CITY OF
TUMWATER

PLANNING COMMISSION
MEETING AGENDA

Online via Zoom and In Person at
Tumwater Fire Department
Headquarters, Training Room, 311 Israel
Rd. SW, Tumwater, WA 98501

Tuesday, January 09, 2024
7:00 PM

1. Call to Order
2. Roll Call
3. Changes to Agenda
4. Approval of Minutes
    a. Tumwater Joint City Council and Planning Commission Meeting Minutes 12-12-2023
5. Commissioner's Reports
6. Manager's Report
7. Public Comment
8. 2025 Comprehensive Plan Periodic Update – Transportation
9. Ordinance No. O2023-017, TMC 18.38 FP Floodplain Overlay
10. Resolution No. R2024-001, Fourth Edition Hazards Mitigation Plan for the Thurston Region
11. Next Meeting Date - 01/23/2024
12. Adjourn

Meeting Information
The public are welcome to attend in person, by telephone or online via Zoom.

Watch Online
https://us02web.zoom.us/webinar/register/WN_xpZkLfUrQ7C_zfteJFQoIw

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Public Comment
The public is invited to attend the meeting and offer comment. The public may register in advance for this webinar to provide comment:

https://us02web.zoom.us/webinar/register/WN_xpZkLfUrQ7C_zfteJFQoIw

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

The public may also submit comments prior to the meeting by sending an email to: cdd@ci.tumwater.wa.us. Please send the comments by 1:00 p.m. on the date of the meeting. Comments are submitted directly to the Commission Members and will not be read individually into the record of the meeting.

If you have any questions, please contact Planning Manager, Brad Medrud at (360) 754-4180 or bmedrud@ci.tumwater.wa.us.

Post Meeting
Audio of the meeting will be recorded and later available by request, please email CityClerk@ci.tumwater.wa.us.

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 Clerk by calling (360) 252-5488 or email CityClerk@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 contact the City's ADA Coordinator directly, call (360) 754-4128 or email ADACoordinator@ci.tumwater.wa.us.

What is the Planning Commission?

> *The Tumwater Planning Commission is a citizen advisory commission that is appointed by and advisory to the City Council on the preparation and amendment of land use plans and implementing ordinances such as zoning. Actions by the Planning Commission are not final decisions; they are Commission recommendations to the City Council who must ultimately make the final decision. If you have any questions or suggestions on ways the Commission can serve you better, please contact the Community Development Department at (360) 754-4180.*

Decorum Statement
Welcome to the Planning Commission meeting. We thank you for attending.

The City Council encourages community engagement in local government and provides a variety of ways to participate.

The Chair of the Planning Commission will be responsible for conducting orderly and efficient meetings within the scheduled time. To accomplish that, the Chair will maintain order and decorum and can regulate inappropriate debate, repetitious discussion, and disruptive behavior when needed.

The Chair will recognize those that wish to speak and may limit the time allowed for individual comments. City staff will record questions and comments during the meeting. If an issue or question cannot be addressed during the meeting, City staff will address the issue or respond to the question by following up with the individual.

We respectfully request that attendees refrain from disruptions during the meeting and comply with decorum rules.

Thank you for participating.

CONVENE: 6:00 p.m.

PRESENT: Mayor Debbie Sullivan and Councilmembers Peter Agabi, Michael Althauser, Joan Cathey, Leatta Dahlhoff, Angela Jefferson, Eileen Swarthout.

Excused: Charlie Schneider.

Planning Commission: Chair Elizabeth Robbins and Commissioners Grace Edwards, Terry Kirkpatrick, Brandon Staff, Michael Tobias, and Anthony Varela.

Absent: Brian Schumacher and Kelly Von Holtz.

Staff: City Administrator Lisa Parks**,** Finance Director Troy Niemeyer, Transportation and Engineering Director Brandon Hicks, Water Resources and Sustainability Director Dan Smith, Planning Manager Brad Medrud, Communications Manager Ann Cook, and Land Use and Housing Planner Erika Smith-Erickson.

2024 LONG RANGE PLANNING WORK PROGRAM: Manager Medrud reported that the Planning Commission and staff develop a preliminary work program reviewed by the City Administrator and the Mayor for consideration by the City Council each year.

Manager Medrud reviewed 2023 accomplishments to include the addition of Housing and Land Use Planner Erika Smith-Erickson, who joined the department in 2023. Planner Smith-Erickson assumed the role of the City's first designated housing planner. Other notable achievements include the adoption of the rental registration ordinance, identification of 2023 Comprehensive Plan Amendments and Development Code Housekeeping Amendments, and a draft Hazard Mitigation Plan scheduled for adoption early next year. Many other planning processes are ongoing. The first is the 2025 Comprehensive Plan and Zoning Code Periodic Update, conclusion of a community survey, and the Habitat Conservation Plan (HCP). U.S. Fish and Wildlife Service (USFWS) provided some detailed comments on the HCP that will need to be addressed. Staff anticipates submitting an outline to USFWS of the City's approach to the comments early next year. Other work has been in support of the Regional Housing Council and the Equity Toolbox anticipated to be completed by mid-2024. As part of the project, the focus is primarily on tools that could be used for policy development. Work on the amendments in support of the Urban Forestry Management Plan will resume in March 2024.

Pending work includes potential amendments to the landscape, street tree, and tree and vegetation preservation ordinances. The work was nearly completed for presentation of draft ordinances to the Planning Commission when the City was notified of the pending adoption of the Washington

Wildland-Urban Interface Code. Staff suspended the update process and have since met with officials from the State Building Code Council to request some changes to the code.

The proposed work program is based on items proposed by the Council, the Planning Commission, staff, and the public. All proposals are folded within the proposed work program. For the 2024 work program, the department budgeted 3.1 FTEs, which requires the addition of one planner. Half of staff time will be devoted to the Comprehensive Plan Periodic Update process. Ongoing work within the work plan includes the HCP and Regional Housing Council support requiring another quarter FTE.

The joint meeting is an opportunity for the Council and Commission to discuss the proposed work program as well as review the roles as part of the process. The work program is comprised of four sections focusing on the Comprehensive Plan Amendment Docket and Development Regulations Docket, other planning projects, and general management and coordination. Included on the work program are below the line projects with no assigned staff but the work might be necessary as it supports the work program. If time becomes available or a higher priority is assigned, staff adjusts the work program. Approximately one quarter of the time will be focused on the Comprehensive Plan Periodic Update process excluding Development Code amendments. Other substantial initiatives are potential changes to development regulations, Urban Forestry Management Plan amendments, and Thurston County Title 22 amendments. Thurston County is wrapping up its joint planning processes with the City of Olympia and the City of Lacey. It is anticipated the Thurston County will direct staff to pursue updating the joint code between the City and the county as it has not been updated since 1995. Title 22 speaks to the City's growth management area and the county's codes that are not in alignment with the City's development codes.

Other planning projects are the Food System Plan with staff efforts on the plan scheduled next year, completion of the Hazard Mitigation Plan Update, managing the Multifamily Tax Exemption Program, code enforcement, and responding to public inquiries.

Tasks related to general management and coordination involves coordination with the code compliance team, transportation team, Green Team, stormwater team, and with GIS staff, as well as general coordination with local jurisdictions primarily with Thurston County and the City of Olympia. As a member of the Regional Housing Council, the City is required to dedicate a quarter FTE to support the Regional Housing Council.

Manager Medrud reviewed some discussion topics and asked for feedback on a series of questions:

- What went well with the 2023 long range work program and what could be improved? *Commissioner Dahlhoff recommended more crossover and touch points between the Commission and the Council. Scheduling the first joint meeting in December is too late.*

  Commissioner Tobias asked whether staff tracks any proposals originated by the Commission and staff that are either successful or changed by the Council as opposed to proposals that were changed during the review process.

  Councilmember Althauser responded that the Council has revised some recommendations based on the legal substance of the change that was not germane to the goal of the overarching issue. When the Council has made changes that are significant, the Council's common practice has been to refer the proposal to the Commission for a second vetting. Differences of opinions can occur in terms of the language of any proposal. As Chair of the General Government Committee, he recommends the Council should enact a process of returning differing proposals to the Commission for additional review and as an opportunity to promote an exchange of ideas and opinions between the Commission and the Council.

  Chair Robbins asked for feedback on what the Council believes a successful Comprehensive Plan should entail to assist the Commission.

  Councilmember Althauser commented that success is measured in a variety of ways as discussed to some degree by the General Government Committee. Councilmember Dahlhoff has been a strong advocate for ensuring public input and public interaction during the update of the Comprehensive Plan. Public accessibility has been an important goal and the General Government Committee has discussed ways to simplify the Plan to increase accessibility. Another option is production of a resident guide to the Comprehensive Plan. His vision for success is ensuring the vision established for the City is reflected throughout the Comprehensive Plan in all elements and strategies. Another important consideration is ensuring the public understands the Plan.

  Councilmember Cathey said the Council should provide some clarity by identifying the goals for 2024. At the last joint meeting two years ago, the goal was environment. Although progress occurred in some areas, more joint efforts by the Council and the Commission would assist in achieving more progress on environmental efforts. She stressed the importance of coordinating actions between the Commission and the Council to advance goals that have been identified by the Council. She questioned the terminology associated *with "equity" within City planning documents. It may affect how the City assigns zones. She thanked and acknowledged Commissioners for their efforts in support of the City.*

Councilmember Jefferson said she views the work of the Planning Commission as seamless with good communication between the two bodies because of the limited number of issues returned to the Commission.

Councilmember Althauser conveyed appreciation as both the Council and the Commission established realistic expectations at the beginning of the year of what could be achievable with current resources.

Councilmember Cathey encouraged Commissioners to consider items listed below the line to determine if some items deserve some attention or address some issues directly to the Council.

- How has coordination between the City Council and Planning Commission gone in 2023 and what can be improved in 2024?

  Commissioner Dahlhoff suggested hosting a community forum next year with the Planning Commission and possibly other Commissions and Boards, as it would fall within the timeline of the update of the Comprehensive Plan.

- Are there additional projects in 2024 to be considered? If so, what projects currently proposed can be delayed?

  Commissioner Dahlhoff said she would provide staff with a list, as the current list might be modified or edited because the Council has not held its retreat at this time. Councilmember Cathey agreed and pointed out that the question would be timelier after the Council's retreat.

  Councilmember Swarthout offered that climate change would be a priority moving forward. Another issue is funding another position to focus on climate change because the existing staff position is responsible for both sustainability and climate change. The Council should consider budgeting another position focused only on climate change.

  Councilmember Althauser said the work plan item for the parks and open space element lacks a long-range plan for the golf course. The property will be paid in full in the next several years and a community conversation is warranted to discuss whether to retain the property as a golf course or consider another use of the property.

Councilmember Cathey expressed some reservation with the suggestion as it speaks to a topic that she believes is important for both the Council and the Commission to consider. One of the challenges next year and beyond is to ensure efforts on economic development align with the environment. Today, the planet is facing a climate crisis and efforts and actions by the Council must be balanced. The golf course is an environmental issue with a river running through the property. Decisions by the Council, Commission, and planning staff for the future must be balanced recognizing the climate crisis in all decisions.

- If adjustments to the 2024 long range work program are needed, what projects have less priority?

  The Council supported deferring the question until after the Council's retreat.

Manager Medrud reported the General Government Committee is scheduled to receive a briefing as a follow-up on the discussion in January. Staff will then seek approval of the Work Program at the Council's January 16, 2024 meeting. The Work Program can also be amended at any time.

2025 COMPREHENSIVE PLAN PERIODIC UPDATE – SURVEY SNAPSHOT:

Manager Medrud referred to the survey documents contained in the agenda packet.

Commissioner Tobias inquired about the date the survey closes. Manager Medrud advised that staff is coordinating the date but that the survey would likely close in January based on the response rate.

Councilmember Dahlhoff questioned how staff plans to aggregate the survey data based on conflicting responses. Manager Medrud advised that the purpose of the survey is soliciting opinions, which may often be conflicting. Staff plans to compile the data to produce a concise and comprehensible synopsis of the survey results.

Councilmember Althauser asked whether survey responses would be weighted based on specific demographics. Manager Medrud explained that the request is likely beyond the scope of the contract; however, the contractor and staff will strive to quantify survey data.

Commissioner Tobias inquired as to whether the City measures the immediate impact of certain projects, Comprehensive Plan amendments, or areas of prioritization. He cited the example of measuring outcomes by allowing more accessory dwelling units or increasing housing density.

Councilmember Swarthout added that it would also be important to ascertain the cost to the City versus the benefit of the Council's action to offer a property tax exemption program for some housing. The City adopted the program many years ago and it is only recently that some developers are beginning to take advantage of the program. It would be important to provide information to the Council on the cost/benefit aspect of the program.

MAYOR/CITY ADMINISTRATOR'S REPORT:

Mayor Sullivan reminded the Council that the December 19, 2023 Council meeting and the December 26, 2023 Council worksession have been cancelled. She conveyed wishes for Councilmembers and Commissioners to enjoy the holidays.

In response to previous questions from Councilmembers Agabi and Cathey, Mayor Sullivan advised the ordinance to amend Tumwater Municipal Code on public parks is scheduled for discussion by the Council in January on the approach for community involvement.

City Administrator Parks added that staff is working on providing accurate information to communicate to the community and to many community members who have communicated with the City to include recommendations on timing and the methodology for communicating with the community. Staff will present a recommended strategy on communicating with the public and alternatives for the Council to consider with respect to the direction of the ordinance.

Commissioner Dahlhoff noted that the timing of the City's process should consider the status of the appeal of the Ninth Circuit Court decision as the appeal process could change outcomes. Mayor Sullivan said the pending appeal would be included in the Council's discussions.

Commissioner Agabi recommended scheduling a public hearing to receive testimony that could be presented and considered by the Council during its discussions. Mayor Sullivan said staff efforts are focused on determining the type of community engagement as it could include scheduling a public hearing or hosting an open house. Staff is working on those details for the Council's conversations in January.

ADJOURNMENT:

With there being no further business, Mayor Sullivan adjourned the meeting at 7:13 p.m.

Prepared by Valerie L. Gow, Recording Secretary/President
Puget Sound Meeting Services, psmsoly@earthlink.net

TO: Planning Commission

FROM: Mary Heather Ames, Assistant Transportation & Engineering Director

DATE: January 9, 2024

SUBJECT: 2025 Comprehensive Plan Periodic Update – Transportation

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1) Recommended Action:

This is a discussion item about the Transportation Plan for the 2025 Comprehensive Plan periodic update.

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2) Background:

On a ten-year cycle, the City is required to conduct a Growth Management Act periodic update of its Comprehensive Plan and related development regulations. For the current cycle, the City is required to complete work on the periodic update by June 30, 2025. Work on the periodic update started last fall.

The updated Comprehensive Plan will address diversity, equity, and inclusion throughout the Plan. 2025 Comprehensive Plan Update | City of Tumwater, WA contains links to guidance material and information about the update.

The intent of this work session is to discuss the current version of the Transportation Plan and guidance for its update.

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3) Alternatives:

- ❑ None.

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4) Attachments:

A. Staff Report
B. Presentation
C. Transportation Plan, November 2016
D. Transportation Plan Appendices, November 2016

MEMORANDUM

Date: January 9, 2024

To: Planning Commission

From: Mary Heather Ames, Assistant Transportation & Engineering Director

2025 Comprehensive Plan Update – Transportation Plan

On a ten-year cycle, the City is required to conduct a Growth Management Act periodic update of its Comprehensive Plan and related development regulations. For the current cycle, the City is required to complete work on the periodic update by June 30, 2025. Work on the periodic update started last fall.

The updated Comprehensive Plan will address diversity, equity, and inclusion throughout the Plan and incorporate a large number of state required changes addressing housing, climate change, and other topics.

The intent of the Planning Commission meeting on Tuesday, January 9, 2024, is to start the discussion of the Transportation Plan by discussing the state requirements and introducing the current version.

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1 – Growth Management Act – Transportation Goals

The state Growth Management Act (Chapter 36.70A Revised Code of Washington (RCW)) requires that the City demonstrate that each Element in its Comprehensive Plan meets the relevant fifteen planning goals contained within the Act. The fifteen goals guide the development and adoption of the City's Comprehensive Plan and development regulations. They are not listed in order of priority.

The following is a summary of how the updated Transportation Plan will need to meet the goals.

3. ***Transportation.*** *Encourage efficient multimodal transportation systems that will reduce greenhouse gas emissions and per capita vehicle miles traveled, and are based on regional priorities and coordinated with county and city comprehensive plans.*

   The Transportation goal was updated in 2023 by the state legislature to add reducing greenhouse gas emissions and per capita vehicle miles traveled. Achieving this goal will be done through a combination of goals, policies, and actions in the Land Use Element and Transportation Plan. The Land Use Element will contain goals, policies, and actions that ensure coordination with regional and local transportation plans. The Land Use Element will also propose residential, mixed-use, and neighborhood commercial land use designations that will encourage multi-modal, transit oriented development. Coordination with the new Climate Element will also be required.

2 – Current Transportation Plan

A – Background

The Transportation Master Plan looks at the transportation network within Tumwater and recommends projects to improve the network for forecasted future conditions. The plan considers all modes of travel and looks at system performance while also discussing funding and needs.

The 2016 Transportation Master Plan is consistent with the plans of our neighboring communities and regional partners.

The 2016 Transportation Master Plan covered the 20-year planning period from 2016 to 2036 and provides the functional framework for realizing Tumwater's transportation vision:

> *"Tumwater's transportation system provides for the safe, efficient, cost-effective movement of people and goods in ways that support adopted land use plans, enhance neighborhood and community livability, support a strong and resilient economy, and minimize environmental impacts." – page 6*

The Transportation Master Plan includes maps that show Roadway Functional Classification, Strategy Corridors, Bike Facilities and Pedestrian Facilities. Other maps include Street and Intersection Projects, Bike Projects and Pedestrian Network Project Needs.

B – Structure

The current Transportation Master Plan consists of the following chapters:

1. Introduction
2. Vision
3. Sub-Area Plans
4. Consistency
5. Modes of Travel
6. Managing Demand
7. Future Conditions
8. Goals and Policies
9. System Inventory
10. System Performance
11. Capital Improvements
12. Funding
13. Opportunities & Needs

C – Link to Current Transportation Plan

https://www.ci.tumwater.wa.us/departments/community-development-department/tumwater-comprehensive-plan

D – Link to State Guidance for Updating Transportation Plans

Your Community's Transportation System (2012):

https://www.ci.tumwater.wa.us/departments/community-development-department/tumwater-comprehensive-plan/2025-comprehensive-plan-update

3 – Specific Topics Addressed as Part of the Update

1. General

A. Diversity, equity, inclusion, and environmental justice will be considered throughout the Comprehensive Plan.

B. All elements, plans, and maps will be updated and be internally consistent.

C. The updated Comprehensive Plan will consist of shorter individual Elements and Plans with a focus on simplified and updated goals, policies, and implementation actions with appendices that contain the required technical information.

D. A new Comprehensive Plan Goal and Policy Guide will be created for use by staff and policymakers as well as a new User Guide for community members.

E. Mutually agreeable Memorandum of Agreements between the City and tribes about collaboration and participation in the planning process will be discussed.

2. Transportation

- Update Maps.
- Update existing conditions and operations.
- Update planned improvements and future operations to 2045.
- Update transportation improvement program.
- Update financial analysis.
- Update traffic impact fees.
- Update estimated traffic impacts to state-owned transportation facilities resulting from land use assumptions to assist the State Department of Transportation in monitoring the performance of state facilities, to plan improvements for the facilities, and to assess the impact of land-use decisions on state-owned transportation facilities.
- Update land use assumptions used in estimating travel.
- Update facilities and service needs, including:
  - ➢ An inventory of air, water, and ground transportation facilities and services, including transit alignments and general aviation airport facilities, to define existing capital facilities and travel levels as a basis for future planning.
    - This inventory must include state-owned transportation facilities within the city or county's jurisdictional boundaries.
  - ➢ Level of service standards for all locally owned arterials and transit routes to serve as a gauge to judge performance of the system.

        - These standards should be regionally coordinated.
    - ➢ For state-owned transportation facilities, include the level of service standards for highways to gauge the performance of the system.
    - ➢ Identify specific actions and requirements for bringing into compliance locally owned transportation facilities or services that are below an established level of service standard.
    - ➢ Update forecasts of traffic for at least ten years based on the adopted Land Use Element to provide information on the location, timing, and capacity needs of future growth.
    - ➢ Identify state and local system needs to meet current and future demands.
        - Identified needs on state-owned transportation facilities must be consistent with the statewide multimodal transportation plan.
- Update financial analysis, including:
    - ➢ An analysis of funding capability to judge needs against probable funding resources.
    - ➢ A multiyear financing plan based on the needs identified in the Comprehensive Plan, the appropriate parts of which shall serve as the basis for the six-year street, road, or transit program required for cities and for public transportation systems.
        - The multiyear financing plan should be coordinated with the ten-year investment program developed by the state Office of Financial Management.
    - ➢ If probable funding falls short of meeting identified needs, a discussion of how additional funding will be raised, or how land use assumptions will be reassessed to ensure that level of service standards will be met.
- The Transportation Plan, the six-year Capital Facilities Plans for cities and for public transportation systems, and the ten-year investment program for the state, must be consistent.
- Provide a projection of state and local system needs to meet current and future demand.
- Provide a pedestrian and bicycle component to include collaborative efforts to identify and designate planned improvements for pedestrian and bicycle facilities and corridors that address and encourage enhanced community access and promote healthy lifestyles.
- Consider approaches that increase physical activity.
- Describe any existing and planned transportation demand management strategies, such as high occupancy vehicle lanes or subsidy programs and parking policies.
- Provide an analysis of future funding capability to judge needs against probable funding resources.

- Provide a multi-year financing plan based on needs identified in the Comprehensive Plan, the appropriate parts of which serve as the basis for the six-year street, road, or transit program.
- If probable funding falls short of meeting identified needs, provide a discussion of how additional funds will be raised, or how land use assumptions will be reassessed to ensure that level of service standards will be met.
- Describe intergovernmental coordination efforts, including an assessment of the impacts of the Transportation Plan, land use assumptions on the transportation systems of adjacent jurisdictions, and how the Plan is consistent with the regional transportation plan.
- Identify lands useful for public purposes such as utility corridors, transportation corridors, landfills, sewage treatment facilities, stormwater management facilities, recreation, schools, and other public uses.
- Identify open space corridors within and between urban growth areas, including lands useful for trails.
- Update, as needed, the process or criteria for identifying and locating essential public facilities in coordination with the update of the Lands for Public Purposes Element.
- Update demand-management strategies.
- Update information on pedestrian and bicycle component to include collaborative efforts to identify and designate planned improvements for pedestrian and bicycle facilities and corridors that address and encourage enhanced community access and promote healthy lifestyles.
- Revisions to allow for some form of Intercity Transit turnarounds on Littlerock Road and Old Highway 99 to allow for future transit services.
- Update to include work done on the Thurston Thrives walkability study, Intercity Transit studies, and the Old Highway 99 Corridor Study.
- Allow active transportation facilities, transportation demand management, or public transportation services to meet concurrency.
- Incorporate equitable implementation.
- Estimate multimodal level of service impacts to state transportation facilities.
- Add impact fee revenue for bike and pedestrian facilities.
- Provide multimodal level of service and needs forecasts for arterials, transit routes, and active transportation facilities.
- Give priority to the greatest multimodal safety benefit to each category of roadway users.
- Include Americans with Disabilities Act transition plan.
- Provide funding analysis that includes state transportation facilities.

4 – Schedule

Phase 2 – Plan Development (Winter 2024 – Fall 2024)

Feedback gathered through the community outreach process will be incorporated into the draft Transportation Plan. Staff will present the drafts to the Planning Commission and General Government Committee as well as external and internal stakeholders and focus groups comprised of subject-area experts for review.

- Continuing Community Outreach – January 2024 –June 2024
- Transportation Plan Development Meetings
  1. Includes Appendices and Maps
  2. Planning Commission Work Session
     - June 11, 2024
     - August 27, 2024
  3. General Government Committee Briefing
     - August 14, 2024
- Commerce Preliminary Review
  - Review of Comprehensive Plan Format
    - March 2024
- Complete Draft of Comprehensive Plan
  - All Elements, Maps, and Appendices
  - July 2024 – October 2024

Phase 3 – Legislative Process (Fall 2024 – June 30, 2025)

Staff will complete a draft version of the Comprehensive Plan during Phase III. Staff will present the draft to the Planning Commission and General Government Committee as well as external and internal stakeholders for review.

The Planning Commission will hold a number of work sessions to discuss the Comprehensive Plan and then conduct a public hearing to gather formal public comment on the draft Comprehensive Plan before developing findings of fact, conclusions, and recommendations that will be forwarded to City Council.

The City Council will hold a number of work sessions to discuss the Comprehensive Plan. The City Council will consider the recommendation forwarded by the Planning Commission.

The process will culminate in the adoption of an updated Comprehensive Plan by the Growth Management Act deadline of June 30, 2025.

1) Community Outreach

- Final Actions:
  - To be determined based on the results of Phase 2 and the Community Outreach Plan.

2) Schedule

- Commerce Review
  - Fall 2024 – Winter 2025
- Prepare Comprehensive Plan Update Ordinance
  - October 2024
- SEPA Review
  - November 2024 – December 2024
- Commerce Notice of Intent
  - November 2024 - December 2024
- Public Adoption Meetings
  1. Planning Commission
     - Briefing
       - November 26, 2024
     - Work Session
       - December 10, 2024 (Joint with City Council)
       - January 14, 2025
       - February 11, 2025
     - Public Hearing
       - February 25, 2025
  2. General Government Committee
     - Briefing for Comprehensive Plan Update Ordinance
       - March 12, 2025
  3. City Council Work Session
     - December 10, 2024 (Joint with Planning Commission)

    - April 15, 2025
    - May 27, 2025
4. City Council
    - June 17, 2025

- Notice of Adoption
    1. Submit Notice of Adoption to Commerce
    2. June 30, 2025

Appendix A – Guidance

The State Department of Commerce has provided guidance specific to the periodic update on their Periodic Update webpage

> https://www.commerce.wa.gov/serving-communities/growth-management/periodic-update/

> www.commerce.wa.gov/serving-communities/growth-management/growth-management-topics

In addition, the Puget Sound Regional Council is conducting a series of workshops on a variety of topics related to the periodic update.

> www.psrc.org/our-work/passport-2044-comprehensive-plan-workshop-series)

The Municipal Research Services Center has a Comprehensive Planning webpage.

> https://mrsc.org/getdoc/d7964de5-4821-4c4d-8284-488ec30f8605/Comprehensive-Planning.aspx

Appendix B – Current Transportation Plan Goals and Policies

Transportation goals and policies provide a framework for transportation decision-making. The policy elements in this Plan derive from a regionally-coordinated process and are consistent with the Regional Transportation Plan and Sustainable Thurston, both of which are regional policy initiatives supported by Tumwater. The goals and policies in this Transportation Master Plan support localized efforts while maintaining consistency with established regional objectives and the policy frameworks of adjacent communities.

1. Transportation and Land Use Consistency

Goal: Ensure the design and function of transportation facilities are consistent with and support sustainable, healthy urban, suburban, and rural communities.

Policies:

a. Commit to the development and implementation of land use plans, development patterns, parking requirements, and design standards that encourage walking, bicycling, transit use, and other alternatives to driving alone.

b. Provide transportation facilities that support the location of jobs, housing, industry, and other activities as called for in Tumwater's adopted land use plan.

c. Support policies, programs, and procedures that promote urban infill, and make transportation investments that support increased urban densities and mix of uses consistent with Tumwater's plans for the Brewery District and Capitol Boulevard.

d. Create vibrant city centers and activity nodes that support active transportation and housing, jobs, and services as called for in Tumwater's Comprehensive Plan.

e. Create safe and vibrant neighborhoods with places that build community and encourage active travel.

f. Create urban parks and places that reduce pressure on the region's farms, forests, prairies, and open spaces.

g. Meet mobility, access, and economic goals in designated Strategy Corridors with an appropriate combination of investments, policies, and land use measures.

h. Design and invest in transportation projects that have a lasting positive impact, reflect the goals of the people who live and work in Tumwater, and contribute to a sense of place and community.

i. Ensure adequate transportation capacity to address growth consistent with this Comprehensive Plan.

j. Preserve and promote awareness of Tumwater's historic, cultural, and natural heritages.

2. Multimodal Transportation System

Goal: Work toward an integrated, multimodal transportation system that supports adopted land use plans, reduces overall need to drive, and provides alternative travel choices.

Policies:

a. Provide quality travel choices appropriate to existing and future land uses, including walking, bicycling, transit, motor vehicles including freight, and rail.

b. Ensure that development of transit transfer centers, activity centers, employment centers, schools, and the airport accommodate multiple modes of travel and safe, efficient connections among those modes of travel.

c. Invest in mode-specific strategies that contribute to overall development of an integrated, multimodal transportation system.

d. Promote public awareness on the rights and responsibilities of drivers, bicyclists, and walkers, and ways these modes can travel together safely and efficiently.

e. Incorporate practical design considerations where appropriate, designing to solve mobility problems more so than to meet design standards if doing so increases functional mobility of the transportation system.

3. Barrier-free Transportation

Goal: Ensure transportation system investments support the special travel needs of youth, elders, people with disabilities, people with literacy or language barriers, those with low incomes, and other affected groups.

Policies:

a. Work over time to ensure that transportation facilities comply with the Americans with Disabilities Act.

b. Construct transit stops and walkway approaches that are accessible for those with differing capabilities.

c. Provide appropriate transportation services, facilities, programs, and on-line resources that reduce barriers to people who do not speak or read English.

d. Present information and provide public participation opportunities for everyone, including people with physical disabilities and/or people with limited literacy skills.

e. Implement land use policies that provide a variety of housing types on corridors with excellent transit service connecting to employment centers, services, retail, health care, and other essential services to support the lifestyles of people who cannot drive.

4. System Safety and Security

Goal: Enhance the safety and security of those who use, operate, and maintain the transportation system.

Policies:

a. Combine education, enforcement, engineering, and evaluation to maintain and enhance system safety.

b. Design transportation infrastructure to encourage safe user behavior.

c. Support projects that improve passenger safety and security at facilities like park-and-ride lots and transit transfer centers.

d. Provide safe walking routes to schools.

e. Retrofit essential transportation facilities where possible to improve their ability to withstand a major earthquake or other natural disaster.

f. Build in system redundancy through a well-connected street grid to support emergency response and reduce community disruption during natural or man-made disasters.

g. Encourage coordination between transportation system providers and emergency response providers who rely on that system.

5. System Maintenance and Repair

Goal: Protect investments that have already been made in the transportation system and keep life-cycle costs as low as possible.

Policies:

a. Prioritize maintenance, preservation, operation, and repair of the existing transportation system.

b. Use preventive maintenance programs to ensure lowest life-cycle costs.

c. Use street restoration standards and coordinate utility and street projects to minimize destructive impacts of utility projects on streets, leveraging where possible investments for both project types to deliver more cost-effective public facilities.

d. Explore innovative programs that reduce infrastructure life-cycle costs or increase efficiency of service delivery, including use of new materials, technologies, and resource partnerships.

6. Travel Demand Management

Goal: Increase overall operating efficiency of the transportation system through the effective use of measures that reduce the need to drive alone.

Policies:

a. Promote transportation-efficient development and redevelopment, and site public services and facilities where transit, walking, and biking are now or will be viable alternatives to driving alone.

b. Encourage use of public transportation, ridesharing, biking, and walking by improving access, convenience, and reliability of those options.

c. Sustain and expand private and public sector programs and services that encourage employees to commute to work by means other than driving alone, or to change commuting patterns through teleworking, flex-time, or compressed work weeks.

d. Manage parking to improve consistency with transportation demand management objectives.

e. Promote technologies that enable people to meet their needs without having to travel.

f. Use travel demand management techniques to provide alternatives during temporary congestion, such as during major construction.

g. Work to mainstream telework as a primary transportation demand management strategy among public and private employers.

h. Strive to meet State Commute Trip Reduction targets for the City.

7. Transportation Technologies

Goal: Use technology-based approaches to address transportation congestion, safety, efficiency, and operations.

Policies:

a. Use transportation technologies to improve the operating efficiency and safety of the existing transportation system.

b. Use transportation technologies to better integrate transportation modes.

c. Make short-range technology investments that support future technology implementation strategies.

d. Look for opportunity to integrate transportation technology considerations in all projects.

e. Recognize that transmittal of electronic information is an important function of a transportation system, and integrate this into transportation system evaluation, policies, and implementation strategies.

8. Freight Mobility

Goal: Promote efficient, cost-effective, timely, and safe movement of the freight within and through the region.

Policies:

a. Plan for freight access to and from highways and other major freight corridors, and between intermodal facilities and industrial areas.

b. Support efforts to increase the amount of freight that is moved by rail to enhance efficiency, productivity, safety, and mobility.

c. Explore strategies to reduce conflict and optimize safety for all transportation system users where industrial or commercial land uses are adjacent to highly urbanized areas.

d. Implement policies and design standards that support local economic vitality by accommodating delivery trucks serving businesses and services while minimizing impacts on local streets.

9. Streets, Roads, and Bridges

Goal: Establish a street and road network that provides for the safe and efficient movement of people and goods while supporting adopted land use goals.

Policies:

a. Design and construct multimodal, context-sensitive, complete streets and roads.

b. Coordinate regionally to identify new connections that provide more direct routes and reduce vehicle miles traveled.

c. Avoid widening any local arterial or collector more than two through-lanes in each direction with auxiliary turn lanes where warranted (maximum five lanes mid-block width) to preserve an acceptable community scale and minimize transportation impacts on non-motorized travelers and adjacent land uses.

d. Develop an interconnected grid of local streets and roads to increase individual travel options and neighborhood connectivity, while improving efficient use of the overall transportation system.

e. Use new technologies or alternative designs to safely and efficiently manage the flow of traffic, such as roundabouts where appropriate as alternatives to traffic signals or stop signs.

f. Use access management techniques to improve roadway capacity and operating efficiency, and increase overall system safety.

g. Ensure that street, road, and bridge projects are integrated with pedestrian amenities in districts and neighborhoods, and add lasting value to the community.

h. Incorporate alternative strategies to address congestion where road widening and traffic control devices are not suitable, particularly along Strategy Corridors.

m. Strategy Corridors are places where street widening is not a preferred option to address congestion problems. This may be because the street is already at the maximum number of lanes (5), or that adjacent land uses are either fully built out or are environmentally sensitive. In strategy corridors, level of service (LOS) may not meet adopted standards, suggesting instead that a different approach is needed for maintaining access and mobility in these areas such as increased transit service, more sidewalks or bike facilities, a complete and connected street grid, transportation technology measures that improve system operating efficiency, access management, parking management, incentives for employees to telework or carpool, or land use measures that increase the density of land use activities in these corridors that support the best alternatives to driving.

i. Design and build streets that are important freight or bus routes to reduce weather-induced weight restrictions.

j. Meet pm peak Level of Service (LOS) standards:

- LOS E or better in Urban Core Areas [where these areas overlap with Strategy Corridors the LOS may exceed adopted standards]
- LOS D or better elsewhere inside the City limits

10. Public Transportation

Goal: Provide an appropriate level of reliable, effective public transportation options commensurate with the region's evolving needs.

Policies:

a. Support Intercity Transit's long-range plan emphasizing trunk and primary routes servicing core areas along designated Urban Corridors and other strategy corridors with supportive land use and appropriate design standards.

b. Increase the share of trips made by public transportation.

c. Support regional commuter vanpool programs to provide cost-effective, flexible alternatives to commuting in single-occupancy vehicles.

d. Support safe, convenient, and cost-effective transportation services for youth, elders, people with disabilities, and low-income populations by increasing the supply of housing on high-quality transit corridors.

e. Schedule public meetings where possible in locations served conveniently by transit; include transit route information on meeting notices.

f. Integrate public transportation considerations into the planning for newly emerging urban centers and locations such as those south and east of the airport, including innovative partnerships or programs where fixed-route service is not feasible in the near-term.

11. Bicycling

Goal: Increase the share of all trips made safely and conveniently by bicycle.

Policies:

n. Develop a continuous, safe, and convenient bicycle network that functions as an integral part of the whole transportation system.

o. Provide safe and convenient bicycle routes to all schools in the city, and encourage their use.

p. Participate with regional partners in developing a network of contiguous and interconnected

north-south and east-west dedicated shareduse corridors to serve as the backbone for the region’s non-motorized transportation system.

q. Provide bicycle parking facilities at transit centers, park-and-ride locations, and other multimodal locations.

r. Provide short- and long-term bicycle parking and other supporting facilities at locations like schools, employment sites, and activity centers.

s. Support education programs for motorists and bicyclists to increase understanding and awareness of bicycling laws, and encourage safe and lawful sharing of the streets.

t. Participate with regional partners in exploring longterm strategies for funding bicycle facilities and services.

12. Walking

Goal: Increase the share of all trips made safely and conveniently by walking.

<u>Policies:</u>

a. Provide a convenient, interconnected, safe pedestrian network that supports existing and desired land uses.

b. Construct and maintain safe and accessible sidewalks and effective crossing opportunities within an appropriate distance of every school in the city, and encourage their use.

c. Provide frequent pedestrian crossings, especially in urban areas and on urban corridors, along transit routes, and near activity centers.

d. Develop and promote non-motorized connections for pedestrian and bike travel to shorten the length of trips to destinations where walking and biking are viable travel options.

e. Require pedestrian-friendly site design and building standards in activity centers, along urban corridors and other key transit routes, and in high density mixed-use zoning districts.

f. Provide street lighting, pedestrian buffers, trees, benches, and other street elements that make walking safe and pleasant.

g. Encourage neighborhood-scale planning efforts to identify and refine important pedestrian routes that increase connectivity and improve walkability.

h. Consider asphalt walkways as appropriate practical solutions for sidewalks when functional pedestrian mobility needs to be improved prior to the availability of adequate funds for construction as called for in adopted sidewalk and street design standards.

13. Rail

Goal: Ensure the continued long term viability of existing and rail-banked rail lines for future freight and passenger rail travel.

Policies:

a. Support appropriate regional opportunities for the potential shared use of freight rail lines for passenger rail travel.

b. Advocate for regional acquisition and continued operation of short-line railroads where needed to support current and future economic development needs.

c. Use design techniques, technology, and operations coordination to minimize potential conflicts between trains and other modes of travel, and between trains and adjacent land uses.

d. Work with regional partners to acquire railroad rights-of-way threatened with abandonment in order to preserve these corridors for future transportation uses.

e. Participate as appropriate in the partnerships necessary to foster efficient, high-speed passenger rail service in the Pacific Northwest.

f. Coordinate with regional partners to position the Thurston Region for a commuter rail connection in the future.

14. Aviation

Goal: Provide an appropriate level of facilities and services to meet the general aviation needs of residents and businesses in the region.

Policies:

a. Coordinate with the Port of Olympia and Thurston County to maintain consistency between adopted land use plans and long-range airport development strategies, and ensure land use compatibility in areas adjacent to the airport.

b. Support multimodal access to the Port of Olympia's airport terminal.

