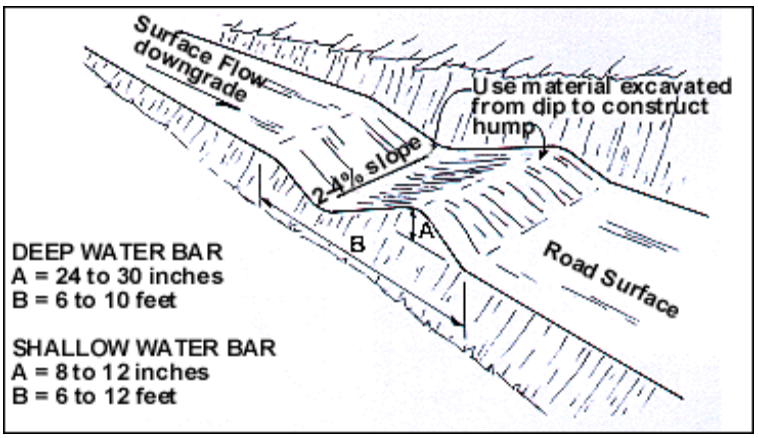


Figure 4.2.3 – Water Bar

BMP C204: Pipe Slope Drains

Purpose

To use a pipe to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Conditions of Use

Pipe slope drains should be used when a temporary or permanent stormwater conveyance is needed to move the water down a steep slope to avoid erosion (Figure 4.2.4).

On highway projects, pipe slope drains should be used at bridge ends to collect runoff and pipe it to the base of the fill slopes along bridge approaches. These can be designed into a project and included as bid items. Another use on road projects is to collect runoff from pavement and pipe it away from side slopes. These are useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.

Water can be collected, channeled with sand bags, Triangular Silt Dikes, berms, or other material, and piped to temporary sediment ponds.

Pipe slope drains can be:

- Connected to new catch basins and used temporarily until all permanent piping is installed;
- Used to drain water collected from aquifers exposed on cut slopes and take it to the base of the slope;
- Used to collect clean runoff from plastic sheeting and direct it away from exposed soil;
- Installed in conjunction with silt fence to drain collected water to a controlled area;
- Used to divert small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement; and,
- Connected to existing down spouts and roof drains and used to divert water away from work areas during building renovation, demolition, and construction projects.

There are now several commercially available collectors that are attached to the pipe inlet and help prevent erosion at the inlet.

Design and Installation Specifications

Size the pipe to convey the flow. The capacity for temporary drains shall be sufficient to handle the peak flow from a 10-year, 24-hour storm event, assuming a Type 1A rainfall distribution. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model.

Consult local drainage requirements for sizing permanent pipe slope drains.

- Use care in clearing vegetated slopes for installation.
- Re-establish cover immediately on areas disturbed by installation.
- Use temporary drains on new cut or fill slopes.
- Use diversion dikes or swales to collect water at the top of the slope.
- Ensure that the entrance area is stable and large enough to direct flow into the pipe.
- Piping of water through the berm at the entrance area is a common failure mode.
- The entrance shall consist of a standard flared end section for culverts 12 inches and larger with a minimum 6-inch metal toe plate to prevent runoff from undercutting the pipe inlet. The slope of the entrance shall be at least 3 percent. Sand bags may also be used at pipe entrances as a temporary measure.
- The soil around and under the pipe and entrance section shall be thoroughly compacted to prevent undercutting.
- The flared inlet section shall be securely connected to the slope drain and have watertight connecting bands.
- Slope drain sections shall be securely fastened together, fused or have gasketed watertight fittings, and shall be securely anchored into the soil.
- Thrust blocks should be installed anytime 90 degree bends are utilized. Depending on size of pipe and flow, these can be constructed with sand bags, straw bales staked in place, “t” posts and wire, or ecology blocks.
- Pipe needs to be secured along its full length to prevent movement. This can be done with steel “t” posts and wire. A post is installed on each side of the pipe and the pipe is wired to them. This should be done every 10-20 feet of pipe length or so, depending on the size of the pipe and quantity of water to divert.
- Interceptor dikes shall be used to direct runoff into a slope drain. The height of the dike shall be at least 1 foot higher at all points than the top of the inlet pipe.
- The area below the outlet must be stabilized with a riprap apron (see BMP C209 Outlet Protection, for the appropriate outlet material).

- If the pipe slope drain is conveying sediment-laden water, direct all flows into the sediment trapping facility.
- Materials specifications for any permanent piped system shall be set by the local government.

Maintenance Standards

Check inlet and outlet points regularly, especially after storms.

The inlet should be free of undercutting, and no water should be going around the point of entry. If there are problems, the headwall should be reinforced with compacted earth or sand bags.

- The outlet point should be free of erosion and installed with appropriate outlet protection.
- For permanent installations, inspect pipe periodically for vandalism and physical distress such as slides and wind-throw.
- Normally the pipe slope is so steep that clogging is not a problem with smooth wall pipe, however, debris may become lodged in the pipe.

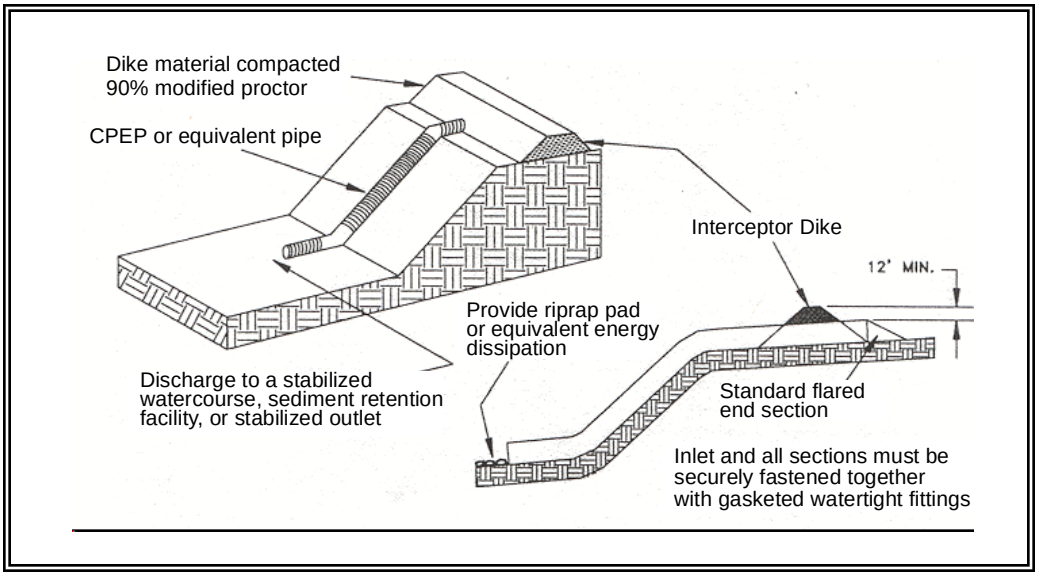


Figure 4.2.4 – Pipe Slope Drain

BMP C205: Subsurface Drains

Purpose

To intercept, collect, and convey ground water to a satisfactory outlet, using a perforated pipe or conduit below the ground surface. Subsurface drains are also known as "french drains." The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Conditions of Use

Use when excessive water must be removed from the soil. The soil permeability, depth to water table and impervious layers are all factors which may govern the use of subsurface drains.

Design and Installation Specifications

Relief drains are used either to lower the water table in large, relatively flat areas, improve the growth of vegetation, or to remove surface water.

Relief drains are installed along a slope and drain in the direction of the slope.

They can be installed in a grid pattern, a herringbone pattern, or a random pattern.

- **Interceptor drains** are used to remove excess ground water from a slope, stabilize steep slopes, and lower the water table immediately below a slope to prevent the soil from becoming saturated.

Interceptor drains are installed perpendicular to a slope and drain to the side of the slope.

They usually consist of a single pipe or series of single pipes instead of a patterned layout.

- **Depth and spacing of interceptor drains** --The depth of an interceptor drain is determined primarily by the depth to which the water table is to be lowered or the depth to a confining layer. For practical reasons, the maximum depth is usually limited to 6 feet, with a minimum cover of 2 feet to protect the conduit.
- The soil should have depth and sufficient permeability to permit installation of an effective drainage system at a depth of 2 to 6 feet.
- An adequate outlet for the drainage system must be available either by gravity or by pumping.
- The quantity and quality of discharge needs to be accounted for in the receiving stream (additional detention may be required).
- This standard does not apply to subsurface drains for building foundations or deep excavations.
- The capacity of an interceptor drain is determined by calculating the maximum rate of ground water flow to be intercepted. Therefore, it is

good practice to make complete subsurface investigations, including hydraulic conductivity of the soil, before designing a subsurface drainage system.

- **Size of drain**--Size subsurface drains to carry the required capacity without pressure flow. Minimum diameter for a subsurface drain is 4 inches.
- The minimum velocity required to prevent silting is 1.4 ft./sec. The line shall be graded to achieve this velocity at a minimum. The maximum allowable velocity using a sand-gravel filter or envelope is 9 ft/sec.
- Filter material and fabric shall be used around all drains for proper bedding and filtration of fine materials. Envelopes and filters should surround the drain to a minimum of 3-inch thickness.
- The outlet of the subsurface drain shall empty into a sediment pond through a catch basin. If free of sediment, it can then empty into a receiving channel, swale, or stable vegetated area adequately protected from erosion and undermining.
- The trench shall be constructed on a continuous grade with no reverse grades or low spots.
- Soft or yielding soils under the drain shall be stabilized with gravel or other suitable material.
- Backfilling shall be done immediately after placement of the pipe. No sections of pipe shall remain uncovered overnight or during a rainstorm. Backfill material shall be placed in the trench in such a manner that the drain pipe is not displaced or damaged.
- Do not install permanent drains near trees to avoid the tree roots that tend to clog the line. Use solid pipe with watertight connections where it is necessary to pass a subsurface drainage system through a stand of trees.
- **Outlet**--Ensure that the outlet of a drain empties into a channel or other watercourse above the normal water level.
- Secure an animal guard to the outlet end of the pipe to keep out rodents.
- Use outlet pipe of corrugated metal, cast iron, or heavy-duty plastic without perforations and at least 10 feet long. Do not use an envelope or filter material around the outlet pipe, and bury at least two-thirds of the pipe length.
- When outlet velocities exceed those allowable for the receiving stream, outlet protection must be provided.

Maintenance Standards

Subsurface drains shall be checked periodically to ensure that they are free-flowing and not clogged with sediment or roots.

- The outlet shall be kept clean and free of debris.
- Surface inlets shall be kept open and free of sediment and other debris.
- Trees located too close to a subsurface drain often clog the system with their roots. If a drain becomes clogged, relocate the drain or remove the trees as a last resort. Drain placement should be planned to minimize this problem.
- Where drains are crossed by heavy vehicles, the line shall be checked to ensure that it is not crushed.

BMP C206: Level Spreader

Purpose

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Conditions of Use

Used when a concentrated flow of water needs to be dispersed over a large area with existing stable vegetation.

- Items to consider are:
  1. What is the risk of erosion or damage if the flow may become concentrated?
  2. Is an easement required if discharged to adjoining property?
  3. Most of the flow should be as ground water and not as surface flow.
  4. Is there an unstable area downstream that cannot accept additional ground water?
- Use only where the slopes are gentle, the water volume is relatively low, and the soil will adsorb most of the low flow events.

Design and Installation Specifications

Use above undisturbed areas that are stabilized by existing vegetation.

If the level spreader has any low points, flow will concentrate, create channels and may cause erosion.

- Discharge area below the outlet must be uniform with a slope flatter than 5H:1V.
- Outlet to be constructed level in a stable, undisturbed soil profile (not on fill).
- The runoff shall not re-concentrate after release unless intercepted by another downstream measure.

- The grade of the channel for the last 20 feet of the dike or interceptor entering the level spreader shall be less than or equal to 1 percent. The grade of the level spreader shall be 0 percent to ensure uniform spreading of storm runoff.
- A 6-inch high gravel berm placed across the level lip shall consist of washed crushed rock, 2- to 4-inch or 3/4-inch to 1½-inch size.
- The spreader length shall be determined by estimating the peak flow expected from the 10-year, 24-hour design storm. The length of the spreader shall be a minimum of 15 feet for 0.1 cfs and shall increase by 10 feet for each 0.1 cfs thereafter to a maximum of 0.5 cfs per spreader. Use multiple spreaders for higher flows.
- The width of the spreader should be at least 6 feet.
- The depth of the spreader as measured from the lip should be at least 6 inches and it should be uniform across the entire length.
- Level spreaders shall be setback from the property line unless there is an easement for flow.
- Level spreaders, when installed every so often in grassy swales, keep the flows from concentrating. Materials that can be used include sand bags, lumber, logs, concrete, and pipe. To function properly, the material needs to be installed level and on contour. Figures 4.2.5Figure425 and 4.2.6 provide a cross-section and a detail of a level spreader. A capped perforated pipe could also be used as a spreader.

Maintenance Standards

The spreader should be inspected after every runoff event to ensure that it is functioning correctly.

- The contractor should avoid the placement of any material on the structure and should prevent construction traffic from crossing over the structure.
- If the spreader is damaged by construction traffic, it shall be immediately repaired.

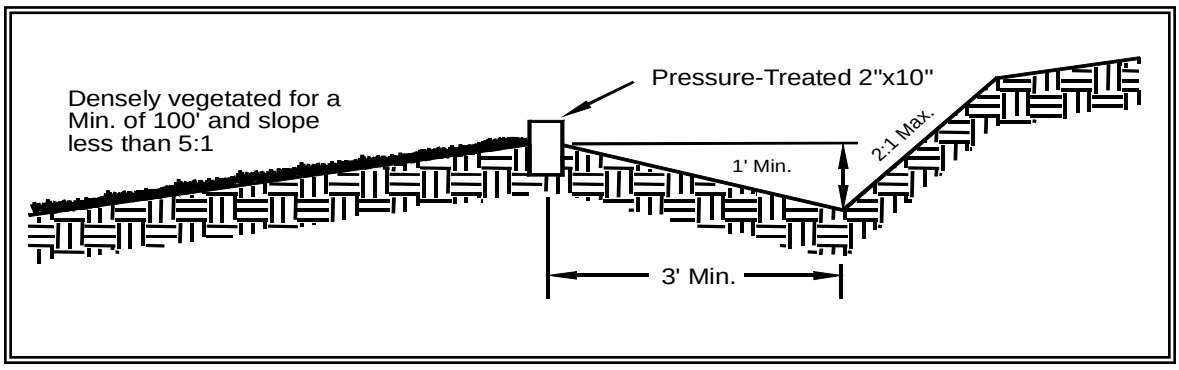


Figure 4.2.5 – Cross Section of Level Spreader

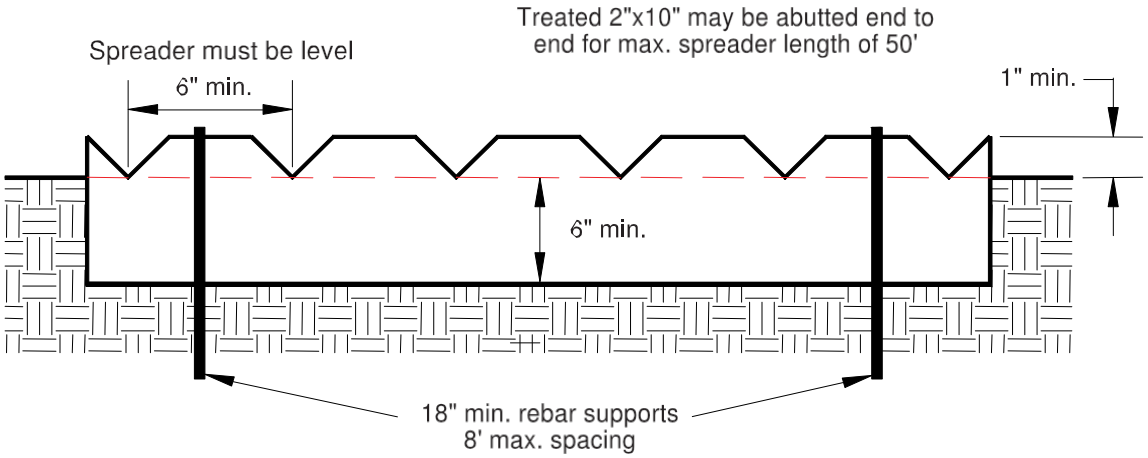


Figure 4.2.6 – Detail of Level Spreader

BMP C207: Check Dams

Purpose Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use Where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

- Check dams may not be placed in streams unless approved by the State Department of Fish and Wildlife. Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to ensure that there is no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.
- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (no dumping of rock to form dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the dam rather than falling directly onto the ditch bottom.

- Before installing check dams impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams in association with sumps work more effectively at slowing flow and retaining sediment than just a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between the dams shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
- Keep the maximum height at 2 feet at the center of the dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.
- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones. Figure 4.2.7 depicts a typical rock check dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each runoff producing rainfall. Sediment shall be removed when it reaches one half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C207. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

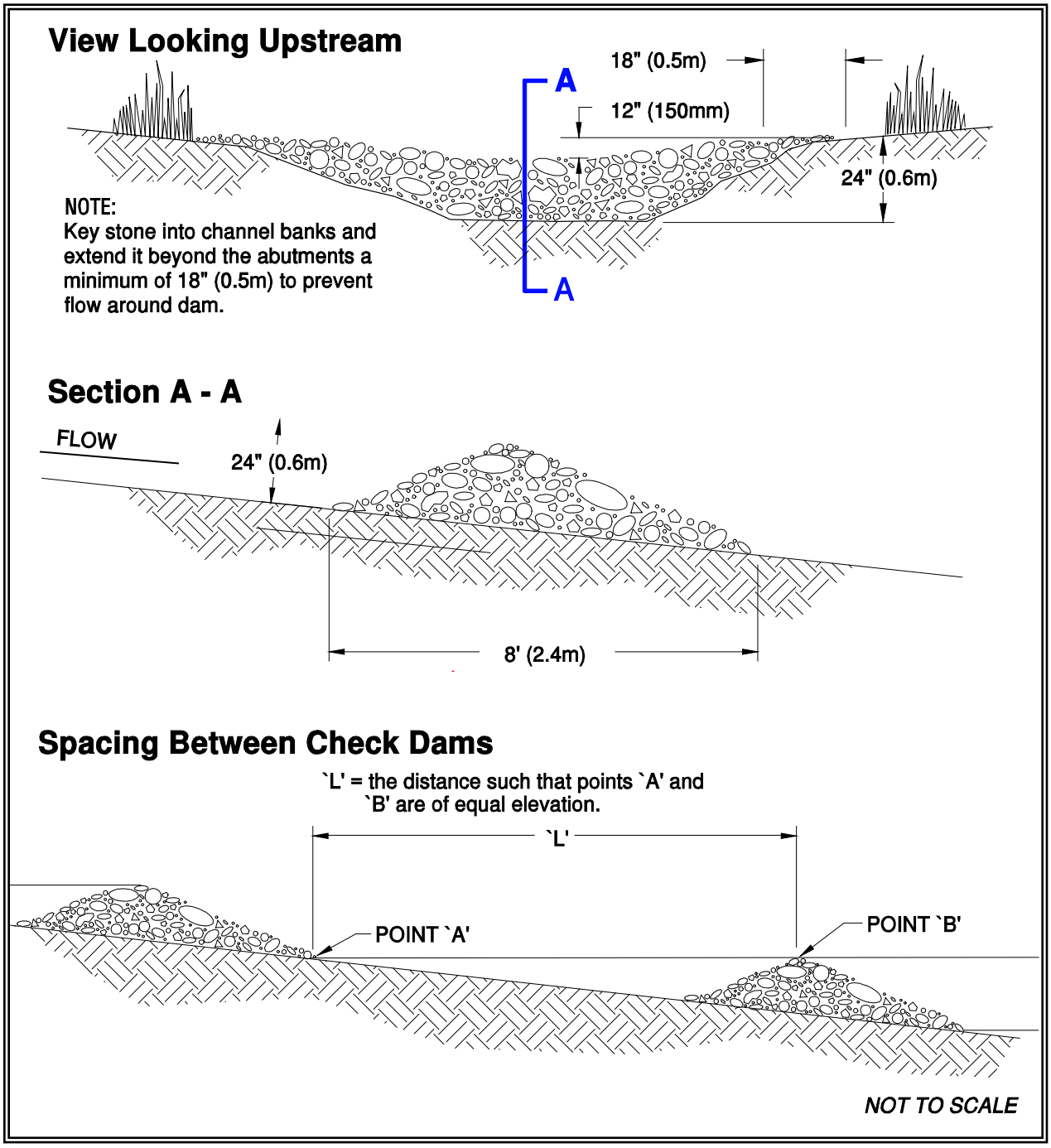


Figure 4.2.7 – Rock Check Dam

BMP C208: Triangular Silt Dike (TSD) (Geotextile-Encased Check Dam)

Purpose

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Conditions of use

- May be used on soil or pavement with adhesive or staples.
- TSDs have been used to build temporary:
  1. sediment ponds;
  2. diversion ditches;
  3. concrete wash out facilities;
  4. curbing;
  5. water bars;
  6. level spreaders; and,
  7. berms.

Design and Installation Specifications

Made of urethane foam sewn into a woven geosynthetic fabric.

It is triangular, 10 inches to 14 inches high in the center, with a 20-inch to 28-inch base. A 2–foot apron extends beyond both sides of the triangle along its standard section of 7 feet. A sleeve at one end allows attachment of additional sections as needed.

- Install with ends curved up to prevent water from flowing around the ends.
- The fabric flaps and check dam units are attached to the ground with wire staples. Wire staples should be No. 11 gauge wire and should be 200 mm to 300 mm in length.
- When multiple units are installed, the sleeve of fabric at the end of the unit shall overlap the abutting unit and be stapled.
- Check dams should be located and installed as soon as construction will allow.
- Check dams should be placed perpendicular to the flow of water.
- When used as check dams, the leading edge must be secured with rocks, sandbags, or a small key slot and staples.
- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance

- Triangular silt dams shall be inspected for performance and sediment

Standards

accumulation during and after each runoff producing rainfall. Sediment shall be removed when it reaches one half the height of the dam.

- Anticipate submergence and deposition above the triangular silt dam and erosion from high flows around the edges of the dam. Immediately repair any damage or any undercutting of the dam.

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of use

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1–foot above the maximum tailwater elevation or 1-foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.

- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulic Manual, available through WSDOT Engineering Publications).
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following guidelines shall be used for riprap outlet protection:
    1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
    2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
    3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.

- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a HPA. See Volume V for more information on outfall system design.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C220: Storm Drain Inlet Protection

Purpose

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction can add significant amounts of sediment into the roof drain system. If possible delay installing lawn and yard drains until just before landscaping or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table 4.2.2 lists several options for inlet protection. All of the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to one acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 4.2.2
Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area Requirement: 30' X 30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No		Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap			18 month expected life.

Design and Installation Specifications

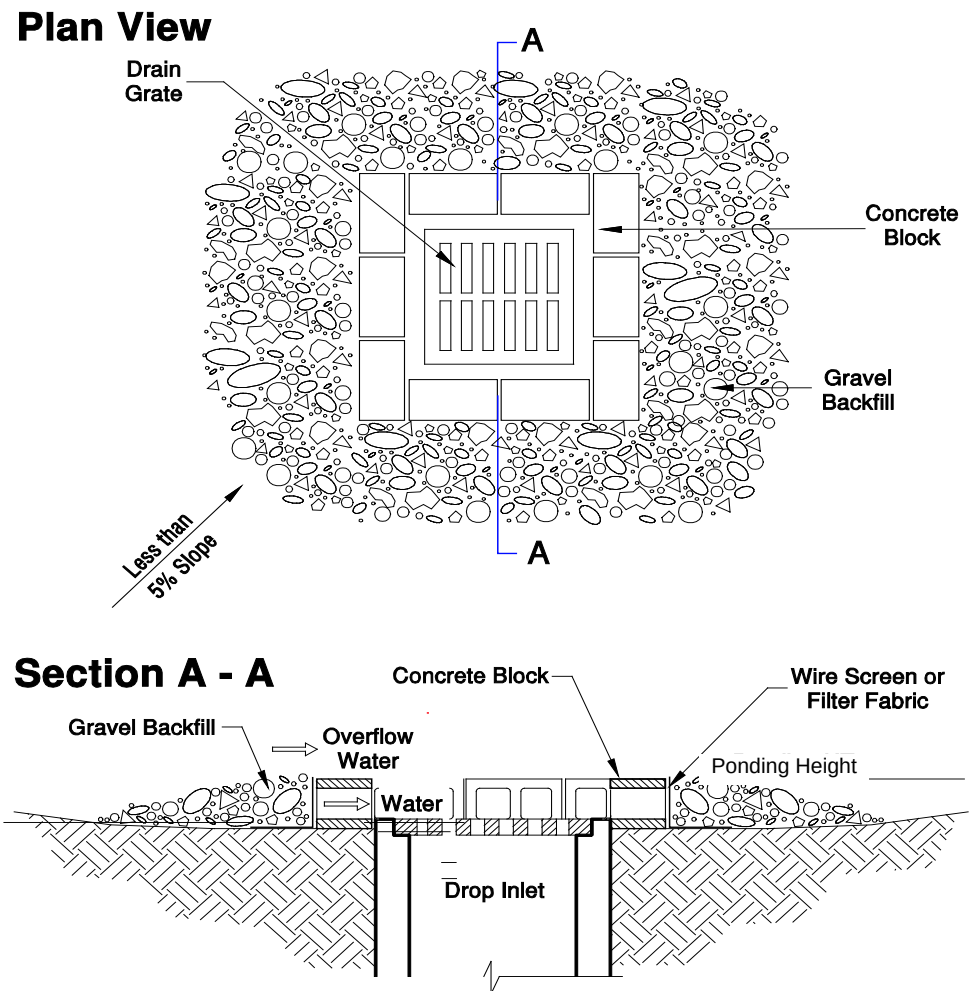
Excavated Drop Inlet Protection - An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation no steeper than 2H:1V.
- Minimum volume of excavation 35 cubic yards.
- Shape basin to fit site with longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water problems.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.

- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter - A barrier formed around the storm drain inlet with standard concrete blocks and gravel. See Figure 4.2.8.

- Provide a height of 1 to 2 feet above inlet.
- Recess the first row 2-inches into the ground for stability.
- Support subsequent courses by placing a 2x4 through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel donut.
- Provide an inlet slope of 3H:1V.
- Provide an outlet slope of 2H:1V.
- Provide a1-foot wide level stone area between the structure and the inlet.
- Use inlet slope stones 3 inches in diameter or larger.
- Use gravel ½- to ¾-inch at a minimum thickness of 1-foot for the outlet slope.



Notes:
1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

Figure 4.2.8 – Block and Gravel Filter

Gravel and Wire Mesh Filter - A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
- Use coarse aggregate.
- Provide a height 1-foot or more, 18-inches wider than inlet on all sides.
- Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
- Overlap the strips if more than one strip of mesh is necessary.

- Place coarse aggregate over the wire mesh.
- Provide at least a 12-inch depth of gravel over the entire inlet opening and extend at least 18-inches on all sides.

Catchbasin Filters – Use inserts designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements combine a catchbasin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way.

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catchbasin filter in the catchbasin just below the grating.

Curb Inlet Protection with Wooden Weir – Barrier formed around a curb inlet with a wooden frame and gravel.

- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against wire/fabric.
- Place weight on frame anchors.

Block and Gravel Curb Inlet Protection – Barrier formed around a curb inlet with concrete blocks and gravel. See Figure 4.2.9.

- Use wire mesh with ½-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Curb and Gutter Sediment Barrier – Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 4.2.10.

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the outside of the berm sized to sediment trap standards for protecting a culvert inlet.

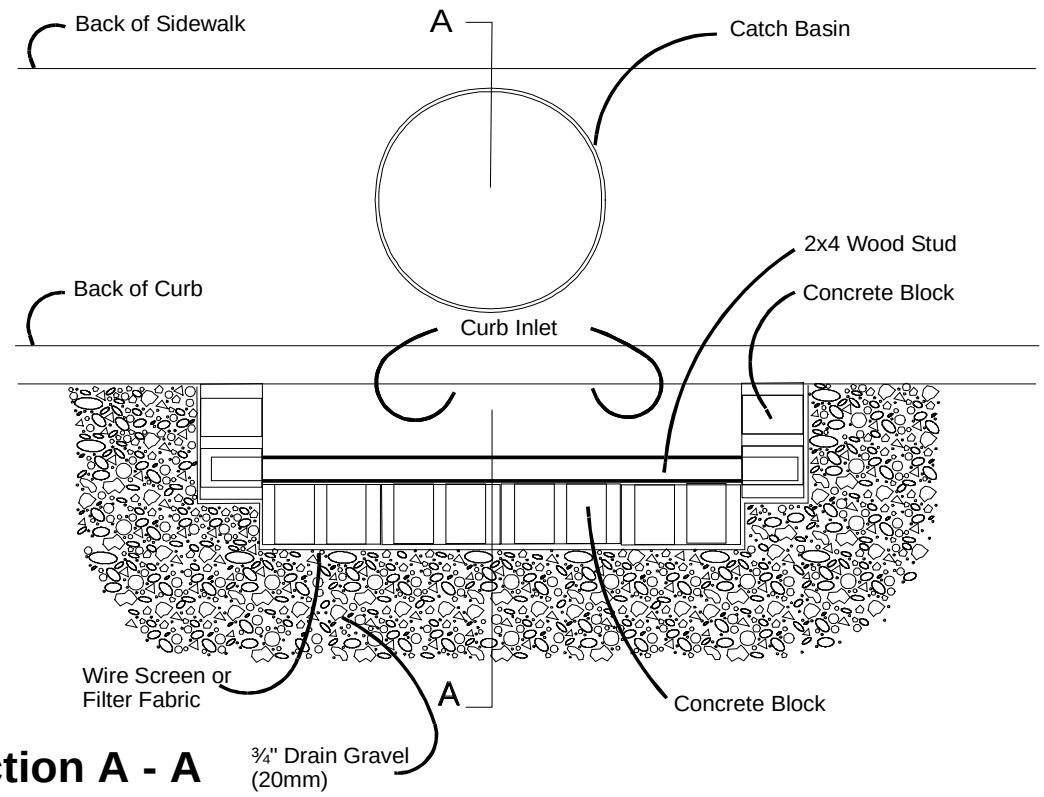
Maintenance Standards

- Inspect catch basin filters frequently, especially after storm events. Clean and replace clogged inserts. For systems with clogged stone filters: pull away the stones from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

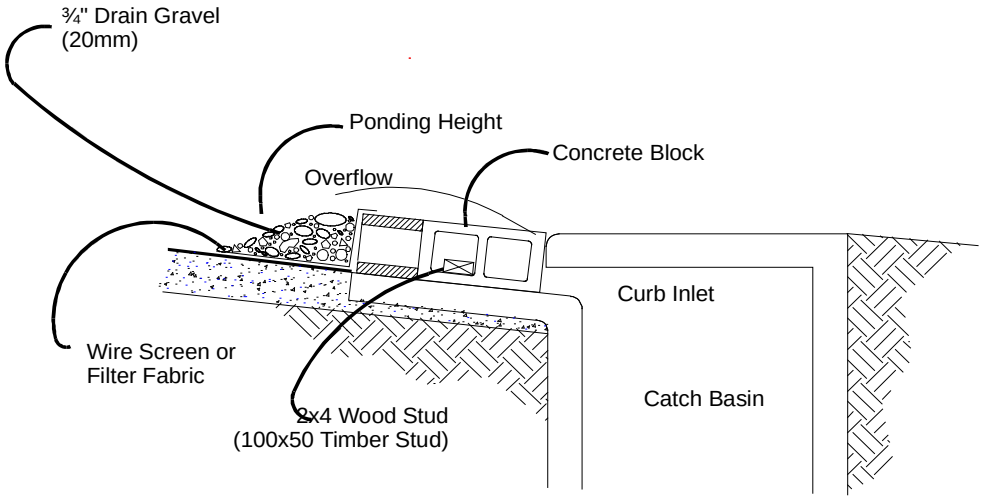
Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C220. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

Plan View

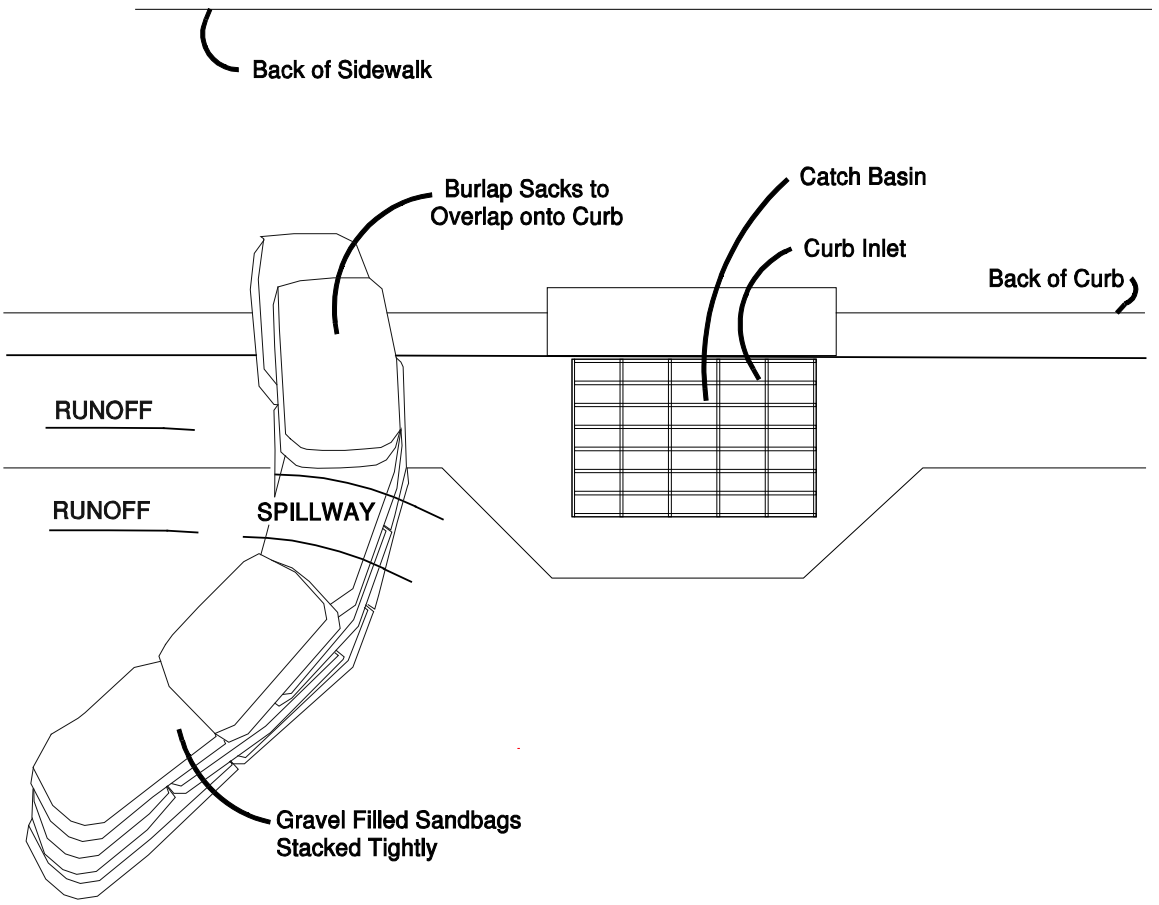


Section A - A



NOTES:
1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

Figure 4.2.9 – Block and Gravel Curb Inlet Protection



NOTES:
1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven `geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

Figure 4.2.10 – Curb and Gutter Barrier

BMP C231: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of all disturbed areas of less than one-quarter acre.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than by a sediment pond, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height 2 feet (minimum) to 5 feet (maximum).
- Width 5 feet at base (minimum) to 15 feet (maximum).
- Filter fabric (geotextile) may be anchored over the brush berm to enhance the filtration ability of the barrier. Ten-ounce burlap is an adequate alternative to filter fabric.
- Chipped site vegetation, composted mulch, or wood-based mulch (hog fuel) can be used to construct brush barriers.
- A 100 percent biodegradable installation can be constructed using 10-ounce burlap held in place by wooden stakes. Figure 4.2.11 depicts a typical brush barrier.

Maintenance Standards

- There shall be no signs of erosion or concentrated runoff under or around the barrier. If concentrated flows are bypassing the barrier, it must be expanded or augmented by toed-in filter fabric.
- The dimensions of the barrier must be maintained.

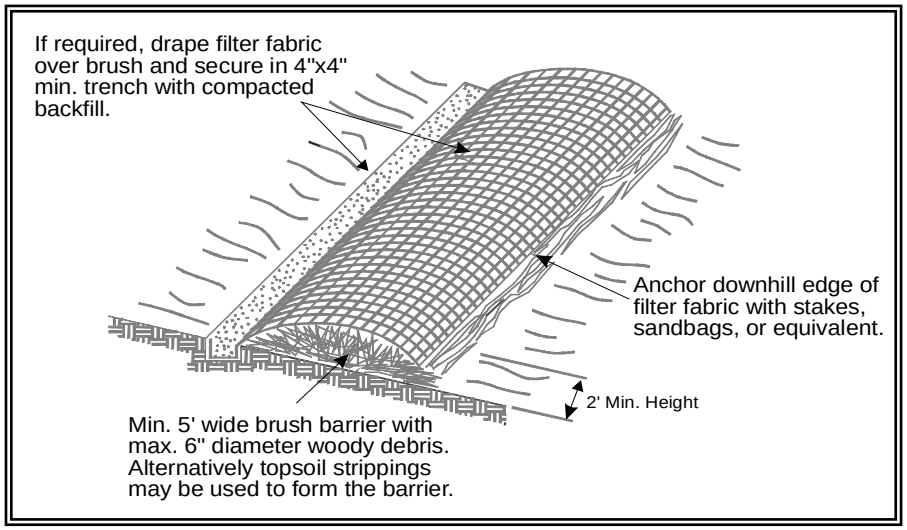


Figure 4.2.11 – Brush Barrier

BMP C232: Gravel Filter Berm

Purpose

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

Conditions of Use

Where a temporary measure is needed to retain sediment from rights-of-way or in traffic areas on construction sites.

Design and Installation Specifications

- Berm material shall be ¾ to 3 inches in size, washed well-grade gravel or crushed rock with less than 5 percent fines.
- Spacing of berms:
  - Every 300 feet on slopes less than 5 percent
  - Every 200 feet on slopes between 5 percent and 10 percent
  - Every 100 feet on slopes greater than 10 percent
- Berm dimensions:
  - 1 foot high with 3H:1V side slopes
  - 8 linear feet per 1 cfs runoff based on the 10-year, 24-hour design storm

Maintenance Standards

- Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

BMP C233: Silt Fence

Purpose

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 4.2.12 for details on silt fence construction.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment pond.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

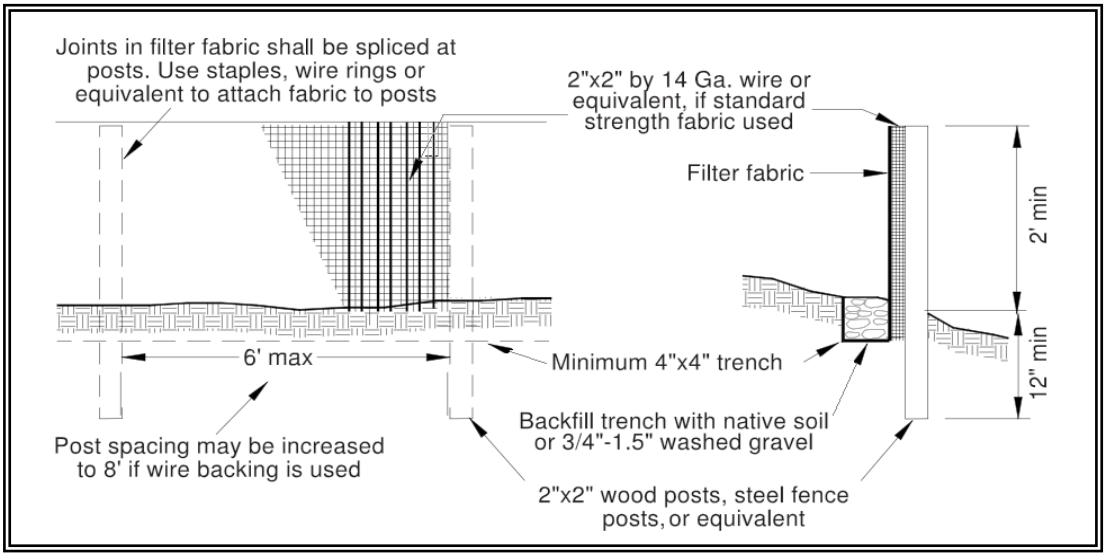


Figure 4.2.12 – Silt Fence

Design and Installation Specifications

- Use in combination with sediment basins or other BMPs.
- Maximum slope steepness (normal (perpendicular) to fence line) 1H:1V.
- Maximum sheet or overland flow path length to the fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- The geotextile used shall meet the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table 4.2.3):

Table 4.2.3
Geotextile Standards

Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength fabrics with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the

fabric. Silt fence materials are available that have synthetic mesh backing attached.

- Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F. to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by local regulations.
- Refer to Figure 4.2.12 for standard silt fence details. Include the following standard Notes for silt fence on construction plans and specifications:

  1. The contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
  2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
  3. The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.
  4. The filter fabric shall be sewn together at the point of manufacture to form filter fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
  5. Attach the filter fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the filter fabric to the posts in a manner that reduces the potential for tearing.
  6. Support the filter fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the filter fabric up-slope of the mesh.
  7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the filter fabric it supports.
  8. Bury the bottom of the filter fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the filter fabric, so that no flow can pass beneath the fence and

scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.

9. Drive or place the fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:
    - Wood with dimensions of 2-inches by 2-inches wide min. and a 3-feet min. length. Wood posts shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place gravel check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.
    - Gravel check dams shall be approximately 1-foot deep at the back of the fence. Gravel check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Gravel check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure 4.2.13 for slicing method details. Silt fence installation using the slicing method specifications:

1. The base of both end posts must be at least 2- to 4-inches above the top of the filter fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the filter fabric, enabling posts to support the filter fabric from upstream water pressure.
4. Install posts with the nipples facing away from the filter fabric.
5. Attach the filter fabric to each post with three ties, all spaced within the top 8-inches of the filter fabric. Attach each tie diagonally 45 degrees through the filter fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
6. Wrap approximately 6-inches of fabric around the end posts and secure with 3 ties.
7. No more than 24-inches of a 36-inch filter fabric is allowed above ground level.

   Compact the soil immediately next to the filter fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

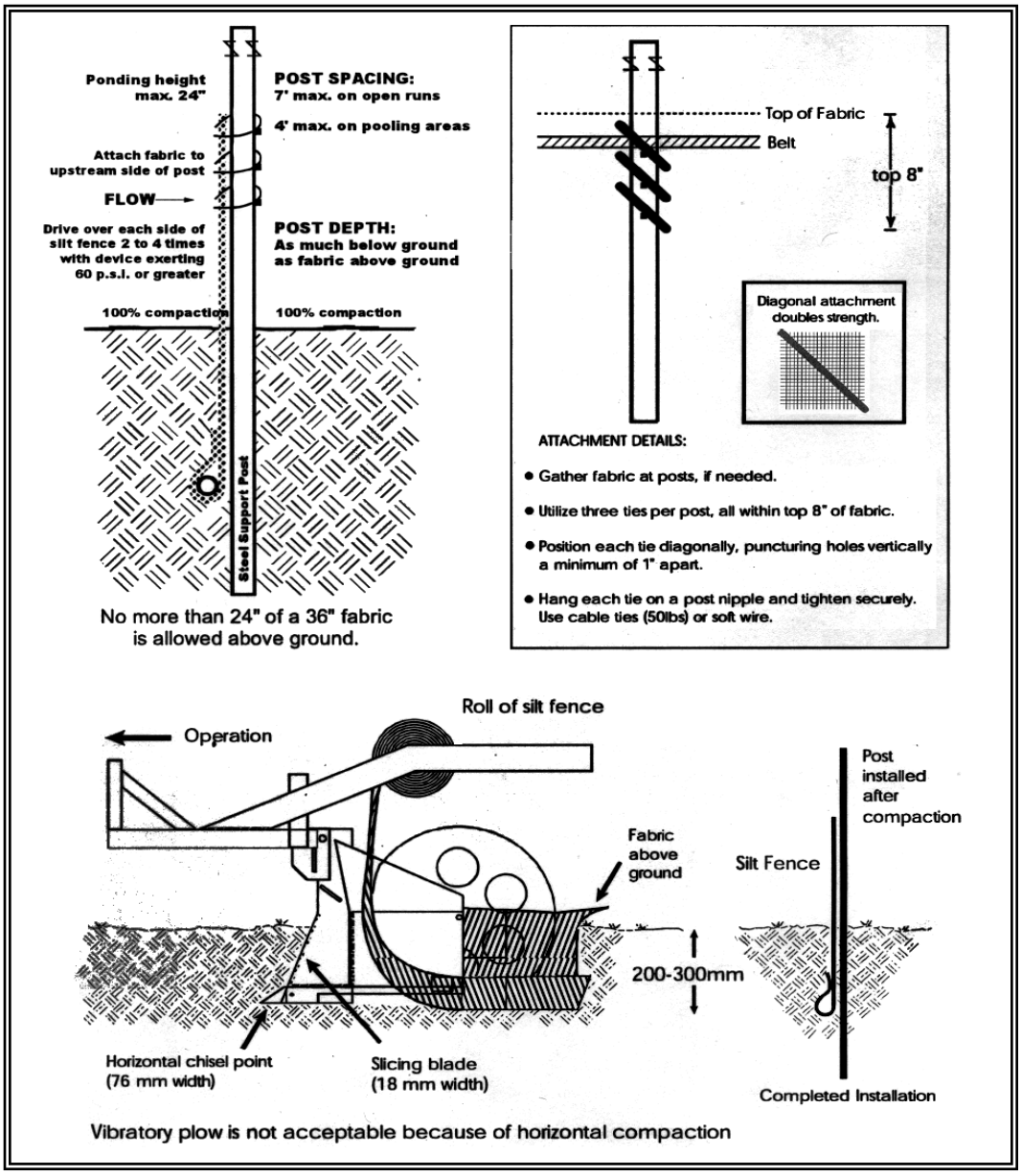


Figure 4.2.13 – Silt Fence Installation by Slicing Method

Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment pond.
- Check the uphill side of the fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence or remove the trapped sediment.

- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace filter fabric that has deteriorated due to ultraviolet breakdown.

BMP C234: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a strip, rather than by a sediment pond, is when the following criteria are met (see Table 4.2.4):

Table 4.2.4
Contributing Drainage Area for Vegetated Strips

Average Contributing area Slope	Average Contributing area Percent Slope	Max Contributing area Flowpath Length
1.5H:1V or flatter	67% or flatter	100 feet
2H:1V or flatter	50% or flatter	115 feet
4H:1V or flatter	25% or flatter	150 feet
6H:1V or flatter	16.7% or flatter	200 feet
10H:1V or flatter	10% or flatter	250 feet

Design and Installation Specifications

- The vegetated strip shall consist of a minimum of a 25-foot flowpath length continuous strip of dense vegetation with topsoil. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally, vegetated strips shall consist of undisturbed native growth with a well-developed soil that allows for infiltration of runoff.
- The slope within the strip shall not exceed 4H:1V.
- The uphill boundary of the vegetated strip shall be delineated with clearing limits.

Maintenance Standards

- Any areas damaged by erosion or construction activity shall be seeded immediately and protected by mulch.
- If more than 5 feet of the original vegetated strip width has had vegetation removed or is being eroded, sod must be installed.
- If there are indications that concentrated flows are traveling across the buffer, surface water controls must be installed to reduce the flows

entering the buffer, or additional perimeter protection must be installed.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. Wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.2.14 for typical construction details. WSDOT Standard Plan I-30.30-00 also provides information on Wattles (http://www.wsdot.wa.gov/Design/Standards/Plans.htm#SectionI)

Conditions of Use

- Use wattles:
  - In disturbed areas that require immediate erosion protection.
  - On exposed soils during the period of short construction delays, or over winter months.
  - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, Wattles are typically effective for one to two seasons.
- Prevent rilling beneath wattles by properly entrenching and abutting wattles together to prevent water from passing between them.

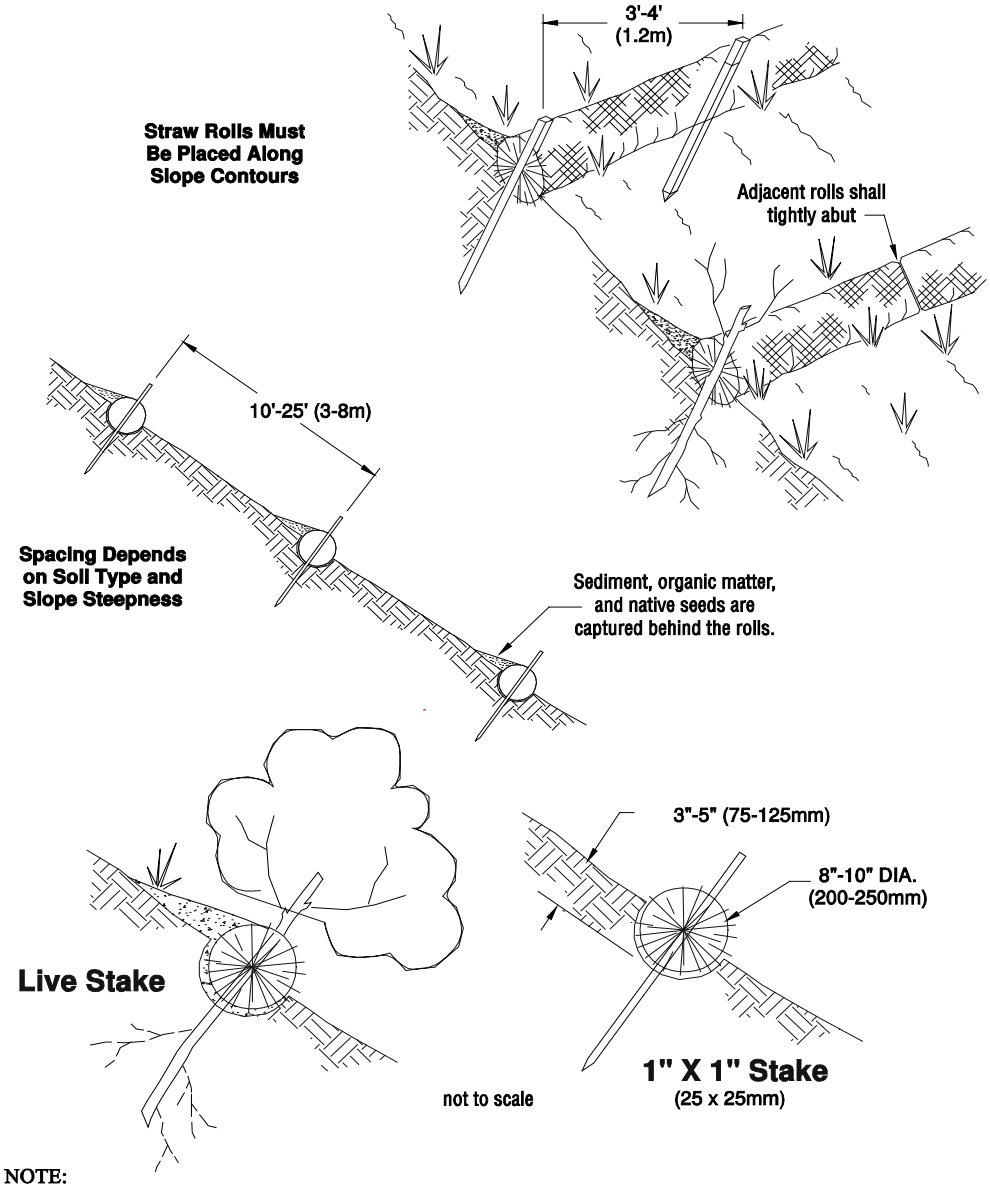
Design Criteria

- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Narrow trenches should be dug across the slope on contour to a depth of 3- to 5-inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5- to 7- inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compacted using hand tamping or other methods.
- Construct trenches at intervals of 10- to 25-feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and abut tightly end to end. Do not overlap the ends.
- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.

- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 3/4 x 3/4 x 24 inches min. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.



NOTE:
1. Straw roll installation requires the placement and secure staking of the roll in a trench, 3"-5" (75-125mm) deep, dug on contour. runoff must not be allowed to run under or around roll.

Figure 4.2.14 – Wattles

- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C235. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C236: Vegetative Filtration

Purpose

Vegetative Filtration may be used in conjunction with BMP C241 Temporary Sediment Ponds, BMP C206 Level Spreader and a pumping system with surface intake to improve turbidity levels of stormwater discharges by filtering through existing vegetation where undisturbed forest floor duff layer or established lawn with thatch layer are present. Vegetative Filtration can also be used to infiltrate dewatering waste from foundations, vaults, and trenches as long as runoff does not occur.

Conditions of Use

- For every five acre of disturbed soil use one acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, ground water table height, and other site conditions.
- Wetlands shall not be used for filtration.
- Do not use this BMP in areas with a high ground water table, or in areas that will have a high seasonal ground water table during the use of this BMP.
- This BMP may be less effective on soils that prevent the infiltration of the water, such as hard till.
- Using other effective source control measures throughout a construction site will prevent the generation of additional highly turbid water and may reduce the time period or area need for this BMP.
- Stop distributing water into the vegetated area if standing water or erosion results.

Design Criteria

- Find land adjacent to the project that has a vegetated field, preferably a farm field, or wooded area.
- If the project site does not contain enough vegetated field area consider obtaining permission from adjacent landowners (especially for farm fields).
- Install a pump and downstream distribution manifold depending on the project size. Generally, the main distribution line should reach 100 to 200-feet long (many large projects, or projects on tight soil, will

require systems that reach several thousand feet long with numerous branch lines off of the main distribution line).

- The manifold should have several valves, allowing for control over the distribution area in the field.
- Install several branches of 4” schedule 20, swaged-fit common septic tight-lined sewer line, or 6” fire hose, which can convey the turbid water out to various sections of the field. See Figure 4.2.15.
- Determine the branch length based on the field area geography and number of branches. Typically, branches stretch from 200-feet to several thousand feet. Always, lay branches on contour with the slope.
- On uneven ground, sprinklers perform well. Space sprinkler heads so that spray patterns do not overlap.
- On relatively even surfaces, a level spreader using 4-inch perforated pipe may be used as an alternative option to the sprinkler head setup. Install drain pipe at the highest point on the field and at various lower elevations to ensure full coverage of the filtration area. Pipe should be place with the holes up to allow for a gentle weeping of stormwater evenly out all holes. Leveling the pipe by staking and using sandbags may be required.
- To prevent the over saturation of the field area, rotate the use of branches or spray heads. Do this as needed based on monitoring the spray field.
- Monitor the spray field on a daily basis to ensure that over saturation of any portion of the field doesn’t occur at any time. The presence of standing puddles of water or creation of concentrated flows visually signify that over saturation of the field has occurred.
- Since the operator is handling contaminated water, physically monitor the vegetated spray field all the way down to the nearest surface water, or furthest spray area, to ensure that the water has not caused overland or concentrated flows, and has not created erosion around the spray nozzle.
- Monitoring usually needs to take place 3-5 times per day to ensure sheet-flow into state waters. Do not exceed water quality standards for turbidity.
- Ecology strongly recommends that a separate inspection log be developed, maintained and kept with the existing site logbook to aid the operator conducting inspections. This separate “Field Filtration Logbook” can also aid the facility in demonstrating compliance with permit conditions.

Maintenance Standards

- Inspect the spray nozzles daily, at a minimum, for leaks and plugging from sediment particles.

- If erosion, concentrated flows, or over saturation of the field occurs, rotate the use of branches or spray heads or move the branches to a new field location.
- Check all branches and the manifold for unintended leaks.

Flowpath Guidelines for Vegetative Filtration		
Average Slope	Average Area % Slope	Estimated Flowpath Length (ft)
1.5H:1V	67%	250
2H:1V	50%	200
4H:1V	25%	150
6H:1V	16.7%	115
10H:1V	10%	100



Figure 4.2.15 – Manifold and Braches in a wooded, vegetated spray field

ENGINEERED DRAINAGE REPORT

of

5th Ave Townhomes Plat
585 5th Ave SW
Tumwater, WA 98512

for

ASH Holdings LLC
3425 Merryman Pl SE
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by

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
A Division of THE LAND DEVELOPER, Inc.

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January 22, 2026

TABLE OF CONTENTS

I. PROJECT OVERVIEW 3

II. EXISTING CONDITIONS 5

III. STORMWATER MANAGEMENT MINIMUM REQUIREMENTS 5

VIII. APPENDICES

Appendix A	Drainage & Erosion Control Plans
Appendix B	SWPPP
Appendix C	Soils Report
Appendix D	Maintenance and Source Control Manual
Appendix E	Stormwater Maintenance Agreement
Appendix F	WWHM Hydraulic Analysis
Appendix G	Compost Amended Soil Details
Appendix H	Regional Drainage Basin Map

I. PROJECT OVERVIEW

This Engineered Drainage Plan was determined to be required as a result of proposing 11 unit townhome plat project proposing more than 10,000 sf of impervious coverage. The parcel is approximately 1.69 Acres in size. There does not appear to be any existing development on the site. The proposal includes the construction of a 11-lot townhome units. Onsite development includes the following:

LOT SIZE:	73,521 SF (1.69 AC)
FRONTAGE (S 5th Ave SW) COVERAGE:	
TOTAL AREA:	7,019 SF (0.16 AC)
NEW SIDEWALK:	1,543 SF (0.04 AC)
NEW + EX ASPH TO SWALE:	3,298 SF (0.08 AC)
NEW LANDSCAPED AREA:	2,178 SF (0.04 AC)
ONSITE COVERAGE:	
4 LOT 11 UNIT TOTAL AREA:	22,123 SF (0.51 AC)
NEW + REPLACED ASPHALT AREA:	1,716 SF (0.04 AC)
PATIO AREA:	792 SF (0.02 AC)
ROOF AREA:	12,312 SF (0.28 AC
BIORETENTION POND AREA:	7,062 SF (0.16 AC)
LANDSCAPED AREA:	9,241 SF (0.21 AC)
TOTAL ONSITE IMP COVERAGE:	14,820 SF (0.34 AC)
	OR 20% OK IF LESS THAN 60%

There are two bioretention ponds proposed for this project. One is intended to mitigate the onsite stormwater, and the other pond is intended to mitigate the frontage improvements.

The site address is 585 5th Ave SW, Tumwater, WA 98512. The parcel number is 33203200001. The legal description as shown on the Thurston County Assessor Website is as follows:

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR:

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007, UNDER AUDITOR' FILE NO. 3599306;

IN THURSTON COUNTY, WA.

TOGETHER WITH AND SUBJECT TO EASEMENTS, RESTRICTIONS, RESERVATIONS AND CONDITIONS OF RECORD, IF ANY. (NOT PART OF THIS SURVEY)

This project proposes to meet the LID performance standard through the use of BMP’s listed in Figure 2.3 in the manual and utilizing WWHM analysis.

The Lawn and landscaped area will either preserve the native soil or amend the soil per manual requirements. This option was chosen for this project.

Roofs:

Roof downspouts are proposed to be collected and infiltrated into a bioretention pond.

Other Hard Surfaces:

Other hard surfaces are proposed to be collected and infiltrated into a bioretention pond.

See Appendix B for Basin Map and Site Plan.

II. EXISTING CONDITIONS

The existing site appears to be an undeveloped site. The property to the north drains onto the property from the peak of the regional hill. Stormwater then drains to the middle area of the lot and then drains offsite near the southwest corner of the property.

The attached soils report The upper 42” of soil has been designated as feasible for infiltration with LID elements. The recommended design infiltration rate listed is 1.28 in/hr for the frontage bioretention pond and 4.8 in/hr for the onsite bioretention pond. The property is currently vegetated with trees, grass and shrubs.

The existing tributary offsite Stormwater generally sheet flows onto the site on the northern portion of the property. The stormwater then drains through the property and discharges via sheet flow on the southwestern portion of the parcel. The project is located in an aquifer recharge area and is located in a wellhead protection area as defined by the Thurston County Health Department, the EPA or by the county. There are no known ravines, or wetlands located on the site. There are no known basin plans for the area. Refer to the attachments for applicable Soils Maps.

The USDA Soils Survey lists the onsite soils as Kapowsin silt loam.

There are no known ravines, or wetlands located on the site. There are no known basin plans for the area. Refer to appendix B for applicable Drainage Maps.

III. VICINITY ANALYSIS AND SUBBASIN DESCRIPTION

The regional drainage basin as shown in the attached. The hillside to the north of the subject parcel drains onto this parcel towards the middle area where the stormwater then drains offsite to the southwest of the parcel. A bypass drainage ditch is proposed to route offsite and onsite undeveloped open space area around the proposed bioretention ponds such that this stormwater will continue to discharge near the southwest corner of the parcel. Regional natural drainage system generally appears to be preserved.

IV. FLOW CONTROL AND WATER QUALITY FACILITY SIZING

STORMWATER MANAGEMENT MINIMUM REQUIREMENTS

There are eleven minimum requirements for stormwater management. The minimum requirements are:

1. Preparation of Stormwater Site Plan
2. Construction Stormwater Pollution Prevention
3. Source Control of Pollution
4. Preservation of Natural Drainage Systems and Outfalls
5. Onsite Stormwater Management
6. Runoff Treatment

7. Flow Control
8. Wetlands Protection
9. Operation and Maintenance
10. Financial Liability
11. Offsite Analysis and Mitigation

Addressing these eleven requirements, it is anticipated that the proposed project will have little or no adverse effects on the downstream and surrounding hydrology. Each of the minimum requirements is discussed below.

Minimum Requirement #1: Preparation of Stormwater Site Plan

This Abbreviated Stormwater Site Plan is submitted as part of the 5th Ave Townhomes Binding Site Plan project to meet this requirement.