15. Public Involvement

Goal: Build a community of engaged and informed constituents that contributes ideas and supports actions to create a highly functional multimodal transportation system consistent with the goals and policies of this transportation element.

Policies:

a. Provide broad-based, early, and continuing public involvement opportunities in all aspects of the transportation planning process.

b. Ensure equal access to participation for all users of the transportation system.

c. Promote increased public understanding of the relationships between land use patterns and transportation choices facing Tumwater.

d. Explore innovative participation techniques to increase public involvement in transportation issues, and maximize use of "plain English" and other communication techniques to translate complex issues or decisions so they can be widely understood.

16. Intergovernmental Coordination

Goal: Ensure transportation facilities and programs function seamlessly across community borders.

Policies:

a. Participate in coordination activities at the local, regional, state, tribal, and federal level that address the condition or operations of the transportation system.

b. Work with other agencies to coordinate land use and public facility siting decisions, implement countywide planning policies, and refine the tools needed to achieve transportation-efficient community development patterns.

c. Coordinate street projects with Olympia, Thurston County, WSDOT, and Intercity Transit as appropriate.

d. Coordinate development of local plan updates with regional efforts when possible to ensure consistency.

e. Collaborate with other local jurisdictions, TRPC, Intercity Transit, the Port of Olympia, the Thurston EDC, and other entities to facilitate informed, reasoned decision-making processes that advance shared transportation and land use objectives.

17. Environmental and Human Health

Goal: Minimize transportation impacts on the natural environment and the people who live and work in Tumwater.

Policies:

a. Protect water quality from the impacts of stormwater runoff by minimizing impervious surface area and by using low impact development methods where feasible to effectively treat and manage unavoidable runoff.

b. Use transportation planning, design, and construction measures that minimize negative impacts on priority fish-bearing streams and other environmentally sensitive areas.

c. Develop a transportation system that supports compact, mixed-use development and related nonmotorized travel to curb growth in miles of motor vehicle travel, increase energy efficiency, reduce environmental impacts, and encourage physical activity and community health.

d. Support state and national efforts to promote the use of alternative fuels and technologies that reduce pollution and other environmental impacts from motorized vehicles.

e. Ensure federal Title VI requirements for environmental justice are met so that minority populations and people with low incomes do not incur disproportionately high and adverse human health or environmental impacts from transportation policies, programs, and investments.

f. Comply with federal Clean Air Act transportation requirements.

g. Support policies and programs that reduce greenhouse gas emissions associated with travel.

h. Reduce the impacts of transportation on the natural environment during construction, retrofit, and maintenance.

i. Plan and design for impacts associated with changing weather and climate patterns, such as increased flooding and extreme weather events.

j. Support regional efforts to decrease annual per capita vehicle miles traveled within the Thurston region to:

- 1990 levels by 2020
- 30 percent below 1990 levels by 2035
- 50 percent below 1990 levels by 2050.

18. Performance Measures

Goal: Develop performance measures that are realistic, efficient to administer, effective in assessing performance, and meaningful to the public.

Policies:

a. Use transportation performance measures to evaluate, monitor, and respond to the performance of Tumwater policies and investments.

b. Use transportation performance measures that reflect priority city and regional objectives such as consistency of transportation and land use decision-making, improved mobility and access, adequate maintenance and repair of the system, environmental health, and safety.

c. Develop performance measures that reflect the needs and contributions of all modes of travel.

d. Where feasible, use performance measures consistent with those used by other agencies and organizations to enable compatible comparisons.

19. Transportation Funding

Goal: Secure adequate funding from all sources to implement the goals and policies in this plan.

Policies:

a. Provide timely and comprehensive public information about transportation funding issues and opportunities to better enable citizens to participate and make informed decisions on complex funding issues.

b. Prioritize the maintenance and preservation of the existing transportation system to minimize lifecycle costs.

c. Consider the full array of costs and benefits in the selection of transportation projects to ensure the best long-term investment decisions.

d. Make strategic transportation investments that reinforce land use and transportation decisions consistent with the goals and policies of this transportation element.

e. Ensure that transportation investments are equitable to all segments of the community in terms of costs associated with relocations, health impacts, and land use disruptions, as well as the benefits derived from system performance and travel choices.

f. Support regional efforts to improve the availability, reliability, and flexibility of transportation revenues.

g. Use transportation funding policies and investments to make development decisions predictable, fair, and cost-effective.

h. Continue policies that require new development to pay for its share of impacts on the transportation system; where appropriate support multimodal mitigations and not just street capacity.

Attachment B

Transportation Plan Review for the City of Tumwater's 2025 Comprehensive Plan Update

Balancing Nature and Community: Tumwater's Path to Sustainable Growth

CITY OF TUMWATER

Planning Commission – January 9, 2024

Intent

- Discuss Growth Management Act Transportation Plan Goals
- Present the current version of the Plan
- Consider specific issues for the Plan
- Consider how to incorporate diversity, equity, and inclusion throughout
- Discuss guidance materials

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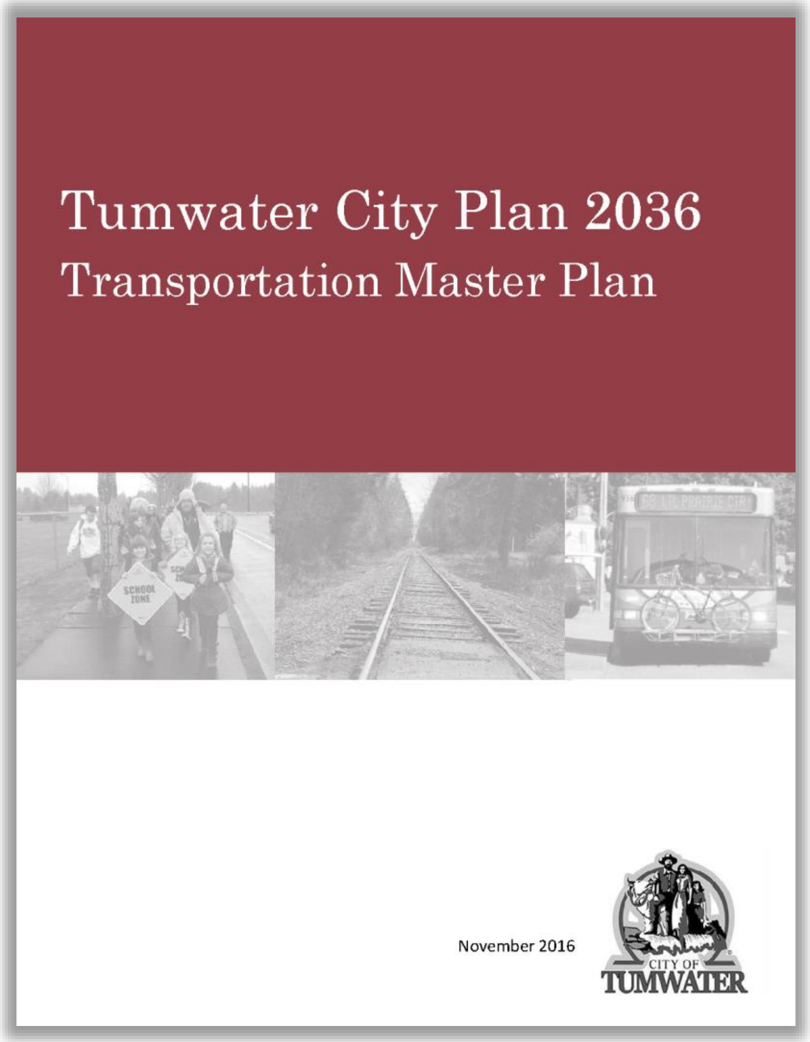
Growth Management Act Transportation Goal

3. ***Transportation**. Encourage efficient multimodal transportation systems that will reduce greenhouse gas emissions and per capita vehicle miles traveled, and are based on regional priorities and coordinated with county and city comprehensive plans.*

2016 Transportation Master Plan

Tumwater's transportation system provides for the safe, efficient, cost-effective movement of people and goods in ways that support adopted land use plans, enhance neighborhood and community livability, support a strong and resilient economy, and minimize environmental impacts.



2025 Topics to Address as Part of the Update

General

- Diversity, equity, inclusion, and environmental justice will be considered throughout the Comprehensive Plan
- All elements, plans, and maps will be updated and be internally consistent
- The updated Comprehensive Plan will consist of shorter individual Elements and Plans with a focus on simplified and updated goals, policies, and implementation actions with appendices that contain the required technical information
- A new Comprehensive Plan Goal and Policy Guide will be created for use by staff and policymakers as well as a new User Guide for community members
- Mutually agreeable Memorandum of Agreements between the City and tribes about collaboration and participation in the planning process will be discussed

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2025 Topics to Address as Part of the Update

Transportation

- Update Maps
- Update existing conditions and operations
- Update planned improvements and future operations to 2045
- Update transportation improvement program
- Update financial analysis
- Update traffic impact fees
- Update estimated traffic impacts to state-owned transportation facilities resulting from land use assumptions to assist the State Department of Transportation in monitoring the performance of state facilities, to plan improvements for the facilities, and to assess the impact of land-use decisions on state-owned transportation facilities
- Update land use assumptions used in estimating travel

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2025 Topics to Address as Part of the Update

- Update facilities and service needs, including:
  - An inventory of air, water, and ground transportation facilities and services, including transit alignments and general aviation airport facilities, to define existing capital facilities and travel levels as a basis for future planning
  - Level of service standards for all locally owned arterials and transit routes to serve as a gauge to judge performance of the system
  - For state-owned transportation facilities, include the level of service standards for highways to gauge the performance of the system
  - Identify specific actions and requirements for bringing into compliance locally owned transportation facilities or services that are below an established level of service standard
  - Update forecasts of traffic for at least ten years based on the adopted Land Use Element to provide information on the location, timing, and capacity needs of future growth
  - Identify state and local system needs to meet current and future demands

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2025 Topics to Address as Part of the Update

- Update financial analysis, including:
  - An analysis of funding capability to judge needs against probable funding resources
  - A multiyear financing plan based on the needs identified in the Comprehensive Plan, the appropriate parts of which shall serve as the basis for the six-year street, road, or transit program required for cities and for public transportation systems
  - If probable funding falls short of meeting identified needs, a discussion of how additional funding will be raised, or how land use assumptions will be reassessed to ensure that level of service standards will be met
- The Transportation Plan, the six-year Capital Facilities Plans for cities and for public transportation systems, and the ten-year investment program for the state, must be consistent
- Provide a projection of state and local system needs to meet current and future demand

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2025 Topics to Address as Part of the Update

- Provide a pedestrian and bicycle component to include collaborative efforts to identify and designate planned improvements for pedestrian and bicycle facilities and corridors that address and encourage enhanced community access and promote healthy lifestyles
- Consider approaches that increase physical activity
- Describe any existing and planned transportation demand management strategies, such as high occupancy vehicle lanes or subsidy programs and parking policies
- Provide an analysis of future funding capability to judge needs against probable funding resources
- Provide a multi-year financing plan based on needs identified in the Comprehensive Plan, the appropriate parts of which serve as the basis for the six-year street, road, or transit program
- If probable funding falls short of meeting identified needs, provide a discussion of how additional funds will be raised, or how land use assumptions will be reassessed to ensure that level of service standards will be met

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2025 Topics to Address as Part of the Update

- Describe intergovernmental coordination efforts, including an assessment of the impacts of the Transportation Plan, land use assumptions on the transportation systems of adjacent jurisdictions, and how the Plan is consistent with the regional transportation plan
- Identify lands useful for public purposes such as utility corridors, transportation corridors, landfills, sewage treatment facilities, stormwater management facilities, recreation, schools, and other public uses
- Identify open space corridors within and between urban growth areas, including lands useful for trails
- Update, as needed, the process or criteria for identifying and locating essential public facilities in coordination with the update of the Lands for Public Purposes Element
- Update demand-management strategies
- Update information on pedestrian and bicycle component to include collaborative efforts to identify and designate planned improvements for pedestrian and bicycle facilities and corridors that address and encourage enhanced community access and promote healthy lifestyles

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2025 Topics to Address as Part of the Update

- Revisions to allow for some form of Intercity Transit turnarounds on Littlerock Road and Old Highway 99 to allow for future transit services
- Update to include work done on the Thurston Thrives walkability study, Intercity Transit studies, and the Old Highway 99 Corridor Study
- Allow active transportation facilities, transportation demand management, or public transportation services to meet concurrency
- Incorporate equitable implementation
- Estimate multimodal level of service impacts to state transportation facilities
- Add impact fee revenue for bike and pedestrian facilities
- Provide multimodal level of service and needs forecasts for arterials, transit routes, and active transportation facilities
- Give priority to the greatest multimodal safety benefit to each category of roadway users
- Include Americans with Disabilities Act transition plan
- Provide funding analysis that includes state transportation facilities

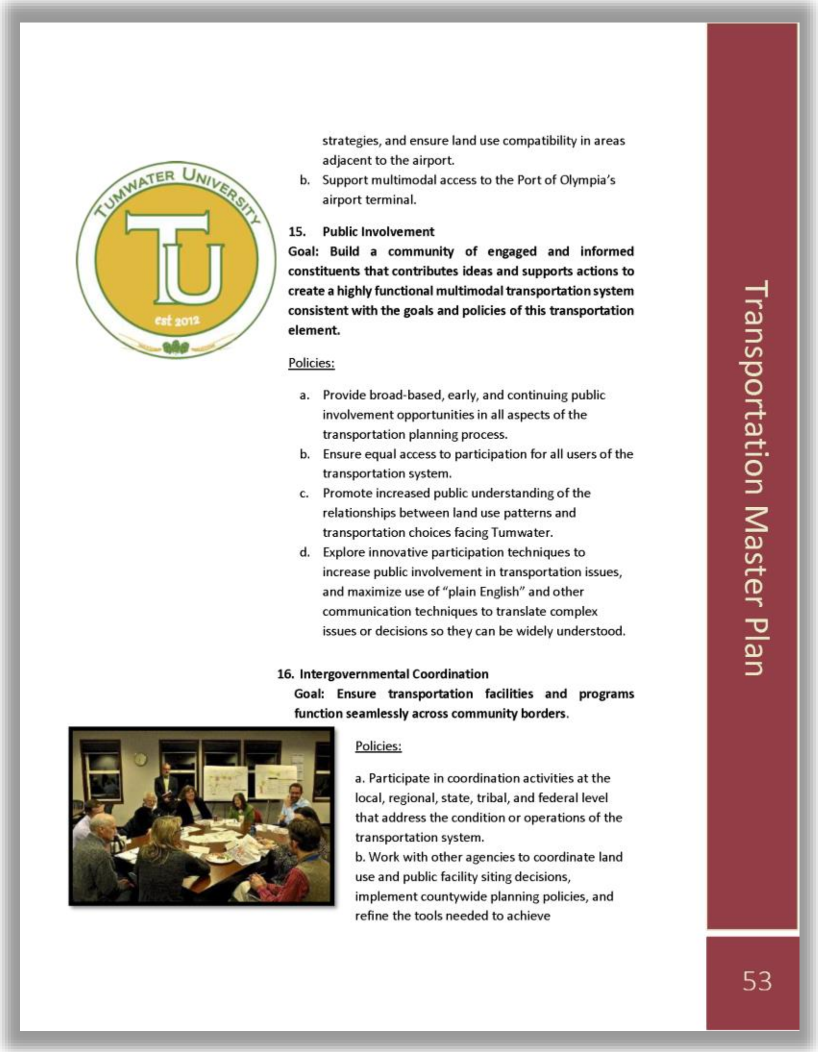
New Requirement: Incorporate Environmental Justice

Special consideration for environmental justice in goals and policies (E2SHB 1181)

Item 8.

Structure of Current Transportation Master Plan

1. Introduction
2. Vision
3. Sub-Area Plans
4. Consistency
5. Modes of Travel
6. Managing Demand
7. Future Conditions
8. Goals and Policies
9. System Inventory
10. System Performance
11. Capital Improvements
12. Funding
13. Opportunities & Needs



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b. Support multimodal access to the Port of Olympia's airport terminal.

15. Public Involvement

Goal: Build a community of engaged and informed constituents that contributes ideas and supports actions to create a highly functional multimodal transportation system consistent with the goals and policies of this transportation element.

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b. Work with other agencies to coordinate land use and public facility siting decisions, implement countywide planning policies, and refine the tools needed to achieve

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Current Transportation Master Plan

Link to current Transportation Master Plan:

https://www.ci.tumwater.wa.us/home/showpublisheddocument/12124/637225343085330000

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Commerce Transportation Guidance Materials

- Your Community's Transportation System (2012)

Next Steps

- Advertise RFQ to bring a consultant on board
- General Government Committee briefing January 10, 2024

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Comments and Contact information

Written comments are welcome at any time during the periodic update process and staff will address and publish all formal comments

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- The periodic update email is compplan@ci.tumwater.wa.us
- All documents related to the periodic update will be located on the City's periodic update webpage

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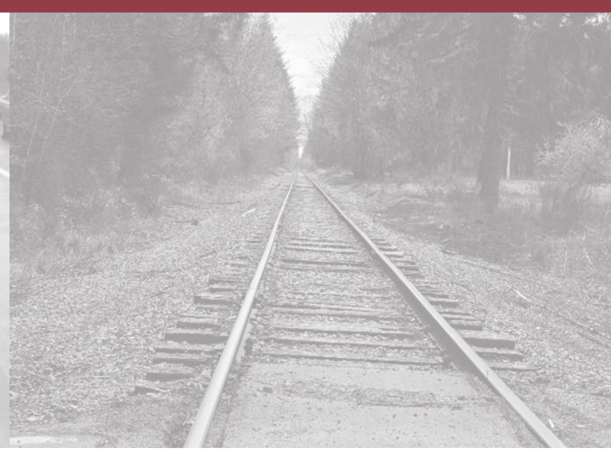
Atttachment C

Tumwater City Plan 2036

Transportation Master Plan



November 2016

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ACKNOWLEDGEMENTS

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The City wishes to thank all of the members of the Tumwater community City Council, Planning Commission and City staff who took the time to review and comment on drafts of the Transportation Master Plan.

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CITY OF TUMWATER

Transportation Master Plan

CHAPTER 1

INTRODUCTION

INTRODUCTION

Long-range plans result from a civic discussion about the kind of place a community wants to be in the future; they offer a roadmap for how to get from "here" to "there." By their very nature, long-range plans take time to mature. Much like a tree, it can take many years for things described in long-range plans to come to fruition.

That is true with Tumwater's long-range planning efforts and it influences the shape of this Transportation Plan. The seeds of ideas planted in Tumwater's Comprehensive Plan in the 1990s are bearing fruit.

There are many more miles of sidewalks and bike lanes today than ever before, and Tumwater elements of the regional trail system are taking shape. Much of the city is served by transit, including premier 15-minute service on Tumwater's urban corridors. Coordination of land use and transportation decisions is resulting in more people living where real travel choices exist, where people can easily keep household travel costs down by not having to drive so much. Street and intersection design is making it safer and more reliable to travel by car, bike, and foot. Technology upgrades have brought the city's signal system into the 21st century while demand management programs are taking vehicles off our streets during the busiest times of the day. Kids are walking to school in larger numbers than we've seen in decades.

Tumwater is a different place in 2016 than it would have been without the policy directions established in that first Comprehensive Plan. We've been slowly but steadily changing course from the purely car-dependent city patterns that dominated our 20th century development to patterns that better support our 21st century needs and values. We've made some gains, and we better understand some challenges we face than we did back then. We have a lot of work to do but we're certainly not starting from scratch.

This Transportation Plan, Tumwater's fourth since passage of the Growth Management Act (GMA) in 1990, picks up where the planning horizon of that very first plan left off. It continues the fundamental policy framework set into place with that first Comp Plan, and is consistent with that of our neighboring communities and regional partners. What do the next 20 years hold? That is what this Plan will shape.

"…establish more walkable, people oriented neighborhoods…"

- This plan continues long-term efforts to establish more walkable, people-oriented neighborhoods that expand upon the array of lifestyle options and travel choices available in the City while reducing impacts on existing neighborhoods and rural lands.
- It takes as an integral assumption that our local transportation system is made up of a network of streets and roads, transit, sidewalks, bike lanes, and trails that all work together as part of one system. It is built on the assumption that investments should make the system safer for all users and more efficient for all modes of travel, and that we should keep life cycle and operating costs as low as possible.
- It continues to support the critical role that transportation plays in fostering and maintaining a strong and resilient economy in Tumwater, promoting the cost-effective and reliable transport of employees to jobs, customers to services and retail, and goods into and out of our city and onto store shelves.

- This plan advances policy direction regarding the role of transportation in public health, community character, and environmental stability, as well as overall quality of life.

Transportation policies derived from regionally-coordinated goals and policies underscore the relationship between efforts underway today in the city and broader, longer-term objectives. This provides good context for ensuing sections that describe the existing transportation system, the likely impacts on that system as the city grows, and measures to maintain adequate levels of service. This Plan introduces multimodal levels of service for non-motorized facilities in addition to traditional vehicle-based service standards. Projects are identified that will help the city achieve and maintain its level of service standards over the next 20 years. A financial summary demonstrates that recommendations in this plan are achievable. Finally, it concludes with some strategic initiatives to help further the vision and values embodied in this plan. The initiatives introduced at the end of this plan can be accomplished through annual work program activities, infrastructure investments and coordinated transportation and land use decision-making.

Throughout this plan readers will find examples of the linkage between Tumwater's transportation vision embodied in this Master Plan and associated goals and coordinated strategies. Look for the connection symbol to highlight these examples.

The Appendices include technical analyses supporting the forecast and project recommendations, as well as a briefing paper on multimodal levels of service, and relevant highlights from the Capitol Boulevard Corridor plan and the Brewery District plan that help shape the direction of this Transportation Master Plan.

CITY OF TUMWATER

Transportation Master Plan

CHAPTER 2

VISION

TUMWATER'S TRANSPORTATION VISION

This Transportation Master Plan provides the functional framework for realizing Tumwater's transportation vision:

Tumwater's transportation system provides for the safe, efficient, cost-effective movement of people and goods in ways that support adopted land use plans, enhance neighborhood and community livability, support a strong and resilient economy, and minimize environmental impacts.

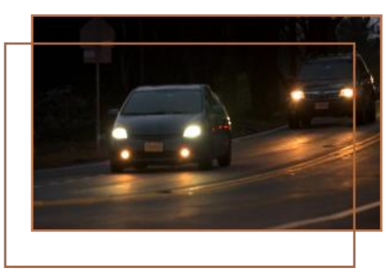
Tumwater is employing new Low Impact Development techniques – such as this infiltration baffle shown under construction on Linderson Way – to reduce the effects on the environment of stormwater runoff.

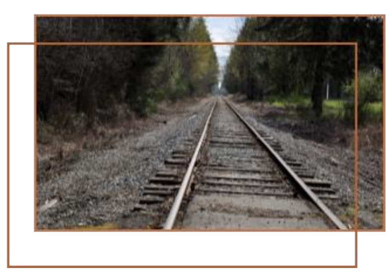
Tumwater's Transportation Master Plan supports many of the City's Strategic Priorities, especially those related to transportation:

Create and Maintain a Transportation System for All Modes of Travel *¬ Construct an inter-connected bicycle and pedestrian system, including developing improved neighborhood connections and enhancing overall bicycle and pedestrian safety – Design and build the E Street Connection – Improve street and sidewalk maintenance – Complete the Tumwater Valley Trail – Explore and utilize lower cost pedestrian facilities (e.g., asphalt paths) as a transition to permanent and long-term facilities (City of Tumwater Strategic Priorities 2017-2022).*

This Plan provides the implementation framework for City priorities such as redevelopment of the Olympia Brewery and revitalization of the Brewery District, transformation of Capitol Boulevard from an old highway corridor to a vibrant, people-oriented, walkable district of interconnected neighborhoods and neighborhood-serving businesses, and continuing evolution of the Littlerock sub-area into a regionally-significant center of commerce. It supports the City's commitment to increased "active travel" options that ensure walking and biking are viable choices for more people for more of their trip purposes. It builds on earlier work to enhance and maintain a transportation system that meets the needs of the City today and into the future.

"Create and Maintain a Transportation System for All Modes of Travel …"





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CITY OF TUMWATER

Transportation Master Plan

CHAPTER 3

SUB-AREA PLANS

Sub-Area Plans Incorporated into the Transportation Master Plan

Tumwater's Transportation Master Plan serves as the transportation element of the Comprehensive Plan. It includes the required traffic analyses and discussions that inform the Plan's policies and recommendations. It serves an important function beyond that plan, though. It incorporates the important policies and recommendations generated by on-going studies and sub-area plans. Several older plans – such as the Black Hills Sub-area Plan and the Littlerock Road Sub-area Plan – have shaped the City's development over the last ten years or longer. Since completion of the last Comprehensive Plan update, additional sub-area plans have been completed that are shaping the content of this Master Plan.

For over two decades, Tumwater has built on its accomplishments to achieve better alignment between its vision and on-the-ground realities. Its success is attributed in large measure to consistency and coordination between the long-range Transportation Plan and other city planning products.

Tumwater works to translate the community's vision into area-specific implementation and strategic plans; these plans evolve as conditions mature in these areas and as implementation moves to the next stages. Steady progress in implementing recommendations from these sub-area plans means that they are not static like the Comprehensive Plan. They are modified and revised as needed to support the implementation process, evolving much more frequently than the Comprehensive Plan itself.

Each sub-area plan is consistent with the overall land use vision put forward in the Comprehensive Plan; the Transportation Master Plan identifies transportation policies and investments that support those sub-area plans. Adopting those plans by reference into the Comprehensive Plan enables them to provide nimble, adaptive guidance to the overall planning process, ensuring that the City's transportation policies and investments fully support the needs of these more detailed implementation plans while maintaining consistency with this Master Plan.

Brewery District Plan

The Brewery District Plan is intended to transform the Brewery District into a vibrant, mixed use, walkable area supporting a mix of local businesses and residential neighborhoods. The work built on analysis conducted by Tumwater in 2011 on revitalizing the former Olympia Brewery.

The Brewery District includes the former Olympia Brewery and the triangle of streets formed by Custer Way, Cleveland Avenue, and Capitol Boulevard. The district extends north to the Sunset Life property and south to E Street. Implementing the Brewery District action plan is a priority in the City's Strategic Plan.

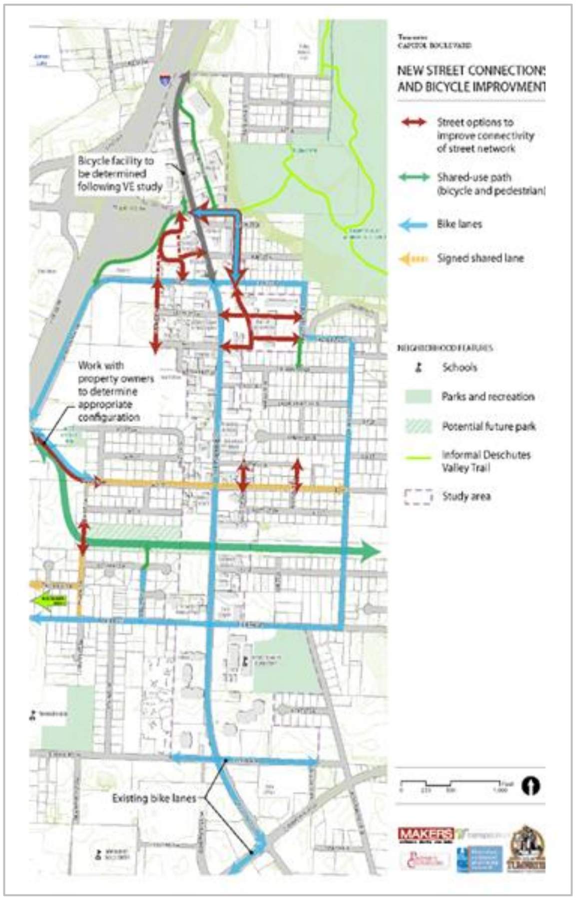
The Brewery District study identified the tools and opportunities needed to revive this historic part of Tumwater. Recommendations from the action plan are included in this Master Plan; they are informing the City as we implement design standards and development regulations. Highlights of

the plan that are relevant to this Transportation Master Plan can be found in Appendix D. The complete report as well as the implementing regulations resulting from the plan can be found at http://www.ci.tumwater.wa.us/departments/community-development/long-range-planning/brewery-district

Figure 3.4: A road diet on Cleveland Avenue will include adding bicycle facilities, widening sidewalks, and installing street trees and stormwater facilities. The calmed streetscape allows easier pedestrian crossings and creates a more welcoming environment for mixed-use (re)development along the "main street".

CAPITOL BOULEVARD CORRIDOR PLAN

The Capitol Boulevard Corridor Plan will stimulate the transformation of Capitol Boulevard between Southgate and Israel Road from an old federal highway route to a lively, mixed-use corridor. The goal of the effort is to improve the economic climate in the area and promote redevelopment along the corridor, improve the aesthetic appeal of the corridor, and improve safe and efficient travel choices for walkers, cyclists, transit riders, and motorists. Neighborhoods along the corridor engaged in the work by completing surveys, participating in workshops and meetings, and offering ideas and comments. Transformation of the corridor was identified as a priority item in the City's Economic Development Plan and the City's Strategic Plan.



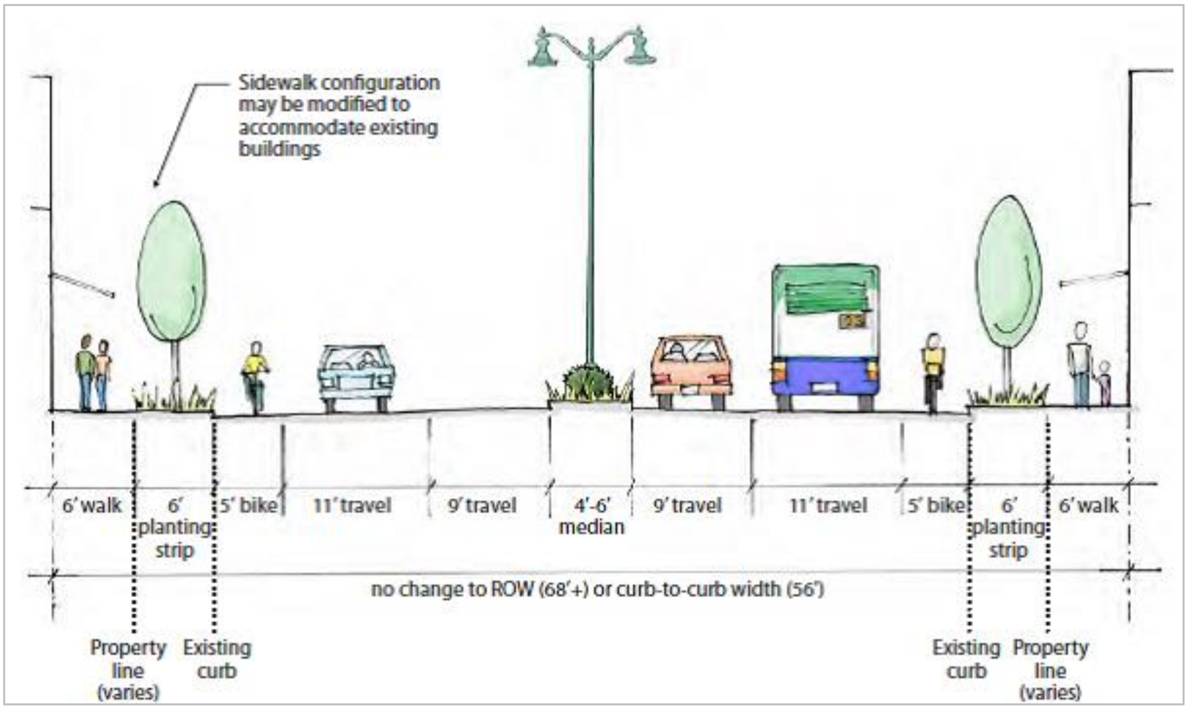
Transportation directives for this corridor provided parameters for the planning work. They included:

a. Reduce congestion growth
b. Provide for pedestrian and bicycle connectivity
c. Improve neighborhoods
d. Beautify the corridor
e. Mitigate new development impacts

These directives were accompanied by seven principles that informed the range of strategies considered and the resulting recommendations:

f. Added travel lanes to quell congestion is neither feasible or desired
g. A parallel street system should be pursued
h. Ensure traffic operations help prioritize premium transit
i. Enhance streetscape at major intersections and crossings
j. Integrate and enhance bus stop facilities
k. Establish parallel and intersecting bike network
l. Establish parallel and intersecting walking routes

Recommendations for transformation include access management that restricts left turn movements, roundabouts to facilitate u-turns, enhanced pedestrian crossings, wider sidewalks and buffers, and the repurposing of existing right-of-way to add bike lanes in each direction without having to reconstruct the street. Resulting traffic will be safer and flow smoother, access to corridor businesses will be enhanced, and the corridor will be more conducive to cycling, walking and transit as the plan is implemented.



Implementing regulations including the design guidelines and zoning have already been adopted. Work is underway now on the preliminary design and engineering work. Recommendations from the Capitol Boulevard Corridor plan are included in Appendix C of this Master Plan and are incorporated as appropriate in the project list. The full plan and its implementing regulations can be found at http://www.ci.tumwater.wa.us/departments/community-development/long-range-planning/capitol-boulevard-corridor-plan

CITY OF TUMWATER

Transportation Master Plan

CHAPTER 4

CONSISTENCY

CONSISTENCY WITH COUNTYWIDE PLANNING POLICIES

Tumwater is required under GMA to ensure its planning process is consistent with adopted Countywide Planning Policies. Countywide Planning Policies (CWPP) are developed collaboratively between Tumwater and all the other jurisdictions in Thurston County to govern development of local comprehensive plans. The primary purpose of the CWPP is to ensure consistency between the comprehensive plans of jurisdictions sharing a common border or related regional issues. They also play an important role in facilitating the transformation of local governance in the unincorporated urban growth area as it is annexed or incorporated into a city, so that urban services are provided by cities and rural and regional services are provided by the county.

The first CWPP in the Thurston Region were adopted in 1992 and most recently amended in November 2015. Most of the CWPP pertain to other aspects of long-range planning but there are policies specific to transportation. This Transportation Master Plan is consistent with and works to implement these policies.

IX. TRANSPORTATION (Countywide Planning Policies, adopted November 2015)

9.1 Increase transportation choices to support all ranges of lifestyles, household incomes, abilities, and ages.

9.2 Increase opportunities for riding transit, biking, walking, ridesharing, allowing and encouraging flexible work schedules, and teleworking.

9.3 Encourage efficient multi-modal transportation systems that are based on regional priorities and are coordinated with county and city comprehensive plans.

a. Local comprehensive plans will consider the relationship between transportation and land use density and development standards.

b. Local comprehensive plans and development standards should provide for local and regional pedestrian and bicycle circulation.

c. Improved transit service will be based on Intercity Transit's plans, informed by and consistent with the regional transportation plan and local comprehensive plans.

d. Transportation Demand Management plans and programs required by State law will be implemented as a key part of the region's transportation program.

e. Improvements to the regional road network will be consistent with local and regional transportation plans.

f. The regional transportation planning process is the primary forum for setting countywide transportation policy.

9.4 The transportation element of each jurisdiction's comprehensive plan will be consistent with the land use element of that jurisdiction's comprehensive plan.

9.5 The transportation element of each jurisdiction's comprehensive plan will include level of service standards for all arterials and transit routes and services. Each jurisdiction will coordinate these level of service standards with all adjacent jurisdictions. Transit level of service standards will be consistent with Intercity Transit policies.

9.6 Each jurisdiction's transportation element will include an assessment of the impacts of the transportation plan and land use assumptions on the transportation systems of adjacent jurisdictions.

9.7 The transportation elements of comprehensive plans adopted by Thurston County and each city and town in the county will be consistent with the Regional Transportation Plan adopted by Thurston Regional Planning Council, in accordance with the provisions of the Washington State Growth Management Act.

9.8 The Regional Transportation Plan adopted by Thurston Regional Planning Council will be consistent with the land use elements of comprehensive plans adopted by Thurston County and the cities and towns within Thurston County and with state transportation plans. To ensure this, the Regional

Transportation Plan will be reviewed and updated, if necessary, at least every two years for consistency with these plans.

9.9 All transportation projects within Thurston County that have an impact upon facilities or services identified as regional in the Regional Transportation Plan will be consistent with the Regional Transportation Plan.

9.10 Local and regional transportation plans will consider maritime, aviation, and rail transportation as an integral link to the area's regional transportation needs.

REGIONAL CONSISTENCY AND COORDINATION

Tumwater's long-range transportation planning must be consistent with the Regional Transportation Plan, or RTP. The RTP is developed and maintained by Thurston Regional Planning Council (TRPC). It provides the primary policy framework for overall transportation system considerations at the local, regional, and state levels. All jurisdictions and other service partners in Thurston County work closely with TRPC at various stages throughout the long-range planning and forecasting process to ensure consistency with the RTP. This includes collaboration and agreement on:

- long-range growth and land use assumptions used to estimate future travel demand, among other things;
- level of service standards and times of "peak period" analysis;
- constraints such as limits to street widening; and
- overarching transportation system goals.

Consistency with the Regional Transportation Plan ensures consistency with applicable state and federal transportation planning requirements.

Starting in the late 1990s, regional collaboration and coordination resulted in a single coordinated growth forecast and travel demand model for use by all jurisdictions in the Thurston Region to evaluate the aggregate effects of growth and system improvements on future transportation needs. Previously, each jurisdiction developed its own growth and travel demand forecasts which were evaluated independently for regional consistency. Since 2000, consistency between local and regional analysis has been built right into the planning process.

Several significant regional initiatives are incorporated into the RTP and reflected in this plan, including:

- **Urban Corridors Task Force Recommendations** – The Urban Corridors Task Force worked to establish an objective understanding of background conditions along the region's key urban corridors including Capitol Boulevard, identified barriers to achieving adopted land use visions, and identified potential opportunities for addressing those barriers. Task Force members looked at the relationship between transportation and land use in these corridors, and worked to understand the market factors that influence the viability of infill and redevelopment projects in the region. That work helped inform Tumwater's focus on Capitol Boulevard and the Brewery District. For information on the Urban Corridors Task Force work and the resulting activities of the Corridor Communities Partnership, visit: http://www.trpc.org/173/Urban-Corridor-Communities

Tumwater's vision for the Brewery District and Capitol Boulevard are tangible applications of the principles and values inherent in the Urban Corridors Task Force recommendations. Reclaiming the old Capitol Way / Capitol Boulevard highway corridor and repurposing it as the transit-rich backbone of a 21st century urban community offering an array of car-lite lifestyle options supported by vibrant local businesses is at the heart of the two active subarea plans shaping the Brewery District and the Boulevard today.

- **Sustainable Thurston (Regional Sustainability Plan) –** This community-wide conversation was the first region-wide discussion since passage of the Growth Management Act about how to create a vibrant, healthy and resilient future for the Thurston region. It resulted in a vision endorsed by Tumwater and other communities across the region as well as the actions and responsibilities necessary to achieve it. For more information on Sustainable Thurston, see: http://www.trpc.org/259/Sustainable-Thurston

Tumwater's vision for future growth links directly back to key tenets of Sustainable Thurston's livability principles. This includes:

Providing more transportation choices that decrease household travel costs, promote active lifestyles and public health, reduce greenhouse gas emissions, improve air quality, and reduce dependence on foreign oil

Promoting equitable, affordable housing by expanding the availability of location-efficient housing on transit-rich corridors

Enhancing economic competitiveness with reliable and efficient access to jobs and good mobility for goods and services

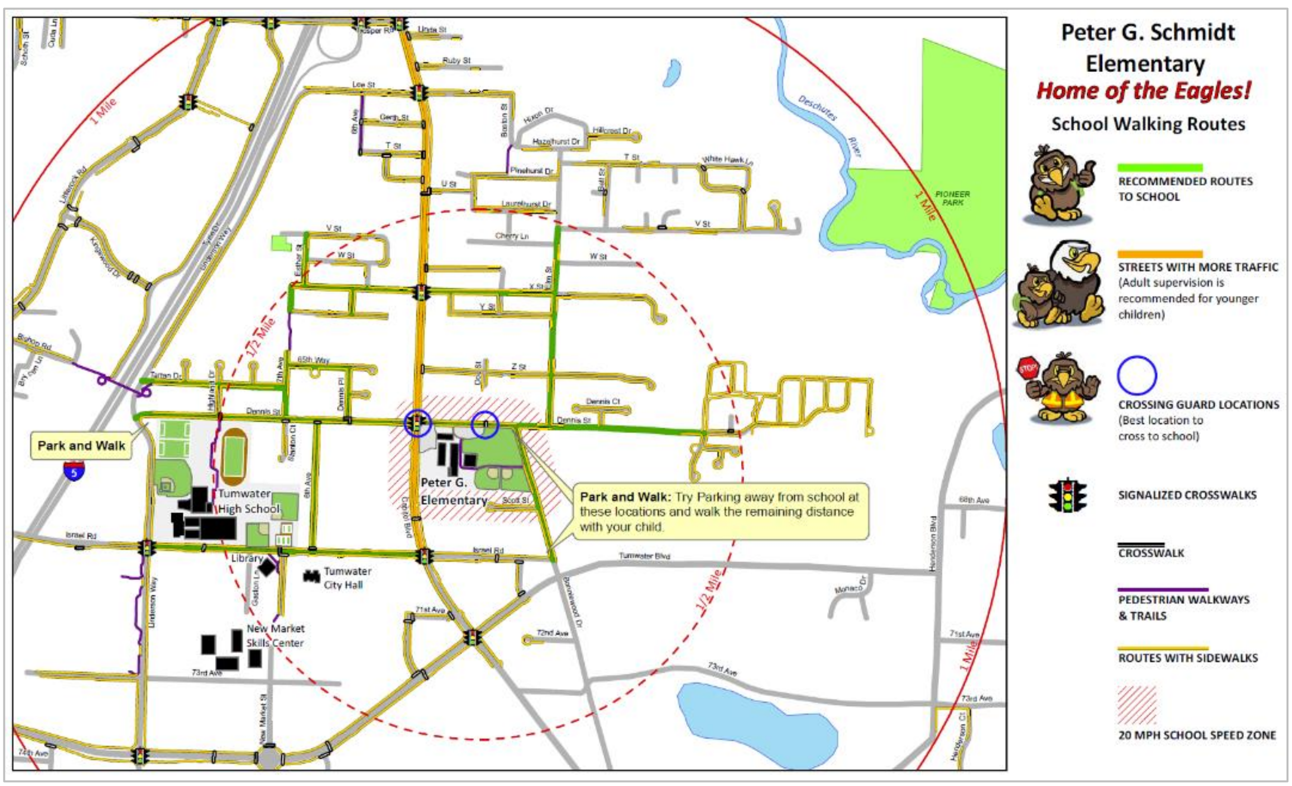
Supporting existing communities with strategies for infill and redevelopment that increase car-lite lifestyle opportunities while reducing pressure on existing neighborhoods and rural and resource lands

Coordinating policies and investments to better align the community's vision with day-to-day implementation activities and leverage available funding resources to get maximum value for the investments

Valuing neighborhoods and communities by investing in healthy, safe, walkable places supporting a variety of lifestyle choices

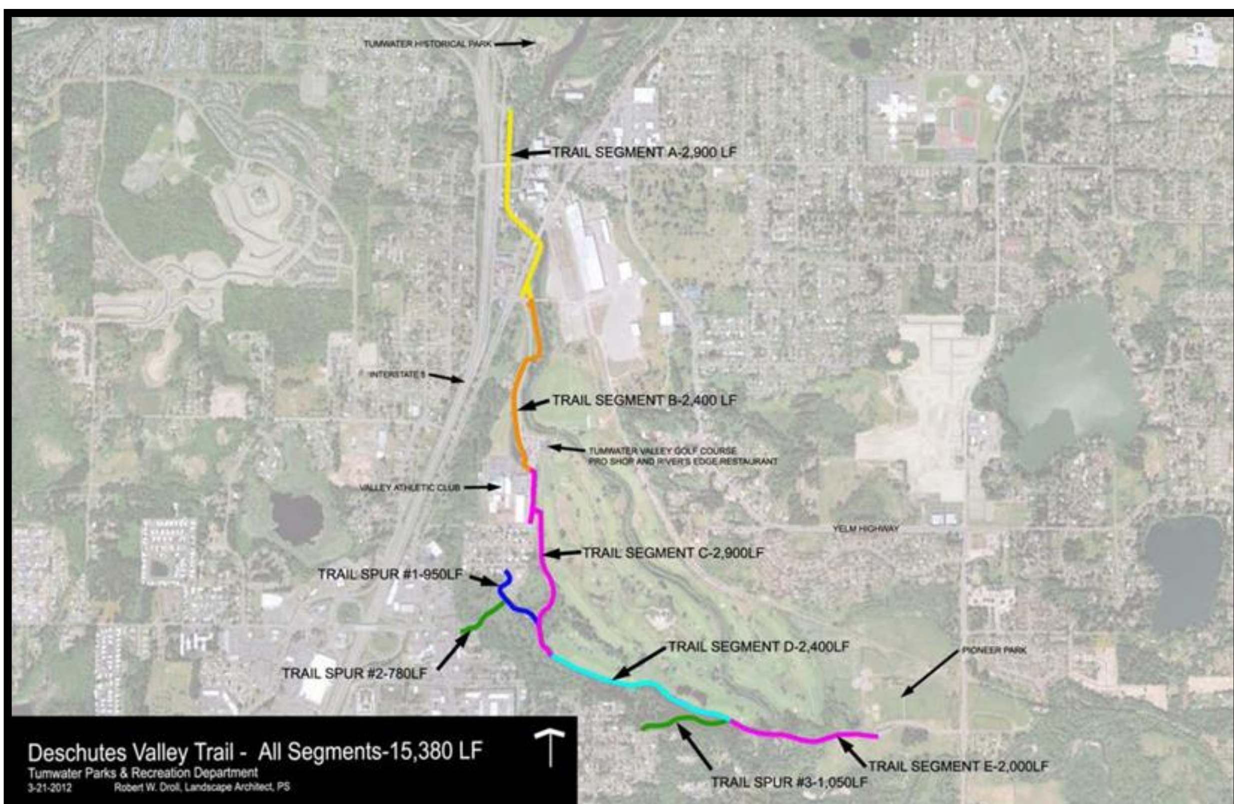
Tumwater is a founding signatory of the Healthy Kids – Safe Streets Action Plan. Two of the region's most active schools participating in the Walk and Roll Program, the centerpiece of the Action Plan, are Michael T. Simmons and Peter G. Schmidt elementary schools in Tumwater. Tumwater's new multimodal level of service approach puts a priority on completing sidewalk networks in the vicinity of schools to create a safe walking environment for school children

- **The Healthy Kids-Safe Streets Action Plan –** This initiative encourages kids to walk, bike, and bus to school by promoting physical activity and safety through education and encouragement programs, development and implementation of school siting criteria, and coordination of infrastructure improvements around schools. Tumwater embraced this plan with its support of Walk and Roll programs at Peter G. Schmidt and Michael T. Simmons schools. For more information on the Healthy Kids-Safe Streets Action Plan and the Walk-and-Roll Program, see: http://www.trpc.org/337/Walk-and-Roll-Program



- **Regional Trails Plan –** Establishing a comprehensive, well-connected non-motorized trail network that links all corners and communities in the region is a regional priority that is strongly supported by Tumwater. Efforts underway now on the Deschutes Valley Trail and the Black Lake-Belmore Trail are moving Tumwater's segments of this trail system to reality. A copy of the complete Regional Trails Plan can be found at http://www.trpc.org/DocumentCenter/View/928

Tumwater's vision of connecting Pioneer Park to Capitol Lake via the Deschutes Valley Trail is consistent with the Regional Trails Plan. This important linkage in the regional system will enhance connectivity to the regional trail system for Tumwater residents. Another important link in the regional trail system is located in Tumwater's urban growth area. The Gate-Belmore trail, currently being developed by Thurston County, will extend from the vicinity of the Black Lake Elementary School to the southwest corner of Thurston County near the Chehalis Reservation via an abandoned rail corridor



- **Intercity Transit -** The future role of transit in serving the transportation needs of the City and surrounding area is a regional priority. Tumwater supports Intercity Transit's strategic plans and continues to coordinate with the agency to identify how transit needs should be addressed, particularly as infill and redevelopment occurs along the urban corridors and within the City's planning sub-areas. Tumwater involves Intercity Transit in the development review process and future planning efforts to ensure that the goals of the City and Intercity Transit related to transit are being met.

Tumwater's vision for the Brewery District and Capitol Boulevard is dependent on robust, high-frequency transit service. Tumwater and Intercity Transit are partnering on a redesign of the Tumwater Transit Station on Cleveland Avenue with a long-term goal of relocating the existing station to a more efficient location on Capitol Boulevard. IT service to the state office buildings provides a critical component of the City's commute trip reduction strategy

Consistency with State Transportation Plans

The Washington State Department of Transportation (WSDOT) establishes planning priorities through its statewide and modal plans. As the Regional Transportation Planning Organization for the region, TRPC carefully monitors those planning priorities and works to ensure they are appropriately considered in the region's long-range plan and policies. Tumwater's close coordination and consistency with TRPC plans and policies ensures the City's Transportation Master Plan is also in line with those state guidelines.

Tumwater policies and investments support statewide transportation planning priorities. One of the most difficult challenges – ensuring adequate preservation of the existing system – was directly addressed through the 2015 Transportation Benefit District package approved by Tumwater voters. This new locally-determined funding source will enable the City to optimize its pavement preservation program over time and keep lifecycle costs as low as possible

The following transportation policy goals of the Washington Transportation Plan are addressed throughout the goals and policies in this plan, and its recommendations.

Preservation. Maintain, preserve, and extend the life and utility of prior investments in transportation systems and services.

Safety. Provide for and improve the safety and security of transportation customers and the transportation system.

Mobility. Improve the predictable movement of goods and people throughout Washington State.

Environment. Enhance Washington's quality of life through transportation investments that promote energy conservation, enhance healthy communities, and protect the environment.

Stewardship. Continuously improve the quality, effectiveness, and efficiency of the transportation system.

Economic Vitality. Promote and develop transportation systems that stimulate, support and enhance the movement of people and goods to ensure a prosperous economy.

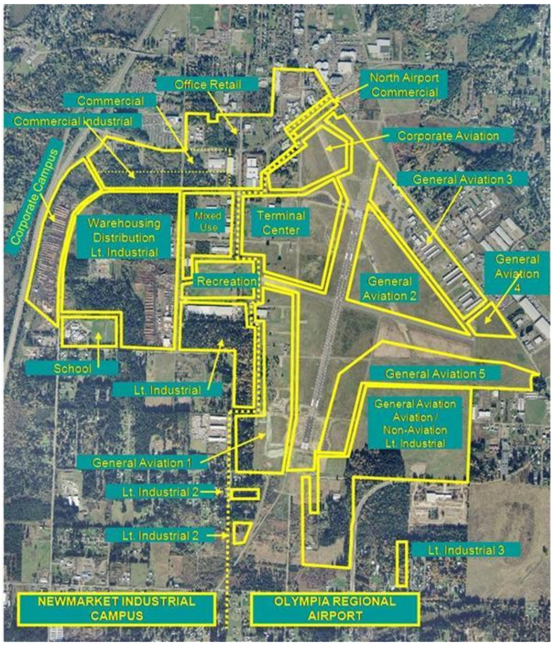
Results WSDOT is a recent initiative that promotes:

- *Strategic Investments*
- *Modal Integration*
- *Environmental Stewardship*
- *Organizational Strength*
- *Community Engagement*
- *Smart Technology*

Tumwater's Transportation Master Plan is consistent with and supportive of WSDOT

INTERGOVERNMENTAL COORDINATION

Coordination between government agencies is a key tenet of the Growth Management Act. The transportation element must describe ***"intergovernmental coordination efforts, including an assessment of the impacts of the transportation plan and land use assumptions on the transportation systems of adjacent jurisdictions."*** This requirement makes good sense; Tumwater cannot develop a realistic plan for its growth without considering its impacts on adjacent communities and their impacts on Tumwater. Much of that coordination occurs at the regional level through TRPC, of which Tumwater is an active member. This Transportation Master Plan is the product of regional coordination, from population and employment forecasts to a unified regional modeling platform to coordinated corridor studies and development reviews. Tumwater's plan reflects the growth and investments anticipated in Olympia and Thurston County; in turn, its own growth and investments are reflected in their plans and strategies.



As a part of its intergovernmental coordination, Tumwater works closely with the Port of Olympia. The Port owns a significant amount of land in the city, where its airport is located alongside hundreds of acres of industrial property. The Port completed in 2016 its New Market Industrial Campus Real Estate Master Plan which provides a blueprint for how these industrial properties will develop over time. Tumwater participated in that planning process and will be active in the plan's implementation.

Another example of Tumwater's intergovernmental coordination related to transportation is its close working relationship with Intercity Transit. From including IT in its development review process and planning activities to its partnership with IT in redesigning the Tumwater Transit Station on Cleveland Avenue and identifying a location for a new park-and-ride facility, Tumwater works to maintain a close working relationship with its transit partner.

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Transportation Master Plan

CHAPTER 5

MODES OF TRAVEL

PLANNING FOR ALL MODES OF TRAVEL

Tumwater understands that the transportation system is more than just streets; its transportation system is made up of streets as well as transit, sidewalks, walkways, bike lanes, trails, highways, rail corridors, and the airport. It accommodates not just car drivers, but transit riders, walkers, cyclists, and freight. The transportation system is made up of a series of intersecting networks that ensure people and goods get to where they need to be. This is what is meant by a "multimodal" transportation system – it is one that accommodates the various modes of travel needed to support existing and future land use patterns.

Tumwater has long promoted biking and walking through its plans, policies, and investments. It is reflected in adopted street standards that require bike lanes and sidewalks with new construction. Long before the term "complete streets" became planning jargon Tumwater was committed to providing safe and convenient facilities enabling more people to bike and walk for more of their trips. Tumwater's street standards incorporate many recommendations found in the National Association of City Transportation Officials (NACTO) Urban Street Design Guidelines. Tumwater has applied for and received grants that help complete the bike and sidewalk networks, making them safer and more convenient for travelers.

In the City's 2015 Community Survey, over half the respondents identified the need for more transportation choices - connected, walkable, bike-able streets and transit that offer reliable, economical travel options that decrease household transportation costs, reduce dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health. Tumwater policies and standards are working to meet that need.

Tumwater works to leverage those complete streets with "complete neighborhoods" offering a mix of different activities close to each other, the kinds of neighborhoods that generate more walking and biking than occurs with traditional residential neighborhood or commercial development. This is a goal of the Brewery District and Capitol Boulevard Corridor strategies – to create the kind of places where driving is but one good option for getting between Point A and Point B.

These sub-area plans enable Tumwater to further align its commitment to a multimodal transportation system by expanding its approach to evaluating system performance. This Master Plan introduces the concept of multimodal system performance to explicitly consider how the sidewalk and bike networks function in different parts of the city. In those areas intended to generate a greater share of walk and bike trips – where land use patterns are resulting in more complete neighborhoods offering a mix of activities in close proximity – this new performance measure will allow the City to more effectively evaluate development impacts and opportunities to determine the right mix of facilities to support that development. The chapter on System Performance describes this new approach to evaluating system performance.

Tumwater's policies are translated into guidelines and standards that define the design and relationship of streets and buildings. They are tailored for different parts of the City, and reflect underlying values and priorities in this transportation plan as well as the City's adopted land use strategies. In this way they help implement the Comprehensive Plan vision, providing clear direction to developers about City expectations for pedestrian oriented streets, signature roads, and other types of streets to achieve attractive, walkable, sustainable development that enhances the City's identity. For more details about the considerations and standards governing the design of streets and buildings, please see the Citywide Design Guidelines

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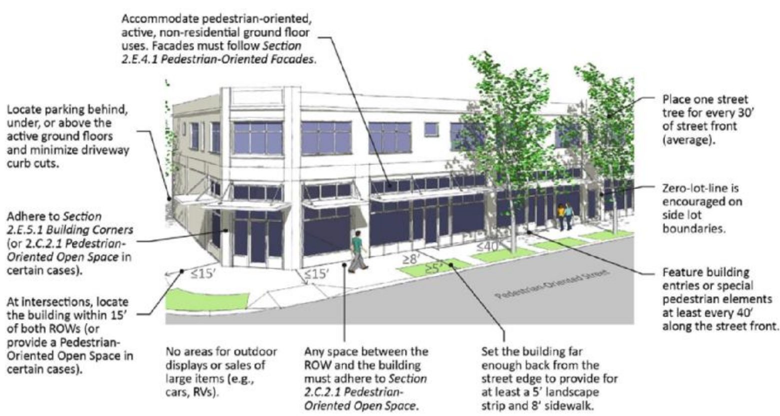

Figure 2.B.1-1. Pedestrian-Oriented Street requirements summary

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CITY OF TUMWATER

Transportation Master Plan

CHAPTER 6

MANAGING DEMAND

Managing Demand

Managing travel demand is one way to maximize operational efficiency and create more capacity within the existing transportation system. Demand management strategies, as the term implies, are strategies that change the demand for travel – typically lowering the demand for travel during peak congestion periods. Compared to most transportation strategies, demand management involves typically low-cost strategies that take many different forms.

Demand Management Programs

Commute Trip Reduction, implemented at the state level in 1993, requires large employers with 100 or more employees commuting during peak periods and all state agencies regardless of size to reduce the share of trips being made in single-occupant vehicles. This can be done via a myriad of strategies that encourage more commute trips by carpool or vanpool, transit, walking, or biking. Programs like the annual Bicycle Commuter Contest, administered by Intercity Transit since 2005, create awareness about travel alternatives in a fun way that also promotes broader CTR objectives.

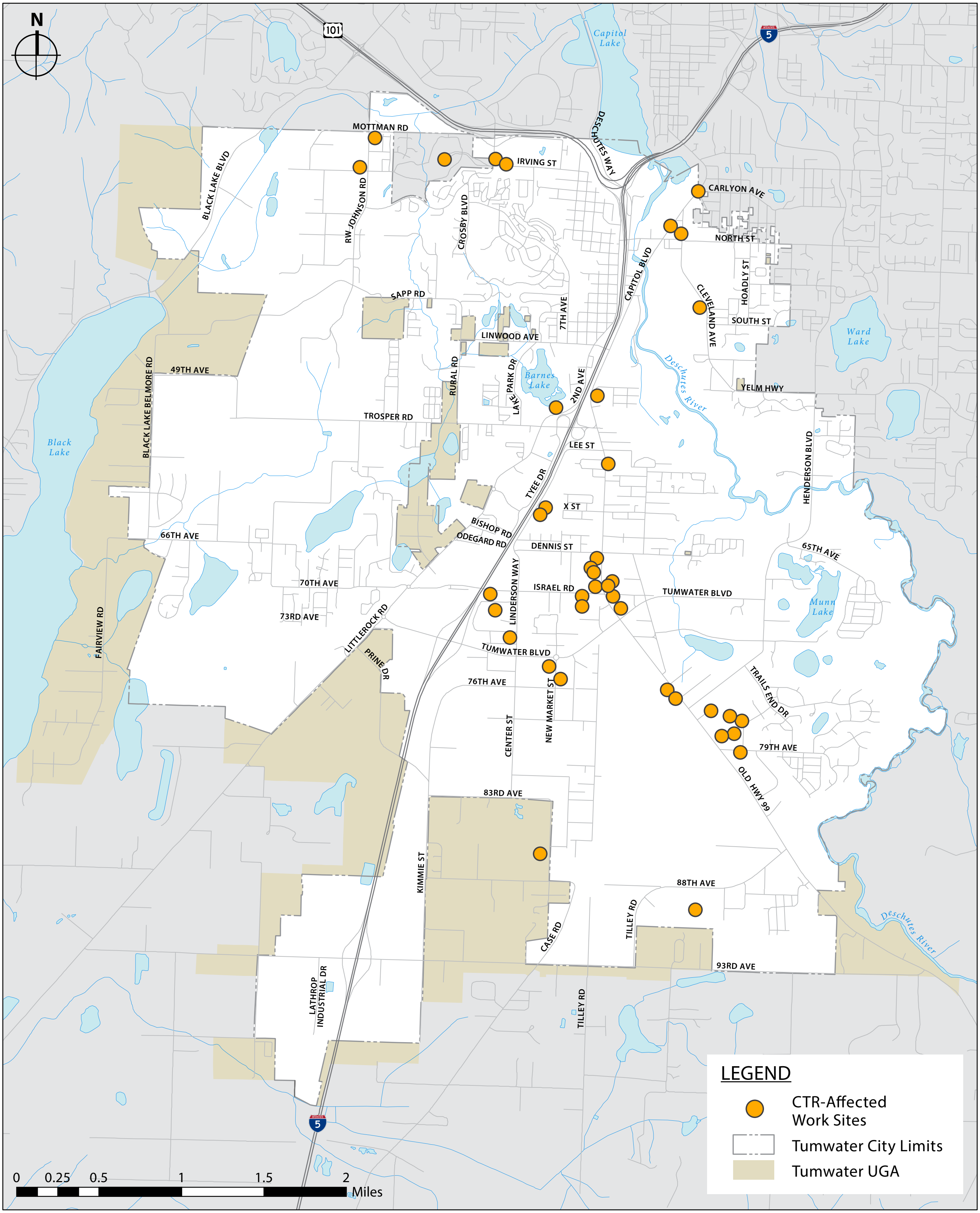
CTR can also include strategies that reduce the number of days an employee has to commute to work, like compressed work weeks that "compress" a five day week into a four day work week, or telework that allows some employees to work from home. It also includes parking pricing that eliminates the financial incentives to drive.

Since 2005, the region's CTR program is administered by TRPC in partnership with Intercity Transit. The CTR program includes 197 active worksites across the region of which 191 must participate and six do so voluntarily. TRPC and IT actively work with local jurisdictions and the State of Washington to improve the program.

Tumwater's 2008 Commute Trip Reduction Plan includes goals and strategies that help support regional CTR objectives.

Figure 1 shows the location of CTR-affected worksites in Tumwater. Many are located in areas with good transit service.

Details on the CTR program and its implementation in the Thurston Region can be found at: http://www.trpc.org/609/Commute-Trip-Reduction-CTR-101



CITY OF TUMWATER
Transportation Master Plan

Figure 1
Location of Tumwater's CTR-Affected Work Sites

School-based programs, like the "Walk & Roll" programs at Peter G. Schmidt and Michael T. Simmons elementary schools help reduce traffic congestion in the vicinity of schools created by parents dropping off or picking up their children. Intercity Transit leads these programs with federal funding from TRPC for this purpose. These innovative programs encourage kids to walk or bike to school more often, which also has health and learning benefits. Program components include field trips, school assemblies and special events, and school-wide "Bike and Walk to School" days. The intent of this award winning program is to build the next generation of safe and healthy bikers, walkers, and transit riders.

Parking management is another tool that Tumwater and many of its employment sites use to manage travel demand. Limiting the amount of parking that can be built, restricting the location of that parking on a building site, and even charging for the use of that parking can influence whether people decide to drive alone or travel differently. Details like locating carpool parking or bike parking closer to building entrances than general parking can help influence how some people travel.

IT's Vanpool Program is celebrating its 34th year of service in 2016. IT's 214 vanpools are carrying over 1,500 people to and from work on any given weekday. This helps free up street and highway capacity and makes the entire transportation system operate more efficiently.

Land use is an important demand management consideration. How communities are built – the proximity of uses within a neighborhood, residential and employment densities, the design of streets and buildings, street connections and infrastructure to support alternatives to driving – all of these are essential determinants in how much traveling people have to do and the choices they have in how they travel.

Traveler Information and Trip Planning Resources

Thurston Here to There is a one-stop resource for information on all different modes of travel and travel needs. Getting from Tumwater to Seattle by transit, planning a bicycle tour of South Thurston County's Bountiful Byways, locating a do-it-yourself bike repair shop, scheduling paratransit services, and figuring out how to take the bus to SeaTac airport – these are just a tiny sampling of the point-and-click resources available on this site, which can be found at http://thurstonheretothere.org/

Rideshare Online is a multi-county effort led by WSDOT and King County Metro. This on-line system, combined with a local database and personal assistance, helps customers identify carpool partners or get into a vanpool as well as evaluate alternate commuting opportunities, primarily in the central Puget Sound area or getting to and from that area. It can be found at www.rideshareonline.com

One Bus Away is an app that provides real-time individual bus arrival schedules so that users can know exactly when the next bus will arrive, thereby minimizing wait times for riders and enhancing the attractiveness of transit as an alternative to driving. It's supported by a consortium of public sector transit agencies and others with the goal of providing robust and real-time transit vehicle location data in combination with transit schedules and other related data. Intercity Transit has been a member of the One Bus Away consortium for several years. A link to the One Bus Away app can be found in the top right corner of Intercity Transit's home page, www.intercitytransit.com

On-Line Bike Maps maintained by Thurston Regional Planning Council allows users to customize their routes, perhaps avoiding certain intersections during the morning commute or maximizing distance traveled on dedicated trails instead of on-street facilities. On-line bike maps can be found at http://www.trpc.org/181/Online-Bike-Maps

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CITY OF TUMWATER

Transportation Master Plan

CHAPTER 7

FUTURE CONDITIONS

Planning for the Future

One of the great values of a long-range plan is in setting a course for how the City will grow over time. Many issues Tumwater grapples with today result from decisions made in the first half of the 20th century that differ from the values, needs, and priorities of the City's 21st century residents and businesses. Instead of simply settling for outdated land use patterns that don't afford the kind of lifestyles and travel choices envisioned today, the City is proactively working to change some of the patterns through its sub-area plans and land use policies.

"The vision includes transformation of the Brewery District, Capitol Boulevard Corridor and Tumwater Town Center…"

The City's vision is for the creation of a number of appropriately scaled and well-designed centers that accommodate increased densities and mix of activities. Work underway will result in a small number of truly urban neighborhoods offering a different range of lifestyles than is found in most parts of Tumwater and the Thurston metropolitan area today. The vision includes transformation of the Brewery District, Capitol Boulevard Corridor, and Tumwater Town Center near the airport. In addition, a number of small neighborhood centers are envisioned that will provide basic day-to-day services within walking distance to outlying residential neighborhoods.

Tumwater's land use vision is dependent on a supporting transportation system if it is to succeed. That is why this transportation plan must be consistent with and support the City's vision for how it will grow over time. Growth assumptions associated with the City's long-range vision for its future are the same as those used to estimate future travel needs identified in this Master Plan.

Established community visions combined with zoning, on-the-ground development patterns, and myriad other factors result in a forecast of how the city will grow over the next 25 years. The long-range land use forecast estimates how many people and jobs Tumwater will have in 2040 and where they will be. The forecast depicts the densities likely to be built over time and the mix of land use activities envisioned in adopted planning policies.

Tumwater's land use forecast is developed and periodically updated in coordination with other jurisdictions in the Thurston region as part of a regional population and employment forecasting process conducted by Thurston Regional Planning Council (TRPC); it takes into consideration growth happening elsewhere in the region and state as well as in the City. Combined with the City's vision for the future, the forecast becomes the basis for the land use element of Tumwater's Comp Plan. The land use element and the forecast on which it is based sets the direction for the Transportation Master Plan.

The table below provides a summary of population and employment projections used to estimate travel demand in Tumwater over time based on its adopted land use policies and regional forecasting assumptions. The land use element of the Comprehensive Plan provides more detail on the geographic distribution of existing patterns and how that is envisioned to change over time.

Table 1: Forecasted 2040 Population and Employment for Tumwater

Forecasts	**2010 (actual)**	2020	2030	2040
Population	**23,720**	30,840	40,150	46,300
City	***17,370***	*22,930*	*28,440*	*32,550*
Urban Growth Area	***6,350***	*7,910*	*11,710*	*13,750*
Jobs	**29,655**	30,325	30,995	31,665

Source:
Thurston Regional Planning Council Population and Employment Forecasts (2013 update). Comprehensive documentation of the entire regional population and employment forecasting process can be found on the TRPC website: http://www.trpc.org/236/Population-Employment-Forecasting. Note that figures do not reflect the annexations completed in 2015, which will shift some share of the population and jobs in the Urban Growth Area into the City, earlier than shown

Transportation Master Plan

CHAPTER 8

GOALS AND POLICIES

TRANSPORTATION GOALS AND POLICIES

Transportation goals and policies provide a framework for transportation decision-making. The policy elements in this Plan derive from a regionally-coordinated process and are consistent with the Regional Transportation Plan and Sustainable Thurston, both of which are regional policy initiatives supported by Tumwater. The goals and policies in this Transportation Master Plan support localized efforts while maintaining consistency with established regional objectives and the policy frameworks of adjacent communities.

In 1998, Tumwater and other members of Thurston Regional Planning Council adopted policies recognizing "strategy corridors" where street widening is no longer a suitable option for improving mobility. This may be because the streets are already at a maximum five-lane cross-section, or because they are built out and cannot be widened without significant community disruption, or simply because the facility is at the maximum appropriate width for the adjacent land uses. The preferred solutions for strategy corridors instead will be some combination of non-motorized or transit strategies, signal timing or other operational improvements, completing a street grid that offers a variety of travel routes and land use measures that attract more mixed-use, walkable, high density development where alternatives to driving are most feasible. A map of Tumwater's Strategy Corridors can be found in Figure 3 on page 71.

1. Transportation and Land Use Consistency

Goal: Ensure the design and function of transportation facilities are consistent with and support sustainable, healthy urban, suburban, and rural communities.

<u>Policies:</u>

a. Commit to the development and implementation of land use plans, development patterns, parking requirements, and design standards that encourage walking, bicycling, transit use, and other alternatives to driving alone.
b. Provide transportation facilities that support the location of jobs, housing, industry, and other activities as called for in Tumwater's adopted land use plan.
c. Support policies, programs, and procedures that promote urban infill, and make transportation investments that support increased urban densities and mix of uses consistent with Tumwater's plans for the Brewery District and Capitol Boulevard.
d. Create vibrant city centers and activity nodes that support active transportation and housing, jobs, and services as called for in Tumwater's Comprehensive Plan.
e. Create safe and vibrant neighborhoods with places that build community and encourage active travel.

f. Create urban parks and places that reduce pressure on the region's farms, forests, prairies, and open spaces.
g. Meet mobility, access, and economic goals in designated Strategy Corridors with an appropriate combination of investments, policies, and land use measures.
h. Design and invest in transportation projects that have a lasting positive impact, reflect the goals of the people who live and work in Tumwater, and contribute to a sense of place and community.
i. Ensure adequate transportation capacity to address growth consistent with this Comprehensive Plan.
j. Preserve and promote awareness of Tumwater's historic, cultural, and natural heritages.

2. Multimodal Transportation System
Goal: Work toward an integrated, multimodal transportation system that supports adopted land use plans, reduces overall need to drive, and provides alternative travel choices.

Policies:

a. Provide quality travel choices appropriate to existing and future land uses, including walking, bicycling, transit, motor vehicles including freight, and rail.

b. Ensure that development of transit transfer centers, activity centers, employment centers, schools, and the airport accommodate multiple modes of travel and safe, efficient connections among those modes of travel.
c. Invest in mode-specific strategies that contribute to overall development of an integrated, multimodal transportation system.
d. Promote public awareness on the rights and responsibilities of drivers, bicyclists, and walkers, and ways these modes can travel together safely and efficiently.
e. Incorporate practical design considerations where appropriate, designing to solve mobility problems more so than to meet design standards if doing so

increases functional mobility of the transportation system.

3. Barrier-free Transportation
Goal: Ensure transportation system investments support the special travel needs of youth, elders, people with disabilities, people with literacy or language barriers, those with low incomes, and other affected groups.

Policies:

a. Work over time to ensure that transportation facilities comply with the Americans with Disabilities Act.
b. Construct transit stops and walkway approaches that are accessible for those with differing capabilities.
c. Provide appropriate transportation services, facilities, programs, and on-line resources that reduce barriers to people who do not speak or read English.
d. Present information and provide public participation opportunities for everyone, including people with physical disabilities and/or people with limited literacy skills.
e. Implement land use policies that provide a variety of housing types on corridors with excellent transit service connecting to employment centers, services, retail, health care, and other essential services to support the lifestyles of people who cannot drive.

4. System Safety and Security
Goal: Enhance the safety and security of those who use, operate, and maintain the transportation system.

Policies:

a. Combine education, enforcement, engineering, and evaluation to maintain and enhance system safety.
b. Design transportation infrastructure to encourage safe user behavior.
c. Support projects that improve passenger safety and security at facilities like park-and-ride lots and transit transfer centers.

d. Provide safe walking routes to schools.
e. Retrofit essential transportation facilities where possible to improve their ability to withstand a major earthquake or other natural disaster.
f. Build in system redundancy through a well-connected street grid to support emergency response and reduce community disruption during natural or man-made disasters.
g. Encourage coordination between transportation system providers and emergency response providers who rely on that system.

In April 2015, Tumwater voters approved a two-tenths of one percent retail sales tax to be devoted to street and sidewalk maintenance. Transportation infrastructure is one of the City's most valuable investments. Inadequate local, state and federal funding had resulted in deferred maintenance which drives repair costs higher. Establishing a Transportation Benefit District with this funding authority helps ensure that over time Tumwater will be able to better preserve and maintain its city streets and sidewalks.

5. System Maintenance and Repair

Goal: Protect investments that have already been made in the transportation system and keep life-cycle costs as low as possible.

Policies:

a. Prioritize maintenance, preservation, operation, and repair of the existing transportation system.
b. Use preventive maintenance programs to ensure lowest life-cycle costs.
c. Use street restoration standards and coordinate utility and street projects to minimize destructive impacts of utility projects on streets, leveraging where possible investments for both project types to deliver more cost-effective public facilities.
d. Explore innovative programs that reduce infrastructure life-cycle costs or increase efficiency of service delivery, including use of new materials, technologies, and resource partnerships.

6. Travel Demand Management

Goal: Increase overall operating efficiency of the transportation system through the effective use of measures that reduce the need to drive alone.

Policies:

a. Promote transportation-efficient development and redevelopment, and site public services and facilities where transit, walking, and biking are now or will be viable alternatives to driving alone.
b. Encourage use of public transportation, ridesharing, biking, and walking by improving access, convenience, and reliability of those options.
c. Sustain and expand private and public sector programs and services that encourage employees to commute to work by means other than driving alone, or to change commuting patterns through teleworking, flex-time, or compressed work weeks.
d. Manage parking to improve consistency with transportation demand management objectives.
e. Promote technologies that enable people to meet their needs without having to travel.
f. Use travel demand management techniques to provide alternatives during temporary congestion, such as during major construction.
g. Work to mainstream telework as a primary transportation demand management strategy among public and private employers.
h. Strive to meet State Commute Trip Reduction targets for the City.

As a partner in the regional 'Smart Corridors' project, Tumwater is bringing its traffic signal system into the 21st century with modern technology and protocols that allow coordination with Intercity Transit buses.

7. Transportation Technologies

Goal: Use technology-based approaches to address transportation congestion, safety, efficiency, and operations.

Policies:

a. Use transportation technologies to improve the operating efficiency and safety of the existing transportation system.

b. Use transportation technologies to better integrate transportation modes.
c. Make short-range technology investments that support future technology implementation strategies.
d. Look for opportunity to integrate transportation technology considerations in all projects.
e. Recognize that transmittal of electronic information is an important function of a transportation system, and integrate this into transportation system evaluation, policies, and implementation strategies.

8. Freight Mobility
Goal: Promote efficient, cost-effective, timely, and safe movement of the freight within and through the region.

Policies:

a. Plan for freight access to and from highways and other major freight corridors, and between intermodal facilities and industrial areas.
b. Support efforts to increase the amount of freight that is moved by rail to enhance efficiency, productivity, safety, and mobility.
c. Explore strategies to reduce conflict and optimize safety for all transportation system users where industrial or commercial land uses are adjacent to highly urbanized areas.
d. Implement policies and design standards that support local economic vitality by accommodating delivery trucks serving businesses and services while minimizing impacts on local streets.

9. Streets, Roads, and Bridges
Goal: Establish a street and road network that provides for the safe and efficient movement of people and goods while supporting adopted land use goals.

Policies:

a. Design and construct multimodal, context-sensitive, complete streets and roads.
b. Coordinate regionally to identify new connections that provide more direct routes and reduce vehicle miles traveled.
c. Avoid widening any local arterial or collector more than two through-lanes in each direction with auxiliary turn lanes where warranted (maximum five lanes mid-block width) to preserve an acceptable community scale and minimize transportation impacts on non-motorized travelers and adjacent land uses.
d. Develop an interconnected grid of local streets and roads to increase individual travel options and neighborhood connectivity, while improving efficient use of the overall transportation system.
e. Use new technologies or alternative designs to safely and efficiently manage the flow of traffic, such as roundabouts where appropriate as alternatives to traffic signals or stop signs.
f. Use access management techniques to improve roadway capacity and operating efficiency, and increase overall system safety.
g. Ensure that street, road, and bridge projects are integrated with pedestrian amenities in districts and neighborhoods, and add lasting value to the community.
h. Incorporate alternative strategies to address congestion where road widening and traffic control devices are not suitable, particularly along Strategy Corridors.
m. Strategy Corridors are places where street widening is not a preferred option to address congestion problems. This may be because the street is already at the maximum number of lanes (5), or that adjacent land uses are either fully built out or are environmentally sensitive. In strategy corridors, level of service (LOS) may not meet adopted standards,

Tumwater's plans for the Brewery District and the Capitol Boulevard Corridor incorporate roundabouts as a safe, efficient intersection treatment that reduces impacts associated with signalized intersections on adjacent properties. The Boulevard will integrate roundabout treatments with the use of access management to smooth traffic flow and create safer turning opportunities while improving travel conditions for cyclists and pedestrians.