Minimum Requirement #2: Construction Stormwater Pollution Prevention

A Stormwater Pollution Prevention Plan (SWPPP) was developed to address erosion and sediment control anticipated during construction. The SWPPP will address all thirteen elements as required by the Department of Ecology. The SWPPP is attached in appendix F

Minimum Requirement #3: Source Control of Pollution

The homeowner will receive a copy of the Pollution Source Control Program as found in the Stormwater Maintenance Plan in Section VII below. The Source Control Program describes Best Management Practices (BMPs) for household products, automotive maintenance, pesticides, fertilizers and remodeling.

Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

The offsite stormwater from the north sheet flows onsite and then will drain down to the middle area of the site where a bypass ditch is proposed to bypass the stormwater down to the southwest corner of the site where it will discharge in general consistency with existing drainage patterns. The proposed stormwater will infiltrate into the ground therefore it appears to maintain existing drainage patterns.

All natural drainage ways generally appear to be preserved.

Minimum Requirement #5: Onsite Stormwater Management, Including Easements and Setbacks

List #2: On-Site Stormwater Management BMPs for Projects Triggering Minimum Requirements #1 through #11

For each surface, consider the BMPs in the order listed for that type of surface. Use the first BMP that is considered feasible. No other on-site stormwater management BMP is necessary for that surface.

Lawn and Landscaped Areas

1. Postconstruction soil quality and depth in Volume V, Chapter 6.

This option is chosen.

Roofs

1. Full dispersion in Volume V, Section 7.2, or downspout infiltration in Volume V, Section 15.3.

Full dispersion due to slopes over 15% near possible dispersion areas. Full infiltration is not feasible due to depth to groundwater.

2. Bioretention in Volume V, Chapter 9, that has a minimum horizontally projected surface area below the overflow, which is at least 5 percent of the total surface area draining to it.

Bioretention is chosen for this project. The design is provided below in this report.

3. Downspout dispersion in Volume V, Section 15.4. ***Not needed***
4. Perforated stub-out connections in Volume V, Section 15.5. ***Not needed***

Other Hard Surfaces

1. Full dispersion in Volume V, Section 7.2.

Full dispersion due to slopes over 15% near possible dispersion areas.

2. Permeable pavement 2 in Volume V, Chapter 11.

Not chosen

3. Bioretention in Volume V, Chapter 9, that has a minimum horizontally projected surface area below the overflow, which is at least 5 percent of the total surface area draining to it.

Bioretention is chosen for this project. The design is provided below in this report.

5. Sheet flow dispersion or concentrated flow dispersion BMPs in Volume V, Sections 7.3 and 7.4. ***Not needed***

All mitigated area stormwater will be infiltrated onsite via an infiltration bioretention ponds. Any stormwater not infiltrated will sheet flow offsite. No easements are required. All setback requirements are met with this project.

Minimum Requirement #6: Runoff Treatment

For sites with greater than 5,000 square feet of pollution generating impervious surface (PGIS), treatment facilities and onsite stormwater BMPs are required. This proposed project has more than 5,000 square feet of PGIS therefore treatment is required. Two bioretention ponds are proposed that meet treatment requirements for this project.

Onsite Bioretention Pond

Table 6.1 WWHM Pre-developed Land Use Summary for Treatment

WWHM Pre-developed Land Use (All Areas Measured in Acres)	Site
C, Forest, Flat	0.64
Saturated, Forest, Flat	0.00
C, Pasture, Flat	0.00
Roads Flat	0.00
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.64**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**0.00%**
100-year Storm Peak (cfs)	**0.0064**

Table 6.2 WWHM Developed Mitigated Land Use Summary for Treatment

WWHM Developed Land Use (All Areas Measured in Acres)	Total
A, Forest, Flat	0.00
A, Pasture, Mod (lawn/landscape)	0.21
Roads Flat	0.06
Roofs Flat	0.28
Pond	0.11
Total Basin	**0.64**

Frontage Bioretention Pond

Table 6.1 WWHM Pre-developed Land Use Summary for Treatment

WWHM Pre-developed Land Use (All Areas Measured in Acres)	Site
C, Forest, Flat	0.16
Saturated, Forest, Flat	0.00
C, Pasture, Flat	0.00
Roads Flat	0.00
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.16**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**0.00%**
100-year Storm Peak (cfs)	**0.0064**

Table 6.2 WWHM Developed Mitigated Land Use Summary for Treatment

WWHM Developed Land Use (All Areas Measured in Acres)	Total
A, Forest, Flat	0.00
A, Pasture, Mod (lawn/landscape)	0.04
Roads Flat	0.12
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.16**

Minimum Requirement #7: Flow Control

This project is required to meet the LID performance standard through the use of BMP's listed in Figure 2.3 in the manual or meet the minimum LID hydraulic standards as shown in the manual utilizing WWHM analysis. For this project we have chosen to meet the LID requirements through analysis and implementing the desired BMP's listed below.

Lawn and landscaped area:

1. Lawn and landscaped area will either preserve the native soil or amend the soil per manual requirements. This option was chosen for this project.

Roofs:

1. Downspout Infiltration via bioretention pond was selected to mitigate the roof. The proposed roof is approximately 12,312 sf in size. The roof is proposed to be directed to large bioretention pond located to the west of the lots. Based upon the soils report the soils report the long-term infiltration rate is 4.8 inches per hour can be used for the onsite bioretention pond. However to provide a level of factor of safety a design infiltration rate of 3" per hour was used.

Other Hard Surfaces:

1. The proposal includes the construction of a 14,820 square feet (sf) driveway, concrete patios front and back yard. The above referenced bioretention pond was used to mitigate these hard surfaces. Based upon the soils report the soils report the long-term infiltration rate is 1.28 inches per hour can be used for the frontage bioretention pond.

   The area tributary to the onsite bioretention pond is as follows:

Table 7.1 WWHM Pre-developed Onsite Pond Land Use Summary

WWHM Pre-developed Land Use (All Areas Measured in Acres)	Site
C, Forest, Flat	0.41
Saturated, Forest, Flat	0.00
C, Pasture, Flat	0.00
Roads Flat	0.00
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.41**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**0.00%**
100-year Storm Peak (cfs)	**0.0064**

Table 7.2 WWHM Developed Mitigated Onsite Pond Land Use Summary

WWHM Developed Land Use (All Areas Measured in Acres)	Total
A, Forest, Flat	0.00
A, Pasture, Mod (lawn/landscape)	0.10
Roads Flat	0.15
Roofs Flat	0.16
Pond	0.00
Total Basin	**0.41**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**77.0%**
Increase (Decrease) in 100-year Storm Peak (cfs)	**(0.01)**

Table 7.3 Onsite Pond Infiltration Trench Summary

	Pond A
Bottom Trench Elevation	272.50
Live Storage Elevation	273.50
Total Pond Bottom Area Req'd	4,200 sf

The required bottom area per WWHM is 2,200 sf, the actual area provided is 2,208 sf therefore the infiltration trench meets design criteria. This is the size specified in the plans therefore the bioretention pond meets design criteria.

The frontage improvements are designed to infiltrate into the second bioretention pond shown just south of the onsite pond. The following data was used to size this pond.

Table 7.4 WWHM Pre-developed Frontage Pond Land Use Summary

WWHM Pre-developed Land Use (All Areas Measured in Acres)	Site
C, Forest, Flat	0.16
Saturated, Forest, Flat	0.00
C, Pasture, Flat	0.00
Roads Flat	0.00
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.16**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**0.00%**
100-year Storm Peak (cfs)	**0.0064**

Table 7.5 WWHM Developed Mitigated Frontage Pond Land Use Summary

WWHM Developed Land Use (All Areas Measured in Acres)	Total
A, Forest, Flat	0.00
A, Pasture, Mod (lawn/landscape)	0.04
Roads Flat	0.12
Roofs Flat	0.00
Pond	0.00
Total Basin	**0.16**
Total % Impervious (all roofs, streets, sidewalks and ponds)	**77.0%**
Increase (Decrease) in 100-year Storm Peak (cfs)	**(0.01)**

Table 7.6 Frontage Pond Infiltration Trench Summary

	Pond A
Bottom Trench Elevation	272.50
Live Storage Elevation	273.50
Total Pond Bottom Area Req'd	1,950sf

The required bottom area per WWHM is 650 sf, the actual area provided is 848 sf therefore the infiltration trench meets design criteria. This is the size specified in the plans therefore the bioretention pond meets design criteria.

Minimum Requirement #8: Wetlands Protection

There are no identified wetlands on the site. Therefore, wetlands are protected based upon these projects compliance with the drainage manual.

Minimum Requirement #9: Operation and Maintenance

This project is a plat and a Declaration of Covenants, Conditions and Restrictions (CCR) and a stormwater maintenance plan are required to insure this project's stormwater mitigation continues to function as design. The property owner's will be responsible for maintaining the bioretention cells, stormwater conveyance systems and compost amended soil area. The Stormwater Maintenance Plan is contained in the appendix. The maintenance plan describes maintenance and operation of the Compost Amended Soils, bioretention facilities, catch basins, conveyance piping, and landscaping and how homeowners can minimize use of hazardous household products.

Minimum Requirement #10: Financial Liability

To insure compliance with these standards, performance bonding or other appropriate financial instruments shall be required for all projects.

In accordance with Tumwater Municipal Code 12.16.080, project applicants shall provide financial guarantees to ensure that:

- The project will operate according to the design approved by the project engineer, and
- Operation of erosion control facilities will provide protection against siltation of surface water, erosion, and damage to adjacent properties.

The applicant shall provide a financial guarantee to the administrator to ensure satisfactory maintenance of drainage facilities for a minimum of 2 years from final plat acceptance or acceptance of the project, whichever is later, in accordance with the maintenance plan submitted as part of the grading and erosion control plan.

A construction cost estimate will be provided at final approval of plan.

Minimum Requirement #11: Offsite Analysis and Mitigation

This project proposes to meet LID infiltration requirements. No increased offsite stormwater discharge is anticipated therefore not offsite analysis and mitigation are required.

V. AESTHETIC CONSIDERATIONS FOR FACILITIES

The bioretention ponds are proposed to be planted per the drainage design manual.

VI. CONVEYANCE SYSTEM ANALYSIS AND DESIGN

The roof conveyance pipe system includes the use of 6" diameter pvc. The attached capacity analysis shows that this pipe has capacity to convey the 25 year design stormwater event. The frontage roadway conveyance pipe system includes the use of 12" diameter pvc. The attached capacity analysis shows that this pipe has capacity to convey the 25 year design stormwater event. Reference appendix F for the analysis.

VII. COVENANTS, DEDICATIONS, EASEMENTS

Prior to final plat the applicable covenants, dedications and easements as shown on the preliminary plat and included in this report will be recorded against each parcel of this plat.

VIII. AGREEMENTS AND GUARANTEES

The performance and maintenance bonds as part of this project will be prepared as part of the construction drawing phase of this project.

IX. OTHER PERMITS OR CONDITIONS PLACED ON THE PROJECT

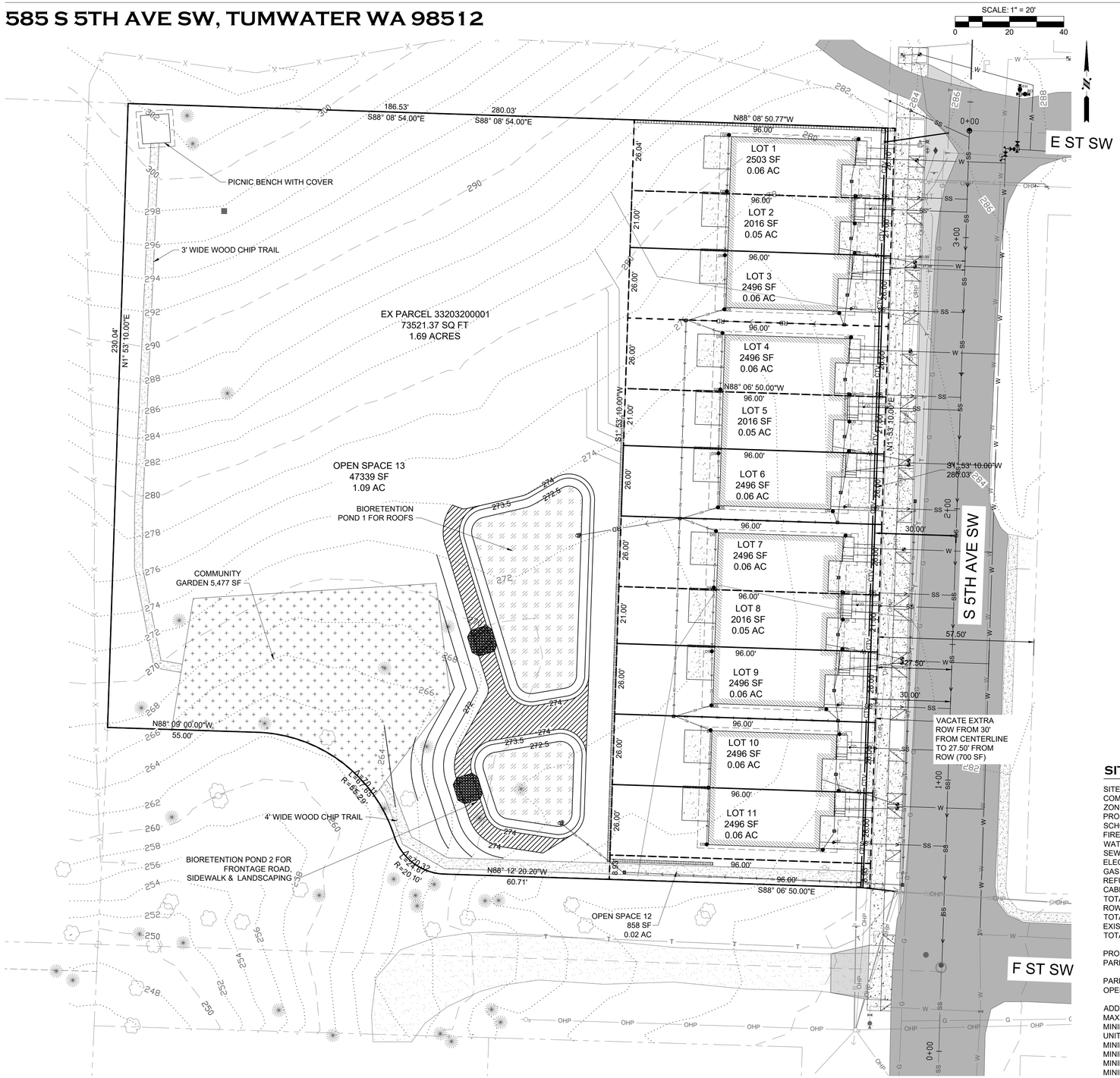
No other permit are anticipated to be required.

APPENDIX A –Drainage & Erosion Control Plans

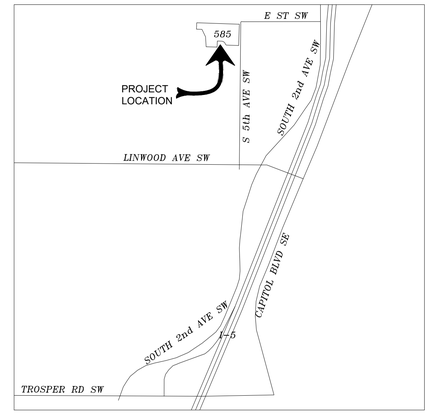
SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.

5TH AVE TOWNHOMES PRELIMINARY PLAT SITE PLAN

585 S 5TH AVE SW, TUMWATER WA 98512



APPROXIMATE CUT/FILL GRADING QUANTITIES
CUT: 1,100 YARDS
FILL: 3,500 YARDS
FOR PERMITTING PURPOSED ONLY



VICINITY MAP

NTS

LEGEND

	EXISTING	PROPOSED
SUBJECT PROPERTY LINE		
ADJACENT LOT LINE		
HABITAT BUFFER LINE		
WETLAND BUFFER LINE		
EASEMENT LINE		
RIGHT-OF-WAY LINE		
CENTER LINE		
CONTOUR, MAJOR	160	160
CONTOUR, MINOR	158	158
CONIFEROUS TREE		
DECIDUOUS TREE		
STREET SIGN		
POWER LINE	UGP	UGP
OVERHEAD POWER LINE	OHP	OHP
POWER POLE		
GUY WIRE		
POWER VAULT	P	P
STREET LIGHT		
NATURAL GAS LINE	G	G
TELEPHONE LINE	T	T
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
CABLE LINE	CTV	CTV
CABLE PEDESTAL	TV	TV
STORM MAIN LINE	SD	SD
FOOTING DRAIN LINE	FD	FD
ROOF DRAIN LINE	RD	RD
CATCH BASIN	CB	
TYPE I CATCH BASIN	D	D
YARD DRAIN	YD	YD
DOWNSPOUT	DS	DS
WATER MAIN LINE	W	W
WATER METER	WM	
BLOWOFF VALVE FIRE HYDRANT	BO	BO
GATE VALVE		
SEWER MANHOLE	CO	CO
CLEANOUT	CO	
SEWER MAIN LINE	SS	SS
CONCRETE		
ASPHALT PAVEMENT		
POROUS ASPHALT		
LANDSCAPING		
GRAVEL		

PROJECT INFO

OWNER:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

LEGAL DESCRIPTION

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY, AUDITOR:

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 5TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. 02005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3624457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007, UNDER AUDITOR' FILE NO. 3599306;

IN THURSTON COUNTY, WA.

TOGETHER WITH AND SUBJECT TO EASEMENTS, RESTRICTIONS, RESERVATIONS AND CONDITIONS OF RECORD, IF ANY. (NOT PART OF THIS SURVEY)

BASIS OF BEARING

CITY OF TUMWATER COORDINATE SYSTEM AND BASED ON THURSTON COUNTY CONTROL POINT NO. ARC AND CENTERLINE BEARING ALONG 5TH AVE SW AND "E" ST. SW

VERTICAL DATUM

THURSTON COUNTY CONTROL POINT NO. ARC, FOUND WSDOT MONUMENT WITH 3" ALUMINUM CAP AT THE NW CORNER OF THE INTERSECTION OF LINWOOD AVE SW AND 2ND AVE SW, ELEVATION = 107.53'

PARCEL NUMBER

33203200001

SITE INFO

SITE ADDRESS:	585 S 5th Ave SW, Tumwater, WA 98512
COMPREHENSIVE PLAN DESIGNATION:	RESIDENTIAL
ZONING:	SFM
PROPOSED IBC CONSTRUCTION TYPE:	5V-B
SCHOOL DISTRICT:	TUMWATER SCHOOL DISTRICT
FIRE DISTRICT:	FIRE DISTRICT #03
WATER PROVIDER:	CITY OF TUMWATER
SEWER PROVIDER:	CITY OF TUMWATER
ELECTRICITY PROVIDER:	PSE
GAS PROVIDER:	PSE
REFUSE/RECYCLING PROVIDER:	LeMAY
CABLE/TV PROVIDER:	COMCAST
TOTAL SITE AREA:	1.69 AC OR 73,521 SF
ROW VACATION AREA:	0.02 AC OR 700 SF
TOTAL AREA AFTER VACATION:	1.70 AC OR 74,221 SF
EXISTING NUMBER OF UNITS:	VACANT
TOTAL EX RESIDENTIAL UNITS:	0
PROPOSED PROJECT:	TOWNHOME PLAT
PARKING SPACES REQUIRED RESIDENT:	2 SPACES / UNIT = 22 SPACES
PARKING SPACES PROP:	22 SPACES
OPEN SPACE REQUIRED:	15% OF SITE = 73,521 SF (0.15) = 11,028 SF
	50,257 SF PROVIDED

ADDITIONAL REGULATIONS:

MAXIMUM AVERAGE HOUSING DENSITY (units per acre)	(8) 1.70 AC = 14 UNITS
MINIMUM AVERAGE HOUSING DENSITY (units per acre)	(6) 1.70 AC = 11 UNITS
UNITS PROPOSED:	11 TOWN HOME UNITS
MINIMUM LOT SIZE	2,000 SF
MINIMUM FRONT YARD SETBACKS	10' or 20' @ GARAGE
MINIMUM REAR YARD SETBACKS	10'
MINIMUM SIDE YARD SETBACKS	5'
MAXIMUM BUILDING HEIGHT	35'
MAXIMUM IMPERVIOUS COVERAGE	70% (TOWNHOUSE) (1.69AC) = 1.18 AC

INDIVIDUAL LOT MAXIMUM COVERAGE CALCULATION:
WORST CASE LOT COVERAGE (LOT 2):

LOT SIZE:	2016 SF
MAX COVERAGE (70%):	1,411 SF
COVERAGE PROPOSED:	1,377 SF PROPOSED THEREFORE OK

SITE COVERAGE DATA

LOT SIZE: 73,521 SF (1.69 AC)

FRONTAGE (S 5TH AVE SW) COVERAGE:	
TOTAL AREA:	7,019 SF (0.16 AC)
NEW SIDEWALK:	1,543 SF (0.04 AC)
NEW + EX ASPH TO SWALE:	3,298 SF (0.08 AC)
NEW LANDSCAPED AREA:	2,178 SF (0.05 AC)
ONSITE AREA:	
11 LOT TOTAL AREA:	22,123 SF (0.51 AC)
NEW + REPLACED ASPHALT AREA:	1,716 SF (0.04 AC)
PATIO AREA:	792 SF (0.02 AC)
ROOF AREA:	12,312 SF (0.28 AC)
	< 0.56 AC THEREFORE OK)
LANDSCAPED AREA:	8,561 SF (0.20 AC)
TOTAL ONSITE IMP COVERAGE:	14,820 SF (0.34 AC)
	OR 20% OK IF LESS THAN 60%

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW,
TUMWATER, WA. 98501
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(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

KENT B. ERIK A. OLSEN
38284
REGISTERED PROFESSIONAL ENGINEER
11/9/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

COVER SHEET

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA

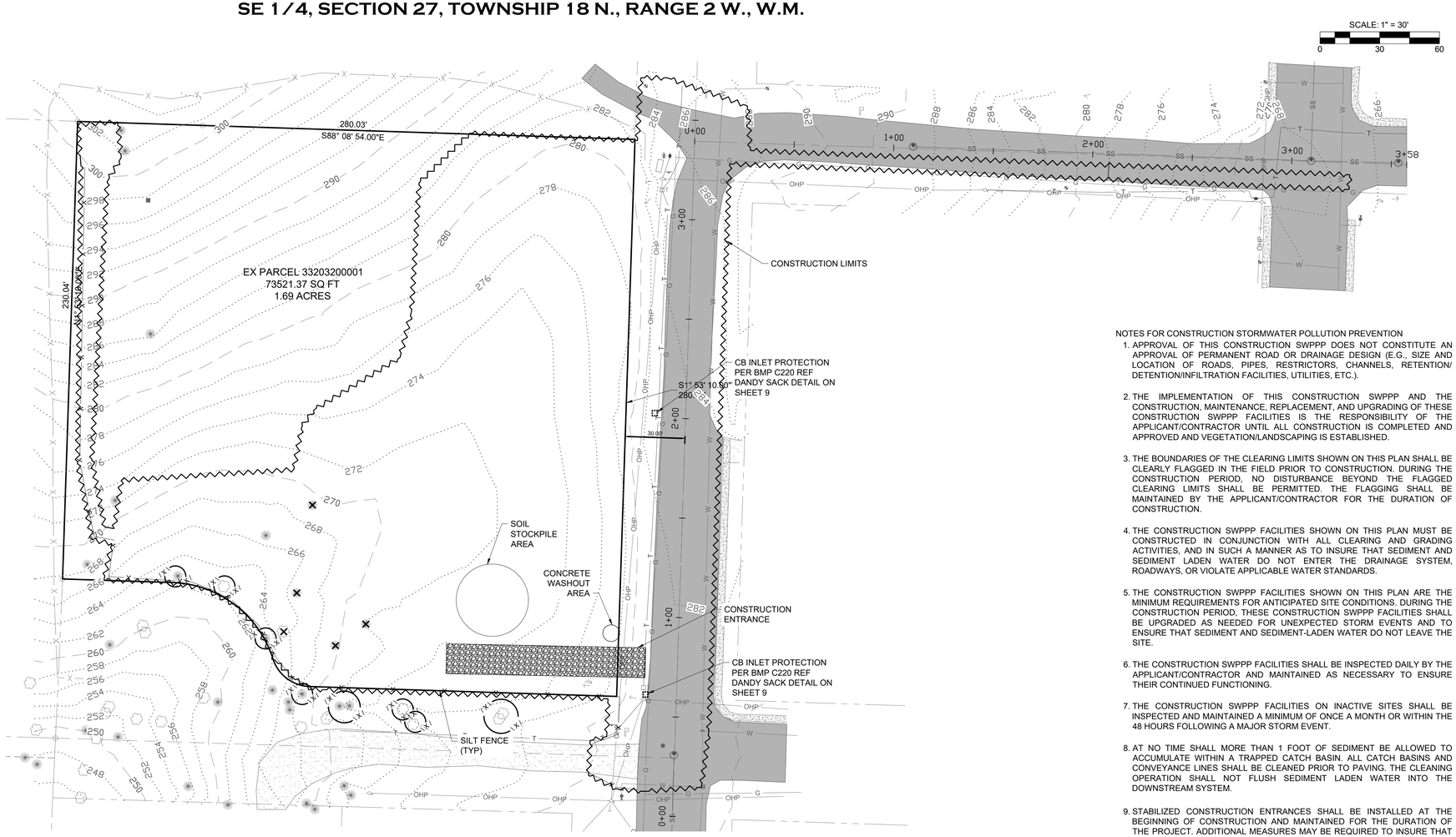
DATE: 9/24/25

AGENCY NO:

SHEET: 1 OF 4

JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.



NOTES FOR CONSTRUCTION STORMWATER POLLUTION PREVENTION

1. APPROVAL OF THIS CONSTRUCTION SWPPP DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION/ DETENTION/INFILTRATION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THIS CONSTRUCTION SWPPP AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE CONSTRUCTION SWPPP FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
4. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO INSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE WATER STANDARDS.
5. THE CONSTRUCTION SWPPP FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE CONSTRUCTION SWPPP FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
6. THE CONSTRUCTION SWPPP FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
7. THE CONSTRUCTION SWPPP FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.
8. AT NO TIME SHALL MORE THAN 1 FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A TRAPPED CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
9. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO INSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.

TOPOGRAPHIC NOTE:

THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, TLD, LLC CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

SITE CONSTRUCTION NOTES:

1. DEMOLISH ALL EXISTING STRUCTURES WITHIN CLEARING LIMITS EXCEPT AS NOTED.
2. SEE SHEETS 3 & 4 FOR EROSION CONTROL DETAILS

X - INDICATES TREES TO BE REMOVED (TYP)

- INDICATES TREES TO BE PROTECTED W/ TREE PROTECTION FENCE INCLUDING A 4' TALL CHAIN LINK OR POLYETHYLENE LAMINAR SAFETY FENCING OR SIMILAR MATERIAL (TYP)

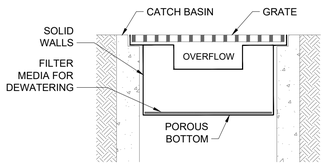
X — SILT FENCE

LIMITS OF DISTURBANCE

SURVEY MONUMENTS NOTES:

- EXISTING SURVEY MONUMENTS MUST BE SHOWN ON THE PLANS WITH NOTES TO PROTECT.
- DISTURBING EXISTING MONUMENTS REQUIRES A DNR PERMIT.
- NEW MONUMENTS TO BE INSTALLED PER CITY STANDARD PLANS

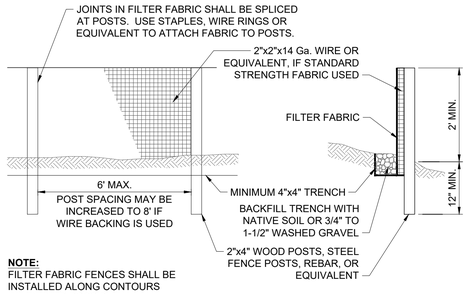
FIGURE D.2.1.5.F CATCH BASIN INSERT



NOTES:
THIS DETAIL IS ONLY SCHEMATIC. ANY INSERT IS ALLOWED THAT HAS:
- A MIN. 0.5 C.F. OF STORAGE,
- THE MEANS TO DEWATER THE STORED SEDIMENT,
- AN OVERFLOW, AND
- CAN BE EASILY MAINTAINED.

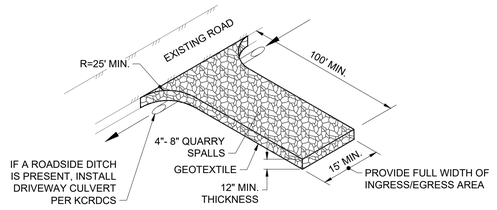
3 CB INLET PROTECTION
SCALE: NTS

FIGURE D.2.1.3.A SILT FENCE



NOTE:
FILTER FABRIC FENCES SHALL BE INSTALLED ALONG CONTOURS WHENEVER POSSIBLE

FIGURE D.2.1.4.A STABILIZED CONSTRUCTION ENTRANCE



NOTES:
- PER KING COUNTY ROAD DESIGN AND CONSTRUCTION STANDARDS (KCRDCS), DRIVEWAYS SHALL BE PAVED TO EDGE OF R-O-W PRIOR TO INSTALLATION OF THE CONSTRUCTION ENTRANCE TO AVOID DAMAGING OF THE ROADWAY.
- IT IS RECOMMENDED THAT THE ENTRANCE BE CROWNED SO THAT RUNOFF DRAINS OFF THE PAD.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
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E-MAIL: erik@thelanddeveloper.com

ERIK B. ANDERSON
38284
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
11/9/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

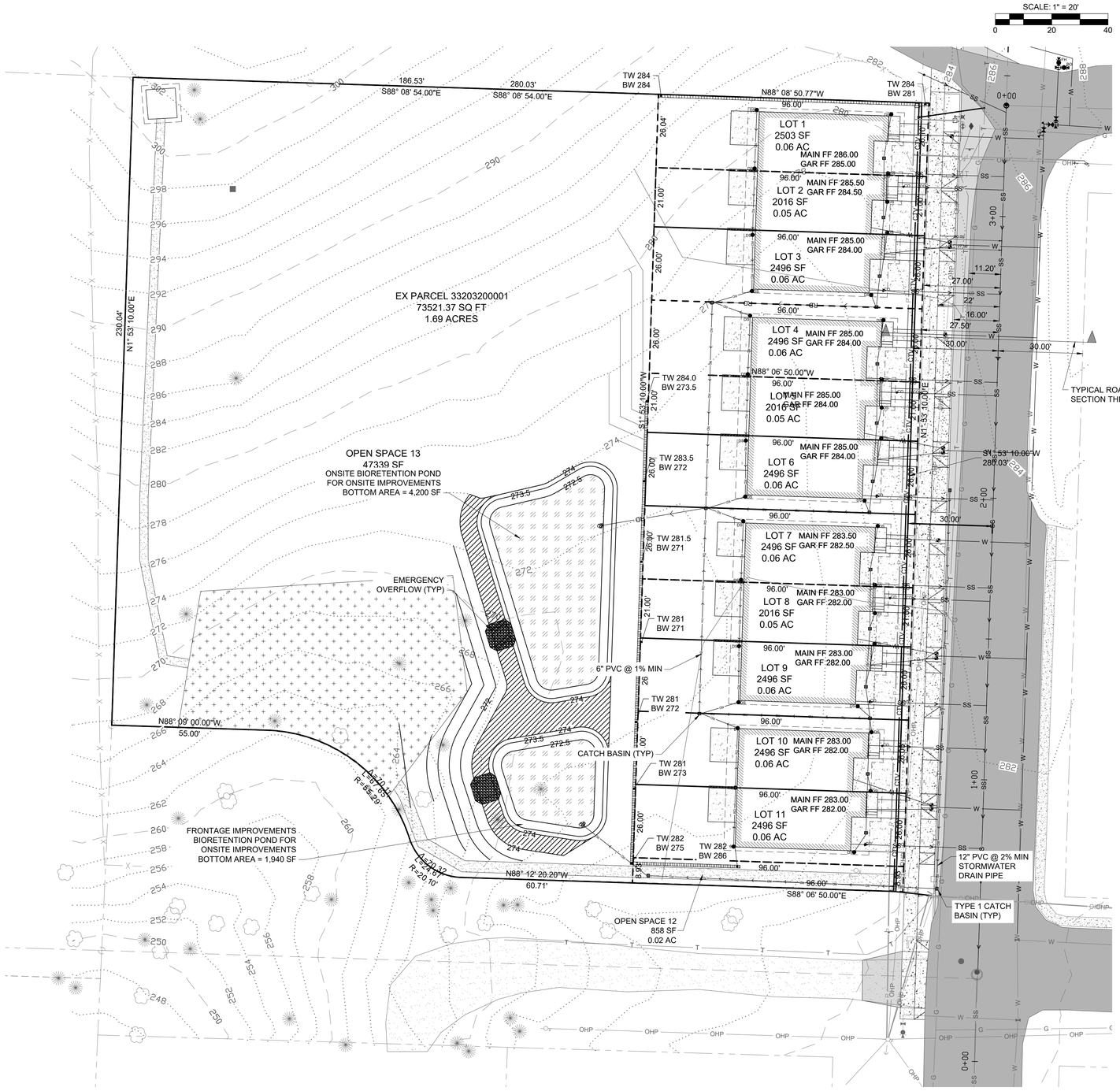
EROSION CONTROL PLAN

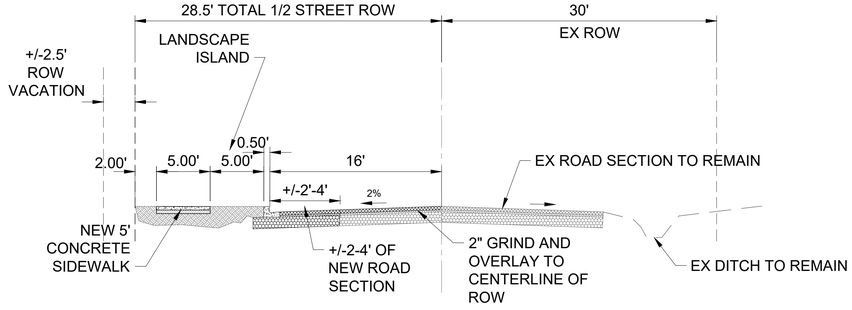
PROJECT:
HOLTZE TOWNHOMES
S 565 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 2 OF 4
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

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9/9/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

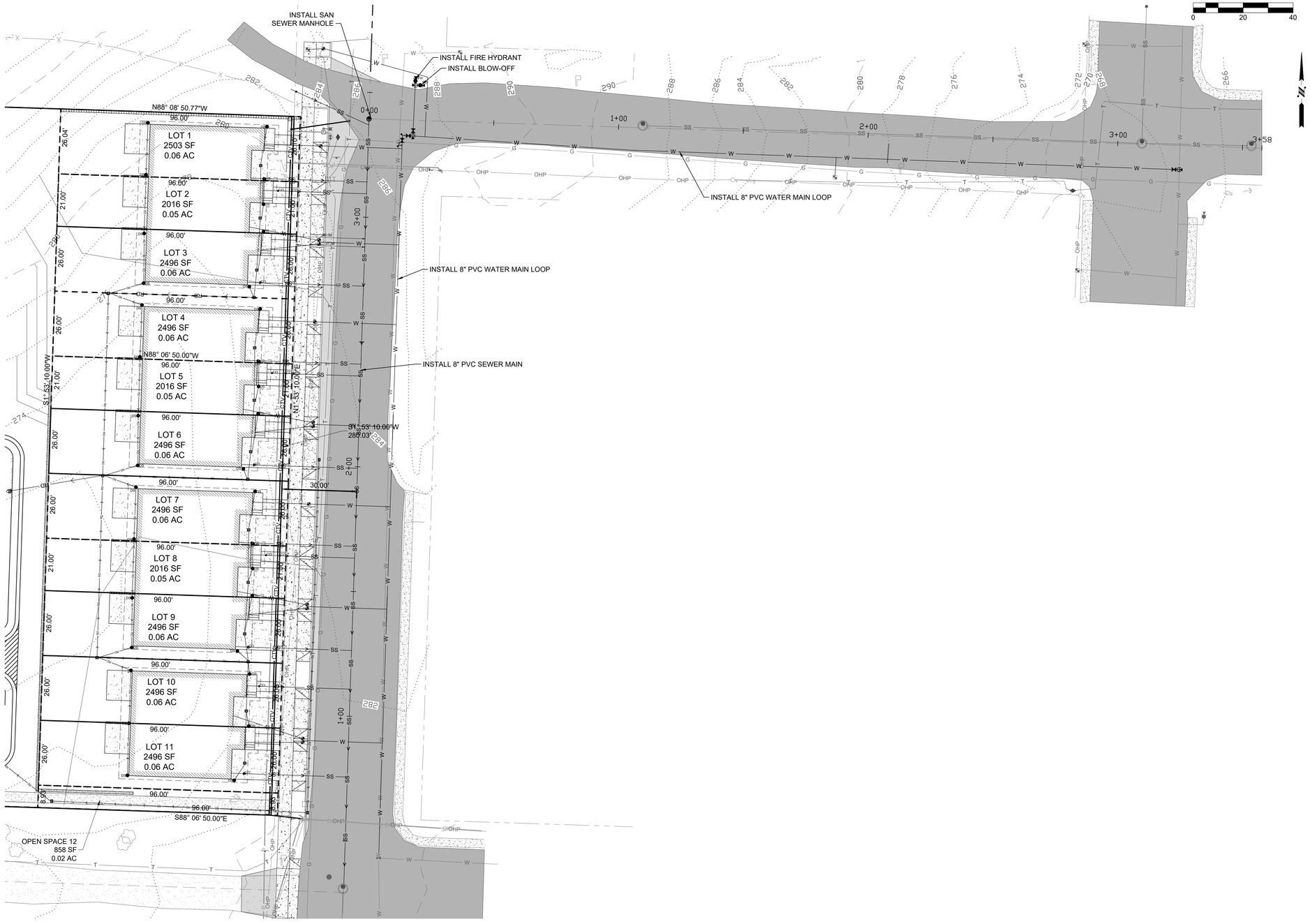
GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.



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38284
ERIK B. ANDERSON
STATE OF WASHINGTON
11/9/26

REVISIONS: DATE:

5TH AVE TOWNHOMES

UTILITY PLAN

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 4 OF 4
JOB NO: 21-132

APPENDIX B – SWPPP

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) (REQUIREMENT #2) REPORT

of

5th Ave Townhomes Binding Site Plan (BSP)
585 5th Ave SW
Tumwater, WA 98512

for

ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501
aholtze@gmail.com

by

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
A Division of THE LAND DEVELOPER, Inc.

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Tumwater, WA 98501
(360) 250-3973

September 24, 2025

TABLE OF CONTENTS

I. SWPPP (REQUIREMENT 2) CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP) 3

Element 1: Preserve vegetation/Mark Clearing Limits 3
Element 2: Establish Construction Access 3
Element 3: Control Flow Rates (Not required this project, threshold not met) 4
Element 4: Install Sediment Controls 4
Element 5: Stabilize Soils 4
Element 6: Protect Slopes 6
Element 7: Protect Drain Inlets 6
Element 8: Stabilize Channels and Outlets (Not applicable) 7
Element 9: Control Pollutants 7
Element 10: Control Dewatering (Not applicable) 8
Element 11: Maintain BMPs 8
Element 12: Manage the Project 8
Element 13: Protect Low Impact Development BMP's 10

II. CONSTRUCTION PHASING AND BMP IMPLEMENTATION 11

III. SITE INSPECTION AND MONITORING 12

VIII. APPENDICES

Appendix A Erosion Control Best Management Practices (BMP)

I. SWPPP (REQUIREMENT 2) CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Please reference Appendix A for construction plan sheets and Appendix B for applicable Erosion and Sediment Control Best Management Practices (BMP).

Element 1: Preserve vegetation/Mark Clearing Limits

• Prior to beginning land disturbing activities, including clearing and grading, clearly mark all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area. These shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

• Plastic, metal, or stake wire fence may be used to mark the clearing limits.

• The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable. If it is not practicable to retain the duff layer in place, it should be stockpiled on site, covered to prevent erosion, and replaced immediately upon completion of the ground disturbing activities.

• Suggested BMPs:

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones
- BMP C103: High Visibility Plastic Fence.

Element 2: Establish Construction Access

• Construction vehicle access and exit shall be limited to one route, if possible, or two for linear projects such as roadways where more than one access is necessary for large equipment maneuvering.

• Access points shall be stabilized with a pad of quarry spalls, crushed rock, or equivalent BMP prior to traffic leaving the construction site to minimize the tracking of sediment onto all roads and accesses.

• Wheel wash or tire baths should be located on site, if the stabilized constructions entrance is not effective in preventing sediment from being tracked onto roads/accesses.

• If sediment is tracked off site, roads/accesses shall be cleaned thoroughly at the end of each day, or more frequently during wet weather, if necessary to prevent sediment from entering waters of the state. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner.

• Street wash wastewater shall be controlled by pumping back on site to an approved infiltration facility, or otherwise must be prevented from discharging into systems tributary to state surface waters. Options include discharge to the sanitary sewer, or discharge to an approved offsite

treatment system. For discharges to the sanitary sewer, permits must be obtained from the County Industrial Pretreatment Program at (253) 798-3013.

• Suggested BMPs:
- BMP C105: Stabilized Construction Entrance
- BMP C107: Construction Road/Parking Area Stabilization.

Element 3: Control Flow Rates (Not required this project, threshold not met)

Element 4: Install Sediment Controls

• Prior to leaving a construction site or prior to discharge to an infiltration facility, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas (see Element #5 second bullet item) may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Element #3 (first bullet item).

• Sediment ponds, vegetated buffer strips, sediment barriers or filters, dikes, and other BMPs intended to trap sediment on site shall be constructed as one of the first steps in grading. These BMPs shall be functional before other land disturbing activities take place.

• Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing indicated in Element #5.

• BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.

• Suggested BMPs:
- BMP C233: Silt Fence
- BMP C234: Vegetated Strip
- BMP C235: Straw Wattles

Element 5: Stabilize Soils

• All exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrop impact, flowing water, and wind.

• Full stabilization means all soil disturbing activities at the site have been completed and areas where the soil or natural vegetative cover has been disturbed have been properly covered and accepted to meet permanent erosion control. Permanent erosion control can include concrete or asphalt paving; quarry spalls used as ditch lining; application of thick layers of gravel or mulch; or vegetative cover in a manner that will fully prevent soil erosion. Where the term "fully established" is used to describe vegetative cover or plantings, it shall be understood to mean that healthy vegetation covers 90 percent of exposed bare soil. The application of hydroseeding, even in conjunction with a bonded fiber matrix (BFM) or rolled erosion product, will not be accepted as fully established permanent erosion control before the necessary development and ground cover requirements of the plantings are met. The strong root structures of well established

vegetation are an essential mechanism in controlling soil erosion. The county will inspect and must approve all areas as fully stabilized before the release of financial guarantees.

• Temporary erosion control measures shall remain in place until permanent measures are established.

• From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This condition applies to all soils on site, whether at final grade or not.

• Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.

• Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.

• Soil stabilization measures should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or groundwater.

• Soil stockpiles must be stabilized from erosion, protected with sediment trapping measures, and when possible, be located away from storm drain inlets, waterways and drainage channels.

• Linear construction activities, including right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and restabilize the disturbed soils so that:

- From October 1 through April 30 no soils shall remain exposed
- and unworked for more than 2 days, and
- From May 1 to September 30, no soils shall remain exposed
- and unworked for more than 7 days.

• Permanent site stability will be achieved by hydroseeding, mulch and placing beauty bark on disturbed areas. Coordinate with owner for location of each permanent BMP.

Suggested BMPs:

- BMP C120: Temporary and Permanent Seeding
- BMP C121: Mulching
- BMP C122: Nets and Blankets
- BMP C123: Plastic Covering
- BMP C124: Sodding
- BMP C125: Topsoiling
- BMP C130: Surface Roughening
- BMP C131: Gradient Terraces
- BMP C140: Dust Control.

Element 6: Protect Slopes

• Design and construct cut and fill slopes in a manner that will minimize erosion. Cover slopes with plastic covering BMP C123 as necessary to minimize erosion.

• Consider soil type and its potential for erosion.

• Reduce slope runoff velocities by reducing continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.

• Offsite stormwater (run-on) shall be diverted away from slopes and disturbed areas with interceptor dikes and/or swales. Offsite stormwater must be managed separately from stormwater generated on the site.

• At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains shall handle the peak flow from a 10-year, 24-hour event assuming a Type 1A rainfall distribution. Alternatively, the 10-year, 1-hour time step flow rates indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. If a 15-minute (or less) time step is used, no correction factor is required. The hydrologic analysis shall use the existing land cover condition for predicting flow rates from tributary areas outside the project limits. For tributary areas on the project site, the analysis shall use the temporary or permanent project land cover condition, whichever will produce the highest flow rates.

• Permanent pipe slope drains shall be sized for the 100-year, 24-hour event.

• Provide drainage to remove groundwater intersecting the slope surface of exposed soil areas.

• Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.

• Check dams shall be placed at regular intervals within channels that are cut down a slope.

• Stabilize soils on slopes, as specified in Element #5.

• Suggested BMPs:
- BMP C120: Temporary and Permanent Seeding
- BMP C130: Surface Roughening
- BMP C131: Gradient Terraces

Element 7: Protect Drain Inlets

• All storm drain inlets made operable during construction shall be protected so that stormwater runoff does not enter the conveyance system without first being filtered or treated to remove sediment.

• All approach roads shall be kept clean. Sediment and street wash wastewater shall be controlled as specified above in Element #2.

• Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

• Suggested BMPs:
- BMP C220: Storm Drain Inlet Protection.

Element 8: Stabilize Channels and Outlets (Not applicable)

Element 9: Control Pollutants

• All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site.

• Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and other materials that have the potential to pose a threat to human health or the environment. Onsite fueling tanks shall include secondary containment.

• Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on site using temporary plastic placed beneath and, if raining, over the vehicle.

• Wheel wash or tire bath wastewater shall be discharged to a separate onsite treatment system or to the sanitary sewer. • Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed.

• BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water.

• Construction sites shall adjust the pH of stormwater if necessary to prevent violations of water quality standards. Projects must obtain written approval from the Department of Ecology prior to using chemical treatment other than CO_2 or dry ice to adjust pH.

• Suggested BMPs:
- BMP C151: Concrete Handling
- BMP C152: Sawcutting and Surfacing Pollution Prevention
- See Volume IV – Source Control BMPs.

Element 10: Control Dewatering (Not applicable)

• Foundation, vault, and trench dewatering water, which have similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels must be stabilized, as specified in Element #8.

• Clean, non-turbid dewatering water, such as well-point groundwater, can be discharged to systems tributary to state surface waters, as specified in Element #8, provided the dewatering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through stormwater sediment ponds.

• Highly turbid or contaminated dewatering water from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam, shall be handled separately from stormwater.

• Other disposal options, depending on site constraints, may include:

- Infiltration
- Transport offsite in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters
- Ecology-approved onsite chemical treatment or other suitable treatment technologies
- Sanitary sewer discharge with local sewer district approval, if there is no other option
- Use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

Element 11: Maintain BMPs

• All temporary and permanent ESC BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with BMP specifications.

• All temporary ESC BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs
or vegetation shall be permanently stabilized.

Element 12: Manage the Project

Phasing of Construction

• Development projects shall be phased where feasible in order to prevent soil erosion and, to the maximum extent practicable, the transport of sediment from the site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.

• Clearing and grading activities for developments shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance/compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas,

buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.

• Seasonal Work Limitations:
From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the county that silt-laden runoff will be prevented from leaving the site through a combination of the following:

- Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters
- Limitations on activities and the extent of disturbed areas
- Proposed ESC measures.

• Based on the information provided and/or local weather conditions, the county may expand or restrict the seasonal limitation on site disturbance. The county shall take enforcement action – such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

- If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard
- If clearing and grading limits or ESC measures shown in the approved plan are not maintained.

• The following activities are exempt from the seasonal clearing and grading limitations:

- Routine maintenance and necessary repair of ESC BMPs
- Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil
- Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed ESC facilities.

Coordination with Utilities and Other Contractors
• The primary project applicant shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.
• Inspection and Monitoring:

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of ESC. The person must have the skills to: 1) assess the site conditions and construction activities that could impact the quality of stormwater and 2) assess the effectiveness of ESC measures used to control the quality of stormwater discharges.
- For construction sites that will disturb 1 acre or more and that discharge stormwater to surface waters of the state, a Certified Erosion and Sediment Control Lead (CESCL) shall be identified in the Construction SWPPP and shall be on site or on-call at all times. Certification may be obtained through an approved training program that meets the ESC training standards established by Ecology.
- Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

• Maintaining an updated Construction SWPPP:

- The Construction SWPPP shall be retained on site or within reasonable access to the site.
- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within 7 days following the inspection.

Element 13: Protect Low Impact Development BMP's

Phasing of Construction

- Protect all Bioretention and Rain Garden BMPs from sedimentation through installation and maintenance of Construction SWPPP BMPs on portions of the site that drain into the Bioretention and/or Rain Garden BMPs. Restore the BMPs to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden Bioretention/Rain Garden soils, and replacing the removed soils with soils meeting the design specification.

- Prevent compacting Bioretention and Rain Garden BMPs by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction due to construction equipment.

- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff onto permeable pavements, including permeable pavement subgrade, reservoir course, or wearing course.

- Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures shown in Volume III of this manual or the manufacturer's procedures.

- Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils.

- See Section 3.3 for more details on protecting LID BMPs.

- **Suggested BMPs:**
    - BMP C102: Buffer Zone
    - BMP C103: High Visibility Fence
    - BMP C200: Interceptor Dike and Swale
    - BMP C201: Grass-Lined Channels
    - BMP C207: Check Dams
    - BMP C208: Triangular Silt Dike (TSD) (Geotextile-Encased Check Dam)
    - BMP C231: Brush Barrier
    - BMP C233: Silt Fence
    - BMP C234: Vegetated Strip
    - BMP C235: Straw Wattles
    - BMP C236: Vegetated Filtration

II. CONSTRUCTION PHASING AND BMP IMPLEMENTATION

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the Cascade Mountain Crest. As such, the dry season is considered to be from May 1 to September 30 and the wet season is considered to be from October 1 to April 30.

Estimated construction start date (during wet season): _____

Estimated construction end date: _____

Mobilize equipment on-site: _____

Mobilize and store all ESC and soil stabilization products _____

Install ESC measures: _____

Install stabilized construction entrance:	_____
Begin clearing and grading:	_____
Begin site grading:	_____
Site inspections and monitoring conducted weekly and for applicable rain events:	_____
Implement Element #12 BMP's and manage site to minimize soil disturbance during the wet season:	none
Final landscaping and planting begins:	_____
Permanent erosion control measures:	_____

III. SITE INSPECTION AND MONITORING

Monitoring includes visual inspection and monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book shall be maintained for all on-site construction activities and shall include:

1. A record of the implementation of the erosion control plan BMP's.
2. Site Inspections.

SITE INSPECTION

All BMP's shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function.

Site inspection shall occur in all areas disturbed by construction activities and at all stormwater discharge points. The site inspection shall evaluate and document the effectiveness of the installed BMP's and determine if it is necessary to repair or replace any of the BMP's to improve the quality of stormwater discharges. All maintenance and repairs shall be documented in the site log book or forms provided in this document. All new BMP's or design changes shall be documented as soon as possible.

SITE INSPECTION FREQUENCY

Site inspections shall be conducted at least once a week and within 24 hours following any rainfall event which causes a discharge of stormwater from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduce to once every month.

APPENDIX B – EROSION CONTROL BMP'S

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

- As required by local governments.
- Phase construction to preserve natural vegetation on the project site for as long as possible during the construction period.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local governments may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

  Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can typically tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be

laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2-3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint if roots will be exposed for more than 24-hours.

  Backfill the trench as soon as possible.

  Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of Grand fir, Pacific silver fir, Noble fir, Sitka spruce, Western red cedar, Western hemlock, Pacific dogwood, and Red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots,

and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

- If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or lopers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

Creation of an undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-areas buffer zones should not be used as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas and buffer zones. Steel construction fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed. Replace all damaged flagging immediately.

BMP C103: High Visibility Fence

Purpose

Fencing is intended to:

1. Restrict clearing to approved limits.
2. Prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed.
3. Limit construction traffic to designated construction entrances, exits, or internal roads.
4. Protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits plastic, fabric, or metal fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 lbs./ft. using the ASTM D4595 testing method.

If appropriate install fabric silt fence in accordance with BMP C233 to act as high visibility fence. Silt fence shall be at least 3 feet high and must be highly visible to meet the requirements of this BMP.

Metal fences shall be designed and installed according to the manufacturer's specifications.

Metal fences shall be at least 3 feet high and must be highly visible.

Fences shall not be wired or stapled to trees.

Maintenance Standards

If the fence has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C105: Stabilized Construction Entrance / Exit

Purpose

Stabilized Construction entrances are established to reduce the amount of sediment transported onto paved roads by vehicles or equipment. This is done by constructing a stabilized pad of quarry spalls at entrances and exits for construction sites.

Conditions of Use

Construction entrances shall be stabilized wherever traffic will be entering or leaving a construction site if paved roads or other paved areas are within 1,000 feet of the site.

For residential construction provide stabilized construction entrances for each residence, rather than only at the main subdivision entrance. Stabilized surfaces shall be of sufficient length/width to provide vehicle access/parking, based on lot size/configuration.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

See Figure 4.1.1 for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').

Construct stabilized construction entrances with a 12-inch thick pad of 4-inch to 8-inch quarry spalls, a 4-inch course of asphalt treated base (ATB), or use existing pavement. Do not use crushed concrete, cement, or calcium chloride for construction entrance stabilization because these products raise pH levels in stormwater and concrete discharge to surface waters of the State is prohibited.

A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.

- Fencing (see BMP C103) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.
- Construction entrances should avoid crossing existing sidewalks and back of walk drains if at all possible. If a construction entrance must cross a sidewalk or back of walk drain, the full length of the sidewalk and back of walk drain must be covered and protected from sediment leaving the site.

Maintenance Standards

Quarry spalls shall be added if the pad is no longer in accordance with the specifications.

- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include replacement/cleaning of the existing quarry spalls, street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when high efficiency sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump to contain the wash water shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Perform street sweeping by hand or with a high efficiency sweeper. Do not use a non-high efficiency mechanical sweeper because this creates dust and throws soils into storm systems or conveyance ditches.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMP C103) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

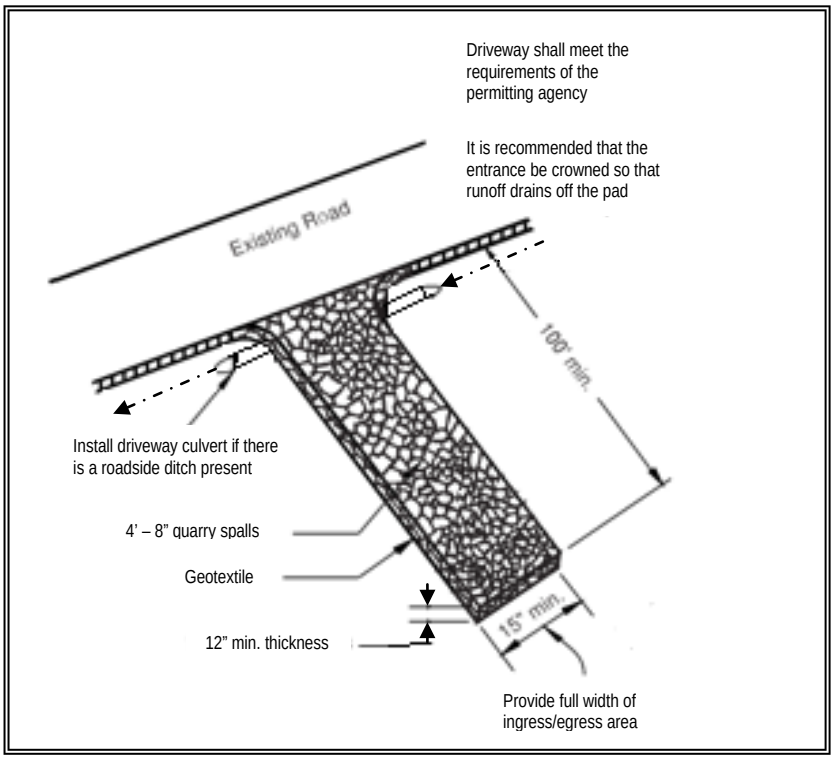


Figure 4.1.1 – Stabilized Construction Entrance

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C105. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Conditions of Use

When a stabilized construction entrance (see BMP C105) is not preventing sediment from being tracked onto pavement.

- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.

- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.
- Discharge wheel wash or tire bath wastewater to a separate on-site treatment system that prevents discharge to surface water, such as closed-loop recirculation or upland land application, or to the sanitary sewer with local sewer district approval.
- Wheel wash or tire bath wastewater should not include wastewater from concrete washout areas.

Design and Installation Specifications

Suggested details are shown in Figure 4.1.2. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6- to 1-inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out the day with fresh water.

The wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wash water will need to be changed more often.

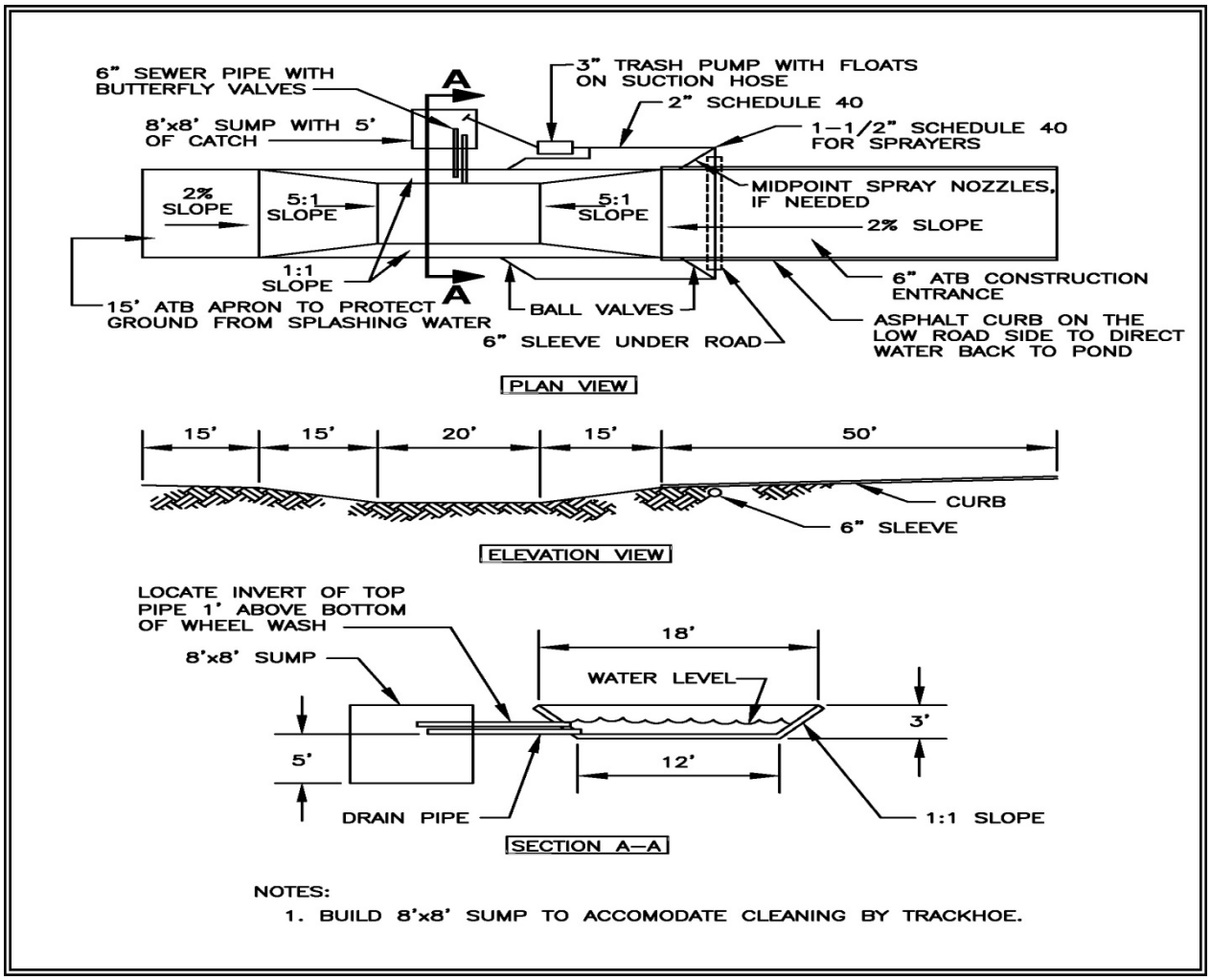


Figure 4.1.2 – Wheel Wash

Notes:

1. Asphalt construction entrance 6 in. asphalt treated base (ATB).
2. 3-inch trash pump with floats on the suction hose.
3. Midpoint spray nozzles, if needed.
4. 6-inch sewer pipe with butterfly valves. Bottom one is a drain. Locate top pipe's invert 1 foot above bottom of wheel wash.
5. 8 foot x 8 foot sump with 5 feet of catch. Build so the sump can be cleaned with a trackhoe.
6. Asphalt curb on the low road side to direct water back to pond.
7. 6-inch sleeve under road.
8. Ball valves.
9. 15 foot. ATB apron to protect ground from splashing water.

BMP C107: Construction Road/Parking Area Stabilization

Purpose

Stabilizing subdivision roads, parking areas, and other on-site vehicle transportation routes immediately after grading reduces erosion caused by construction traffic or runoff.

Conditions of Use

Roads or parking areas shall be stabilized wherever they are constructed, whether permanent or temporary, for use by construction traffic.

- High Visibility Fencing (see BMP C103) shall be installed, if necessary, to limit the access of vehicles to only those roads and parking areas that are stabilized.