"Strategy Corridors are places where street widening is not a preferred option to address congestion problems…"

suggesting instead that a different approach is needed for maintaining access and mobility in these areas such as increased transit service, more sidewalks or bike facilities, a complete and connected street grid, transportation technology measures that improve system operating efficiency, access management, parking management, incentives for employees to telework or carpool, or land use measures that increase the density of land use activities in these corridors that support the best alternatives to driving.

i. Design and build streets that are important freight or bus routes to reduce weather-induced weight restrictions.

j. Meet pm peak Level of Service (LOS) standards:
   - LOS E or better in Urban Core Areas [where these areas overlap with Strategy Corridors the LOS may exceed adopted standards]
   - LOS D or better elsewhere inside the City limits

10. Public Transportation

Goal: Provide an appropriate level of reliable, effective public transportation options commensurate with the region's evolving needs.

<u>Policies:</u>

a. Support Intercity Transit's long-range plan emphasizing trunk and primary routes servicing core areas along designated Urban Corridors and other strategy corridors with supportive land use and appropriate design standards.

b. Increase the share of trips made by public transportation.

c. Support regional commuter vanpool programs to provide cost-effective, flexible alternatives to commuting in single-occupancy vehicles.

d. Support safe, convenient, and cost-effective transportation services for youth, elders, people with disabilities, and low-income populations by increasing the supply of housing on high-quality transit corridors.

e. Schedule public meetings where possible in locations served conveniently by transit; include transit route information on meeting notices.
f. Integrate public transportation considerations into the planning for newly emerging urban centers and locations such as those south and east of the airport, including innovative partnerships or programs where fixed-route service is not feasible in the near-term.

11. Bicycling
Goal: Increase the share of all trips made safely and conveniently by bicycle.

Policies:

n. Develop a continuous, safe, and convenient bicycle network that functions as an integral part of the whole transportation system.
o. Provide safe and convenient bicycle routes to all schools in the city, and encourage their use.
p. Participate with regional partners in developing a network of contiguous and interconnected north-south and east-west dedicated shared-use corridors to serve as the backbone for the region's non-motorized transportation system.
q. Provide bicycle parking facilities at transit centers, park-and-ride locations, and other multimodal locations.
r. Provide short- and long-term bicycle parking and other supporting facilities at locations like schools, employment sites, and activity centers.
s. Support education programs for motorists and bicyclists to increase understanding and awareness of bicycling laws, and encourage safe and lawful sharing of the streets.
t. Participate with regional partners in exploring long-term strategies for funding bicycle facilities and services.

While City codes require bike parking facilities with most new construction, some developers are catering to a growing interest in biking by offering even more amenities for resident cyclists. For example, Hearthstone Apartments in the Capitol Boulevard District offers a dedicated bike workshop space for residents. This supports increased bike use within the City's urban core and is an example of market forces aligning with City bike policies.

12. Walking

Goal: Increase the share of all trips made safely and conveniently by walking.

Policies:

a. Provide a convenient, interconnected, safe pedestrian network that supports existing and desired land uses.

b. Construct and maintain safe and accessible sidewalks and effective crossing opportunities within an appropriate distance of every school in the city, and encourage their use.

c. Provide frequent pedestrian crossings, especially in urban areas and on urban corridors, along transit routes, and near activity centers.

d. Develop and promote non-motorized connections for pedestrian and bike travel to shorten the length of trips to destinations where walking and biking are viable travel options.

e. Require pedestrian-friendly site design and building standards in activity centers, along urban corridors and other key transit routes, and in high density mixed-use zoning districts.

f. Provide street lighting, pedestrian buffers, trees, benches, and other street elements that make walking safe and pleasant.

g. Encourage neighborhood-scale planning efforts to identify and refine important pedestrian routes that increase connectivity and improve walkability.

h. Consider asphalt walkways as appropriate practical solutions for sidewalks when functional pedestrian mobility needs to be improved prior to the availability of adequate funds for construction as called for in adopted sidewalk and street design standards.

Tumwater partners with the Tumwater School District and Intercity Transit to support "Walk and Roll" programs at area elementary and middle schools. These programs work with educators and school administrators to encourage children to walk and bike to school. This includes coordinated education and enforcement activities as well as a focused response to infrastructure needs in the vicinity of schools to make it safer and easier for students to walk to school.

13. Rail

Goal: Ensure the continued long term viability of existing and rail-banked rail lines for future freight and passenger rail travel.

Policies:

a. Support appropriate regional opportunities for the potential shared use of freight rail lines for passenger rail travel.
b. Advocate for regional acquisition and continued operation of short-line railroads where needed to support current and future economic development needs.
c. Use design techniques, technology, and operations coordination to minimize potential conflicts between trains and other modes of travel, and between trains and adjacent land uses.
d. Work with regional partners to acquire railroad rights-of-way threatened with abandonment in order to preserve these corridors for future transportation uses.
e. Participate as appropriate in the partnerships necessary to foster efficient, high-speed passenger rail service in the Pacific Northwest.
f. Coordinate with regional partners to position the Thurston Region for a commuter rail connection in the future.

14. Aviation

Goal: Provide an appropriate level of facilities and services to meet the general aviation needs of residents and businesses in the region.

Policies:

a. Coordinate with the Port of Olympia and Thurston County to maintain consistency between adopted land use plans and long-range airport development strategies, and ensure land use compatibility in areas adjacent to the airport.

b. Support multimodal access to the Port of Olympia's airport terminal.

15. Public Involvement

Goal: Build a community of engaged and informed constituents that contributes ideas and supports actions to create a highly functional multimodal transportation system consistent with the goals and policies of this transportation element.

Policies:

a. Provide broad-based, early, and continuing public involvement opportunities in all aspects of the transportation planning process.

b. Ensure equal access to participation for all users of the transportation system.

c. Promote increased public understanding of the relationships between land use patterns and transportation choices facing Tumwater.

d. Explore innovative participation techniques to increase public involvement in transportation issues, and maximize use of "plain English" and other communication techniques to translate complex issues or decisions so they can be widely understood.

16. Intergovernmental Coordination

Goal: Ensure transportation facilities and programs function seamlessly across community borders.

Policies:

a. Participate in coordination activities at the local, regional, state, tribal, and federal level that address the condition or operations of the transportation system.

b. Work with other agencies to coordinate land use and public facility siting decisions, implement countywide planning policies, and refine the tools needed to achieve transportation-efficient community development patterns.

c. Coordinate street projects with Olympia, Thurston County, WSDOT, and Intercity Transit as appropriate.
d. Coordinate development of local plan updates with regional efforts when possible to ensure consistency.
e. Collaborate with other local jurisdictions, TRPC, Intercity Transit, the Port of Olympia, the Thurston EDC, and other entities to facilitate informed, reasoned decision-making processes that advance shared transportation and land use objectives.

17. Environmental and Human Health

Goal: Minimize transportation impacts on the natural environment and the people who live and work in Tumwater.

Policies:

a. Protect water quality from the impacts of stormwater runoff by minimizing impervious surface area and by using low impact development methods where feasible to effectively treat and manage unavoidable runoff.
b. Use transportation planning, design, and construction measures that minimize negative impacts on priority fish-bearing streams and other environmentally sensitive areas.
c. Develop a transportation system that supports compact, mixed-use development and related non-motorized travel to curb growth in miles of motor vehicle travel, increase energy efficiency, reduce environmental impacts, and encourage physical activity and community health.
d. Support state and national efforts to promote the use of alternative fuels and technologies that reduce pollution and other environmental impacts from motorized vehicles.

Low Impact Development mimics the natural hydrologic action of watersheds by retaining and infiltrating stormwater runoff on or near the site, and by effectively treating unavoidable runoff, in addition to simply reducing the amount of paved surface area on a site.

e. Ensure federal Title VI requirements for environmental justice are met so that minority populations and people with low incomes do not incur disproportionately high and adverse human health or environmental impacts from transportation policies, programs, and investments.
f. Comply with federal Clean Air Act transportation requirements.
g. Support policies and programs that reduce greenhouse gas emissions associated with travel.
h. Reduce the impacts of transportation on the natural environment during construction, retrofit, and maintenance.
i. Plan and design for impacts associated with changing weather and climate patterns, such as increased flooding and extreme weather events.
j. Support regional efforts to decrease annual per capita vehicle miles traveled within the Thurston region to:
    - 1990 levels by 2020
    - 30 percent below 1990 levels by 2035
    - 50 percent below 1990 levels by 2050.

18. Performance Measures

Goal: Develop performance measures that are realistic, efficient to administer, effective in assessing performance, and meaningful to the public.

Policies:

a. Use transportation performance measures to evaluate, monitor, and respond to the performance of Tumwater policies and investments.

b. Use transportation performance measures that reflect priority city and regional objectives such as consistency of transportation and land use decision-making, improved mobility and access, adequate maintenance and repair of the system, environmental health, and safety.

c. Develop performance measures that reflect the needs and contributions of all modes of travel.
d. Where feasible, use performance measures consistent with those used by other agencies and organizations to enable compatible comparisons.

19. Transportation Funding
Goal: Secure adequate funding from all sources to implement the goals and policies in this plan.

<u>Policies:</u>

a. Provide timely and comprehensive public information about transportation funding issues and opportunities to better enable citizens to participate and make informed decisions on complex funding issues.
b. Prioritize the maintenance and preservation of the existing transportation system to minimize life-cycle costs.
c. Consider the full array of costs and benefits in the selection of transportation projects to ensure the best long-term investment decisions.
d. Make strategic transportation investments that reinforce land use and transportation decisions consistent with the goals and policies of this transportation element.
e. Ensure that transportation investments are equitable to all segments of the community in terms of costs associated with relocations, health impacts, and land use disruptions, as well as the benefits derived from system performance and travel choices.
f. Support regional efforts to improve the availability, reliability, and flexibility of transportation revenues.
g. Use transportation funding policies and investments to make development decisions predictable, fair, and cost-effective.
h. Continue policies that require new development to pay for its share of impacts on the transportation system; where appropriate support multimodal mitigations and not just street capacity.

Transportation Master Plan

CHAPTER 9

SYSTEM INVENTORY

Transportation System Inventory

The transportation system is made up of a number of different networks. Combined, they connect people to the places they need to be and get freight into and out of our city and products to our stores. Following is an inventory of the existing transportation system serving Tumwater's residents and businesses.

City Streets

City streets are the most ubiquitous element of our transportation system. The City has about 113 centerline miles of streets it owns and is responsible for maintaining.

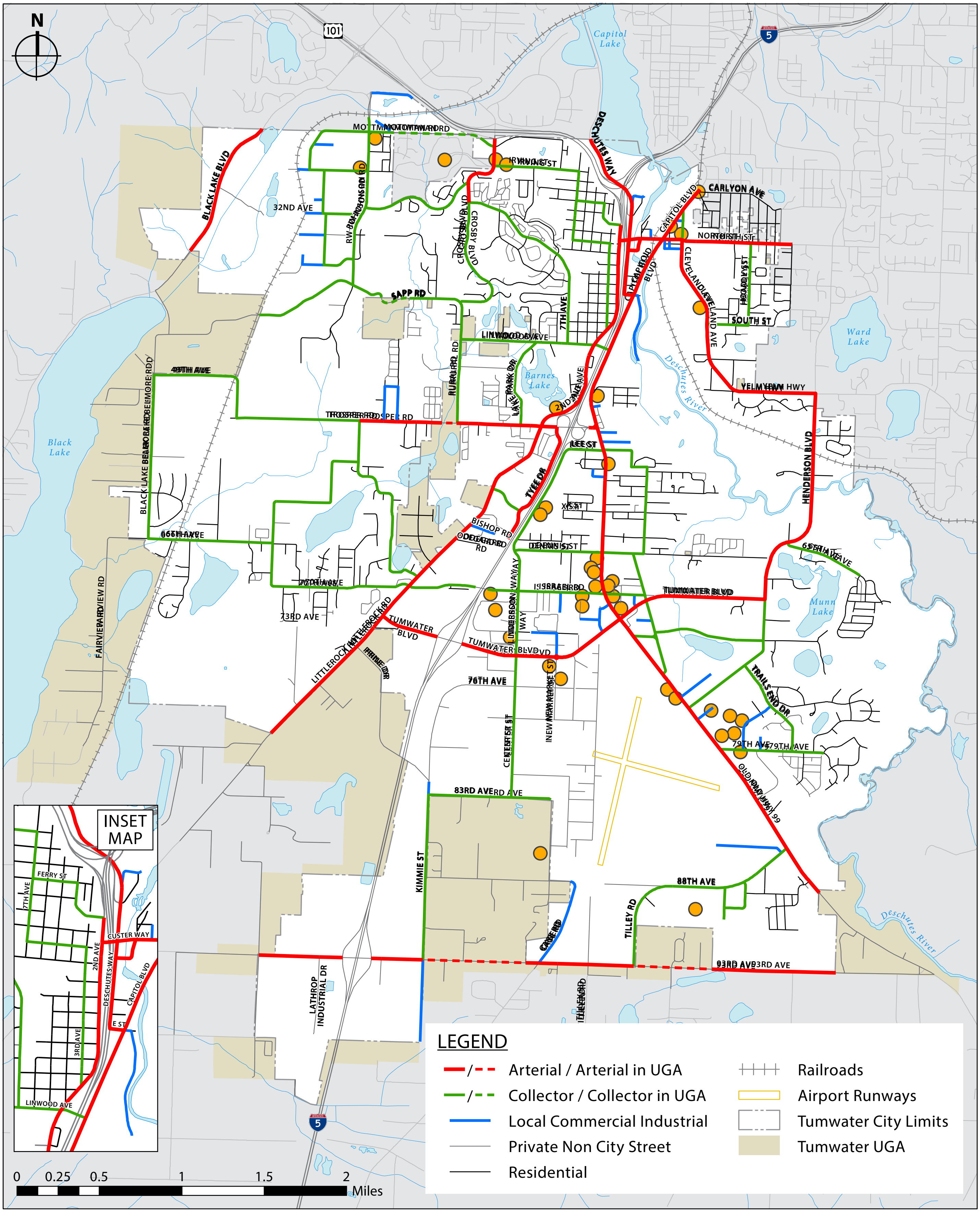
Tumwater has defined the functional classification of its streets in accordance with City standards in much the same way that Federal Highway Administration assigns Federal Functional Classification to the nation's streets and highways. While very similar, these are two different street classifications

Some of the intersections where the streets meet need traffic control to enable safe crossing and turning movements. Tumwater has 23 traffic signals and five roundabouts to control traffic at its busiest intersections.

Figure 2 illustrates the City's street system by its functional classification. Functional classification is a way of characterizing the relative importance of a street in terms of the volumes of traffic it carries and its relation to other streets in the network. Some streets are intended to carry more traffic than other streets and serve large commercial or employment centers. Others are intended to connect residential areas with neighborhood centers and schools, carrying lower volumes at slower speeds. Still others provide circulation within a neighborhood and have the lowest volumes and slowest speeds. In this way arterials carry the highest volumes of traffic, followed by collectors, and then local access streets.

A well-connected street grid offering many route choices is the most efficient pattern for carrying and dispersing traffic. The more efficient the street network the less we have to rely on widening to address chronic congestion. We are challenged to complete that grid due to things like I-5 and topographic features that limit our ability to make street connections, but where possible we strive to maximize connectivity.

Item 8.



CITY OF TUMWATER
Transportation Master Plan

Figure 2
Roadway Functional Classification

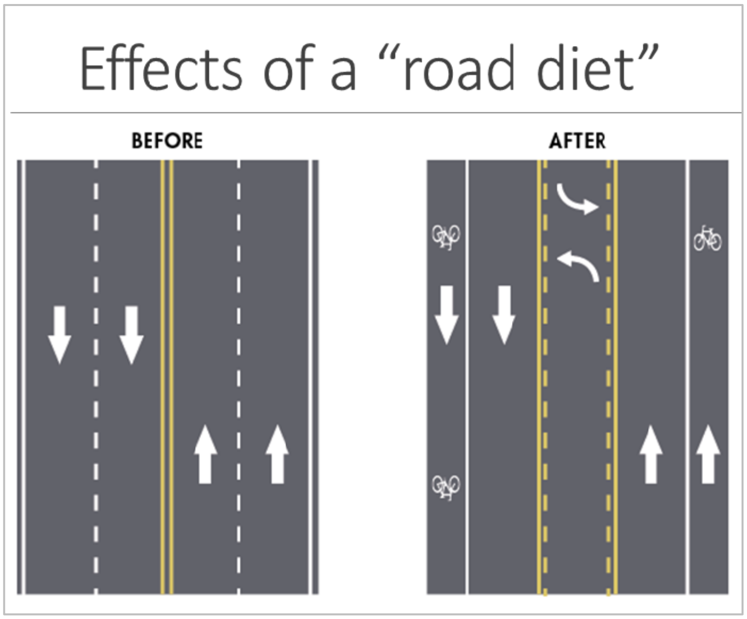
There is a practical limit to how wide we can build our streets and still maintain the character of our community. Regional policies put into place in the late 1990s restrict the width of arterials in our region to five lanes between intersections. This is two lanes in each direction plus a center turn lane, if needed. It was determined that streets wider than this would be inconsistent with the small city character of Tumwater and our neighboring jurisdictions. Our communities realized that traffic congestion cannot be solved by street widening – at best, it alleviates the problem for a while before congestion resumes at an even bigger scale. At worst, it creates bottlenecks elsewhere on the system and degrades the character of the place with facilities that are highway-like in form and function. Excessively wide streets undermine our efforts to create walkable, bike-friendly neighborhoods that are more oriented to people than cars.

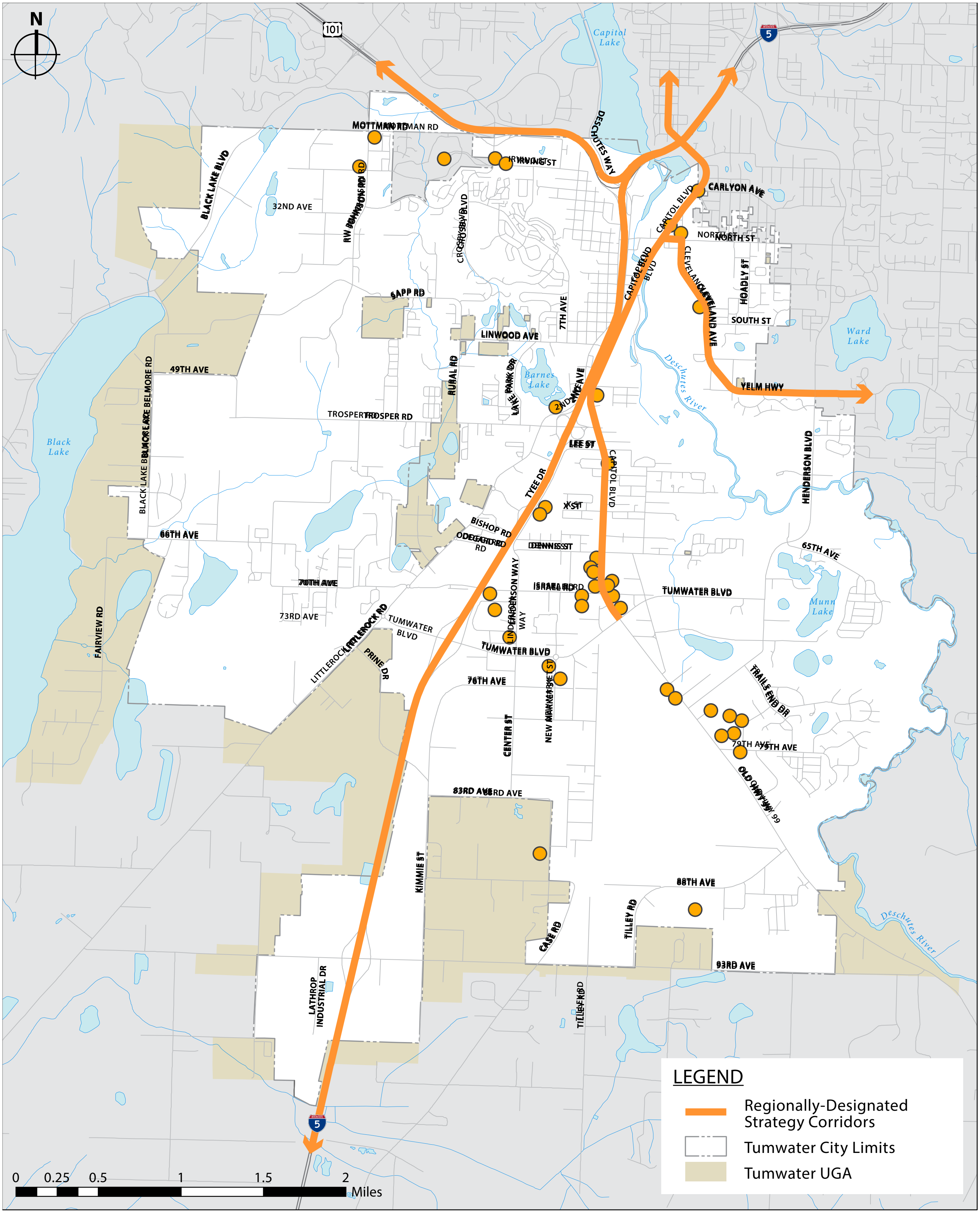
TRPC policies identify 'strategy corridors' where widening is not a viable option due to existing street width or other constraints. Strategy corridors are those places where alternatives to widening are most needed to improve mobility and access. These strategies can include improved signal timing and operational enhancements; they can include improved transit, walking, and biking options; they can include access control that improves safety and efficiency by restricting turn movements.

Interestingly, strategies can also include more urban-style development on these corridors that results in a mix of activities in close proximity and that generates demand for walking, cycling, and transit. If that development were locating on the periphery of the city it would generate car traffic that further clogs these arterials. Locating that same development on our close-in corridors creates opportunities for travel choice that don't exist elsewhere. Figure 3 depicts the regionally-designated strategy corridors in Tumwater. They include Capitol Boulevard, Tumwater Boulevard, Cleveland Avenue and Yelm Highway, and Interstate 5.

Tumwater adheres to some general design principles for its streets, with the goal of creating a safe, convenient street system that supports community identity.

- Design streets to accommodate all travelers, not just drivers.
- Limit the width of streets, ensuring no arterials exceed five lanes mid-block and using "road diets" to repurpose existing rights-of-way where streets are unnecessarily wide.





CITY OF TUMWATER
Transportation Master Plan

Figure 3
Regionally-Designated Strategy Corridors in Tumwater

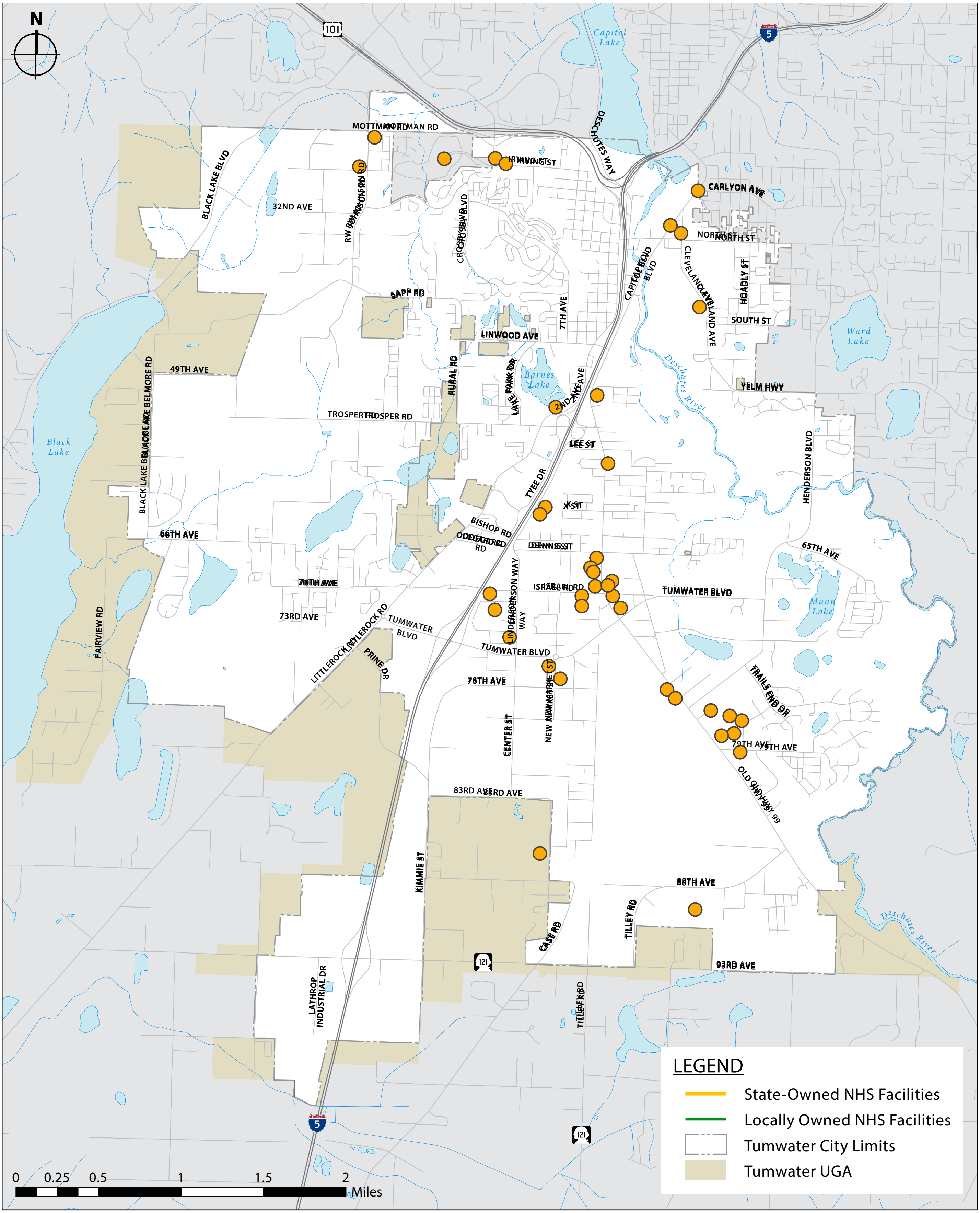
State Facilities

SR 121 includes 93rd Avenue between I-5 and Tilley Road, Tilley Road south to Maytown Road, and Maytown Road west to I-5.

In addition to the city's streets, Tumwater is also served by two state highways – Interstate 5 and SR 121 – that are owned and managed by the Washington State Department of Transportation (WSDOT). US 101 and its interchanges, which provide access to and from Tumwater, is located in Olympia along Tumwater's northern border. I-5 is a Highway of Statewide Significance that bisects the City from north to south.

National Highway System Routes

The National Highway System (NHS) includes the interstate highway system as well as other streets and highways important to the nation's economy, defense, and mobility. Local arterials are designated as a part of the NHS, as are other local streets that connect intermodal facilities like the airport to the interstate highway system. Figure 4 identifies the NHS routes in Tumwater. Golden colored facilities are state—owned while green colored facilities are local components of the NHS.



CITY OF TUMWATER
Transportation Master Plan

Figure 4
National Highway System Routes in Tumwater

PUBLIC TRANSPORTATION

Transit is an integral part of Tumwater's transportation system. A range of services, from general purpose to commuter to rural connectivity, make up the City's transit network.

INTERCITY TRANSIT

Intercity Transit is an important partner in meeting the City's mobility needs. Intercity Transit (IT) is the region's public transportation service provider, operating a fleet of 71 buses with 20 local routes in the Tumwater, Olympia, Lacey, and Yelm area. IT also operates 5 Express routes to Lakewood and Tacoma offering connections to Pierce Transit and Sound Transit services. All buses are equipped with bike racks and all buses are ADA accessible. In addition, IT operates complementary paratransit service called "Dial-A-Lift", or DAL for short, with 35 vans; this service exceeds requirements of the Americans with Disabilities Act (ADA). IT also maintains an extensive commuter vanpool program with 200 active vans carrying over 1,500 people each workday between work and home efficiently and cost-effectively. IT supports its transit and vanpool program utilizing 7 park-and-ride lots throughout the region, including one in Tumwater located at the corner of Bonniewood Drive and Israel Road, in the Department of Health parking lot. In 2014, IT had 4.5 million boardings on its fixed-route service, over 154,000 boardings on its "Dial-A-Lift" paratransit service, and over 745,000 trips on its Commuter Vanpool service.

IT's commitment to efficiency results in the most frequent service operating along the region's urban corridors, the next most frequent service connecting neighborhoods to significant employment and activity centers, and the sparsest service connecting outlying areas to transit transfer centers. Five local transit routes currently serve the Tumwater area.

u. Route 12 operates between the Olympia Transit Center at the north to Tumwater Square and the

State's Department of Labor and Industries building on Linderson Way SW to the south, providing access to the west side of Tumwater via Littlerock Road, Trosper Road, and Linwood Avenue. Service is provided Monday through Friday between approximately 6:00 a.m. and 11:15 p.m. On the weekends service is provided between approximately 8:15 a.m. and 11:15 p.m.

v. Route 13 also operates between the Olympia Transit Center at the north to the Labor and Industries building on Linderson Way to the south via Capitol Way and Capitol Boulevard; it is a high frequency weekday service route offering 15 minute service frequency. Service is provided Monday through Friday between approximately 6:00 a.m. and 11:00 p.m. On Saturdays service is provided between approximately 8:45 a.m. and 11:00 p.m., and on Sundays from 8:45 a.m. to 8:15 p.m.

w. Route 42, a weekday circulator route, provides service to the Thurston County Family Court and the Accountability and Restitution Center (ARC), both located in Tumwater's Mottman Industrial Park. This route is also within ¼ mile of Quixote Village, the cottage community for previously homeless adults. Route 42 makes connections with the high frequency service corridors served by Routes 43 and 44 on Cooper Point Road and at the South Puget Sound Community College.

x. Route 43 operates between the Olympia Transit Center and the Tumwater Square Transfer Station, traveling along Deschutes Parkway, and serving the County Courthouse, Evergreen Park Drive, the South Puget Sound Community College, Barnes Hill, and back to Capitol Boulevard via the northwest part of Tumwater. Service is provided Monday through Friday between approximately 6:15 a.m. and 7:45 p.m. On

Saturdays, service is provided between approximately 8:45 a.m. and 7:00 p.m.

y. Route 68 travels between the Lacey Transit Center, Tumwater Square Transfer Station, and the Olympia Transit Center via the Yelm highway, providing access to parts of east Tumwater along the way. Service is provided Monday through Friday between approximately 6:00 a.m. and 8:30 p.m. On the weekends service is provided between approximately 8:30 a.m. and 8:30 p.m.

Intercity Transit also offers inter-regional service to and from Lakewood on weekdays with stops near the Labor and Industries and Department of Health buildings. Express Route 609 provides 10 northbound trips departing Tumwater from 5:00 a.m. to 5:20 p.m. and 11 southbound trips arriving in Tumwater from 6:50 a.m. to 7:30 p.m. Transfer points in Lakewood enable connections with Pierce Transit and Sound Transit's Sounder commuter rail and Express bus service to SeaTac airport and Seattle. This is a grant-funded pilot program through June 2017, to demonstrate the demand for express service between Tumwater, Olympia, Lacey, and Lakewood.

IT's service standards and facilities plans are guided by an annual update of both its six-year Transit Development Plan and its Strategic Plan. Together, these two plans help the agency prioritize its service and investments to maximize system performance. Seven essential design principles frame IT's decision-making processes and ensure coordination with Tumwater and other local jurisdictions:

- Operate a range of services, each designed to meet the needs and capabilities of the neighborhoods it serves.
- Strengthen service operating along major corridors.
- Reduce customer travel times with strategies such as:
    - Express services
    - Priority treatment for transit vehicles
    - More direct services linking major points of origin and destination
    - Fare policies that speed boarding times
- Keep pace with development.
- Expand regional express routes.

- Support a range of transportation alternatives.
- Provide fixed facilities and equipment that support the region's public transit infrastructure.

Figure 5 illustrates the extent of IT service within Tumwater, by route and service frequency. Note that all service in Tumwater is directly linked to service elsewhere within the metropolitan area. Thus, transit riders in Tumwater can easily connect in downtown Olympia with inter-regional service offered by Intercity Transit, Grays Harbor Transit, Mason Transit, and Greyhound, as well as to routes operating into Pierce County.

IT maintains the regional Tumwater Square Transfer Station on Cleveland Avenue, near the Safeway. Tumwater engages IT in reviewing land use permitting requests in order to maximize the opportunities for public transportation through effective land use planning and urban design. IT is also a regular stakeholder on the City's advisory committees convened for special studies and sub-area plans. IT and Tumwater are partnering on an upgrade to the Tumwater Square Transit Station to improve accessibility, pedestrian safety and bus alignments in support of Brewery District recommendations.

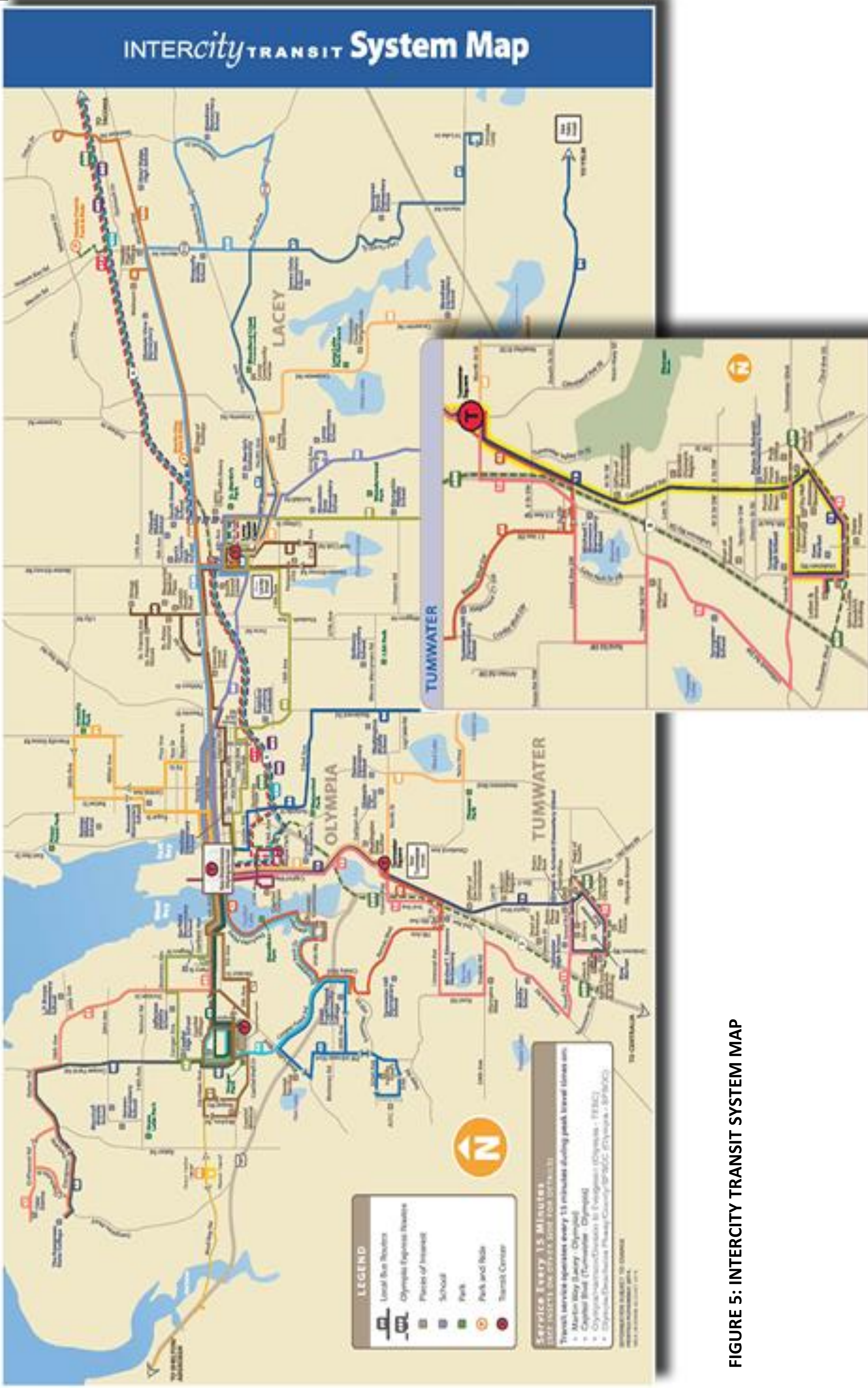
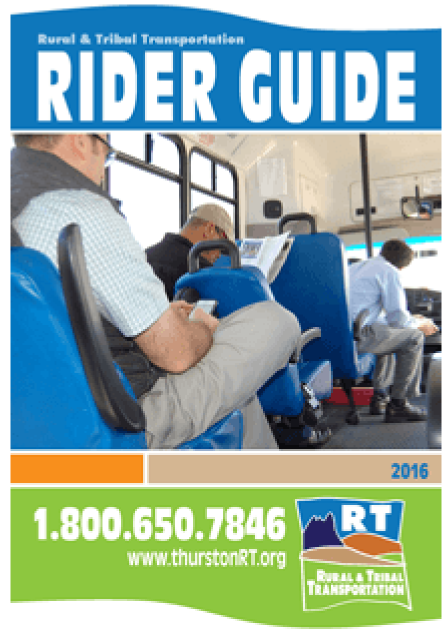


FIGURE 5: INTERCITY TRANSIT SYSTEM MAP

R/T – Rural & Tribal Transportation

R/T – the Rural & Tribal Transportation program – helps connect outlying communities outside of Intercity Transit's service area to the urban transit network. R/T provides accessible, fixed-route public transportation services for the Nisqually Indian Tribe, the Confederated Tribes of the Chehalis Reservation, and the communities of Bucoda, Rainier, Rochester, Tenino, Yelm, and Centralia, connecting those communities to Intercity Transit in Thurston County and Twin Transit in Lewis County. The north urban connection to Intercity Transit is in Tumwater, at the state office buildings located at Capitol Boulevard and Israel Road, and at the Tumwater Square Transfer Station.



- Route 2 makes arrivals in Tumwater from Rainier and Tenino beginning at 6:50 a.m. through about 5:00 p.m., with return trips leaving Tumwater from 7:00 a.m. until 5:00 p.m.
- Route 3 makes arrivals in Tumwater from the Chehalis Reservation, Rochester, and Grand Mound from 7:40 a.m. until 5:40 p.m., with return trips leaving Tumwater from 7:45 a.m. until 5:45 p.m.

Timed transfer points enable people to travel conveniently between rural communities in south Thurston County and north Lewis County and Tumwater.

Non-Motorized Facilities

Tumwater, like other jurisdictions in the Thurston region, places a high priority on "complete streets" that include infrastructure for all modes of travel and not just cars. For almost 20 years, Tumwater has had in place street standards that require sidewalks and bike lanes with street construction or reconstruction projects. Following is a summary description of these systems.