Design and Installation Specifications

- On areas that will receive asphalt as part of the project, install the first lift as soon as possible.
- A 6-inch depth of 2- to 4-inch crushed rock, gravel base, or crushed surfacing base course shall be applied immediately after grading or utility installation. A 4-inch course of asphalt treated base (ATB) may also be used, or the road/parking area may be paved. It may also be possible to use cement or calcium chloride for soil stabilization. If cement or cement kiln dust is used for roadbase stabilization, pH monitoring and BMPs (BMPs C252 and C253) are necessary to evaluate and minimize the effects on stormwater. If the area will not be used for permanent roads, parking areas, or structures, a 6-inch depth of hog fuel may also be used, but this is likely to require more maintenance. Whenever possible, construction roads and parking areas shall be placed on a firm, compacted subgrade.
- Temporary road gradients shall not exceed 15 percent. Roadways shall be carefully graded to drain. Drainage ditches shall be provided on each side of the roadway in the case of a crowned section, or on one side in the case of a super-elevated section. Drainage ditches shall be directed to a sediment control BMP.
- Rather than relying on ditches, it may also be possible to grade the road so that runoff sheet-flows into a heavily vegetated area with a well-developed topsoil. Landscaped areas are not adequate. If this area has at least 50 feet of vegetation that water can flow through, then it is generally preferable to use the vegetation to treat runoff, rather than a sediment pond or trap. The 50 feet shall not include wetlands or their buffers. If runoff is allowed to sheetflow through adjacent vegetated areas, it is vital to design the roadways and parking areas so that no concentrated runoff is created.
- Storm drain inlets shall be protected to prevent sediment-laden water entering the storm drain system (see BMP C220).

Maintenance Standards

Inspect stabilized areas regularly, especially after large storm events.

Crushed rock, gravel base, etc. shall be added as required to maintain a

stable driving surface and to stabilize any areas that have eroded.

Following construction, these areas shall be restored to pre-construction condition or better to prevent future erosion.

Perform street cleaning at the end of each day or more often if necessary.

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding reduces erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

Use seeding throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.

The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1.

Between July 1 and August 30 seeding requires irrigation until 75 percent grass cover is established.

Between October 1 and March 30 seeding requires a cover of mulch with straw or an erosion control blanket until 75 percent grass cover is established.

Review all disturbed areas in late August to early September and complete all seeding by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.

- Mulch is required at all times for seeding because it protects seeds from heat, moisture loss, and transport due to runoff. Mulch can be applied on top of the seed or simultaneously by hydroseeding. See BMP C121: Mulching for specifications.
- Seed and mulch, all disturbed areas not otherwise vegetated at final site stabilization. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion.

Design and Installation Specifications

Seed retention/detention ponds as required.

Install channels intended for vegetation before starting major earthwork and hydroseed with a Bonded Fiber Matrix. For vegetated channels that will have high flows, install erosion control blankets over hydroseed. Before allowing water to flow in vegetated channels, establish 75 percent vegetation cover. If vegetated channels cannot be established by seed before water flow; install sod in the channel bottom—over hydromulch and erosion control blankets.

- Confirm the installation of all required surface water control measures to prevent seed from washing away.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. See BMP C121: Mulching for specifications.
- Areas that will have seeding only and not landscaping may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Re-install native topsoil on the disturbed soil surface before application.
- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. To overcome this, consider increasing seed quantities by up to 50 percent.
- Enhance vegetation establishment by dividing the hydromulch operation into two phases:

  1. Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift.
  2. Phase 2- Install the rest of the mulch and tackifier over the first lift.

  Or, enhance vegetation by:

  1. Installing the mulch, seed, fertilizer, and tackifier in one lift.
  2. Spread or blow straw over the top of the hydromulch at a rate of 800-1000 pounds per acre.
  3. Hold straw in place with a standard tackifier.

  Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

  - Irrigation.
  - Reapplication of mulch.
  - Repair of failed slope surfaces.

  This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM/MBFMs (3,000 pounds per acre minimum).
- Seed may be installed by hand if:
  - Temporary and covered by straw, mulch, or topsoil.
  - Permanent in small areas (usually less than 1 acre) and covered with mulch, topsoil, or erosion blankets.
- The seed mixes listed in the tables below include recommended mixes for both temporary and permanent seeding.

- Apply these mixes, with the exception of the wetland mix, at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used.
- Consult the local suppliers or the local conservation district for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used.
- Other mixes may be appropriate, depending on the soil type and hydrology of the area.

- Table 4.1.2 lists the standard mix for areas requiring a temporary vegetative cover.

Table 4.1.2
Temporary Erosion Control Seed Mix

	% Weight	% Purity	% Germination
Chewings or annual blue grass *Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye - *Lolium perenne*	50	98	90
Redtop or colonial bentgrass *Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

- Table 4.1.3 lists a recommended mix for landscaping seed.

Table 4.1.3
Landscaping Seed Mix

	% Weight	% Purity	% Germination
Perennial rye blend *Lolium perenne*	70	98	90
Chewings and red fescue blend *Festuca rubra var. commutata* or *Festuca rubra*	30	98	90

- Table 4.1.4 lists a turf seed mix for dry situations where there is no need for watering. This mix requires very little maintenance.

Table 4.1.4
Low-Growing Turf Seed Mix

	% Weight	% Purity	% Germination
Dwarf tall fescue (several varieties) *Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay) *Lolium perenne var. barclay*	30	98	90
Red fescue *Festuca rubra*	20	98	90
Colonial bentgrass *Agrostis tenuis*	5	98	90

- Table 4.1.5 lists a mix for bioswales and other intermittently wet areas.

Table 4.1.5
Bioswale Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	92	85
Redtop bentgrass *Agrostis alba* or *Agrostis gigantea*	5-10	90	80

* *Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.6 lists a low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Apply this mixture at a rate of 60 pounds per acre. Consult Hydraulic Permit Authority (HPA) for seed mixes if applicable.

Table 4.1.6
Wet Area Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	98	85
Meadow foxtail *Alepocurus pratensis*	10-15	90	80
Alsike clover *Trifolium hybridum*	1-6	98	90
Redtop bentgrass *Agrostis alba*	1-6	92	85

** Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

- Table 4.1.7 lists a recommended meadow seed mix for infrequently maintained areas or non-maintained areas where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. Consider the appropriateness of clover, a fairly invasive species, in the mix. Amending the soil can reduce the need for clover.

Table 4.1.7
Meadow Seed Mix

	% Weight	% Purity	% Germination
Redtop or Oregon bentgrass *Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue *Festuca rubra*	70	98	90
White dutch clover *Trifolium repens*	10	98	90

- **Roughening and Rototilling:**
  - The seedbed should be firm and rough. Roughen all soil no matter what the slope. Track walk slopes before seeding if engineering purposes require compaction. Backblading or smoothing of slopes greater than 4H:1V is not allowed if they are to be seeded.
  - Restoration-based landscape practices require deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical, initially rip the subgrade to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches complete the rototilling process in multiple lifts, or prepare the engineered soil system per specifications and place to achieve the specified depth.
- **Fertilizers:**
  - Conducting soil tests to determine the exact type and quantity of fertilizer is recommended. This will prevent the over-application of fertilizer.
  - Organic matter is the most appropriate form of fertilizer because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form.
  - In general, use 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer at a rate of 90 pounds per acre. Always use slow-release fertilizers because they are more efficient and have fewer environmental impacts. Do not add fertilizer to the hydromulch machine, or agitate, more than 20 minutes before use. Too much agitation destroys the slow-release coating.
  - There are numerous products available that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal provides a good source of long-term, slow-release, available nitrogen.
- **Bonded Fiber Matrix and Mechanically Bonded Fiber Matrix:**
  - On steep slopes use Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products. Apply BFM/MBFM products at a minimum rate of 3,000 pounds per acre of mulch with approximately 10 percent tackifier. Achieve a minimum of 95 percent soil coverage during application. Numerous products are available commercially. Installed products per manufacturer's instructions. Most products require 24-36 hours to cure before rainfall and cannot be installed on wet or saturated soils.

Generally, products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.

- BFMs and MBFMs provide good alternatives to blankets in most areas requiring vegetation establishment. Advantages over blankets include:
  - BFM and MBFMs do not require surface preparation.
  - Helicopters can assist in installing BFM and MBFMs in remote areas.
  - On slopes steeper than 2.5H:1V, blanket installers may require ropes and harnesses for safety.
  - Installing BFM and MBFMs can save at least $1,000 per acre compared to blankets.

Maintenance Standards

Reseed any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows). If reseeding is ineffective, use an alternate method such as sodding, mulching, or nets/blankets. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.

- Reseed and protect by mulch any areas that experience erosion after achieving adequate cover. Reseed and protect by mulch any eroded area.
- Supply seeded areas with adequate moisture, but do not water to the extent that it causes runoff.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C120. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C121: Mulching

Purpose

Mulching soils provides immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. This section discusses only the most common types of mulch.

Conditions of Use

As a temporary cover measure, mulch should be used:

- For less than 30 days on disturbed areas that require cover.
- At all times for seeded areas, especially during the wet season and

during the hot summer months.

- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.

Mulch may be applied at any time of the year and must be refreshed periodically.

- For seeded areas mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table 4.1.8. Always use a 2-inch minimum mulch thickness; increase the thickness until the ground is 95% covered (i.e. not visible under the mulch layer). Note: Thickness may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material. Consult Hydraulic Permit Authority (HPA) for mulch mixes if applicable.

Maintenance Standards

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

Table 4.1.8
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1,000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place by crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1,000 sf or 1,500 - 2,000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Composted Mulch and Compost	No visible water or dust during handling. Must be produced in accordance with WAC 173-350, Solid Waste Handling Standards. .	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Composted mulch has a coarser size gradation than compost. It is more stable and practical to use in wet areas and during rainy weather conditions. Do not use composted mulch near wetlands or near phosphorous impaired water bodies.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" thick min.;	This is a cost-effective way to dispose of debris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported by runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch or Wood Straw	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2” thick min.; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called “hog or hogged fuel.” The use of mulch ultimately improves the organic matter in the soil. Special caution is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).
Wood Strand Mulch	A blend of loose, long, thin wood pieces derived from native conifer or deciduous trees with high length-to-width ratio.	2” thick min.	Cost-effective protection when applied with adequate thickness. A minimum of 95-percent of the wood strand shall have lengths between 2 and 10-inches, with a width and thickness between 1/16 and ⅜-inches. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or wood shavings shall not be used as mulch. (WSDOT specification (9-14.4(4))

BMP C122: Nets and Blankets

Purpose

Erosion control nets and blankets are intended to prevent erosion and hold seed and mulch in place on steep slopes and in channels so that vegetation can become well established. In addition, some nets and blankets can be used to permanently reinforce turf to protect drainage ways during high flows. Nets (commonly called matting) are strands of material woven into an open, but high-tensile strength net (for example, coconut fiber matting). Blankets are strands of material that are not tightly woven, but instead form a layer of interlocking fibers, typically held together by a biodegradable or photodegradable netting (for example, excelsior or straw blankets). They generally have lower tensile strength than nets, but cover the ground more completely. Coir (coconut fiber) fabric comes as both nets and blankets.

Conditions of Use

Erosion control nets and blankets should be used:

- To aid permanent vegetated stabilization of slopes 2H:1V or greater and with more than 10 feet of vertical relief.
- For drainage ditches and swales (highly recommended). The application of appropriate netting or blanket to drainage ditches and swales can protect bare soil from channelized runoff while vegetation is established. Nets and blankets also can capture a great deal of sediment due to their open, porous structure. Nets and blankets can be used to permanently stabilize channels and may provide a cost-effective, environmentally preferable alternative to riprap. 100 percent synthetic blankets manufactured for use in ditches may be easily reused as temporary ditch liners.

Disadvantages of blankets include:

- Surface preparation required.
- On slopes steeper than 2.5H:1V, blanket installers may need to be roped and harnessed for safety.
- They cost at least $4,000-6,000 per acre installed.

Advantages of blankets include:

- Installation without mobilizing special equipment.
- Installation by anyone with minimal training
- Installation in stages or phases as the project progresses.
- Installers can hand place seed and fertilizer as they progress down the slope.
- Installation in any weather.
- There are numerous types of blankets that can be designed with various parameters in mind. Those parameters include: fiber blend, mesh strength, longevity, biodegradability, cost, and availability.

Design and Installation Specifications

- See Figure 4.1.3 and Figure 4.1.4 for typical orientation and installation of blankets used in channels and as slope protection. Note: these are typical only; all blankets must be installed per manufacturer's installation instructions.
- Installation is critical to the effectiveness of these products. If good ground contact is not achieved, runoff can concentrate under the product, resulting in significant erosion.
- Installation of Blankets on Slopes:
    1. Complete final grade and track walk up and down the slope.
    2. Install hydromulch with seed and fertilizer.
    3. Dig a small trench, approximately 12 inches wide by 6 inches deep along the top of the slope.
    4. Install the leading edge of the blanket into the small trench and staple approximately every 18 inches. NOTE: Staples are metal, "U"-shaped, and a minimum of 6 inches long. Longer staples are used in sandy soils. Biodegradable stakes are also available.
    5. Roll the blanket slowly down the slope as installer walks backwards. NOTE: The blanket rests against the installer's legs. Staples are installed as the blanket is unrolled. It is critical that the proper staple pattern is used for the blanket being installed. The blanket is not to be allowed to roll down the slope on its own as this stretches the blanket making it impossible to maintain soil contact. In addition, no one is allowed to walk on the blanket after it is in place.
    6. If the blanket is not long enough to cover the entire slope length, the trailing edge of the upper blanket should overlap the leading edge of the lower blanket and be stapled. On steeper slopes, this overlap should be installed in a small trench, stapled, and covered with soil.
- With the variety of products available, it is impossible to cover all the details of appropriate use and installation. Therefore, it is critical that the design engineer consult the manufacturer's information and that a site visit takes place in order to ensure that the product specified is appropriate. Information is also available at the following web sites:
    1. WSDOT (Section 3.2.4):

       http://www.wsdot.wa.gov/NR/rdonlyres/3B41E087-FA86-4717-932D-D7A8556CCD57/0/ErosionTrainingManual.pdf
    2. Texas Transportation Institute:

       http://www.txdot.gov/business/doing_business/product_evaluation/erosion_control.htm

- Use jute matting in conjunction with mulch (BMP C121). Excelsior, woven straw blankets and coir (coconut fiber) blankets may be installed without mulch. There are many other types of erosion control nets and blankets on the market that may be appropriate in certain circumstances.
- In general, most nets (e.g., jute matting) require mulch in order to prevent erosion because they have a fairly open structure. Blankets typically do not require mulch because they usually provide complete protection of the surface.
- Extremely steep, unstable, wet, or rocky slopes are often appropriate candidates for use of synthetic blankets, as are riverbanks, beaches and other high-energy environments. If synthetic blankets are used, the soil should be hydromulched first.
- 100-percent biodegradable blankets are available for use in sensitive areas. These organic blankets are usually held together with a paper or fiber mesh and stitching which may last up to a year.
- Most netting used with blankets is photodegradable, meaning they break down under sunlight (not UV stabilized). However, this process can take months or years even under bright sun. Once vegetation is established, sunlight does not reach the mesh. It is not uncommon to find non-degraded netting still in place several years after installation. This can be a problem if maintenance requires the use of mowers or ditch cleaning equipment. In addition, birds and small animals can become trapped in the netting.

Maintenance Standards

- Maintain good contact with the ground. Erosion must not occur beneath the net or blanket.
- Repair and staple any areas of the net or blanket that are damaged or not in close contact with the ground.
- Fix and protect eroded areas if erosion occurs due to poorly controlled drainage.

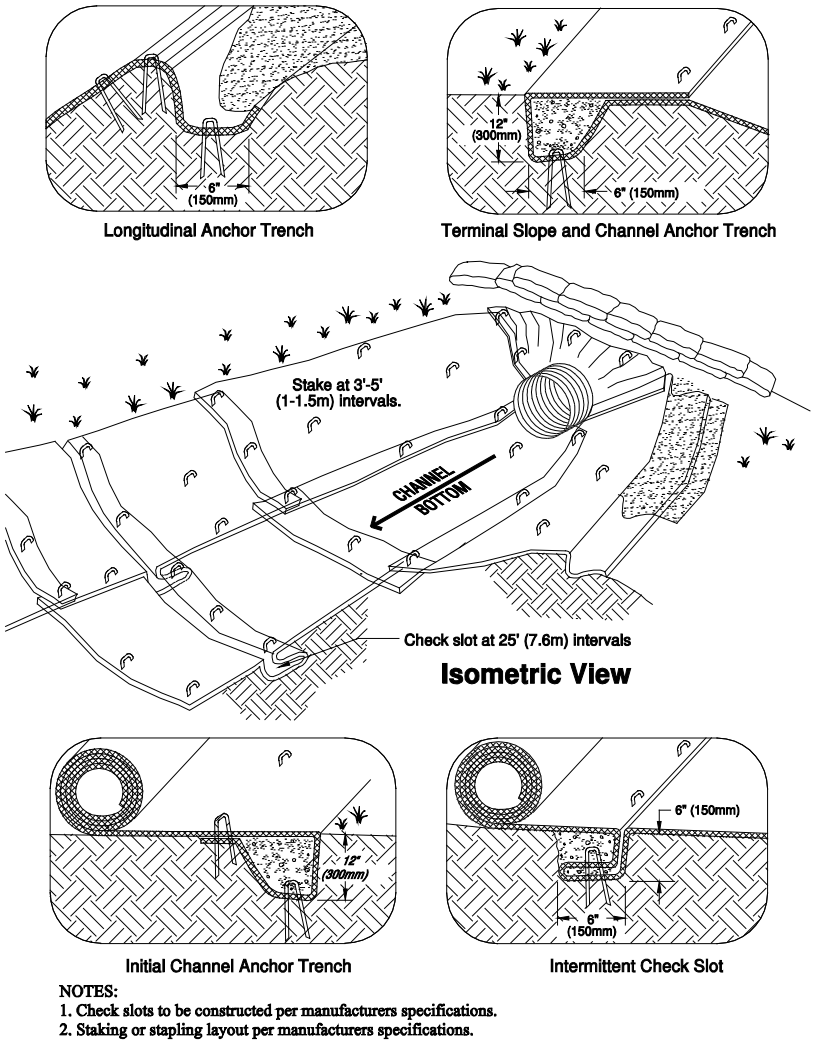


Figure 4.1.3 – Channel Installation

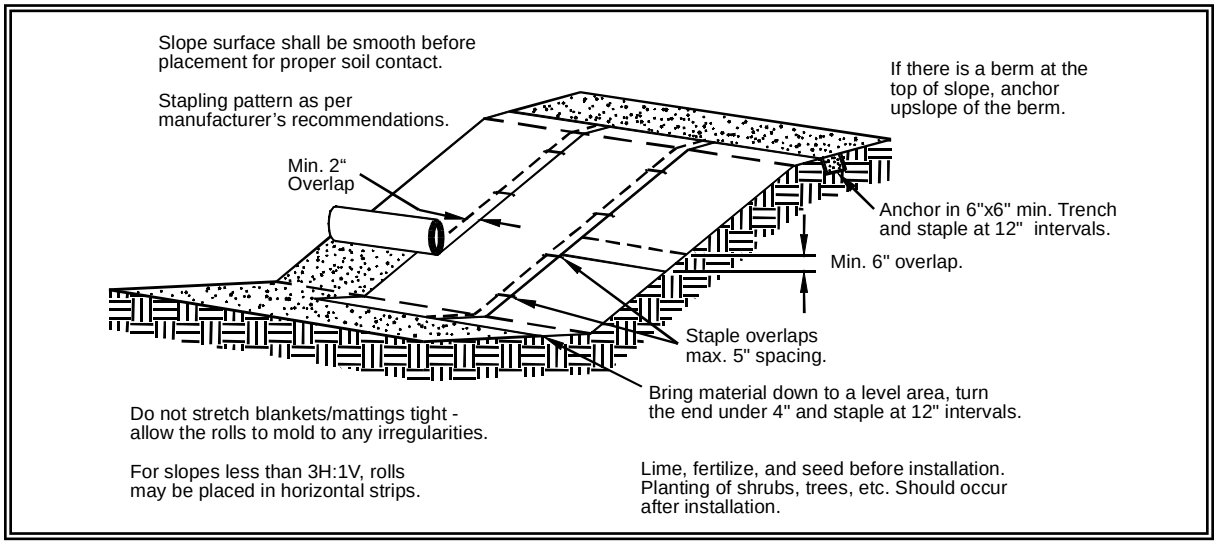


Figure 4.1.4 – Slope Installation

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Due to rapid runoff caused by plastic covering, do not use this method upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Plastic sheeting may result in increased runoff volumes and velocities, requiring additional on-site measures to counteract the increases. Creating a trough with wattles or other material can convey clean water away from these areas.
- To prevent undercutting, trench and backfill rolled plastic covering products.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to $1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes install water collection measures at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. Do not mix clean runoff from a plastic covered slope with dirty runoff from a project.
- Other uses for plastic include:
    1. Temporary ditch liner.
    2. Pond liner in temporary sediment pond.
    3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored.
    4. Emergency slope protection during heavy rains.
    5. Temporary drainpipe (“elephant trunk”) used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
    1. Run plastic up and down slope, not across slope.
    2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet.
    3. Minimum of 8-inch overlap at seams.

4. On long or wide slopes, or slopes subject to wind, tape all seams.
5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath.
6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and tie them together with twine to hold them in place.
7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion.
8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.

- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- Completely remove and replace the plastic if it begins to deteriorate due to ultraviolet radiation.
- Completely remove plastic when no longer needed.
- Dispose of old tires used to weight down plastic sheeting appropriately.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C123. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C124: Sodding

Purpose

The purpose of sodding is to establish permanent turf for immediate erosion protection and to stabilize drainage ways where concentrated overland flow will occur.

Conditions of Use

Sodding may be used in the following areas:

- Disturbed areas that require short-term or long-term cover.
- Disturbed areas that require immediate vegetative cover.
- All waterways that require vegetative lining. Waterways may also be seeded rather than sodded, and protected with a net or blanket.

Design and Installation Specifications

Sod shall be free of weeds, of uniform thickness (approximately 1-inch thick), and shall have a dense root mat for mechanical strength.

The following steps are recommended for sod installation:

- Shape and smooth the surface to final grade in accordance with the approved grading plan. The swale needs to be overexcavated 4 to 6 inches below design elevation to allow room for placing soil amendment and sod.
- Amend 4 inches (minimum) of compost into the top 8 inches of the soil if the organic content of the soil is less than ten percent or the permeability is less than 0.6 inches per hour. See http://www.ecy.wa.gov/programs/swfa/organics/soil.html for further information.
- Fertilize according to the supplier's recommendations.
- Work lime and fertilizer 1 to 2 inches into the soil, and smooth the surface.
- Lay strips of sod beginning at the lowest area to be sodded and perpendicular to the direction of water flow. Wedge strips securely into place. Square the ends of each strip to provide for a close, tight fit. Stagger joints at least 12 inches. Staple on slopes steeper than 3H:1V. Staple the upstream edge of each sod strip.
- Roll the sodded area and irrigate.
- When sodding is carried out in alternating strips or other patterns, seed the areas between the sod immediately after sodding.

Maintenance Standards

If the grass is unhealthy, the cause shall be determined and appropriate action taken to reestablish a healthy groundcover. If it is impossible to establish a healthy groundcover due to frequent saturation, instability, or some other cause, the sod shall be removed, the area seeded with an appropriate mix, and protected with a net or blanket.

BMP C125: Topsoiling / Composting

Purpose

Topsoiling and composting provide a suitable growth medium for final site stabilization with vegetation. While not a permanent cover practice in itself, topsoiling and composting are an integral component of providing permanent cover in those areas where there is an unsuitable soil surface for plant growth. Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Native soils and disturbed soils that have been organically amended not only retain much more stormwater, but they also serve as effective biofilters for urban pollutants and, by supporting more vigorous plant growth, reduce the water, fertilizer and pesticides needed to support

installed landscapes. Topsoil does not include any subsoils but only the material from the top several inches including organic debris.

Conditions of Use

- Permanent landscaped areas shall contain healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation.
- Leave native soils and the duff layer undisturbed to the maximum extent practicable. Stripping of existing, properly functioning soil system and vegetation for the purpose of topsoiling during construction is not acceptable. Preserve existing soil systems in undisturbed and uncompacted conditions if functioning properly.
- Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.
- Restore, to the maximum extent practical, native soils disturbed during clearing and grading to a condition equal to or better than the original site condition's moisture-holding capacity. Use on-site native topsoil, incorporate amendments into on-site soil, or import blended topsoil to meet this requirement.
- Topsoiling is a required procedure when establishing vegetation on shallow soils, and soils of critically low pH (high acid) levels.
- Beware of where the topsoil comes from, and what vegetation was on site before disturbance, invasive plant seeds may be included and could cause problems for establishing native plants, landscaped areas, or grasses.
- Topsoil from the site will contain mycorrhizal bacteria that are necessary for healthy root growth and nutrient transfer. These native mycorrhiza are acclimated to the site and will provide optimum conditions for establishing grasses. Use commercially available mycorrhiza products when using off-site topsoil.

Design and Installation Specifications

Meet the following requirements for areas requiring disruption and topsoiling:

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium. Topsoil shall have:
  - A minimum depth of 8-inches. Scarify subsoils below the topsoil layer at least 4-inches with some incorporation of the upper material to avoid stratified layers, where feasible. Ripping or re-structuring the subgrade may also provide additional benefits regarding the overall infiltration and interflow dynamics of the soil system.

- A minimum organic content of 10% dry weight, and 5% organic matter content in turf areas. Incorporate organic amendments to a minimum 8-inch depth except where tree roots or other natural features limit the depth of incorporation.
- A pH between 6.0 and 8.0 or matching the pH of the undisturbed soil.
- If blended topsoil is imported, then fines should be limited to 25 percent passing through a 200 sieve.

- Accomplish the required organic content and pH by either returning native topsoil to the site and/or incorporating organic amendments.
  - To meet the organic content use compost that meets the definition of "composted materials" in WAC 173-350-220. This code is available online at: http://apps.leg.wa.gov/WAC/default.aspx?cite=173-350-220.

    The compost must also have an organic matter content of 35% to 65%, and a carbon to nitrogen ratio below 25H:1V.

    The carbon to nitrogen ratio may be as high as 35H:1V for plantings composed entirely of plants native to the Puget Sound Lowlands region.
  - For till soils use a mixture of approximately two parts soil to one part compost. This equates to 4 inches of compost mixed to a depth of 12 inches in till soils. Increasing the concentration of compost beyond this level can have negative effects on vegetal health, while decreasing the concentrations can reduce the benefits of amended soils.
  - Gravel or cobble outwash soils, may require different approaches. Organics and fines easily migrate through the loose structure of these soils. Therefore, the importation of at least 6 inches of quality topsoil, underlain by some type of filter fabric to prevent the migration of fines, may be more appropriate for these soils.
- The final composition and construction of the soil system will result in a natural selection or favoring of certain plant species over time. For example, incorporation of topsoil may favor grasses, while layering with mildly acidic, high-carbon amendments may favor more woody vegetation.
- Allow sufficient time in scheduling for topsoil spreading prior to seeding, sodding, or planting.
- Take care when applying top soil to subsoils with contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil layers and causes the topsoil to slough. If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to

establish vegetation. The best method to prevent a lack of bonding is to actually work the topsoil into the layer below for a depth of at least 6 inches.

- Field exploration of the site shall be made to determine if there is surface soil of sufficient quantity and quality to justify stripping. Topsoil shall be friable and loamy (loam, sandy loam, silt loam, sandy clay loam, and clay loam). Avoid areas of natural ground water recharge.
- Stripping shall be confined to the immediate construction area. A 4-inch to 6-inch stripping depth is common, but depth may vary depending on the particular soil. All surface runoff control structures shall be in place prior to stripping.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.
- In any areas requiring grading remove and stockpile the duff layer and topsoil on site in a designated, controlled area, not adjacent to public resources and critical areas. Stockpiled topsoil is to be reapplied to other portions of the site where feasible.
- Locate the topsoil stockpile so that it meets specifications and does not interfere with work on the site. It may be possible to locate more than one pile in proximity to areas where topsoil will be used.

Stockpiling of topsoil shall occur in the following manner:

- Side slopes of the stockpile shall not exceed 2H:1V.
- Between October 1 and April 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil.
  - Within 2 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- Between May 1 and September 30:
  - An interceptor dike with gravel outlet and silt fence shall surround all topsoil if the stockpile will remain in place for a longer period of time than active construction grading.
  - Within 7 days complete erosion control seeding, or covering stockpiles with clear plastic, or other mulching materials.
- When native topsoil is to be stockpiled and reused the following should apply to ensure that the mycorrhizal bacterial, earthworms, and other beneficial organisms will not be destroyed:

  1. Re-install topsoil within 4 to 6 weeks.

2. Do not allow the saturation of topsoil with water.
3. Do not use plastic covering.

Maintenance Standards

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Establish soil quality and depth toward the end of construction and once established, protect from compaction, such as from large machinery use, and from erosion.
- Plant and mulch soil after installation.
- Leave plant debris or its equivalent on the soil surface to replenish organic matter.
- Reduce and adjust, where possible, the use of irrigation, fertilizers, herbicides and pesticides, rather than continuing to implement formerly established practices.

BMP C126: Polyacrylamide (PAM) for Soil Erosion Protection

Purpose

Polyacrylamide (PAM) is used on construction sites to prevent soil erosion.

Applying PAM to bare soil in advance of a rain event significantly reduces erosion and controls sediment in two ways. First, PAM increases the soil's available pore volume, thus increasing infiltration through flocculation and reducing the quantity of stormwater runoff. Second, it increases flocculation of suspended particles and aids in their deposition, thus reducing stormwater runoff turbidity and improving water quality.

Conditions of Use

PAM shall not be directly applied to water or allowed to enter a water body.

In areas that drain to a sediment pond, PAM can be applied to bare soil under the following conditions:

- During rough grading operations.
- In Staging areas.
- Balanced cut and fill earthwork.
- Haul roads prior to placement of crushed rock surfacing.
- Compacted soil roadbase.
- Stockpiles.
- After final grade and before paving or final seeding and planting.
- Pit sites.

- Sites having a winter shut down. In the case of winter shut down, or where soil will remain unworked for several months, PAM should be used together with mulch.

Design and Installation Specifications

PAM may be applied with water in dissolved form. The preferred application method is the dissolved form.

PAM is to be applied at a maximum rate of 2/3 pound PAM per 1,000 gallons water (80 mg/L) per 1 acre of bare soil. Table 4.1.9 can be used to determine the PAM and water application rate for a disturbed soil area. Higher concentrations of PAM **do not** provide any additional effectiveness.

Table 4.1.9
PAM and Water Application Rates

Disturbed Area (ac)	PAM (lbs)	Water (gal)
0.50	0.33	500
1.00	0.66	1,000
1.50	1.00	1,500
2.00	1.32	2,000
2.50	1.65	2,500
3.00	2.00	3,000
3.50	2.33	3,500
4.00	2.65	4,000
4.50	3.00	4,500
5.00	3.33	5,000

The Preferred Method:

- Pre-measure the area where PAM is to be applied and calculate the amount of product and water necessary to provide coverage at the specified application rate (2/3 pound PAM/1000 gallons/acre).
- PAM has infinite solubility in water, but dissolves very slowly. Dissolve pre-measured dry granular PAM with a known quantity of clean water in a bucket several hours or overnight. Mechanical mixing will help dissolve the PAM. Always add PAM to water - not water to PAM.
- Pre-fill the water truck about 1/8 full with water. The water does not have to be potable, but it must have relatively low turbidity – in the range of 20 NTU or less.
- Add PAM /Water mixture to the truck
- Completely fill the water truck to specified volume.
- Spray PAM/Water mixture onto dry soil until the soil surface is uniformly and completely wetted.

An Alternate Method:

PAM may also be applied as a powder at the rate of 5 lbs. per acre. This must be applied on a day that is dry. For areas less than 5-10 acres, a hand-held “organ grinder” fertilizer spreader set to the smallest setting will work. Tractor-mounted spreaders will work for larger areas.

The following shall be used for application of powdered PAM:

- Powered PAM shall be used in conjunction with other BMPs and not in place of other BMPs.
- Do not use PAM on a slope that flows directly into a stream or wetland. The stormwater runoff shall pass through a sediment control BMP prior to discharging to surface waters.
- Do not add PAM to water discharging from site.
- When the total drainage area is greater than or equal to 5 acres, PAM treated areas shall drain to a sediment pond.
- Areas less than 5 acres shall drain to sediment control BMPs, such as a minimum of 3 check dams per acre. The total number of check dams used shall be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam shall be spaced evenly in the drainage channel through which stormwater flows are discharged off-site.
- On all sites, the use of silt fence shall be maximized to limit the discharges of sediment from the site.
- All areas not being actively worked shall be covered and protected from rainfall. PAM shall not be the only cover BMP used.
- PAM can be applied to wet soil, but dry soil is preferred due to less sediment loss.
- PAM will work when applied to saturated soil but is not as effective as applications to dry or damp soil.
- Keep the granular PAM supply out of the sun. Granular PAM loses its effectiveness in three months after exposure to sunlight and air.
- Proper application and re-application plans are necessary to ensure total effectiveness of PAM usage.
- PAM, combined with water, is very slippery and can be a safety hazard. Care must be taken to prevent spills of PAM powder onto paved surfaces. During an application of PAM, prevent over-spray from reaching pavement as pavement will become slippery. If PAM powder gets on skin or clothing, wipe it off with a rough towel rather than washing with water-this only makes cleanup messier and take longer.
- Some PAMs are more toxic and carcinogenic than others. Only the most environmentally safe PAM products should be used.

The specific PAM copolymer formulation must be anionic. **Cationic PAM shall not be used in any application because of known aquatic toxicity problems.** Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, will be used for soil applications. Recent media attention and high interest in PAM has resulted in some entrepreneurial exploitation of the term "polymer." All PAM are polymers, but not all polymers are PAM, and not all PAM products comply with ANSI/NSF Standard 60. PAM use shall be reviewed and approved by the local permitting authority.

- PAM designated for these uses should be "water soluble" or "linear" or "non-crosslinked". Cross-linked or water absorbent PAM, polymerized in highly acidic (pH<2) conditions, are used to maintain soil moisture content.
- The PAM anionic charge density may vary from 2-30 percent; a value of 18 percent is typical. Studies conducted by the United States Department of Agriculture (USDA)/ARS demonstrated that soil stabilization was optimized by using very high molecular weight (12-15 mg/mole), highly anionic (>20% hydrolysis) PAM.

- PAM tackifiers are available and being used in place of guar and alpha plantago. Typically, PAM tackifiers should be used at a rate of no more than 0.5-1 lb. per 1000 gallons of water in a hydromulch machine. Some tackifier product instructions say to use at a rate of 3 –5 lbs. per acre, which can be too much. In addition, pump problems can occur at higher rates due to increased viscosity.

Maintenance Standards

- PAM may be reapplied on actively worked areas after a 48-hour period.
- Reapplication is not required unless PAM treated soil is disturbed or unless turbidity levels show the need for an additional application. If PAM treated soil is left undisturbed a reapplication may be necessary after two months. More PAM applications may be required for steep slopes, silty and clayey soils (USDA Classification Type "C" and "D" soils), long grades, and high precipitation areas. When PAM is applied first to bare soil and then covered with straw, a reapplication may not be necessary for several months.
- Loss of sediment and PAM may be a basis for penalties per RCW 90.48.080.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are

created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Use this BMP in conjunction with other BMPs such as seeding, mulching, or sodding.

Conditions for Use

- All slopes steeper than 3H:1V and greater than 5 vertical feet require surface roughening to a depth of 2 to 4 inches prior to seeding..
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 4.1.5 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3H:1V) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes steeper than 3H:1V but less than 2H:1V should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are graded in this manner should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-graded and re-seeded immediately.

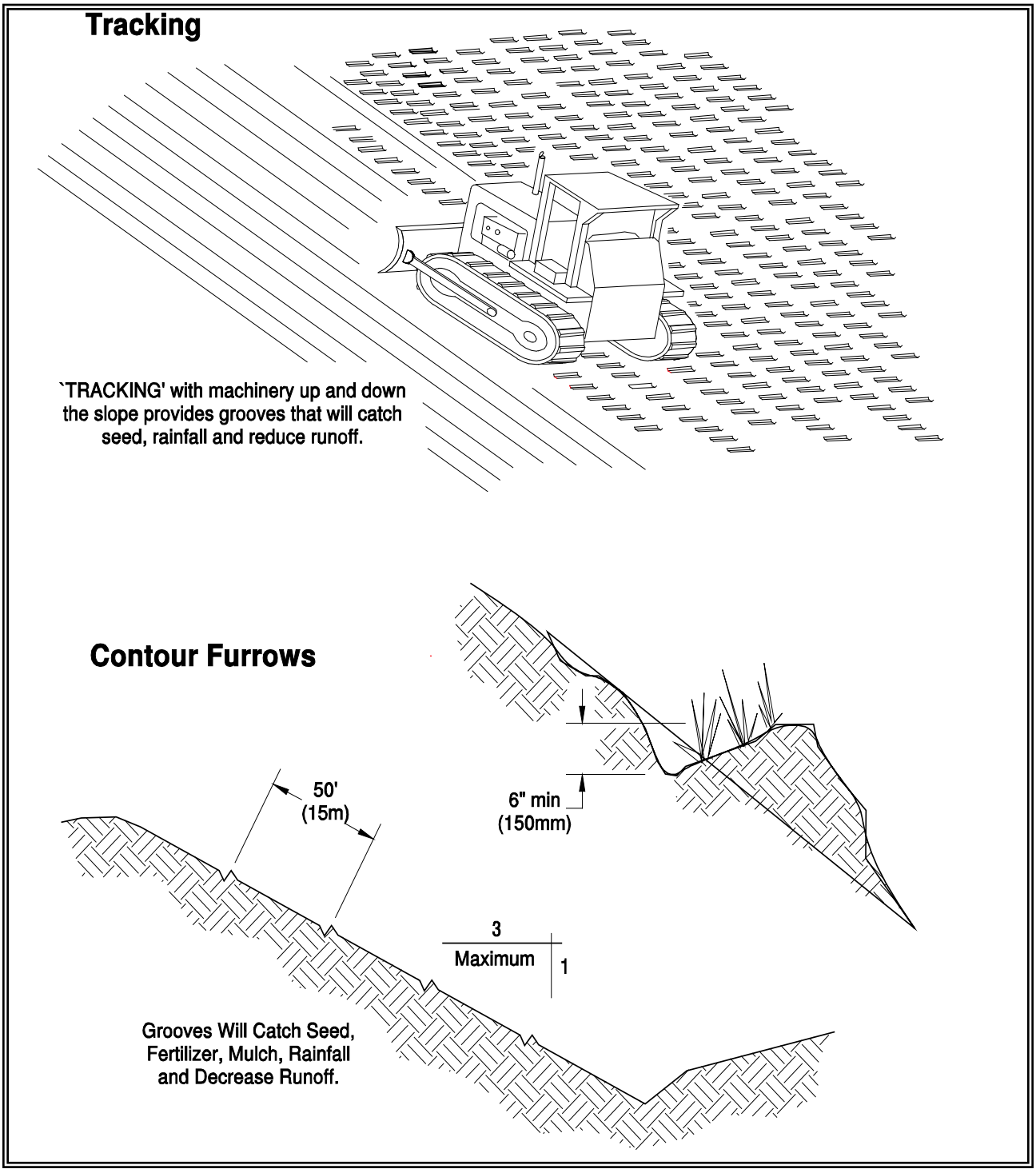


Figure 4.1.5 – Surface Roughening by Tracking and Contour Furrows

BMP C131: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Conditions of Use

- Gradient terraces normally are limited to denuded land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may be used only where suitable outlets are or will be made available. See Figure 4.1.6 for gradient terraces.

Design and Installation Specifications

- The maximum vertical spacing of gradient terraces should be determined by the following method:

  VI = (0.8)s + y

  Where: VI = vertical interval in feet

  s = land rise per 100 feet, expressed in feet

  y = a soil and cover variable with values from 1.0 to 4.0

  Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1½ tons of straw/acre equivalent) is on the surface.

- The minimum constructed cross-section should meet the design dimensions.
- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.
- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length (0.6%). For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type.
- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover should be used in the outlet channel.
- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow.

- Vertical spacing determined by the above methods may be increased as much as 0.5 feet or 10 percent, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet. The drainage area above the terrace should not exceed the area that would be drained by a terrace with normal spacing.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross-section should be proportioned to fit the land slope. The ridge height should include a reasonable settlement factor. The ridge should have a minimum top width of 3 feet at the design height. The minimum cross-sectional area of the terrace channel should be 8 square feet for land slopes of 5 percent or less, 7 square feet for slopes from 5 to 8 percent, and 6 square feet for slopes steeper than 8 percent. The terrace can be constructed wide enough to be maintained using a small vehicle.

Maintenance Standards

- Maintenance should be performed as needed. Terraces should be inspected regularly; at least once a year, and after large storm events.

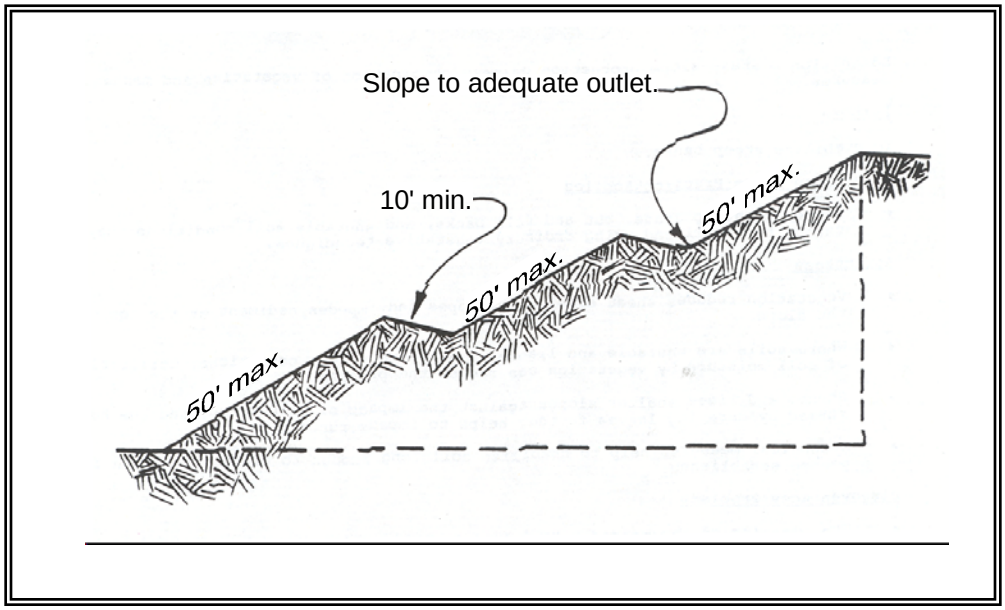


Figure 4.1.6 – **Gradient Terrace**s

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

- In areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126) added to water at a rate of 0.5 lbs. per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control. Use of PAM could be a cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.
- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.

- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Restrict use of paved roadways by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.
- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP.

Maintenance Standards Respray area as necessary to keep dust to a minimum.

BMP C150: Materials on Hand

Purpose Keep quantities of erosion prevention and sediment control materials on the project site at all times to be used for regular maintenance and emergency situations such as unexpected heavy summer rains. Having these materials on-site reduces the time needed to implement BMPs when inspections indicate that existing BMPs are not meeting the Construction SWPPP requirements. In addition, contractors can save money by buying some materials in bulk and storing them at their office or yard.

Conditions of Use

- Construction projects of any size or type can benefit from having materials on hand. A small commercial development project could have a roll of plastic and some gravel available for immediate protection of bare soil and temporary berm construction. A large earthwork project, such as highway construction, might have several tons of straw, several rolls of plastic, flexible pipe, sandbags, geotextile fabric and steel “T” posts.
- Materials are stockpiled and readily available before any site clearing, grubbing, or earthwork begins. A large contractor or developer could keep a stockpile of materials that are available for use on several projects.
- If storage space at the project site is at a premium, the contractor could maintain the materials at their office or yard. The office or yard must be less than an hour from the project site.

Design and Installation Specifications

Depending on project type, size, complexity, and length, materials and quantities will vary. A good minimum list of items that will cover numerous situations includes:

Material
Clear Plastic, 6 mil
Drainpipe, 6 or 8 inch diameter
Sandbags, filled
Straw Bales for mulching,
Quarry Spalls
Washed Gravel
Geotextile Fabric
Catch Basin Inserts
Steel “T” Posts
Silt fence material
Straw Wattles

Maintenance Standards

- All materials with the exception of the quarry spalls, steel “T” posts, and gravel should be kept covered and out of both sun and rain.
- Re-stock materials used as needed.

BMP C151: Concrete Handling

Purpose

Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate concrete, concrete process water, and concrete slurry from entering waters of the state.

Conditions of Use

Any time concrete is used, utilize these management practices. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks
- Roads
- Bridges
- Foundations
- Floors
- Runways

Design and Installation

- Wash out concrete truck chutes, pumps, and internals into formed areas only. Assure that washout of concrete trucks is performed off-

Specifications

site or in designated concrete washout areas. Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams. Refer to BMP C154 for information on concrete washout areas.

- Return unused concrete remaining in the truck and pump to the originating batch plant for recycling. Do not dump excess concrete on site, except in designated concrete washout areas.
- Wash off hand tools including, but not limited to, screeds, shovels, rakes, floats, and trowels into formed areas only.
- Wash equipment difficult to move, such as concrete pavers in areas that do not directly drain to natural or constructed stormwater conveyances.
- Do not allow washdown from areas, such as concrete aggregate driveways, to drain directly to natural or constructed stormwater conveyances.
- Contain washwater and leftover product in a lined container when no formed areas are available,. Dispose of contained concrete in a manner that does not violate ground water or surface water quality standards.
- Always use forms or solid barriers for concrete pours, such as pilings, within 15-feet of surface waters.
- Refer to BMPs C252 and C253 for pH adjustment requirements.
- Refer to the Construction Stormwater General Permit for pH monitoring requirements if the project involves one of the following activities:
  - Significant concrete work (greater than 1,000 cubic yards poured concrete or recycled concrete used over the life of a project).
  - The use of engineered soils amended with (but not limited to) Portland cement-treated base, cement kiln dust or fly ash.
  - Discharging stormwater to segments of water bodies on the 303(d) list (Category 5) for high pH.

Maintenance Standards

Check containers for holes in the liner daily during concrete pours and repair the same day.

BMP C152: Sawcutting and Surfacing Pollution Prevention

Purpose

Sawcutting and surfacing operations generate slurry and process water that contains fine particles and high pH (concrete cutting), both of which can violate the water quality standards in the receiving water. Concrete spillage or concrete discharge to surface waters of the State is prohibited. Use this BMP to minimize and eliminate process water and slurry created through sawcutting or surfacing from entering waters of the State.

Conditions of Use

Utilize these management practices anytime sawcutting or surfacing operations take place. Sawcutting and surfacing operations include, but are not limited to, the following:

- Sawing
- Coring
- Grinding
- Roughening
- Hydro-demolition
- Bridge and road surfacing

Design and Installation Specifications

- Vacuum slurry and cuttings during cutting and surfacing operations.
- Slurry and cuttings shall not remain on permanent concrete or asphalt pavement overnight.
- Slurry and cuttings shall not drain to any natural or constructed drainage conveyance including stormwater systems. This may require temporarily blocking catch basins.
- Dispose of collected slurry and cuttings in a manner that does not violate ground water or surface water quality standards.
- Do not allow process water generated during hydro-demolition, surface roughening or similar operations to drain to any natural or constructed drainage conveyance including stormwater systems. Dispose process water in a manner that does not violate ground water or surface water quality standards.
- Handle and dispose cleaning waste material and demolition debris in a manner that does not cause contamination of water. Dispose of sweeping material from a pick-up sweeper at an appropriate disposal site.

Maintenance Standards

Continually monitor operations to determine whether slurry, cuttings, or process water could enter waters of the state. If inspections show that a violation of water quality standards could occur, stop operations and immediately implement preventive measures such as berms, barriers, secondary containment, and vacuum trucks.

BMP C153: Material Delivery, Storage and Containment

Purpose

Prevent, reduce, or eliminate the discharge of pollutants to the stormwater system or watercourses from material delivery and storage. Minimize the storage of hazardous materials on-site, store materials in a designated area, and install secondary containment.

Conditions of Use

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Petroleum products such as fuel, oil and grease
- Soil stabilizers and binders (e.g. Polyacrylamide)
- Fertilizers, pesticides and herbicides
- Detergents
- Asphalt and concrete compounds
- Hazardous chemicals such as acids, lime, adhesives, paints, solvents and curing compounds
- Any other material that may be detrimental if released to the environment

Design and Installation Specifications

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic, near the construction entrance(s), and away from waterways or storm drains.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored. Chemicals should be kept in their original labeled containers.
- Hazardous material storage on-site should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the wet weather season (Oct 1 – April 30), consider storing materials in a covered area.
- Materials should be stored in secondary containments, such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, and within secondary containment.
- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.

Material Storage Areas and Secondary Containment Practices:

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be stored in temporary secondary containment facilities.
- Temporary secondary containment facilities shall provide for a spill containment volume able to contain 10% of the total enclosed container volume of all containers, or 110% of the capacity of the largest container within its boundary, whichever is greater.
- Secondary containment facilities shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- Secondary containment facilities shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as hazardous waste unless testing determines them to be non-hazardous.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- During the wet weather season (Oct 1 – April 30), each secondary containment facility shall be covered during non-working days, prior to and during rain events.
- Keep material storage areas clean, organized and equipped with an ample supply of appropriate spill clean-up material (spill kit).
- The spill kit should include, at a minimum:
    - 1-Water Resistant Nylon Bag
    - 3-Oil Absorbent Socks 3”x 4’
    - 2-Oil Absorbent Socks 3”x 10’
    - 12-Oil Absorbent Pads 17”x19”
    - 1-Pair Splash Resistant Goggles
    - 3-Pair Nitrile Gloves
    - 10-Disposable Bags with Ties
    - Instructions

BMP C154: Concrete Washout Area

Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste by conducting washout off-site, or performing on-site washout in a designated area to prevent pollutants from entering surface waters or ground water.

Conditions of Use

Concrete washout area best management practices are implemented on construction projects where:

- Concrete is used as a construction material
- It is not possible to dispose of all concrete wastewater and washout off-site (ready mix plant, etc.).
- Concrete trucks, pumpers, or other concrete coated equipment are washed on-site.
- Note: If less than 10 concrete trucks or pumpers need to be washed out on-site, the washwater may be disposed of in a formed area awaiting concrete or an upland disposal site where it will not contaminate surface or ground water. The upland disposal site shall be at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.

Design and Installation Specifications

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Perform washout of concrete trucks off-site or in designated concrete washout areas only.
- Do not wash out concrete trucks onto the ground, or into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated concrete washout areas.
- Concrete washout areas may be prefabricated concrete washout containers, or self-installed structures (above-grade or below-grade).
- Prefabricated containers are most resistant to damage and protect against spills and leaks. Companies may offer delivery service and provide regular maintenance and disposal of solid and liquid waste.
- If self-installed concrete washout areas are used, below-grade structures are preferred over above-grade structures because they are less prone to spills and leaks.
- Self-installed above-grade structures should only be used if excavation is not practical.

Education

- Discuss the concrete management techniques described in this BMP with the ready-mix concrete supplier before any deliveries are made.
- Educate employees and subcontractors on the concrete waste management techniques described in this BMP.
- Arrange for contractor's superintendent or Certified Erosion and Sediment Control Lead (CESCL) to oversee and enforce concrete waste management procedures.
- A sign should be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities.

Contracts

Incorporate requirements for concrete waste management into concrete supplier and subcontractor agreements.

Location and Placement

- Locate washout area at least 50 feet from sensitive areas such as storm drains, open ditches, or water bodies, including wetlands.
- Allow convenient access for concrete trucks, preferably near the area where the concrete is being poured.
- If trucks need to leave a paved area to access washout, prevent track-out with a pad of rock or quarry spalls (see BMP C105). These areas should be far enough away from other construction traffic to reduce the likelihood of accidental damage and spills.
- The number of facilities you install should depend on the expected demand for storage capacity.
- On large sites with extensive concrete work, washouts should be placed in multiple locations for ease of use by concrete truck drivers.

On-site Temporary Concrete Washout Facility, Transit Truck Washout Procedures:

- Temporary concrete washout facilities shall be located a minimum of 50 ft from sensitive areas including storm drain inlets, open drainage facilities, and watercourses. See Figures 4.1.7 and 4.1.8.
- Concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- Approximately 7 gallons of wash water are used to wash one truck chute.
- Approximately 50 gallons are used to wash out the hopper of a concrete pump truck.

- Washout of concrete trucks shall be performed in designated areas only.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of off-site.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per applicable solid waste regulations. Dispose of hardened concrete on a regular basis.
- Temporary Above-Grade Concrete Washout Facility
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
- Temporary Below-Grade Concrete Washout Facility
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details below, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material shall be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Liner seams shall be installed in accordance with manufacturers' recommendations.
  - Soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Maintenance Standards

Inspection and Maintenance

- Inspect and verify that concrete washout BMPs are in place prior to the commencement of concrete work.
- During periods of concrete work, inspect daily to verify continued performance.
  - Check overall condition and performance.
  - Check remaining capacity (% full).

  - If using self-installed washout facilities, verify plastic liners are intact and sidewalls are not damaged.
  - If using prefabricated containers, check for leaks.
- Washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 12 inches.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- If the washout is nearing capacity, vacuum and dispose of the waste material in an approved manner.
  - Do not discharge liquid or slurry to waterways, storm drains or directly onto ground.
  - Do not use sanitary sewer without local approval.
  - Place a secure, non-collapsing, non-water collecting cover over the concrete washout facility prior to predicted wet weather to prevent accumulation and overflow of precipitation.
  - Remove and dispose of hardened concrete and return the structure to a functional condition. Concrete may be reused on-site or hauled away for disposal or recycling.
- When you remove materials from the self-installed concrete washout, build a new structure; or, if the previous structure is still intact, inspect for signs of weakening or damage, and make any necessary repairs. Re-line the structure with new plastic after each cleaning.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete, slurries and liquids shall be removed and properly disposed of.
- Materials used to construct temporary concrete washout facilities shall be removed from the site of the work and disposed of or recycled.
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled, repaired, and stabilized to prevent erosion.

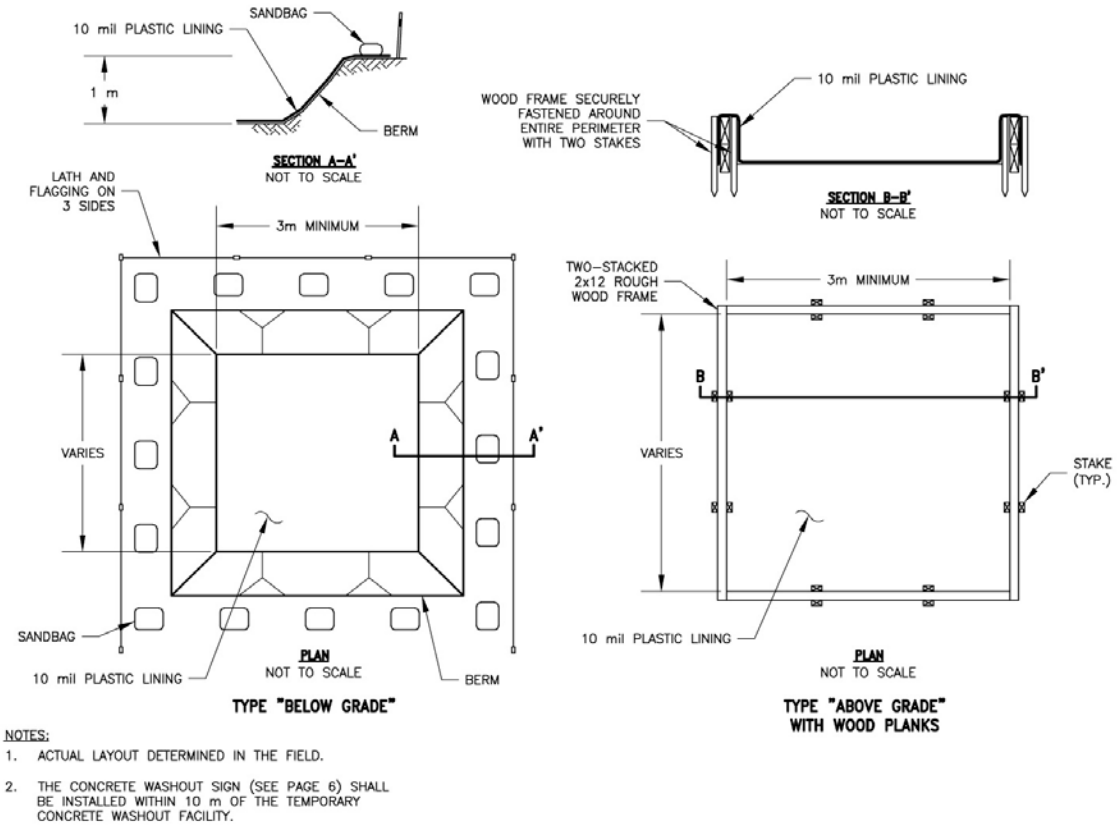


Figure 4.1.7a – Concrete Washout Area

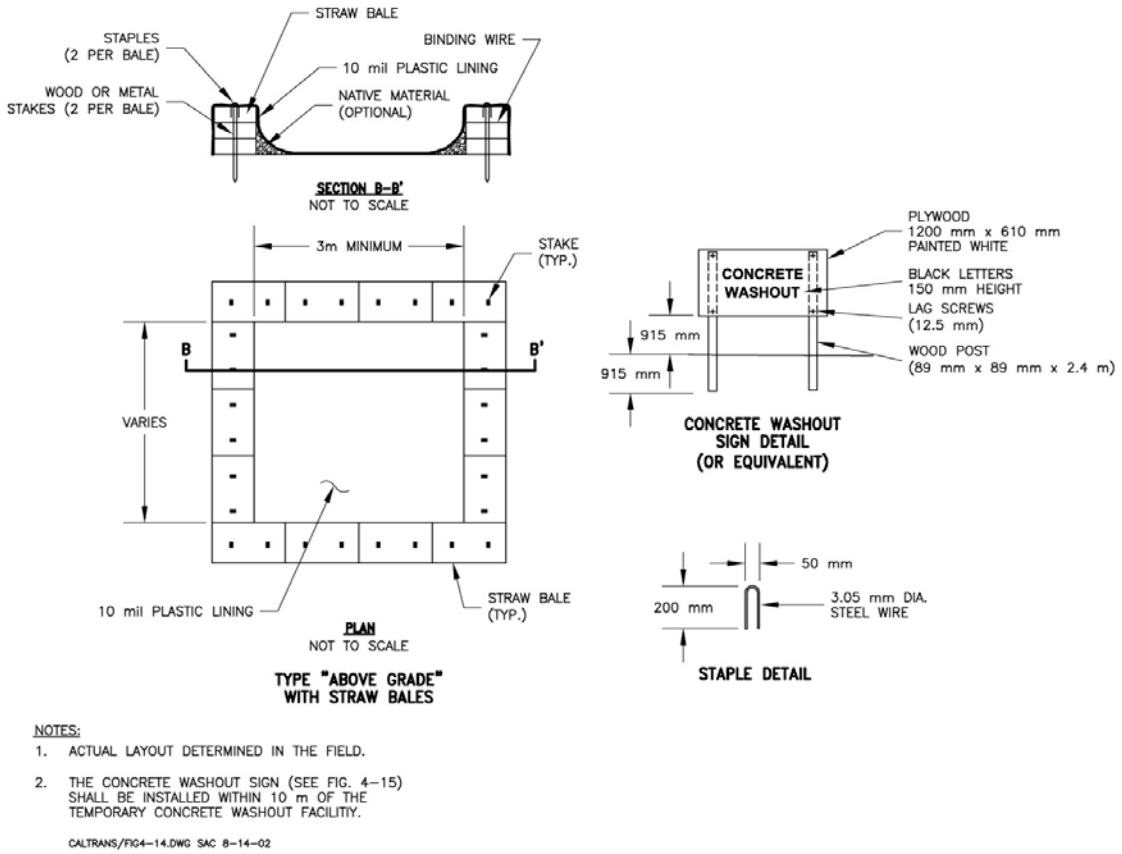


Figure 4.1.7b – Concrete Washout Area

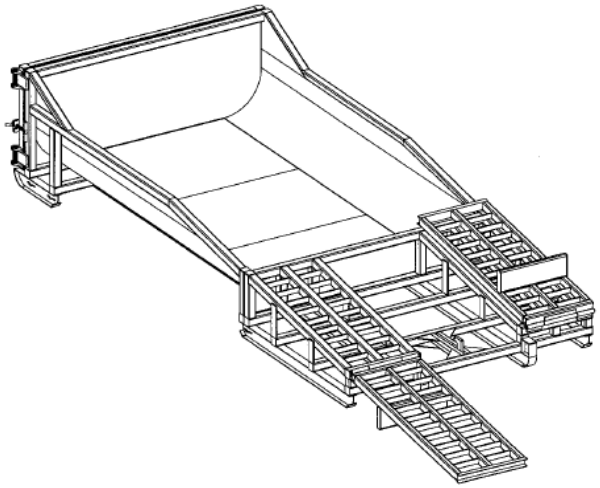


Figure 4.1.8 – Prefabricated Concrete Washout Container w/Ramp

BMP C160: Certified Erosion and Sediment Control Lead

Purpose

The project proponent designates at least one person as the responsible representative in charge of erosion and sediment control (ESC), and water quality protection. The designated person shall be the Certified Erosion and Sediment Control Lead (CESCL) who is responsible for ensuring compliance with all local, state, and federal erosion and sediment control and water quality requirements.

Conditions of Use

A CESCL shall be made available on projects one acre or larger that discharge stormwater to surface waters of the state. Sites less than one acre may have a person without CESCL certification conduct inspections; sampling is not required on sites that disturb less than an acre.

- The CESCL shall:
  - Have a current certificate proving attendance in an erosion and sediment control training course that meets the minimum ESC training and certification requirements established by Ecology (see details below).

    Ecology will maintain a list of ESC training and certification providers at:
    http://www.ecy.wa.gov/programs/wq/stormwater/cescl.html

    OR

  - Be a Certified Professional in Erosion and Sediment Control (CPESC); for additional information go to: www.cpesc.net

Specifications

- Certification shall remain valid for three years.
- The CESCL shall have authority to act on behalf of the contractor or developer and shall be available, or on-call, 24 hours per day throughout the period of construction.
- The Construction SWPPP shall include the name, telephone number, fax number, and address of the designated CESCL.
- A CESCL may provide inspection and compliance services for multiple construction projects in the same geographic region.

Duties and responsibilities of the CESCL shall include, but are not limited to the following:

- Maintaining permit file on site at all times which includes the Construction SWPPP and any associated permits and plans.
- Directing BMP installation, inspection, maintenance, modification, and removal.

- Updating all project drawings and the Construction SWPPP with changes made.
- Completing any sampling requirements including reporting results using WebDMR.
- Keeping daily logs, and inspection reports. Inspection reports should include:
    - Inspection date/time.
    - Weather information; general conditions during inspection and approximate amount of precipitation since the last inspection.
    - A summary or list of all BMPs implemented, including observations of all erosion/sediment control structures or practices. The following shall be noted:
        1. Locations of BMPs inspected.
        2. Locations of BMPs that need maintenance.
        3. Locations of BMPs that failed to operate as designed or intended.
        4. Locations of where additional or different BMPs are required.
    - Visual monitoring results, including a description of discharged stormwater. The presence of suspended sediment, turbid water, discoloration, and oil sheen shall be noted, as applicable.
    - Any water quality monitoring performed during inspection.
    - General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.
- Facilitate, participate in, and take corrective actions resulting from inspections performed by outside agencies or the owner.

BMP C162: Scheduling

Purpose Sequencing a construction project reduces the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Conditions of Use The construction sequence schedule is an orderly listing of all major land-disturbing activities together with the necessary erosion and sedimentation control measures planned for the project. This type of schedule guides the contractor on work to be done before other work is started so that serious erosion and sedimentation problems can be avoided.

Following a specified work schedule that coordinates the timing of land-disturbing activities and the installation of control measures is perhaps the most cost-effective way of controlling erosion during construction. The removal of surface ground cover leaves a site vulnerable to accelerated

erosion. Construction procedures that limit land clearing provide timely installation of erosion and sedimentation controls, and restore protective cover quickly can significantly reduce the erosion potential of a site.

Design Considerations

- Minimize construction during rainy periods.
- Schedule projects to disturb only small portions of the site at any one time. Complete grading as soon as possible. Immediately stabilize the disturbed portion before grading the next portion. Practice staged seeding in order to revegetate cut and fill slopes as the work progresses.

4.2 Runoff Conveyance and Treatment BMPs

This section contains the standards and specifications for Runoff Conveyance and Treatment BMPs. Table 4.2.1, below, shows the relationship of the BMPs in Section 4.2 to the Construction Stormwater Pollution Prevention Plan (SWPPP) Elements described in Section 3.3.3.

Table 4.2.1 Runoff Conveyance and Treatment BMPs by SWPPP Element

BMP or Element Name	Element #1 Preserve Vegetation/Mark Clearing Limits	Element #2 Establish Construction Access	Element #5 Stabilize Soils	Element #6 Protect Slopes	Element #8 Stabilize Channels and Outlets	Element #9 Control Pollutants	Element #11 Maintain BMPs	Element #12 Manage the Project	Element #13 Protect Low Impact Development
BMP C101: Preserving Natural Vegetation	✓								
BMP C102: Buffer Zones	✓								✓
BMP C103: High Visibility Plastic or Metal Fence	✓								✓
BMP C105: Stabilized Construction Entrance / Exit		✓							
BMP C106: Wheel Wash		✓							
BMP C107: Construction Road/Parking Area Stabilization		✓							
BMP C120: Temporary and Permanent Seeding			✓	✓					
BMP C121: Mulching			✓	✓					
BMP C122: Nets and Blankets			✓	✓	✓				
BMP C123: Plastic Covering			✓						
BMP C124: Sodding			✓						
BMP C125: Topsoiling / Composting			✓						
BMP C126: Polyacrylamide for Soil Erosion Protection			✓						
BMP C130: Surface Roughening			✓	✓					
BMP C131: Gradient Terraces			✓	✓					
BMP C140: Dust Control			✓						
BMP C150: Materials On Hand							✓	✓	
BMP C151: Concrete Handling						✓			
BMP C152: Sawcutting and Surfacing Pollution Prevention						✓			
BMP C153: Material Delivery, Storage and Containment						✓			
BMP C154: Concrete Washout Area						✓			
BMP C160: Certified Erosion and Sediment Control Lead							✓	✓	
BMP C162: Scheduling								✓	

BMP C200: Interceptor Dike and Swale

Purpose

Provide a ridge of compacted soil, or a ridge with an upslope swale, at the top or base of a disturbed slope or along the perimeter of a disturbed construction area to convey stormwater. Use the dike and/or swale to intercept the runoff from unprotected areas and direct it to areas where erosion can be controlled. This can prevent storm runoff from entering the work area or sediment-laden runoff from leaving the construction site.

Conditions of Use

Where the runoff from an exposed site or disturbed slope must be conveyed to an erosion control facility which can safely convey the stormwater.

- Locate upslope of a construction site to prevent runoff from entering disturbed area.
- When placed horizontally across a disturbed slope, it reduces the amount and velocity of runoff flowing down the slope.
- Locate downslope to collect runoff from a disturbed area and direct water to a sediment basin.

Design and Installation Specifications

- Dike and/or swale and channel must be stabilized with temporary or permanent vegetation or other channel protection during construction.
- Channel requires a positive grade for drainage; steeper grades require channel protection and check dams.
- Review construction for areas where overtopping may occur.
- Can be used at top of new fill before vegetation is established.
- May be used as a permanent diversion channel to carry the runoff.
- Sub-basin tributary area should be one acre or less.
- Design capacity for the peak flow from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution, for temporary facilities. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model. For facilities that will also serve on a permanent basis, consult the local government's drainage requirements.

Interceptor dikes shall meet the following criteria:

Top Width	2 feet minimum.
Height	1.5 feet minimum on berm.
Side Slope	2H:1V or flatter.
Grade	Depends on topography, however, dike system minimum is 0.5%, and maximum is 1%.
Compaction	Minimum of 90 percent ASTM D698 standard proctor.

Horizontal Spacing of Interceptor Dikes:

Average Slope	Slope Percent	Flowpath Length
20H:1V or less	3-5%	300 feet
(10 to 20)H:1V	5-10%	200 feet
(4 to 10)H:1V	10-25%	100 feet
(2 to 4)H:1V	25-50%	50 feet

Stabilization depends on velocity and reach

Slopes <5% Seed and mulch applied within 5 days of dike construction (see BMP C121, Mulching).

Slopes 5 - 40% Dependent on runoff velocities and dike materials. Stabilization should be done immediately using either sod or riprap or other measures to avoid erosion.

- The upslope side of the dike shall provide positive drainage to the dike outlet. No erosion shall occur at the outlet. Provide energy dissipation measures as necessary. Sediment-laden runoff must be released through a sediment trapping facility.
- Minimize construction traffic over temporary dikes. Use temporary cross culverts for channel crossing.

Interceptor swales shall meet the following criteria:

Bottom Width	2 feet minimum; the cross-section bottom shall be level.
Depth	1-foot minimum.
Side Slope	2H:1V or flatter.
Grade	Maximum 5 percent, with positive drainage to a suitable outlet (such as a sediment pond).
Stabilization	Seed as per BMP C120, *Temporary and Permanent Seeding*, or *BMP C202*, *Channel Lining*, 12 inches thick riprap pressed into the bank and extending at least 8 inches vertical from the bottom.

- Inspect diversion dikes and interceptor swales once a week and after every rainfall. Immediately remove sediment from the flow area.
- Damage caused by construction traffic or other activity must be repaired before the end of each working day.

Check outlets and make timely repairs as needed to avoid gully formation. When the area below the temporary diversion dike is permanently stabilized, remove the dike and fill and stabilize the channel to blend with the natural surface.

BMP C201: Grass-Lined Channels

Purpose

To provide a channel with a vegetative lining for conveyance of runoff. See Figure 4.2.1 for typical grass-lined channels.

Conditions of Use

This practice applies to construction sites where concentrated runoff needs to be contained to prevent erosion or flooding.

- When a vegetative lining can provide sufficient stability for the channel cross section and at lower velocities of water (normally dependent on grade). This means that the channel slopes are generally less than 5 percent and space is available for a relatively large cross section.
- Typical uses include roadside ditches, channels at property boundaries, outlets for diversions, and other channels and drainage ditches in low areas.
- Channels that will be vegetated should be installed before major earthwork and hydroseeded with a bonded fiber matrix (BFM). The vegetation should be well established (i.e., 75 percent cover) before water is allowed to flow in the ditch. With channels that will have high flows, erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch in lieu of hydromulch and blankets.

Design and Installation Specifications

Locate the channel where it can conform to the topography and other features such as roads.

- Locate them to use natural drainage systems to the greatest extent possible.
- Avoid sharp changes in alignment or bends and changes in grade.
- Do not reshape the landscape to fit the drainage channel.
- The maximum design velocity shall be based on soil conditions, type of vegetation, and method of revegetation, but at no times shall velocity exceed 5 feet/second. The channel shall not be overtopped by the peak runoff from a 10-year, 24-hour storm, assuming a Type 1A rainfall distribution." Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model to determine a flow rate which the channel must contain.
- Where the grass-lined channel will also function as a permanent stormwater conveyance facility, consult the drainage conveyance requirements of the local government with jurisdiction.

- An established grass or vegetated lining is required before the channel can be used to convey stormwater, unless stabilized with nets or blankets.
- If design velocity of a channel to be vegetated by seeding exceeds 2 ft/sec, a temporary channel liner is required. Geotextile or special mulch protection such as fiberglass roving or straw and netting provides stability until the vegetation is fully established. See Figure 4.2.2.
- Check dams shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- If vegetation is established by sodding, the permissible velocity for established vegetation may be used and no temporary liner is needed.
- Do not subject grass-lined channel to sedimentation from disturbed areas. Use sediment-trapping BMPs upstream of the channel.
- V-shaped grass channels generally apply where the quantity of water is small, such as in short reaches along roadsides. The V-shaped cross section is least desirable because it is difficult to stabilize the bottom where velocities may be high.
- Trapezoidal grass channels are used where runoff volumes are large and slope is low so that velocities are nonerosive to vegetated linings. (Note: it is difficult to construct small parabolic shaped channels.)
- Subsurface drainage, or riprap channel bottoms, may be necessary on sites that are subject to prolonged wet conditions due to long duration flows or a high water table.
- Provide outlet protection at culvert ends and at channel intersections.
- Grass channels, at a minimum, should carry peak runoff for temporary construction drainage facilities from the 10-year, 24-hour storm without eroding. Where flood hazard exists, increase the capacity according to the potential damage.
- Grassed channel side slopes generally are constructed 3H:1V or flatter to aid in the establishment of vegetation and for maintenance.
- Construct channels a minimum of 0.2 foot larger around the periphery to allow for soil bulking during seedbed preparations and sod buildup.

Maintenance Standards

During the establishment period, check grass-lined channels after every rainfall.

- After grass is established, periodically check the channel; check it after every heavy rainfall event. Immediately make repairs.
- It is particularly important to check the channel outlet and all road crossings for bank stability and evidence of piping or scour holes.

- Remove all significant sediment accumulations to maintain the designed carrying capacity. Keep the grass in a healthy, vigorous condition at all times, since it is the primary erosion protection for the channel.

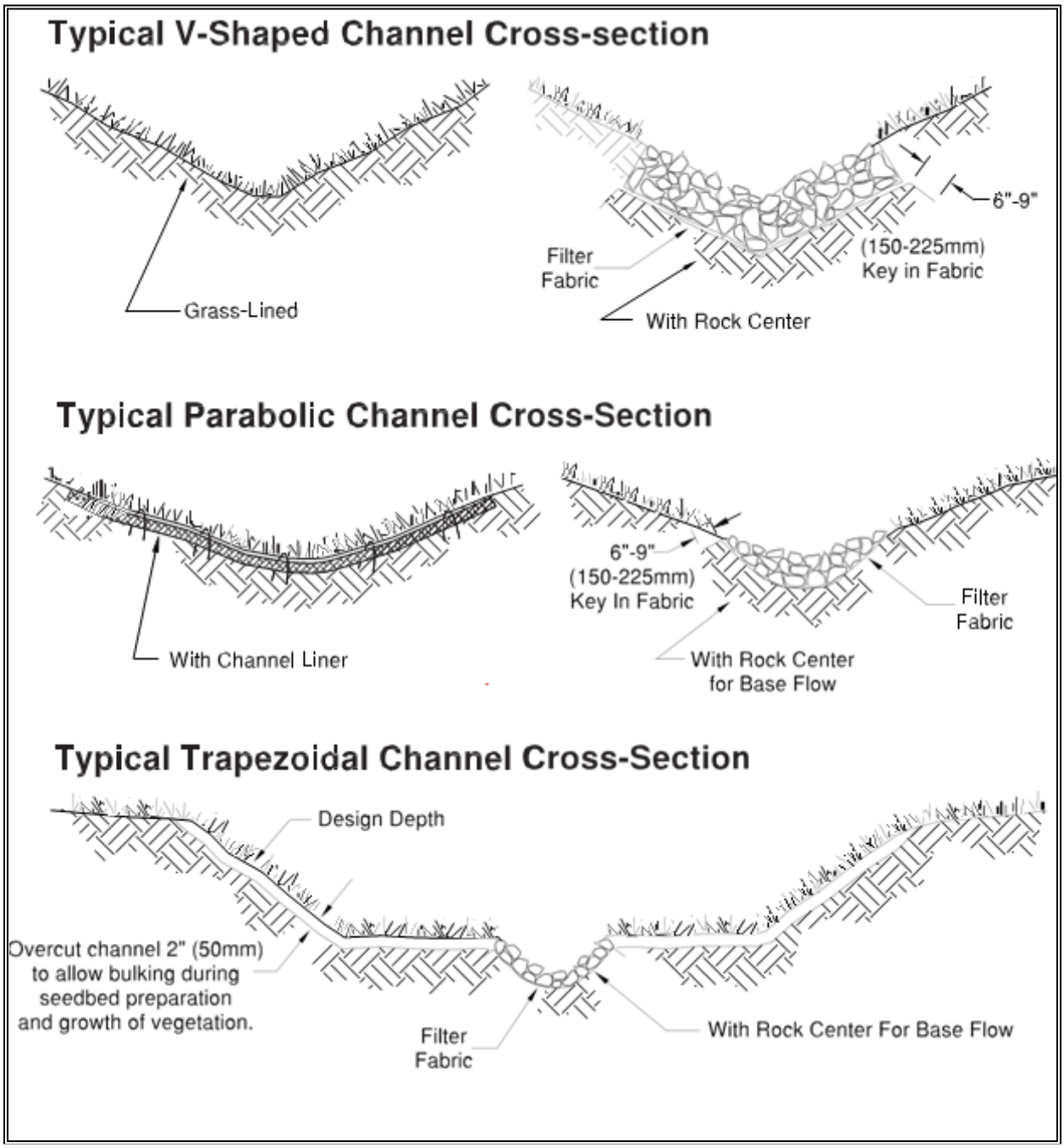
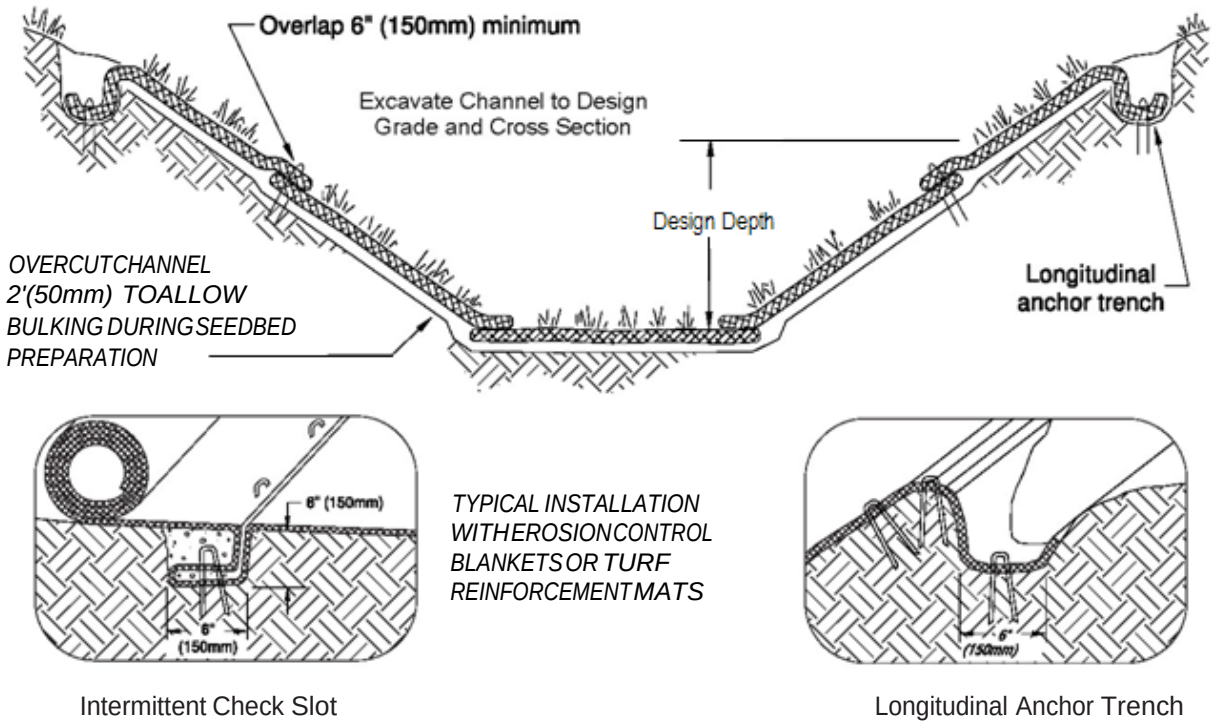
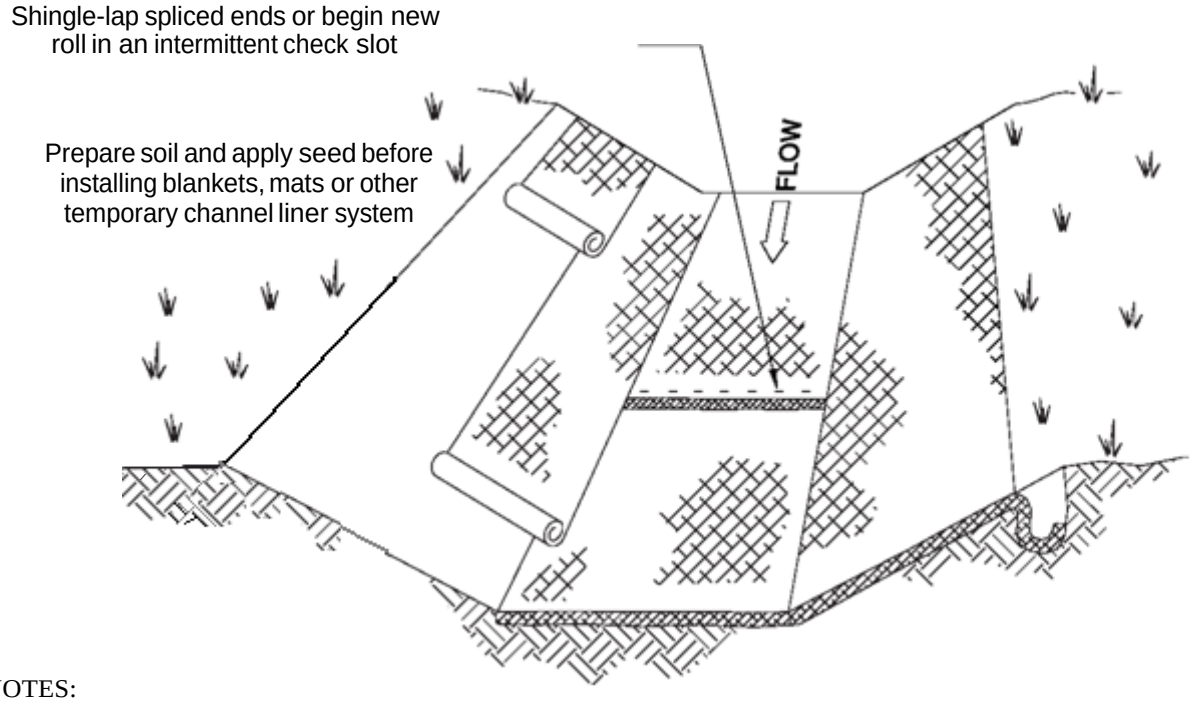


Figure 4.2.1 – Typical Grass-Lined Channels





NOTES:

1 Design velocities exceeding 2 ft/sec (0.5m/sec) require temporary blankets, mats or similar liners to protect seed and soil until vegetation becomes established.

2 Grass-lined channels with design velocities exceeding 6 ft/sec (2m/sec) should include turf reinforcement mats.

Figure 4.2.2 – Temporary Channel Liners

BMP C202: Channel Lining

Purpose

To protect channels by providing a channel liner using either blankets or riprap.

Conditions of Use

When natural soils or vegetated stabilized soils in a channel are not adequat to prevent channel erosion.

- When a permanent ditch or pipe system is to be installed and a temporary measure is needed.
- In almost all cases, synthetic and organic coconut blankets are more effective than riprap for protecting channels from erosion. Blankets can be used with and without vegetation. Blanketed channels can be designed to handle any expected flow and longevity requirement. Some synthetic blankets have a predicted life span of 50 years or more, even in sunlight.
- Other reasons why blankets are better than rock include the availability of blankets over rock. In many areas of the state, rock is not easily obtainable or is very expensive to haul to a site. Blankets can be delivered anywhere. Rock requires the use of dump trucks to haul and heavy equipment to place. Blankets usually only require laborers with hand tools, and sometimes a backhoe.
- The Federal Highway Administration recommends not using flexible liners whenever the slope exceeds 10 percent or the shear stress exceeds 8 lbs/ft^2.

Design and Installation Specifications

See BMP C122 for information on blankets.

Since riprap is used where erosion potential is high, construction must be sequenced so that the riprap is put in place with the minimum possible delay.

- Disturbance of areas where riprap is to be placed should be undertaken only when final preparation and placement of the riprap can follow immediately behind the initial disturbance. Where riprap is used for outlet protection, the riprap should be placed before or in conjunction with the construction of the pipe or channel so that it is in place when the pipe or channel begins to operate.
- The designer, after determining the riprap size that will be stable under the flow conditions, shall consider that size to be a minimum size and then, based on riprap gradations actually available in the area, select the size or sizes that equal or exceed the minimum size. The possibility of drainage structure damage by children shall be considered in selecting a riprap size, especially if there is nearby water or a gully in which to toss the stones.
- Stone for riprap shall consist of field stone or quarry stone of approximately rectangular shape. The stone shall be hard and angular

and of such quality that it will not disintegrate on exposure to water or weathering and it shall be suitable in all respects for the purpose intended.

- A lining of engineering filter fabric (geotextile) shall be placed between the riprap and the underlying soil surface to prevent soil movement into or through the riprap. The geotextile should be keyed in at the top of the bank.
- Filter fabric shall not be used on slopes greater than 1-1/2H:1V as slippage may occur. It should be used in conjunction with a layer of coarse aggregate (granular filter blanket) when the riprap to be placed is 12 inches and larger.

BMP C203: Water Bars

Purpose

A small ditch or ridge of material is constructed diagonally across a road or right-of-way to divert stormwater runoff from the road surface, wheel tracks, or a shallow road ditch. See Figure 4.2.3.

Conditions of use

Clearing right-of-way and construction of access for power lines, pipelines, and other similar installations often require long narrow right-of-ways over sloping terrain. Disturbance and compaction promotes gully formation in these cleared strips by increasing the volume and velocity of runoff. Gully formation may be especially severe in tire tracks and ruts. To prevent gullying, runoff can often be diverted across the width of the right-of-way to undisturbed areas by using small predesigned diversions.

- Give special consideration to each individual outlet area, as well as to the cumulative effect of added diversions. Use gravel to stabilize the diversion where significant vehicular traffic is anticipated.

Design and Installation Specifications

Height: 8-inch minimum measured from the channel bottom to the ridge top.

- Side slope of channel: 2H:1V maximum; 3H:1V or flatter when vehicles will cross.
- Base width of ridge: 6-inch minimum.
- Locate them to use natural drainage systems and to discharge into well vegetated stable areas.
- Guideline for Spacing:

Slope %	Spacing (ft)
< 5	125
5 - 10	100
10 - 20	75
20 - 35	50
> 35	Use rock lined ditch

- Grade of water bar and angle: Select angle that results in ditch slope less than 2 percent.
- Install as soon as the clearing and grading is complete. Reconstruct when construction is complete on a section when utilities are being installed.
- Compact the ridge when installed.
- Stabilize, seed and mulch the portions that are not subject to traffic. Gravel the areas crossed by vehicles.

Maintenance Standards

Periodically inspect right-of-way diversions for wear and after every heavy rainfall for erosion damage.

- Immediately remove sediment from the flow area and repair the dike.
- Check outlet areas and make timely repairs as needed.
- When permanent road drainage is established and the area above the temporary right-of-way diversion is permanently stabilized, remove the dikes and fill the channel to blend with the natural ground, and appropriately stabilize the disturbed area.

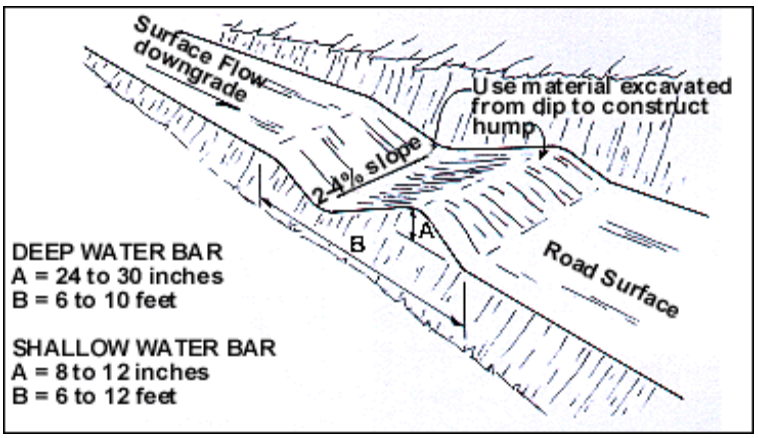


Figure 4.2.3 – Water Bar

BMP C204: Pipe Slope Drains

Purpose

To use a pipe to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Conditions of Use

Pipe slope drains should be used when a temporary or permanent stormwater conveyance is needed to move the water down a steep slope to avoid erosion (Figure 4.2.4).

On highway projects, pipe slope drains should be used at bridge ends to collect runoff and pipe it to the base of the fill slopes along bridge approaches. These can be designed into a project and included as bid items. Another use on road projects is to collect runoff from pavement and pipe it away from side slopes. These are useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.

Water can be collected, channeled with sand bags, Triangular Silt Dikes, berms, or other material, and piped to temporary sediment ponds.

Pipe slope drains can be:

- Connected to new catch basins and used temporarily until all permanent piping is installed;
- Used to drain water collected from aquifers exposed on cut slopes and take it to the base of the slope;
- Used to collect clean runoff from plastic sheeting and direct it away from exposed soil;
- Installed in conjunction with silt fence to drain collected water to a controlled area;
- Used to divert small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement; and,
- Connected to existing down spouts and roof drains and used to divert water away from work areas during building renovation, demolition, and construction projects.

There are now several commercially available collectors that are attached to the pipe inlet and help prevent erosion at the inlet.

Design and Installation Specifications

Size the pipe to convey the flow. The capacity for temporary drains shall be sufficient to handle the peak flow from a 10-year, 24-hour storm event, assuming a Type 1A rainfall distribution. Alternatively, use 1.6 times the 10-year, 1-hour flow indicated by an approved continuous runoff model.

Consult local drainage requirements for sizing permanent pipe slope drains.

- Use care in clearing vegetated slopes for installation.
- Re-establish cover immediately on areas disturbed by installation.
- Use temporary drains on new cut or fill slopes.
- Use diversion dikes or swales to collect water at the top of the slope.
- Ensure that the entrance area is stable and large enough to direct flow into the pipe.
- Piping of water through the berm at the entrance area is a common failure mode.
- The entrance shall consist of a standard flared end section for culverts 12 inches and larger with a minimum 6-inch metal toe plate to prevent runoff from undercutting the pipe inlet. The slope of the entrance shall be at least 3 percent. Sand bags may also be used at pipe entrances as a temporary measure.
- The soil around and under the pipe and entrance section shall be thoroughly compacted to prevent undercutting.
- The flared inlet section shall be securely connected to the slope drain and have watertight connecting bands.
- Slope drain sections shall be securely fastened together, fused or have gasketed watertight fittings, and shall be securely anchored into the soil.
- Thrust blocks should be installed anytime 90 degree bends are utilized. Depending on size of pipe and flow, these can be constructed with sand bags, straw bales staked in place, “t” posts and wire, or ecology blocks.
- Pipe needs to be secured along its full length to prevent movement. This can be done with steel “t” posts and wire. A post is installed on each side of the pipe and the pipe is wired to them. This should be done every 10-20 feet of pipe length or so, depending on the size of the pipe and quantity of water to divert.
- Interceptor dikes shall be used to direct runoff into a slope drain. The height of the dike shall be at least 1 foot higher at all points than the top of the inlet pipe.
- The area below the outlet must be stabilized with a riprap apron (see BMP C209 Outlet Protection, for the appropriate outlet material).

- If the pipe slope drain is conveying sediment-laden water, direct all flows into the sediment trapping facility.
- Materials specifications for any permanent piped system shall be set by the local government.

Maintenance Standards

Check inlet and outlet points regularly, especially after storms.

The inlet should be free of undercutting, and no water should be going around the point of entry. If there are problems, the headwall should be reinforced with compacted earth or sand bags.

- The outlet point should be free of erosion and installed with appropriate outlet protection.
- For permanent installations, inspect pipe periodically for vandalism and physical distress such as slides and wind-throw.
- Normally the pipe slope is so steep that clogging is not a problem with smooth wall pipe, however, debris may become lodged in the pipe.

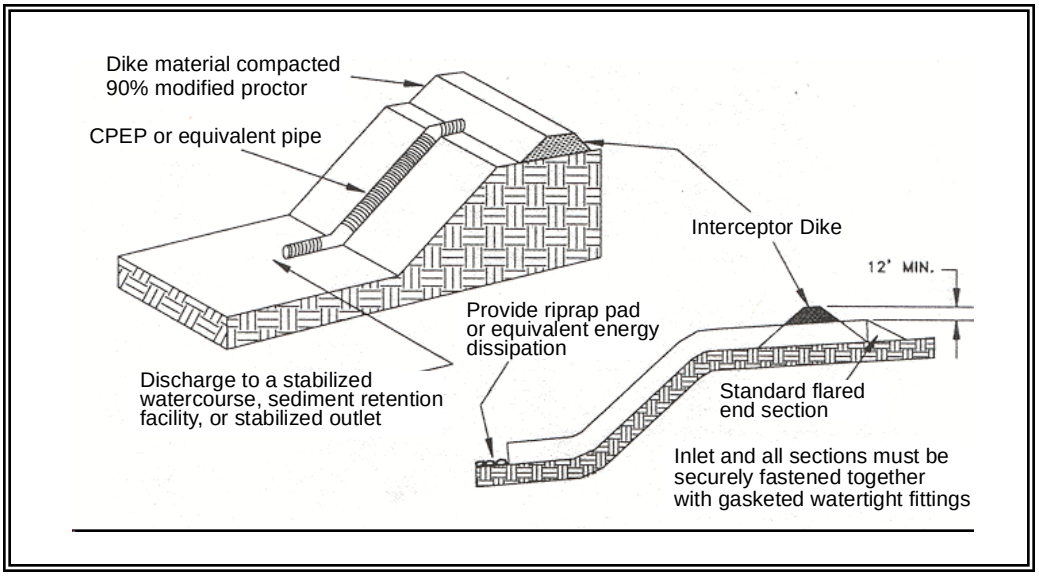


Figure 4.2.4 – Pipe Slope Drain

BMP C205: Subsurface Drains

Purpose

To intercept, collect, and convey ground water to a satisfactory outlet, using a perforated pipe or conduit below the ground surface. Subsurface drains are also known as "french drains." The perforated pipe provides a dewatering mechanism to drain excessively wet soils, provide a stable base for construction, improve stability of structures with shallow foundations, or to reduce hydrostatic pressure to improve slope stability.

Conditions of Use

Use when excessive water must be removed from the soil. The soil permeability, depth to water table and impervious layers are all factors which may govern the use of subsurface drains.

Design and Installation Specifications

Relief drains are used either to lower the water table in large, relatively flat areas, improve the growth of vegetation, or to remove surface water.

Relief drains are installed along a slope and drain in the direction of the slope.

They can be installed in a grid pattern, a herringbone pattern, or a random pattern.

- **Interceptor drains** are used to remove excess ground water from a slope, stabilize steep slopes, and lower the water table immediately below a slope to prevent the soil from becoming saturated.

Interceptor drains are installed perpendicular to a slope and drain to the side of the slope.

They usually consist of a single pipe or series of single pipes instead of a patterned layout.

- **Depth and spacing of interceptor drains** --The depth of an interceptor drain is determined primarily by the depth to which the water table is to be lowered or the depth to a confining layer. For practical reasons, the maximum depth is usually limited to 6 feet, with a minimum cover of 2 feet to protect the conduit.
- The soil should have depth and sufficient permeability to permit installation of an effective drainage system at a depth of 2 to 6 feet.
- An adequate outlet for the drainage system must be available either by gravity or by pumping.
- The quantity and quality of discharge needs to be accounted for in the receiving stream (additional detention may be required).
- This standard does not apply to subsurface drains for building foundations or deep excavations.
- The capacity of an interceptor drain is determined by calculating the maximum rate of ground water flow to be intercepted. Therefore, it is

good practice to make complete subsurface investigations, including hydraulic conductivity of the soil, before designing a subsurface drainage system.

- **Size of drain**--Size subsurface drains to carry the required capacity without pressure flow. Minimum diameter for a subsurface drain is 4 inches.
- The minimum velocity required to prevent silting is 1.4 ft./sec. The line shall be graded to achieve this velocity at a minimum. The maximum allowable velocity using a sand-gravel filter or envelope is 9 ft/sec.
- Filter material and fabric shall be used around all drains for proper bedding and filtration of fine materials. Envelopes and filters should surround the drain to a minimum of 3-inch thickness.
- The outlet of the subsurface drain shall empty into a sediment pond through a catch basin. If free of sediment, it can then empty into a receiving channel, swale, or stable vegetated area adequately protected from erosion and undermining.
- The trench shall be constructed on a continuous grade with no reverse grades or low spots.
- Soft or yielding soils under the drain shall be stabilized with gravel or other suitable material.
- Backfilling shall be done immediately after placement of the pipe. No sections of pipe shall remain uncovered overnight or during a rainstorm. Backfill material shall be placed in the trench in such a manner that the drain pipe is not displaced or damaged.
- Do not install permanent drains near trees to avoid the tree roots that tend to clog the line. Use solid pipe with watertight connections where it is necessary to pass a subsurface drainage system through a stand of trees.
- **Outlet**--Ensure that the outlet of a drain empties into a channel or other watercourse above the normal water level.
- Secure an animal guard to the outlet end of the pipe to keep out rodents.
- Use outlet pipe of corrugated metal, cast iron, or heavy-duty plastic without perforations and at least 10 feet long. Do not use an envelope or filter material around the outlet pipe, and bury at least two-thirds of the pipe length.
- When outlet velocities exceed those allowable for the receiving stream, outlet protection must be provided.

Maintenance Standards

Subsurface drains shall be checked periodically to ensure that they are free-flowing and not clogged with sediment or roots.

- The outlet shall be kept clean and free of debris.
- Surface inlets shall be kept open and free of sediment and other debris.
- Trees located too close to a subsurface drain often clog the system with their roots. If a drain becomes clogged, relocate the drain or remove the trees as a last resort. Drain placement should be planned to minimize this problem.
- Where drains are crossed by heavy vehicles, the line shall be checked to ensure that it is not crushed.

BMP C206: Level Spreader

Purpose

To provide a temporary outlet for dikes and diversions consisting of an excavated depression constructed at zero grade across a slope. To convert concentrated runoff to sheet flow and release it onto areas stabilized by existing vegetation or an engineered filter strip.

Conditions of Use

Used when a concentrated flow of water needs to be dispersed over a large area with existing stable vegetation.

- Items to consider are:
  1. What is the risk of erosion or damage if the flow may become concentrated?
  2. Is an easement required if discharged to adjoining property?
  3. Most of the flow should be as ground water and not as surface flow.
  4. Is there an unstable area downstream that cannot accept additional ground water?
- Use only where the slopes are gentle, the water volume is relatively low, and the soil will adsorb most of the low flow events.

Design and Installation Specifications

Use above undisturbed areas that are stabilized by existing vegetation.

If the level spreader has any low points, flow will concentrate, create channels and may cause erosion.

- Discharge area below the outlet must be uniform with a slope flatter than 5H:1V.
- Outlet to be constructed level in a stable, undisturbed soil profile (not on fill).
- The runoff shall not re-concentrate after release unless intercepted by another downstream measure.

- The grade of the channel for the last 20 feet of the dike or interceptor entering the level spreader shall be less than or equal to 1 percent. The grade of the level spreader shall be 0 percent to ensure uniform spreading of storm runoff.
- A 6-inch high gravel berm placed across the level lip shall consist of washed crushed rock, 2- to 4-inch or 3/4-inch to 1½-inch size.
- The spreader length shall be determined by estimating the peak flow expected from the 10-year, 24-hour design storm. The length of the spreader shall be a minimum of 15 feet for 0.1 cfs and shall increase by 10 feet for each 0.1 cfs thereafter to a maximum of 0.5 cfs per spreader. Use multiple spreaders for higher flows.
- The width of the spreader should be at least 6 feet.
- The depth of the spreader as measured from the lip should be at least 6 inches and it should be uniform across the entire length.
- Level spreaders shall be setback from the property line unless there is an easement for flow.
- Level spreaders, when installed every so often in grassy swales, keep the flows from concentrating. Materials that can be used include sand bags, lumber, logs, concrete, and pipe. To function properly, the material needs to be installed level and on contour. Figures 4.2.5Figure425 and 4.2.6 provide a cross-section and a detail of a level spreader. A capped perforated pipe could also be used as a spreader.

Maintenance Standards

The spreader should be inspected after every runoff event to ensure that it is functioning correctly.

- The contractor should avoid the placement of any material on the structure and should prevent construction traffic from crossing over the structure.
- If the spreader is damaged by construction traffic, it shall be immediately repaired.

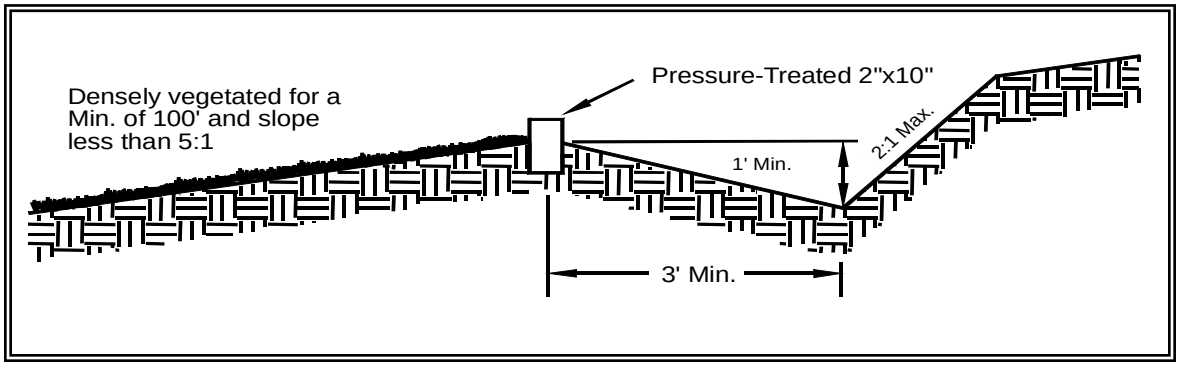


Figure 4.2.5 – Cross Section of Level Spreader

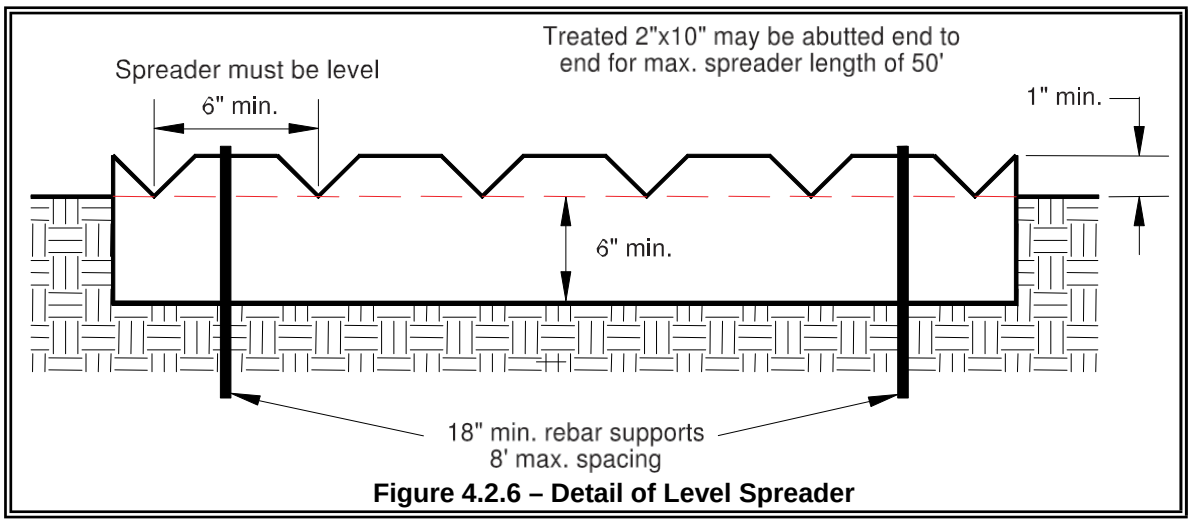


Figure 4.2.6 – Detail of Level Spreader

BMP C207: Check Dams

Purpose Construction of small dams across a swale or ditch reduces the velocity of concentrated flow and dissipates energy at the check dam.

Conditions of Use Where temporary channels or permanent channels are not yet vegetated, channel lining is infeasible, and/or velocity checks are required.

- Check dams may not be placed in streams unless approved by the State Department of Fish and Wildlife. Check dams may not be placed in wetlands without approval from a permitting agency.
- Do not place check dams below the expected backwater from any salmonid bearing water between October 1 and May 31 to ensure that there is no loss of high flow refuge habitat for overwintering juvenile salmonids and emergent salmonid fry.
- Construct rock check dams from appropriately sized rock. The rock used must be large enough to stay in place given the expected design flow through the channel. The rock must be placed by hand or by mechanical means (no dumping of rock to form dam) to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.
- Check dams may also be constructed of either rock or pea-gravel filled bags. Numerous new products are also available for this purpose. They tend to be re-usable, quick and easy to install, effective, and cost efficient.
- Place check dams perpendicular to the flow of water.
- The dam should form a triangle when viewed from the side. This prevents undercutting as water flows over the face of the dam rather than falling directly onto the ditch bottom.

- Before installing check dams impound and bypass upstream water flow away from the work area. Options for bypassing include pumps, siphons, or temporary channels.
- Check dams in association with sumps work more effectively at slowing flow and retaining sediment than just a check dam alone. A deep sump should be provided immediately upstream of the check dam.
- In some cases, if carefully located and designed, check dams can remain as permanent installations with very minor regrading. They may be left as either spillways, in which case accumulated sediment would be graded and seeded, or as check dams to prevent further sediment from leaving the site.
- The maximum spacing between the dams shall be such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
- Keep the maximum height at 2 feet at the center of the dam.
- Keep the center of the check dam at least 12 inches lower than the outer edges at natural ground elevation.
- Keep the side slopes of the check dam at 2H:1V or flatter.
- Key the stone into the ditch banks and extend it beyond the abutments a minimum of 18 inches to avoid washouts from overflow around the dam.
- Use filter fabric foundation under a rock or sand bag check dam. If a blanket ditch liner is used, filter fabric is not necessary. A piece of organic or synthetic blanket cut to fit will also work for this purpose.
- In the case of grass-lined ditches and swales, all check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale - unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.
- Ensure that channel appurtenances, such as culvert entrances below check dams, are not subject to damage or blockage from displaced stones. Figure 4.2.7 depicts a typical rock check dam.

Maintenance Standards

Check dams shall be monitored for performance and sediment accumulation during and after each runoff producing rainfall. Sediment shall be removed when it reaches one half the sump depth.

- Anticipate submergence and deposition above the check dam and erosion from high flows around the edges of the dam.
- If significant erosion occurs between dams, install a protective riprap liner in that portion of the channel.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C207. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

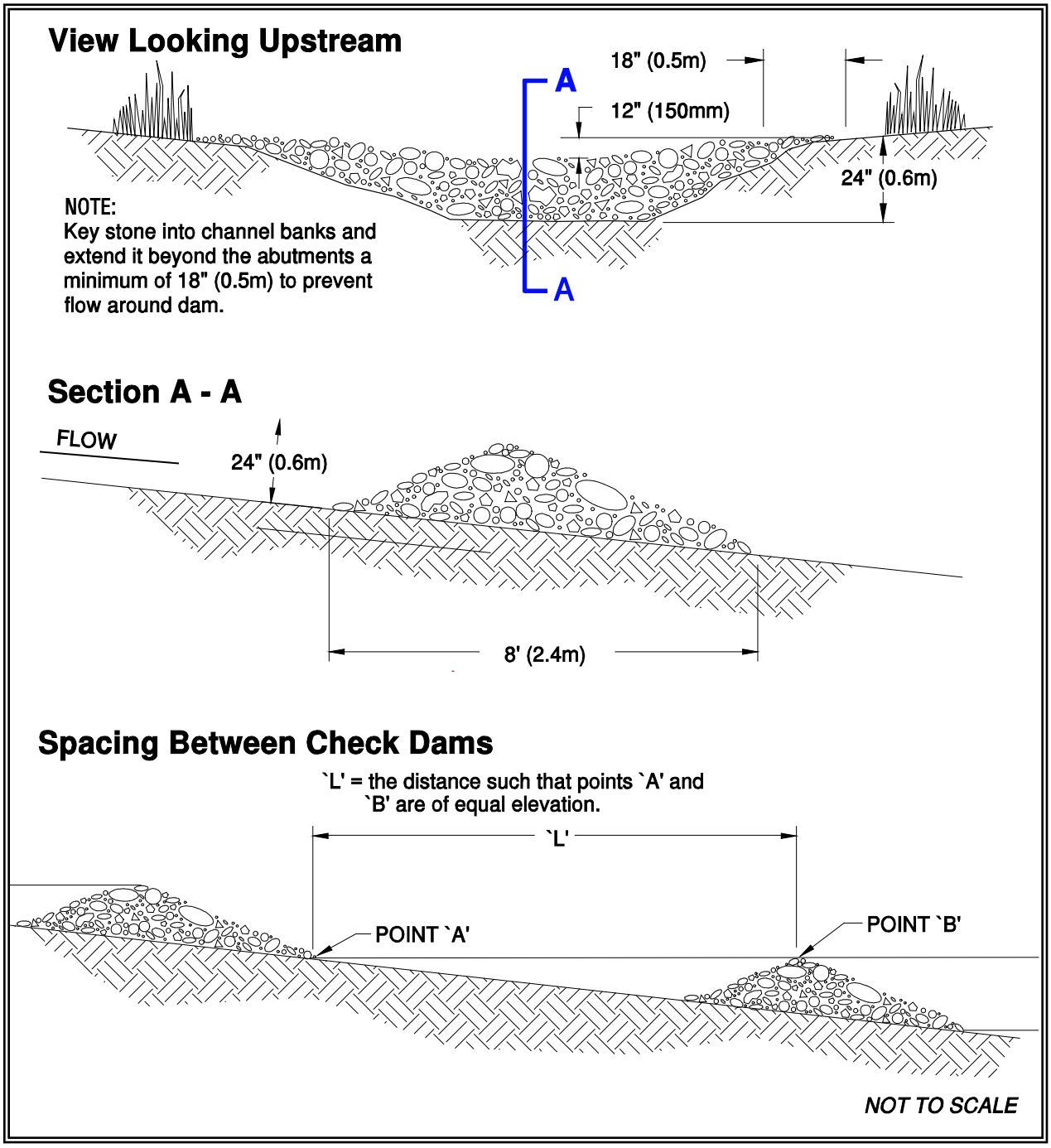


Figure 4.2.7 – Rock Check Dam

BMP C208: Triangular Silt Dike (TSD) (Geotextile-Encased Check Dam)

Purpose

Triangular silt dikes may be used as check dams, for perimeter protection, for temporary soil stockpile protection, for drop inlet protection, or as a temporary interceptor dike.

Conditions of use

- May be used on soil or pavement with adhesive or staples.
- TSDs have been used to build temporary:
  1. sediment ponds;
  2. diversion ditches;
  3. concrete wash out facilities;
  4. curbing;
  5. water bars;
  6. level spreaders; and,
  7. berms.

Design and Installation Specifications

Made of urethane foam sewn into a woven geosynthetic fabric.

It is triangular, 10 inches to 14 inches high in the center, with a 20-inch to 28-inch base. A 2–foot apron extends beyond both sides of the triangle along its standard section of 7 feet. A sleeve at one end allows attachment of additional sections as needed.

- Install with ends curved up to prevent water from flowing around the ends.
- The fabric flaps and check dam units are attached to the ground with wire staples. Wire staples should be No. 11 gauge wire and should be 200 mm to 300 mm in length.
- When multiple units are installed, the sleeve of fabric at the end of the unit shall overlap the abutting unit and be stapled.
- Check dams should be located and installed as soon as construction will allow.
- Check dams should be placed perpendicular to the flow of water.
- When used as check dams, the leading edge must be secured with rocks, sandbags, or a small key slot and staples.
- In the case of grass-lined ditches and swales, check dams and accumulated sediment shall be removed when the grass has matured sufficiently to protect the ditch or swale unless the slope of the swale is greater than 4 percent. The area beneath the check dams shall be seeded and mulched immediately after dam removal.

Maintenance

- Triangular silt dams shall be inspected for performance and sediment

Standards

accumulation during and after each runoff producing rainfall. Sediment shall be removed when it reaches one half the height of the dam.

- Anticipate submergence and deposition above the triangular silt dam and erosion from high flows around the edges of the dam. Immediately repair any damage or any undercutting of the dam.

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of use

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1–foot above the maximum tailwater elevation or 1-foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.

- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulic Manual, available through WSDOT Engineering Publications).
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following guidelines shall be used for riprap outlet protection:
    1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
    2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 48-inch riprap. Minimum thickness is 2 feet.
    3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.

- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. This work may require a HPA. See Volume V for more information on outfall system design.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C220: Storm Drain Inlet Protection

Purpose

Storm drain inlet protection prevents coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area.

Conditions of Use

Use storm drain inlet protection at inlets that are operational before permanent stabilization of the disturbed drainage area. Provide protection for all storm drain inlets downslope and within 500 feet of a disturbed or construction area, unless conveying runoff entering catch basins to a sediment pond or trap.

Also consider inlet protection for lawn and yard drains on new home construction. These small and numerous drains coupled with lack of gutters in new home construction can add significant amounts of sediment into the roof drain system. If possible delay installing lawn and yard drains until just before landscaping or cap these drains to prevent sediment from entering the system until completion of landscaping. Provide 18-inches of sod around each finished lawn and yard drain.

Table 4.2.2 lists several options for inlet protection. All of the methods for storm drain inlet protection tend to plug and require a high frequency of maintenance. Limit drainage areas to one acre or less. Possibly provide emergency overflows with additional end-of-pipe treatment where stormwater ponding would cause a hazard.

Table 4.2.2
Storm Drain Inlet Protection

Type of Inlet Protection	Emergency Overflow	Applicable for Paved/ Earthen Surfaces	Conditions of Use
Drop Inlet Protection			
Excavated drop inlet protection	Yes, temporary flooding will occur	Earthen	Applicable for heavy flows. Easy to maintain. Large area Requirement: 30' X 30'/acre
Block and gravel drop inlet protection	Yes	Paved or Earthen	Applicable for heavy concentrated flows. Will not pond.
Gravel and wire drop inlet protection	No		Applicable for heavy concentrated flows. Will pond. Can withstand traffic.
Catch basin filters	Yes	Paved or Earthen	Frequent maintenance required.
Curb Inlet Protection			
Curb inlet protection with a wooden weir	Small capacity overflow	Paved	Used for sturdy, more compact installation.
Block and gravel curb inlet protection	Yes	Paved	Sturdy, but limited filtration.
Culvert Inlet Protection			
Culvert inlet sediment trap			18 month expected life.

Design and Installation Specifications

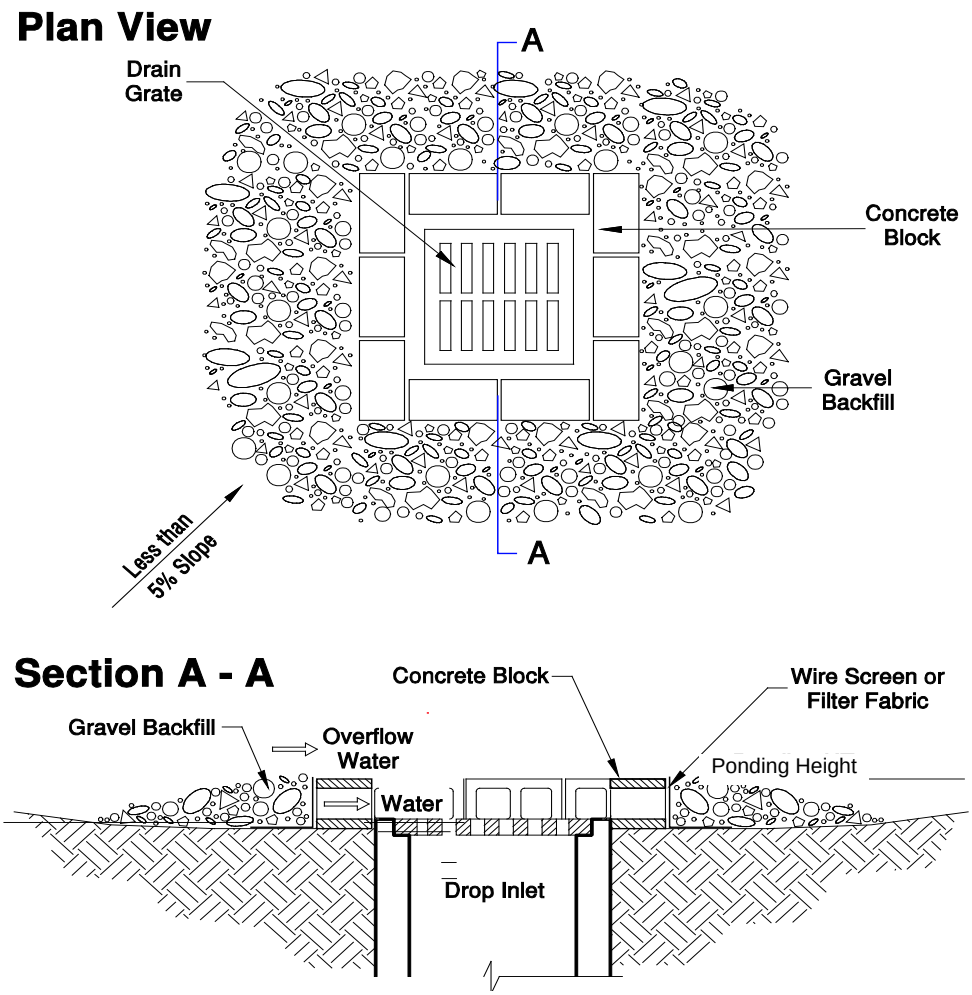
Excavated Drop Inlet Protection - An excavated impoundment around the storm drain. Sediment settles out of the stormwater prior to entering the storm drain.

- Provide a depth of 1-2 ft as measured from the crest of the inlet structure.
- Slope sides of excavation no steeper than 2H:1V.
- Minimum volume of excavation 35 cubic yards.
- Shape basin to fit site with longest dimension oriented toward the longest inflow area.
- Install provisions for draining to prevent standing water problems.
- Clear the area of all debris.
- Grade the approach to the inlet uniformly.
- Drill weep holes into the side of the inlet.
- Protect weep holes with screen wire and washed aggregate.
- Seal weep holes when removing structure and stabilizing area.

- Build a temporary dike, if necessary, to the down slope side of the structure to prevent bypass flow.

Block and Gravel Filter - A barrier formed around the storm drain inlet with standard concrete blocks and gravel. See Figure 4.2.8.

- Provide a height of 1 to 2 feet above inlet.
- Recess the first row 2-inches into the ground for stability.
- Support subsequent courses by placing a 2x4 through the block opening.
- Do not use mortar.
- Lay some blocks in the bottom row on their side for dewatering the pool.
- Place hardware cloth or comparable wire mesh with ½-inch openings over all block openings.
- Place gravel just below the top of blocks on slopes of 2H:1V or flatter.
- An alternative design is a gravel donut.
- Provide an inlet slope of 3H:1V.
- Provide an outlet slope of 2H:1V.
- Provide a1-foot wide level stone area between the structure and the inlet.
- Use inlet slope stones 3 inches in diameter or larger.
- Use gravel ½- to ¾-inch at a minimum thickness of 1-foot for the outlet slope.



Notes:
1. Drop inlet sediment barriers are to be used for small, nearly level drainage areas. (less than 5%)
2. Excavate a basin of sufficient size adjacent to the drop inlet.
3. The top of the structure (ponding height) must be well below the ground elevation downslope to prevent runoff from bypassing the inlet. A temporary dike may be necessary on the downslope side of the structure.

Figure 4.2.8 – Block and Gravel Filter

Gravel and Wire Mesh Filter - A gravel barrier placed over the top of the inlet. This structure does not provide an overflow.

- Use a hardware cloth or comparable wire mesh with ½-inch openings.
- Use coarse aggregate.
- Provide a height 1-foot or more, 18-inches wider than inlet on all sides.
- Place wire mesh over the drop inlet so that the wire extends a minimum of 1-foot beyond each side of the inlet structure.
- Overlap the strips if more than one strip of mesh is necessary.

- Place coarse aggregate over the wire mesh.
- Provide at least a 12-inch depth of gravel over the entire inlet opening and extend at least 18-inches on all sides.

Catchbasin Filters – Use inserts designed by manufacturers for construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which may be daily for heavy sediment loads. To reduce maintenance requirements combine a catchbasin filter with another type of inlet protection. This type of inlet protection provides flow bypass without overflow and therefore may be a better method for inlets located along active rights-of-way.

- Provides 5 cubic feet of storage.
- Requires dewatering provisions.
- Provides a high-flow bypass that will not clog under normal use at a construction site.
- Insert the catchbasin filter in the catchbasin just below the grating.

Curb Inlet Protection with Wooden Weir – Barrier formed around a curb inlet with a wooden frame and gravel.

- Use wire mesh with ½-inch openings.
- Use extra strength filter cloth.
- Construct a frame.
- Attach the wire and filter fabric to the frame.
- Pile coarse washed aggregate against wire/fabric.
- Place weight on frame anchors.

Block and Gravel Curb Inlet Protection – Barrier formed around a curb inlet with concrete blocks and gravel. See Figure 4.2.9.

- Use wire mesh with ½-inch openings.
- Place two concrete blocks on their sides abutting the curb at either side of the inlet opening. These are spacer blocks.
- Place a 2x4 stud through the outer holes of each spacer block to align the front blocks.
- Place blocks on their sides across the front of the inlet and abutting the spacer blocks.
- Place wire mesh over the outside vertical face.
- Pile coarse aggregate against the wire to the top of the barrier.

Curb and Gutter Sediment Barrier – Sandbag or rock berm (riprap and aggregate) 3 feet high and 3 feet wide in a horseshoe shape. See Figure 4.2.10.

- Construct a horseshoe shaped berm, faced with coarse aggregate if using riprap, 3 feet high and 3 feet wide, at least 2 feet from the inlet.
- Construct a horseshoe shaped sedimentation trap on the outside of the berm sized to sediment trap standards for protecting a culvert inlet.

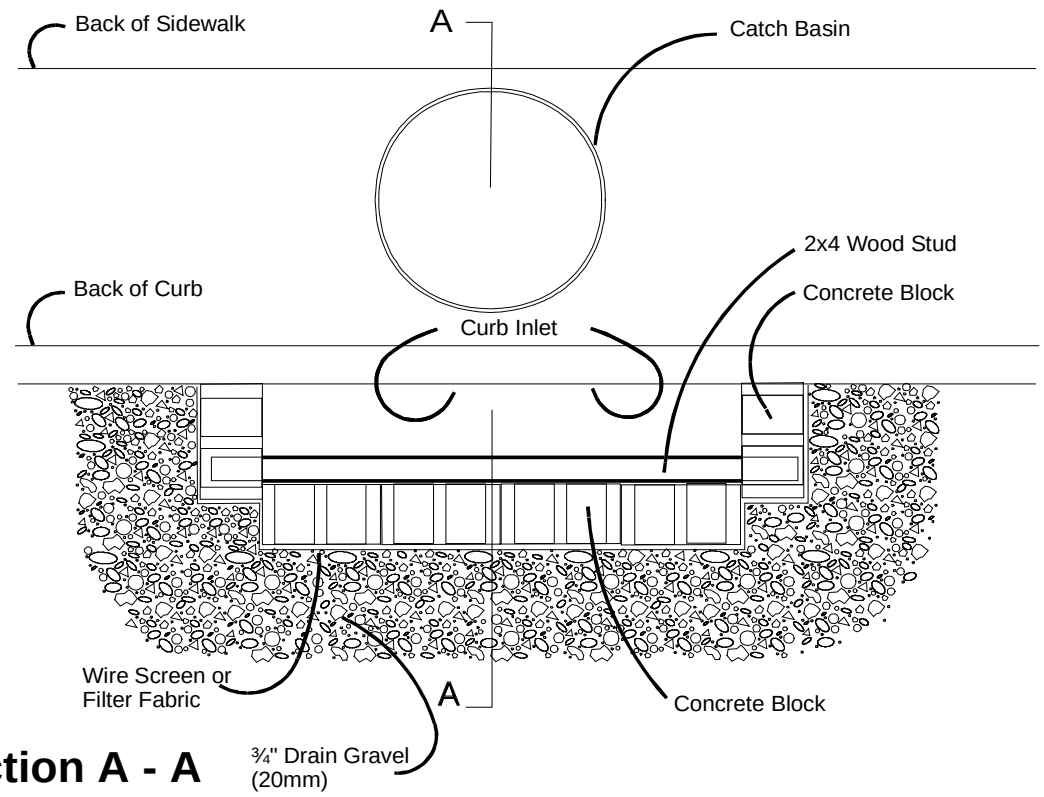
Maintenance Standards

- Inspect catch basin filters frequently, especially after storm events. Clean and replace clogged inserts. For systems with clogged stone filters: pull away the stones from the inlet and clean or replace. An alternative approach would be to use the clogged stone as fill and put fresh stone around the inlet.
- Do not wash sediment into storm drains while cleaning. Spread all excavated material evenly over the surrounding land area or stockpile and stabilize as appropriate.