Pedestrian Facilities

Every single trip begins or ends with a walk for most people. Sidewalks and other elements of the pedestrian system are the facilities that make those walks to and from final destinations safe and convenient. Design guidelines specify how sidewalks are to be built – their width, their distance from the street, whether they are on one side of the street or both sides. Different standards apply to different types of streets depending on the speed and volume of vehicular traffic, number of pedestrian-generating activities, and other factors.

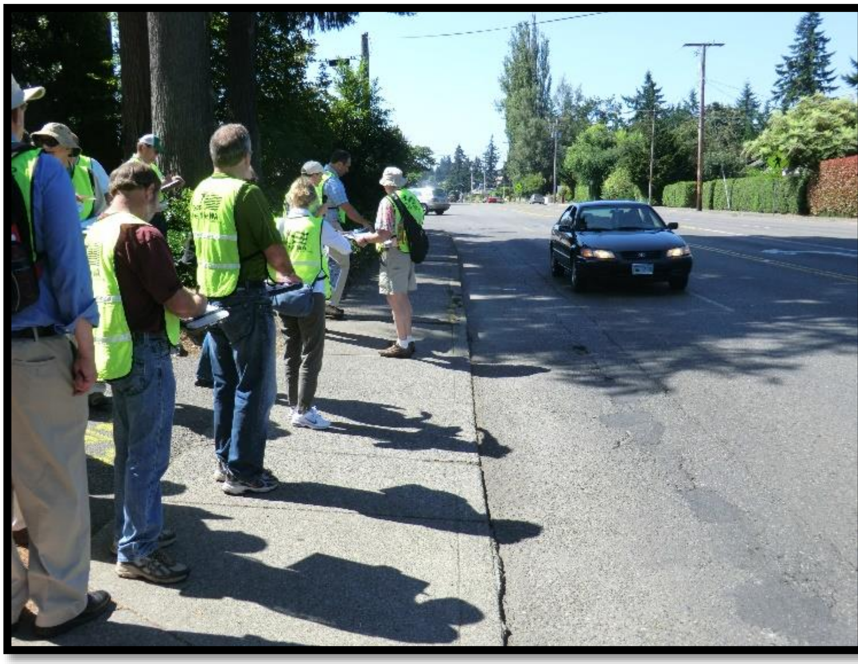
Asphalt walkways, such as this walkway located on 70th Avenue, provide a cost-effective, practical solution for improving pedestrian mobility.

Most streets built or upgraded since the mid-1990s have sidewalks because of policies put into place after GMA that require streets to accommodate all travelers and not just those in cars. However, many older streets do not have sidewalks and adding them will be an expensive undertaking to be accomplished over many years. Tumwater is using asphalt walkways as a functional alternative to sidewalks in some locations that don't have sidewalks and will not for the foreseeable future due to costs, land acquisition, and other factors. Walkways are designed to solve a problem – lack of safe and convenient pedestrian facilities for the people who need to walk there. They provide functional, safe, and convenient connections at a fraction of the cost of full-standard sidewalks.

Crosswalks are what makes it possible for people to safely cross busy streets while giving drivers some predictability about where to expect pedestrians in the street. They come in various configurations and may be located at an intersection or "mid-block", enabling people to safely cross between intersections. Mid-block crossing opportunities are especially important on busy transit corridors because riders typically have to cross either going to or returning from their trips.

It takes more than sidewalks and crosswalks to make a comfortable and accessible pedestrian environment. Other elements that may be deployed include refuge islands for wide intersections, pedestrian-activated signals, planter strips, colored or textured pavement, street trees, and bulb-outs or curb extensions. In more urbanized areas, building architecture and site design are also critical considerations that will either enhance or inhibit pedestrian access

Figure 6 delineates the existing pedestrian network, including sidewalks and sidewalks adjacent to planter strips, walkways that provide safe and functional places for people to walk, and multiuse pathways designed to serve pedestrians and cyclists.



A Walkability Audit conducted by Planning Commissioners and staff evaluated the condition and suitability of sidewalks in the Brewery District.

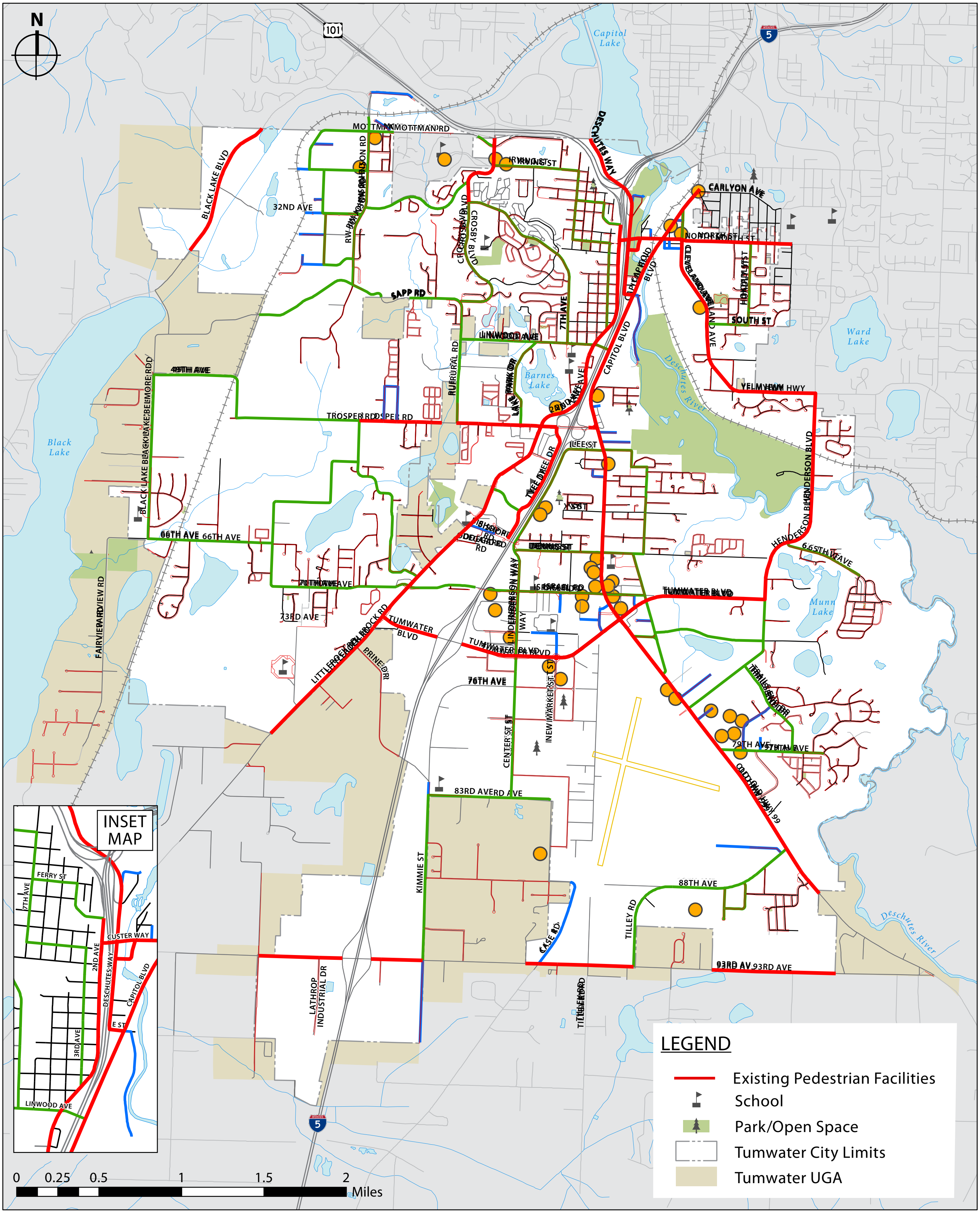


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Figure 6
Existing Pedestrian Facilities 2012

Despite rain, hills, and short winter days, biking is an increasingly popular mode of travel throughout Tumwater and the rest of the region. Designated bike routes include several different types of facilities with different types of treatments. What they have in common is that they are favorable routes for cyclists that connect important destinations or corridors.

Bike lanes are typically on-street facilities with a minimum width of five feet that are designed and signed to accommodate cyclists on existing streets. Bike lanes enable cyclists to travel on streets without having to ride in traffic by dedicating a part of the street for bike travel.

Wide shoulders can serve the function of bike lanes on some roads where a signed bike facility is not appropriate. This might be because additional paved width is not available, or where the space is shared with pedestrians because there are no sidewalks. Four feet of shoulder width can make biking safer and more comfortable for some people, even if it is not designated as a formal bike lane.

Multi-use pathways and trails provide off-street facilities that may be paved or unpaved but smooth, and which are designed to accommodate cyclists as well as pedestrians. Trails are sometimes discounted as being purely recreational in nature but in reality, a well-developed trail system is the backbone of the non-motorized network connecting far-flung activity centers and destinations with a dedicated route that is generally free of motorized traffic.

Finally, quiet parallel streets can offer ideal alternatives for many riders to busy streets with or without bike lanes. Quiet streets are typically low-volume, low-speed routes regularly used by riders due to their proximity to key corridors and destinations. Sometimes these are marked with a “sharrow” indicating the street is to be shared by cars and bikes alike, but just as often they are unmarked except on traveler resources like the Thurston County Bike Map developed and maintained by TRPC.

The availability of bike facilities is complemented by Intercity Transit’s policy of including bike racks on every bus, design standards that require convenient bike parking at buildings, and education and enforcement activities directed to cyclists and motorists alike. Figure 7 illustrates Tumwater’s bike facilities.

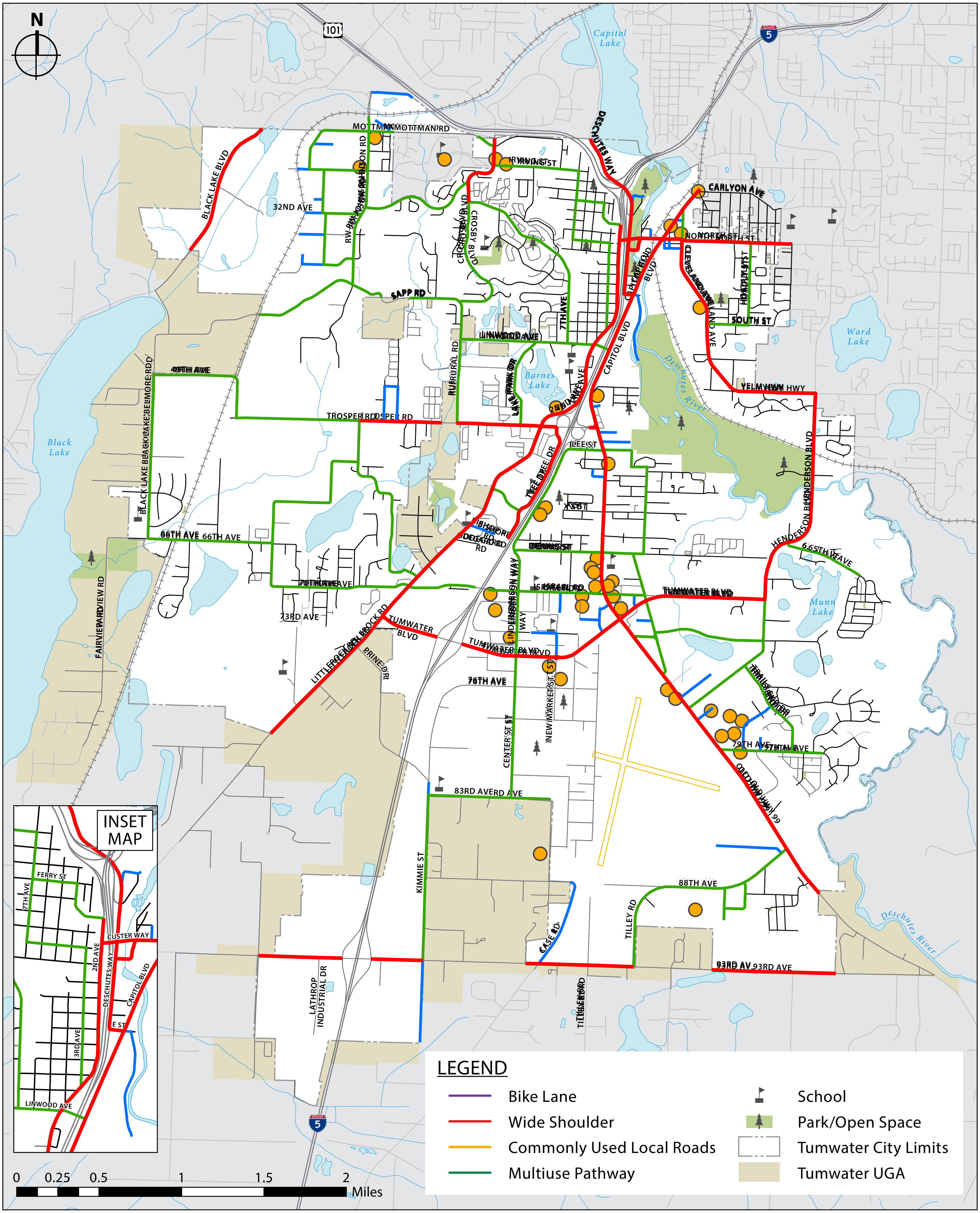

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Figure 7
Existing Bicycle Facilities by Type – 2016

AIRPORT

The Olympia Regional Airport is owned and operated by the Port of Olympia. It consists of 835 acres within the city limits of Tumwater. Uses at the airport include general aviation facilities as well as industrial, commercial and public uses. The airport accommodates a variety of users, ranging from single engine aircraft to business jets, and includes activity by helicopters, gliders, and ultralights. The airport does not have scheduled passenger flights.

The airport currently operates with two runways. Runway 17/35 is the primary runway at 5,501 feet in length and 150 feet in width. Runway 08/26 is the airport's crosswind runway and is 4,157 feet in length and 150 feet wide.

The airport is well connected to several arterial roadways that serve Tumwater. Vehicle access to the property is provided by Old Highway 99 along the east side of the property, Terminal Street and New Market Street along the northwest side of the property and Center Street and Case Road along the southwest side of the property. Tumwater Boulevard is adjacent to the northern boundary of the airport and provides direct access to I-5.

Rail

Two railroad facilities serve Tumwater, both owned by Union Pacific Railroad Company. One is the line that comes up through the Deschutes Valley from East Olympia, with connections to the former Olympia Brewery warehouses in Tumwater valley. This rail line intersects a spur line owned by Tacoma Municipal Belt line in Olympia at Capitol Lake; it provides service into and out of the Mottman Industrial Complex via Percival Creek Canyon. That second line extends south of 66th Avenue though it is active only to Sapp Road.

There are six at-grade crossings in Tumwater. They are located at R.W. Johnson Road SW, 29th Avenue, Sapp Road, Trosper Road SW at 49th Avenue SW, 66th Avenue, and Henderson Boulevard. Five crossings are active but lightly used, with a regulated low travel speed. The crossing at R.W. Johnson has lights, sound, and cross arms; the crossing at Henderson has lights and sound. The crossings at 29th Avenue, Sapp Road, and Trosper Road/49th Avenue have signs. The crossing at 66th Avenue is inactive. The rail corridor from 66th to 81st went into abandonment proceedings in 2016; Thurston County will acquire the corridor and incorporate it into the future Gate-Belmore Trail.

Designated Freight Routes on Local Streets

Freight mobility is an important function of the transportation system. It is how goods get to stores and how local businesses get products to their customers. Freight mobility is an integral part of the City's overall economy. Figure 8 illustrates the City's locally-designated freight routes. The State designates streets as freight routes based on the amount of tonnage carried on those streets.

Item 8.

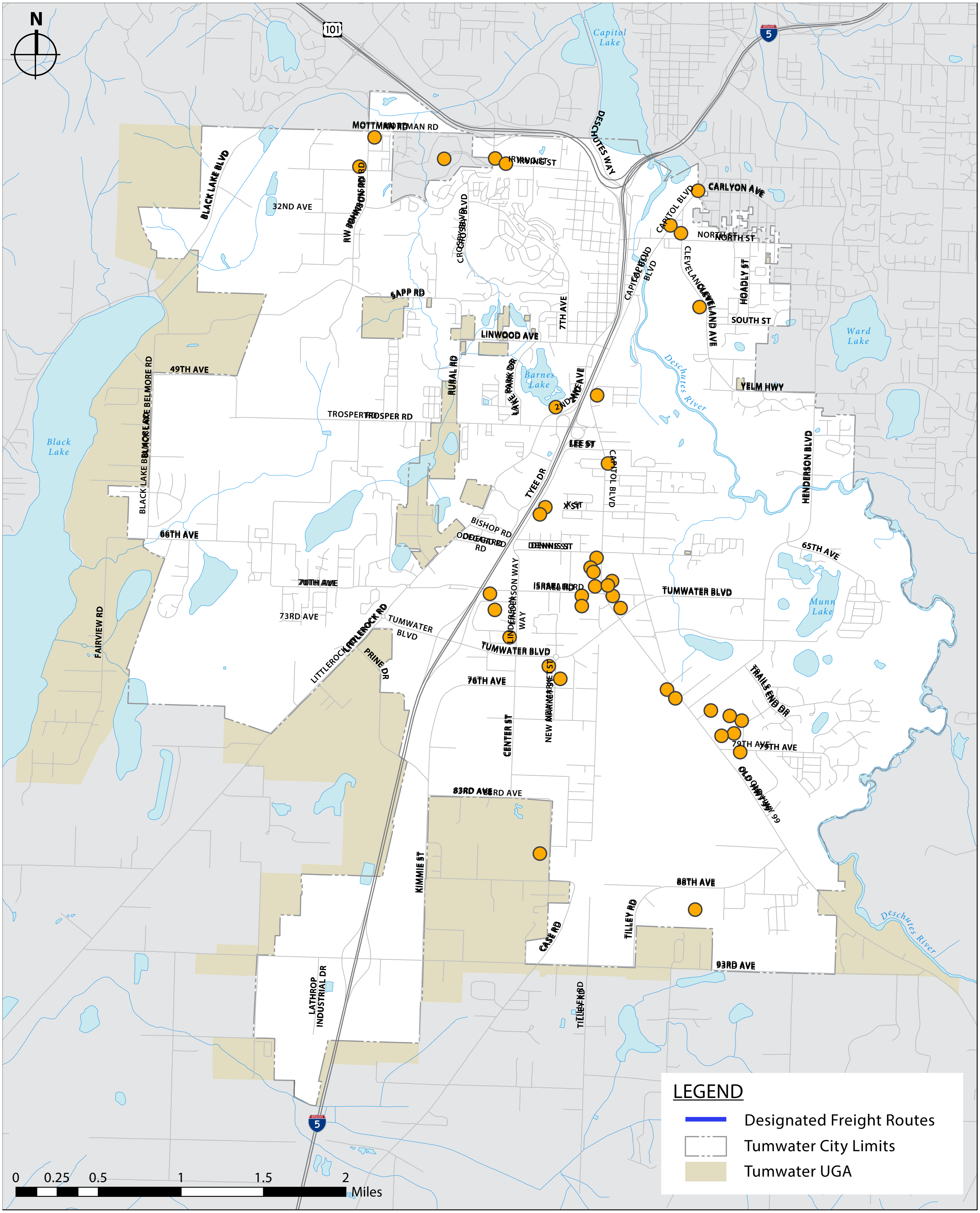

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Figure 8
Locally-Designated Freight Routes

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CHAPTER 10

SYSTEM PERFORMANCE

System Performance

The way we measure system performance is commonly referred to as its "level of service." Level of service standards, or LOS standards, describe our expectations about what is acceptable and unacceptable in terms of how our transportation system performs.

The GMA does not prescribe to Tumwater how to measure system performance, only that it must do so and that the standards it uses for arterials and collectors must be regionally coordinated. For decades Tumwater has used a traditional approach based on vehicle congestion and delay. With this Transportation Master Plan, Tumwater is advancing its system performance measures – its LOS – to include non-motorized networks in its evaluation process. It is initiating development of multimodal LOS standards.

The new multimodal standards do not replace the old standards. The City is introducing these new LOS standards to augment existing LOS standards for streets. The new standards will incorporate additional factors more appropriate for evaluating bike and sidewalk network performance in different parts of the city. The City is working to align its evaluation of transportation system performance with what it's trying to accomplish with infill and redevelopment in some of its sub-areas and the completion of walking routes around its schools.

Growth will continue to mitigate its impacts through fees, development and street standards, SEPA mitigations, and other mechanisms. The mitigations developers make derive from LOS evaluations and the criteria used to judge system performance. That's why it's important to measure what matters when looking at impacts and mitigations. These multimodal level of service standards give Tumwater a greater range of tools for managing impacts of growth and improving the quality and performance of the City's transportation system.

How Tumwater defines its system performance – its level of service – affects how it evaluates concurrency. Concurrency is the process describing how Tumwater calculates the impacts of future development on the transportation system. Like the Comprehensive Plan, concurrency is a process required by the GMA. It ensures system improvements are made "concurrent with" development so that the transportation system performs as expected as the city grows. Concurrency is addressed in a different city process; what matters is that it is based on expectations of future system performance that are established in this transportation element. The rest of this section looks at system performance based on today's conditions and an analysis of system performance based on future growth in light of its adopted LOS standards. This includes some projects that resulted from the detailed sub-area plans for the Brewery District and Capitol Boulevard, projects that are needed to realize the community vision embodied in those plans.

Performance of City Streets

LOS standards for streets consider travel conditions perceived by motorists – travel speed, travel time, freedom to maneuver, traffic interruptions and delays, comfort, and convenience. These standards are typically expressed with letter designations ranging from A – completely free flow conditions – to F, or failing, when chronic congestion is predictable and extends well beyond a "peak 15 minutes" at the end of the work day.

Sometimes chronic congestion results not from too many vehicles but from system inefficiency – poorly timed signals, too many left-turning movements, inadequate storage space at intersections. Analysis of traffic operations can help determine whether the problem is one of too many cars or a need for better intersection or roadway design.

Tumwater will continue to evaluate the performance of its arterials and collectors using congestion measures that equate to delay. Since the late 1990s this has included acceptance of a bit more congestion on streets offering a wider range of travel choices, such as Capitol Boulevard. Expectations are that congestion will be less acceptable on more suburban streets like 70^{th} Avenue or R.W. Johnson Boulevard.

The following LOS designations describe Tumwater's policy in the city and its urban growth area:

- For the designated "Urban Core Areas" LOS E is the acceptable standard of system performance. The Urban Core Areas are shown on Figure 9.
- For the rest of the City and its urban growth area, LOS D will apply.
- The City has established Tumwater Strategy Corridors where the local LOS standard still applies as a goal, but it is acknowledged that some intersections or roadways may experience periodic congestion that exceeds the applicable standard. The Tumwater Strategy Corridors are also shown on Figure 9.

Tumwater's use of regionally coordinated level of service standards for arterials and collectors ensures consistency in evaluation methods between Tumwater and its neighboring jurisdictions.

Figure 10 illustrates PM peak period level of service conditions in 2015 for the City's streets and intersections. Figure 11 shows corresponding 2015 traffic volumes in an order-of-magnitude map; Figure 12 shows those same facilities with 2040 traffic volumes. Figure 13 shows the resulting level of service conditions in 2040 if no projects were built between now and then, while Figure 14 demonstrates the improvement to adopted levels of service generated by the projects included in this plan.

Congestion is not the over-riding consideration in Strategy Corridors. In these areas the City will work with developers to mitigate impacts and enhance multimodal mobility to the extent practicable; however, the City may choose to permit development even if it exceeds LOS thresholds because that development supports broader City objectives about growth and urban form. In these areas extra emphasis is placed on operational efficiency and completeness of the multimodal network as this is where development is most likely to generate bike, walk and transit trips.

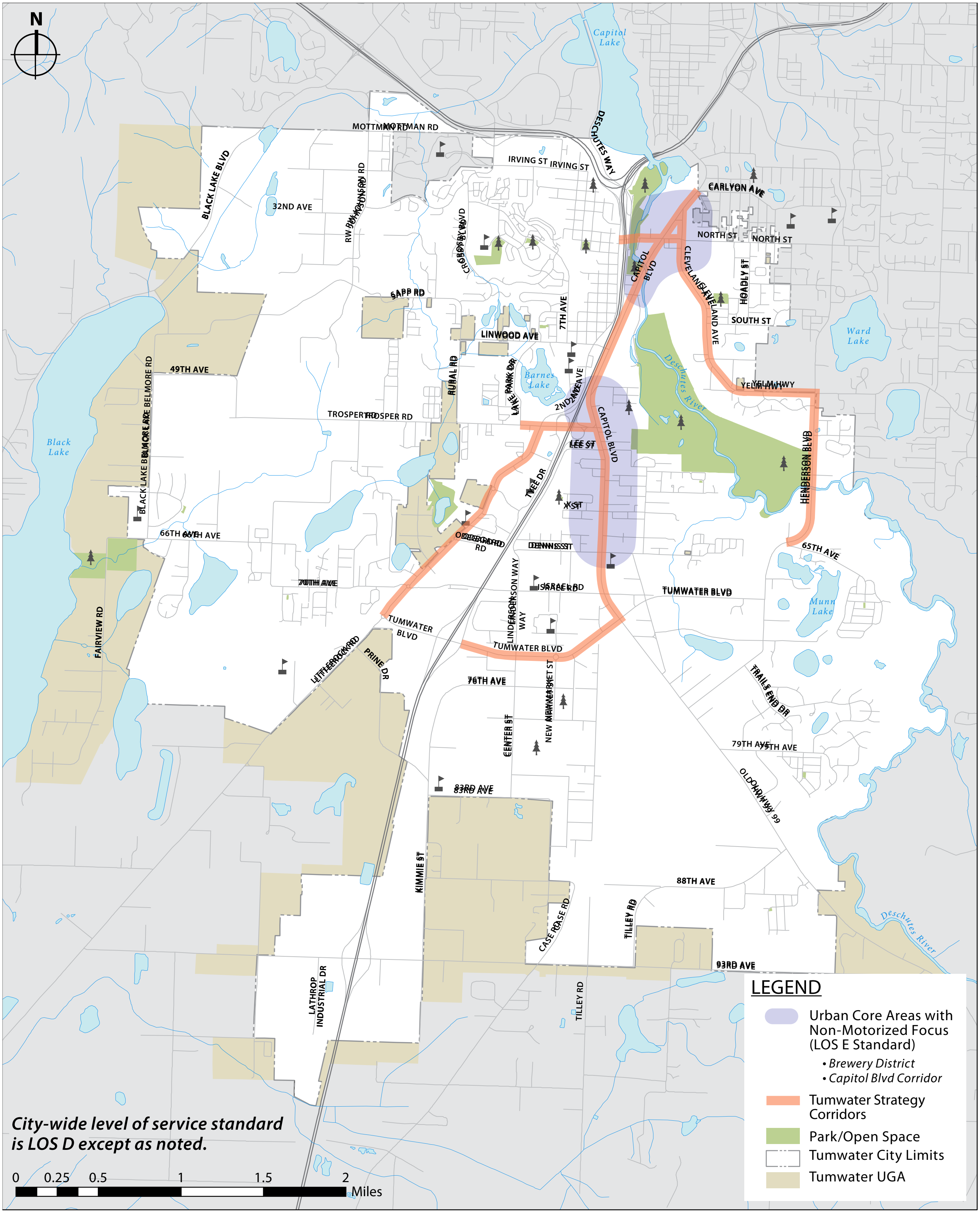

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Figure 9
Motorized Level of Service Standards

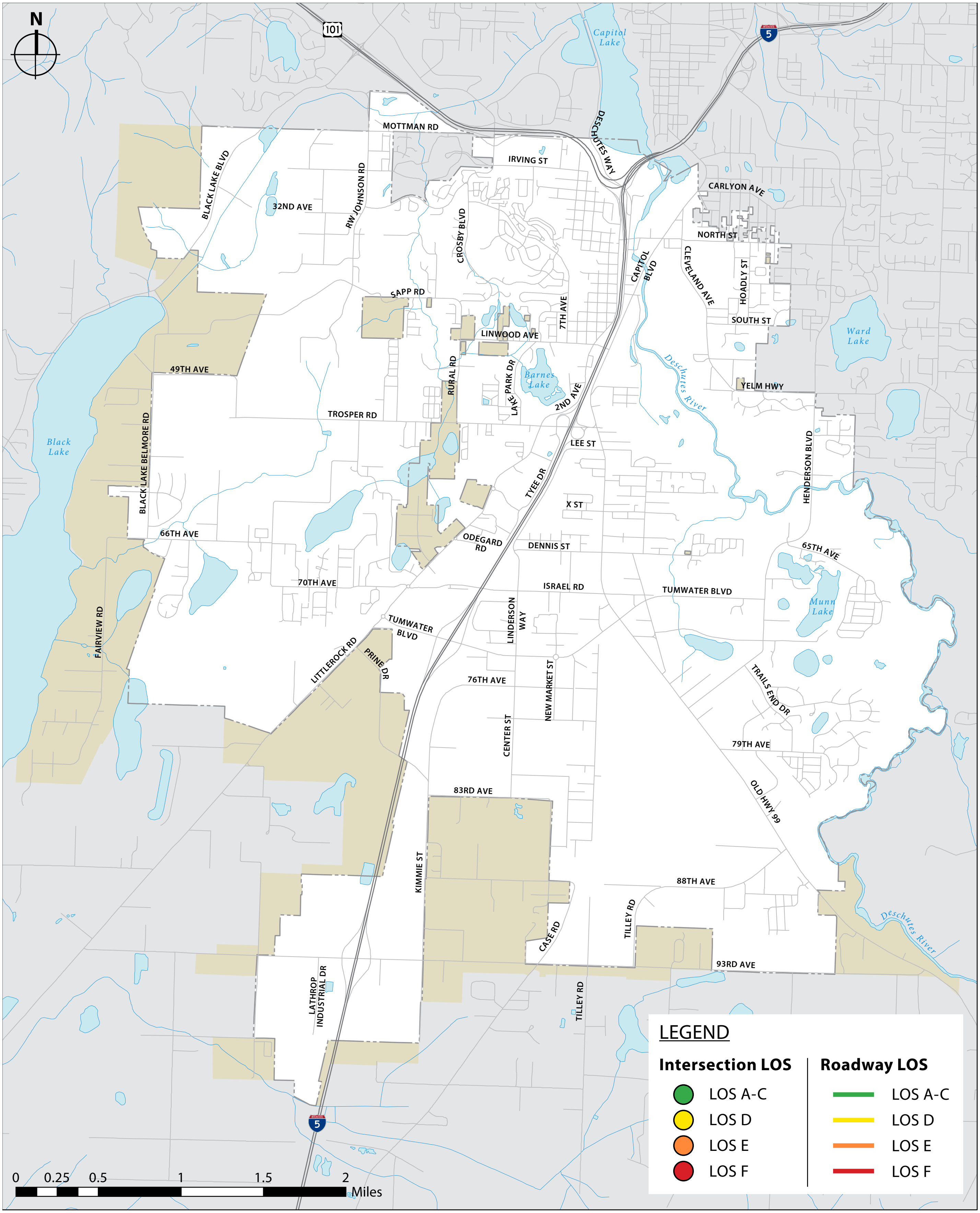

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Figure 10

2015 Intersection and Roadway Level of Service

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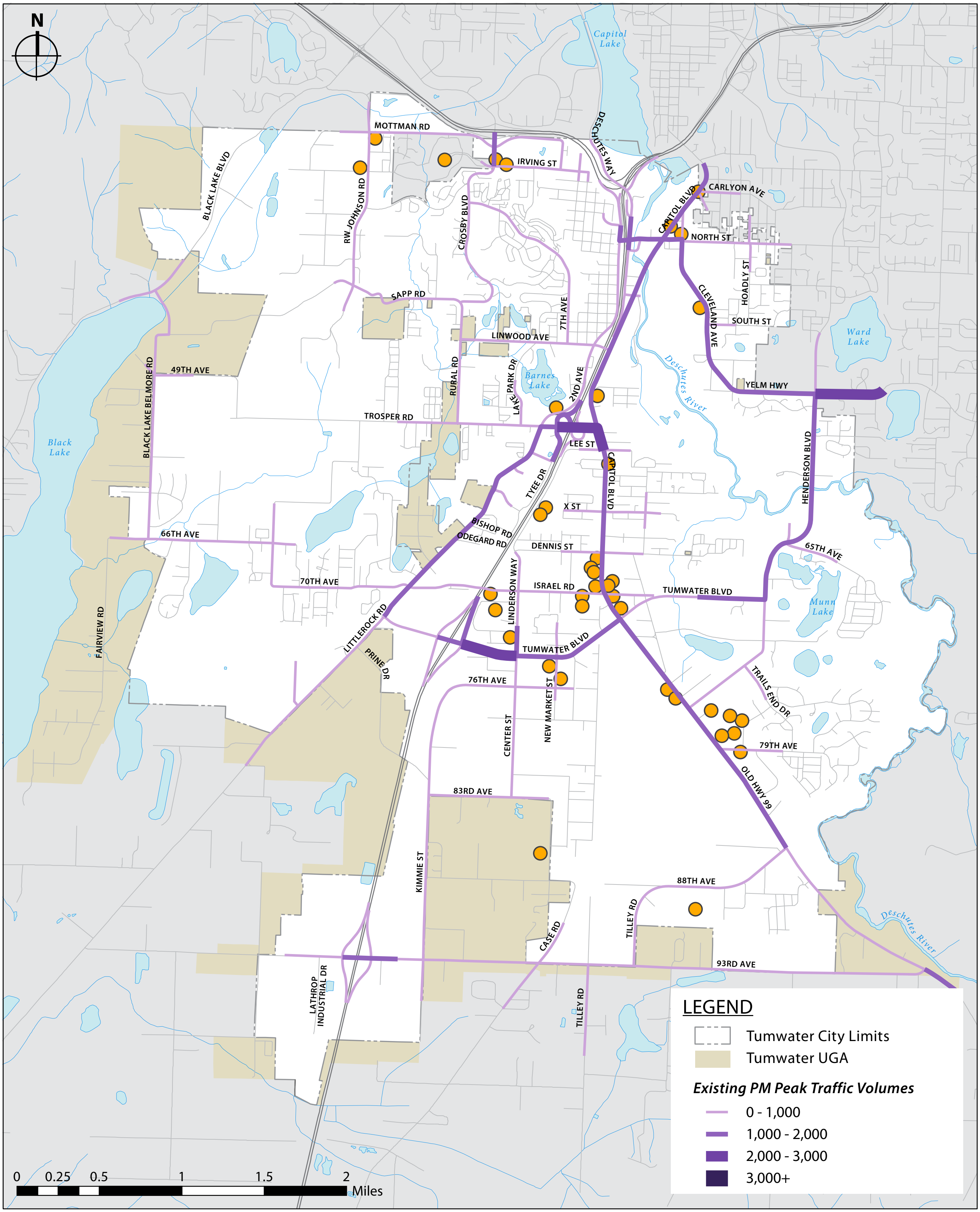

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Figure 11
2015 PM Peak Traffic Volumes

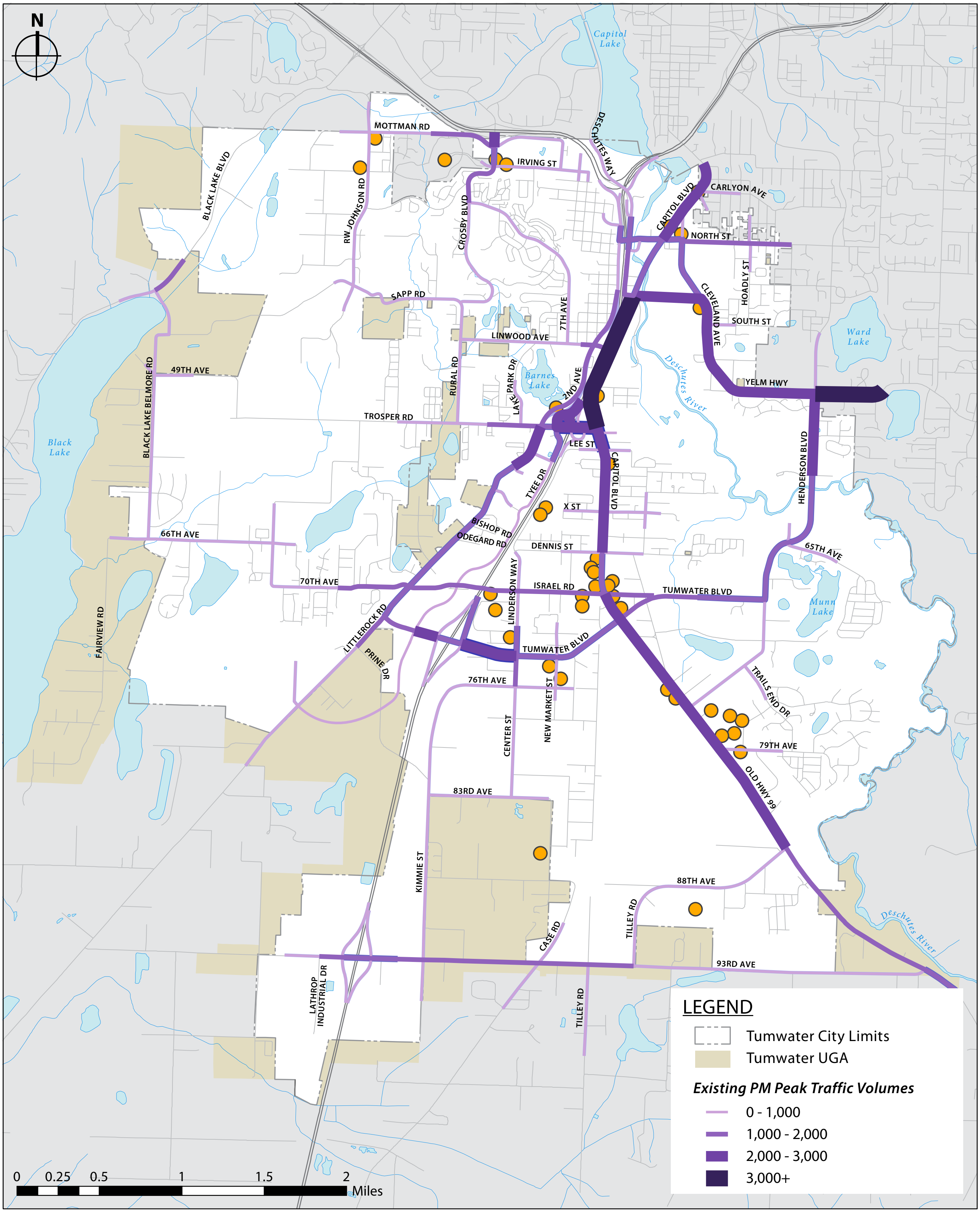

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Figure 12
2040 PM Peak Traffic Volumes

DETERMINING FUTURE PROJECT NEEDS

In planning for the future, Tumwater establishes base line conditions reflecting today's system performance and then "grows" the demand for future travel based on adopted population and employment forecasts. This gives an estimation of what future conditions are likely to be absent any kind of system investment to improve operating performance. This is sometimes called the "no build" scenario as it illustrates the hypothetical situation of growth with no additional transportation projects between now and 2040. Tumwater then evaluates locations that are under-performing, working to identify what will be needed to restore system performance as the city grows. Sometimes no project is identified and instead, the area is watched for a period of time in order to determine the best strategy to address future needs. That is because occasionally a problem in one location may generate symptoms in another location; evaluating conditions at that site over time will help ensure the right strategy is identified to maintain system performance.

Often evaluation reveals areas that may need an improvement if the City grows as planned over the next 20-25 years, but it may also be a longer-term need. Forecasting growth over two or more decades is imprecise and the City does not want to overbuild its system. In those cases the areas are flagged and monitored, and will be addressed in subsequent plan updates as warranted.

Level of service is the measure of how well the transportation system is performing. As this section makes clear, LOS can be measured in different ways.

For example, LOS evaluation of intersections, such as those in the following table, is typically measured by seconds of delay. The fewer seconds of delay, generally, the better the intersection is said to perform. Long delays such as those experienced at Trosper Road and Capitol Boulevard during rush hour result in people sitting through several signal cycles before they can proceed; this creates long queues that can block driveways and side streets. Even though the problem is at the intersection itself delays can be felt several blocks away.

Another measure of vehicle LOS is known as "V/C ratio". V/C ratio stands for Volume to Capacity ratio. It is calculated by dividing the number of vehicles to be accommodated on a street by the total capacity of the street. For example, if the street is designed to carry 800 vehicles an hour and during peak periods it is carrying 600 vehicles an hour then it has a V/C ratio of 0.75, which equates to an LOS C. The V/C ratio is a “percent of capacity” measure – what percent of the available capacity is consumed by traffic today and in the future.

The closer the capacity consumed is to 100% - the closer the V/C ratio is to 1.0 – the more friction and congestion drivers on that street will experience. It’s even possible for a model to produce a V/C ratio in excess of 100%, which can seem impossible at first glance; no street can carry more vehicles than it was designed to carry. It doesn’t, of course. It just means that there is much more demand for travel on that street during that period of time than can be accommodated. In reality it means that congestion will last longer, or that it may be faster to get around by walking or biking than by driving during rush hour.

Tables in the rest of this plan use intersection delay as well as V/C ratio to describe system performance of the motorized system. Table 2 provides the intersection operational results. It shows 2015 conditions for 69 intersections evaluated for this plan, what those conditions are likely to be in 2040 without any improvements, and 2040 conditions with proposed improvements. Details on proposed intersection improvements are in the Capital Improvements Chapter.

TABLE 2: LOS CONDITIONS FOR INTERSECTIONS - 2015 AND 2040

#	Intersection	2015 Conditions		2040 LOS No-Build	2040 Conditions with Improvements	
		Intersection Control	LOS (Delay, in seconds)		Improvement	LOS (Delay, in seconds)
1	RW Johnson Blvd/Mottman Rd	AWSC	B (12)	C (17)		
2	Crosby Blvd/Mottman Rd	Signal	B (16)	B (17)		
3	Crosby Blvd/Irving St	Signal	B (11)	B (12)		
4	7th Ave/Irving St	AWSC	A (9)	B (10)		
5	Crosby Blvd/Barnes Blvd	TWSC	C (22)	F (60)		
6	Black Lake Blvd/Black Lake Belmore Rd	TWSC	E (37)	F (200+)	RAB	B (11)
7	RW Johnson Blvd/Sapp Rd	TWSC	B (10)	B (15)		
8	Sapp Rd/Crosby Blvd	TWSC	B (12)	C (21)		
9	49th Ave/Black Lake Belmore Rd	TWSC	A (9)	B (12)		
10	Capitol Blvd/Carlyon Ave/Sunset Way	Signal	B (10)	B (12)*	RAB	B (12)*
11	Deschutes Way/I-5 NB On-Ramp	Yield	A (9)	A (9)		
12	Deschutes Way/US 101 WB On-Ramp	Yield	A (10)	B (11)		
13	I-5/US 101 Off-Ramps/Desoto St/2nd Ave	TWSC	D (32)	F (200+)	Lanes	E (50)
14	2nd Ave/Custer Way	Signal	B (15)	D (40)	Lanes	C (25)
15	Boston St/Custer Way	TWSC	D (30)	B (12)*	RAB	B (12)*
16	Deschutes Way/Boston St	AWSC	D (29)	C (20)*	Signal	C (20)*
17	Cleveland Ave/Capitol Blvd	TWSC	B (11)	B (10)*	RAB	B (10)*
18	Custer Way/Capitol Blvd	Signal	D (39)	D (36)*	RAB	D (36)*
19	Custer Way/North St/Cleveland Ave	Signal	D (48)	B (13)	RAB	B (13)*
20	Hoadly St/North St	TWSC	C (20)	F (54)		
21	Deschutes Way/I-5 NB Off-Ramp	TWSC	B (12)	D (30)*	Lanes	D (30)*
22	Capitol Blvd/E St	Signal	C (23)	D (38)*	RAB	D (38)*
23	Cleveland Ave/South St	TWSC	B (15)	C (21)		
24	7th Ave/Linwood Ave	TWSC	C (18)	D (33)		
25	2nd Ave/Linwood Ave	AWSC	C (25)	F (58)	RAB	B (19)
26	Capitol Blvd/Linwood Ave	Signal	B (17)	D (44)	RAB	B (17)
27	Henderson Blvd/Yelm Hwy	Signal	D (49)	F (82)	Signal	D (55)
28	Rural Rd/Trosper Rd	TWSC	C (16)	F (53)	Lanes	C (18)
29	Lake Park Dr/Trosper Rd	Signal	B (14)	B (14)		
30	Littlerock Rd/Trosper Rd	Signal	D (42)	E (58)	RAB	C (32)
31	I-5 SB Ramps/Tyee Dr/Trosper Rd	Signal	D (45)	D (50)	RAB	C (23)
32	I-5 NB Ramps/Trosper Rd	Signal	A (7)	C (19)*	TWSC	C (19)*
33	Capitol Blvd/Trosper Rd	Signal	F (30)	F (112)	RAB	C (26)
34	Capitol Blvd/Lee St	Signal	C (24)	C (25)		
35	Littlerock Rd/Fred Meyer/Costco Drwy	Signal	A (8)	A (10)		

AWSC – All-Way Stop Control	TWSC – Two-Way Stop Control	RAB - Roundabout

* Projects included in Regional Transportation Plan were included in the 2040 No-Build; these projects included associated local intersection improvements.

#	Intersection	2015 Conditions		2040 LOS No-Build	2040 Conditions with Improvements	
		Intersection Control	LOS (Delay, in seconds)		Improvement	LOS (Delay, in seconds)
36	Littlerock Rd/Costco Drwy	Signal	C (21)	C (27)		
37	Littlerock Rd/Kingswood Dr	RAB	A (6)	B (14)		
38	Capitol Blvd/X St	Signal	A (7)	A (10)	RAB	A (8)
39	Elm St/X St	TWSC	A (10)	A (10)		
40	Capitol Blvd/Dennis St	Signal	B (12)	B (16)	RAB	A (9)
41	Capitol Blvd/Israel Rd	Signal	C (22)	D (42)		
42	66th Ave/Black Lake Belmore Rd	TWSC	B (11)	C (16)		
43	Kirsop Rd/66th Ave	TWSC	B (13)	C (19)		
44	Littlerock Rd/Odegard Rd	RAB	A (5)	A (5)		
45	Littlerock Rd/Israel Rd/70th Ave	RAB	A (9)	C (25)		
46	Linderson Way/Israel Rd	Signal	B (17)	D (49)		
47	Littlerock Rd/Tumwater Blvd	RAB	A (8)	A (9)		
48	I-5 SB Ramps/Tumwater Blvd	Signal	B (12)	C (22)*	RAB	C (22)*
49	I-5 NB Ramps/Tumwater Blvd	TWSC	F (106)	A (7)*	RAB	A (7)*
50	Linderson Way/Tumwater Blvd	Signal	C (35)	D (47)		
51	New Market St/Tumwater Blvd	RAB	A (4)	A (6)		
52	Capitol Blvd/Tumwater Blvd	Signal	D (36)	D (55)		
53	65th Ave/Henderson Blvd	Signal	A (7)	B (10)		
54	Tumwater Blvd/Henderson Blvd	Signal	C (34)	D (45)		
55	Trails End Dr/Henderson Blvd	TWSC	B (13)	C (16)		
56	Littlerock Rd/Black Hills School Drwy	Signal	A (3)	A (4)	Lanes	C (27)
57	Center St/76th Ave	TWSC	C (17)	D (33)		
58	Old Hwy 99/Henderson Blvd	Signal	B (13)	B (11)*	RAB	B (11)*
59	Old Hwy 99/79th Ave	TWSC	F (64)	F (177)	RAB	A (8)
60	Kimmie St/83rd Ave	TWSC	A (9)	B (11)		
61	Center St/83rd Ave	TWSC	B (12)	C (15)		
62	Old Hwy 99/88th Ave	Signal	A (9)	A (8)*	RAB	A (8)*
63	I-5 SB Ramps/93rd Ave	Signal	B (20)	D (35)	Lanes	B (15)
64	I-5 NB Ramps/93rd Ave	TWSC	B (12)	F (112)	Signal	A (9)
65	Kimmie St/93rd Ave	TWSC	C (21)	D (34)	Signal	B (14)
66	Case Rd/93rd Ave	AWSC	C (20)	F (53)	RAB	B (16)
67	Tilley Rd (South)/93rd Ave	AWSC	B (15)	F (54)	RAB	B (17)
68	Tilley Rd (North)/93rd Ave	TWSC	B (14)	F (60)	RAB	B (12)
69	Old Hwy 99/93rd Ave	TWSC	C (18)	E (36)	RAB	C (24)

AWSC – All-Way Stop Control	TWSC – Two-Way Stop Control	RAB - Roundabout

* Projects included in Regional Transportation Plan were included in the 2040 No-Build; these projects included associated local intersection improvements.

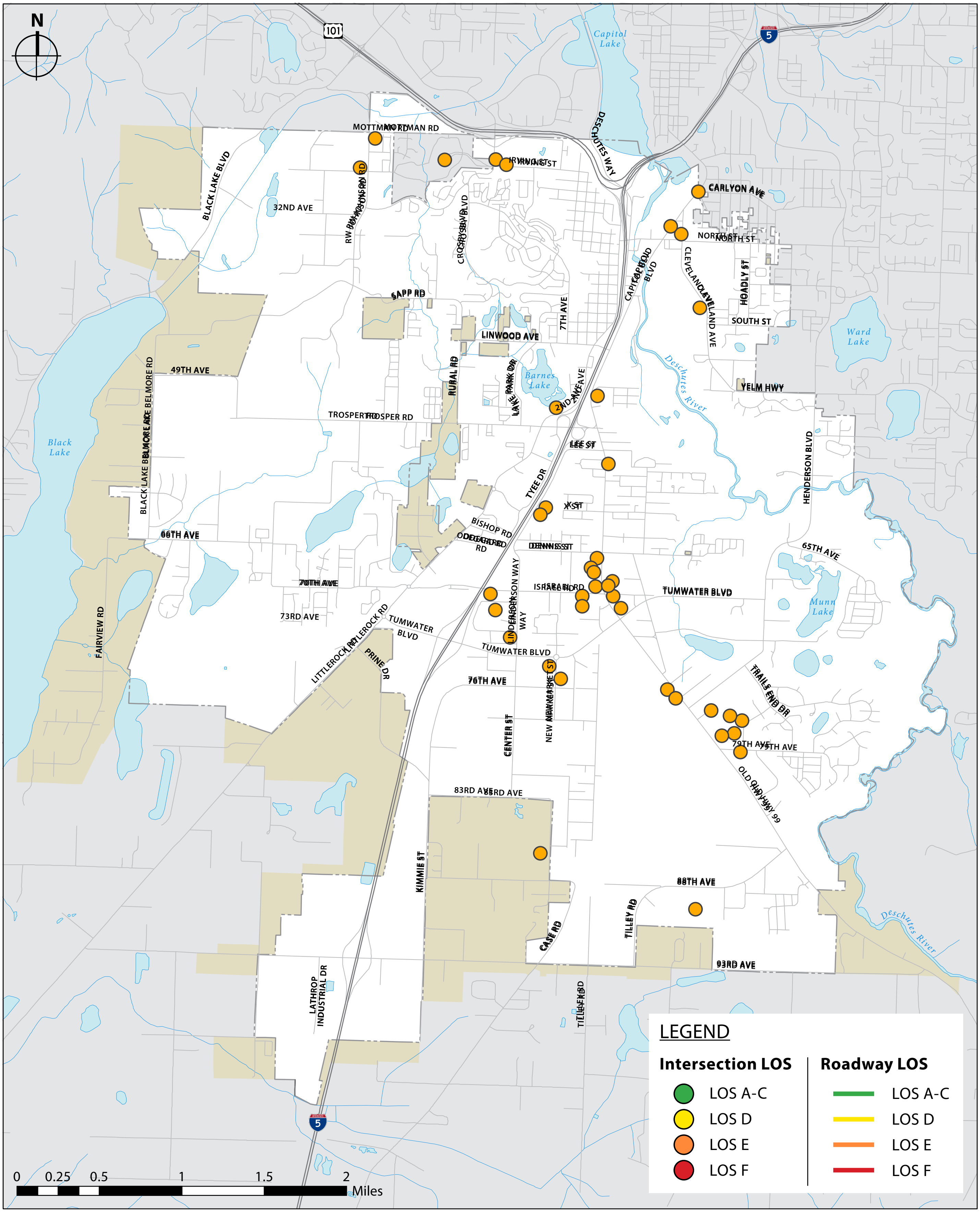

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Figure 13
2040 Intersection and Roadway Levels of Service – No Build

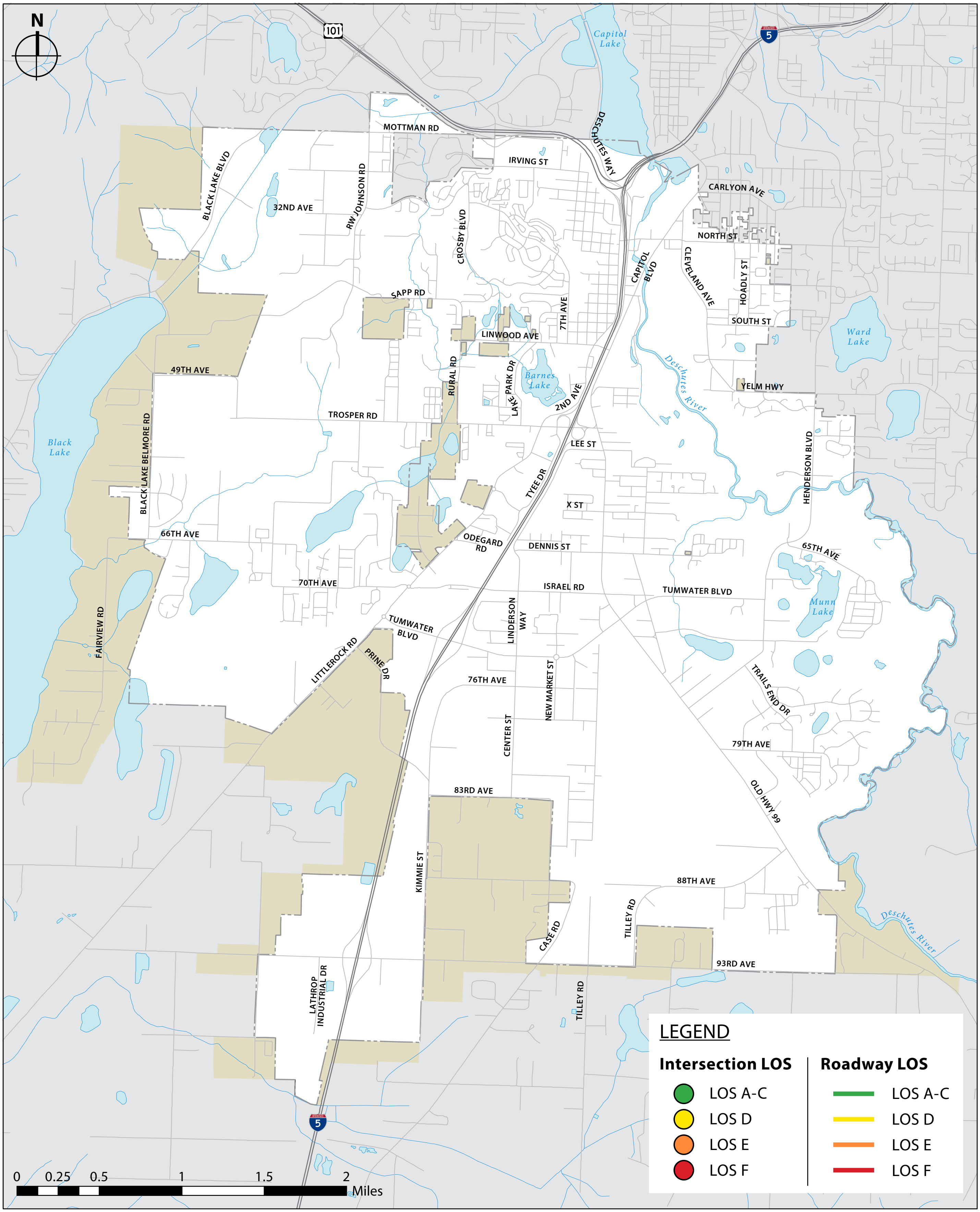

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Figure 14
2040 Intersection and Roadway Level of Service – With Improvements

PERFORMANCE OF PUBLIC TRANSPORTATION

Intercity Transit establishes and maintains its own level of service standards, which Tumwater supports and adopts by reference. These are governed by IT's six-year Transit Development Plan and its Strategic Plan, in which seven different service design principles are articulated.

Following is a summary of each service design principle and its implications for Tumwater.

1. Operate five different types of local service, each designed to meet the needs of the neighborhoods it serves.
   IT operates five types of local service based on street network, residential densities, and levels of commercial activity in the areas being served.

TABLE 3: INTERCITY TRANSIT LOS STANDARDS

Service Type	Roadway Type	Service Frequency (A bus every x minutes)		
		Peak Svc	Midday Svc	Night Svc
Trunk	Major Arterial	15	15	30
Primary	Local	30	30	60
Secondary	Arterial, Local	30 / 60	60	None
Rural	Local	30 / 60	60	None

2. Strengthen service operating along major corridors.
   Services operating along major corridors will be strengthened by operating weekday services more frequently and by extending hours of operation. Major corridors also received new shelters and other stop upgrades in the past several years. Corridors in Tumwater with 15 minute, extended service are highlighted in yellow.

3. Reduce customer travel times.
   This is being accomplished by providing more direct service, increasing travel speeds through the use of transit priority measures, and by increasing service reliability. Tumwater partnered with IT in this effort by participating in the regional Smart Corridors project sponsored by TRPC, upgrading its signal system and adding Transit Signal Priority to assist IT in maintaining its schedules.

4. Keep pace with new high-density development.

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This includes Tumwater Town Center, the area bordered by I-5, Tumwater Boulevard, Israel Road, and Capitol Boulevard. The number of state employees in this area continues to increase and plans call for increased residential and retail development. Fifteen minute service was introduced to this area in early 2008. Express service between Tumwater and Lakewood began September 30, 2013, funded by a regional mobility grant.

5. Expand regional express routes.
IT sought and received a regional mobility grant to pilot express inter-regional service between Tumwater, Olympia, Lacey and Lakewood.

6. Support a range of transportation alternatives.
These efforts include:

- On-going, active support of the Commute Trip Reduction program
- Addition of bike racks to all new IT buses
- On-going engagement with Tumwater schools supporting Walk N Roll programs and other Healthy Kids, Safe Streets implementation activities
- Encouraging land use patterns that support public transportation and coordinating with jurisdictions to ensure zoning ordinances and development standards support alternate modes by providing: sidewalks and street lighting; bus shelters and schedule information; convenient and safe pedestrian crossings; convenient pedestrian access to public buildings and businesses.
- Advocating and support for Tumwater's efforts to implement transit-oriented development in the vicinity of transit stations such as that at Tumwater Square, in the Brewery District
- Reviewing all development proposals and commenting on those impacting public transportation.

7. Provide fixed facilities and equipment that support the region's public transit infrastructure.
Intercity Transit is exploring opportunities for a more conveniently-located, permanent park-and-ride facility in

the vicinity of Tumwater Town Center to replace the interim facility at the corner of Bonniewood Drive and Israel Road.

PERFORMANCE OF NON-MOTORIZED NETWORKS

This Transportation Master Plan introduces new ways of looking at system performance. Specifically, this Plan introduces the concept of a multimodal level of service that focuses on how well the non-motorized network supports pedestrians and cyclists. Concepts introduced in this plan will be evaluated and tested with on-going work program activities where it will be refined and adapted to best suit Tumwater's needs.

Tumwater has had in place for many years a multimodal street policy and supportive design standards. What this means is that Tumwater includes sidewalks and bike lanes where feasible with new street construction projects and major reconstructions throughout the city as a standard procedure. Today there are many miles of sidewalks and bike lanes that would not have existed without these policies and design standards.

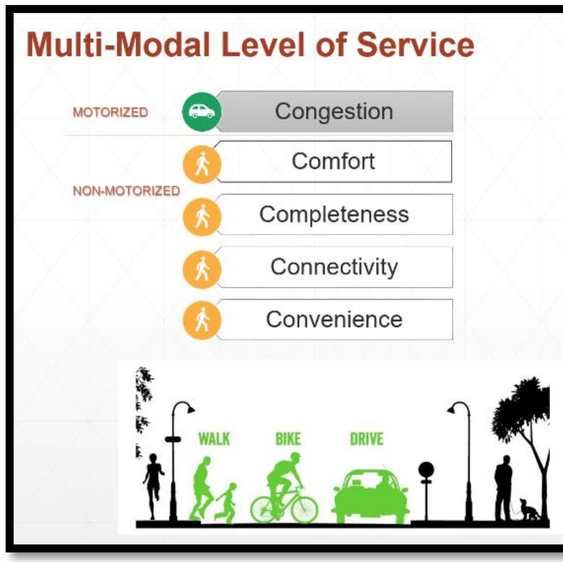
The multimodal system performance standards introduced with this plan do not replace those requirements. Instead, they will serve as an overlay to guide the retrofit of older infrastructure that was built with inadequate non-motorized infrastructure to satisfy current expectations about system performance. Standards must be responsive to the different place types throughout the city which include increasingly urbanized mixed-use neighborhoods, older established suburban neighborhoods and new suburban communities, regional commercial centers, and older rural areas that will transition over several decades into a more suburban character.

SYSTEM PERFORMANCE

As Tumwater expands its analysis of system performance to more explicitly consider non-motorized travel, it's important to expand its definitions of system performance. There are no congested sidewalks in Tumwater – congestion is not an appropriate way to evaluate performance of these types of facilities in a small, predominately suburban city like Tumwater.

Instead, Tumwater is looking at other factors that influence how well the non-motorized network meets traveler expectations.

- **Comfort** pertains to the traveler's experience. It gets at the sense of safety people might feel when walking or biking along that street, and the effects that traffic volumes and speeds might have on that experience given the available infrastructure and whether it is appropriate for the speed and volume of traffic. It considers the ability of people to find their way easily, without confusion, what is referred to as the "legibility" of the network and signage. It includes things like pavement condition and lighting, which can greatly affect the comfort with which walkers and cyclists travel.
- **Completeness** relates to the area served by infrastructure. It gets at the degree of system continuity and the extent of the area served by the non-motorized system.
- **Connectivity** refers to the ways that infrastructure is considered in development patterns –street connections and non-motorized pathways increase traveler route choices. Connectivity also includes the ability to make modal linkages such as pedestrian connections from residential neighborhoods to high-frequency transit corridors.



- **Convenience** refers to the density and mix of uses within close proximity – walking distance – and the range of travel choices available to reach those destinations. This particular consideration is applicable where land use policies are deliberately working to create high density, mixed-use environments such as those envisioned for the Brewery District and the Capitol Boulevard Corridor.

This plan proposes a performance classification based on these considerations; it describes the non-motorized system in terms of good, acceptable, and poor conditions. Table 4 on the following page describes these conditions as they might be experienced by travelers.

As with congestion-based performance standards for motor vehicles, the perception of system performance for non-motorized facilities is likely to be very subjective and reflect the individual experience and comfort level of each traveler in a variety of different conditions. Table 5 offers some illustrative examples of good, acceptable, and poor system performance conditions introduced in this plan.

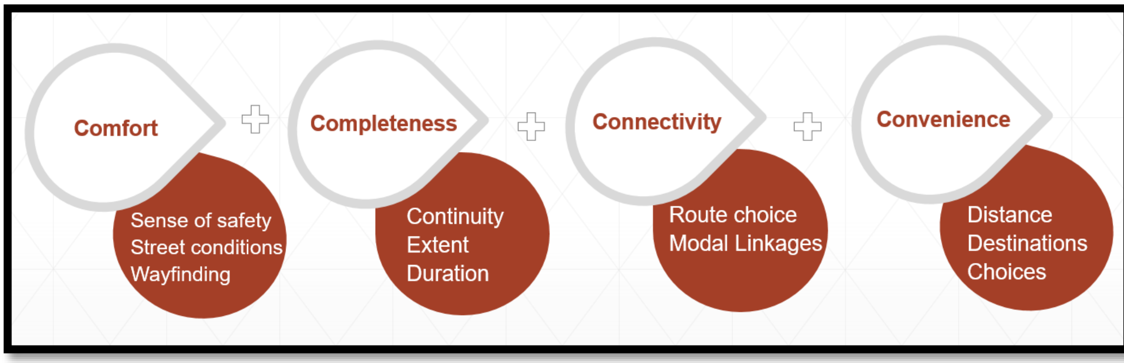


Table 4: Proposed Non-Motorized System Performance Standards - Traveler Experience

System Performance	Traveler Experience
Good	Direct routes. Well-connected network has good signage and is well lit. Non-motorized facilities are continuous, with infrequent gaps, and are the appropriate scale for the type of street. Frequent designated crossing opportunities, actuated signal controls, and design elements make travel comfortable for people of all abilities most of the time.
Acceptable	Routes may be less than direct but they are often quieter and more scenic than direct routes. Network connectivity is satisfactory though the connections may be far apart. Lighting in more rural areas is not oriented to pedestrians. Facilities are present but are discontinuous or only available on one side of the street, or may be somewhat undersized for the street type. Crossing opportunities are present but may lack actuated signal controls. Some travelers may have a less-than-comfortable travel experience some times of the day.
Poor	Routes are indirect and offer no parallel alternate routes on quieter streets. There are no network connections, no practical alternate routes. Lighting and signage are lacking. Facilities are non-existent, or are grossly undersized for the street type, or are in such poor physical condition that they constitute a hazard. Travel is stressful for most people even during off-peak travel times.

Table 5: Proposed Non-Motorized System Performance Standards - Illustrative Examples

System Performance	Illustrative Examples	
GOOD Complete facilities with signage, crosswalk, both sides of street		
ACCEPTABLE Facilities on one side of the street, shared facilities off-street or on shoulder		
POOR No shoulders, large and busy intersections offer few amenities for non-motorized travel or comfort		

It's important to note that the quality of non-motorized system performance is an inherently subjective measure; what is considered acceptable, good, or poor performance often varies by person, location, and situation.

Non-motorized system performance in Tumwater is a qualitative measure more than a quantitative measure. The goal of this initial foray into multimodal system performance is not to derive a standardized two decimal-point numeric value to quantify multimodal level of service in a manner similar to congestion. Rather, it is to develop a practical framework for evaluating the quality of non-motorized travel in relation to the built environment. That is because the built environment – where we each live and work and shop and recreate – influences whether walking or biking or transit are viable travel options or whether driving is the only reasonable option. Non-motorized infrastructure is but one factor in determining how we each get from Point A to Point B. Going forward, Tumwater will refine this framework to ensure alignment between its non-motorized investments and its land use policies and objectives.

Primary and Secondary Networks

An efficient, well-functioning street system has a hierarchy of arterials, collectors, and residential streets to support the mobility, circulation, and access needs of drivers. In the same way, a mature non-motorized system will have an increasingly complete network of primary and secondary routes, with other streets and facilities playing a vital role connecting neighborhoods to those networks. Table 6 describes the central function and characteristics of these networks. This plan introduces a network concept for the bike and pedestrian systems that recognizes these distinct system functions.

TABLE 6: DESCRIPTION OF NON-MOTORIZED NETWORK HIERARCHY

Hierarchy	System Function
Primary Network	Backbone of the system. Offers direct connections to majority of important community destinations, usually on arterials or collectors. Primary Network routes are often the most attractive route in terms of convenience in urban areas. Includes trails.
Secondary Network	Supportive role to Primary Network, often providing system continuity by connecting segments of the primary network with on-street or off-street facilities. Secondary network routes sometimes offers more comfortable routes on quieter streets, throughout route may not be as direct as Primary network.
Other Streets	Majority of streets, including residential neighborhood streets. Many have bicycle and pedestrian facilities and most future streets in this category will as a result of street standards required of all development since the mid-late 1990s. Other Streets provide access to primary and secondary networks.

Due to the different travel characteristics of cyclists and pedestrians, there are differences in the designation of primary and secondary networks serving those two modes of travel.

Pedestrian Network

Designation of the Primary and Secondary pedestrian network is largely a reflection of destinations within walkable distances. The average person is willing to travel about one-quarter mile – roughly a five minute walk – for utilitarian trips such as going to the store or catching a bus to a more distant destination. Outside of the City's most urban corridors, these destinations tend to be schools, parks, trailheads, and other recreational opportunities. Along the City's most urban corridors walkable destinations also include stores, services, restaurants and coffee shops, pubs, entertainment, employment sites, and transit stops. The pedestrian network within one-quarter mile of community destinations is considered to be part of the Primary Network. Pedestrian infrastructure within one-quarter to one mile is considered as part of the Secondary Network.

Figure 15 illustrates the Pedestrian Network introduced in this plan. Based on these designations, Tumwater's Primary Pedestrian Network is 33.2 miles in total length and its Secondary Pedestrian Network is 36.8 miles in length. Of these 70 total miles about 47 percent – roughly 33 miles – are complete with pedestrian facilities on both sides of the street. The remaining network will be built out over the years via multimodal street projects, developer mitigations, and stand-alone projects.

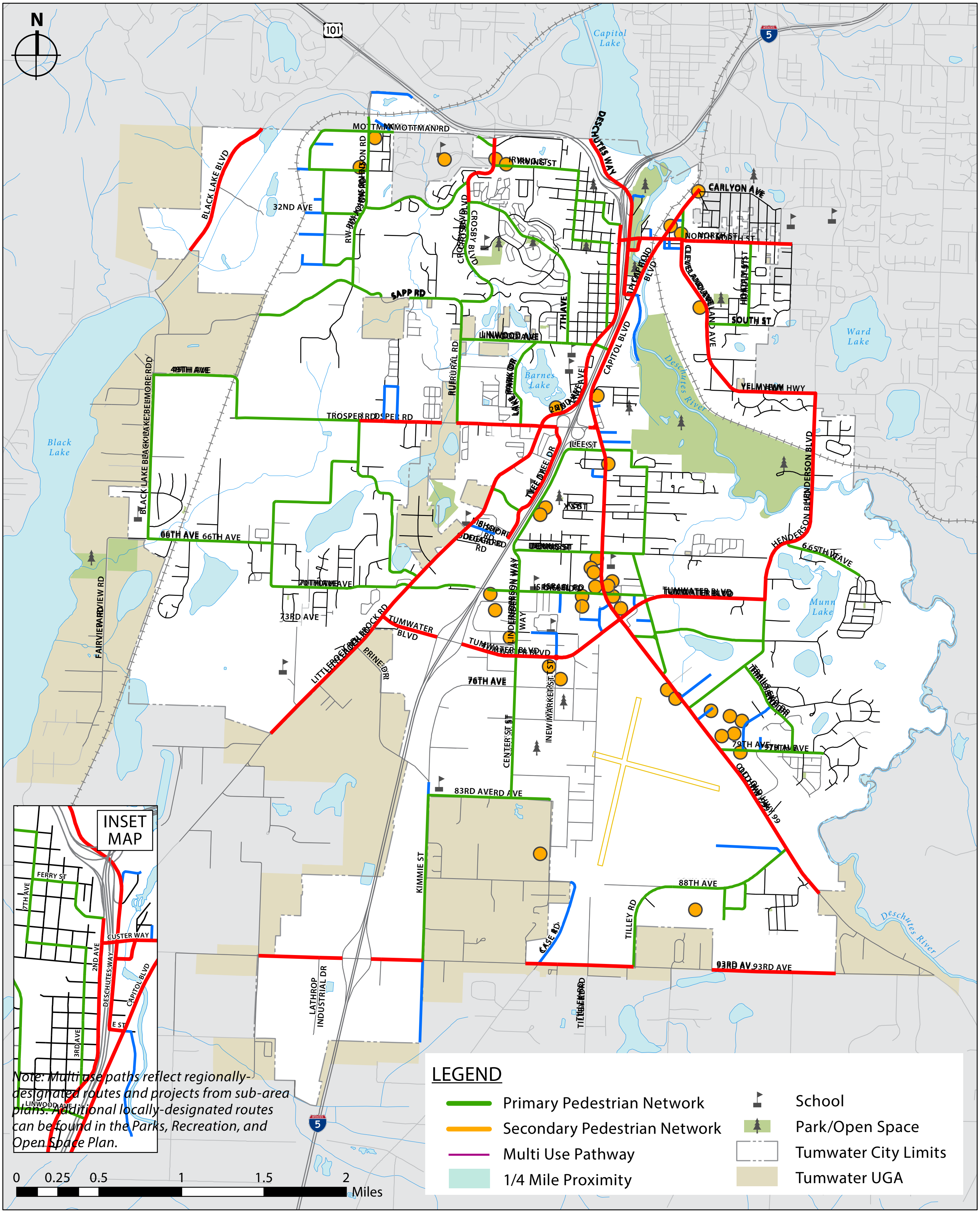


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Figure 15

Primary and Secondary Pedestrian Network

Bike Network

In contrast to the proximity and destination-oriented considerations in designating pedestrian networks, the Primary and Secondary bike network seeks to create a foundation of east-west and north-south routes that offer a mix of direct routes on streets often regarded as busy streets as well as alternate though often less-direct routes on lower volume streets. Trails – which provide a completely non-motorized travel route – are designated as part of the Primary Network.

Figure 16 illustrates the Primary and Secondary Bike Network introduced in this plan. Based on these designations, Tumwater's Primary Bike Network is 57 miles in total length and its Secondary Bike Network is 30.3 miles in length. Of these 87 total miles about 31 percent – roughly 27 miles – are complete with bike facilities on both sides of the street. As with the pedestrian network, the remaining bike network will be built out over the years via multimodal street projects, developer mitigations, and stand-alone projects. In some of the more rural parts of the city the future network is likely to include wide, multiuse shoulders that will accommodate cyclists and pedestrians.

Zonal Approach to Evaluating Infrastructure Needs

Not all parts of the city are equally conducive to walking and biking because of how land use patterns have evolved over the decades. The majority of people still prefer to live in residential-only neighborhoods; this is the predominant type of land use across the city. There are expectations that people should be able to walk and ride their bikes safely though it is not assumed that people will be able to reduce many vehicle trips to a significant degree because land use activities are so dispersed.

There are some areas, though, where land use patterns make it possible for more people to meet some of their travel needs by walking or biking or transit instead of driving. City policies are working to increase development activity in these areas, which in turn will generate even more demand for walking, biking and transit.

The multimodal levels of service introduced with this plan includes designation of two zones within which to evaluate and respond to system performance. One of these is referred to as

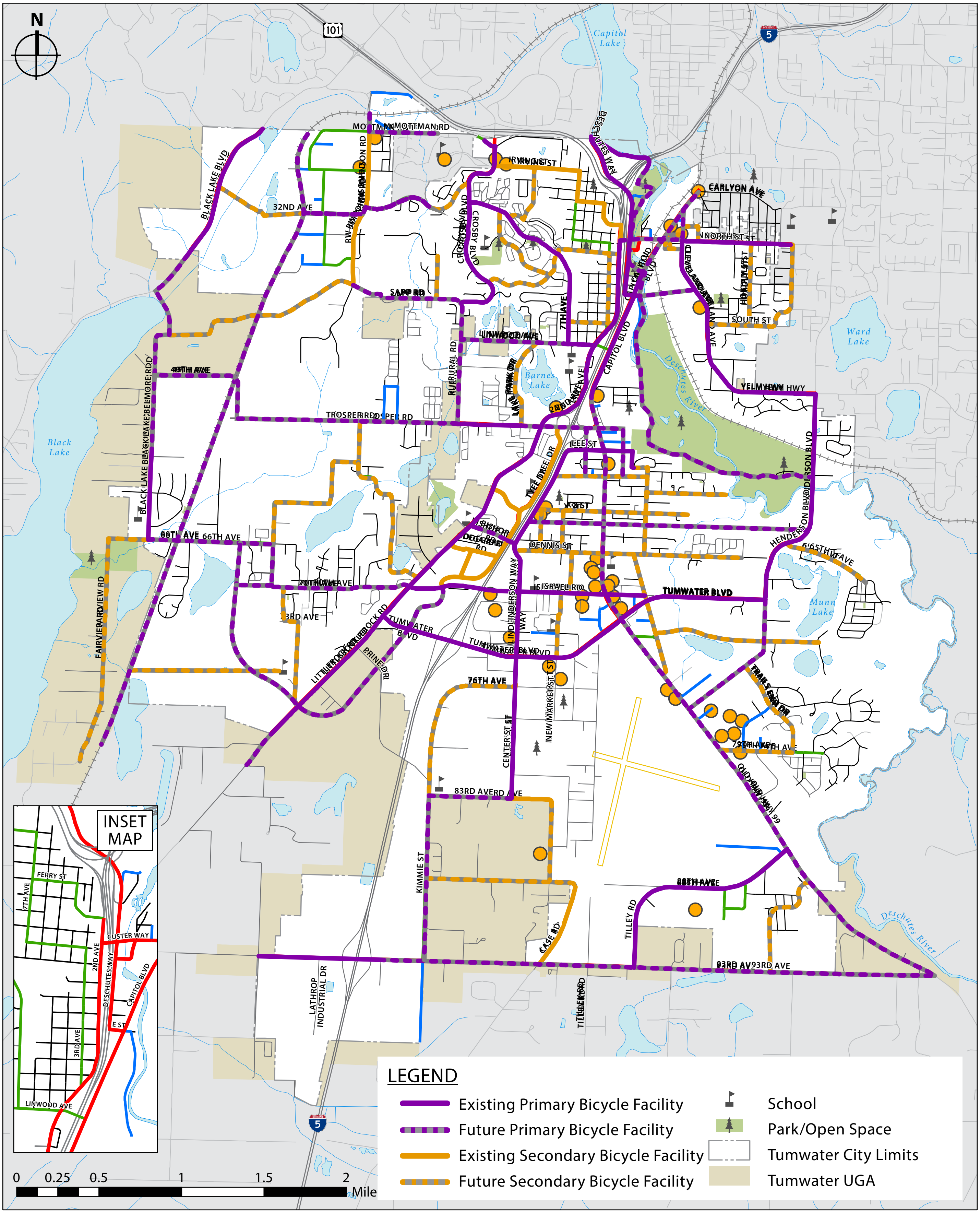

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Figure 16

Primary and Secondary Bicycle Network

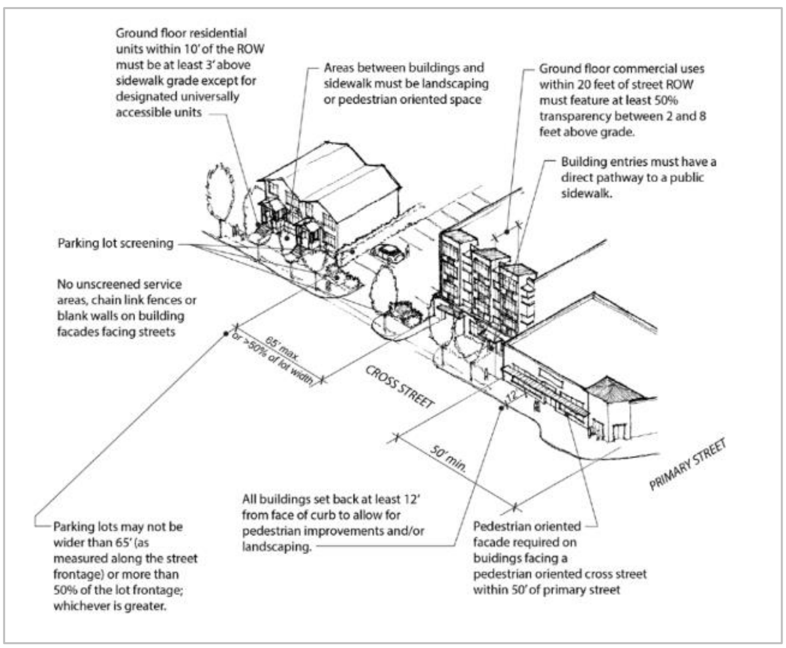
the Urban Corridor Zone; the second is referred to as the Practical Design Zone.