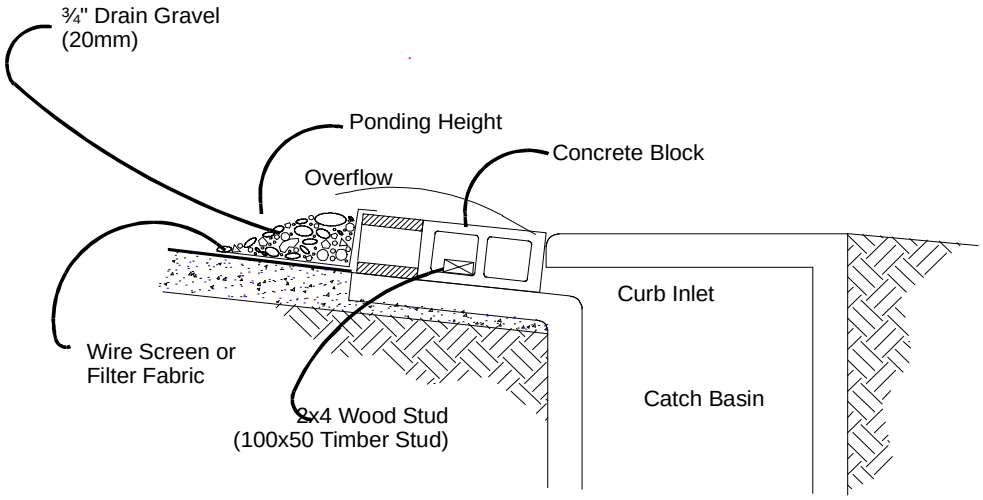
Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C220. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

Plan View

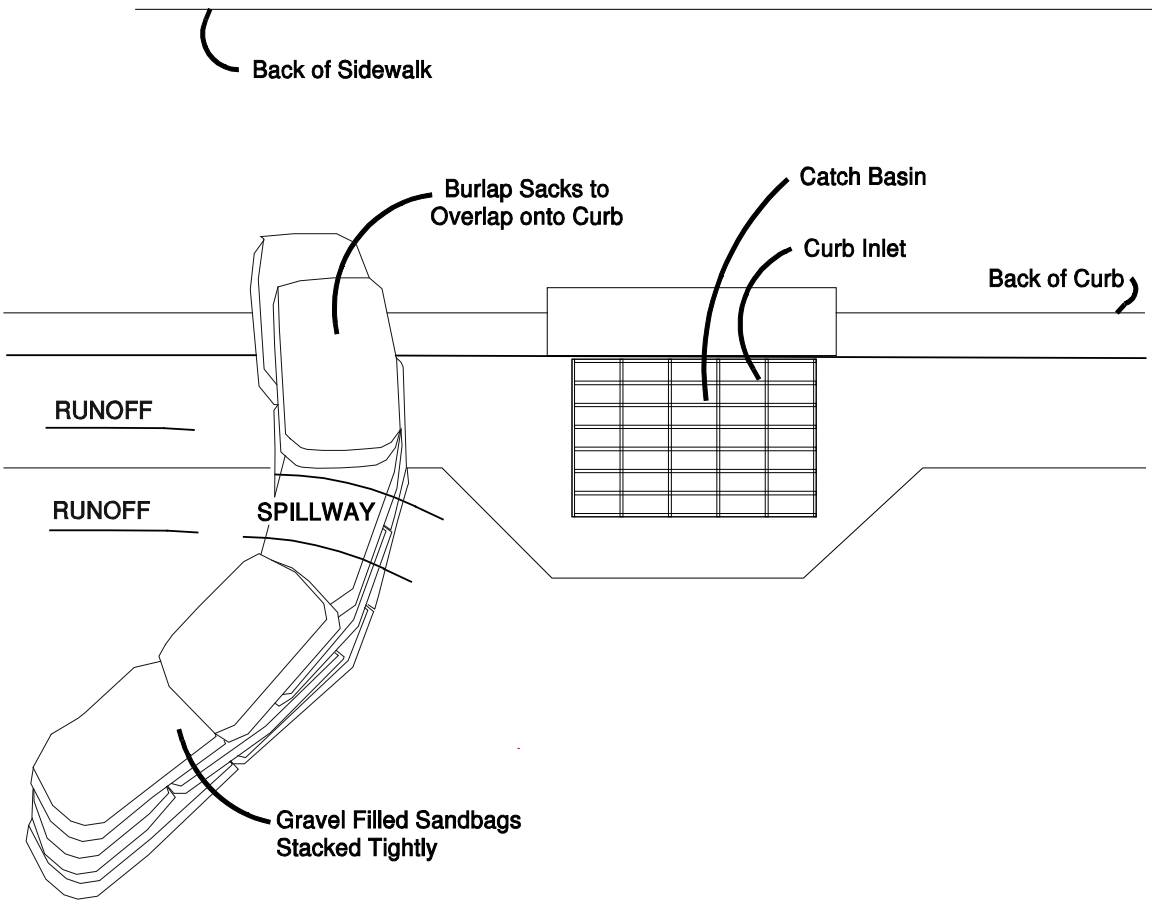


Section A - A



NOTES:
1. Use block and gravel type sediment barrier when curb inlet is located in gently sloping street segment, where water can pond and allow sediment to separate from runoff.
2. Barrier shall allow for overflow from severe storm event.
3. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

Figure 4.2.9 – Block and Gravel Curb Inlet Protection



NOTES:
1. Place curb type sediment barriers on gently sloping street segments, where water can pond and allow sediment to separate from runoff.
2. Sandbags of either burlap or woven `geotextile' fabric, are filled with gravel, layered and packed tightly.
3. Leave a one sandbag gap in the top row to provide a spillway for overflow.
4. Inspect barriers and remove sediment after each storm event. Sediment and gravel must be removed from the traveled way immediately.

Figure 4.2.10 – Curb and Gutter Barrier

BMP C231: Brush Barrier

Purpose

The purpose of brush barriers is to reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Brush barriers may be used downslope of all disturbed areas of less than one-quarter acre.
- Brush barriers are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a brush barrier, rather than by a sediment pond, is when the area draining to the barrier is small.
- Brush barriers should only be installed on contours.

Design and Installation Specifications

- Height 2 feet (minimum) to 5 feet (maximum).
- Width 5 feet at base (minimum) to 15 feet (maximum).
- Filter fabric (geotextile) may be anchored over the brush berm to enhance the filtration ability of the barrier. Ten-ounce burlap is an adequate alternative to filter fabric.
- Chipped site vegetation, composted mulch, or wood-based mulch (hog fuel) can be used to construct brush barriers.
- A 100 percent biodegradable installation can be constructed using 10-ounce burlap held in place by wooden stakes. Figure 4.2.11 depicts a typical brush barrier.

Maintenance Standards

- There shall be no signs of erosion or concentrated runoff under or around the barrier. If concentrated flows are bypassing the barrier, it must be expanded or augmented by toed-in filter fabric.
- The dimensions of the barrier must be maintained.

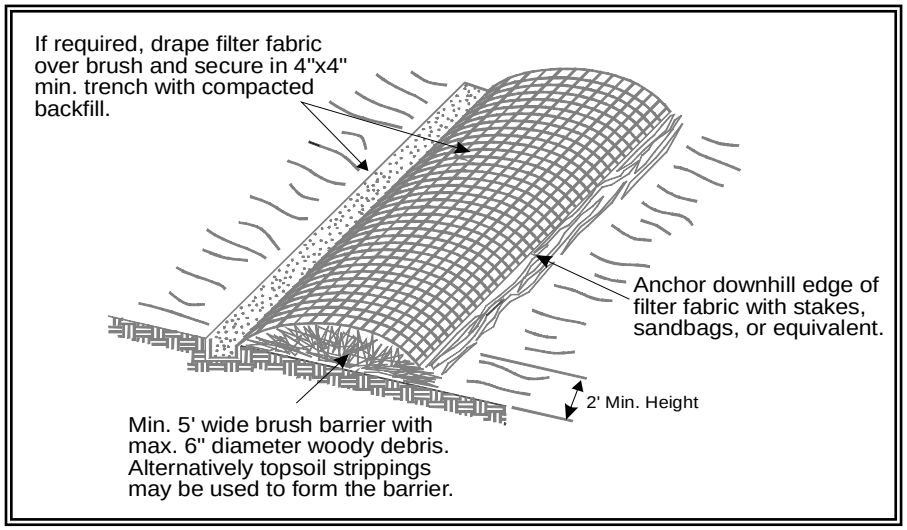


Figure 4.2.11 – Brush Barrier

BMP C232: Gravel Filter Berm

Purpose

A gravel filter berm is constructed on rights-of-way or traffic areas within a construction site to retain sediment by using a filter berm of gravel or crushed rock.

Conditions of Use

Where a temporary measure is needed to retain sediment from rights-of-way or in traffic areas on construction sites.

Design and Installation Specifications

- Berm material shall be ¾ to 3 inches in size, washed well-grade gravel or crushed rock with less than 5 percent fines.
- Spacing of berms:
  - Every 300 feet on slopes less than 5 percent
  - Every 200 feet on slopes between 5 percent and 10 percent
  - Every 100 feet on slopes greater than 10 percent
- Berm dimensions:
  - 1 foot high with 3H:1V side slopes
  - 8 linear feet per 1 cfs runoff based on the 10-year, 24-hour design storm

Maintenance Standards

- Regular inspection is required. Sediment shall be removed and filter material replaced as needed.

BMP C233: Silt Fence

Purpose

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 4.2.12 for details on silt fence construction.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.
- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Convey any concentrated flows through the drainage system to a sediment pond.
- Do not construct silt fences in streams or use in V-shaped ditches. Silt fences do not provide an adequate method of silt control for anything deeper than sheet or overland flow.

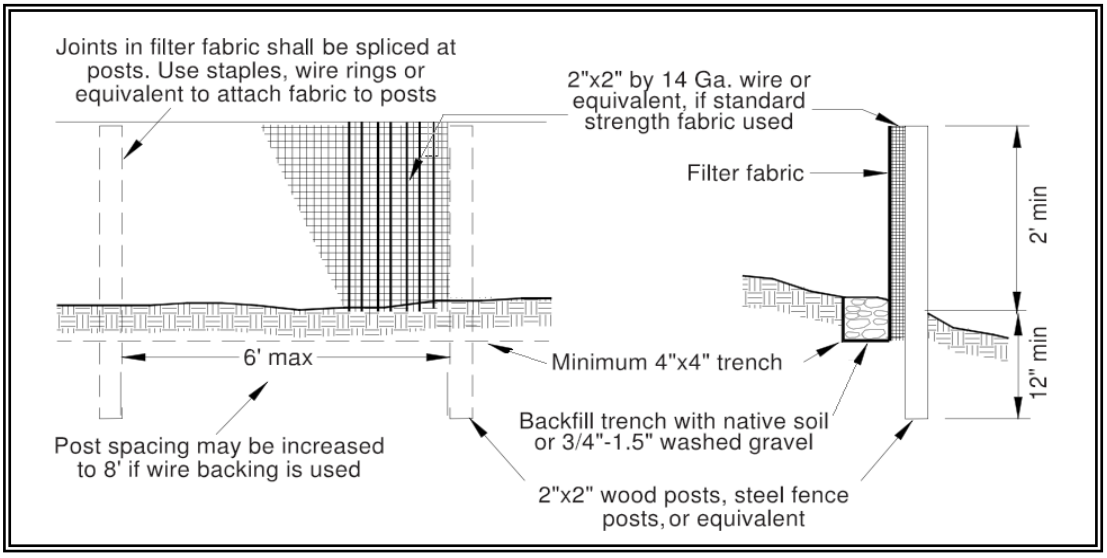


Figure 4.2.12 – Silt Fence

Design and Installation Specifications

- Use in combination with sediment basins or other BMPs.
- Maximum slope steepness (normal (perpendicular) to fence line) 1H:1V.
- Maximum sheet or overland flow path length to the fence of 100 feet.
- Do not allow flows greater than 0.5 cfs.
- The geotextile used shall meet the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table 4.2.3):

Table 4.2.3
Geotextile Standards

Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film woven (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Support standard strength fabrics with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the

fabric. Silt fence materials are available that have synthetic mesh backing attached.

- Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F. to 120°F.
- One-hundred percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by local regulations.
- Refer to Figure 4.2.12 for standard silt fence details. Include the following standard Notes for silt fence on construction plans and specifications:

  1. The contractor shall install and maintain temporary silt fences at the locations shown in the Plans.
  2. Construct silt fences in areas of clearing, grading, or drainage prior to starting those activities.
  3. The silt fence shall have a 2-feet min. and a 2½-feet max. height above the original ground surface.
  4. The filter fabric shall be sewn together at the point of manufacture to form filter fabric lengths as required. Locate all sewn seams at support posts. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.
  5. Attach the filter fabric on the up-slope side of the posts and secure with staples, wire, or in accordance with the manufacturer's recommendations. Attach the filter fabric to the posts in a manner that reduces the potential for tearing.
  6. Support the filter fabric with wire or plastic mesh, dependent on the properties of the geotextile selected for use. If wire or plastic mesh is used, fasten the mesh securely to the up-slope side of the posts with the filter fabric up-slope of the mesh.
  7. Mesh support, if used, shall consist of steel wire with a maximum mesh spacing of 2-inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to the same level of ultraviolet radiation as the filter fabric it supports.
  8. Bury the bottom of the filter fabric 4-inches min. below the ground surface. Backfill and tamp soil in place over the buried portion of the filter fabric, so that no flow can pass beneath the fence and

scouring cannot occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the ground 3-inches min.

9. Drive or place the fence posts into the ground 18-inches min. A 12–inch min. depth is allowed if topsoil or other soft subgrade soil is not present and 18-inches cannot be reached. Increase fence post min. depths by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.
10. Use wood, steel or equivalent posts. The spacing of the support posts shall be a maximum of 6-feet. Posts shall consist of either:
    - Wood with dimensions of 2-inches by 2-inches wide min. and a 3-feet min. length. Wood posts shall be free of defects such as knots, splits, or gouges.
    - No. 6 steel rebar or larger.
    - ASTM A 120 steel pipe with a minimum diameter of 1-inch.
    - U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft.
    - Other steel posts having equivalent strength and bending resistance to the post sizes listed above.
11. Locate silt fences on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.
12. If the fence must cross contours, with the exception of the ends of the fence, place gravel check dams perpendicular to the back of the fence to minimize concentrated flow and erosion. The slope of the fence line where contours must be crossed shall not be steeper than 3H:1V.
    - Gravel check dams shall be approximately 1-foot deep at the back of the fence. Gravel check dams shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence.
    - Gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. Gravel check dams shall be located every 10 feet along the fence where the fence must cross contours.

- Refer to Figure 4.2.13 for slicing method details. Silt fence installation using the slicing method specifications:

1. The base of both end posts must be at least 2- to 4-inches above the top of the filter fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.
2. Install posts 3- to 4-feet apart in critical retention areas and 6- to 7-feet apart in standard applications.
3. Install posts 24-inches deep on the downstream side of the silt fence, and as close as possible to the filter fabric, enabling posts to support the filter fabric from upstream water pressure.
4. Install posts with the nipples facing away from the filter fabric.
5. Attach the filter fabric to each post with three ties, all spaced within the top 8-inches of the filter fabric. Attach each tie diagonally 45 degrees through the filter fabric, with each puncture at least 1-inch vertically apart. Each tie should be positioned to hang on a post nipple when tightening to prevent sagging.
6. Wrap approximately 6-inches of fabric around the end posts and secure with 3 ties.
7. No more than 24-inches of a 36-inch filter fabric is allowed above ground level.

   Compact the soil immediately next to the filter fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips. Check and correct the silt fence installation for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

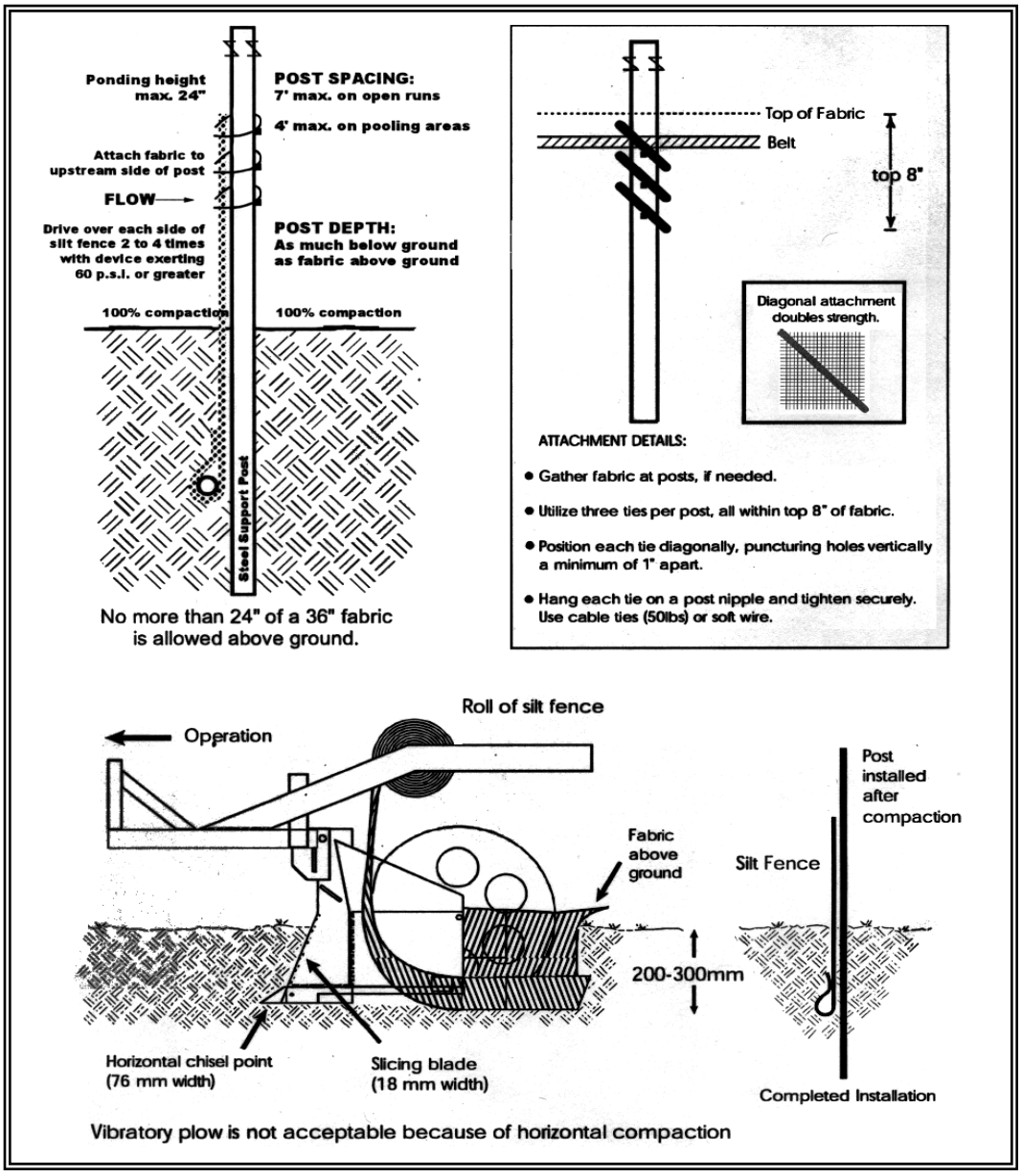


Figure 4.2.13 – Silt Fence Installation by Slicing Method

Maintenance Standards

- Repair any damage immediately.
- Intercept and convey all evident concentrated flows uphill of the silt fence to a sediment pond.
- Check the uphill side of the fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence or remove the trapped sediment.

- Remove sediment deposits when the deposit reaches approximately one-third the height of the silt fence, or install a second silt fence.
- Replace filter fabric that has deteriorated due to ultraviolet breakdown.

BMP C234: Vegetated Strip

Purpose

Vegetated strips reduce the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow.

Conditions of Use

- Vegetated strips may be used downslope of all disturbed areas.
- Vegetated strips are not intended to treat concentrated flows, nor are they intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a strip, rather than by a sediment pond, is when the following criteria are met (see Table 4.2.4):

Table 4.2.4
Contributing Drainage Area for Vegetated Strips

Average Contributing area Slope	Average Contributing area Percent Slope	Max Contributing area Flowpath Length
1.5H:1V or flatter	67% or flatter	100 feet
2H:1V or flatter	50% or flatter	115 feet
4H:1V or flatter	25% or flatter	150 feet
6H:1V or flatter	16.7% or flatter	200 feet
10H:1V or flatter	10% or flatter	250 feet

Design and Installation Specifications

- The vegetated strip shall consist of a minimum of a 25-foot flowpath length continuous strip of dense vegetation with topsoil. Grass-covered, landscaped areas are generally not adequate because the volume of sediment overwhelms the grass. Ideally, vegetated strips shall consist of undisturbed native growth with a well-developed soil that allows for infiltration of runoff.
- The slope within the strip shall not exceed 4H:1V.
- The uphill boundary of the vegetated strip shall be delineated with clearing limits.

Maintenance Standards

- Any areas damaged by erosion or construction activity shall be seeded immediately and protected by mulch.
- If more than 5 feet of the original vegetated strip width has had vegetation removed or is being eroded, sod must be installed.
- If there are indications that concentrated flows are traveling across the buffer, surface water controls must be installed to reduce the flows

entering the buffer, or additional perimeter protection must be installed.

BMP C235: Wattles

Purpose

Wattles are temporary erosion and sediment control barriers consisting of straw, compost, or other material that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. Wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.2.14 for typical construction details. WSDOT Standard Plan I-30.30-00 also provides information on Wattles (http://www.wsdot.wa.gov/Design/Standards/Plans.htm#SectionI)

Conditions of Use

- Use wattles:
  - In disturbed areas that require immediate erosion protection.
  - On exposed soils during the period of short construction delays, or over winter months.
  - On slopes requiring stabilization until permanent vegetation can be established.
- The material used dictates the effectiveness period of the wattle. Generally, Wattles are typically effective for one to two seasons.
- Prevent rilling beneath wattles by properly entrenching and abutting wattles together to prevent water from passing between them.

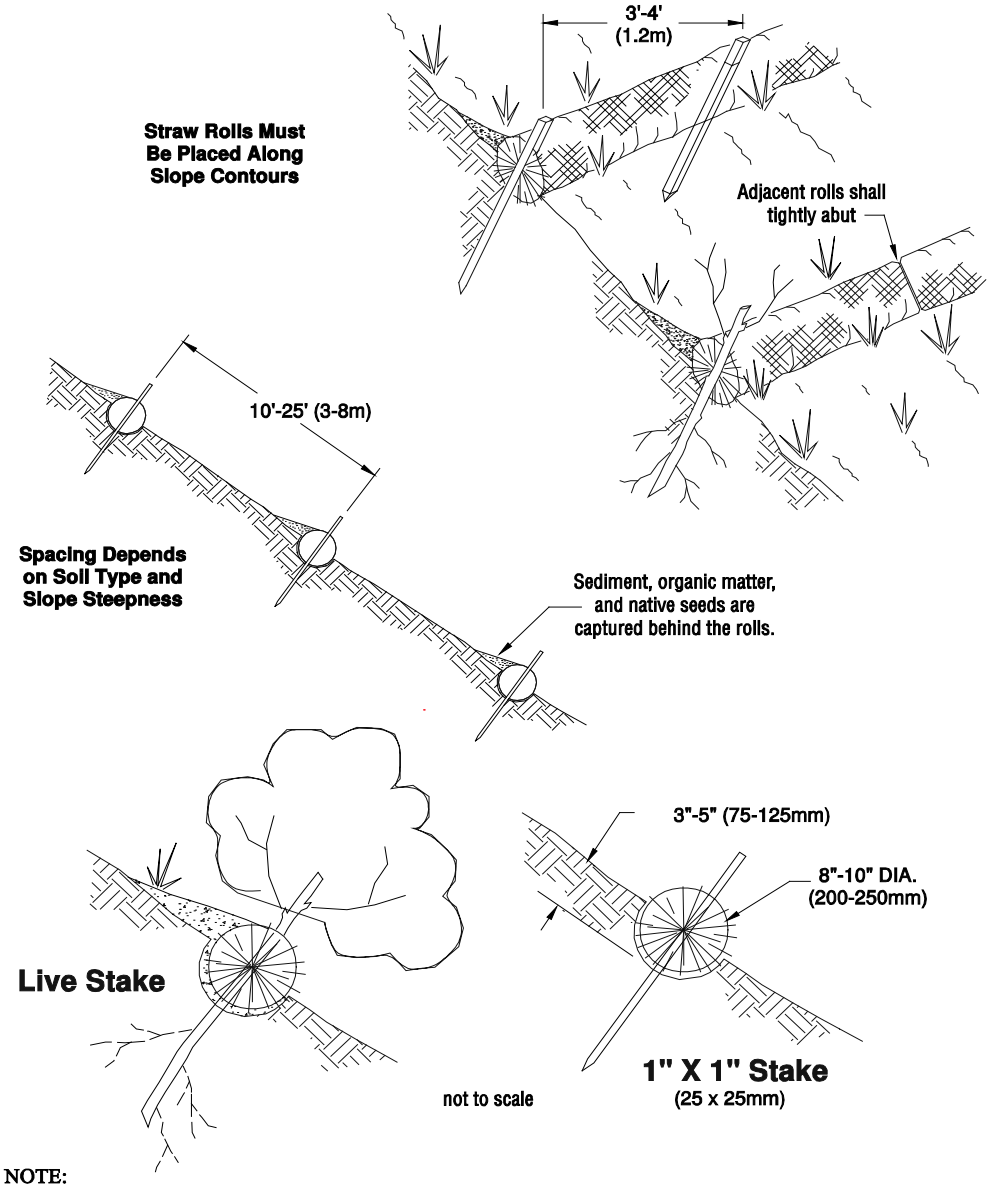
Design Criteria

- Install wattles perpendicular to the flow direction and parallel to the slope contour.
- Narrow trenches should be dug across the slope on contour to a depth of 3- to 5-inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5- to 7- inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Spread excavated material evenly along the uphill slope and compacted using hand tamping or other methods.
- Construct trenches at intervals of 10- to 25-feet depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and abut tightly end to end. Do not overlap the ends.
- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.

- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- Wooden stakes should be approximately 3/4 x 3/4 x 24 inches min. Willow cuttings or 3/8-inch rebar can also be used for stakes.
- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.



NOTE:
1. Straw roll installation requires the placement and secure staking of the roll in a trench, 3"-5" (75-125mm) deep, dug on contour. runoff must not be allowed to run under or around roll.

Figure 4.2.14 – Wattles

- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

Approved as Equivalent

Ecology has approved products as able to meet the requirements of BMP C235. The products did not pass through the Technology Assessment Protocol – Ecology (TAPE) process. Local jurisdictions may choose not to accept this product approved as equivalent, or may require additional testing prior to consideration for local use. The products are available for review on Ecology's website at http://www.ecy.wa.gov/programs/wq/stormwater/newtech/equivalent.html

BMP C236: Vegetative Filtration

Purpose

Vegetative Filtration may be used in conjunction with BMP C241 Temporary Sediment Ponds, BMP C206 Level Spreader and a pumping system with surface intake to improve turbidity levels of stormwater discharges by filtering through existing vegetation where undisturbed forest floor duff layer or established lawn with thatch layer are present. Vegetative Filtration can also be used to infiltrate dewatering waste from foundations, vaults, and trenches as long as runoff does not occur.

Conditions of Use

- For every five acre of disturbed soil use one acre of grass field, farm pasture, or wooded area. Reduce or increase this area depending on project size, ground water table height, and other site conditions.
- Wetlands shall not be used for filtration.
- Do not use this BMP in areas with a high ground water table, or in areas that will have a high seasonal ground water table during the use of this BMP.
- This BMP may be less effective on soils that prevent the infiltration of the water, such as hard till.
- Using other effective source control measures throughout a construction site will prevent the generation of additional highly turbid water and may reduce the time period or area need for this BMP.
- Stop distributing water into the vegetated area if standing water or erosion results.

Design Criteria

- Find land adjacent to the project that has a vegetated field, preferably a farm field, or wooded area.
- If the project site does not contain enough vegetated field area consider obtaining permission from adjacent landowners (especially for farm fields).
- Install a pump and downstream distribution manifold depending on the project size. Generally, the main distribution line should reach 100 to 200-feet long (many large projects, or projects on tight soil, will

require systems that reach several thousand feet long with numerous branch lines off of the main distribution line).

- The manifold should have several valves, allowing for control over the distribution area in the field.
- Install several branches of 4” schedule 20, swaged-fit common septic tight-lined sewer line, or 6” fire hose, which can convey the turbid water out to various sections of the field. See Figure 4.2.15.
- Determine the branch length based on the field area geography and number of branches. Typically, branches stretch from 200-feet to several thousand feet. Always, lay branches on contour with the slope.
- On uneven ground, sprinklers perform well. Space sprinkler heads so that spray patterns do not overlap.
- On relatively even surfaces, a level spreader using 4-inch perforated pipe may be used as an alternative option to the sprinkler head setup. Install drain pipe at the highest point on the field and at various lower elevations to ensure full coverage of the filtration area. Pipe should be place with the holes up to allow for a gentle weeping of stormwater evenly out all holes. Leveling the pipe by staking and using sandbags may be required.
- To prevent the over saturation of the field area, rotate the use of branches or spray heads. Do this as needed based on monitoring the spray field.
- Monitor the spray field on a daily basis to ensure that over saturation of any portion of the field doesn’t occur at any time. The presence of standing puddles of water or creation of concentrated flows visually signify that over saturation of the field has occurred.
- Since the operator is handling contaminated water, physically monitor the vegetated spray field all the way down to the nearest surface water, or furthest spray area, to ensure that the water has not caused overland or concentrated flows, and has not created erosion around the spray nozzle.
- Monitoring usually needs to take place 3-5 times per day to ensure sheet-flow into state waters. Do not exceed water quality standards for turbidity.
- Ecology strongly recommends that a separate inspection log be developed, maintained and kept with the existing site logbook to aid the operator conducting inspections. This separate “Field Filtration Logbook” can also aid the facility in demonstrating compliance with permit conditions.

Maintenance Standards

- Inspect the spray nozzles daily, at a minimum, for leaks and plugging from sediment particles.

- If erosion, concentrated flows, or over saturation of the field occurs, rotate the use of branches or spray heads or move the branches to a new field location.
- Check all branches and the manifold for unintended leaks.

Flowpath Guidelines for Vegetative Filtration		
Average Slope	Average Area % Slope	Estimated Flowpath Length (ft)
1.5H:1V	67%	250
2H:1V	50%	200
4H:1V	25%	150
6H:1V	16.7%	115
10H:1V	10%	100



Figure 4.2.15 – Manifold and Braches in a wooded, vegetated spray field

APPENDIX C – Soils Report

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, Inc.
• BECAUSE RESULTS MATTER •

January 22, 2026

Alex Holtze
ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501

Re: 5th Ave Townhomes Soils Report for Design Infiltration Rates
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001

Dear Mr. Holtze:

At your request, I have prepared this soils report. A site visit was performed on 12/12/25 to assess site conditions.

The subject site consists of an undeveloped lot in a mostly cleared area of a residential area. The lot is located on the west side of 5th Avenue SW.

The site topography is generally sloping from the west to east. The property is bordered on all sides by residential lots. The approximately 1.69 acre (Per Thurston County Assessor data) property is vegetated with grass, shrubs and a few trees.

The United States Natural Resource Conservation Service maps the soils in the area as Kapowsin silt loam. These soils are listed as Type D soils.

Groundwater was in one of the test pits.

The existing tributary offsite Stormwater generally sheet flows onto the site on the northern portion of the property. The stormwater then drains through the property and discharges via sheet flow on the southwestern portion of the parcel. The project is located in an aquifer recharge area and a wellhead protection area as defined by the Thurston County Health Department, the EPA or by the county. There are no known ravines, or wetlands located on the site. There are no known basin plans for the area. Refer to the attachments for applicable Soils Maps.

The Washington Geologic Information Portal lists the onsite soils as the following:

Geologic Unit Label: Qgd

Geologic Age: Quaternary (Pleistocene)

Lithology: Pleistocene continental glacial drift

Geologic Unit Description: Pleistocene till and outwash clay, silt, sand, gravel, cobbles, and boulders deposited by or originating from continental glaciers; locally includes peat, nonglacial sediments, modified land, and artificial fill.

There were two test pits dug and three small pit infiltration test dug onsite to determine soil infiltration feasibility. It appeared to have soils consistent with Kapowsin silt loam. There were three soil sieve test performed at the bottom of each of the small pit infiltration test locations. Each of the tests revealed similar soils shown to be SM - Silty Sand with Gravel down to approximately 42". Below this level to approximately 5' is fractured weathered basalt. Ground water was observed in the lower test pit located in the flow line of the natural grade in the weathered basalt. It appeared to be flowing quickly.

On 12/12/26 The there small pit infiltration tests were performed per Thurston County Surface Water Design Manual.

Small Pit Test 1: The measured infiltration rate was 12.00 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 4.8 inches per hour.

Small Pit Test 2: The measured infiltration rate was 33 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 13.2 inches per hour.

Small Pit Test 3: The measured infiltration rate was 3.20 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 1.28 inches per hour

Re: 5th Ave Townhomes Soils Report for Design Infiltration Rates
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001
January 22, 2026

As a result of the above tests we recommend using a design infiltration rate of 4.8 in/hr for the onsite bioretention pond and 1.28 in/hr for the frontage bioretention pond.

Once again, thank you for the opportunity to work with you on this project. Please feel free to give me a call if you have any questions.

Sincerely,

The Land Developer, Inc.



Erik B. Ainsworth, PE
President



Attachments:
SCS Soils Map
Site plan with soil logs
Sieve Report

Soil Map—Thurston County Area, Washington



Map Scale: 1:1,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Thurston County Area, Washington
Survey Area Data: Version 18, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

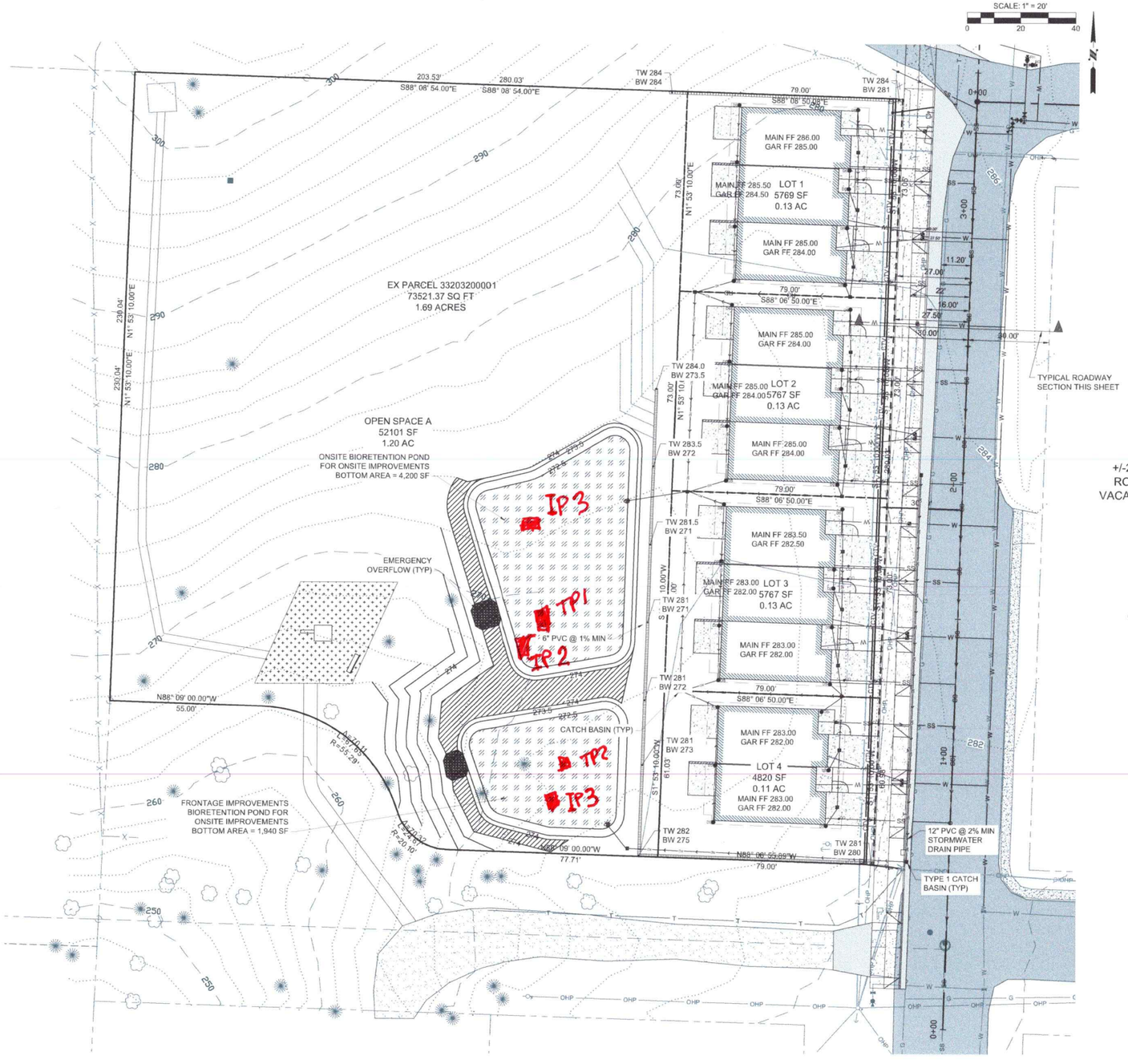
Date(s) aerial images were photographed: Jul 31, 2022—Aug 14, 2023

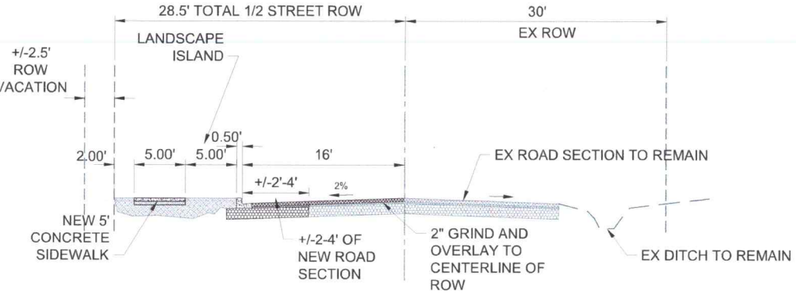
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
39	Giles silt loam, 3 to 15 percent slopes	0.2	1.7%
52	Kapowsin silt loam, 15 to 30 percent slopes	13.5	98.3%
Totals for Area of Interest		**13.7**	**100.0%**

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
at division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW.
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

STATE OF WASHINGTON
ERIK A. BRANDT
18284
REGISTERED
PROFESSIONAL ENGINEER
9/24/2026

REVISIONS: DATE:

5TH AVE TOWNHOMES

GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
S 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 2
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date Started: 11AM		
Weather: Overcast	Date Completed: 12:00PM		
	Date Backfilled: YES		
	Groundwater Depth: None observed	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	3			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
5					Brown Medium Dense fractured weathered basalt			
					End test pit @ 5 ft, No groundwater observed			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- ☒ Bulk/ Bag Sample
- Stabllized Ground water
- Groundwater At time of Drilling

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 1
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date Started: 11AM		
Weather: Overcast	Date Completed: 12:00PM		
	Date Backfilled: YES		
	Groundwater Depth: Observed @ 42"	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	1			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
	▼				Brown Medium Dense fractured weathered basalt GROUNDWATER FLOWING THROUGH FRACTURED ROCK			
5					End test pit @ 5 ft, groundwater observed @ 42"			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- Bulk/ Bag Sample
- Stabllized Ground water
- Groundwater At time of Drilling

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP2 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1009	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

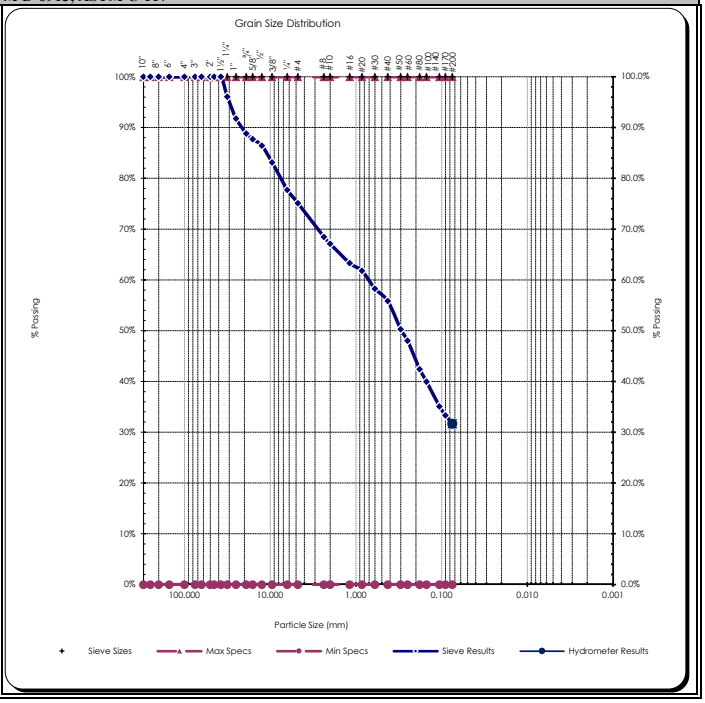
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	24.9%	Coeff. of Curvature, C_C = 0.29
$D_{(10)}$ =	0.024	mm	% Sand =	43.4%	Coeff. of Uniformity, C_U = 30.55
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.7%	Fineness Modulus = 2.73
$D_{(30)}$ =	0.071	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.294	mm	Plasticity Index =	n/a	Moisture %, as sampled = 19.6%
$D_{(60)}$ =	0.723	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	21.372	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	21/37		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50		96%	100.0%	0.0%
1.00"	25.00	92%	92%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	86%	86%	100.0%	0.0%
3/8"	9.50	83%	83%	100.0%	0.0%
1/4"	6.30		78%	100.0%	0.0%
#4	4.75	75%	75%	100.0%	0.0%
#8	2.36	68%	68%	100.0%	0.0%
#10	2.00	67%	67%	100.0%	0.0%
#16	1.18		63%	100.0%	0.0%
#20	0.850	62%	62%	100.0%	0.0%
#30	0.600		58%	100.0%	0.0%
#40	0.425	56%	56%	100.0%	0.0%
#50	0.300		50%	100.0%	0.0%
#60	0.250	48%	48%	100.0%	0.0%
#80	0.180	42%	42%	100.0%	0.0%
#100	0.150	40%	40%	100.0%	0.0%
#140	0.106		35%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.7%	31.7%	100.0%	0.0%

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All results apply only to actual locations and materials tested. MTC uses the simple acceptance/simple rejection decision rule to determine in-tolerance and out-of-tolerance or pass/fail comply (yes/no) conditions, and no measurement of uncertainty is applied in this determination. As a mutual protection to clients, the public, and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions, or extracts from or regarding our reports is reserved pending our written approval.

Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP3 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1010	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

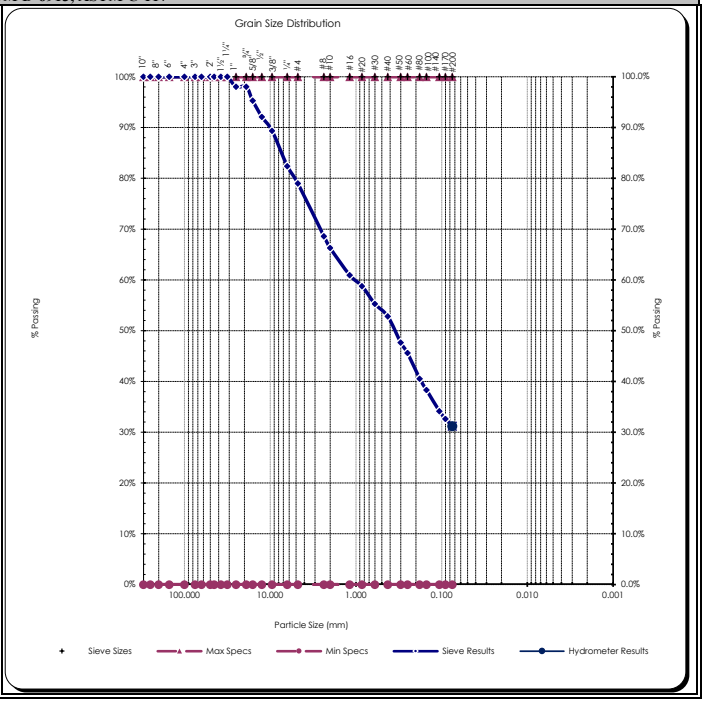
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	21.0%	Coeff. of Curvature, C_C = 0.21
$D_{(10)}$ =	0.024	mm	% Sand =	47.8%	Coeff. of Uniformity, C_U = 43.13
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.2%	Fineness Modulus = 2.63
$D_{(30)}$ =	0.072	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.357	mm	Plasticity Index =	n/a	Moisture %, as sampled = 21.0%
$D_{(60)}$ =	1.037	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	10.200	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	13/22		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	98%	98%	100.0%	0.0%
3/4"	19.00	98%	98%	100.0%	0.0%
5/8"	16.00		95%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	89%	89%	100.0%	0.0%
1/4"	6.30		82%	100.0%	0.0%
#4	4.75	79%	79%	100.0%	0.0%
#8	2.36	69%	69%	100.0%	0.0%
#10	2.00	66%	66%	100.0%	0.0%
#16	1.18		61%	100.0%	0.0%
#20	0.850	59%	59%	100.0%	0.0%
#30	0.600		55%	100.0%	0.0%
#40	0.425	53%	53%	100.0%	0.0%
#50	0.300		48%	100.0%	0.0%
#60	0.250	46%	46%	100.0%	0.0%
#80	0.180	41%	41%	100.0%	0.0%
#100	0.150	38%	38%	100.0%	0.0%
#140	0.106		34%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.2%	31.2%	100.0%	0.0%

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All results apply only to actual locations and materials tested. MTC uses the simple acceptance/simple rejection decision rule to determine in-tolerance and out-of-tolerance or pass/fail comply (yes/no) conditions, and no measurement of uncertainty is applied in this determination. As a mutual protection to clients, the public, and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions, or extracts from or regarding our reports is reserved pending our written approval.

Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP1 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1008	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

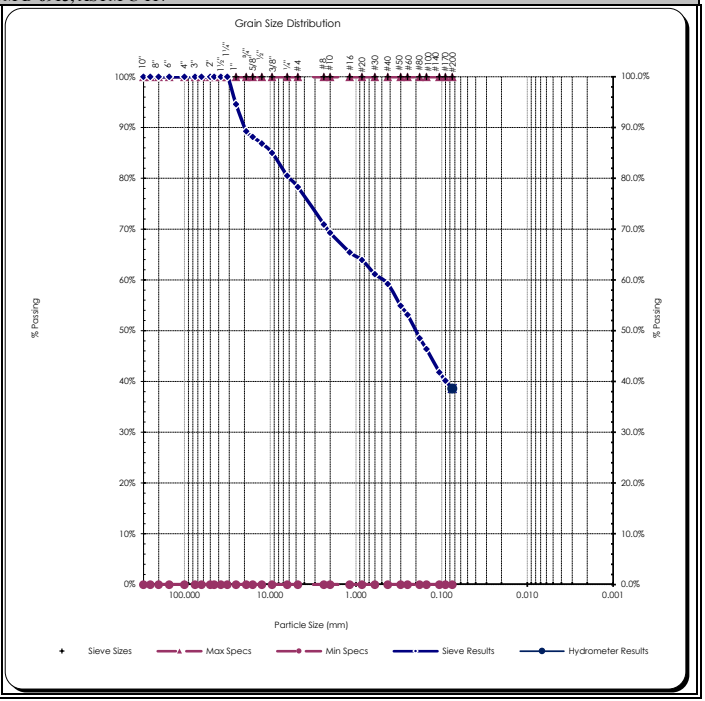
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.010	mm	% Gravel =	21.7%	Coeff. of Curvature, C_C = 0.35
$D_{(10)}$ =	0.019	mm	% Sand =	39.7%	Coeff. of Uniformity, C_U = 25.51
$D_{(15)}$ =	0.029	mm	% Silt & Clay =	38.6%	Fineness Modulus = 2.49
$D_{(30)}$ =	0.058	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.202	mm	Plasticity Index =	n/a	Moisture %, as sampled = 22.2%
$D_{(60)}$ =	0.496	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	19.810	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	58/89		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	95%	95%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	87%	87%	100.0%	0.0%
3/8"	9.50	85%	85%	100.0%	0.0%
1/4"	6.30		80%	100.0%	0.0%
#4	4.75	78%	78%	100.0%	0.0%
#8	2.36	71%	71%	100.0%	0.0%
#10	2.00	69%	69%	100.0%	0.0%
#16	1.18		65%	100.0%	0.0%
#20	0.850	64%	64%	100.0%	0.0%
#30	0.600		61%	100.0%	0.0%
#40	0.425	59%	59%	100.0%	0.0%
#50	0.300		55%	100.0%	0.0%
#60	0.250	53%	53%	100.0%	0.0%
#80	0.180	49%	49%	100.0%	0.0%
#100	0.150	46%	46%	100.0%	0.0%
#140	0.106		42%	100.0%	0.0%
#170	0.090		40%	100.0%	0.0%
#200	0.075	38.6%	38.6%	100.0%	0.0%

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All results apply only to actual locations and materials tested. MTC uses the simple acceptance/simple rejection decision rule to determine in-tolerance and out-of-tolerance or pass/fail comply (yes/no) conditions, and no measurement of uncertainty is applied in this determination. As a mutual protection to clients, the public, and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions, or extracts from or regarding our reports is reserved pending our written approval.

Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

PIT TEST 1		
AVERAGE INF RATE:	0.200	IN/MIN
	12.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	4.8	IN/HR

PIT TEST 2		
AVERAGE INF RATE:	0.550	IN/MIN
	33.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	13.2	IN/HR

PIT TEST 3		
AVERAGE INF RATE:	0.053	IN/MIN
	3.20	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	1.28	IN/HR

APPENDIX D – Maintenance and Source Control Manual

HOMEOWNER'S STORMWATER MAINTENANCE PLAN

of

5th Ave Townhomes Plat
585 5th Ave SW
Tumwater, WA 98512

for

ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501
aholtze@gmail.com

by

THE LAND DEVELOPER'S
ENGINEERED SOLUTION
A Division of THE LAND DEVELOPER, Inc.

Erik B. Ainsworth, PE
PO Box 4420
Tumwater, WA 98501
(360) 250-3973

January 23, 2026

TABLE OF CONTENTS

I. STORMWATER MAINTENANCE PLAN 3
II. Best Management Practices for Commercial Property 11

I. STORMWATER MAINTENANCE PLAN

TABLE OF CONTENTS

I. STORMWATER FACILITY MAINTENANCE GUIDE 5

Introduction 5
- What Is Stormwater Runoff? 5
- What Is a Storm Drain System and How Does It Work? 5
- What Does Stormwater Runoff Have to Do With Water Quality? 5
- Stormwater Facilities 5
- Who Is Responsible for Maintaining Stormwater Facilities? 5
- How to Use the Stormwater Facility Maintenance Guide? 6
- Included in This Guide 6

Your Stormwater Facilities 6
Facility Key 6
Site Plan 7
Quick List 8
Maintenance Checklists 9
- Infiltration Trench 9

Resource Listing 9
Log Sheet 10

II. Best Management Practices for SFR's 17

I. STORMWATER FACILITY MAINTENANCE GUIDE

Introduction

What Is Stormwater Runoff?

When urban and suburban development covers the land with buildings, streets and parking lots, much of the native topsoil, duff, trees, shrubs and grass are replaced by asphalt and concrete. Rainfall that would have soaked directly into the ground instead stays on the surface as *stormwater runoff* making its way into storm drains (including man-made pipes, ditches or swale networks), stormwater ponds, surface and groundwater and, eventually, to Puget Sound.

What Is a Storm Drain System and How Does It Work?

The storm drain system for most developments includes measures to *carry, store, cleanse and release* the stormwater. Components work together to reduce the impacts of development on the environment. Impacts can include *flooding* that results in property damage and blocked emergency routes, *erosion* that can cause damage to salmon spawning habitat and *pollution* that harms fish and/or drinking water supplies.

The storm drain system provides a safe method to carry stormwater to the treatment and storage area. Swales and ponds filter pollutants from the stormwater by *physically* settling out particles, *chemically* binding pollutants to pond sediments and *biologically* converting pollutants to less harmful compounds. Ponds also store treated water, releasing it gradually to a nearby stream or to groundwater.

What Does Stormwater Runoff Have to Do With Water Quality?

Stormwater runoff must be treated because it carries litter, oil, gasoline, fertilizers, pesticides, pet wastes, sediments and anything else that can float, dissolve or be swept along by moving water. Left untreated, polluted stormwater can reach nearby waterways where it can harm and even kill aquatic life. It can also pollute groundwater to the extent that it requires treatment before it is suitable for drinking. Nationally, stormwater is recognized as a major threat to water quality. Remember to keep everything out of stormwater systems except the rainwater they are designed to collect.

What Types of Stormwater Facilities Are There?

Different types of ponds are designed for different purposes. For example, wet ponds primarily provide treatment of stormwater. Dry ponds or infiltration ponds are designed to provide storage for stormwater and allow for its gradual release downstream or into the ground. Roof infiltration trenches serve in infiltrate roof runoff directly into the ground reducing offsite stormwater discharges.

Who Is Responsible for Maintaining Stormwater Facilities?

All stormwater facilities require maintenance. Regular maintenance ensures proper functioning and preserves visual appeal. This Stormwater Facility Maintenance Guide was designed to explain

how stormwater facilities work and provide user-friendly, straightforward guidance on facility maintenance.

You are responsible for regularly maintaining privately owned ponds, catch basins, pipes and other drainage facilities on your property. Stormwater facilities located in public rights-of-way are maintained by local governments.

How to Use the Stormwater Facility Maintenance Guide

This Maintenance Guide includes a Site Plan specific to your development and a Facility Key that identifies the private stormwater facilities you are responsible for maintaining. A “Quick List” of maintenance activities has also been included to help you identify the more routine needs of your facility. Also included in this guide:

- Comprehensive Maintenance Checklists that provide specific details on required maintenance
- Pollution Prevention Tips that list ways to protect water quality and keep storm drain systems functioning smoothly
- Resources to provide more information and technical assistance

Your Stormwater Facilities

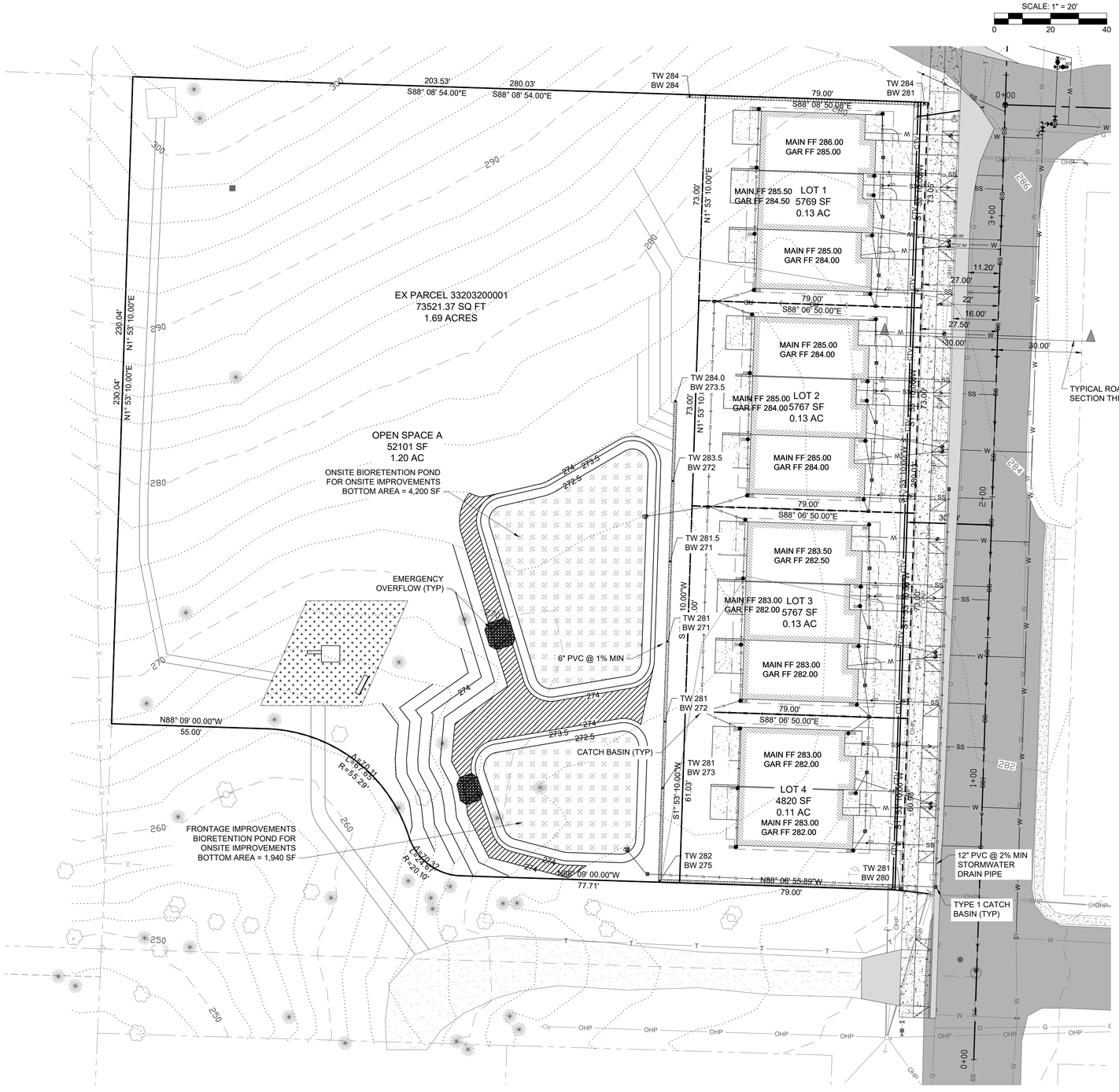
This section consists of two parts that are to be used together: the Facility Key and the Site Plan. Review the Site Plan and identify the numbers denoting a feature of the system. Then check the Facility Key for the feature type and checklist name.

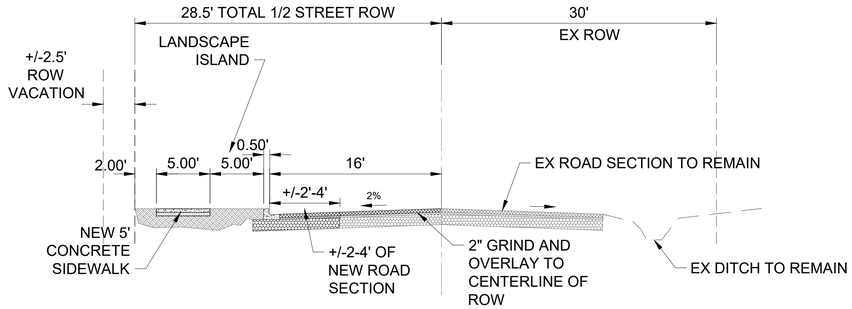
Facility Key

The stormwater facility in your neighborhood is composed of the following elements:

Type of Feature & Checklist Name	Location on Site Plan
Grounds & Landscaping	1
Bioretention Pond	2
Catch Basin	3
Conveyance System	4
Downspouts	5

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW.
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

REGISTERED PROFESSIONAL ENGINEER
ERIK B. ANDERSON
38284
STATE OF WASHINGTON
9/24/2025

REVISIONS: DATE:

5TH AVE TOWNHOMES

GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
S 58S S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

Quick List

The following is an abbreviated checklist of the most common types of maintenance required. Please go over this checklist after heavy rains. The list represents minimum maintenance to be performed and should be completed in conjunction with the other checklists for an effective maintenance program.

- ❑ Inspect catch basin grates to see that they are not clogged or broken. Remove twigs, leaves or other blockages.
- ❑ Inspect inlet and outlet pipes for blockages. Clear all blockages.
- ❑ Inspect Amended soil area and infiltration trench cleanouts.

Maintenance Checklists

The Maintenance Checklists in this packet are for your use when inspecting the stormwater facilities on your property. This packet has been customized so that only the checklists for your facilities are included. If you feel you are missing a checklist, or you have additional facilities not identified or addressed in this packet, please contact your local jurisdiction.

The checklists are in tabular format for ease of use. Each describes the area to inspect, inspection frequency, what to look for and what action to take. A log sheet is included toward the end of the chapter to help you track maintenance of your storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer, including:

- A flashlight
- A long pole or broom handle
- Some kind of pry bar or lifting tool for pulling manhole and grate covers
- Gloves

A resource list is included in the next chapter. There you will find the phone numbers of the agencies referenced in the tables, as well as the contractors and consultants who designed and constructed your facilities.



SAFETY WARNING: In keeping with OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a long pole or broom handle to check sediment depths in confined spaces. *NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF* THE *OPEN HOLE.*

Resource Listing

If you suspect a problem exists, please contact your local jurisdiction at one of the numbers below and ask for technical assistance.

CONTACT NUMBERS

Thurston County	(253) 798-7250
Washington State University (WSU) Cooperative Extension	(360) 786-5445

DEVELOPER INFORMATION

ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501
aholtze@gmail.com

ENGINEER'S INFORMATION

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of The Land Developer, LLC
PO Box 4420
Tumwater, WA 98501
(360) 250-3973

Table C-13. Maintenance Checklist for Catch Basins and Inlets

Frequency	Drainage Systems Feature	√	Problem	Conditions to Check For	Conditions that Shall Exist
M,S	General		Trash and Debris	Trash, debris, and sediment in or on basin	No trash or debris located immediately in front of catch basin opening. Grate is kept clean and allows water to enter.
M				Sediment or debris (in the basin) that exceeds 1/3 the depth from the bottom of basin to invert of the lowest pipe into or out of the basin.	No sediment or debris in the catch basin. Catch basin is dug out and clean.
M,S				Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
M			Structural Damage to Frame and/or Top Slab	Corner of frame extends more than 3/4 inch past curb face into the street (if applicable).	Frame is even with curb.
M				Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
M				Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
A			Cracks in Basin Walls/ Bottom	Cracks wider than 1/2 inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards. Contact a professional engineer for evaluation.
A				Cracks wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.

Frequency	Drainage Systems Feature	√	Problem	Conditions to Check For	Conditions that Shall Exist
A			Settlement/ Misalignment	Basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards. Contact a professional engineer for evaluation.
M			Vegetation	Vegetation growing across and blocking more than 10 percent of the basin opening.	No vegetation blocking opening to basin.
M			Vegetation	Vegetation growing in inlet/outlet pipe joints that is more than 6 inches tall and less than 6 inches apart.	No vegetation or root growth present.

If you are unsure whether a problem exists, please contact Tumwater and ask for technical assistance.

Key:
A = Annual (March or April preferred)
M = Monthly (see schedule)
S = After major storms

Table C-8. Maintenance Checklist for Compost Amended Soil for Post-Construction Soil Quality and Depth (BMP LID.02) and Compost-Amended Vegetated Filter Strip (BMP BF.06)

Frequency	Drainage Systems Feature	√	Problem	Conditions to Check For	Conditions that Shall Exist
A	General		Soil media (maintain high organic soil content	Vegetation not fully covering ground surface.	Re-mulch landscape beds with 2-3 inches of mulch until the vegetation fully closes over the ground surface
Ongoing				None. Preventative maintenance.	Return leaf fall and shredded woody materials from the landscape to the site as mulch.
Ongoing				None. Preventative maintenance.	On turf areas, “grasscycle” (mulch-mow or leave the clippings) to build turf health
Ongoing				None. Preventative maintenance.	Avoiding broadcast use of pesticides (bug and weed killers) like “weed & feed,” which damage the soil life.
A				None. Preventative maintenance.	Where fertilization is needed (mainly turf and annual flower beds), a moderate fertilization program which relies on natural organic fertilizers (like compost) or slow release synthetic balanced fertilizers.
A			Compaction	Soils become waterlogged, do not appear to be infiltrating.	To remediate, aerate soil, till or further amend soil. If drainage is still slow, consider investigating alternative causes (e.g., high wet-season groundwater levels, low permeability soils). Also consider land use and protection from compacting activities. If areas are turf, aerate compacted areas and top dress them with 1/4 to 1/2 inch of compost to renovate them.

Frequency	Drainage Systems Feature	√	Problem	Conditions to Check For	Conditions that Shall Exist
A			Erosion/scouring	Areas of potential erosion are visible.	Take steps to repair or prevent erosion. Identify and address the causes of erosion.
A			Grass/vegetation	Less than 75% of planted vegetation is healthy with a generally good appearance.	Take appropriate maintenance actions (e.g., remove/replace plants)
M			Noxious weeds	Listed noxious vegetation is present. See Pierce County noxious weed list.	By law, noxious weeds must be removed and disposed immediately. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.
Q			Weeds	Weeds are present.	Remove and dispose of weed material. It is strongly encouraged that herbicides and pesticides not be used in order to protect water quality.

If you are unsure whether a problem exists, please contact Tumwater and ask for technical assistance.

Key:
A = Annual (March or April preferred)
M = Monthly (see schedule)
S = After major storms.
Q = Quarterly

Table C-15. Maintenance Checklist for Fencing/Shrubbery Screen/Other Landscaping

Frequency	Drainage Systems Feature	√	Problem	Conditions to Check For	Conditions that Shall Exist
M	General		Missing or broken parts/dead shrubbery	Any defect in the fence or screen that permits easy entry to a facility.	Fence is mended or shrubs replaced to form a solid barrier to entry.
M,S			Erosion	Erosion has resulted in an opening under a fence that allows entry by people or pets.	Replace soil under fence so that no opening exceeds 4 inches in height.
M			Unruly Vegetation	Shrubbery is growing out of control or is infested with weeds.	Shrubbery is trimmed and weeded to provide appealing aesthetics. Do not use chemicals to control weeds.
A	Wire Fences		Damaged Parts	Posts out of plumb more than 6 inches.	Posts plumb to within 1.5 inches of plumb.
A				Top rails bent more than 6 inches.	Top rail free of bends greater than 1 inch.
A				Any part of fence (including posts, top rails, and fabric) more than 1 foot out of design alignment.	Fence is aligned and meets design standards.
A				Missing or loose tension wire.	Tension wire in place and holding fabric.
A				Missing or loose barbed wire that is sagging more than 2.5 inches between posts.	Barbed wire in place with less than 3/4 inch sag between posts.
A				Extension arm missing, broken, or bent out of shape more than 1.5 inches.	Extension arm in place with no bends larger than 3/4 inch.
A			Deteriorated Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.	Structurally adequate posts or parts with a uniform protective coating.
M			Openings in Fabric	Openings in fabric are such that an 8-inch diameter ball could fit through.	No openings in fabric.

If you are unsure whether a problem exists, please contact Tumwater and ask for technical assistance.

Key:
A = Annual (March or April preferred)
M = Monthly (see schedule)
S = After major storms

#36 – Maintenance Checklist for Downspout Full Infiltration Systems:

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Maintenance Frequency	Completed
Rock trench/well	Inflow disruption	Accumulated trash, debris, or sediment on drain rock surface impeding sheet flow into facility.	Sheet flow re-established. Material removed and disposed of in accordance with applicable solid waste requirements.		
Rock trench/well	Inflow disruption	Vegetation/moss present on drain rock surface impeding sheet flow into facility.	Material removed and sheet flow re-established.		
Rock trench/well	Inflow disruption	Water ponding at surface, or standing water in subgrade observation port.	Inflow to facility is consistent and no ponding is observed. Inlet piping is clear and/or rock or sand reservoirs have been replaced.		
Inlet/outlet pipe conveyance	Conveyance blockage	Accumulation of trash, debris, or sediment in roof drains, gutters, driveways drains, area drains, etc.	Conveyance systems are clear of debris and free-flowing.		
Inlet/outlet pipe conveyance	Conveyance blockage	Pipes to or from sump, trench, or drywell have accumulated sediment or is plugged.	Pipe systems are clear of debris and free-flowing.		
Inlet/outlet pipe conveyance	Conveyance damage	Pipes to or from sump, trench, or drywell is cracked, broken, or misaligned.	Pipe systems are undamaged and free-flowing.		
Roof downspout	Splash pad malfunction	Splash pad missing or damaged.	Splash pad installed and functioning correctly		
Storage sump	Sediment in sump	Excess sediment accumulate in sump.	Material removed and disposed of in accordance with applicable solid waste requirements.		
Storage sump	Access lid problems	Access lid cannot be opened or is missing.	Access lid is functioning as designed. Refer to record drawings to confirm type, function, and required components.		

#20 – Maintenance Checklist for Grounds (Landscaping):

Drainage System Feature	Defect or Problem	Condition When Maintenance Is Needed	Results Expected When Maintenance Is Performed	Maintenance Frequency	Completed
General	Weeds (nonpoisonous)	Weeds growing in more than 20 percent of the landscaped area (trees and shrubs only). See also Thurston County Noxious weeds list.	Weeds present in less than five percent of the landscaped area.		
General	Insect Hazard	Any presence of poison ivy or other poisonous vegetation or insect nests.	No poisonous vegetation or insect nests present in landscaped area.		
General	Trash or Litter	See Detention Ponds (Checklist #1).	See Detention Ponds (Checklist #1).		
General	Erosion of Ground Surface	Noticeable rills are seen in landscaped areas.	Causes of erosion are identified and steps taken to slow down/spread out the water. Eroded areas are filled, contoured, and seeded.		
Trees and shrubs	Damage	Limbs or parts of trees or shrubs that are split or broken which affect more than 25 percent of the total foliage of the tree or shrub.	Trim trees/shrubs to restore shape. Replace trees/shrubs with severe damage.		
Trees and shrubs	Damage	Trees or shrubs that have been blown down or knocked over.	Tree replanted, inspected for injury to stem or roots. Replace if severely damaged.		
Trees and shrubs	Damage	Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Stakes and rubber-coated ties placed around young trees/shrubs for support.		

Log Sheet

Use log sheets to track maintenance checks and what items, if any, are repaired or altered. Make copies of this page; use a fresh copy for each inspection. The completed sheets will serve as a record of maintenance activity and will provide valuable information about how your facilities are operating. Log sheets should be kept in a dry, readily accessible place.

INSPECTION DATE: _____

PERFORMED BY: _____

PHONE NUMBER: _____ **ADDRESS:** _____

POSITION ON HOA: _____ **CITY, ST ZIP:** _____

PART OF FACILITY INSPECTED	OBSERVATIONS (LIST REQUIRED MAINTENANCE ACTIVITIES)	ACTION TAKEN	DATE OF ACTION

II. Chapter 3 – Best Management Practices for SFR's

ATTACHMENT B

Permanent Pollution Source Control Program

Table of Contents

INTRODUCTION 1
ABOUT THIS MANUAL 1
BEST MANAGEMENT PRACTICES … WHAT ARE THEY? 1
WHAT'S IN THIS MANUAL? 2
GENERAL PRINCIPLES OF POLLUTION PREVENTION 3
BEST MANAGEMENT PRACTICES FOR SINGLE FAMILY RESIDENCES 7
1 AUTOMOBILE WASHING 8
2 AUTOMOBILE MAINTENANCE 9
3 STORAGE OF SOLID WASTES AND FOOD WASTES 10
4 COMPOSTING 11
5 YARD MAINTENANCE AND GARDENING 12
6 SWIMMING POOL AND SPA CLEANING AND MAINTENANCE 15
7 HOUSEHOLD HAZARDOUS MATERIAL USE, STORAGE AND DISPOSAL 16
8 PET WASTE MANAGEMENT 18
9 ON-SITE SEWAGE MAINTENANCE AND OPERATION 20
10 ACTIVITIES IN WETLANDS AND WETLANDS BUFFERS 22
11 ILLICIT DISCHARGE DETECTION AND ELIMINATION 23
12 QUICK REFERENCE PHONE NUMBERS AND WEB SITES 25

Introduction

ABOUT THIS MANUAL

Thurston County's water resources – its streams, lakes, wetlands, groundwater, and Puget Sound – play an important role in the quality of life we enjoy. They provide us with recreation and drinking water, support tourism and salmon and are used by industry. These waters, however, are vulnerable to pollution from a wide variety of human activities.

This manual applies to those residential properties and activities in unincorporated Thurston County that have the potential to contribute pollutants to stormwater runoff or directly to receiving waters. Stormwater runoff may seep into the ground, drain to a storm drain or a drainage ditch, or flow over the ground. Regardless of the way runoff leaves your site, it ends up in a stream river, lake, wetland, groundwater or Puget Sound.

Contaminated stormwater can negatively affect every water body it enters. Therefore, this manual provides detailed information on what you can do to reduce the contamination of surface water, groundwater, and stormwater from your property.

Many of our water pollution problems are due in large part to pollutants washed off the land by storms. The quality of "stormwater" from residential properties is an increasing concern nationwide. Many people believe that stormwater is "clean" and does not harm water quality. This perception is understandable since the amount of pollution from any one place is not usually significant by itself. But when all these small amounts are combined, they can cause significant pollution problems.

The federal Clean Water Act mandates that cities and counties control the quality of stormwater runoff. One way to achieve this is to implement pollution prevention measures on individual properties. By following the "Best Management Practices" described in this manual you can do your part to protect our streams, groundwater, and Puget Sound.

BEST MANAGEMENT PRACTICES … WHAT ARE THEY?

Best Management Practices (BMPs) are a set of activities designed to reduce stormwater pollution. BMPs are separated into two broad categories: *source control* and *treatment.*

Source Control BMPs

***Source control* BMPs** prevent contaminants from entering stormwater runoff by controlling them at the source. Some source control BMPs are operational, such as checking regularly for leaks and drips from equipment and vehicles, covering materials that have potential to add pollutants to surface water if rainwater comes in contact with the materials, cleaning up pet waste, and minimizing use of pesticides, fertilizers, and insecticides. Other source control BMPs require use of a structure to prevent rainwater

from contacting materials that will contaminate stormwater runoff such as provide a covered area or berm to prevent clean stormwater from entering work or storage areas.

Source control BMPs prevent contaminants from entering stormwater by controlling them at the source.

Treatment BMPs

In contrast, ***treatments* BMPs** are structures that treat stormwater to remove contaminants. Treatment BMPs typically require elaborate planning, design and construction. A stormwater pond for your subdivision is an example of a *treatment BMP*. No treatment BMP is capable of removing 100 percent of the contaminants in stormwater and the less contaminants in the stormwater prior to the treatment BMP, the more effective the BMP is.

Also remember that, just because there is a stormwater collection system where you live, it does not necessarily mean that the stormwater is treated. Many developments were created prior to requirements to treat stormwater. The runoff from your property may go directly or indirectly to a stream or wetland without any treatment.

Keep in mind that runoff from your property may go directly or indirectly to a stream or wetland without any treatment.

This manual will focus on *source control* BMPs applicable to the routine practices of most owners of a single family residence..

WHAT'S IN THIS MANUAL?

This manual has been developed for the owners of single family residences. If you are trying to get a building permit to construct a new home you may be required to submit a copy of this manual, or its equivalent as part of your permit application and then record it with the Thurston County Auditor's office prior to receiving final approval of your project.

The manual is divided into three sections as follows:

- **Introduction**
- **General Principles of Pollution Prevention**
- **Best Management Practices for Single-Family Residences**

The general principles and best management practices described are based on the requirements of the ***Thurston County Drainage Design and Erosion Control Manual***, Volume IV – *Source Control*.

General Principles of Pollution Prevention

There are 15 general principles of pollution prevention that every homeowner should consider.

This section describes simple pollution prevention principles that every homeowner should consider. Most of these are common sense, "housekeeping" types of solutions. With collective action by individuals throughout the county in implementing these principles, the improvement in water quality can be substantial. There are 15 general principles of pollution prevention.

1. Avoid the activity or reduce its occurrence

Avoid potentially polluting activity or do it less frequently, especially if it takes place outdoors. Apply lawn care chemicals following directions and only as needed. Do not apply herbicides right before it rains.

2. Move the activity indoors

Move a potentially polluting activity indoors out of the weather. This prevents runoff contamination and provides more control for a cleanup if a spill occurs. For example unload and store chemicals inside a garage area or shed instead of outside. Be safe and ensure any storage area is well ventilated and required building and fire code requirements are met.

3. Cleanup spills quickly

Promptly contain and cleanup solid and liquid pollutant leaks and spills on any exposed soil, vegetation, or paved area. Use readily available absorbents such as kitty litter to absorb spills and then sweep up the material and dispose of it in the garbage. Promptly repair or replace leaking connections, pipes, hoses, valves, etc. on vehicles and equipment you own.

4. Use less material

Don't buy or use more material than you really need. This not only helps keep potential disposal, storage and pollution problems to a minimum, but will probably save you money too.

5. Use the least toxic materials available

Investigate the use of materials that are less toxic. For example, replace a caustic-type detergent or solvent with a more environmentally friendly product. Even if you do switch to a biodegradable product, remember that only uncontaminated water is allowed to enter the stormwater drainage system.

Remember that only uncontaminated water is allowed to enter the stormwater drainage system.

6. Create and maintain vegetated areas near activity locations

Vegetation can filter pollutants out of stormwater. Route stormwater from parking and work areas through vegetated areas. Remember that wastewater other than stormwater runoff, such as wash water, must be discharged to a wastewater collection system (sewer or septic system), and may not be discharged to a storm drainage system.

7. Locate activities as far as possible from surface drainage paths

Activities located as far as possible from known drainage paths such as ditches, streams, other water bodies, and storm drains will be less likely to pollute, since it will take longer for material to reach the drainage features. This give more time to react to a spill, or if it is a "housekeeping" issue, may protect the local waters long enough for you to cleanup the area around the activity. Don't forget that groundwater protection is important throughout Thurston County, no matter where the activity is located, so the actions you take on a day-to-day basis area always important, even in dry weather.

Don't forget that groundwater protection is important throughout Thurston County.

8. Maintain stormwater drainage systems

Pollutants can concentrate over time in storm drainage facilities such as catch basins, ditches, and storm drains. When a large storm event occurs, turbulent runoff can mobilize these pollutants and carry them to receiving waters. By performing regular maintenance on stormwater facilities located on your property you can prevent this from occurring. Also repair or replace cracked or otherwise damaged pavement in parking areas and any other drainage areas that are subject to pollutant material leaks or spills.

9. Reduce, reuse, and recycle as much as possible

Look for ways to recycle instead of just disposing. This saves money and keeps hazardous and non-hazardous materials out of landfills. Contact the Thurston County Solid Waste Division at (360) 357-2491 for more information on recycling opportunities at the Thurston County Waste and Recover Center.

10. Be an advocate for stormwater pollution prevention

Help friends, neighbors, and business associates find ways to reduce stormwater pollution in their activities. Most people want clean water and do not pollute intentionally. Share your ideas and the BMPs in this manual to get them thinking about how their everyday activities affect water quality.

11. Report problems

We all must do our part to protect water, fish, wildlife, and our own health by implementing proper BMPs, and reporting water quality problems that we observe. In Thurston County, call the Storm and Surface Water Utility at (360) 867-2099 to report dumping to storm drains or ditches.

12. Provide oversight and training

Talk to the members of your family, or if you are a landlord talk to your tenants, to ensure they understand the pollution prevention source control measures and BMPs described in this manual. If you are a landlord monitor the activities of your tenants to ensure that they are carrying out the principles of this manual.

13. Dust control

Sweep paved parking and storage areas regularly to collect and dispose of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch or any receiving water (stream, wetland, lake, etc.). Do not use used oils or other petroleum products for dust control. Volumes of water used for light watering for dust control of dirt driveways or gravel roads should be conducted to prevent any runoff of stormwater from the surface.

Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch or any receiving water (stream, wetland, lake, etc.)

14. Eliminate illicit connections

A common problem with the stormwater drainage system for most communities is the existence of illicit connections of wastewater to the storm drainage system. Many businesses and residences have internal building drains, sump overflows, sump pumps, garage and outdoor sinks and showers, and even sanitary sewer and septic system pipes that were inadvertently connected to the nearby storm drainage system in the past.

Examine the plumbing system for your home to determine if illicit connections exist. Any time it is found that toilets, sinks, appliances, showers and bathtubs, floor drains, industrial process waters, and/or other indoor activities are connected to the stormwater drainage system; these connections must be immediately rerouted to the sanitary or septic system, holding tanks, or process treatment system. For assistance in methods to detect and eliminate illicit connections contact the Storm and Surface Water Utility at (360) 867-2099.

15. Dispose of waste properly

Every business and residence in Thurston County must dispose of solid and liquid wastes and contaminated stormwater properly. There are generally four options for disposal depending on the type of materials. These options include:

- Sanitary sewer and septic systems.
- Recycling facilities
- Municipal solid waste disposal facilities
- Hazardous waste treatment, storage and disposal facilities.

Every business and residence in Thurston County must dispose of solid and liquid wastes and contaminated stormwater properly.

Best Management Practices for Single Family Residences

Stormwater goes directly to our groundwater, lakes, streams and to Puget Sound. It does not go to the wastewater treatment plant.

The actions we take each day in and around our homes have a profound effect on surface water quality and fish habitat. Stormwater goes directly to our groundwater, lakes, streams, and to Puget Sound. It does not go to the wastewater treatment plant. Any pollutants that get into the stormwater go directly to surface or groundwater. Small amounts of pollution from many different sources can significantly affect our waterways. Stormwater BMPs discussed in this section are practical ways to keep stormwater from becoming polluted in the first place. It is recommended that all residents in Thurston County use these BMPs. **Please note that some of these procedures are required by various state, or county laws, and are noted as required BMPs.**

This section provides a general list of activities typically conducted by home owners and describes the BMPs that may be required or recommended to prevent stormwater pollution. The list includes brief information on applicability. More detailed information for the BMPs described in this section can be found in the Thurston County Drainage Design and Erosion Control Manual, Volume IV or by contacting the Thurston County Storm and Surface Water Utility at (360) 754-4681. BMPs for the following activities are described in this section:

1. ***Automobile Washing***
2. ***Automobile Maintenance***
3. ***Storage of Solid Wastes and Food Wastes***
4. ***Composting***
5. ***Yard Maintenance and Gardening***
6. ***Swimming Pool and Spa Cleaning and Maintenance***
7. ***Household Hazardous Material use, Storage and Disposal***
8. ***Pet Waste Management***
9. ***On-Site Sewage Maintenance and Operation***
10. ***Activities in Wetlands and Wetlands Buffers***
11. ***Illicit Discharge Detection and Elimination***

1
Automobile Washing

Many residents wash their cars in the driveway or on the street. Wash waters typically flow to a storm drain or ditch, which discharges stormwater directly to the underlying groundwater or to the nearest stream, lake, or Puget Sound. Soaps and detergents, even the biodegradable ones, can have immediate and long-term effects on aquatic life in water bodies. The grime washed off the car also contains a variety of pollutants that can harm fish and wildlife.

Suggested BMPs

At Home:

- Wash your car directly over your lawn or make sure the wash water drains to a vegetated area. This allows the water and soap to soak into the ground instead of running off into a local water body.

- Ideally, no soaps or detergents should be used, but if you do use one, select one without phosphates.

- Commercial products are available that allow you to clean a vehicle without water. These were developed for areas where water is scarce, so a water saving benefit is realized, as well as reduced pollution.

- Use a hose nozzle with a shut-off valve to save water.

- Do not wash your car if rain is expected.

- Pour the bucket of soapy, dirty wash water down your sink. This way the water doesn't pollute surface water. Instead, it's treated at the wastewater treatment plant or by your septic system.

Away from Home:

- Consider not washing your car at home. Take it to a commercial car wash that has a recycle system and discharges wastewater to the sanitary sewer for treatment.

2
Automobile Maintenance

Many of us are "weekend mechanics". We enjoy the cost savings of changing our own oil and antifreeze, topping off the battery with water, and generally making our car perform its' best. There is a lot of potential for stormwater pollution associated with these activities; however, the following BMPs will help you minimize pollution while servicing your car, truck, van, or RV.

Required BMPs

- Recycle all oils, antifreeze, solvents, and batteries. Many local car parts dealers and gas stations accept used oil and oil filters. The Household Hazardous Waste facilities at the Thurston County Waste and Recovery Center accept oil, oil filters, antifreeze, and solvents.

- Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a water body. Eventually, it will make its way to local surface waters or groundwater, including the water we drink.

- Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Always keep your wastes in separate containers which are properly labeled and store them out of the weather.

Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter…

Suggested BMPs

- Fix all leaks, to keep the leaky material off streets and out of surface water.

- To dispose of oil filters, punch a hole in the top and let drain for 24 hours. This is where a large funnel in the top of your oil storage container will come in handy. After draining, wrap in 2 layers of plastic and dispose of in your regular garbage or recycle by taking it to the Thurston County Waste and Waste and Recovery Center. Call the Thurston County Department of Public Works at (360) 867-2491 for up-to-date information on the appropriate disposal of consumer products.

- Use care in draining and collecting antifreeze to prevent accidental spills. Spilled antifreeze tastes sweet and can be deadly to animals that ingest it.

- Perform your service activities on concrete or asphalt or over a plastic tarpaulin to make spill cleanup easier. Keep a bag of kitty litter on hand to absorb spills. If there is a spill, sprinkle a good layer on the spill, let it absorb for a little while and then sweep it up. Place the

contaminated litter in a plastic bag, tie it up, and dispose of it in your regular garbage. Take care not to leave kitty litter out in the rain; it will form a sticky goop that is hard to clean up.

- If you are doing body work outside, be sure to use a tarpaulin to catch material resulting from grinding, sanding, and painting. Dispose of this waste by double bagging in plastic and placing in your garbage.

Spilled antifreeze tastes sweet and can be deadly to animals that ingest it.

3
Storage of Solid Wastes and Food Wastes

Improper storage of food and solid waste at residences can lead not only to water pollution problems, but problems with neighborhood pets and vermin as well. Following the BMPs listed below can help keep your property a clean and healthy place to live.

Suggested BMPs

- Recycle as much as you can. Most Thurston County residents have access to curbside pickup for yard waste and recyclable materials. Also, look under "recycling" in the phone book for firms which take other recyclables.

- All waste containers kept outside should have lids. If your lid is damaged, please call your local solid waste hauler to get the lid repaired or replaced. The Thurston County web site lists haulers for your neighborhood: http://www.co.thurston.wa.us/solidwaste/recycling/recycling-curbside.html

- Leaking waste containers should be replaced. If your container is damaged, please call your local solid waste hauler.

- Store waste containers under cover if possible, or on grassy areas.

- Inspect the storage area regularly to pick up loose scraps of material and dispose of them properly.

- Purchase products which have the least amount of packaging materials.

- Compost biodegradable materials such as grass clippings and vegetable scraps instead of throwing them away. Your flowerbeds will love the finished compost, and you'll be helping to conserve limited landfill space. Call Thurston County Department of Public Works at (360) 867-2491 for more information on composting or information on yard waste collections. See the section on composting for BMPs relating to that activity.

- A fun alternative to traditional composting is worm composting. You can let worms do all the work for you by keeping a small vermiculture box just outside your kitchen. For more information on getting started with worms, call the number listed above.

4
Composting

Composting is an earth-friendly activity as long as some common sense rules outlined below are followed. If you choose to compost, the following BMPs should be utilized. More information can be found on-line at: http://www.co.thurston.wa.us/solidwaste/organics/organics-home.htm

Suggested BMPs

- Compost piles must be located on an unpaved area where runoff can soak into the ground or be filtered by grass and other vegetation. Compost piles should be located in an area of your yard not prone to water ponding during storms, and should be kept well away from wetlands, streams, lakes, and other drainage paths.

- Compost piles must be maintained and turned over regularly to work properly. Large piles of unattended compost may create odor and vermin problems.

- Avoid putting hazardous, inorganic, plastics or metal waste in the pile.

- Cover the compost pile (See Figure) for two reasons:

    1. To keep stormwater from washing nutrients into waterways.
    2. To keep excess water from cooling the pile—this slows down the rate of decomposition.

- Build bins of wood, chicken wire, or fencing material to contain compost so it can't be washed away. You can purchase reduced price compost bins through Thurston County's web-site or find information on building your own bins. Call Thurston County Department of Public Works at (360) 867-2491 to get free composter designs and materials lists or see: http://www.co.thurston.wa.us/solidwaste/index.htm.

- Building a small earthen dike around your compost pile is an effective means of preventing nutrient-rich compost drainage from reaching stormwater paths.

Compost piles should be located in an area of your yard not prone to water ponding during storms, and should be kept well away from wetlands, streams, lakes and other drainage paths.

5
Yard Maintenance and Gardening

This section deals with the normal yard maintenance activities we all perform at our homes. Over watering, over fertilizing, improper herbicide application, and improper disposal of trimmings and clippings can all contribute to serious water pollution problems. Following the BMPs listed below will help alleviate pollutant runoff.

Required BMPs

- Follow the manufacturer's directions exactly for mixing and applying herbicides, fungicides, and pesticides, and use them sparingly. Never apply when it is windy or when rain is expected. Never apply over water, within 100 feet of a well-head, or adjacent to streams, wetlands, or other water bodies. Triple-rinse empty containers, using the rinsate for mixing your next batch of spray, and then double-bag and dispose of the empty container in your regular garbage. Never dispose of grass clippings or other vegetation in or near storm drains, streams, lakes, or Puget Sound.

Suggested BMPs

- Use natural, organic soil amendments when possible. The excellent soil conditioning properties of the organic matter aid water retention in lighter soils and help to break up and aerate heavier soils, so roots can grow better and less watering is needed. It contains both readily available and long term nitrogen and other nutrients commonly lacking in Northwest soils. The slow release of nitrogen better matches the needs of plants. Thus, there is much less potential for nitrates to leach into surface or groundwater due both to less “excess nitrogen” and less water use. Better vegetative growth can also reduce erosion and runoff.

Use natural, organic soil amendments when possible…The slow release of nitrogen better matches the needs of plants.

- Follow manufacturer's directions when applying fertilizers. More is not better, either for your lawn or for local water bodies. Never apply fertilizers over water or adjacent to ditches, streams, or other water bodies. Remember that organic fertilizers have a slow release of nitrogen, and less potential to pollute then synthetic fertilizers.

- Save water and prevent pollution problems by watering your lawn sensibly. Lawns and gardens typically need the equivalent of 1 inch of rainfall per week. You can check on how you're doing by putting a wide mouth jar out where you're sprinkling, and measure the water with a small plastic ruler. Overwatering to the point of runoff can carry polluting nutrients to the nearest water body.

Lawns and gardens typically need the equivalent of 1 inch of rainfall per week…. Put a wide mouth jar out when sprinkler, and measure the water with a small plastic ruler.

- Consider planting a vegetated buffer zone adjacent to streams or other water bodies on your property. Call the Thurston County Conservation District at (360) 754-3588 for advice and assistance in developing a planting plan. The Stream Team program (360) 754-4681 at the County may even be able to help you plant it!

- Reduce the need for pesticides and fertilizers on lawns by improving the health of the soil. Aerating, thatching, and topdressing with compost will improve soil health and help desired grasses compete with weeds and moss.

- Make sure all fertilizers and pesticides are stored in a covered location. Rain can wash the labels off of bottles and convert 50 pounds of boxed fertilizer into either a solid lump or a river of nutrients.

- Use a mulching mower and mow higher to improve soil/grass health and reduce or eliminate pesticide use.

- Compost all yard clippings, or use them as mulch to save water and keep down weeds in your garden. See Composting section for more information.

Aerating, thatching, and topdressing with compost will improve soil health and help desired grasses compete with weeds and moss.

- Practice organic gardening and virtually eliminate the need to use pesticides and fertilizers. Contact Thurston County Cooperative Extension at (360) 786-5445 for information and classes on earth-friendly gardening.

- Pull weeds instead of spraying and get some healthy exercise, too. If you must spray, use the least toxic formulations that will get the job done. The Master Gardener program listed above can help advise you on which spray to use.

- Work fertilizers into the soil instead of letting them lie on the ground surface exposed to the next rain storm.

- Plant native vegetation which is suited to Northwest conditions, they require less water and little to no fertilizers and pesticides.

- Contact your local waste disposal company for curbside pickup and recycling of yard waste.

6
Swimming Pool and Spa Cleaning and Maintenance

Despite the fact that we immerse ourselves in it, the water from pools and spas is far from chemically clean. Nutrients, pH, and chlorine can adversely affect fish and wildlife in water bodies. Following these BMPs will ensure the cleanliness of your pool and the environment.

Required BMPs

- Pool and spa water must be dechlorinated to 0.1 mg/L if it is to be emptied into a ditch or to the stormwater drainage system. Contact your pool chemical supplier to obtain the neutralizing chemicals you will need. The rate of flow into the ditch or drainage system must be regulated so that it does not cause problems such as erosion, surcharging, or flooding. Water discharged to the ground or a lawn must not cross property lines and must not produce runoff.

- If pool and spa water cannot be dechlorinated, it must be discharged to the sanitary sewer. Prior to draining, your local sewer provider must be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels. A pool service company can help you determine the frequency of cleaning and backwash of filters.

- Diatomaceous earth used in pool filters cannot be disposed of in surface waters, on the ground, or into stormwater drainage systems or septic systems. Dry it out as much as possible, bag it in plastic, and dispose of at the landfill.

Suggested BMPs

Hire a professional pool service company to collect all pool water for proper disposal. Make sure to ask them where they will dispose of it and the kind of permits they hold to do so.

7
Household Hazardous Material use, Storage and Disposal

Once we really start looking around our houses, the amount of hazardous materials we have on site is a real eye-opener. Oil-based paints and stains, paint thinner, gasoline, charcoal starter fluid, cleaners, waxes, pesticides, fingernail polish remover, and wood preservatives are just a few hazardous materials that most of us have around the house.

When products such as these are dumped on the ground or in a storm drain, they can be washed directly to receiving waters where they can harm fish and wildlife. They can also infiltrate into the ground and contaminate drinking water supplies. The same problem can occur if they are disposed of with your regular garbage; the containers can leak at the landfill and contaminate groundwater. The same type of contamination can also occur if hazardous products are poured down a sink or toilet into a septic system. Don't pour them down the drain if you're on municipal sewers, either. Many compounds can "pass through" the wastewater treatment plant without treatment and contaminate receiving waters, or they can harm the biological process used at the treatment plant, reducing overall treatment efficiency.

With such a diversity of hazardous products present in all homes in Thurston County, a large potential for serious environmental harm exists if improper methods of storage, usage, and disposal are employed. Using the following BMPs will help keep these materials out of our soils, sediments, and waters.

Don't pour them down the drain… Many compounds can "pass through" the wastewater treatment plant without treatment and contaminate receiving waters.

Required BMPs

- Hazardous Materials must be used in accordance with the manufacturer recommendation or guidelines as shown on the label.

- Always store hazardous materials in properly labeled containers, never in food or beverage containers which could be misinterpreted by a child as something to eat or drink.

- Dispose of hazardous materials and their containers properly. Never dump products labeled as *poisonous*, *corrosive*, *caustic*, *flammable, inflammable*, *volatile*, *explosive danger*, *warning*, *caution*, or *dangerous* outdoors, in a storm drain, or into sinks, toilets or drains. Call the Thurston County Department of Public Works at (360) 754-4581 for information on disposal methods, collection events, and alternative products. Household hazardous wastes from Thurston County residents and non-residents are accepted at the HazoHouse, at the

Thurston County Waste and Recovery Center in Hawks Prairie at 2418 Hogum Bay Road NE.

Household hazardous wastes from Thurston County residents and non-residents are accepted at the HazoHouse, at the Thurston County Waste and Recovery Center in Hawks Prairie…

Suggested BMPs

- Check hazardous material containers frequently for signs of leakage. If a container is rusty and has the potential of leaking soon, place it in a secondary container before the leak occurs and prevent a cleanup problem.
- Hazardous materials should be stored out of the reach of children**.**
- Store hazardous materials containers under cover and off the ground. Keep them out of the weather to avoid rusting, freezing, cracking, labels being washed off, etc.
- Keep appropriate spill cleanup materials on hand. Kitty litter is good for many oil-based spills.
- Ground cloths and drip pans must be used under any work outdoors which involves hazardous materials such as oil-based paints, stains, rust removers, masonry cleaners, and others bearing label warnings as outlined above (See Figure).
- Latex paints are not a hazardous waste, but are not accepted in liquid form at the landfill. To dispose of, leave uncovered in a protected place until dry, then place in the garbage. If your can is at least half full, you can take it to the HazoHouse to be placed in Swap Shop area. If you wish to dry waste paint quickly, mix kitty litter or sawdust in the can to absorb the paint. Once paint is dry, leave the lid off when you place it in the garbage so your garbage collector can see that it is no longer liquid.
- Use less toxic products whenever possible. Ecology maintains a hotline at 1-800-RECYCLE, or see information online at https://fortress.wa.gov/ecy/recycle/
- If an activity involving the use of a hazardous material can be moved indoors out of the weather, then do so. Make sure you can provide proper ventilation, however.
- Follow manufacturers' directions in the use of all materials. Over-application of yard chemicals, for instance, can result in the washing of these compounds into receiving water bodies. Never apply pesticides when rain is expected.
- When hazardous materials are in use, place the container inside a tub or bucket to minimize spills and store materials above the local base flood elevation (BFE).

Latex paints are not a hazardous waste… leave uncovered in a protected place until dry, then place in the garbage.

8
Pet Waste Management

Pet waste that washes into lakes, streams or Puget Sound begins to decay, using up oxygen and releasing ammonia. Low oxygen levels and ammonia combined with warm water can kill fish. Pet waste also contains nutrients that encourage weed and algae growth in waters we use for swimming, boating and fishing. Most importantly, in many urban areas, pet waste is the largest source of bacterial loading to streams. It can carry diseases that could make water unsafe for contact and lead to beach closures or affect shellfish harvest. These include:

- Campylobacteriosis—bacterial infection
- Salmonellosis—bacterial infection
- Toxocariasis—roundworm infection
- Toxoplasmosis—protozoan parasite infection
- Giardiasis—protozoan parasite infection
- Fecal Coliform—bacteria in feces, indicates contamination
- *E. coli*—bacteria in feces, may cause disease.

Pet waste is the largest source of bacterial loading in streams. It can carry diseases that could make water unsafe for contact and lead to beach closures or affect shellfish harvest.

Cleaning up after your pet can be as simple as taking a plastic bag or pooper scooper along on your next walk. Then choose one of the following:

Suggested BMPs

- **Bag it** – Put waste in a securely closed bag and deposit it in the trash. Do not put it in your yard waste container because pet waste may carry diseases, and yard waste treatment may not kill disease organisms.

- **Bury it** – Bury waste at least 1 foot deep and cover with soil in your yard or garden (not in food-growing areas).

- **Flush it** – Only flush pet wastes if your home is served by a sanitary sewer which goes to a sewage treatment plant. Water from your toilet goes through a treatment process that removes pollutants before it is discharged into the environment.

To prevent plumbing problems, don't flush debris or cat litter. Cat feces may be flushed, but used litter should be put in a securely closed bag in the trash. Septic systems are not designed to accommodate the high pollutant load of pet waste. To prevent premature failure or excessive maintenance costs do not flush pet wastes to your septic system.

To prevent premature failure or excessive maintenance costs do not flush pet wastes to your septic system.

- **Compost it** – waste from small animals **other than dogs and cats** (rabbits, rodents, etc.), can be put in your compost bin.

9
On-Site Sewage Maintenance and Operation

Thurston County is responsible for ensuring that stormwater discharged from stormwater management systems we operate does not harm or impair the use of the receiving waters (creeks, rivers, lakes, groundwater or Puget Sound). Sample tests of stormwater discharges and receiving water occasionally indicate high levels of fecal coliform bacteria.

One potential source of bacteria in surface water is malfunctioning onsite sewage systems (septic systems). Septic tank failures have been documented on private property in Thurston County.

Septic systems vary widely in their design and complexity. Owners of septic systems should contact the Thurston County Department of Public Health and Social Services (Environmental Health Division) at (360) 754-4111 to request an as-built of their system. As-built requests are also available at the Development Review counter at 2000 Lakeridge Drive SW, Olympia. More information is available at: <www.co.thurston.wa.us/permitting>.

In its simplest design the septic tank is the first stage of a private sewage disposal system. The septic tank is a water-tight tank below ground that is usually made of concrete but may be fiberglass, plastic or steel. Septic tanks have one or two access ports for inspection and maintenance which are usually buried a few inches below the ground.

The tank receives household wastewater through an inlet pipe at one end, settles out larger material to the bottom, breaks down waste material with bacteria present in the tank and delivers the partially treated wastewater out another pipe on the opposite end of the tank to the disposal field.

The disposal field is the second stage of the private sewage disposal system and completes the final breakdown of wastewater with organisms in the soil.

The disposal field consists of narrow trenches filled with gravel and perforated pipes that distribute the wastewater to the field. With proper maintenance, a well designed system can last a long time; however, disposal fields will clog if forced to handle large particles that should settle out in the bottom of the septic tank.

One potential source of bacteria in surface water is malfunctioning onsite sewage systems.

Required BMPs

Owners of septic systems must follow all of the requirements of the Thurston County Department of Public Health and Social Services, Environmental Health Division. They can be contacted at Thurston County Health Department at (360) 754-3355 extension 6518 for further information and specific requirements applicable to your system.

Suggested BMPs

- **Regular Inspection and Maintenance**
  Septic tanks require regular inspection and maintenance. Inspections should be done to measure accumulated sludge every 3 to 5 years. Pumping frequency can vary depending on tank size, family size and garbage disposal use. Failure to remove sludge periodically will result in reduced settling capacity and eventual overloading of the disposal field, which can be difficult and expensive to remedy. Maintenance is required on complex systems, those serving more than one single family residence, and commercial establishments.

- **Eliminate or Restrict Garbage Disposal Use**
  Eliminating or restricting garbage disposals can significantly reduce the loading of solids to the septic tank thus reducing the pumping frequency.

- **Reduce and Spread Water Use Out Over the Day**
  Septic tanks are limited in their ability to handle rapid large increases in the amount of water discharged into them. Excess wastewater flow can cause turbulence in the tank flushing accumulated solids into the disposal field. Over time this will impair the ability of the disposal field to function. Limit water using appliances to one at a time. Do one load of clothes a day rather than several in one day. Practice water conservation at home.

- **Chemical Use**
  Septic systems are to be used for the disposal of household wastewater only. Never dispose of excess or unwanted chemicals into the septic system. Occasional use of household cleaners in accordance with the manufacturers' recommendations should not harm your septic system. There is little evidence that products advertised for use as septic system cleaners and substitutes for pumping actually work as advertised.

  For additional information on proper operation of your septic system or to report a failing septic system in your neighborhood, contact Thurston County Environmental Health at (360) 786-5490 or at: <www.co.thurston.wa.us/health/ehoss/index.html>.

10
Activities in Wetlands and Wetlands Buffers

Wetlands and associated buffers are vegetated ecosystems through which water passes. These areas usually have a high water table and are often subject to periodic flooding. Wetlands can be very effective in removing sediments, nutrients and other pollutants from stormwater.

Wetlands can be very effective in removing sediments, nutrients and other pollutants from stormwater.

Maintaining wetlands and associated buffers helps to slow stormwater runoff, trap sediments and other pollutants and reduce the volume of runoff by allowing infiltration to occur. Reducing the velocity of runoff reduces soil erosion and increases contact time with soil and vegetation. Increasing contact of stormwater with soils and vegetation in a wetland or riparian area can be effective in removing sediments, nutrients and other pollutants from stormwater runoff.

Buffer areas are important to both the wetland and the upland areas as habitat for aquatic wetland-dependant wildlife and as buffers during extreme weather events. Other functions of buffer areas that contribute to water quality include shading, flood attenuation and shoreline stabilization.

Persons responsible for maintenance of wetland areas are encouraged to call Thurston County Development Services at (360)786-5490 prior to performing work in wetlands or their buffers.

Required BMPs

- Removal by hand of manmade litter and control of noxious weeds that are included on the state noxious weed list (Washington Administrative Code [WAC] 16-750) or invasive plant species as identified by Thurston County. Control may be conducted by clipping, pulling, over-shading with native tree and shrub species, or non-mechanized digging. Alternative methods such as mechanical excavation, barrier installation, or herbicide use may be allowed if acceptable to the Department of Resource Stewardship and acquisition of any necessary permits, per Thurston County Code Title 17 *Environment*, 17.15 - *Critical Areas.*

- Check with Thurston County Development Services and Planning on guidelines for vegetation and hazardous tree removal in critical areas.

Suggested BMPs

- To prevent possible contamination limit fertilizer and herbicide use around wetlands and their buffers.

- Limit access to wetlands and their buffers. To avoid compaction do not establish trails within the wetland areas

11
Illicit Discharge Detection and Elimination

A common problem with Thurston County's stormwater drainage system is illegal hook-ups to the system. Many businesses and residences hooked internal building drains, sump overflows, and even sanitary sewer and septic system pipes to the storm drain in the past, allowing a variety of pollutants to flow directly to receiving waters instead of the sanitary sewer or septic system. Frequently, these connections are unknown to the current owner, and do not appear on any plans for the site. Because of the pollution potential these connections represent, the Environmental Protection Agency, under the mandate of the NPDES stormwater permits, has made elimination of illegal connections a top priority.

All businesses and residences in Thurston County must examine their plumbing systems to determine if illegal connections exist. We recommend starting with site plans, to better understand what piping systems were initially installed, making piping that does not appear on the plan a priority for investigation. Wherever toilets, sinks, appliances, showers and bathtubs, floor drains, or other indoor activities are connected to the stormwater drainage system, immediately reroute them to the sanitary or septic system or holding tanks.

All businesses and residences in Thurston County must examine their plumbing systems to determine if illegal connections exist.

If sanitary facilities (such as toilets) are connected to the stormwater drainage system, you must obtain a permit from your local sewer utility and reroute them to the sanitary sewer. If sanitary service is not available, contact the Thurston County Public Health and Social Services Department at (360) 786-5581 for septic permits.

Dye Testing

Dye testing with a non-toxic dye is one way to determine where a pipe or structure drains if not obvious by observations or on plans. The dye is put into the structure and flushed with some water. Observations are then made at ends-of-pipes, drainage ditches, catch basins, and manholes to look for the color coming through. Contact Thurston County Storm and Surface Water Utility (360) 754-4681 if you need assistance in locating structures adjacent to your property.

Smoke Testing

Smoke testing can also help detect illegal connections and is best done by qualified personnel. To conduct smoke testing, shut off all indoor discharges, place a smoke bomb or other smoke-generating device in a storm drain manhole, and force air in after it. Station personnel at each suspect drain location to observe if smoke is coming out. Identify smoking drains for future rerouting.

Plugging or Rerouting Illicit Discharges

Drains which are found to connect to the stormwater drainage system must either be permanently plugged or disconnected and rerouted as soon as possible. Plug unused drains with concrete or similar permanent materials. If a drain pipe is to be rerouted and a sanitary sewer services the property, then the local sewer provider must be contacted. It is the responsibility of the property owner to follow through on rerouting illicit storm drainage connections to the sanitary sewer.

> *It is the responsibility of the property owner to follow through on rerouting illicit storm drainage connections to the sanitary sewer.*

If the property is not served by a sanitary sewer, alternate measures will be necessary. If the discharge is simply domestic waste, a septic system may be feasible. If it is necessary to install a septic system, the proper permits will need to be obtained from the Thurston County Public Health and Social Services Department at (360) 786-5581. If the discharge is anything other than domestic waste, then a holding tank or onsite treatment will be necessary. Contact LOTT Alliance Industrial Pretreatment Program at (360) 528-5708 or your local sewer service provider for specific directions for installation and disposal.

QUICK REFERENCE PHONE NUMBERS AND WEB SITES

PHONE NUMBERS

Environmental Protection Agency (U.S. EPA) – Region X	800-424-4372
Thurston County:	
Stormwater Utility	360-754-4681
Department of Public Works	360-867-2300
After-hours water and sewer emergencies (paging service)	800-926-7761
Thurston County Waste Line (automated information)	360-867-2491
LOTT Alliance Industrial Pretreatment Program	360-528-5708
Development Services – Permits	360-786-5490
Weed Control/ Noxious Chemical Use	360-786-5576
Thurston County Public Health and Social Services Department:	
On-Site Sewage	360-754-3355 x 6518
Asbestos Removal	360-786-5461
Hazardous Waste Section	360-786-5457
Solid Waste	360-786-5461
University of Washington Center for Urban Water Resources	206-543-6272
Washington State Department of Agriculture	360-902-2010 877-301-4555
Washington State Department of Ecology	360-407-6000
Southwest Regional Office	360-407-6300
Dangerous/Hazardous Waste	360-407-6300
NPDES Stormwater or Wastewater Permits	360-407-6400
Spill Reporting	800-424-8802
Recycling	800-732-9253
Groundwater Quality and Protection	360-407-6400
Underground and Aboveground Storage Tanks	360-407-7170
Washington State University/Thurston County Cooperative Extension	360-867-2151
Industrial Materials Exchange	206-296-4899
Nisqually Tribe	360-456-5221
Confederated Tribes of the Chehalis	360-273-5911
Olympic Region Clean Air Agency (ORCAA)	800-422-5623
Underground Utility Locate “Call Before You Dig”	800-424-5555

WEB PAGES

Washington State Departments:

Washington State Department of Health
<http://www.doh.wa.gov/>

Washington Department of Fish and Wildlife
<http://wdfw.wa.gov/>

Washington State Government Information and Services
<http://www.access.wa.gov/>

Washington State Department of Ecology – Flood Information
<http://www.ecy.wa.gov/programs/sea/floods/>

Washington State Department of Ecology - Digital Coastal Atlas
<http://www.ecy.wa.gov/programs/sea/SMA/atlas_home.html>

Washington State Department of Ecology - Stormwater Home Page
<http://www.ecy.wa.gov/programs/wq/stormwater/index.html>

Salmon and Watershed Information Management (SWIM) Team
<http://www.swim.wa.gov/>

Federal Departments:

Federal Emergency Management Agency (FEMA)
<http://fema.gov/>

U.S. EPA Office of Water, Academy 2000
<http://epa.gov/watertrain/>

U.S. Geological Survey (USGS) Departments:

USGS Historical Water Resource Data
<http://wa.water.usgs.gov/realtime/historical.html>

USGS National Water Information System (NWISWeb)
<http://water.usgs.gov/nwis/>

TerraServer (zoom in on USGS aerial photos anywhere in the USA)
<http://terraserver-usa.com/>

Water Quality and NPDES:

Natural Resources Conservation Service (NRCS) and U.S. Department of Agriculture (USDA)
<http://www.nrcs.usda.gov/>

National Climatic Data Center Data Archive
<http://www.ncdc.noaa.gov/>

National Weather Service Hydrologic Forecasts (River Flooding)
<http://ahps2.wrh.noaa.gov/ahps2/index.php?wfo=sew>

USGS Real Time Gauging Info
<http://wa.water.usgs.gov/realtime/current.html>

U.S. Army Corps of Engineers Real Time Gauge Info
<http://www.nwd-wc.usace.army.mil/nws/hh/basins/puy.html>

The Central Puget Sound Water Suppliers' Forum
<http://www.ci.seattle.wa.us/Forum>

Thurston County:

Thurston County Homepage
<http://www.co.Thurston.wa.us/>

Thurston County Stormwater Utility
< http://www.co.thurston.wa.us/stormwater/>

Thurston County Mapping
<http://www.geodata.org>

Thurston Conservation District
<http://www.Thurstoncountycd.org/>

Thurston County Public Health and Social Services
<http://www.co.thurston.wa.us/health/ehadm/index.html>

Other Agencies:

NWS River Forecast Center - Flood Outlook
<http://www.nwrfc.noaa.gov/river/fop.cgi>

NOAA Tide and Current Predictions
<http://co-ops.nos.noaa.gov/tp4days.html>

Appendix E Stormwater Maintenance Agreement

Appendix F WWHM Hydraulic Analysis

WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 21-132bio-pond-frontage3
Site Name:
Site Address:
City:

Report Date:	1/12/2026
Gage:	Courthouse
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	0.000 (adjusted)
Version Date:	2023/03/31
Version:	4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.2
Pervious Total	0.2
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.2

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Pasture, Mod	0.02
Pervious Total	0.02
Impervious Land Use	acre
ROADS MOD	0.18
Impervious Total	0.18
Basin Total	0.2

Routing Elements

Predeveloped Routing

Mitigated Routing

Bioretention 1

Bottom Length: 50.00 ft.
Bottom Width: 13.00 ft.
Material thickness of first layer: 1.5
Material type for first layer: SMMWW 12 in/hr
Material thickness of second layer: 0
Material type for second layer: Sand
Material thickness of third layer: 0
Material type for third layer: GRAVEL
Infiltration On
Infiltration rate: 1.28
Infiltration safety factor: 1
Wetted surface area On
Total Volume Infiltrated (ac-ft.): 40.263
Total Volume Through Riser (ac-ft.): 0.001
Total Volume Through Facility (ac-ft.): 40.264
Percent Infiltrated: 100
Total Precip Applied to Facility: 3.347
Total Evap From Facility: 1.396
Underdrain not used
Discharge Structure
Riser Height: 1 ft.
Riser Diameter: 10 in.
Element Flows To:
Outlet 1 Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0298	0.0000	0.0000	0.0000
0.0330	0.0296	0.0002	0.0000	0.0000
0.0659	0.0292	0.0005	0.0000	0.0000
0.0989	0.0289	0.0007	0.0000	0.0000
0.1319	0.0285	0.0009	0.0000	0.0000
0.1648	0.0282	0.0012	0.0000	0.0008
0.1978	0.0278	0.0014	0.0000	0.0013
0.2308	0.0274	0.0017	0.0000	0.0020
0.2637	0.0271	0.0019	0.0000	0.0028
0.2967	0.0267	0.0022	0.0000	0.0038
0.3297	0.0264	0.0025	0.0000	0.0051
0.3626	0.0260	0.0027	0.0000	0.0065
0.3956	0.0257	0.0030	0.0000	0.0082
0.4286	0.0253	0.0033	0.0000	0.0101
0.4615	0.0250	0.0036	0.0000	0.0124
0.4945	0.0247	0.0039	0.0000	0.0149
0.5275	0.0243	0.0042	0.0000	0.0178
0.5604	0.0240	0.0045	0.0000	0.0210
0.5934	0.0236	0.0048	0.0000	0.0245
0.6264	0.0233	0.0051	0.0000	0.0267
0.6593	0.0230	0.0054	0.0000	0.0271
0.6923	0.0226	0.0057	0.0000	0.0275
0.7253	0.0223	0.0060	0.0000	0.0279
0.7582	0.0220	0.0064	0.0000	0.0284
0.7912	0.0217	0.0067	0.0000	0.0288

0.8242	0.0213	0.0070	0.0000	0.0292
0.8571	0.0210	0.0074	0.0000	0.0296
0.8901	0.0207	0.0077	0.0000	0.0301
0.9231	0.0204	0.0081	0.0000	0.0305
0.9560	0.0200	0.0084	0.0000	0.0309
0.9890	0.0197	0.0088	0.0000	0.0314
1.0220	0.0194	0.0092	0.0000	0.0318
1.0549	0.0191	0.0096	0.0000	0.0323
1.0879	0.0188	0.0099	0.0000	0.0327
1.1209	0.0185	0.0103	0.0000	0.0332
1.1538	0.0182	0.0107	0.0000	0.0336
1.1868	0.0179	0.0111	0.0000	0.0341
1.2198	0.0176	0.0115	0.0000	0.0345
1.2527	0.0173	0.0119	0.0000	0.0350
1.2857	0.0170	0.0123	0.0000	0.0354
1.3187	0.0167	0.0127	0.0000	0.0359
1.3516	0.0164	0.0132	0.0000	0.0363
1.3846	0.0161	0.0136	0.0000	0.0368
1.4176	0.0158	0.0140	0.0000	0.0373
1.4505	0.0155	0.0145	0.0000	0.0377
1.4835	0.0152	0.0149	0.0000	0.0382
1.5000	0.0149	0.0151	0.0000	0.0385

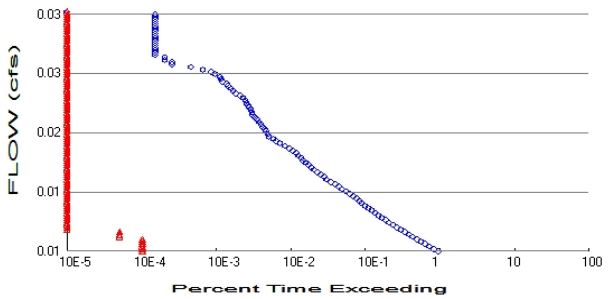
Bioretention Surface Hydraulic Table

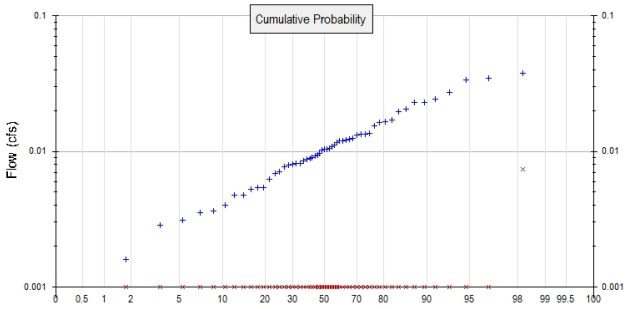
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
1.5000	0.0298	0.0151	0.0000	0.1806	0.0005
1.5330	0.0302	0.0161	0.0000	0.1806	0.0010
1.5659	0.0305	0.0171	0.0000	0.1885	0.0014
1.5989	0.0309	0.0181	0.0000	0.1925	0.0019
1.6319	0.0313	0.0192	0.0000	0.1964	0.0024
1.6648	0.0317	0.0202	0.0000	0.2004	0.0029
1.6978	0.0320	0.0212	0.0000	0.2044	0.0034
1.7308	0.0324	0.0223	0.0000	0.2083	0.0039
1.7637	0.0328	0.0234	0.0000	0.2123	0.0044
1.7967	0.0332	0.0245	0.0000	0.2163	0.0049
1.8297	0.0336	0.0256	0.0000	0.2202	0.0054
1.8626	0.0340	0.0267	0.0000	0.2242	0.0059
1.8956	0.0343	0.0278	0.0000	0.2282	0.0064
1.9286	0.0347	0.0289	0.0000	0.2321	0.0069
1.9615	0.0351	0.0301	0.0000	0.2361	0.0074
1.9945	0.0355	0.0313	0.0000	0.2401	0.0079
2.0275	0.0359	0.0324	0.0000	0.2440	0.0084
2.0604	0.0363	0.0336	0.0000	0.2480	0.0089
2.0934	0.0367	0.0348	0.0000	0.2520	0.0094
2.1264	0.0371	0.0360	0.0000	0.2560	0.0100
2.1593	0.0375	0.0373	0.0000	0.2599	0.0105
2.1923	0.0379	0.0385	0.0000	0.2639	0.0110
2.2253	0.0383	0.0398	0.0000	0.2679	0.0115
2.2582	0.0387	0.0410	0.0000	0.2718	0.0121
2.2912	0.0391	0.0423	0.0000	0.2758	0.0126
2.3242	0.0396	0.0436	0.0000	0.2798	0.0131
2.3571	0.0400	0.0449	0.0000	0.2837	0.0137
2.3901	0.0404	0.0463	0.0000	0.2877	0.0142
2.4231	0.0408	0.0476	0.0000	0.2917	0.0147
2.4560	0.0412	0.0490	0.0000	0.2956	0.0153
2.4890	0.0416	0.0503	0.0000	0.2996	0.0158
2.5220	0.0421	0.0517	0.0288	0.3009	0.0164
2.5549	0.0425	0.0531	0.1136	0.3009	0.0169

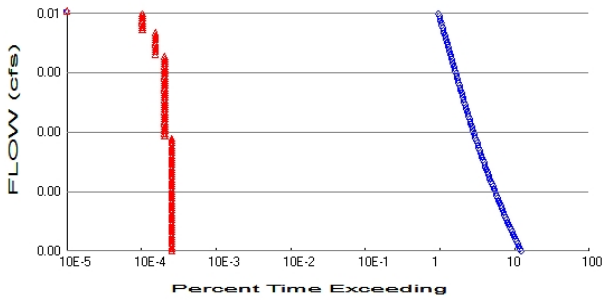
2.5879	0.0429	0.0545	0.2289	0.3009	0.0175
2.6209	0.0433	0.0559	0.3652	0.3009	0.0180
2.6538	0.0438	0.0574	0.5151	0.3009	0.0186
2.6868	0.0442	0.0588	0.6708	0.3009	0.0192
2.7198	0.0446	0.0603	0.8245	0.3009	0.0197
2.7527	0.0451	0.0618	0.9685	0.3009	0.0203
2.7857	0.0455	0.0632	1.0962	0.3009	0.0208
2.8187	0.0459	0.0648	1.2026	0.3009	0.0214
2.8516	0.0464	0.0663	1.2861	0.3009	0.0220
2.8846	0.0468	0.0678	1.3487	0.3009	0.0226
2.9176	0.0473	0.0694	1.4134	0.3009	0.0231
2.9505	0.0477	0.0709	1.4681	0.3009	0.0237
2.9835	0.0482	0.0725	1.5209	0.3009	0.0240
3.0000	0.0484	0.0733	1.5719	0.3009	0.0000

Analysis Results

POC 1







\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.2
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.02
Total Impervious Area: 0.18

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.010246
5 year	0.017609
10 year	0.022503
25 year	0.028447
50 year	0.032631
100 year	0.036583