Urban Corridor Zone

The Urban Corridor Zone includes the Brewery District, the Capitol Boulevard Corridor, and Tumwater Town Center. These are the areas of focused study and policy development over the last few years on ways to revitalize the region’s urban corridors.

Those studies pointed out the important role that non-motorized travel and access to transit play in fostering the kind of built environment people say they want in an urban area. Tumwater simply can’t accommodate the kind of mixed-use, compact, walkable development desired in these areas without a robust non-motorized network; walking, biking, and transit are increasingly viable alternatives to driving as the mix and density of land uses increase. In many respects it can be said that Tumwater cannot achieve its land use vision within the Urban Corridor Zone without completing its non-motorized networks. Detailed sub-area studies evaluated access and circulation for all modes of travel, and identified critical connections, upgrades, and additions that will enable the non-motorized system to accommodate future growth.

Capitol Boulevard is an example of a city street with a pronounced pedestrian focus. Updated design standards specific to the Capitol Boulevard Corridor will ensure that future development is compatible with the intended pedestrian orientation of this important street while increasing internal access and circulation between businesses and properties. The Design Guidelines specify “primary” and “secondary” pedestrian cross streets with corresponding site and development standards.



Design standards are rigid in the Urban Corridor Zone. New facilities in these areas will be carefully designed to ensure they are compatible with adjacent land uses and building standards, and contribute to the overall sense of place in the public realm called for in adopted plans. Transportation drives land use development in this zone. In the Urban Corridor Zone, “form” or design is as important as “function” when it comes to the non-motorized system.

Practical Design Zone

Outside of the Urban Corridor Zone, the City’s Comprehensive Plan calls for different types of land uses. The majority of lands are designated for residential-only neighborhoods, regional commercial centers, and industrial areas. While many developments over the last 15-20 year have included sidewalks and bike lanes, many older neighborhoods and streets have few facilities at all for walking or biking.

This 6 foot wide asphalt pathway on 70th Avenue is a good example of how flexible design can result in critical infrastructure that would not have been achievable otherwise. Responding to area resident concerns about the lack of safe shoulders or sidewalks, the City constructed this pathway for a fraction of the cost of its standard frontage improvements. This means people had safe walking and biking options years before they would have under current standards.

While there is no expectation that these areas will generate the same share of non-motorized trips as the Urban Corridor Zone, there are still important connections needed for walking and biking. Schools and parks are two of the most important destinations that need to be served by non-motorized infrastructure so that more people can access them safely without having to drive. There are also critical corridors that could accommodate longer bicycle trips if they had better infrastructure.

The imperative in these areas is to expand the functionality of the transportation system to accommodate these additional modes to the greatest extent possible. However, the distance between destinations in these areas is often great and it is beyond the City’s fiscal capacity to build urban-style sidewalks and bike lanes throughout these areas. Instead, those multimodal system performance standards will allow the City greater flexibility in the design of facilities in the Practical Design Zone in order to maximize the linear feet of safe, non-motorized infrastructure.

While the City may adhere to its established “curb-gutter-sidewalk” development standards, it may also apply different standards if – after careful engineering evaluation - this results in a significant increase in non-motorized infrastructure. This could mean wide asphalt walkways, or wide multi-use shoulders on rural roads. Practical designs can safely accommodate cyclists and pedestrians at a fraction of the cost of more rigid urban standards. Alternate designs can generate more miles of safe and efficient network in less time than is achievable with established standards. Transportation responds to land use development in this zone. In the Practical Design Zone, “function” can take precedence over “form” when appropriate.

Figure 17, on the next page, illustrates the two zones established for purposes of multimodal level of service evaluation in Tumwater.

As Tumwater works to apply these multimodal standards it may be necessary to modify their boundaries somewhat to better account for underlying land use and transportation patterns. For example, the older neighborhood along 2nd Avenue and Linwood Avenue has many characteristics reminiscent of neighborhoods in the Urban Corridor zone though it is separated from that zone by I-5. The Tumwater Transportation Master Plan introduces this concept of multimodal level of service analysis zones; implementation at the work program level is necessary to refine it further.

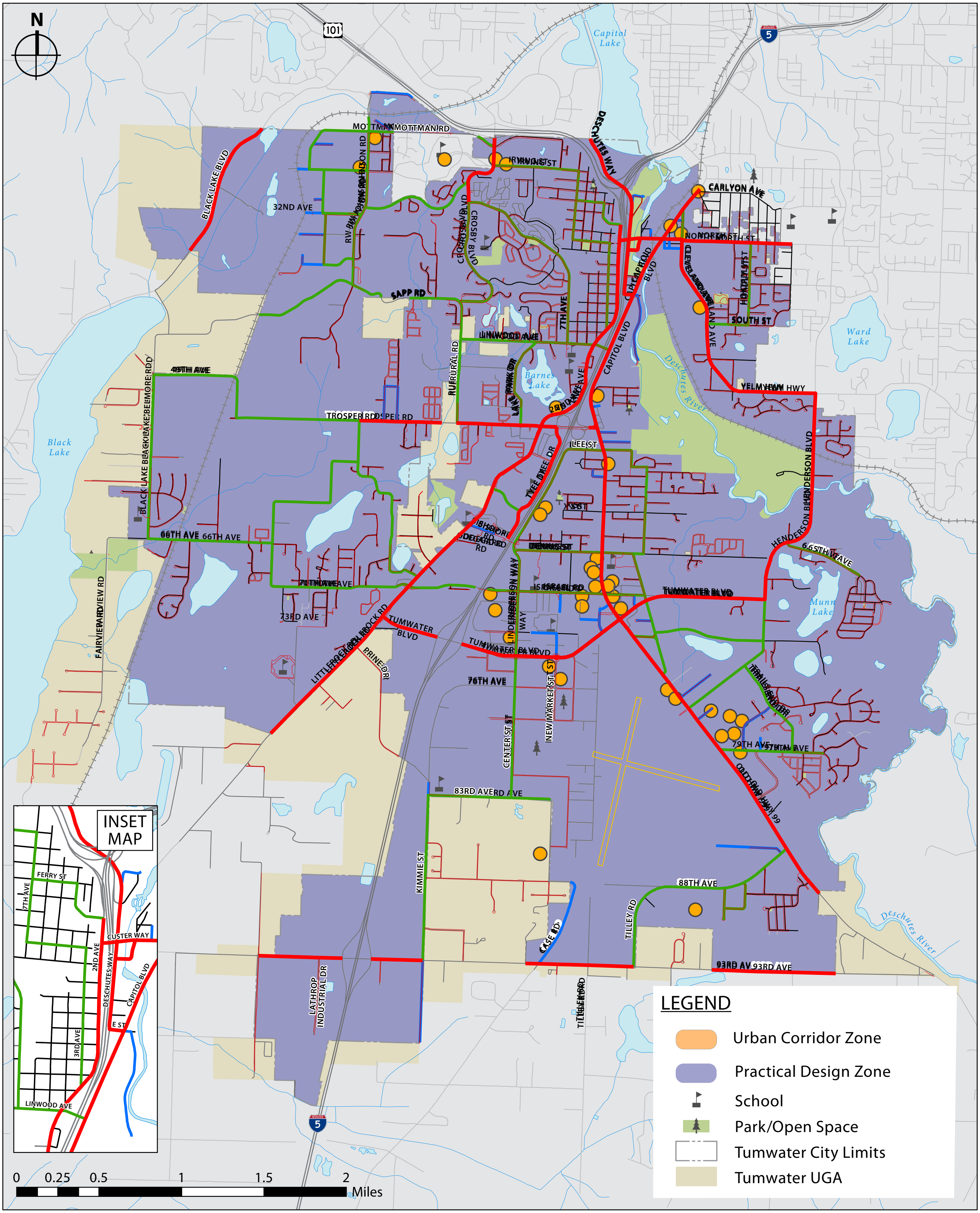


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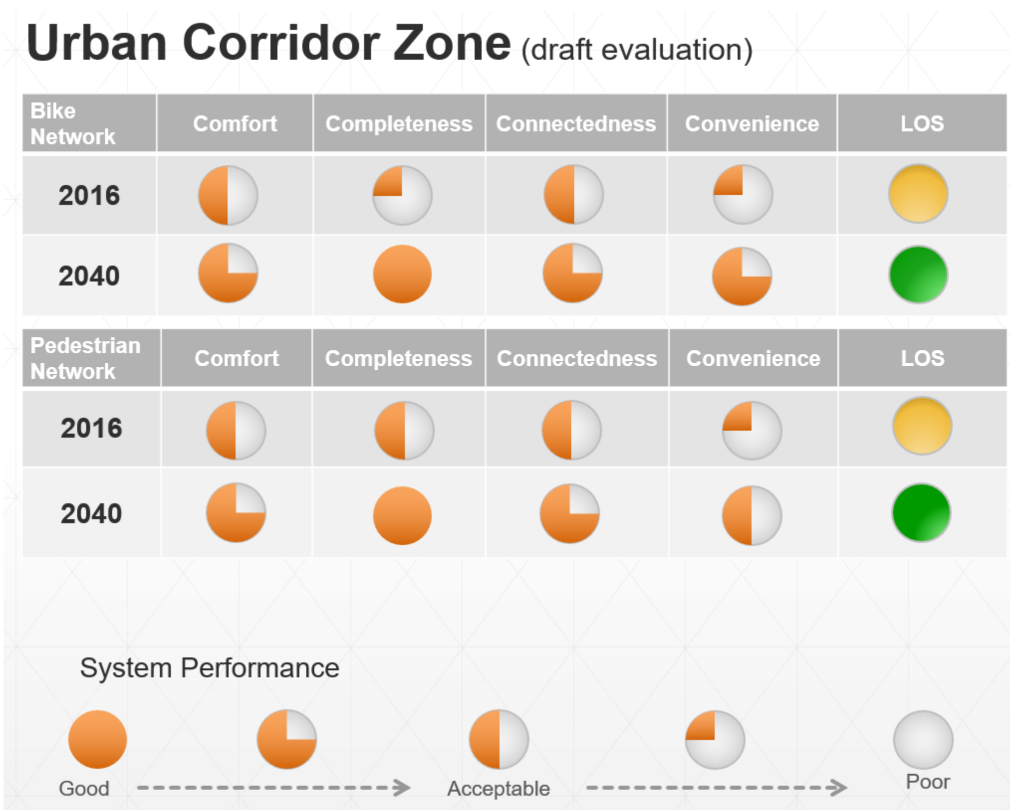
Figure 17
Urban Corridor and Practical Design Zones

Evaluating System Performance

This plan introduces a framework within which the City can evaluate the effectiveness of its policies and investments, prioritize scarce resources, and benchmark progress towards meeting long-range objectives. This initial evaluation is not yet tested with the realities of day-to-day implementation activities; the framework may need to be revised to accommodate practical needs. In the meantime, this plan offers an initial evaluation of non-motorized system performance.

Figure 18 suggests that while much remains to be done, taken as a whole the non-motorized system is generally acceptable in the Urban Corridor Zone. There are certainly system gaps – lack of bike lanes on Capitol Boulevard is a prominent example – but there is also some system redundancy and alternate routes due to the somewhat gridded street system. In fact, those alternate routes – such as Linderson Way – will always be more comfortable for some bikers than Capitol Way will be, even when it has bike lanes. Attractive destinations tend to be on busy streets; Capitol Way will always have a lot of traffic on it due to its role within the regional transportation system.

FIGURE 18: NON-MOTORIZED LOS EVALUATION IN THE URBAN CORRIDOR ZONE



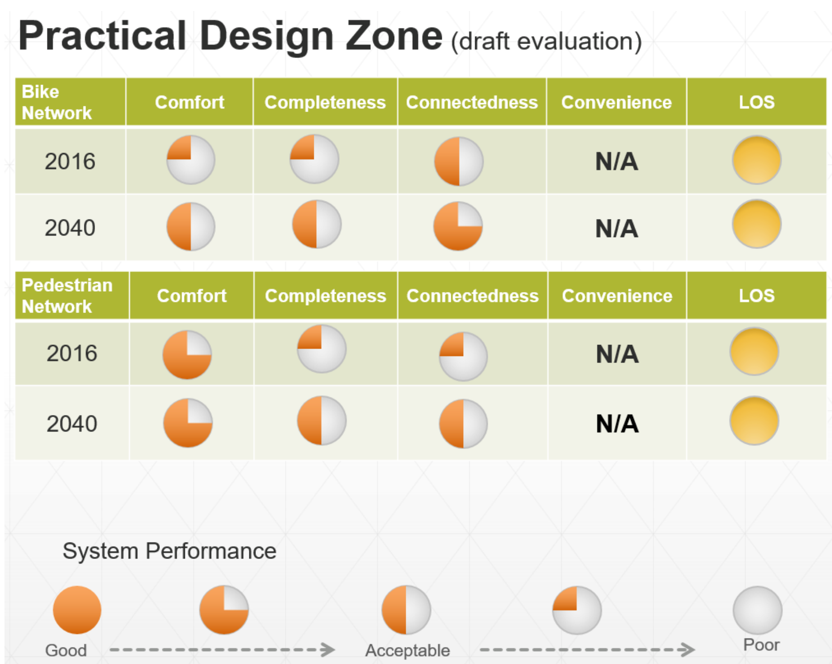
Deficiencies in system convenience is a land use issue as much as a transportation issue. Infill and redevelopment over time will increase the convenience factor in this zone.

Currently 78 percent of the Primary and Secondary Pedestrian Network within the Urban Corridor Zone is complete, with facilities on both sides of the street, and 37 percent of the Primary and Secondary Bike Network is complete. Implementation of the projects included in this plan could raise the non-motorized level of service in the Urban Corridor Zone to Good by 2040.

Factors affecting level of service in the Practical Design Zone are somewhat different than in the Urban Corridor Zone. Land uses are greatly dispersed. The transportation network has many fewer connections than in the Urban Corridor Zone so there are fewer alternate routes; even some direct routes are not very direct. Much of this zone has a distinctly rural feel to it.

Yet population is growing out at the fringes, especially around Black Lake to the west and around Trails End to the south. Residents must drive these "rural" roads to get to and from their day to day activities, creating suburban levels of traffic on streets, some of which still have a rural character. This makes biking and walking a challenging proposition if there are no shoulders.

FIGURE 19: NON-MOTORIZED LOS EVALUATION IN THE PRACTICAL DESIGN ZONE

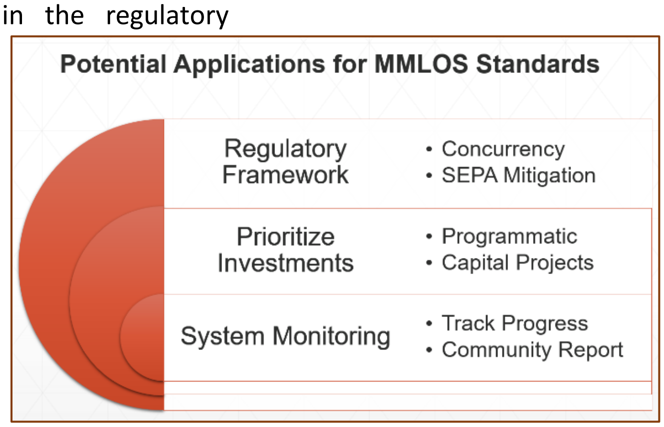


Outside of the oldest neighborhoods, such as those on Tumwater Hill or off of South Street, most non-motorized infrastructure was built to current standards over the last 15-20 years so travel on those facilities where they exist is relatively comfortable. The non-motorized infrastructure is sized appropriately for the adjacent traffic volumes and speeds. The problem is that there are vast stretches of relatively rural streets with no shoulders or off-street facilities, and these serve as important connections between destinations at either end. Currently 39 percent of the Primary and Secondary Pedestrian Network in the Practical Design Zone is complete, with facilities on both sides of the street, and 29 percent of the Bike Network is complete. The challenge in the Practical Design Zone will be to stretch resources as far as possible to maximize the extent of network available to make these connections and satisfy the longer distance travel needs of cyclists in particular. The intent of this zone is to give Tumwater Public Works the flexibility in design it needs to achieve this outcome.

As with the Urban Design Zone, there are serious gaps in the system but taken as a whole throughout the Practical Design Zone, non-motorized level of service is generally acceptable, given conditions of the built environment. Implementation of the projects included in this plan will improve travel conditions by 2040 though it is not expected to materially raise the level of service rating, which is expected to be Acceptable in 2040.

Potential Applications Outside of Transportation Master Plan

The framework introduced in this plan can be applied to a variety of different purposes outside of the long-range planning arena. That includes a potential role in the regulatory environment, as a tool to help prioritize projects and funding, and for monitoring progress over time in meeting City objectives, among other uses.



It will be necessary to take a more fine-grained look at the non-motorized network than can be done in a long-range plan in order to identify and prioritize problems and opportunities. Such an analysis may reveal improvements to the evaluation criteria that can be applied to future plan updates.

PERFORMANCE OF STATE HIGHWAY FACILITIES

Tumwater has sole authority to plan for and implement recommendations for its local transportation system, but not for state routes. The Washington State Department of Transportation (WSDOT) has sole authority to plan for and implement recommendations for I-5, which bisects the city. US 101 and its interchanges, while adjacent to Tumwater, are actually located in Olympia. WSDOT also owns and is responsible for SR 121; since this functions more like a local street than a highway, there is closer collaboration between WSDOT and Tumwater regarding this facility.

Among the various factors it considers when developing its plans, WSDOT uses output from the local long-range forecasting process to estimate how its highway system might perform in the future and where the hotspots are likely to be. WSDOT maintains its own transportation plans and project lists[1].

The GMA directs Tumwater to include level of service standards for state-owned highways in its transportation. However, chapters 47.06 and 47.80 of the Revised Code of Washington (RCW) explain that while the State may consult with local agencies in the matter of system performance, WSDOT retains the sole authority to establish level of service standards for state facilities. WSDOT has established LOS D for state highways within Tumwater's urban area (and that of Olympia and Lacey) and LOS C outside of it. Highways of Statewide Significance – I-5 for Tumwater – are exempted from complying with adopted level of service standards.

All systems analysis, even on local streets, considers projects identified in the statewide multimodal plan since they are incorporated by TRPC into the regional model, which is used by Tumwater for its analysis. WSDOT intends to extend its freeway cameras and other technology improvements through

[1] WSDOT is in the process of updating its Washington Transportation Plan: http://www.wsdot.wa.gov/planning/wtp/ WSDOT maintains a variety of inter-related transportation plans and project lists it uses to inform investment decisions. Projections from local forecasts, such as those required by the GMA, are but one input in its process.

Tumwater in the future. There is little else planned for WSDOT infrastructure in the future, though.

Areas that have been problematic for years will continue to be problematic in the future absent any implementation strategy in state plans to improve system efficiency. This includes at various times of the day the I-5/US 101 system interchange, the I-5 at Trosper Road interchange, the I-5 at Tumwater Boulevard interchange, and the US 101 at Crosby Boulevard interchange.

There are growing concerns about the performance of the 93rd Avenue interchange at I-5; outdated interchange design challenges the efficient movement of trucks on and off the highway there. Currently there are no WSDOT plans to improve mobility at these hotspots or through the Tumwater/Olympia/Lacey I-5 corridor.

Tables 7 and 8 show peak period level of service for I-5 in 2015 and in 2040. For planning purposes, Freeway capacity is 6,000 vehicles per hour northbound and 6,000 vehicles per hour southbound The LOS is based on lane capacity as derived from the regional travel demand model and does not take into account friction-causing factors like merging on or off the highway or weaving between lanes.

TABLE 7: 2015 I-5 MAINLINE PM PEAK PERIOD LEVEL OF SERVICE CONDITIONS

		Southbound		Northbound	
Freeway Segment	Freeway Capacity	Volume	Level of Service (V/C)	Volume	Level of Service (V/C)
South of 93rd Avenue	6000	2,440	A (0.41)	1,765	A (0.29)
South of Tumwater Boulevard	6000	3,045	A (0.51)	2,190	A (0.36)
South of Trosper Road	6000	3,295	A (0.55)	3,355	A (0.56)
South of Deschutes Way	6000	3,955	B (0.66)	4,245	C (0.71)
North of Deschutes Way	6000	3,955	B (0.66)	4,030	B (0.67)

TABLE 8: PROJECTED 2040 I-5 MAINLINE PM PEAK PERIOD LEVEL OF SERVICE CONDITIONS

Freeway Segment	Freeway Capacity	Southbound		Northbound	
		Volume	Level of Service (V/C)	Volume	Level of Service (V/C)
South of 93rd Avenue	6000	3,535	A (0.41)	2,645	A (0.44)
South of Tumwater Boulevard	6000	4,250	C (0.71)	3,095	A (0.52)
South of Trosper Road	6000	4,445	C (0.74	4,220	C (0.70)
South of Deschutes Way	6000	4,990	D (0.83)	5,335	D (0.89)
North of Deschutes Way	6000	4,990	D (0.83)	4,995	D (0.83)

CONCURRENCY

Concurrency, as noted previously, is the process of determining whether transportation infrastructure can accommodate new development and if not, what mitigation measures will be required. Concurrency can result in denial of a development proposal if it cannot mitigate its impacts on adopted LOS standards. In the legislation regarding the transportation element of the Comprehensive Plan, GMA stipulates ***"after adoption of the comprehensive plan…local jurisdictions must adopt and enforce ordinances which prohibit development approval if the development causes the level of service…to decline below the standards adopted in the transportation element…unless improvements or strategies to accommodate the impacts of development are made concurrent with the development."*** This reiterates the importance of LOS standards explained earlier. While the concurrency ordinance is not part of this transportation element, it is informed by the LOS standards and other considerations included in this element.

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Transportation Master Plan

CHAPTER 11

CAPITAL IMPROVEMENTS

Capital Improvements

The Transportation Master Plan includes a list of capital improvements needed in the city between now and 2040 to achieve and maintain adopted levels of service and accomplish other important transportation objectives for the city, such as supporting the development of more walkable, people-oriented places and promoting active travel options that encourage better public health. Following is a list of projects, by project type.

Non-Motorized Projects

Every street project in this transportation plan includes appropriate non-motorized facilities. Non-motorized facilities account for anywhere from 30 percent to 60 percent of the cost of typical street projects. This includes right-of-way acquisition, stormwater treatment, and additional materials in addition to the construction labor.

This 2014 Capitol Way project added bike lanes and improved the sidewalks in this part of the Brewery District in addition to improving stormwater runoff facilities.

The projects identified here are stand-alone projects. Some were previously identified in sub-area plans and other focused studies. Others were identified to support Safe Routes to School programs. The majority come from evaluation of the future needs suggested by the Primary and Secondary networks. The latter source merits some additional explanation to avoid confusion when looking at the map of future network needs and the project list.

For bike projects, "future network needs" were identified on an initial list of project needs. Comparison of that list to the list of street projects revealed a significant number of those non-motorized facilities slated to be built as a part of these street projects. Consequently, those projects are not included on this list as stand-alone projects.

The remaining projects were evaluated for potential low cost improvements. Some future needs can be met with a programmatic approach to non-motorized facility improvements such as striping, signage, and crosswalk improvements. A separate list of these programmatic upgrades is included at the end of the capital improvements list.

Those deficits that remained after consideration of street projects and programmatic opportunities comprised the list of stand-along bike projects found in Table 9. A map of those stand-alone projects can be found in Figure 20. Costs are not developed for these projects; most are still conceptual and others will be designed and built in the course of development or redevelopment projects. Costs will be developed as projects move into the six-year Transportation Improvement Program or as part of a more in-depth bike and pedestrian planning effort.

A slightly different approach was used to identify stand-alone pedestrian facilities.

Similar to bike facilities, many pedestrian deficiencies will be addressed with completion of proposed street projects. Figure 21 shows those deficiencies on the Primary and Secondary Network that will be addressed by future street projects; it also indicates whether the remaining deficiencies are attributed to needs on one side of the street or both.

In looking at the remaining deficiencies, particular attention was focused on the Urban Corridor Zone, where detailed sub-area plans have identified specific pedestrian improvements that will help accommodate future land use activities. Those needs constitute the majority of stand-alone pedestrian projects identified in Table 10. Some number of the remaining deficiencies are likely to be addressed with wide, multi-use shoulders in rural areas, or programmatic investments that create a safer and more comfortable walking route. A detailed pedestrian plan such as that identified in the chapter on Strategic Needs and Opportunities will be useful in identifying and prioritizing needs citywide.

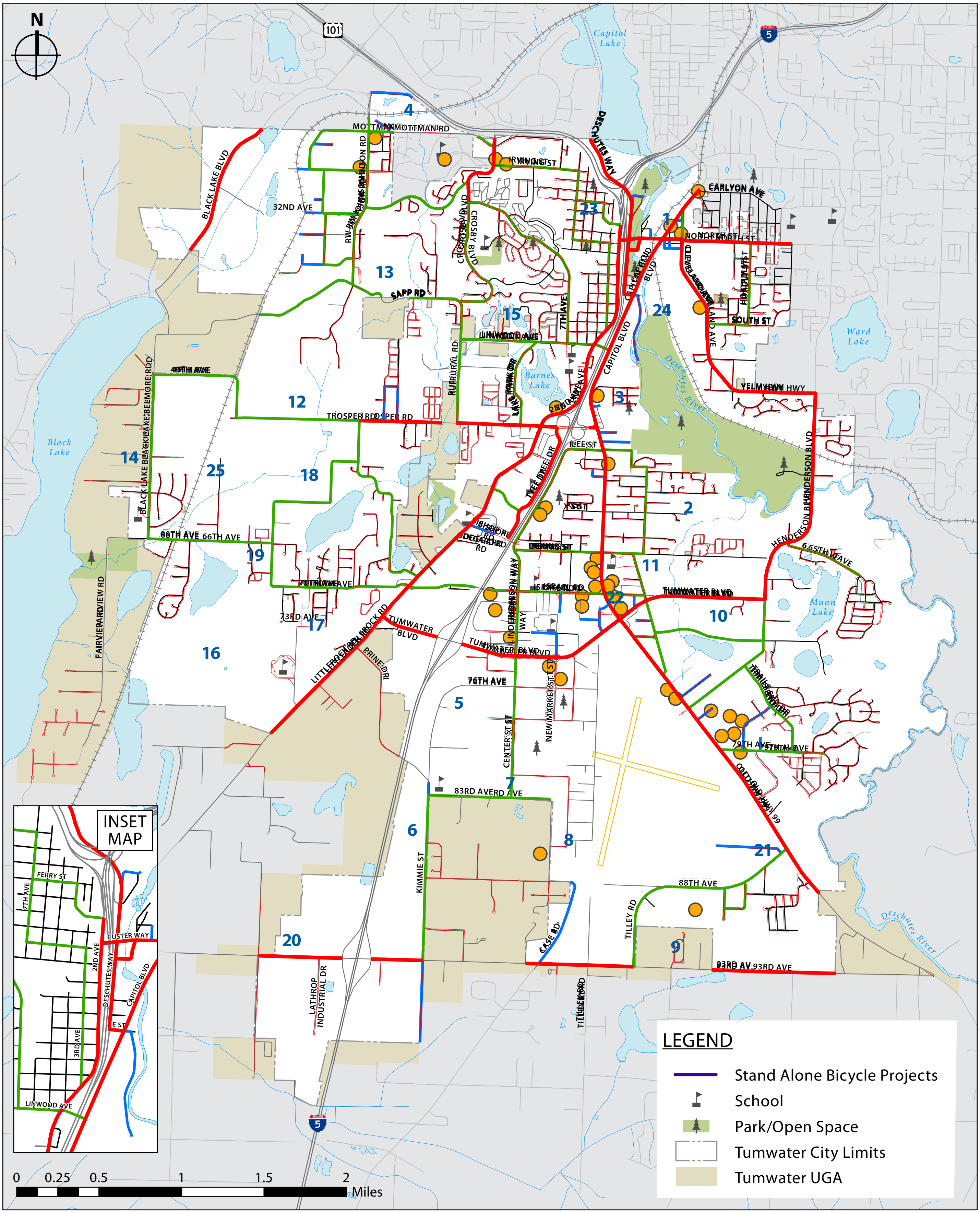
Cost are not developed for these projects; most are still conceptual and others will be designed and built in the course of development or redevelopment projects. Costs will be developed as projects move into the six-year Transportation Improvement Program or as part of a more in-depth bike and pedestrian planning effort

Table 9 Stand-alone Bike Projects

ID	Project	Description
1	Public Alleyway Non-motorized Network	Improve alleyways within the Brewery District "triangle" to provide comfortable, attractive connections for cyclists and pedestrians that also enhance activities on the ground floors of adjacent buildings and increase access to transit.
2	Shared-use Path Along BPA Alignment	Establish a new shared-use pathway running through the east-west BPA alignment and connecting to Linderson Way.
3	Shared-use Path from Trosper Road to South of M Street	New non-motorized connection east of Capitol Boulevard linking the neighborhood in the vicinity of Linda Street and Ruby Street to Capitol Boulevard near M Street.
4	Mottman Road Sidewalk and Bike Lane Improvements	Install sidewalk on the north side of Mottman Road from the vicinity of Crosby Boulevard to R.W. Johnson Boulevard. Note that sidewalks and bike lanes will be added to both sides of Mottman between Mottman Court and R.W. Johnson Boulevard during a pavement resurfacing project.
5	76th Ave / Kimmie Street Bike Facilities (Port property)	From Center Street to 83rd Avenue (Port of Olympia project).
6	76th Ave / Kimmie Street Bike Facilities (City property)	From 83rd Avenue to 93rd Avenue.
7	83rd Avenue Bike Facilities	From Kimmie Street to Center Street
8	Armstrong Road Bike Facilities	From 83rd Avenue to 88th Avenue
9	93rd Avenue Bike Facilities	From I-5 to Old Highway 99
10	73rd Avenue Bike Facilities	From Bonniewood Drive to Henderson Boulevard
11	Bonniewood Drive Bike Facilities	From Dennis Street to Old Highway 99
12	49th Avenue / Trosper Road / 54th Avenue Bike Facilities	From Black Lake-Belmore Road to Rural Road
13	Sapp Road / Rural Road Bike Facilities	From Trosper Road to Black Lake-Belmore Road
14	Black Lake-Belmore Road Bike Lanes	From 66th Avenue to Black Lake Boulevard (some partial programmatic potential)
15	Linwood Avenue Bike Facilities	From Sapp Road to G Street
16	New Pathway to Black Hills High School	New dedicated pathway from the future Gate-Belmore Trail to Black Hills High School
17	Black Hills High School Neighborhood Connection	From Bronington Street to Black Hills High School
18	Kirsop Road Bike Facilities	From 54th Avenue / Trosper Road to 66th Avenue
19	66th Avenue / 70th Avenue Bike Lanes	From Black Lake-Belmore Road to Littlerock Road
20	93rd Avenue Bike Lanes West of I-5	From I-5 to the western City Limits, as development occurs
21	88th Avenue Bike Facilities	From just west of Cabot Drive to 85th Avenue
22	Israel Road Bike Facilities	From Nikolas Street to Bonniewood Drive
23	Desoto Street Bike Lanes	From 2nd Avenue to Emerson Street. Note that additional bike lanes in this vicinity are included as a programmatic improvement.
24	Deschutes Valley Trail	From Henderson Boulevard at Pioneer Park to Tumwater Historical Park
25	Gate to Mottman Trail	Conversion of the old Gate-Belmore rail corridor to a trail between Gate and Mottman. Note that conversion of this rail corridor to a trail south of 66th is in the works, led by Thurston County.

Table 9 Stand-alone Bike projects Continued

Programmatic Bike Improvements (low cost projects that can generally be completed within the existing right-of-way)		
ID	**Project**	**Description**
P1	Trosper Road Bike Facilities	From Lake Park Drive to Rural Road
P2	Center Street Bike Facilities	From Tumwater Boulevard to 83rd Avenue
P3	Trails End Road Bike Facilities	From Henderson Boulevard to 79th Avenue and then to Old Highway 99
P4	Lake Park Drive Bike Facilities	From Linwood Avenue to Trosper Road
P5	Vista Loop Bike Facilities	From Crosby Boulevard to Barnes Boulevard
P6	12th Avenue / Vista Loop Bike Facilities	From Barnes Road to Irving Street
P7	Somerset Hill Road Bike Facilities	From R.W. Johnson Boulevard to Crosby Boulevard
P8	Miner Drive Bike Facilities	From Kirsop Road to Littlerock Road
P9	South Street / Hoadly / Pifer Road Bike Facilities	From North Street to South Street. Note that some segments of this fall within the City of Olympia.
P10	Lee Street / Boston Avenue / Hazelhurst Bike Facilities	From Capitol Boulevard to Elm Street
P11	Dennis Street Bike Facilities	From Linderson Way to Capitol Boulevard, and from Capitol Boulevard to Elm Street
P12	Bates Street / 7th Avenue Bike Facilities	From 2nd Avenue to Irving Street
P13	Desoto / 4th / Ferry / Irving Street Bike Facilities	From 2nd Avenue to Crosby and 3rd Avenue
P14	Shared Bike Streets	Upgrade as necessary and sign with 'sharrows' the key shared bike streets identified in the Brewery District plan to provide good connections between adjacent neighborhoods and the stores and services in the District. (Programmatic potential)
P15	Shared-use Path from Linderson Way to Southgate Shopping Center	New non-motorized connection linking the neighborhood in the vicinity of Gerth Street to the Southgate Shopping Center. Potentially can be incorporated into the 6th Avenue Extension design. (Programmatic potential)
P16	X Street Shared Bike Streets	Upgrade as necessary and sign with 'sharrows' X Street, from Elm Street to 7th Ave. (Programmatic potential)



CITY OF TUMWATER
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Figure 20
Stand Alone Bicycle Projects

Table 10 Stand-alone Pedestrian Projects

ID	Project	Description
1	Public Alleyway Non-motorized Network	Improve alleyways within the Brewery District “triangle” to provide comfortable, attractive connections for cyclists and pedestrians that also enhance activities on the ground floors of adjacent buildings and increase access to transit.
2	Improved Sidewalks in Brewery District	Upgrade existing sidewalks (in addition to those being reconstructed as part of street projects) to improve access and circulation throughout the District, including well marked and designed pedestrian crossings at key locations.
3	Cleveland Avenue Retrofit	Retrofit Cleveland Avenue between Custer Way and Capitol Boulevard to be more pedestrian oriented.
4	Pedestrian Crossings at New Transit Station	When the Tumwater Square Transit Station is relocated to Capitol Boulevard establish new pedestrian crossings in the vicinity of the Station, incorporating high visibility flashers and other treatments to ensure safe pedestrian access.
5	New Pedestrian Connection from Linderson Way to Elm Street, in vicinity of T Street	Pedestrian facilities offering a direct route between Linderson Way and Elm Street with a crossing at Capitol Way. Preferred route roughly aligns with T Street and Pinehurst Drive.
6	Elm Street Sidewalks	Completion of sidewalk facilities on Elm Street between Pinehurst and W Street.
7	Shared-use Path Along BPA Alignment	Establish a new shared-use pathway running through the east-west BPA alignment that crosses Capitol Boulevard and connecting to Linderson Way.
8	Capitol Boulevard at U Street Pedestrian Improvement	Create a safe pedestrian crossing opportunity on Capitol Boulevard at U Street incorporating a refuge island and rectangular rapid flashing beacons.
9	North-South Pedestrian Connection between X Street and Dennis Street	Create a new pedestrian / non-motorized connection through the future shared-use pathway on the BPA alignment to connect X Street and Dennis Street in the vicinity of Tumwater High School.
10	Enhanced Access at I-5 Overcrossing	Upgrade pedestrian and cyclist access to the non-motorized crossing of I-5 near Dennis Street.
11	Pedestrian Improvements and Traffic Calming	Various locations throughout the city. Intent is to create a safer and more inviting pedestrian environment by improving crossing opportunities on busy streets and by installing traffic calming devices that slow vehicles in high pedestrian areas. Specific projects developed as a part of the six-year Transportation Improvement Program (TIP) process.
12	Safe Routes to School Projects	Pedestrian facility upgrades in the vicinity of Peter G. Schmidt and Michael T. Simmons schools to promote walking to and from school. Project details developed as a part of the six-year TIP process.
13	Mottman Road Sidewalk and Bike Lane Improvements	Install sidewalk on the north side of Mottman Road from the vicinity of Crosby Boulevard to R.W. Johnson Boulevard. Note that sidewalks and bike lanes will be added to both sides of Mottman between Mottman Court and R.W. Johnson Boulevard during a pavement resurfacing project.