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.010	0.000
1957	0.021	0.000
1958	0.010	0.000
1959	0.008	0.000
1960	0.034	0.000
1961	0.009	0.000
1962	0.004	0.000
1963	0.024	0.000
1964	0.009	0.000
1965	0.009	0.000
1966	0.005	0.000
1967	0.020	0.000
1968	0.013	0.000
1969	0.005	0.000
1970	0.008	0.000
1971	0.010	0.000
1972	0.038	0.000
1973	0.010	0.000
1974	0.012	0.000
1975	0.005	0.000
1976	0.012	0.000
1977	0.003	0.000
1978	0.008	0.000
1979	0.008	0.000
1980	0.009	0.000
1981	0.017	0.000
1982	0.008	0.000
1983	0.013	0.000
1984	0.034	0.000
1985	0.004	0.000
1986	0.015	0.000
1987	0.012	0.000
1988	0.006	0.000
1989	0.007	0.000
1990	0.016	0.000
1991	0.027	0.000
1992	0.011	0.000
1993	0.005	0.000
1994	0.005	0.000
1995	0.013	0.000
1996	0.023	0.000
1997	0.001	0.000
1998	0.002	0.000
1999	0.010	0.000
2000	0.007	0.000
2001	0.003	0.000
2002	0.014	0.000
2003	0.008	0.000
2004	0.023	0.007
2005	0.009	0.000
2006	0.012	0.000
2007	0.012	0.000
2008	0.017	0.000
2009	0.012	0.000
2010	0.004	0.000
2011	0.011	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.0376	0.0074
2	0.0344	0.0000
3	0.0339	0.0000
4	0.0272	0.0000
5	0.0241	0.0000
6	0.0231	0.0000
7	0.0228	0.0000
8	0.0206	0.0000
9	0.0197	0.0000
10	0.0170	0.0000
11	0.0167	0.0000
12	0.0164	0.0000
13	0.0154	0.0000
14	0.0136	0.0000
15	0.0135	0.0000
16	0.0134	0.0000
17	0.0132	0.0000
18	0.0124	0.0000
19	0.0123	0.0000
20	0.0122	0.0000
21	0.0120	0.0000
22	0.0119	0.0000
23	0.0116	0.0000
24	0.0112	0.0000
25	0.0108	0.0000
26	0.0104	0.0000
27	0.0104	0.0000
28	0.0103	0.0000
29	0.0103	0.0000
30	0.0097	0.0000
31	0.0094	0.0000
32	0.0092	0.0000
33	0.0090	0.0000
34	0.0089	0.0000
35	0.0087	0.0000
36	0.0085	0.0000
37	0.0082	0.0000
38	0.0081	0.0000
39	0.0080	0.0000
40	0.0079	0.0000
41	0.0077	0.0000
42	0.0071	0.0000
43	0.0069	0.0000
44	0.0063	0.0000
45	0.0054	0.0000
46	0.0054	0.0000
47	0.0052	0.0000
48	0.0048	0.0000
49	0.0048	0.0000
50	0.0040	0.0000
51	0.0036	0.0000
52	0.0035	0.0000
53	0.0031	0.0000
54	0.0029	0.0000

55	0.0016	0.0000
56	0.0010	0.0000

LID Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0008	241717	5	0	Pass
0.0009	232488	5	0	Pass
0.0009	224045	5	0	Pass
0.0010	215994	5	0	Pass
0.0010	208533	5	0	Pass
0.0010	201464	5	0	Pass
0.0011	194611	5	0	Pass
0.0011	188190	5	0	Pass
0.0012	181867	5	0	Pass
0.0012	175878	5	0	Pass
0.0013	169987	5	0	Pass
0.0013	164470	5	0	Pass
0.0013	159129	5	0	Pass
0.0014	154181	5	0	Pass
0.0014	149272	5	0	Pass
0.0015	144716	5	0	Pass
0.0015	140298	5	0	Pass
0.0016	136017	5	0	Pass
0.0016	131914	5	0	Pass
0.0016	128045	5	0	Pass
0.0017	124118	5	0	Pass
0.0017	120446	5	0	Pass
0.0018	116931	5	0	Pass
0.0018	113456	5	0	Pass
0.0019	110196	5	0	Pass
0.0019	106917	5	0	Pass
0.0019	103893	5	0	Pass
0.0020	100869	5	0	Pass
0.0020	97924	5	0	Pass
0.0021	95037	5	0	Pass
0.0021	92308	5	0	Pass
0.0022	89598	5	0	Pass
0.0022	87085	5	0	Pass
0.0023	84670	5	0	Pass
0.0023	82431	5	0	Pass
0.0023	80252	5	0	Pass
0.0024	78190	5	0	Pass
0.0024	76187	5	0	Pass
0.0025	74165	5	0	Pass
0.0025	72240	5	0	Pass
0.0026	70277	5	0	Pass
0.0026	68431	5	0	Pass
0.0026	66664	5	0	Pass
0.0027	64995	5	0	Pass
0.0027	63384	5	0	Pass
0.0028	61833	5	0	Pass
0.0028	60282	5	0	Pass
0.0029	58888	5	0	Pass
0.0029	57474	4	0	Pass
0.0029	56119	4	0	Pass
0.0030	54843	4	0	Pass
0.0030	53567	4	0	Pass
0.0031	52310	4	0	Pass

0.0031	51171	4	0	Pass
0.0032	49993	4	0	Pass
0.0032	48756	4	0	Pass
0.0033	47597	4	0	Pass
0.0033	46537	4	0	Pass
0.0033	45536	4	0	Pass
0.0034	44495	4	0	Pass
0.0034	43513	4	0	Pass
0.0035	42512	4	0	Pass
0.0035	41569	4	0	Pass
0.0036	40685	4	0	Pass
0.0036	39821	4	0	Pass
0.0036	39016	4	0	Pass
0.0037	38192	4	0	Pass
0.0037	37367	4	0	Pass
0.0038	36562	4	0	Pass
0.0038	35757	4	0	Pass
0.0039	34952	4	0	Pass
0.0039	34225	4	0	Pass
0.0039	33479	4	0	Pass
0.0040	32831	4	0	Pass
0.0040	32105	4	0	Pass
0.0041	31457	4	0	Pass
0.0041	30710	4	0	Pass
0.0042	30082	4	0	Pass
0.0042	29395	4	0	Pass
0.0043	28806	4	0	Pass
0.0043	28177	4	0	Pass
0.0043	27588	4	0	Pass
0.0044	27039	3	0	Pass
0.0044	26469	3	0	Pass
0.0045	25978	3	0	Pass
0.0045	25448	3	0	Pass
0.0046	24918	3	0	Pass
0.0046	24388	3	0	Pass
0.0046	23858	3	0	Pass
0.0047	23367	3	0	Pass
0.0047	22817	3	0	Pass
0.0048	22326	3	0	Pass
0.0048	21815	2	0	Pass
0.0049	21344	2	0	Pass
0.0049	20893	2	0	Pass
0.0049	20461	2	0	Pass
0.0050	20048	2	0	Pass
0.0050	19610	2	0	Pass
0.0051	19161	2	0	Pass
0.0051	18695	2	0	Pass

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0051	18695	2	0	Pass
0.0054	16168	2	0	Pass
0.0057	14002	2	0	Pass
0.0060	12367	2	0	Pass
0.0062	10976	2	0	Pass
0.0065	9686	2	0	Pass
0.0068	8510	1	0	Pass
0.0071	7517	1	0	Pass
0.0073	6649	1	0	Pass
0.0076	5853	0	0	Pass
0.0079	5182	0	0	Pass
0.0082	4626	0	0	Pass
0.0085	4118	0	0	Pass
0.0087	3637	0	0	Pass
0.0090	3258	0	0	Pass
0.0093	2928	0	0	Pass
0.0096	2661	0	0	Pass
0.0098	2399	0	0	Pass
0.0101	2144	0	0	Pass
0.0104	1933	0	0	Pass
0.0107	1758	0	0	Pass
0.0110	1634	0	0	Pass
0.0112	1489	0	0	Pass
0.0115	1353	0	0	Pass
0.0118	1215	0	0	Pass
0.0121	1081	0	0	Pass
0.0123	961	0	0	Pass
0.0126	855	0	0	Pass
0.0129	775	0	0	Pass
0.0132	682	0	0	Pass
0.0135	596	0	0	Pass
0.0137	545	0	0	Pass
0.0140	500	0	0	Pass
0.0143	444	0	0	Pass
0.0146	400	0	0	Pass
0.0148	369	0	0	Pass
0.0151	337	0	0	Pass
0.0154	310	0	0	Pass
0.0157	288	0	0	Pass
0.0160	271	0	0	Pass
0.0162	249	0	0	Pass
0.0165	231	0	0	Pass
0.0168	211	0	0	Pass
0.0171	187	0	0	Pass
0.0173	164	0	0	Pass
0.0176	141	0	0	Pass
0.0179	126	0	0	Pass
0.0182	114	0	0	Pass
0.0185	100	0	0	Pass
0.0187	96	0	0	Pass
0.0190	92	0	0	Pass
0.0193	88	0	0	Pass
0.0196	82	0	0	Pass

0.0198	78	0	0	Pass
0.0201	75	0	0	Pass
0.0204	69	0	0	Pass
0.0207	65	0	0	Pass
0.0210	61	0	0	Pass
0.0212	59	0	0	Pass
0.0215	57	0	0	Pass
0.0218	54	0	0	Pass
0.0221	53	0	0	Pass
0.0224	50	0	0	Pass
0.0226	48	0	0	Pass
0.0229	45	0	0	Pass
0.0232	41	0	0	Pass
0.0235	36	0	0	Pass
0.0237	33	0	0	Pass
0.0240	31	0	0	Pass
0.0243	28	0	0	Pass
0.0246	27	0	0	Pass
0.0249	24	0	0	Pass
0.0251	23	0	0	Pass
0.0254	22	0	0	Pass
0.0257	19	0	0	Pass
0.0260	17	0	0	Pass
0.0262	13	0	0	Pass
0.0265	9	0	0	Pass
0.0268	5	0	0	Pass
0.0271	5	0	0	Pass
0.0274	4	0	0	Pass
0.0276	4	0	0	Pass
0.0279	3	0	0	Pass
0.0282	3	0	0	Pass
0.0285	3	0	0	Pass
0.0287	3	0	0	Pass
0.0290	3	0	0	Pass
0.0293	3	0	0	Pass
0.0296	3	0	0	Pass
0.0299	3	0	0	Pass
0.0301	3	0	0	Pass
0.0304	3	0	0	Pass
0.0307	3	0	0	Pass
0.0310	3	0	0	Pass
0.0312	3	0	0	Pass
0.0315	3	0	0	Pass
0.0318	3	0	0	Pass
0.0321	3	0	0	Pass
0.0324	3	0	0	Pass
0.0326	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
retention 1 POC	☐	36.64			☐	100.00			
Total Volume Infiltrated		36.64	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

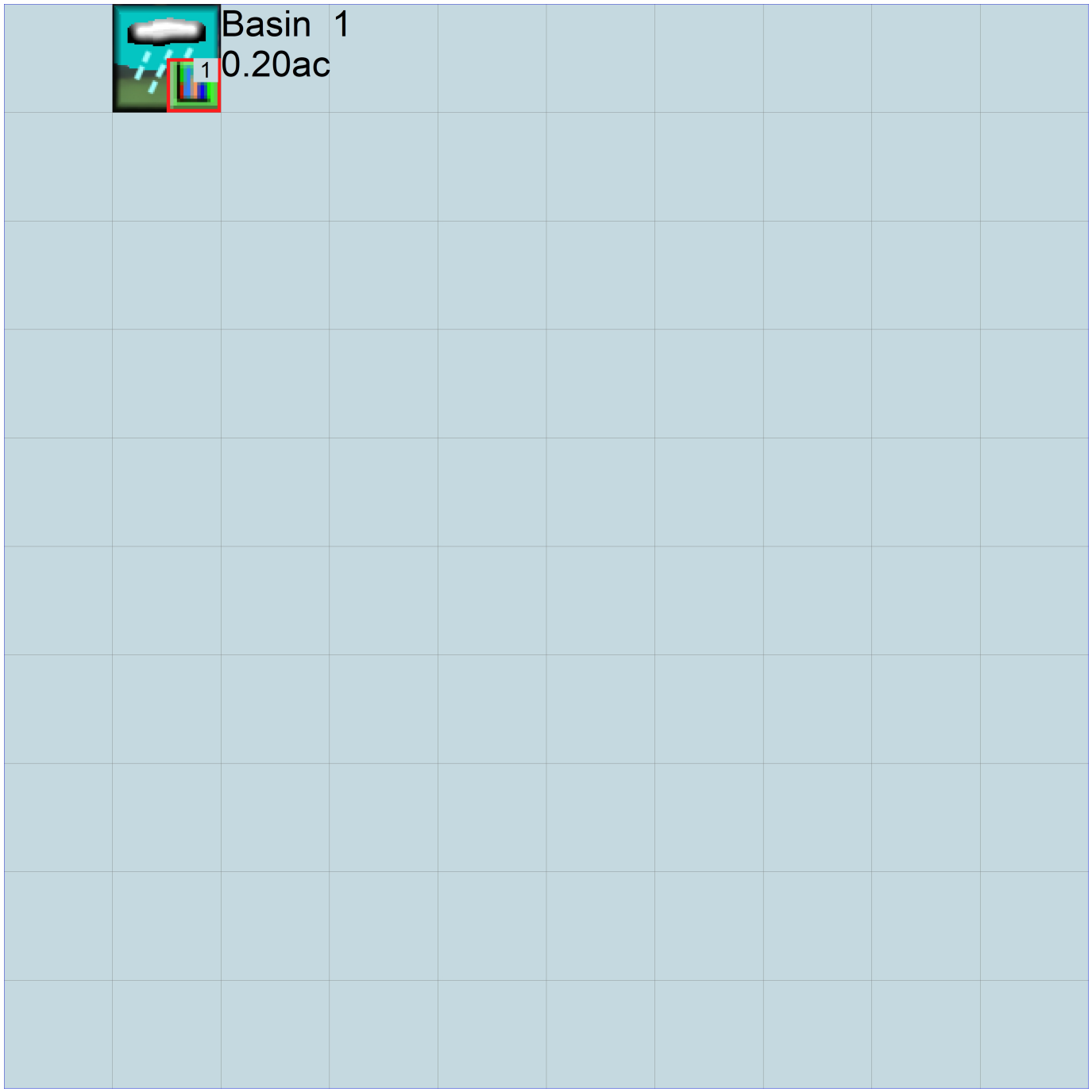
No PERLND changes have been made.

IMPLND Changes

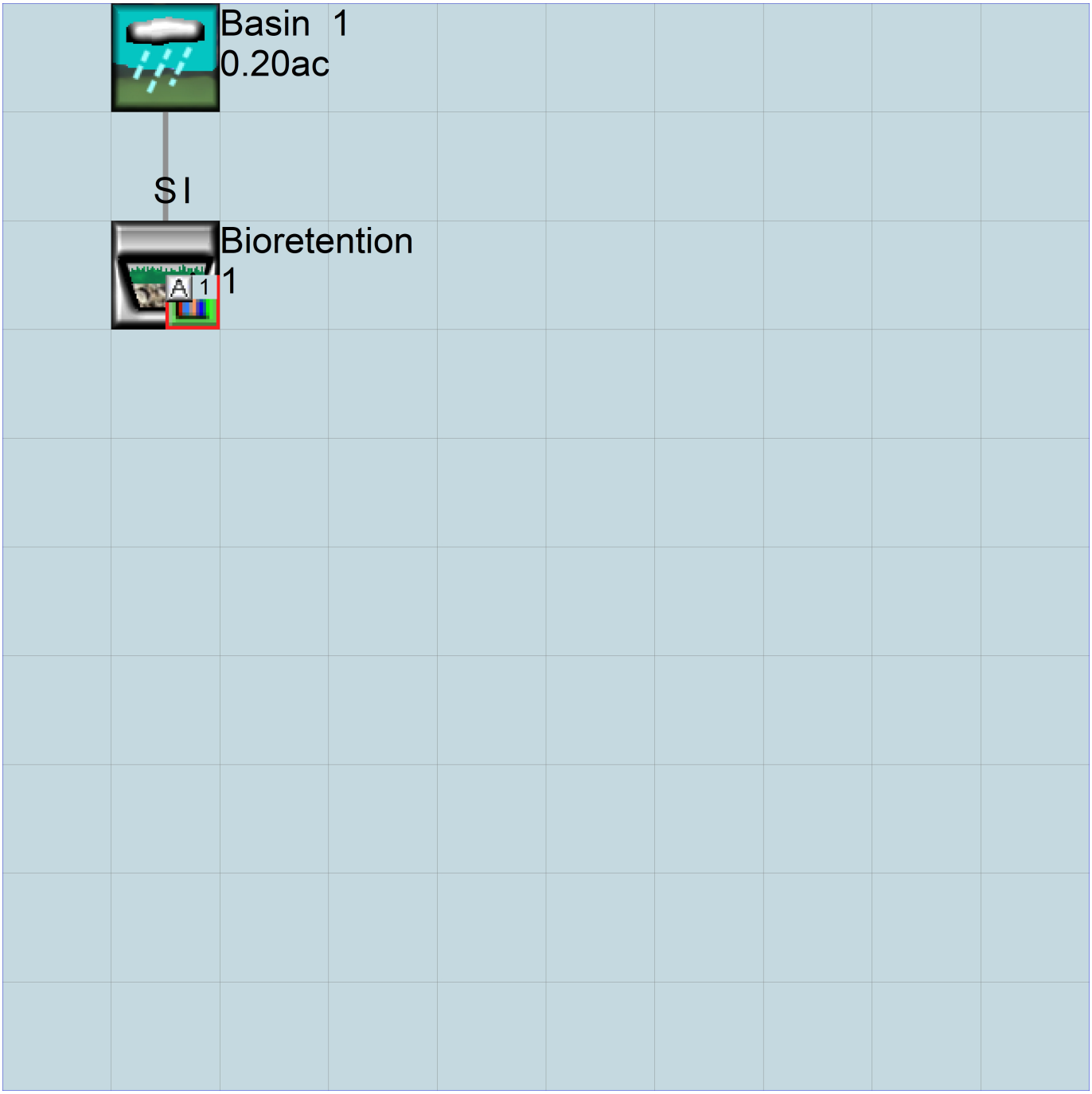
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   21-132bio-pond-frontage3.wdm
MESSU       25   Pre21-132bio-pond-frontage3.MES
            27   Pre21-132bio-pond-frontage3.L61
            28   Pre21-132bio-pond-frontage3.L62
            30   POC21-132bio-pond-frontage31.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   11         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   11              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  11                        0.2     COPY   501     12
PERLND  11                        0.2     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   21-132bio-pond-frontage3.wdm
MESSU       25   Mit21-132bio-pond-frontage3.MES
            27   Mit21-132bio-pond-frontage3.L61
            28   Mit21-132bio-pond-frontage3.L62
            30   POC21-132bio-pond-frontage31.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      14
      IMPLND       2
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface retention  1        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   14     C, Pasture, Mod         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   14         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   14         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   14         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   14              0       4.5      0.06       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   14              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   14           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   14              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                    in  out           ***
    2      ROADS/MOD              1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    ***
    2         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    2         0    0    4    0    0    4    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    2         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    2            400      0.05       0.1      0.08
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    2             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    2             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  14                        0.02     RCHRES   1      2
PERLND  14                        0.02     RCHRES   1      3
IMPLND   2                        0.18     RCHRES   1      5

******Routing******
PERLND  14                        0.02     COPY     1     12
IMPLND   2                        0.18     COPY     1     15
PERLND  14                        0.02     COPY     1     13
RCHRES   1                           1     RCHRES   2      8
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0011111     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface retentio-008    3    1    1    1   28    0    1
    2     Bioretention  1         2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
```

```
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *         ***
    1       0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2       0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.01       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  693.47
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   47    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.029798  0.000000  0.000000  0.000000
  0.032967  0.029614  0.000227  0.000000  0.000000
  0.065934  0.029248  0.000459  0.000000  0.000000
  0.098901  0.028884  0.000694  0.000000  0.000000
  0.131868  0.028522  0.000935  0.000000  0.000004
  0.164835  0.028161  0.001179  0.000000  0.000849
  0.197802  0.027802  0.001428  0.000000  0.001348
  0.230769  0.027445  0.001682  0.000000  0.002000
  0.263736  0.027090  0.001940  0.000000  0.002823
  0.296703  0.026736  0.002203  0.000000  0.003835
```

```
  0.329670  0.026385  0.002470  0.000000  0.005053
  0.362637  0.026035  0.002742  0.000000  0.006497
  0.395604  0.025687  0.003018  0.000000  0.008184
  0.428571  0.025341  0.003299  0.000000  0.010135
  0.461538  0.024996  0.003585  0.000000  0.012367
  0.494505  0.024654  0.003875  0.000000  0.014902
  0.527473  0.024313  0.004170  0.000000  0.017759
  0.560440  0.023974  0.004470  0.000000  0.020959
  0.593407  0.023636  0.004774  0.000000  0.024522
  0.626374  0.023301  0.005084  0.000000  0.026693
  0.659341  0.022967  0.005398  0.000000  0.027108
  0.692308  0.022635  0.005717  0.000000  0.027524
  0.725275  0.022305  0.006041  0.000000  0.027943
  0.758242  0.021977  0.006370  0.000000  0.028365
  0.791209  0.021650  0.006704  0.000000  0.028789
  0.824176  0.021326  0.007042  0.000000  0.029215
  0.857143  0.021003  0.007386  0.000000  0.029643
  0.890110  0.020682  0.007735  0.000000  0.030074
  0.923077  0.020362  0.008089  0.000000  0.030507
  0.956044  0.020045  0.008448  0.000000  0.030942
  0.989011  0.019729  0.008812  0.000000  0.031380
  1.021978  0.019415  0.009181  0.000000  0.031819
  1.054945  0.019103  0.009555  0.000000  0.032262
  1.087912  0.018793  0.009934  0.000000  0.032706
  1.120879  0.018484  0.010319  0.000000  0.033153
  1.153846  0.018177  0.010709  0.000000  0.033602
  1.186813  0.017873  0.011104  0.000000  0.034054
  1.219780  0.017569  0.011504  0.000000  0.034508
  1.252747  0.017268  0.011910  0.000000  0.034964
  1.285714  0.016969  0.012321  0.000000  0.035423
  1.318681  0.016671  0.012738  0.000000  0.035883
  1.351648  0.016375  0.013160  0.000000  0.036346
  1.384615  0.016081  0.013587  0.000000  0.036812
  1.417582  0.015788  0.014020  0.000000  0.037280
  1.450549  0.015498  0.014458  0.000000  0.037750
  1.483516  0.015209  0.014901  0.000000  0.038222
  1.500000  0.014922  0.015920  0.000000  0.038459
  END FTABLE  2
  FTABLE      1
   47    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.014922  0.000000  0.000000  0.000000  0.000476
  0.032967  0.030167  0.000988  0.000000  0.180556  0.000476
  0.065934  0.030537  0.001989  0.000000  0.188492  0.000954
  0.098901  0.030910  0.003002  0.000000  0.192460  0.001435
  0.131868  0.031284  0.004027  0.000000  0.196429  0.001917
  0.164835  0.031660  0.005065  0.000000  0.200397  0.002403
  0.197802  0.032037  0.006115  0.000000  0.204365  0.002890
  0.230769  0.032417  0.007177  0.000000  0.208334  0.003380
  0.263736  0.032798  0.008252  0.000000  0.212302  0.003872
  0.296703  0.033181  0.009339  0.000000  0.216270  0.004366
  0.329670  0.033566  0.010440  0.000000  0.220238  0.004863
  0.362637  0.033953  0.011553  0.000000  0.224207  0.005362
  0.395604  0.034341  0.012678  0.000000  0.228175  0.005864
  0.428571  0.034731  0.013817  0.000000  0.232143  0.006367
  0.461538  0.035123  0.014968  0.000000  0.236111  0.006873
  0.494505  0.035517  0.016133  0.000000  0.240080  0.007382
  0.527473  0.035913  0.017310  0.000000  0.244048  0.007892
  0.560440  0.036310  0.018501  0.000000  0.248016  0.008405
  0.593407  0.036710  0.019704  0.000000  0.251984  0.008921
  0.626374  0.037111  0.020921  0.000000  0.255953  0.009438
  0.659341  0.037514  0.022151  0.000000  0.259921  0.009958
  0.692308  0.037918  0.023395  0.000000  0.263889  0.010480
  0.725275  0.038325  0.024651  0.000000  0.267857  0.011005
  0.758242  0.038733  0.025922  0.000000  0.271826  0.011532
  0.791209  0.039143  0.027205  0.000000  0.275794  0.012061
  0.824176  0.039555  0.028502  0.000000  0.279762  0.012593
```

```
  0.857143  0.039968  0.029813  0.000000  0.283730  0.013127
  0.890110  0.040384  0.031138  0.000000  0.287699  0.013663
  0.923077  0.040801  0.032476  0.000000  0.291667  0.014201
  0.956044  0.041220  0.033828  0.000000  0.295635  0.014742
  0.989011  0.041641  0.035194  0.000000  0.299603  0.015285
  1.021978  0.042063  0.036573  0.028803  0.300926  0.015831
  1.054945  0.042488  0.037967  0.113632  0.300926  0.016378
  1.087912  0.042914  0.039375  0.228879  0.300926  0.016928
  1.120879  0.043342  0.040797  0.365247  0.300926  0.017481
  1.153846  0.043772  0.042233  0.515121  0.300926  0.018036
  1.186813  0.044203  0.043683  0.670824  0.300926  0.018593
  1.219780  0.044637  0.045147  0.824493  0.300926  0.019152
  1.252747  0.045072  0.046626  0.968497  0.300926  0.019714
  1.285714  0.045509  0.048119  1.096154  0.300926  0.020278
  1.318681  0.045948  0.049627  1.202640  0.300926  0.020844
  1.351648  0.046388  0.051149  1.286061  0.300926  0.021412
  1.384615  0.046831  0.052685  1.348651  0.300926  0.021983
  1.417582  0.047275  0.054236  1.413410  0.300926  0.022557
  1.450549  0.047721  0.055802  1.468143  0.300926  0.023132
  1.483516  0.048168  0.057383  1.520907  0.300926  0.023710
  1.500000  0.048393  0.058179  1.571901  0.300926  0.024000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.76           RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1004 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
```

```
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1               COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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WWHM2012

PROJECT REPORT

General Model Information

WWHM2012 Project Name: 21-132bio-pond-LOTS3
Site Name:
Site Address:
City:
Report Date: 1/13/2026
Gage: Courthouse
Data Start: 1955/10/01
Data End: 2011/09/30
Timestep: 15 Minute
Precip Scale: 0.000 (adjusted)
Version Date: 2023/03/31
Version: 4.2.19

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C, Forest, Mod	0.76
Pervious Total	0.76
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.76

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Pasture, Mod	0.19
Pervious Total	0.19

Impervious Land Use	acre
ROOF TOPS FLAT	0.43
POND	0.14
Impervious Total	0.57
Basin Total	0.76

Routing Elements

Predeveloped Routing

Mitigated Routing

Bioretention 1

Bottom Length:	110.00 ft.
Bottom Width:	20.00 ft.
Material thickness of first layer:	1.5
Material type for first layer:	SMMWW 12 in/hr
Material thickness of second layer:	0
Material type for second layer:	Sand
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	3
Infiltration safety factor:	1
Wetted surface area On	
Total Volume Infiltrated (ac-ft.):	137.647
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	137.647
Percent Infiltrated:	100
Total Precip Applied to Facility:	10.458
Total Evap From Facility:	3.954
Underdrain not used	
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	10 in.
Element Flows To:	
Outlet 1	Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0792	0.0000	0.0000	0.0000
0.0330	0.0789	0.0008	0.0000	0.0000
0.0659	0.0782	0.0015	0.0000	0.0000
0.0989	0.0775	0.0023	0.0000	0.0000
0.1319	0.0769	0.0031	0.0000	0.0000
0.1648	0.0762	0.0039	0.0000	0.0028
0.1978	0.0756	0.0047	0.0000	0.0044
0.2308	0.0749	0.0055	0.0000	0.0064
0.2637	0.0742	0.0064	0.0000	0.0090
0.2967	0.0736	0.0072	0.0000	0.0122
0.3297	0.0729	0.0081	0.0000	0.0160
0.3626	0.0723	0.0089	0.0000	0.0204
0.3956	0.0716	0.0098	0.0000	0.0256
0.4286	0.0710	0.0107	0.0000	0.0315
0.4615	0.0703	0.0115	0.0000	0.0382
0.4945	0.0697	0.0124	0.0000	0.0457
0.5275	0.0690	0.0133	0.0000	0.0542
0.5604	0.0684	0.0143	0.0000	0.0636
0.5934	0.0677	0.0152	0.0000	0.0740
0.6264	0.0671	0.0161	0.0000	0.0854
0.6593	0.0665	0.0170	0.0000	0.0979
0.6923	0.0658	0.0180	0.0000	0.1116
0.7253	0.0652	0.0190	0.0000	0.1265
0.7582	0.0646	0.0199	0.0000	0.1426
0.7912	0.0639	0.0209	0.0000	0.1600

0.8242	0.0633	0.0219	0.0000	0.1788
0.8571	0.0627	0.0229	0.0000	0.1989
0.8901	0.0620	0.0239	0.0000	0.2030
0.9231	0.0614	0.0249	0.0000	0.2049
0.9560	0.0608	0.0259	0.0000	0.2068
0.9890	0.0602	0.0270	0.0000	0.2088
1.0220	0.0596	0.0280	0.0000	0.2107
1.0549	0.0589	0.0291	0.0000	0.2127
1.0879	0.0583	0.0301	0.0000	0.2147
1.1209	0.0577	0.0312	0.0000	0.2166
1.1538	0.0571	0.0323	0.0000	0.2186
1.1868	0.0565	0.0334	0.0000	0.2206
1.2198	0.0559	0.0345	0.0000	0.2226
1.2527	0.0553	0.0356	0.0000	0.2246
1.2857	0.0547	0.0367	0.0000	0.2266
1.3187	0.0541	0.0379	0.0000	0.2286
1.3516	0.0535	0.0390	0.0000	0.2306
1.3846	0.0529	0.0402	0.0000	0.2326
1.4176	0.0523	0.0413	0.0000	0.2346
1.4505	0.0517	0.0425	0.0000	0.2366
1.4835	0.0511	0.0437	0.0000	0.2386
1.5000	0.0505	0.0443	0.0000	0.2397

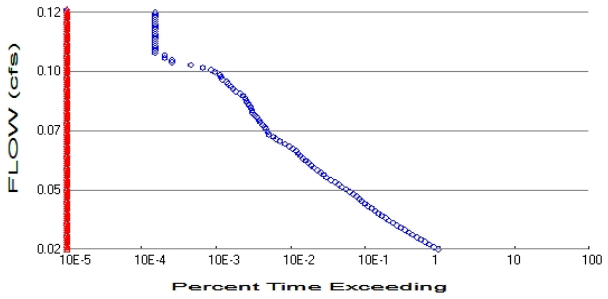
Bioretention Surface Hydraulic Table

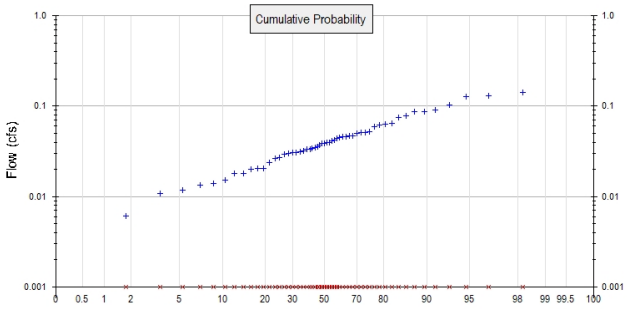
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
1.5000	0.0792	0.0443	0.0000	0.6111	0.0020
1.5330	0.0799	0.0469	0.0000	0.6111	0.0041
1.5659	0.0806	0.0495	0.0000	0.6380	0.0061
1.5989	0.0812	0.0522	0.0000	0.6514	0.0082
1.6319	0.0819	0.0549	0.0000	0.6648	0.0102
1.6648	0.0826	0.0576	0.0000	0.6783	0.0123
1.6978	0.0833	0.0604	0.0000	0.6917	0.0144
1.7308	0.0840	0.0631	0.0000	0.7051	0.0164
1.7637	0.0847	0.0659	0.0000	0.7186	0.0185
1.7967	0.0853	0.0687	0.0000	0.7320	0.0206
1.8297	0.0860	0.0715	0.0000	0.7454	0.0227
1.8626	0.0867	0.0744	0.0000	0.7589	0.0248
1.8956	0.0874	0.0772	0.0000	0.7723	0.0269
1.9286	0.0881	0.0801	0.0000	0.7857	0.0290
1.9615	0.0888	0.0830	0.0000	0.7991	0.0311
1.9945	0.0895	0.0860	0.0000	0.8126	0.0332
2.0275	0.0902	0.0889	0.0000	0.8260	0.0353
2.0604	0.0909	0.0919	0.0000	0.8394	0.0375
2.0934	0.0916	0.0949	0.0000	0.8529	0.0396
2.1264	0.0923	0.0980	0.0000	0.8663	0.0417
2.1593	0.0930	0.1010	0.0000	0.8797	0.0439
2.1923	0.0937	0.1041	0.0000	0.8932	0.0460
2.2253	0.0944	0.1072	0.0000	0.9066	0.0482
2.2582	0.0952	0.1103	0.0000	0.9200	0.0504
2.2912	0.0959	0.1135	0.0000	0.9335	0.0525
2.3242	0.0966	0.1167	0.0000	0.9469	0.0547
2.3571	0.0973	0.1198	0.0000	0.9603	0.0569
2.3901	0.0980	0.1231	0.0000	0.9737	0.0591
2.4231	0.0987	0.1263	0.0000	0.9872	0.0612
2.4560	0.0995	0.1296	0.0000	1.0006	0.0634
2.4890	0.1002	0.1329	0.0000	1.0140	0.0656
2.5220	0.1009	0.1362	0.0288	1.0185	0.0678
2.5549	0.1016	0.1395	0.1136	1.0185	0.0700

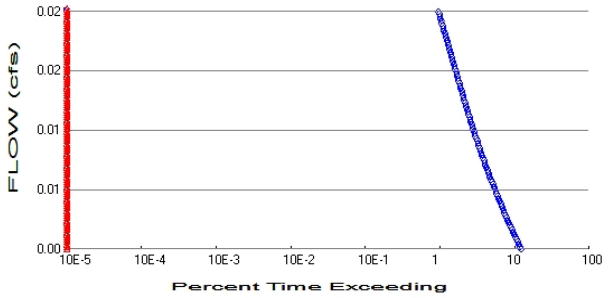
2.5879	0.1024	0.1429	0.2289	1.0185	0.0723
2.6209	0.1031	0.1463	0.3652	1.0185	0.0745
2.6538	0.1038	0.1497	0.5151	1.0185	0.0767
2.6868	0.1046	0.1531	0.6708	1.0185	0.0789
2.7198	0.1053	0.1566	0.8245	1.0185	0.0812
2.7527	0.1061	0.1601	0.9685	1.0185	0.0834
2.7857	0.1068	0.1636	1.0962	1.0185	0.0857
2.8187	0.1075	0.1671	1.2026	1.0185	0.0879
2.8516	0.1083	0.1707	1.2861	1.0185	0.0902
2.8846	0.1090	0.1742	1.3487	1.0185	0.0924
2.9176	0.1098	0.1779	1.4134	1.0185	0.0947
2.9505	0.1105	0.1815	1.4681	1.0185	0.0970
2.9835	0.1113	0.1851	1.5209	1.0185	0.0981
3.0000	0.1117	0.1870	1.5719	1.0185	0.0000

Analysis Results

POC 1







\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.76
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.19
Total Impervious Area: 0.57

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.038937
5 year	0.066916
10 year	0.08551
25 year	0.108099
50 year	0.123999
100 year	0.139016

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	0.039	0.000
1957	0.078	0.000
1958	0.037	0.000
1959	0.031	0.000
1960	0.129	0.000
1961	0.034	0.000
1962	0.013	0.000
1963	0.092	0.000
1964	0.034	0.000
1965	0.036	0.000
1966	0.020	0.000
1967	0.075	0.000
1968	0.051	0.000
1969	0.018	0.000
1970	0.031	0.000
1971	0.039	0.000
1972	0.143	0.000
1973	0.040	0.000
1974	0.044	0.000
1975	0.020	0.000
1976	0.045	0.000
1977	0.012	0.000
1978	0.032	0.000
1979	0.031	0.000
1980	0.033	0.000
1981	0.063	0.000
1982	0.029	0.000
1983	0.050	0.000
1984	0.131	0.000
1985	0.015	0.000
1986	0.059	0.000
1987	0.047	0.000
1988	0.024	0.000
1989	0.026	0.000
1990	0.062	0.000
1991	0.103	0.000
1992	0.041	0.000
1993	0.020	0.000
1994	0.018	0.000
1995	0.051	0.000
1996	0.087	0.000
1997	0.004	0.000
1998	0.006	0.000
1999	0.040	0.000
2000	0.027	0.000
2001	0.011	0.000
2002	0.052	0.000
2003	0.030	0.000
2004	0.088	0.000
2005	0.035	0.000
2006	0.046	0.000
2007	0.045	0.000
2008	0.064	0.000
2009	0.047	0.000
2010	0.014	0.000
2011	0.043	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1427	0.0000
2	0.1306	0.0000
3	0.1287	0.0000
4	0.1032	0.0000
5	0.0917	0.0000
6	0.0877	0.0000
7	0.0868	0.0000
8	0.0784	0.0000
9	0.0748	0.0000
10	0.0645	0.0000
11	0.0633	0.0000
12	0.0624	0.0000
13	0.0587	0.0000
14	0.0519	0.0000
15	0.0511	0.0000
16	0.0509	0.0000
17	0.0502	0.0000
18	0.0471	0.0000
19	0.0468	0.0000
20	0.0462	0.0000
21	0.0455	0.0000
22	0.0452	0.0000
23	0.0441	0.0000
24	0.0425	0.0000
25	0.0411	0.0000
26	0.0397	0.0000
27	0.0396	0.0000
28	0.0391	0.0000
29	0.0391	0.0000
30	0.0370	0.0000
31	0.0358	0.0000
32	0.0350	0.0000
33	0.0342	0.0000
34	0.0337	0.0000
35	0.0330	0.0000
36	0.0321	0.0000
37	0.0311	0.0000
38	0.0308	0.0000
39	0.0305	0.0000
40	0.0300	0.0000
41	0.0291	0.0000
42	0.0268	0.0000
43	0.0261	0.0000
44	0.0238	0.0000
45	0.0205	0.0000
46	0.0204	0.0000
47	0.0199	0.0000
48	0.0182	0.0000
49	0.0181	0.0000
50	0.0152	0.0000
51	0.0138	0.0000
52	0.0133	0.0000
53	0.0118	0.0000
54	0.0109	0.0000

55	0.0060	0.0000
56	0.0037	0.0000

LID Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0031	241717	0	0	Pass
0.0033	232488	0	0	Pass
0.0034	223849	0	0	Pass
0.0036	215994	0	0	Pass
0.0038	208533	0	0	Pass
0.0039	201464	0	0	Pass
0.0041	194532	0	0	Pass
0.0043	188033	0	0	Pass
0.0044	181808	0	0	Pass
0.0046	175780	0	0	Pass
0.0048	169968	0	0	Pass
0.0049	164352	0	0	Pass
0.0051	159090	0	0	Pass
0.0053	154102	0	0	Pass
0.0054	149252	0	0	Pass
0.0056	144657	0	0	Pass
0.0058	140298	0	0	Pass
0.0059	135959	0	0	Pass
0.0061	131914	0	0	Pass
0.0063	128006	0	0	Pass
0.0064	124118	0	0	Pass
0.0066	120427	0	0	Pass
0.0067	116833	0	0	Pass
0.0069	113417	0	0	Pass
0.0071	110137	0	0	Pass
0.0072	106898	0	0	Pass
0.0074	103834	0	0	Pass
0.0076	100830	0	0	Pass
0.0077	97845	0	0	Pass
0.0079	95018	0	0	Pass
0.0081	92269	0	0	Pass
0.0082	89598	0	0	Pass
0.0084	87046	0	0	Pass
0.0086	84650	0	0	Pass
0.0087	82392	0	0	Pass
0.0089	80252	0	0	Pass
0.0091	78170	0	0	Pass
0.0092	76148	0	0	Pass
0.0094	74125	0	0	Pass
0.0096	72181	0	0	Pass
0.0097	70257	0	0	Pass
0.0099	68392	0	0	Pass
0.0101	66683	0	0	Pass
0.0102	65034	0	0	Pass
0.0104	63384	0	0	Pass
0.0105	61892	0	0	Pass
0.0107	60302	0	0	Pass
0.0109	58927	0	0	Pass
0.0110	57513	0	0	Pass
0.0112	56198	0	0	Pass
0.0114	54863	0	0	Pass
0.0115	53625	0	0	Pass
0.0117	52349	0	0	Pass

0.0119	51230	0	0	Pass
0.0120	49993	0	0	Pass
0.0122	48736	0	0	Pass
0.0124	47617	0	0	Pass
0.0125	46537	0	0	Pass
0.0127	45536	0	0	Pass
0.0129	44495	0	0	Pass
0.0130	43533	0	0	Pass
0.0132	42512	0	0	Pass
0.0134	41589	0	0	Pass
0.0135	40685	0	0	Pass
0.0137	39841	0	0	Pass
0.0139	39016	0	0	Pass
0.0140	38231	0	0	Pass
0.0142	37367	0	0	Pass
0.0143	36582	0	0	Pass
0.0145	35757	0	0	Pass
0.0147	34991	0	0	Pass
0.0148	34225	0	0	Pass
0.0150	33518	0	0	Pass
0.0152	32831	0	0	Pass
0.0153	32144	0	0	Pass
0.0155	31457	0	0	Pass
0.0157	30730	0	0	Pass
0.0158	30082	0	0	Pass
0.0160	29434	0	0	Pass
0.0162	28806	0	0	Pass
0.0163	28217	0	0	Pass
0.0165	27608	0	0	Pass
0.0167	27019	0	0	Pass
0.0168	26489	0	0	Pass
0.0170	25959	0	0	Pass
0.0172	25448	0	0	Pass
0.0173	24918	0	0	Pass
0.0175	24407	0	0	Pass
0.0177	23858	0	0	Pass
0.0178	23367	0	0	Pass
0.0180	22817	0	0	Pass
0.0181	22346	0	0	Pass
0.0183	21815	0	0	Pass
0.0185	21364	0	0	Pass
0.0186	20893	0	0	Pass
0.0188	20480	0	0	Pass
0.0190	20048	0	0	Pass
0.0191	19634	0	0	Pass
0.0193	19163	0	0	Pass
0.0195	18717	0	0	Pass

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0195	18717	0	0	Pass
0.0205	16168	0	0	Pass
0.0216	13994	0	0	Pass
0.0226	12371	0	0	Pass
0.0237	10976	0	0	Pass
0.0247	9690	0	0	Pass
0.0258	8514	0	0	Pass
0.0269	7526	0	0	Pass
0.0279	6649	0	0	Pass
0.0290	5853	0	0	Pass
0.0300	5182	0	0	Pass
0.0311	4626	0	0	Pass
0.0321	4120	0	0	Pass
0.0332	3637	0	0	Pass
0.0343	3258	0	0	Pass
0.0353	2928	0	0	Pass
0.0364	2661	0	0	Pass
0.0374	2399	0	0	Pass
0.0385	2140	0	0	Pass
0.0395	1933	0	0	Pass
0.0406	1760	0	0	Pass
0.0416	1631	0	0	Pass
0.0427	1486	0	0	Pass
0.0438	1352	0	0	Pass
0.0448	1215	0	0	Pass
0.0459	1079	0	0	Pass
0.0469	959	0	0	Pass
0.0480	855	0	0	Pass
0.0490	775	0	0	Pass
0.0501	682	0	0	Pass
0.0511	593	0	0	Pass
0.0522	543	0	0	Pass
0.0533	500	0	0	Pass
0.0543	443	0	0	Pass
0.0554	401	0	0	Pass
0.0564	368	0	0	Pass
0.0575	336	0	0	Pass
0.0585	310	0	0	Pass
0.0596	288	0	0	Pass
0.0606	269	0	0	Pass
0.0617	249	0	0	Pass
0.0628	231	0	0	Pass
0.0638	211	0	0	Pass
0.0649	187	0	0	Pass
0.0659	164	0	0	Pass
0.0670	141	0	0	Pass
0.0680	126	0	0	Pass
0.0691	114	0	0	Pass
0.0701	100	0	0	Pass
0.0712	96	0	0	Pass
0.0723	92	0	0	Pass
0.0733	88	0	0	Pass
0.0744	82	0	0	Pass

0.0754	77	0	0	Pass
0.0765	74	0	0	Pass
0.0775	69	0	0	Pass
0.0786	65	0	0	Pass
0.0797	61	0	0	Pass
0.0807	59	0	0	Pass
0.0818	57	0	0	Pass
0.0828	54	0	0	Pass
0.0839	53	0	0	Pass
0.0849	50	0	0	Pass
0.0860	48	0	0	Pass
0.0870	45	0	0	Pass
0.0881	41	0	0	Pass
0.0892	36	0	0	Pass
0.0902	33	0	0	Pass
0.0913	31	0	0	Pass
0.0923	28	0	0	Pass
0.0934	27	0	0	Pass
0.0944	24	0	0	Pass
0.0955	23	0	0	Pass
0.0965	22	0	0	Pass
0.0976	19	0	0	Pass
0.0987	17	0	0	Pass
0.0997	13	0	0	Pass
0.1008	9	0	0	Pass
0.1018	5	0	0	Pass
0.1029	5	0	0	Pass
0.1039	4	0	0	Pass
0.1050	4	0	0	Pass
0.1060	3	0	0	Pass
0.1071	3	0	0	Pass
0.1082	3	0	0	Pass
0.1092	3	0	0	Pass
0.1103	3	0	0	Pass
0.1113	3	0	0	Pass
0.1124	3	0	0	Pass
0.1134	3	0	0	Pass
0.1145	3	0	0	Pass
0.1156	3	0	0	Pass
0.1166	3	0	0	Pass
0.1177	3	0	0	Pass
0.1187	3	0	0	Pass
0.1198	3	0	0	Pass
0.1208	3	0	0	Pass
0.1219	3	0	0	Pass
0.1229	3	0	0	Pass
0.1240	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
retention 1 POC	☐	125.26			☐	100.00			
Total Volume Infiltrated		125.26	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

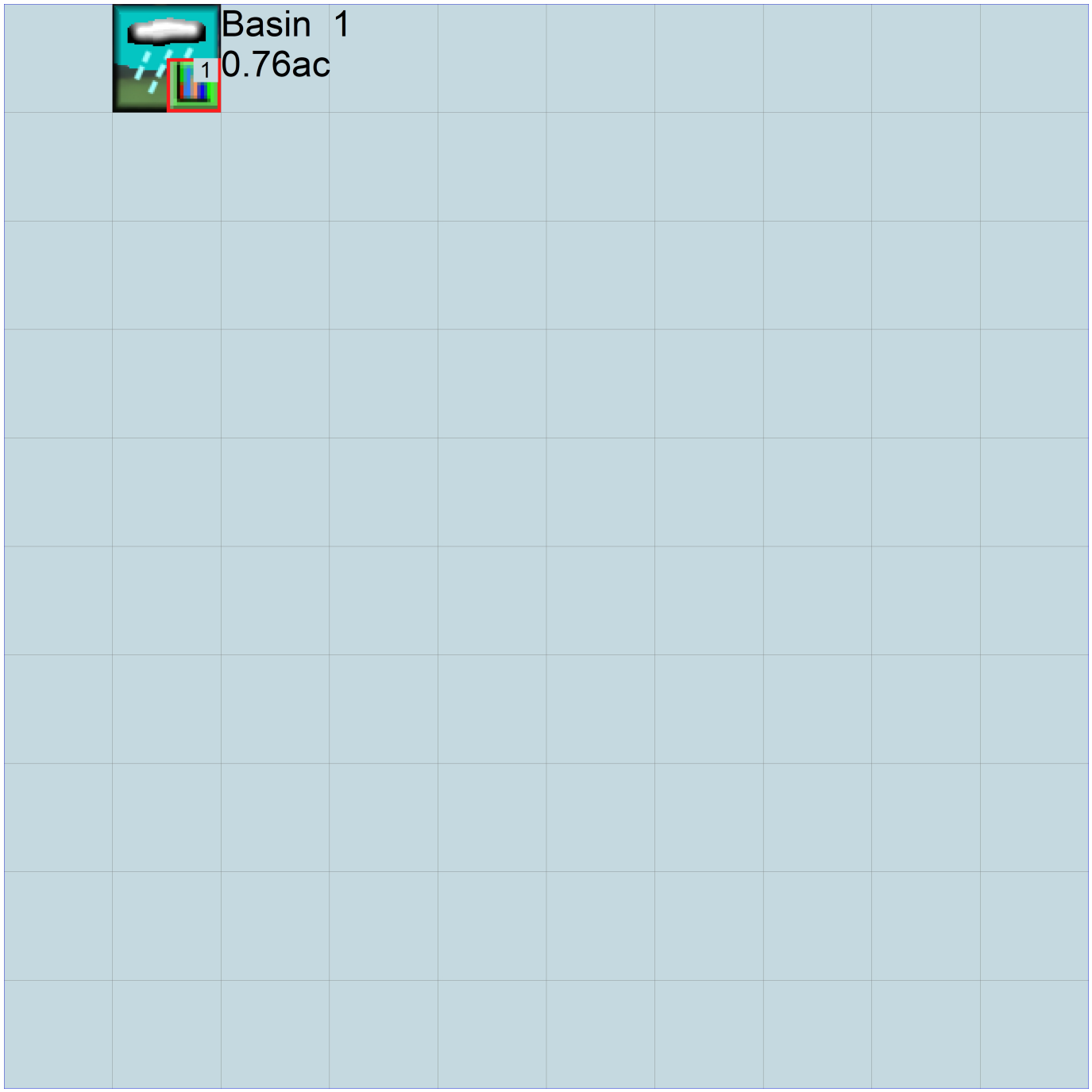
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   21-132bio-pond-LOTS3.wdm
MESSU       25   Pre21-132bio-pond-LOTS3.MES
            27   Pre21-132bio-pond-LOTS3.L61
            28   Pre21-132bio-pond-LOTS3.L62
            30   POC21-132bio-pond-LOTS31.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      11
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                      in  out           ***
   11     C, Forest, Mod          1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   11         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   11         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   11              0       4.5      0.08       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   11             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   11            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   11             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  11                       0.76     COPY   501     12
PERLND  11                       0.76     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><--------> ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   21-132bio-pond-LOTS3.wdm
MESSU       25   Mit21-132bio-pond-LOTS3.MES
            27   Mit21-132bio-pond-LOTS3.L61
            28   Mit21-132bio-pond-LOTS3.L62
            30   POC21-132bio-pond-LOTS31.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      14
      IMPLND       4
      IMPLND      14
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title---------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface retention  1        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   14     C, Pasture, Mod         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   14         0    0    1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   14         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   14         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   14              0       4.5      0.06       400       0.1       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   14              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   14           0.15       0.4       0.3         6       0.5       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   14              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                    in  out           ***
    4      ROOF TOPS/FLAT         1    1    1   27    0
   14      POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    4         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    4         0    0    4    0    0    4    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    4         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1
```

```
  IWAT-PARM2
    <PLS >       IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    4            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    4              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    4              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                 <--Area-->     <-Target->   MBLK   ***
<Name>   #                 <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  14                       0.19     RCHRES   1      2
PERLND  14                       0.19     RCHRES   1      3
IMPLND   4                       0.43     RCHRES   1      5
IMPLND  14                       0.14     RCHRES   1      5

******Routing******
PERLND  14                       0.19     COPY     1     12
IMPLND   4                       0.43     COPY     1     15
IMPLND  14                       0.14     COPY     1     15
PERLND  14                       0.19     COPY     1     13
RCHRES   1                          1     RCHRES   2      8
RCHRES   2                          1     COPY   501     17
RCHRES   1                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0011111     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<----------------><---> User T-series  Engl Metr LKFG             ***
                                        in  out                             ***
    1     Surface retentio-008    3    1    1    1   28    0    1
    2     Bioretention  1         2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                    ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
           FG FG FG FG  possible  exit  *** possible  exit      possible  exit
            *  *  *  *    *  *  *  *  *      *  *  *  *  *        ***
    1        0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->      ***
    1              1      0.01       0.0       0.0       0.0       0.0
    2              2      0.02       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                       ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
         *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <--><--><--><--><--> *** <--><--><--><--><--><--><-->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                         <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL             4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                              v2m2           =  2144.58
*** Compute remaining available pore space
  GENER   2                              vpo2           =  v2m2
  GENER   2                              vpo2          -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                              vpo2           =  0.0
END IF
*** Infiltration volume
  GENER   2                              v2d2           =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   47    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
```

```
  0.000000  0.079224  0.000000  0.000000  0.000000
  0.032967  0.078888  0.000766  0.000000  0.000000
  0.065934  0.078218  0.001541  0.000000  0.000000
  0.098901  0.077550  0.002324  0.000000  0.000000
  0.131868  0.076883  0.003117  0.000000  0.000014
  0.164835  0.076218  0.003919  0.000000  0.002772
  0.197802  0.075555  0.004730  0.000000  0.004373
  0.230769  0.074894  0.005549  0.000000  0.006446
  0.263736  0.074234  0.006378  0.000000  0.009038
  0.296703  0.073576  0.007216  0.000000  0.012198
  0.329670  0.072921  0.008064  0.000000  0.015973
  0.362637  0.072267  0.008920  0.000000  0.020410
  0.395604  0.071614  0.009785  0.000000  0.025555
  0.428571  0.070964  0.010660  0.000000  0.031457
  0.461538  0.070315  0.011544  0.000000  0.038161
  0.494505  0.069668  0.012438  0.000000  0.045717
  0.527473  0.069023  0.013340  0.000000  0.054171
  0.560440  0.068380  0.014252  0.000000  0.063572
  0.593407  0.067738  0.015173  0.000000  0.073968
  0.626374  0.067098  0.016104  0.000000  0.085409
  0.659341  0.066461  0.017044  0.000000  0.097943
  0.692308  0.065824  0.017994  0.000000  0.111621
  0.725275  0.065190  0.018953  0.000000  0.126493
  0.758242  0.064558  0.019921  0.000000  0.142610
  0.791209  0.063927  0.020899  0.000000  0.160024
  0.824176  0.063298  0.021887  0.000000  0.178785
  0.857143  0.062671  0.022884  0.000000  0.198946
  0.890110  0.062045  0.023891  0.000000  0.202973
  0.923077  0.061422  0.024907  0.000000  0.204908
  0.956044  0.060800  0.025933  0.000000  0.206849
  0.989011  0.060180  0.026969  0.000000  0.208795
  1.021978  0.059562  0.028014  0.000000  0.210746
  1.054945  0.058946  0.029070  0.000000  0.212703
  1.087912  0.058331  0.030134  0.000000  0.214665
  1.120879  0.057718  0.031209  0.000000  0.216633
  1.153846  0.057107  0.032294  0.000000  0.218606
  1.186813  0.056498  0.033388  0.000000  0.220585
  1.219780  0.055891  0.034492  0.000000  0.222569
  1.252747  0.055285  0.035607  0.000000  0.224558
  1.285714  0.054681  0.036731  0.000000  0.226553
  1.318681  0.054079  0.037865  0.000000  0.228554
  1.351648  0.053479  0.039009  0.000000  0.230559
  1.384615  0.052881  0.040163  0.000000  0.232571
  1.417582  0.052284  0.041327  0.000000  0.234587
  1.450549  0.051689  0.042501  0.000000  0.236609
  1.483516  0.051096  0.043685  0.000000  0.238637
  1.500000  0.050505  0.049233  0.000000  0.239653
  END FTABLE  2
  FTABLE      1
   47    6
     Depth      Area    Volume  Outflow1  Outflow2  Outflow3  Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.050505  0.000000  0.000000  0.000000  0.002036
  0.032967  0.079897  0.002623  0.000000  0.611112  0.002036
  0.065934  0.080572  0.005268  0.000000  0.637974  0.004077
  0.098901  0.081248  0.007935  0.000000  0.651405  0.006123
  0.131868  0.081927  0.010625  0.000000  0.664836  0.008175
  0.164835  0.082607  0.013337  0.000000  0.678267  0.010233
  0.197802  0.083289  0.016072  0.000000  0.691698  0.012296
  0.230769  0.083972  0.018829  0.000000  0.705129  0.014364
  0.263736  0.084658  0.021608  0.000000  0.718560  0.016438
  0.296703  0.085345  0.024411  0.000000  0.731991  0.018517
  0.329670  0.086034  0.027236  0.000000  0.745422  0.020601
  0.362637  0.086725  0.030083  0.000000  0.758853  0.022691
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  0.428571  0.088113  0.035847  0.000000  0.785715  0.026888
  0.461538  0.088809  0.038763  0.000000  0.799146  0.028994
  0.494505  0.089507  0.041703  0.000000  0.812577  0.031106
```

```
  0.527473  0.090207  0.044665  0.000000  0.826008  0.033223
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  0.593407  0.091612  0.050659  0.000000  0.852870  0.037474
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  0.692308  0.093733  0.059824  0.000000  0.893163  0.043891
  0.725275  0.094444  0.062926  0.000000  0.906594  0.046040
  0.758242  0.095156  0.066051  0.000000  0.920025  0.048196
  0.791209  0.095871  0.069200  0.000000  0.933456  0.050356
  0.824176  0.096587  0.072373  0.000000  0.946887  0.052522
  0.857143  0.097305  0.075569  0.000000  0.960318  0.054694
  0.890110  0.098024  0.078788  0.000000  0.973749  0.056871
  0.923077  0.098746  0.082032  0.000000  0.987180  0.059053
  0.956044  0.099469  0.085299  0.000000  1.000611  0.061241
  0.989011  0.100194  0.088590  0.000000  1.014042  0.063434
  1.021978  0.100921  0.091905  0.028803  1.018519  0.065633
  1.054945  0.101650  0.095244  0.113632  1.018519  0.067837
  1.087912  0.102380  0.098607  0.228879  1.018519  0.070047
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  1.285714  0.106800  0.119295  1.096154  1.018519  0.083418
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  1.384615  0.109035  0.129968  1.348651  1.018519  0.090178
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  1.450549  0.110533  0.137206  1.468143  1.018519  0.094711
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  1.500000  0.111662  0.142700  1.571901  1.018519  0.098125
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END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.76           RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1004 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3
```

```
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Appendix G Compost Amended Soil Details

Chapter 6 – Postconstruction Soil Quality and Depth (Ecology BMP T5.13)

Most projects require that site soils meet minimum quality and depth requirements at project completion. Requirements may be achieved by either retaining and protecting undisturbed soil or restoring the soil (e.g., amending with compost) in disturbed areas.

Additional guidance for this BMP can be found in *Building Soil: Guidelines and Resources for Implementing Soil Quality and Depth BMP T5.13* (Stenn et al. 2012), which is available at: <www.buildingsoil.org>.

Naturally occurring (undisturbed) soil, soil organisms, and vegetation provide the following important stormwater management functions:

- Water infiltration
- Nutrient, sediment, and pollutant adsorption
- Sediment and pollutant biofiltration
- Water interflow storage and transmission
- Pollutant decomposition

These functions are largely lost when development strips away native soil and vegetation and replaces it with minimal soil and sod. Not only are these important stormwater management functions lost, but such landscapes can become PGPS themselves due to compaction; increased use of pesticides, fertilizers, and other landscaping and household/industrial chemicals; the concentration of pet wastes; and pollutants that accompany roadside litter.

Postconstruction soil quality and depth requirements help to regain greater stormwater functions in the postdevelopment landscape, provide increased treatment of pollutants and sediments that result from development and habitation, and minimize the need for some landscaping chemicals (thus reducing pollution through prevention).

6.1.1 Applications and Limitations

- When used in combination with other on-site stormwater management BMPs, soil preservation and amendment can help achieve compliance with the Performance Standard option of Minimum Requirement #5.
- On sites underlain by cemented till layers, which are nearly impermeable, the upper soil horizon (native topsoil) processes most of the stormwater on the site. Ensure that the existing depth of the upper soil horizon is either left in place, or

removed and replaced (according to the requirements herein) during the grading process.

- On sites underlain by outwash soils, the existing topsoil is not usually as deep (as with till soils), but must still be preserved or replaced.

- Portions of the site composed of till soils with slopes greater than 33 percent need not implement this BMP.

6.1.2 Modeling and Sizing

Lawn and landscaped areas that meet the requirements of this section may be modeled, using approved runoff models, as "pasture" rather than "lawn" surface over the underlying soil (till or outwash).

In addition, flow control credit is given in runoff modeling when postconstruction soil quality and depth BMP requirements are met and used as part of a dispersion design under the conditions described in Chapters 9 through 15.

6.1.3 Postconstruction Soil Quality and Depth Design Criteria

This section describes the implementation options and design requirements for postconstruction soil quality and depth. Typical cross-sections of compost-amended soil in planting bed and turf applications are shown in Figure 6.1. Design criteria are provided in this section for the following elements.

- Implementation options

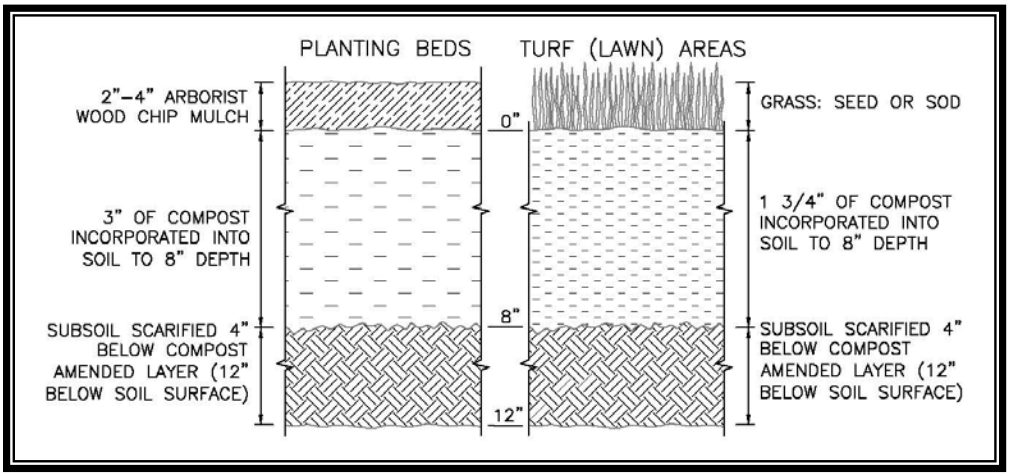
- Soil retention

- Soil amendment

- Soil stockpiling

- Soil importing

- Postconstruction Soil Quality and Depth Plan



Source: Seattle 2016 (reproduced with permission)

Figure 6.1. Cross-Section of Soil Amendment.

Implementation Options

The soil quality design requirements can be met by using one of the four options listed below. Additional details for each option are provided in the subsequent subsections.

1. Retain and Protect Undisturbed Soil

   - Leave undisturbed vegetation and soil, and protect from compaction by fencing and keeping materials storage and equipment off these areas during construction.

   - For all areas where soil or vegetation is disturbed, use option 2, 3, or 4.

2. Amend Soil

   - Soil amendments shall be applied to all areas that are being set aside as non-buildable areas (open space or natural resource protection areas) and are in need of rehabilitation because of past land use disturbances such as clearing and intrusion of invasive species. The purpose is to enhance and accelerate the rehabilitation of the soil structure. The application will be non-destructive to the existing vegetation that is retained by taking care to taper depths of soil amendment near the surface roots.

   - Amend existing site topsoil or subsoil either at default "preapproved" rates, or at custom calculated rates to meet the soil quality guidelines based on engineering tests of the soil and amendment. (Refer to the *Building Soil* manual [Stenn et al. 2012] or web site <www.buildingsoil.org> for custom calculation methods.)

3. Stockpile Soil

   - Stockpile existing topsoil during grading and replace it prior to planting. Amend stockpiled topsoil if needed to meet the organic matter or depth requirements either at the default "preapproved" rate or at a custom calculated rate (refer to the *Building Soil* manual [Stenn et al. 2012] or web site <www.buildingsoil.org> for custom calculation method). Scarify subsoil and mulch planting beds, as described under the Soil Amendment heading below.

4. Import Soil

   - Import topsoil mix of sufficient organic content and depth to meet the requirements. Imported soils must not contain excessive clay or silt fines (more than 5 percent passing the U.S. #200 sieve) because that could restrict stormwater infiltration. Use imported topsoil that meets default "preapproved" rates.

   - Scarify subsoil and mulch planting beds, as described under the "Soil Amendment" heading below.

Note: more than one method may be used on different portions of the same site.

Soil Retention

In buildable areas where minimal excavation foundation systems may be applied, existing topsoils shall be left in place to the greatest extent feasible and shaped or feathered only with tracked grading equipment not exceeding 650 pounds per square foot machine loads. Where some re-grading is required, re-compaction of placed materials, which may include topsoils free of vegetated matter, shall be limited to the minimum densities required by the foundation system engineering.

Soil Amendment

If soil retention and protection is not feasible, disturbed soil must be amended. Soil organic matter is often missing from disturbed soils. Replenish organic matter by amending with compost. It is important that the materials used to meet the Postconstruction Soil Quality and Depth BMP are appropriate and beneficial to the plant cover to be established. Likewise, it is important that imported topsoils improve soil conditions and do not have an excessive percent of clay or silt fines.

Amend existing site topsoil or subsoil either at default "preapproved" soil amendment rates or at custom calculated rates to meet the soil quality guidelines based on engineering tests of the soil and amendment. Both options are described in further detail below.

All areas subject to clearing and grading that have not been covered by impervious surface, incorporated into a drainage facility, or engineered as structural fill or slope must, at project completion, demonstrate the following:

- A topsoil layer meeting these requirements:
  - Turf areas: Place 1.75 inches of compost and till-in to an 8-inch depth. Achieve an organic matter content, as measured by the loss-on-ignition test, of a minimum 4 percent (target 5 percent) organic matter content[1].
  - Planting beds: Place 3 inches of compost and till-in to an 8-inch depth. Achieve an organic matter content, as measured by the loss-on-ignition test, of a minimum 8 percent (target 10 percent) dry weight[1].
  - A pH from 6.0 to 8.0 or matching the pH of the original undisturbed soil.
  - A minimum depth of 8 inches.
- Root zones where tree roots limit the depth of incorporation of amendments are exempted from this requirement. Fence and protect these root zones from stripping of soil, grading, or compaction to the maximum extent practical.
- Scarify (loosen) subsoils below the topsoil layer at least 4 inches for a finished minimum depth of 12 inches of uncompacted soil. Incorporate some of the upper material to avoid stratified layers, where feasible.
- For turf installations: Water or roll to compact to 85 percent of maximum dry density, rake to level, and remove surface woody debris and rocks larger than 1-inch diameter (*Building Soil* manual [Stenn et al. 2012] or web site <www.buildingsoil.org>).
- After planting: Mulch planting beds with 2 to 4 inches of organic material such as arborist wood chips, bark, shredded leaves, compost, etc. Do not use fine bark because it can seal the soil surface.
- Use compost and other materials that meet the following organic content requirements:
  - The organic content for "preapproved" amendment rates can only be met using compost meeting the compost specification for bioretention (see Chapter 9), with the exception that the compost may have up to 35 percent biosolids or manure. The compost must have an organic matter content of 40 percent to 65 percent, and a carbon to nitrogen ratio below 25:1. The carbon to nitrogen ratio may be as high as 35:1 for plantings composed entirely of plants native to the Puget Sound Lowlands region (*Building Soil* manual [Stenn et al. 2012] or web site <www.buildingsoil.org>).

[1] Acceptable test methods for determining loss-on-ignition soil organic matter include the most current version of ASTM D2974 "Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils" and TMECC 05.07-A "Loss-On-Ignition Organic Matter Method"

- Within the 1-year capture zone of any drinking water well or wellhead protection area, compost used within the site shall not include biosolids or animal manure components, as these can result in large concentrations of nitrates leaching into groundwater aquifers and are consequently prohibited within the wellhead protection area.

- Calculated amendment rates may be met through use of composted materials as defined above, or other organic materials amended to meet the carbon to nitrogen ratio requirements, and not exceeding the contaminant limits identified in Table 220-B, Testing Parameters, in WAC 173-350-220 (*Building Soil* manual [Stenn et al. 2012] or web site <www.buildingsoil.org>).

Ensure that the resulting soil is conducive to the type of vegetation to be established.

Soil Stockpiling

In any areas requiring grading, remove and stockpile the duff layer and topsoil on site in a designated, controlled area, which is not adjacent to public resources and critical areas. Reapply to other portions of the site where feasible.

- In buildable areas of the site, where conventional grading is required, the areas requiring cuts shall have the upper native topsoil removed and stockpiled for replacement for areas of the development utilized for stormwater and/or vegetation management (yards, bioretention areas, interflow pathways, vegetated channels, or degraded natural resource protection areas).

- The depth of upper native topsoil required to be stockpiled and replaced shall be the entire depth of the native topsoil horizon up to a maximum of 3 feet.

- Over-excavation of cut sections may be necessary if the cut is in a location that will be used for stormwater management. Cut to a depth that will allow replacement of stockpiled native topsoil to the entire depth that was on the site predevelopment, up to a maximum of 3 feet.

- Cut sections where native topsoil replacement is required shall require ripping of any cemented till layers to a depth of 6 inches. Subsequently, the replacement of stockpiled topsoil shall be thoroughly mixed into the ripped till to provide a gradual transition between the cemented till layer and the topsoil.

- Stockpiled topsoil shall be replaced in lifts no greater than 1 foot deep and compacted by rolling to a density that matches existing conditions.

- Amend stockpiled topsoil if needed to meet the organic matter or depth requirements either at the default “preapproved” rate or at a custom calculated rate (refer to the Building Soil manual [Stenn et al. 2012] or web site <www.buildingsoil.org> for custom calculation method).

Importing Soil

The default preapproved rates for imported topsoils are:

- For planting beds: Use a mix by volume of 35 percent compost with 65 percent mineral soil to achieve the requirement of a minimum 8 percent (target 10 percent) organic matter by loss-on-ignition test

- For turf areas: Use a mix by volume of 20 percent compost with 80 percent mineral soil to achieve the requirement of a minimum 4 percent (target 5 percent) organic matter by loss-on-ignition test.

Soil Management Plan

A Soil Management Plan must be included in the project submittal, i.e., the Construction SWPPP, and Drainage Control Plan or Abbreviated Plan. Refer to Volume I, Section 3.3, for Soil Management Plan requirements.

6.1.4 Construction Criteria

Most of the construction requirements for small-scale infiltration and dispersion facilities included in Chapter 6, also apply to postconstruction soil quality and depth. Minimum construction requirements for disturbed areas include:

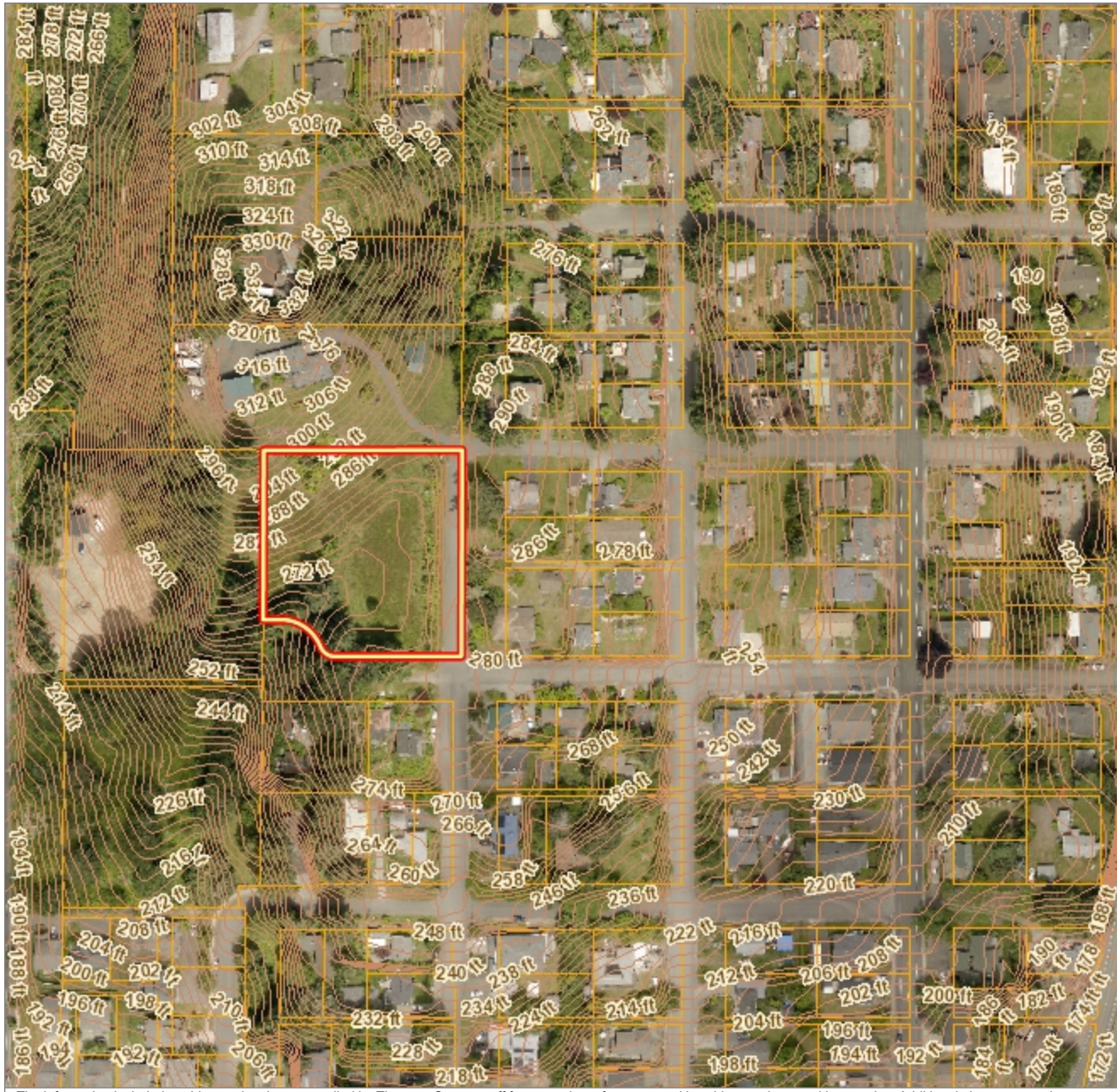
- Install soil to meet postconstruction soil quality and depth BMP requirements toward the end of construction, and once established, protect from compaction and erosion

- Plant soil with appropriate vegetation and mulch planting beds installation.

6.1.5 Operations and Maintenance Criteria

The most important maintenance issue is to replenish the soil organic matter by leaving leaf litter and grass clippings on site (or by adding compost and mulch regularly). This BMP is designed to reduce the need for irrigation, fertilizers, herbicides, and pesticides.

Appendix H Regional Drainage Basin Map



DRAINAGE BASIN

Legend

- Contours 2ft 1996 (NGVD 29)
- Parcel Boundaries

Scale 1: 3,883

0 200 400

Feet

Map Created Using GeoData Public Website

Published: 2/5/2025

Note:

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County GeoData Center

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BASIN MAP

Legend

- Contours 2ft 1996 (NGVD 29)
- Parcel Boundaries

Scale 1: 2,084

0 100 200

Feet

Map Created Using GeoData Public Website

Published: 2/5/2025

Note:

Thurston County GeoData Center

THURSTON COUNTY WASHINGTON SINCE 1852

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• BECAUSE RESULTS MATTER •

January 22, 2026

Alex Holtze
ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501

Re: 5th Ave Townhomes Soils Report for Design Infiltration Rates
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001

Dear Mr. Holtze:

At your request, I have prepared this soils report. A site visit was performed on 12/12/25 to assess site conditions.

The subject site consists of an undeveloped lot in a mostly cleared area of a residential area. The lot is located on the west side of 5th Avenue SW.

The site topography is generally sloping from the west to east. The property is bordered on all sides by residential lots. The approximately 1.69 acre (Per Thurston County Assessor data) property is vegetated with grass, shrubs and a few trees.

The United States Natural Resource Conservation Service maps the soils in the area as Kapowsin silt loam. These soils are listed as Type D soils.

Groundwater was in one of the test pits.

The existing tributary offsite Stormwater generally sheet flows onto the site on the northern portion of the property. The stormwater then drains through the property and discharges via sheet flow on the southwestern portion of the parcel. The project is located in an aquifer recharge area and a wellhead protection area as defined by the Thurston County Health Department, the EPA or by the county. There are no known ravines, or wetlands located on the site. There are no known basin plans for the area. Refer to the attachments for applicable Soils Maps.

The Washington Geologic Information Portal lists the onsite soils as the following:

Geologic Unit Label: Qgd

Geologic Age: Quaternary (Pleistocene)

Lithology: Pleistocene continental glacial drift

Geologic Unit Description: Pleistocene till and outwash clay, silt, sand, gravel, cobbles, and boulders deposited by or originating from continental glaciers; locally includes peat, nonglacial sediments, modified land, and artificial fill.

There were two test pits dug and three small pit infiltration test dug onsite to determine soil infiltration feasibility. It appeared to have soils consistent with Kapowsin silt loam. There were three soil sieve test performed at the bottom of each of the small pit infiltration test locations. Each of the tests revealed similar soils shown to be SM - Silty Sand with Gravel down to approximately 42". Below this level to approximately 5' is fractured weathered basalt. Ground water was observed in the lower test pit located in the flow line of the natural grade in the weathered basalt. It appeared to be flowing quickly.

On 12/12/26 The there small pit infiltration tests were performed per Thurston County Surface Water Design Manual.

Small Pit Test 1: The measured infiltration rate was 12.00 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 4.8 inches per hour.

Small Pit Test 2: The measured infiltration rate was 33 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 13.2 inches per hour.

Small Pit Test 3: The measured infiltration rate was 3.20 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 1.28 inches per hour

Re: 5th Ave Townhomes Soils Report for Design Infiltration Rates
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001
January 22, 2026

As a result of the above tests we recommend using a design infiltration rate of 4.8 in/hr for the onsite bioretention pond and 1.28 in/hr for the frontage bioretention pond.

Once again, thank you for the opportunity to work with you on this project. Please feel free to give me a call if you have any questions.

Sincerely,

The Land Developer, Inc.



Erik B. Ainsworth, PE
President



Attachments:
SCS Soils Map
Site plan with soil logs
Sieve Report

Soil Map—Thurston County Area, Washington



Map Scale: 1:1,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Thurston County Area, Washington
Survey Area Data: Version 18, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

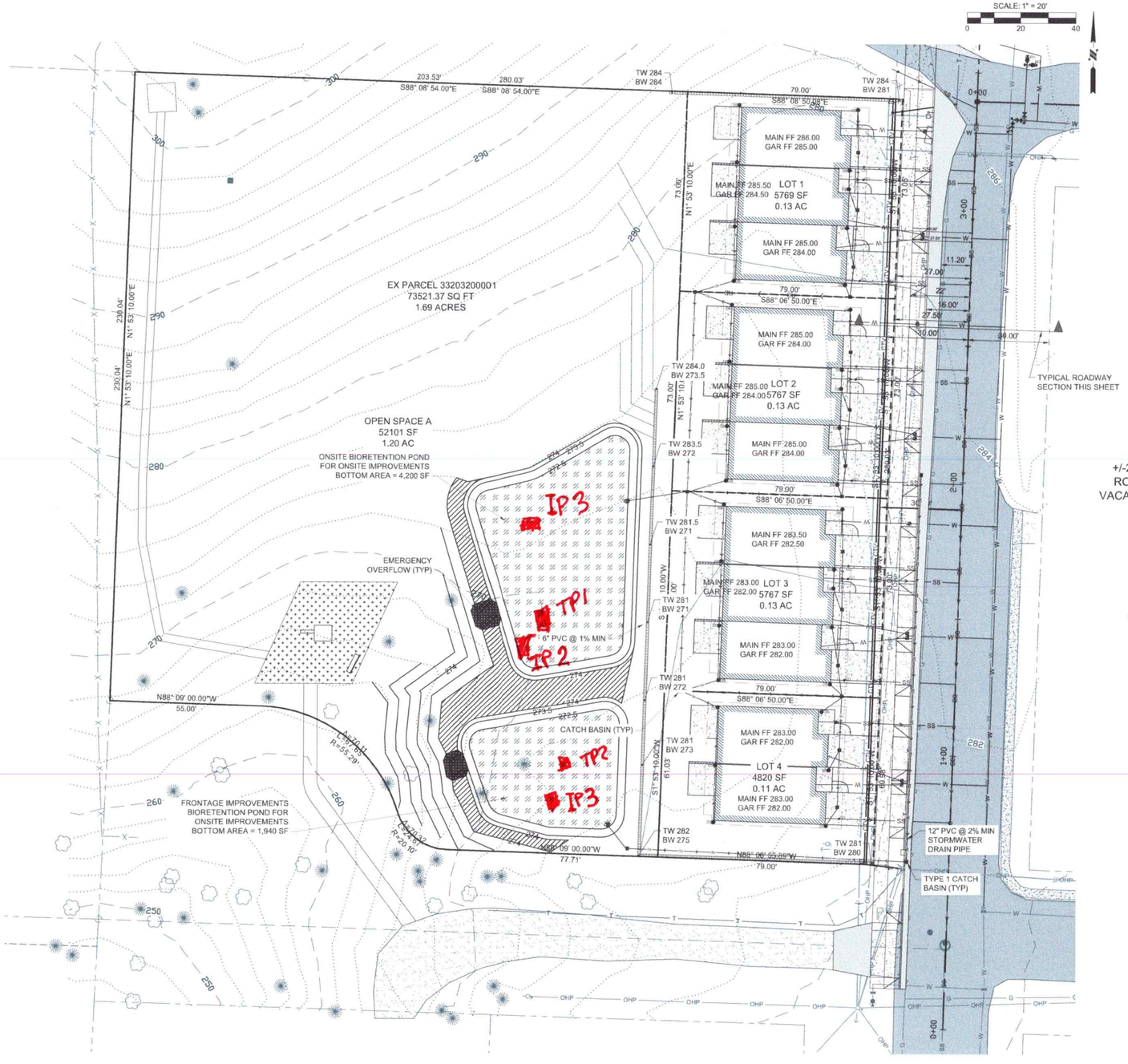
Date(s) aerial images were photographed: Jul 31, 2022—Aug 14, 2023

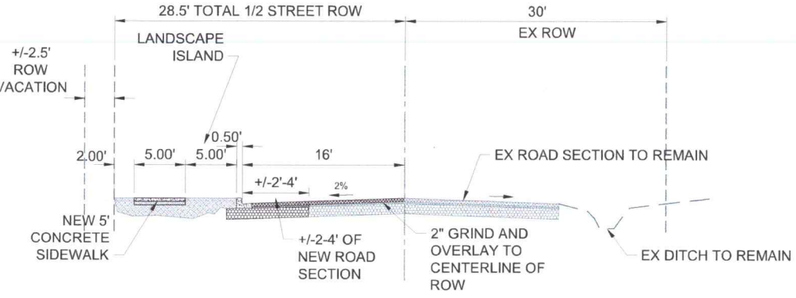
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
39	Giles silt loam, 3 to 15 percent slopes	0.2	1.7%
52	Kapowsin silt loam, 15 to 30 percent slopes	13.5	98.3%
Totals for Area of Interest		**13.7**	**100.0%**

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
at division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW.
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

STATE OF WASHINGTON
ERIK A. BRANSON
18284
REGISTERED
PROFESSIONAL ENGINEER
9/24/2026

REVISIONS: DATE:

5TH AVE TOWNHOMES

GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
S 56th S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 2
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date Started: 11AM		
Weather: Overcast	Date Completed: 12:00PM		
	Date Backfilled: YES		
	Groundwater Depth: None observed	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	3			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
5					Brown Medium Dense fractured weathered basalt			
					End test pit @ 5 ft, No groundwater observed			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- ☒ Bulk/ Bag Sample
- ▼ Stabllized Ground water
- ▽ Groundwater At time of Drilling

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 1
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date Started: 11AM		
Weather: Overcast	Date Completed: 12:00PM		
	Date Backfilled: YES		
	Groundwater Depth: Observed @ 42"	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	1			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
	▼				Brown Medium Dense fractured weathered basalt GROUNDWATER FLOWING THROUGH FRACTURED ROCK			
5					End test pit @ 5 ft, groundwater observed @ 42"			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- ☒ Bulk/ Bag Sample
- ▼ Stabllized Ground water
- ▽ Groundwater At time of Drilling

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP2 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1009	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

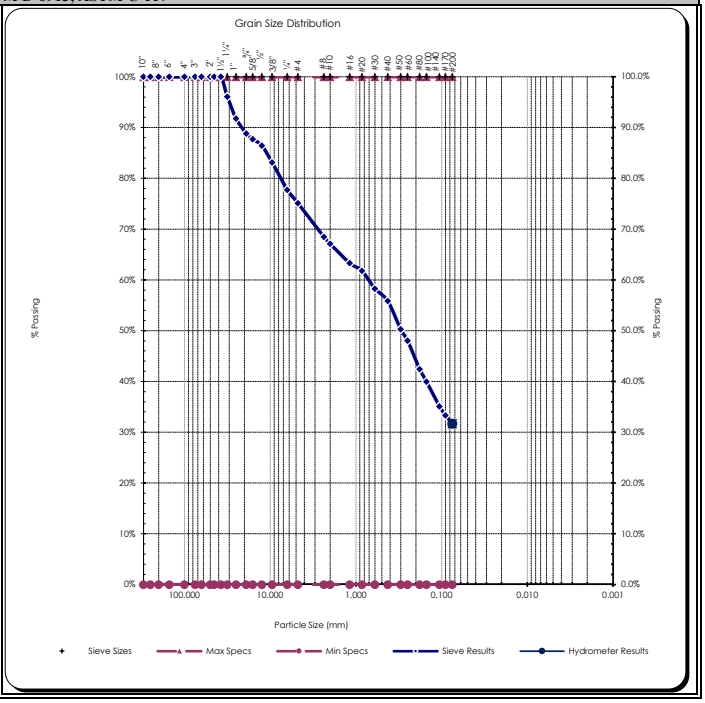
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	24.9%	Coeff. of Curvature, C_C = 0.29
$D_{(10)}$ =	0.024	mm	% Sand =	43.4%	Coeff. of Uniformity, C_U = 30.55
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.7%	Fineness Modulus = 2.73
$D_{(30)}$ =	0.071	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.294	mm	Plasticity Index =	n/a	Moisture %, as sampled = 19.6%
$D_{(60)}$ =	0.723	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	21.372	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	21/37		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50		96%	100.0%	0.0%
1.00"	25.00	92%	92%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	86%	86%	100.0%	0.0%
3/8"	9.50	83%	83%	100.0%	0.0%
1/4"	6.30		78%	100.0%	0.0%
#4	4.75	75%	75%	100.0%	0.0%
#8	2.36	68%	68%	100.0%	0.0%
#10	2.00	67%	67%	100.0%	0.0%
#16	1.18		63%	100.0%	0.0%
#20	0.850	62%	62%	100.0%	0.0%
#30	0.600		58%	100.0%	0.0%
#40	0.425	56%	56%	100.0%	0.0%
#50	0.300		50%	100.0%	0.0%
#60	0.250	48%	48%	100.0%	0.0%
#80	0.180	42%	42%	100.0%	0.0%
#100	0.150	40%	40%	100.0%	0.0%
#140	0.106		35%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.7%	31.7%	100.0%	0.0%

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Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP3 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1010	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

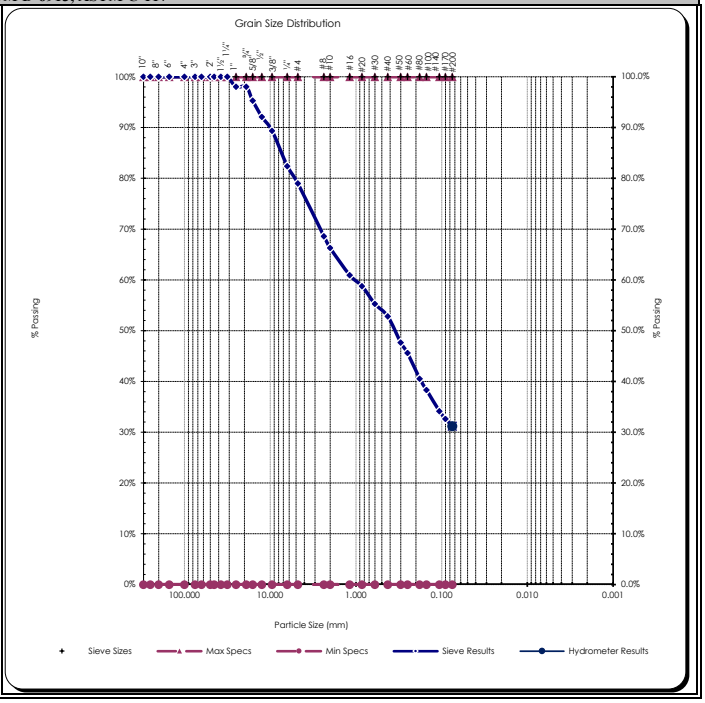
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	21.0%	Coeff. of Curvature, C_C = 0.21
$D_{(10)}$ =	0.024	mm	% Sand =	47.8%	Coeff. of Uniformity, C_U = 43.13
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.2%	Fineness Modulus = 2.63
$D_{(30)}$ =	0.072	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.357	mm	Plasticity Index =	n/a	Moisture %, as sampled = 21.0%
$D_{(60)}$ =	1.037	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	10.200	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	13/22		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	98%	98%	100.0%	0.0%
3/4"	19.00	98%	98%	100.0%	0.0%
5/8"	16.00		95%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	89%	89%	100.0%	0.0%
1/4"	6.30		82%	100.0%	0.0%
#4	4.75	79%	79%	100.0%	0.0%
#8	2.36	69%	69%	100.0%	0.0%
#10	2.00	66%	66%	100.0%	0.0%
#16	1.18		61%	100.0%	0.0%
#20	0.850	59%	59%	100.0%	0.0%
#30	0.600		55%	100.0%	0.0%
#40	0.425	53%	53%	100.0%	0.0%
#50	0.300		48%	100.0%	0.0%
#60	0.250	46%	46%	100.0%	0.0%
#80	0.180	41%	41%	100.0%	0.0%
#100	0.150	38%	38%	100.0%	0.0%
#140	0.106		34%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.2%	31.2%	100.0%	0.0%

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Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP1 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1008	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

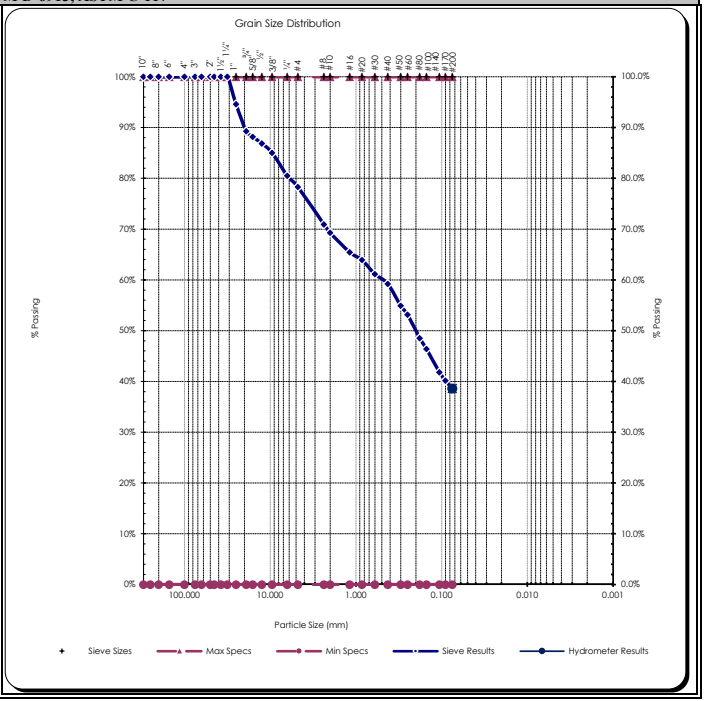
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.010	mm	% Gravel =	21.7%	Coeff. of Curvature, C_C = 0.35
$D_{(10)}$ =	0.019	mm	% Sand =	39.7%	Coeff. of Uniformity, C_U = 25.51
$D_{(15)}$ =	0.029	mm	% Silt & Clay =	38.6%	Fineness Modulus = 2.49
$D_{(30)}$ =	0.058	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.202	mm	Plasticity Index =	n/a	Moisture %, as sampled = 22.2%
$D_{(60)}$ =	0.496	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	19.810	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	58/89		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	95%	95%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	87%	87%	100.0%	0.0%
3/8"	9.50	85%	85%	100.0%	0.0%
1/4"	6.30		80%	100.0%	0.0%
#4	4.75	78%	78%	100.0%	0.0%
#8	2.36	71%	71%	100.0%	0.0%
#10	2.00	69%	69%	100.0%	0.0%
#16	1.18		65%	100.0%	0.0%
#20	0.850	64%	64%	100.0%	0.0%
#30	0.600		61%	100.0%	0.0%
#40	0.425	59%	59%	100.0%	0.0%
#50	0.300		55%	100.0%	0.0%
#60	0.250	53%	53%	100.0%	0.0%
#80	0.180	49%	49%	100.0%	0.0%
#100	0.150	46%	46%	100.0%	0.0%
#140	0.106		42%	100.0%	0.0%
#170	0.090		40%	100.0%	0.0%
#200	0.075	38.6%	38.6%	100.0%	0.0%

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Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

PIT TEST 1

AVERAGE INF RATE:	0.200	IN/MIN
	12.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	4.8	IN/HR

PIT TEST 2

AVERAGE INF RATE:	0.550	IN/MIN
	33.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	13.2	IN/HR

PIT TEST 3

AVERAGE INF RATE:	0.053	IN/MIN
	3.20	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	1.28	IN/HR

CITY OF TUMWATER

555 ISRAEL RD. SW, TUMWATER, WA 98501
(360) 754-4180
Email: cdd@ci.tumwater.wa.us

PRELIMINARY PLAT Application

TUM - 26- 0115	DATE STAMP
Kelly	02/04/2026
RCVD BY	

Application fee: $2,750.00, plus $38.50 per lot.

SUBJECT PROPERTY

ADDRESS OF PROPERTY (COMPLETE): 585 5th Ave SW, Tumwater, WA 98512

PROJECT NAME: 5th Ave Townhomes

PARCEL NUMBER(s): 33203200001

APPLICANT *(please print neatly)*

NAME OF APPLICANT: Erik Ainsworth

APPLICANT'S MAILING ADDRESS (COMPLETE): 5737 Linderson Way SW, Tumwater, WA 98501

APPLICANT'S TELEPHONE(S): 360.890.4806

APPLICANT'S E-MAIL: erik@thelanddeveloper.com

PROJECT REPRESENTATIVE

NAME OF PROJECT REPRESENTATIVE: Same As Applicant

REPRESENTATIVE'S MAILING ADDRESS (COMPLETE):

REPRESENTATIVE'S TELEPHONE(S):

REPRESENTATIVE'S E-MAIL:

PROPERTY OWNER

NAME OF PROPERTY OWNER: ASH Holdings LLC

OWNER'S MAILING ADDRESS (COMPLETE): 3425 Merryman Pl SE, Olympia, WA 98501

OWNER'S TELEPHONE(S):

OWNER'S E-MAIL:

PROJECT DESCRIPTION *(attach additional sheets and documentation, as needed)*

Cunstruct 11 Townhomes

I affirm that all answers, statements, and information submitted with this application are correct and accurate to the best of my knowledge. I also affirm that I am the owner of the subject site or am duly authorized by the owner to act with respect to this application. Further, I grant permission to any and all employees and representatives of the City of Tumwater and other governmental agencies to enter upon and inspect said property as reasonably necessary to process this application. I agree to pay all fees of the City that apply to this application.

Erik Ainsworth

Digitally signed by Erik Ainsworth
DN: cn=Erik Ainsworth gn=Erik Ainsworth c=US United States i=US United States o=The Land Developer ou=The Land Developer e=erik@thelanddeveloper.com
Reason: I am the author of this document
Location:
Date: 2026-01-23 08:40:-08:00

Signature of Applicant/Representative

1/23/2026

Date

Please attach the **Preliminary Plat submittal checklist** to this Application.

CITY OF TUMWATER

April 24, 2026

ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501

RE: **Water Availability – Parcel # 33203200001**
Sent via email to ASH Holdings LLC aholtze@gmail.com **and Erik Ainsworth** erik@thelanddeveloper.com

Dear ASH Holdings LLC,

The City of Tumwater, WA PWSID #89700Q, is pleased to accommodate your request for water and sewer connection and service to the above parcel sited at 585 5th Ave SW. The parcel is zoned Low Density Residential (6-9 Acres). The requested services can be accommodated by the City under the following conditions:

1. Sewer and water extensions to serve the development will be per the City of Tumwater's comprehensive plans.
2. Easements necessary for utility maintenance shall be dedicated to the City of Tumwater in advance of making the physical connection to the water and sewer systems.
3. All connection/latecomer fees, if any, are due at time of building permit issuance or subdivision occurs.
4. Existing water wells or septic systems, if any, will be legally decommissioned.
5. Follow and comply with all standard city requirements.

This letter serves as the City's Certificate of Water and Sewer Availability for the proposed 11 units of multi-family residential for domestic water and sewer uses. The project has been approved for **7.7 Water ERUs and 7.7 Wastewater ERUs**, per TMC 13.08 and TMC 13.04. If additional consumptive needs for the project are identified, please notify us as soon as possible.

This agreement will expire 180 days after the date shown above. This agreement will remain valid for the duration of permit approval coverage, including extensions. Additional information may be required to accurately determine wastewater connection fees. If you have further questions, please contact Jared Crews at 360-754-4140.

Warm regards,

Carrie Gillum

Carrie Gillum
Senior Water Resources Specialist

cc: WRS Water Sewer Availability (waterseweravailablity@ci.tumwater.wa.us)

THURSTON COUNTY TITLE

105 8th Ave SE
Olympia, WA 98501 Phone: 360-943-7300 Fax: 360-208-1153

SUBDIVISION GUARANTEE

SCHEDULE A

Office File Number	Policy Number	Date of Policy	Amount of Insurance	Premium
TH46819	**SGW-08007991**	**September 16, 2025** at **12:00 AM**	**$2,000.00**	**$300.00**

NAME OF ASSURED:

ALEX S. HOLTZE

THE ASSURANCES REFERRED TO ON THE FACE PAGE ARE:

THAT, ACCORDING TO THOSE PUBLIC RECORDS WHICH, CONSTRUCTIVE NOTICE OF MATTERS RELATIVE TO THE DESCRIPTION OF WHICH IS FULLY SET FORTH IN UNDER THE RECORDING LAWS, IMPART FOLLOWING DESCRIBED REAL PROPERTY:

SEE ATTACHED EXHIBIT "A"

TITLE TO SAID REAL PROPERTY IS VESTED IN:

ASH HOLDINGS LLC., a Washington Limited Liability Company

SUBJECT TO THE MATTERS SHOWN BELOW UNDER EXCEPTIONS, WHICH EXCEPTIONS ARE NOT NECESSARILY SHOWN IN THE ORDER OF THEIR PRIORITY.

EXCEPTIONS:

1. GENERAL TAXES AND ASSESSMENTS, IF ANY, NO SEARCH HAVING BEEN MADE THEREOF; ALSO, TAXES OR ASSESSMENTS WHICH ARE NOT SHOWN AS EXISTING LIENS BY THE RECORDS OF ANY TAXING AUTHORITY THAT LEVIES TAXES OR ASSESSMENTS ON REAL PROPERTY OR BY THE PUBLIC RECORDS.

2. UNPATENTED MINING CLAIMS, RESERVATIONS OR EXCEPTIONS IN THE UNITED STATES PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; WATER RIGHTS, CLAIMS OR TITLE TO WATER.

3. TITLE TO ANY PROPERTY BEYOND THE LINES OF THE REAL PROPERTY EXPRESSLY DESCRIBED HEREIN, OR TITLE TO STREETS, ROADS, AVENUES, LANES, WAYS OR WATERWAYS ON WHICH SUCH REAL PROPERTY ABUTS, OR THE RIGHT TO MAINTAIN THEREIN VAULTS, TUNNELS, RAMPS, OR ANY OTHER STRUCTURE OR IMPROVEMENT; OR ANY RIGHTS OR EASEMENTS THEREIN UNLESS SUCH PROPERTY, RIGHTS OR EASEMENTS ARE EXPRESSLY AND SPECIFICALLY SET FORTH IN SAID DESCRIPTION.

Policy Number: **SGW-08007991**

ADDITIONAL EXCEPTIONS:

4. **DEED OF TRUST AND THE TERMS AND CONDITIONS THEREOF:**
   GRANTOR: ALEXANDER HOLTZE, A SINGLE MAN AND ASH HOLDINGS, LLC, A WASHINGTON LIMITED LIABILITY COMPANY
   TRUSTEE: CHICAGO TITLE COMPANY OF WASHINGTON
   BENEFICIARY: LORRAINE OLSON
   AMOUNT: $400,000.00
   DATED: October 25, 2022
   RECORDED: October 26, 2022
   AUDITOR'S FILE NO.: 4956606
   (AFFECTS THIS AND OTHER PROPERTY)

   APPOINTMENT OF SUCCESSOR TRUSTEE:
   APPOINTED: STEWART TITLE COMPANY
   RECORDED: December 28, 2023
   AUDITOR'S FILE NO: 5001549

5. **TERMS AND CONDITIONS OF EASEMENTS AS CONTAINED IN INSTRUMENT RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED APRIL 18, 2006 UNDER AUDITOR'S FILE NO. 3824457, DESCRIBED AS FOLLOWS:**

   A PRIVATE UTILITY EASEMENT IN FAVOR OF PUGET SOUND ENERGY, INC. IS RETAINED TO CONSTRUCT, MAINTAIN, REPAIR, REPLACE, IMPROVE, REMOVE, ENLARGE, USE, EXTEND AND ACCESS THE EXISTING POLE AND WIRES AND ANY FUTURE FACILITIES SHALL BE RETAINED OVER AND ACROSS THE FOLLOWING PORTION OF "E" STREET:

   THE NORTH 30 FEET OF "E" STREET LYING BETWEEN THE EAST RIGHT-OF-WAY LINE OF 7TH AVENUE/BARNES BOULEVARD AND A POINT 150 FEET EAST OF THE EAST LINE OF 7TH AVENUE/BARNES BOULEVARD, TOGETHER WITH THE RIGHT TO MAINTAIN, REPAIR, REPLACE, IMPROVE, REMOVE, AND EXTEND NECESSARY GUY WIRES AND ANCHORS LYING ADJACENT TO SAID EASEMENT AREA AND LOCATED WITHIN THE VACATED PORTIONS OF "E" STREET.

   AND THE CITY OF TUMWATER SHALL RETAIN A UTILITY AND PEDESTRIAN EASEMENT OVER AND ACROSS THE FOLLOWING PORTION OF "F" STREET:

   THE SOUTH 15 FEET OF THE NORTH 25 FEET OF THAT PORTION OF "F" STREET BEING HEREIN DESCRIBED AND VACATED.

6. **RIGHTS, IF ANY, FOR UTILITIES WHICH MAY HAVE BEEN GRANTED IN VACATED STREETS, PREVIOUS TO THE VACATION THEREOF.**

END OF SCHEDULE A EXCEPTIONS.

Policy Number: **SGW-08007991**

NOTES:

AT THE REQUEST OF THE ASSURED THE FOLLOWING INFORMATION IS PROVIDED:

a. THE ADDRESS OF THE SUBJECT PROPERTY IS:
585 5TH AVE SW
TUMWATER, WA 98512

b. ACCORDING TO THE RECORDS OF THURSTON COUNTY ASSESSOR, THE CURRENT VALUE OF SAID PREMISES IS AS FOLLOWS:

TAX ACCOUNT NO.:	3320-32-00001
LAND:	$184,900.00
IMPROVEMENTS:	$0.00
TOTAL:	$184,900.00

c. THE FOLLOWING ABBREVIATED LEGAL DESCRIPTION IS PROVIDED AS A COURTESY TO ENABLE THE DOCUMENT PREPARER TO CONFORM WITH THE REQUIREMENTS OF RCW 65.04.045, PERTAINING TO STANDARDIZATION OF RECORDED DOCUMENTS.

ABBREVIATED LEGAL DESCRIPTION: BLK 32 OF SUPPLEMENTAL PLAT OF BARNES ADD TO TUMWATER

d. DELINQUENT GENERAL TAXES FOR 2025 IN THE SUM OF $1,846.93, PLUS INTEREST. TAX ACCOUNT NO. 3320-32-00001. (AREA CODE 440, FIRST HALF TAXES ARE DELINQUENT MAY 1. LAST HALF TAXES ARE DELINQUENT NOVEMBER 1.)

e. THERE ARE NO CONVEYANCES AFFECTING SAID PREMISES RECORDED WITHIN THE LAST 24 MONTHS.

THE LAST RECORDED TRANSFER OR AGREEMENT TO TRANSFER THE LAND DESCRIBED HEREIN IS AS FOLLOWS:

INSTRUMENT:	STATUTORY WARRANTY DEED
GRANTOR:	CALVERT JAMES MILLER, A MARRIED MAN AS HIS SEPARATE ESTATE
GRANTEE:	ASH HOLDINGS LLC., A WASHINGTON LIMITED LIABILITY COMPANY
RECORDED:	September 24, 2019
AUDITOR'S FILE NO.:	4708754

tv

Thurston County Title Company

Privacy Policy Notice

PURPOSE OF THIS NOTICE

Title V of the Gramm-Leach-Bliley Act (GLBA) generally prohibits any financial institution, directly or through its affiliates, from sharing nonpublic personal information about you with a nonaffiliated third party unless the institution provides you with a notice of its privacy policies and practices, such as the type of information that it collects about you and the categories of persons or entities to whom it may be disclosed. In compliance with the GLBA, we are providing you with this document, which notifies you of the privacy policies and practices of **Thurston County Title Company**

We may collect nonpublic personal information about you from the following sources:

Information we receive from you such as on applications or other forms.
Information about your transactions we secure from our files, or from [our affiliates or] others.
Information we receive from a consumer reporting agency.
Information that we receive from others involved in your transaction, such as the real estate agent or lender.

Unless it is specifically stated otherwise in an amended Privacy Policy Notice, no additional nonpublic personal information will be collected about you.

We may disclose any of the above information that we collect about our customers or former customers to our affiliates as permitted by law.

WE DO NOT DISCLOSE ANY NONPUBLIC PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT SPECIFICALLY PERMITTED BY LAW.

We restrict access to nonpublic personal information about you to those employees who need to know that information in order to provide products or services to you. We maintain physical, electronic, and procedural safeguards that comply with federal regulations to guard your nonpublic personal information.

ORT 287-C 5/07/01

Order No.: TH46819

EXHIBIT "A"

BLOCK 32 OF SUPPLEMENTAL PLAT OF BARNES ADDITION TO TUMWATER, AS PER PLAT RECORDED IN VOLUME 6 OF PLATS, PAGE 5, RECORDS OF THURSTON COUNTY AUDITOR;

TOGETHER WITH THOSE PORTIONS OF VACATED "E" STREET ON THE NORTH OF SAID BLOCK 32, OF VACATED 6TH AVENUE ON THE WEST OF SAID BLOCK 32 AS VACATED BY ORDINANCE NO. O2005-027, RECORDED FEBRUARY 8, 2006 UNDER AUDITOR'S FILE NO. 3807120 AND RE-RECORDED UNDER AUDITOR'S FILE NO. 3824457;

EXCEPT THAT PORTION CONVEYED TO THE CITY OF TUMWATER BY DEED RECORDED FEBRUARY 1, 2007 UNDER AUDITOR'S FILE NO. 3899305;

IN THURSTON COUNTY, WASHINGTON.

Item 1a.

Subdivision Guarantee

Washington - CLTA Guarantee Form No. 14

Issued by Old Republic National Title Insurance Company

Guarantee Number **SGW-08007991**

File Number: TH46819

SUBJECT TO THE EXCLUSIONS FROM COVERAGE, AND THE GUARANTEE CONDITIONS ATTACHED HERETO AND MADE A PART OF THIS GUARANTEE, OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, a Florida corporation, herein called the Company,

GUARANTEES

the Assured named in Schedule A against actual monetary loss or damage not exceeding the liability stated in Schedule A, which the Assured shall sustain by reason of any incorrectness in the assurances set forth in Schedule A.

Issued through the office of:

Policy Issuer:
THURSTON COUNTY TITLE COMPANY
105 8TH AVENUE SE
OLYMPIA, WA 98501
PHONE: (360) 943-7300

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY
A Stock Company
1408 North Westshore Blvd., Suite 900, Tampa, Florida 33607
(612) 371-1111 *www.oldrepublictitle.com*

By _____ President

Attest _____ Secretary

_____
Authorized Signatory

SCHEDULE OF EXCLUSIONS FROM COVERAGE

1. Except to the extent that specific assurances are provided in Schedule A of this Guarantee, the Company assumes no liability for loss or damage by reason of the following:

   (a) Defects, liens, encumbrances, adverse claims or other matters against the title, whether or not shown by the public records.

   (b) (1) Taxes or assessments of any taxing authority that levies taxes or assessments on real property; or, (2) Proceedings by a public agency which may result in taxes or assessments, or notices of such proceedings, whether or not the matters excluded under (1) or (2) are shown by the records of the taxing authority or by the public records.

   (c) (1) Unpatented mining claims; (2) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (3) water rights, claims or title to water, whether or not the matters excluded under (1), (2) or (3) are shown by the public records.

2. Notwithstanding any specific assurances which are provided in Schedule A of this Guarantee, the Company assumes no liability for loss or damage by reason of the following:

   (a) Defects, liens, encumbrances, adverse claims or other matters affecting the title to any property beyond the lines of the land expressly described in the description set forth in Schedule (A), (C) or in Part 2 of this Guarantee, or title to streets, roads, avenues, lanes, ways or waterways to which such land abuts, or the right to maintain therein vaults, tunnels, ramps or any structure or improvements; or any rights or easements therein, unless such property, rights or easements are expressly and specifically set forth in said description.

   (b) Defects, liens, encumbrances, adverse claims or other matters, whether or not shown by the public records; (1) which are created, suffered, assumed or agreed to by one or more of the Assureds; (2) which result in no loss to the Assured; or (3) which do not result in the invalidity or potential invalidity of any judicial or non-judicial proceeding which is within the scope and purpose of the assurances provided.

   (c) The identity of any party shown or referred to in Schedule A.

   (d) The validity, legal effect or priority of any matter shown or referred to in this Guarantee.

GUARANTEE CONDITIONS

1. DEFINITION OF TERMS

The following terms when used in the Guarantee mean:

(a) the "Assured": the party or parties named as the Assured in this Guarantee, or on a supplemental writing executed by the Company.

(b) "land": the land described or referred to in Schedule (A) or in Part 2, and improvements affixed thereto which by law constitute real property. The term "land" does not include any property beyond the lines of the area described or referred to in Schedule (A) or in Part 2, nor any right, title, interest, estate or easement in abutting streets, roads, avenues, alleys, lanes, ways or waterways.

(c) "mortgage": mortgage, deed of trust, trust deed, or other security instrument.

(d) "public records": records established under state statutes at Date of Guarantee for the purpose of imparting constructive notice of matters relating to real property to purchasers for value and without knowledge.

(e) "date": the effective date.

2. NOTICE OF CLAIM TO BE GIVEN BY ASSURED CLAIMANT

An Assured shall notify the Company promptly in writing in case knowledge shall come to an Assured hereunder of any claim of title or interest which is adverse to the title to the estate or interest, as stated herein, and which might cause loss or damage for which the Company may be liable by virtue of this Guarantee. If prompt notice shall not be given to the Company, then all liability of the Company shall terminate with regard to the matter or matters for which prompt notice is required; provided, however, that failure to notify the Company shall in no case prejudice the rights of any Assured under this Guarantee unless the Company shall be prejudiced by the failure and then only to the extent of the prejudice.

3. NO DUTY TO DEFEND OR PROSECUTE

The Company shall have no duty to defend or prosecute any action or proceeding to which the Assured is a party, notwithstanding the nature of any allegation in such action or proceeding.

4. COMPANY'S OPTION TO DEFEND OR PROSECUTE ACTIONS; DUTY OF ASSURED CLAIMANT TO COOPERATE

Even though the Company has no duty to defend or prosecute as set forth in Paragraph 3 above:

(a) The Company shall have the right, at its sole option and cost, to institute and prosecute any action or proceeding, interpose a defense, as limited in (b), or to do any other act which in its opinion may be necessary or desirable to establish the title to the estate or interest as stated herein, or to establish the lien rights of the Assured, or to prevent or reduce loss or damage to the Assured. The Company may take any appropriate action under the terms of this Guarantee, whether or not it shall be liable hereunder, and shall not thereby concede liability or waive any provision of this Guarantee. If the Company shall exercise its rights under this paragraph, it shall do so diligently.

(b) If the Company elects to exercise its options as stated in Paragraph 4(a) the Company shall have the right to select counsel of its choice (subject to the right of such Assured to object for reasonable cause) to represent the Assured and shall not be liable for and will not pay the fees of any other counsel, nor will the Company pay any fees, costs or expenses incurred by an Assured in the defense of those causes of action which allege matters not covered by this Guarantee.

(c) Whenever the Company shall have brought an action or interposed a defense as permitted by the provisions of this Guarantee, the Company may pursue any litigation to final determination by a court of competent jurisdiction and expressly reserves the right, in its sole discretion, to appeal from an adverse judgment or order.

(d) In all cases where this Guarantee permits the Company to prosecute or provide for the defense of any action or proceeding, an Assured shall secure to the Company the right to so prosecute or provide for the defense of any action or proceeding, and all appeals therein, and permit the Company to use, at its option, the name of such Assured for this purpose. Whenever requested by the Company, an Assured, at the Company's expense, shall give the Company all reasonable aid in any action or proceeding, securing evidence, obtaining witnesses, prosecuting or defending the action or lawful act which in the opinion of the Company may be necessary or desirable to establish the title to the estate or interest as stated herein, or to establish the lien rights of the Assured. If the Company is prejudiced by the failure of the Assured to furnish the required cooperation, the Company's obligations to the Assured under the Guarantee shall terminate.

5. PROOF OF LOSS OR DAMAGE

In addition to and after the notices required under Section 2 of these Conditions and Stipulations have been provided to the Company, a proof of loss or damage signed and sworn to by the Assured shall be furnished to the Company within ninety (90) days after the Assured shall ascertain the facts giving rise to the loss or damage. The proof of loss or damage shall describe the matters covered by this Guarantee which constitute the basis of loss or damage and shall state, to the extent possible, the basis of calculating the amount of the loss or damage. If the Company is prejudiced by the failure of the Assured to provide the required proof of loss or damage, the Company's obligation to such assured under the Guarantee shall terminate. In addition, the Assured may reasonably be required to submit to examination under oath by any authorized representative of the Company and shall produce for examination, inspection and copying, at such reasonable times and places as may be designated by any authorized representative of the Company, all records, books, ledgers, checks, correspondence and memoranda, whether bearing a date before or after Date of Guarantee, which reasonably pertain to the loss or damage. Further, if requested by any authorized representative of the Company, the Assured shall grant its permission, in writing, for any authorized representative of the Company to examine, inspect and copy all records, books, ledgers, checks, correspondence and memoranda in the custody or control of a third party, which reasonably pertain to the loss or damage. All information designated as confidential by the Assured provided to the Company pursuant to this Section shall not be disclosed to others unless, in the reasonable judgment of the Company, it is necessary in the administration of the claim. Failure of the Assured to submit for examination under oath, produce other reasonably requested information or grant permission to secure reasonably necessary information from third parties as required in the above paragraph, unless prohibited by law or governmental regulation, shall terminate any liability of the Company under this Guarantee to the Assured for that claim.

6. OPTIONS TO PAY OR OTHERWISE SETTLE CLAIMS: TERMINATION OF LIABILITY

In case of a claim under this Guarantee, the Company shall have the following additional options:

(a) To Pay or Tender Payment of the Amount of Liability or to Purchase the Indebtedness.

The Company shall have the option to pay or settle or compromise for or in the name of the Assured any claim which could result in loss to the Assured within the coverage of this Guarantee, or to pay the full amount of this Guarantee or, if this Guarantee is issued for the benefit of a holder of a mortgage or a lienholder, the Company shall have the option to purchase the indebtedness secured by said mortgage or said lien for the amount owing thereon, together with any costs, reasonable attorneys' fees and expenses incurred by the Assured claimant which were authorized by the Company up to the time of purchase.

Such purchase, payment or tender of payment of the full amount of the Guarantee shall terminate all liability of the Company hereunder. In the event after notice of claim has been given to the Company by the Assured the Company offers to purchase said indebtedness, the owner of such indebtedness shall transfer and assign said indebtedness, together with any collateral security, to the Company upon payment of the purchase price.

Upon the exercise by the Company of the option provided for in Paragraph (a) the Company's obligation to the Assured under this Guarantee for the claimed loss or damage, other than to make the payment required in that paragraph, shall terminate, including any obligation to continue the defense or prosecution of any litigation for which the Company has exercised its options under Paragraph 4, and the Guarantee shall be surrendered to the Company for cancellation.

(b) To Pay or Otherwise Settle With Parties Other Than the Assured or With the Assured Claimant.

To pay or otherwise settle with other parties for or in the name of an Assured claimant any claim assured against under this Guarantee, together with any costs, attorneys' fees and expenses incurred by the Assured claimant which were authorized by the Company up to the time of payment and which the Company is obligated to pay.

Upon the exercise by the Company of the option provided for in Paragraph (b) the Company's obligation to the Assured under this Guarantee for the claimed loss or damage, other than to make the payment required in that paragraph, shall terminate, including any obligation to continue the defense or prosecution of any litigation for which the Company has exercised its options under Paragraph 4.

7. DETERMINATION AND EXTENT OF LIABILITY

This Guarantee is a contract of Indemnity against actual monetary loss or damage sustained or incurred by the Assured claimant who has suffered loss or damage by reason of reliance upon the assurances set forth in this Guarantee and only to the extent herein described, and subject to the Exclusions From Coverage of This Guarantee.

The liability of the Company under this Guarantee to the Assured shall not exceed the least of:

(a) the amount of liability stated in Schedule A or in Part 2;

(b) the amount of the unpaid principal indebtedness secured by the mortgage of an Assured mortgagee, as limited or provided under Section 6 of these Conditions and Stipulations or as reduced under Section 9 of these Conditions and Stipulations, at the time the loss or damage assured against by this Guarantee occurs, together with interest thereon; or

(c) the difference between the value of the estate or interest covered hereby as stated herein and the value of the estate or interest subject to any defect, lien or encumbrance assured against by this Guarantee.

8. LIMITATION OF LIABILITY

(a) If the Company establishes the title, or removes the alleged defect, lien or encumbrance, or cures any other matter assured against by this Guarantee in a reasonably diligent manner by any method, including litigation and the completion of any appeals therefrom, it shall have fully performed its obligations with respect to that matter and shall not be liable for any loss or damage caused thereby.

(b) In the event of any litigation by the Company or with the Company's consent, the Company shall have no liability for loss or damage until there has been a final determination by a court of competent jurisdiction, and disposition of all appeals therefrom, adverse to the title, as stated herein.

(c) The Company shall not be liable for loss or damage to any Assured for liability voluntarily assumed by the Assured in settling any claim or suit without the prior written consent of the Company.

9. REDUCTION OF LIABILITY OR TERMINATION OF LIABILITY

All payments under this Guarantee, except payments made for costs, attorneys' fees and expenses pursuant to Paragraph 4 shall reduce the amount of liability pro tanto.

10. PAYMENT OF LOSS

(a) No payment shall be made without producing this Guarantee for endorsement of the payment unless the Guarantee has been lost or destroyed, in which case proof of loss or destruction shall be furnished to the satisfaction of the Company.

(b) When liability and the extent of loss or damage has been definitely fixed in accordance with these Conditions and Stipulations, the loss or damage shall be payable within thirty (30) days thereafter.

11. SUBROGATION UPON PAYMENT OR SETTLEMENT

Whenever the Company shall have settled and paid a claim under this Guarantee, all right of subrogation shall vest in the Company unaffected by any act of the Assured claimant.

The Company shall be subrogated to and be entitled to all rights and remedies which the Assured would have had against any person or property in respect to the claim had this Guarantee not been issued. If requested by the Company, the Assured shall transfer to the Company all rights and remedies against any person or property necessary in order to perfect this right of subrogation. The Assured shall permit the Company to sue, compromise or settle in the name of the Assured and to use the name of the Assured in any transaction or litigation involving these rights or remedies.

If a payment on account of a claim does not fully cover the loss of the Assured the Company shall be subrogated to all rights and remedies of the Assured after the Assured shall have recovered its principal, interest, and costs of collection.

12. LIABILITY LIMITED TO THIS GUARANTEE; GUARANTEE ENTIRE CONTRACT

(a) This Guarantee together with all endorsements, if any, attached hereto by the Company is the entire Guarantee and contract between the Assured and the Company. In interpreting any provision of this Guarantee, this Guarantee shall be construed as a whole.

(b) Any claim of loss or damage, whether or not based on negligence, or any action asserting such claim, shall be restricted to this Guarantee.

(c) No amendment of or endorsement to this Guarantee can be made except by a writing endorsed hereon or attached hereto signed by either the President, a Vice President, the Secretary, an Assistant Secretary, or validating officer or authorized signatory of the Company.

13. NOTICES, WHERE SENT

All notices required to be given the Company and any statement in writing required to be furnished the Company shall include the number of this Guarantee and shall be addressed to the Company at the office which issued this Guarantee or to the Company at: 1408 North Westshore Boulevard, Suite 900, Tampa, Florida 33607, (612) 371-1111.

COMMUNITY DEVELOPMENT DEPARTMENT

ADMINISTRATIVE DETERMINATION

TOPIC: Mazama Pocket Gopher Screening

APPROVED: _____ DATE: 7/25/18

Michael Matlock, AICP
Community Development Director

BACKGROUND: The Mazama Pocket Gopher (MPG) became a federally listed endangered species in April 2014. This memo addresses the City regulatory structure. The Endangered Species Act (ESA) is a separate regulatory structure from the Growth Management Act, the State statute the City does implement, so compliance with City regulations does not necessarily mean an applicant complies with the ESA. While the City routinely addresses questions from property owners on how to comply with its local development regulations, it does not do so with respect to the ESA.[1] ESA compliance is the property owner's responsibility.

FINDINGS: In implementing the City's critical areas ordinance (CAO), and based on analysis prepared by qualified professionals, staff have found that projects in certain areas and with certain features lack gopher habitat, so do not require CAO review by a qualified professional. While the CAO governs these issues, the below summarizes what staff have found to date.

DETERMINATION: Based on the findings above, Tumwater summarizes assessment findings for MPG presence as follows:

1. **Geographic** – Due to lack of habitat, no properties in the City north of Trosper Road have required CAO review.
2. **Vegetative Cover** – Project Sites, parcels, or portions of these sites with 30% or greater forested cover have not required CAO review, although where there are adjacent unforested and undeveloped lots exceeding 7,600 square feet (SF) in area, CAO review may be needed.
3. **Project Use Level** –
   a. Single-family, manufactured homes, and duplexes for lots 7,600 SF or less
      1) New or additions to single-family, manufactured homes, and duplexes – CAO review has typically not been required on existing lots 7,600 SF

[1] For land owners seeking guidance on ESA compliance, while the City cannot assist, see USFWS Memorandum, Guidance on Trigger for an Incidental Take Permit Under Section 10(a)(1)(B) of the Endangered Species Act Where Occupied Habitat or Potentially Occupied Habitat is Being Modified, issued April 26, 2018.

or less in size. Unforested and undeveloped lots exceeding 7,600 SF may require CAO review.

2) Developed lots surrounded by existing development (homes, streets, storm ponds, sidewalks, etc.) that are of a similar size have not required CAO review. This would not exclude sites on the periphery areas where adjacent lands are not developed at an urban density level.

3) Single-family lots vested under RCW 58.17 and/or TMC 15.44.040 will likely not require CAO review.

b. Commercial/Industrial/Institutional

1) New or additions to buildings proposed in areas with 30% or greater forested coverage, existing impervious surfaces or significantly disturbed pervious areas (i.e. evidence of compacted gravel, formal landscape areas or other scenarios that would exclude the proposed developed area as being defined as habitat) have typically not required CAO review.

4. **Approved United States Fish and Wildlife Service (USFWS) Avoidance/Mitigation Strategy** – Any projects that have consulted with USFWS and have a documented avoidance/mitigation strategy that is acceptable to USFWS can typically proceed with normal permitting.

5. **Site Screening** – Properties may be screened by a qualified professional. Alternately, USFWS may screen properties by arrangement between the property owner and USFWS. At least two screenings, no less than 30 days apart, between June 1 and October 31, are consistent with best available science to determine the presence or absence of MPG.

PRIOR GUIDANCE: This Administrative Determination supersedes and replaces the City's prior Administrative Determination on Mazama Pocket Gopher Screening Protocol dated October 31, 2017.

APPEAL: This code determination shall become effective on the above date. Any person affected by this determination may appeal this decision to the Tumwater Hearing Examiner pursuant to Chapter 18.62 of the Tumwater Municipal Code.