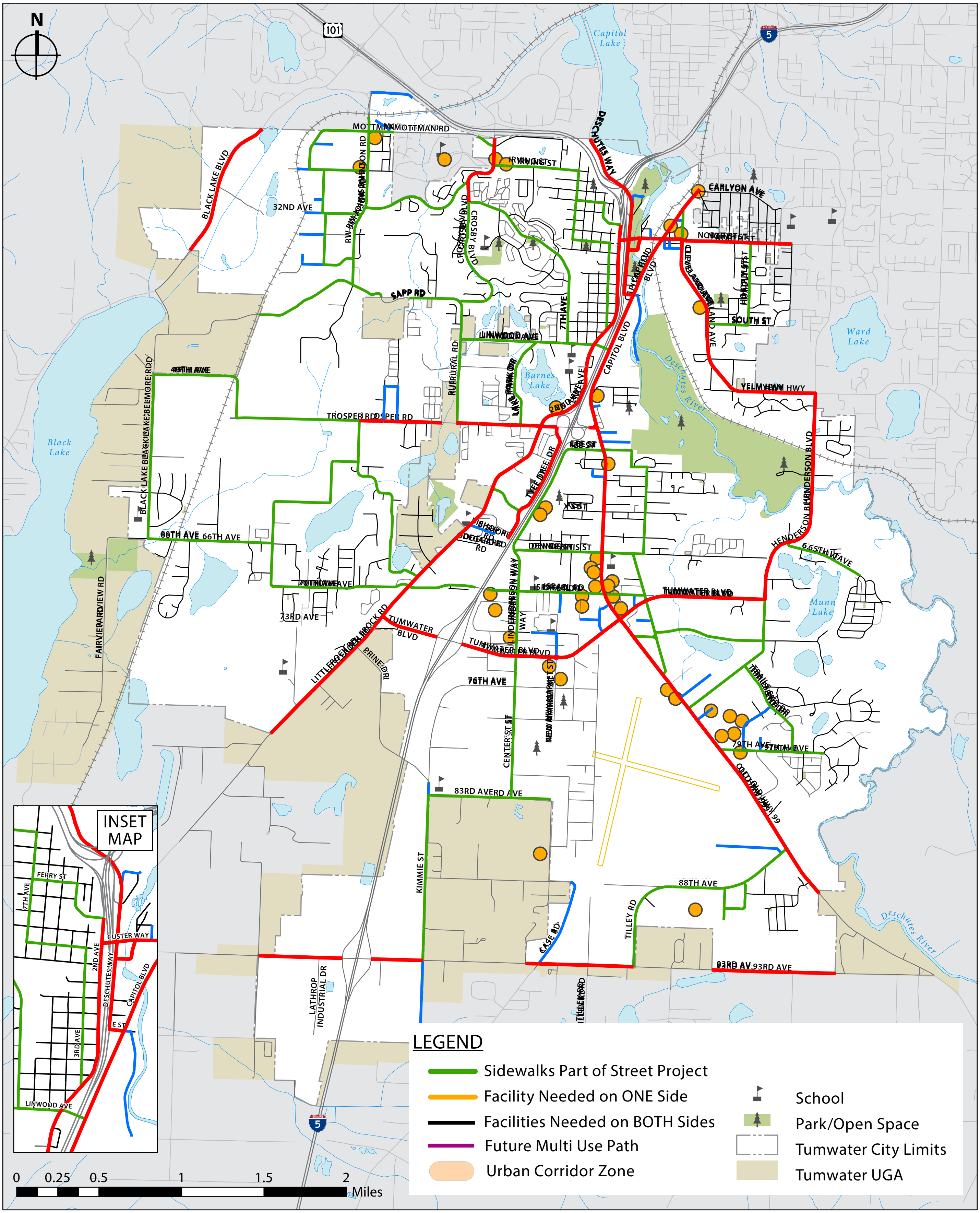

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Figure 21
Pedestrian Network Project Status

MOTORIZED PROJECTS

Motorized projects include street projects – widenings and new connections, primarily – and intersection projects. Tables on the next few pages identify projects needed between now and 2040 to meet adopted levels of service and achieve City objectives. Table 11 identifies roadway projects; Table 12 identifies intersection projects. A map of proposed projects is shown in Figure 22. Note that all street projects include appropriate non-motorized facilities according to City design standards.

TABLE 11: PROPOSED 2040 STREET PROJECTS W/ BIKE LANES AND SIDEWALKS

PROPOSED 2040 STREET PROJECTS w/ Bike Lanes and Sidewalks as Appropriate Based on Street Standards and Design Guidelines

	Street	Extents	Existing Conditions	Proposed Improvement	Notes
R1	Littlerock Road	Tumwater Blvd to Western City Limits	2 lanes, no bike lanes or sidewalks	Widen to 3 lane	Projected volume is approaching need for a 4/5 lane section. Monitor road as development occurs; all building construction should be set back to accommodate 5 lanes.
R2	Tyee Drive	Bishop Rd to Israel Rd	No road	New 3 lane extension with RAB at Israel Rd	This project is currently being designed.
R3	Tyee Drive	Israel Rd to Tumwater Blvd	No road	Construct 5 lane extension, including intersection improvements at Tumwater Blvd	Reassess need for a 5 lane section as the surrounding properties are developed
R4	Tyee Drive	Tumwater Blvd to Prine Dr	No road	Construct 5 lane extension, including intersection improvements at Prine Dr	Reassess need for a 5 lane section as the surrounding properties are developed
R5	Tyee Drive	Prine Dr to Littlerock Rd	No road	Construct 3 lane extension, including intersection improvements at Littlerock Rd	Reassess need for TWLTL as the surrounding properties are developed
R6	Trosper Road	Lake Park Dr to Rural Rd	2 lanes, on-street parking, partial bike lane, sidewalks	Repurpose asphalt to provide 3 travel lanes and bike lanes	
R7	Tumwater Blvd	Capitol Blvd to Henderson Blvd	2 lanes, wide shoulders and no bike lanes or sidewalks	Widen to 3 lanes, including intersection at Bonniewood Dr	
R8	Tumwater Blvd	I-5 Interchange	Currently 3 lane bridge	RAB Intersection control and wider bridge	Note: This is a WSDOT project
R9	Tumwater Blvd	I-5 SB Ramps to Tyee	3 lanes, no bike or sidewalks	Widen to 5 lanes	
R10	E Street	Capitol Blvd to Cleveland Ave	No road	Construct 4 lane extension across Tumwater Valley, incl: E St & Cleveland Ave intersections	This project will also provide access to properties on the valley floor.
R11	Old Highway 99	Tumwater Blvd to 73rd Av	2 lanes, no bike or sidewalks	Widen to 5 lanes	This project is already funded
R12	Old Highway 99	73rd Ave to 88th Ave	2 lanes, no bike lanes or sidewalks	Widen to 5 lanes, including intersection improvements at Bonniewood Dr, Henderson Blvd and 88th Ave	This widening will include the construction of RAB's at Henderson Blvd and 88th Ave
R13	Old Highway 99	88th Ave to 93rd Ave	2 lanes, no bike lanes or sidewalks	Widen to 3 lanes	Projected volume is approaching need for a 5 lane section. Widening Old Hwy 99 would not provide meaningful benefit unless continues south beyond city Limits. This road should be monitored as development occurs.
R14	Henderson Boulevard	Tumwater Blvd to 65th Ave	2 lanes, no bike lanes or sidewalks	Widen to 3 lanes	Construct left-turn lanes where needed, consider TWLTL or median for remaining sections
R15	Henderson Boulevard	Tumwater Blvd to Old Hwy 99	2 lanes, no bike lanes or sidewalks	Widen to 3 lanes	Construct left-turn lanes where needed, consider TWLTL or median for remaining sections
R16	32nd Street	Ferguson St to Black Lake Blvd	3 lanes with sidewalks, no bike lanes	Construct 3 lane extension, including intersection at Black Lake Blvd	This roadway project will be development driven
R17	70th Avenue Extension	Kirsop Rd to 73rd/66th Connector	2 lanes with partial sidewalks and no bike lanes	Construct 3 lane extension, including intersection improvements at Kirsop Rd	This roadway project will be development driven
R18	73rd Avenue	Prine Dr Ext to 73rd/66th Connector	No road	Construct 3 lane road	This roadway project will be development driven. Need for 3rd lane will be assessed during design
R19	Prine Drive	Tyee Rd to 73rd Ave	2 lanes, no bike lanes or sidewalks	Widen to 3 lanes between Tyee Rd & Tumwater Blvd. Construct 3 lane extension, including intersection improvements at Tumwater Blvd	This roadway project will be development driven.
R20	93rd Avenue	Lathrop Industrial Dr to I-5 SB Ramps	2 lanes, no bike lanes or sidewalks	Widen to 5 lanes, including intersection improvements at Lathrop Rd	5 lane section to accommodate commercial properties on both sides of 93rd Ave. Additional lanes will add/drop at Lathrop Industrial Dr and SB ramps (until project R24)

PROPOSED 2040 STREET PROJECTS w/ Bike Lanes and Sidewalks as Appropriate Based on Street Standards and Design Guidelines

	Street	Extents	Existing Conditions	Proposed Improvement	Notes
R21	SR 121 (93rd Avenue)	I-5 NB Ramps to Kimmie St	2 lanes, partial bike lanes and sidewalks	Widen to 5 lanes, including intersection improvements at Kimmie St	5 lane section to accommodate commercial properties on both sides of 93rd Ave. Additional lanes will add/drop at Kimmie St and NB ramps (until project R24)
R22	SR 121 (93rd Avenue)	Kimmie St to Tilley Rd (South)	2 lanes, no bike lanes or sidewalks	Widen to 3 lanes	New development setback for a 5 lane corridor allows for widening long term; 2040 volumes may exceed 3 lanes
R23	SR 121 (93rd Avenue)	Lathrop Industrial Dr to Western City Limits	2 lanes, partial bike lanes and sidewalks	Widen to 3 lanes	
R24	SR 121 (93rd Avenue)	I-5 Interchange	Currently 2 lane bridge	Widen bridge to 5 lanes	This will become a WSDOT project
R25	6th Ave	T St to Lee St	No road	Construct 3 lane roadway as part of Trosper Rd interchange improvements	The connection of this roadway to Trosper Road is included in the Trosper Interchange project
R26	Custer Way	Boston St to Cleveland Ave	4 lanes with sidewalk, no bike lanes	Reduce to 3 lanes, install bike lane EB	This project is dependent on construction of intersection projects I2, I4, I6, I7 and I8
R27	Capitol Boulevard	E St to Cleveland Ave	5 lanes with sidewalk, no bike lanes	Reduce to 3 lanes, install bike lanes	Requires construction of intersection projects I2, I4, I6, I7, I8
R28	Capitol Boulevard	Cleveland Ave to Carlyon Ave	5 lanes with sidewalk, no bike lanes	Reduce to 4 lanes, install bike lanes	Requires construction of intersection projects I2, I4, I6, I7, I8
R29	Capitol Boulevard	Israel Rd to M St	5 lanes with sidewalks, no bike lanes	Reduce to 4 lanes, install bike lanes and curbed median	Requires construction of intersection projects 15, 16, 17, I8
R30	New North/South St	Lee St to Trosper Rd	No road	Construct 2 lane road with sidewalks, bike lanes	
R31	Odegard Road	Littlerock Rd to Tyee Dr	2 lanes, no bike lanes or sidewalks	Construct 2 lane road with on-street parking	
R32	Bishop Road	Littlerock Rd to Tyee Dr	2 lanes, no bike lanes or sidewalks	Construct 2 lane road with on-street parking	
R33	73rd/66th Connector	66th Ave to 73rd Ave	No road	Construct 3 lane roadway	This roadway project will be development driven
R34	New Market Street	Tumwater Blvd to Israel Rd	2 lanes, no bike lanes or sidewalks	Construct 2 lane road with on-street parking	
R35	Town Center Connector	Tumwater Blvd to Israel Rd	No road	Construct 2 lane road with on-street parking	
R36	72nd Avenue	Cleanwater Dr to Linderson Way	Site Access	Construct 2 lane extension	
R37	Dolman Property	South of 73rd Ave	No roads	Construct road system as development occurs	This roadway project will be development driven
R38	Trosper Road Interchange	NB Ramps	Currently accesses Trosper Road	Reroute NB ramps to Ruby St at 6th Ave with new RAB. Existing WB to NB slip ramp (Trosper to I-5) remains. Includes upgrade of NB ramps	This project came out of a follow up to the Capitol Blvd Corridor Plan to address the Trosper Rd/Capitol Blvd intersection
R39	Deschutes Way	E St to US 101 WB On-Ramp	2 lanes, on street parking and sidewalk, no bike lanes	Undetermined	The specific improvement for this roadway will be determined in the E Street Extension project
R40	M Street Connection	M Street to Tumwater Valley Drive	No street	Construct 2 lane connection	
R41	Lambskin St Connection	Lambskin St to Sapp Rd	No street	Construct 2 lane connection	Developer funded

TABLE 12: PROPOSED 2040 INTERSECTION PROJECTS W/ PEDESTRIAN CROSSINGS AND ADA UPGRADES WHERE APPROPRIATE

PROPOSED 2040 INTERSECTION PROJECTS w/ Pedestrian Crossing and ADA Upgrades as Warranted

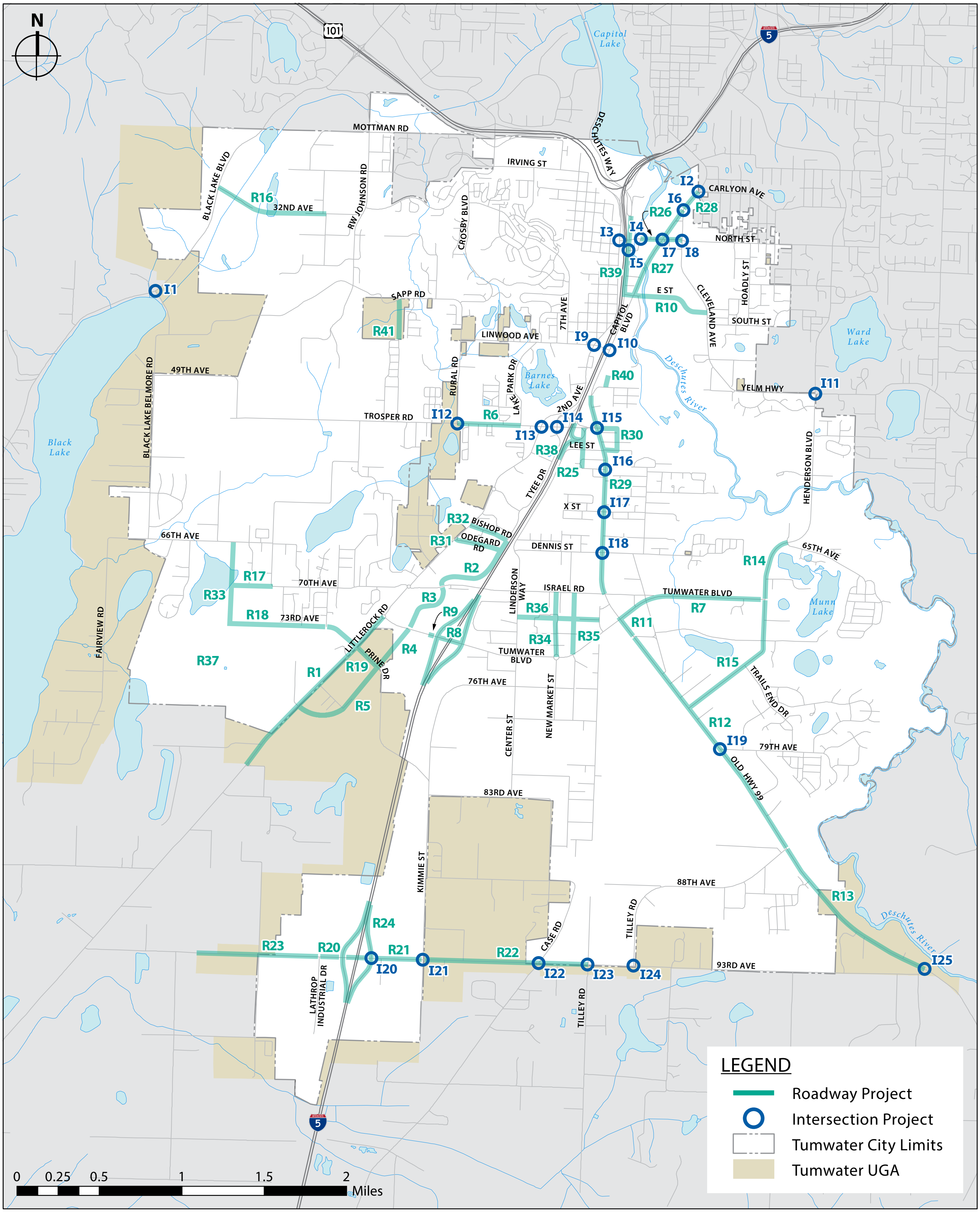
ID	Cross Streets	2015 Condition	Proposed Improvement	Notes
I1	Black Lake Belmore at Black Lake Blvd	TWSC	Install RAB	
I2	Capitol Blvd at Carlyon Ave	Signal	Install RAB	
I3	2nd Ave at Custer Way	Signal	Restripe SB through lane to be a shared through-left-turn lane	This improvement will provide improved lane utilization at the 2nd Ave at US 101/I-5 Off-ramps intersection
I4	Boston St at Custer Way	TWSC	Install RAB	
I5	Deschutes Way at Boston St	AWSC	Install Traffic Signal	
I6	Capitol Blvd at Cleveland Ave	TWSC	Install RAB	
I7	Capitol Blvd at Custer Way	Signal	Install RAB	
I8	Cleveland Ave at Custer Way/North St	Signal	Install RAB	
I9	Linwood Ave at 2nd Ave	AWSC	Install RAB	
I10	Capitol Blvd at Linwood Ave	Signal	Install RAB	This improvement is to facilitate access along Capitol Blvd as median treatment is installed as part of the Capitol Blvd Corridor Plan. It is not a capacity improvement
I11	Henderson Ave at Yelm Hwy	Signal	Construct a 2nd WB to SB left-turn lane	Construction of a 2 lane roundabout would also improve the traffic signal operations to LOS D. Both of these potential improvements present ROW challenges
I12	Trosper Rd at Rural Rd	TWSC	Construct EB left-turn lane and TWLTL east of Rural, allowing SB lefts to perform two-stage movements	These improvements could be constructed without repurposing the existing ROW along Trosper Rd to Lake Park Dr
I13	Trosper Rd at 2nd Ave/Littlerock Rd	Signal	Install RAB	Construction of a RAB will have ROW impacts. Without improvement intersection is expected to operate at LOS E with congestion along 2nd Ave and Littlerock Rd
I14	Trosper Rd at Tyee Dr/SB I-5 Ramps	Signal	Install RAB	Construction of a RAB will have ROW impacts. Without improvement intersection is expected to operate at LOS F with congestion along Tyee Dr, SB I-5 Ramps and Trosper Rd
I15	Trosper Rd at Capitol Blvd	Signal	Install RAB	
I16	T St at Capitol Blvd	TWSC	Install RAB	

PROPOSED 2040 INTERSECTION PROJECTS w/ Pedestrian Crossings and ADA Upgrades as Warranted

ID	Cross Streets	2015 Condition	Proposed Improvement	Notes
I17	X St at Capitol Blvd	Signal	Install RAB	
I18	Dennis St at Capitol Blvd	Signal	Install RAB	
I19	Old Hwy 99 at 79th Ave	TWSC	Install RAB	
I20	93rd Ave at I-5 NB Ramps	TWSC	Install Traffic Signal	
I21	93rd Ave at Kimmie St	TWSC	Install Traffic Signal	Current development mitigation plans call for a traffic signal here.
I22	93rd Ave at Case Rd	AWSC	Install RAB	
I23	93rd Ave at Tilley Rd (south)	AWSC	Install RAB	Construction of a RAB would be necessary should median control along 93rd Ave be implemented between Case Rd and Tilley Rd
I24	93rd Ave at Tilley Rd (north)	TWSC	Install RAB	
I25	93rd Ave at Old Hwy 99	TWSC	Install RAB	As traffic along Old Hwy 99 grows, acceleration lanes will not be sufficient to accommodate traffic on 93rd Ave

Abbreviations used in the 2040 street and intersection projects tables:

TWLTL	Two-way left turn lane
RAB	Roundabout
TWSC	Two-way stop controlled intersection
AWSC	All-way stop controlled intersection



CITY OF TUMWATER
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Figure 22
2040 Street and Intersection Projects
(includes associated non-motorized facilities)

CITY OF TUMWATER

Transportation Master Plan

CHAPTER 12

FUNDING

Funding Analysis

Tumwater must demonstrate that it has the financial resources to accomplish recommended actions in this plan. If the City is unlikely to be able to afford the projects necessary to maintain its levels of service as it grows then either additional revenues must be generated, LOS standards need to be revised, future land use patterns need to be reevaluated, or some combination of these actions. It is important that the City's plan be reasonably achievable.

A funding analysis looks at two basic things – revenues and expenditures. This section summarizes key considerations for each and then concludes by demonstrating that the recommendations in this plan are achievable though additional resources may be needed in the outside years of this planning horizon.

Revenues

City revenues for transportation typically fall into three buckets: local revenues, state revenues, and federal revenues.

Local revenues are the ones over which the City has the greatest control and discretion. They come from a variety of different sources – utility tax, Real Estate Excise Tax, impact fees and other developer mitigations, and most recently, from a 2/10 of one percent retail sales tax approved by Tumwater voters to fund a Transportation Benefit District. All of those revenues are directed to capital projects except for Transportation Benefit District (TBD) revenue which is strictly limited to preservation. In addition, transportation receives revenue annually from the City's General Fund during the general budget process, and which is directed to maintenance and operations.

State revenues come primarily from the state gas tax, in two forms. Tumwater receives an annual direct distribution from the state gas tax that is earmarked for cities. The City also receives state grants that are funded by the state gas tax, either from WSDOT or more commonly, from the Transportation

Improvement Board. Grant revenue is project specific and depending on the nature of the grant program, can be for capital or operations.

Federal revenues, which are derived primarily from the federal gas tax, come from grants administered by Thurston Regional Planning Council and occasionally from WSDOT. These funds are typically applied to capital projects or larger preservation projects.

State and federal grants are unpredictable. An entity other than the City determines funding priorities in any particular year and decides which projects will be funded. Tumwater competes with other communities for scarce resources. This makes it difficult for Tumwater to establish a reliable, priority-based funding strategy

The forecast assumes that the City's actual transportation operating expenditures funded with General Fund revenues are an appropriate surrogate for estimating revenues available for operations. Revenues available for capital projects are identified specifically in the capital facilities plan. Transportation benefit district revenues are derived from city sales tax forecasts. This forecast assumes TBD revenue is reapproved in 2025, when the current tax expires.

The revenue forecast assumes a 4.16% average annual rate of change in General Fund revenues available for operations, based on the 2009-2015 rate of change in constant 2015 dollars. Forecasted revenues for capital projects are based on assumptions of 4.67% average annual rate of change for the utility tax, a 6.11% average annual rate of change for the direct distribution state gas tax, and a 3.00% average annual rate of change for real estate excise tax, all in constant 2015 dollars. Grant revenues are volatile; an average annual amount of $2.7 million was assumed, increasing to $3 million by 2022 and to $3.3 million by 2030. In reality, grants received will be higher in some years and lower in others. Impact fee revenues available for projects were assumed to be $600,000 per year for the forecast period. Miscellaneous revenues were assumed to be a flat $1.3 million per year; as with grants, some years will be higher and others lower. TBD revenues were forecasted to grow at an average annual rate of 2% per year.

EXPENDITURES

City expenditures for transportation typically fall into two broad categories: capital expenditures and operating expenditures. Programs like preservation – which includes overlays, chip seal, fog seal, and other techniques – maintenance, signal timing, engineering, and striping are considered operating expenditures. Construction projects resulting in new or expanded infrastructure – streets, sidewalks, intersections – are considered capital expenditures. It can also include major reconstruction that significantly extends the life of these facilities.

The expenditure forecast assumes that operations expenditures will not exceed operations revenue, and that the additional preservation to be funded by the TBD will be commensurate with the available revenue. That leaves capital project costs to forecast.

Planning level estimates were made for each project in constant 2015 dollars. Professional judgment was used to estimate which projects would likely be wholly funded by developers as a condition of development entailing no direct costs to the city. This amounted to about $60 million in projects assumed to be developer-funded over the forecast period. Several projects will be WSDOT projects but are included to demonstrate projects needed to address future deficiencies. These are illustrative since they are not yet included on a WSDOT project list. These projects totaled about $43 million in costs, which are not included in the following table.

Between now and 2040 Tumwater may need to address other system needs that are not included in this forecast. This includes such things as stormwater retrofits, the upgrade of facilities annexed into the City and which do not meet adopted urban street standards, and potentially raising the elevation of some streets in the Salmon Creek basin. As those projects are defined and costs established they will be included in future updates of the Transportation Master Plan and Capital Facilities Plan.

FINANCIAL SUMMARY

Following is a summary of revenues and expenditures associated with the transportation recommendations included in this Transportation Master Plan. Revenues and expenditures are in constant 2015 dollars.

TABLE 13: REVENUE AND EXPENDITURE FORECAST SUMMARY, 2016-2040

Revenue (in $1,000s) by Functional Area

Time Period	Capital	Operations	TBD Revenue (additional maintenance)	Total
2016-2026	$ 65,645	$ 18,433	$ 10,538	$ 94,616
2027-2040	$ 104,504	$ 30,338	$ 17,200	$152,042
2016-2040	**$170,149**	**$ 48,771**	**$ 27,738**	**$246,658**

Expenditures (in $1,000s) by Functional Area

Time Period	Capital	Operations	Additional Maintenance (TBD-funded)	Total
2016-2026	$ 89,036	$ 18,024	$ 10,538	$117,598
2027-2040	$141,742	$ 28,209	$ 17,200	$187,151
2016-2040	**$230,778**	**$ 46,233**	**$ 27,738**	**$304,749**

This is a long-range plan; it is possible some projects will not be needed in this planning horizon and so total costs may be lower. If not, projected capital expenditures exceed projected revenues for capital projects by about $58 million. The Growth Management Act requires a discussion of how this gap will be closed if a deficit exists.

- Depending on what happens with the local, state, and national economies over the next 20+ years it may be necessary to identify additional revenues in the outside years of this forecast to accomplish some projects. These may come in the form of singularly large grants or appropriations, or some other new grant programs such as may be established in the future by TRPC or WSDOT utilizing newly appropriated revenues.
- Conversely, depending on what happens with the local, state, and national economics over the next couple of decades Tumwater's revenue growth may

exceed what is projected, which would lessen or eliminate the difference. One example of this is the new Toyota dealership relocating from Olympia to Tumwater. This is the region's largest auto dealership. Retail sales tax revenues from this new business is not included in any of these forecasts.

- Impact fee estimates used in this forecast are based on the current Transportation Impact Fee ordinance. Tumwater will update that ordinance after this plan is adopted, based on the new project list. This can result in additional revenues targeted towards capacity-related projects.
- In addition to impact fees, Tumwater can and does require development mitigation projects where appropriate. These are transportation improvements the City requires as a condition for development approval. Several projects on the City's long-range list will likely qualify as developer-funded mitigation projects.
- Tumwater may also choose to finance future projects. This forecast makes no assumptions about financing tools though several projects on Tumwater's list are good candidates for a Local Improvement District (LID), a late-comers agreement, or General Obligation bonds. Financing tools like an LID or a late-comers agreement generate new project revenues while General Obligation bonds provide financing at the front end that is paid off over time, in part by new residents and businesses in the area that benefit from these projects. Bonds incur additional debt service costs.
- Tumwater may also choose to adopt a more congestion-tolerant urban LOS commensurate with its maturation as a city, thereby reducing the number of congestion-related projects on the list. This might entail establishing LOS E as the standard not just on Capitol Way / Capitol Boulevard but on other arterials as well. It can also entail application of the multimodal LOS being introduced with this plan as a concurrency tool used to achieve adopted land use visions. By 2025 or 2030 it is conceivable that larger parts of the city will be more urban in character where

higher levels of congestion are tolerated and where greater emphasis on pedestrian and bike mobility combined with transit service is the preferred means of addressing LOS deficiencies.

- Finally, Tumwater will continue to work towards greater investment in infill and redevelopment of its key corridors as a strategy for addressing future congestion. That is because growth located on these key corridors generates greater opportunity for walking, biking, and transit – opportunities that are minimal or non-existent when growth locates on the outer fringes of the city and in its more rural areas. While it may seem counter-intuitive, attracting more mixed-use, compact development on key corridors is an effective strategy for addressing funding gaps between likely revenues and expensive street widening projects.

This forecast will be updated periodically between now and 2040, during which the underlying assumptions will be revisited and revised as warranted.

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CITY OF TUMWATER

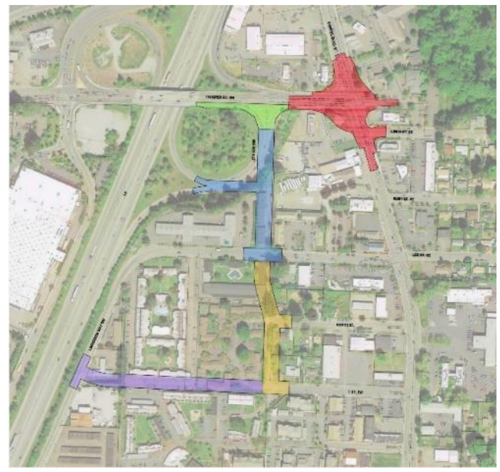
Transportation Master Plan

CHAPTER 13

OPPORTUNITIES & NEEDS

Strategic Opportunities and Needs

Developing the long-range Transportation Master Plan provides an opportunity to inject emerging local initiatives into the long-range planning framework. These are areas identified for follow-up that build on previous work and help the City achieve its broader strategic objectives. They also help support objectives of the City's Strategic Plan, particularly those associated with Strategic Priorities A- C:



Strategic Priority A: Aggressively pursue targeted community development opportunities (including the Brewery District and the Capitol Boulevard Corridor).

Strategic Priority B: Build a community recognized for quality (including sufficient facility maintenance).

Strategic Priority C: Create and maintain a transportation system for all modes of travel (including system maintenance, transformation of Capitol Boulevard, and design and construction of the E Street Connection).

Following are some notable local initiatives that will shape the City's transportation work program over the next few years.

Sub-Area Plan Implementation

Tumwater is implementing recommendations first identified by the Urban Corridors Task Force and later realized in its two seminal sub-area plans related to urban corridors, the Brewery District Plan and the Capitol Boulevard Corridor Plan. Each of those sub-area plans have moved into the implementation phase; work will continue to progress on both over the next several years.

Brewery District

Tumwater and Intercity Transit are partnering on a redesign of the existing Tumwater Square Transit Station to make better use of the right-of-way while enhancing pedestrian access and safety, and overall efficiency of Cleveland Street in the vicinity of the Safeway store. Concurrent with that 2016 work is the analysis and preliminary design of the new E Street Connection that will divert a significant amount of through-traffic out of the Brewery District neighborhood itself. The City's website has current information on the status of projects and next steps in the implementation of Brewery District plan recommendations.

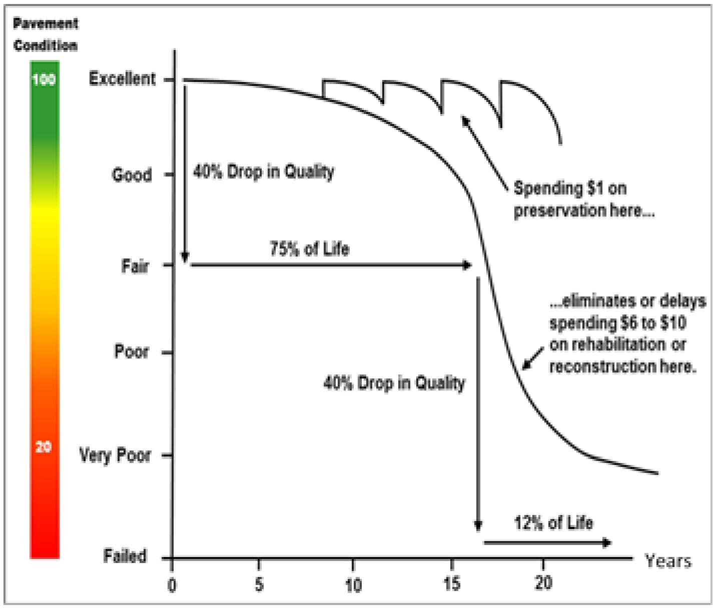
Capitol Boulevard Corridor

Design and engineering for projects identified in the corridor plan are underway. Engineering and design of improvements at the Trosper Road / Capitol Boulevard intersection are key to determining the design for other parts of the Boulevard. Conclusion of that work will result in additional recommendations and next steps in the transformation of this old highway corridor into a vibrant, mixed-use linear urban community. See the City's website for current information on the status of existing projects and next steps.

Pavement Management Program

The City of Tumwater's transportation system is worth hundreds of millions of dollars. As with any investment, it must be maintained so that it doesn't fall into disrepair. Similar to a house that needs routine maintenance in order to avoid expensive and disruptive repairs, pavement preservation helps to keep infrastructure in good shape for the traveling public while keeping lifecycle costs as low as possible.

Even if no vehicles traveled on pavement, especially asphalt pavement, it would degrade over time. The sun's ultraviolet rays break down the structure, and freezing rain seeps into fine cracks and enlarges them. Of course, our streets and roads are used, and this contributes to the degradation. Studded snow tires grind away at the surface, and heavy vehicles like garbage trucks and big freight trucks create ruts.



A regimen of relatively minor investments can avoid or postpone much more expensive reconstruction projects needed to restore a badly degraded facility. In fact, every dollar spent in an optimal pavement preservation strategy saves anywhere from six to ten dollars needed to reconstruct and rehabilitate that facility later.

In 2015 Tumwater residents approved a Transportation Benefit District sales tax that is dedicated to restoring the City's streets to fair or better condition and keeping them that way at the lowest cost. A pavement management program will help the City know where to make investments to get the most out of its preservation program.

ADA Transition Plan

The 1990 Americans with Disabilities Act, or ADA, is a civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools, transportation, public places, and all private places that are open to the public. It is often regarded as one of America's most comprehensive pieces of civil rights legislation. Title II of the ADA requires state and local governments to make their programs and services accessible to people with disabilities.

All new transportation infrastructure built in Tumwater and all major infrastructure reconstruction activities result in either the addition of ADA facilities if they do not exist, or retrofitting older facilities to comply with new standards. The most common of these types of facilities are curb ramps. These are the ramps that enable someone in a wheelchair, or walking with a walker or cane, or traveling by means of a scooter to get off a sidewalk into a crosswalk and then back up onto a sidewalk on the other side of the street. There are other types of transportation facilities to consider, too, such as pedestrian crosswalk signals, parking lots, access to transit stops, and even the way construction zones are signed and barricaded.

While all new infrastructure is built to be ADA-compliant it is much more difficult retrofitting older infrastructure, especially as stand-alone projects. That is because there is no dedicated funding for this kind of work, which is often expensive and frequently entails the acquisition of right-of-way to accommodate ADA-compliant design standards. The standards change periodically, too, so that a facility brought into compliance in the early 2000s may not comply with today's standards.

The ADA legislation recognizes that Tumwater and other governments cannot afford to do a wholesale retrofit of all transportation infrastructure but it does expect the City to make progress in this regard. It expects communities to have a strategy for how it will approach this retrofit and to have a process in place to respond to specific needs as they arise.

An ADA transition plan is the tool used by communities like Tumwater to conduct a self-evaluation of transportation facilities, identify deficiencies, and then plan and budget for changes needed to increase accessibility.

Tumwater is currently developing its own ADA transition plan to help guide strategic investments. The Plan will identify and prioritize deficiencies, develop implementation strategies and include policies for collaboration and coordination with the disability community.

Multimodal LOS Concurrency Program

This Transportation Master Plan introduces the concept of multimodal level of service. It will result in a practical means of evaluating the adequacy of the non-motorized network with the potential for prioritizing needed investments.

To truly integrate its multimodal philosophy with its development regulations, Tumwater will explore ways of incorporating multimodalism into its concurrency program. The expectation is not that sidewalks or bike lanes or improved transit access will noticeably reduce congestion; rather, the expectation is that in select areas where regulatory policies are promoting transit-oriented, walkable, mixed-use development patterns greater benefit will be realized by a non-motorized project than a traditional street or intersection project. This is particularly true in the Brewery District and the Capitol Boulevard Corridor, where very little street widening will occur. In these areas the kind of growth envisioned will generate more bike and walk and transit trips than in other parts of the city; it is appropriate for growth in these areas to contribute towards the completion and improvement of the non-motorized network. That network is essential for the functioning of the districts.

This work program element will evaluate ways in which the existing concurrency ordinance can be modified to effectively and defensibly incorporate stand-alone non-motorized facilities in the development review and fee collection processes. The objective is to help Tumwater put its growth-related resources where they will make the greatest impact by supporting system level needs and performance priorities, regardless of mode of travel.

PEDESTRIAN PLAN AND INVESTMENT STRATEGY

This long-range plan attempts to identify and address non-motorized facility needs. This is particularly challenging for pedestrian facilities due to the scale of the pedestrian network and the range of factors that determine the walkability of a place, not just the presence of sidewalks. A citywide Pedestrian Facilities Plan can concentrate on facility needs at an appropriate scale. It should consider not just sidewalks but also crosswalks, street trees and other amenities, and cost-effective design alternatives to enable extension of the pedestrian system as fast as possible with the resources available. Such a plan will consider things like safe walking routes to schools and parks, and access to and from transit corridors. It can take into account those neighborhoods that tend to be transit-dependent due to income or age. It can identify priority pedestrian connections between neighborhoods should be coordinated with codes governing building and site design in order to account for the increased emphasis on pedestrian orientation in certain parts of the city. While a similar planning process for bike facilities would be beneficial, it is most needed for the pedestrian system. The City may consider a standing Pedestrian –Bicycle Advisory Committee advantageous for this effort.


North Street, before and after sidewalks were added.


APPENDIX

A. Analysis of Streets, Roads and Intersections

B. Analysis of Non-motorized Network

C. Capitol Boulevard Plan – Transportation Summary

D. Brewery District Plan – Transportation Summary

A. Analysis of Roads, and Intersections

This Document has been published separately

Appendix A
Analysis of Roads and Intersections

Project Reference: SCJ #625.17

Path: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Report\2016 0607 Appendix A.docx

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1. EXISTING ROADWAY CONDITIONS

1.1 TRAFFIC VOLUME COUNTS AND INTERSECTION LANE GEOMETRY

A comprehensive traffic volume count program was conducted to identify base year traffic volumes within the study area. Sixty-nine intersection counts were collected, primarily by Traffic Count Consultants, a traffic data collection firm. Most of the counts were conducted between 4:00 PM and 6:00 PM on June 23, 24, 25 and 30, 2015 and July 1, 2015. The traffic volumes were summarized to identify the highest individual hour within the two-hour count period. These traffic volumes were used for our base year operations analysis and as the basis for future year traffic volume projections. The turning movement count worksheets are provided in **Appendix A-1**. The existing 2015 PM peak hour intersection turning movement volumes are shown on **Figure 1**.

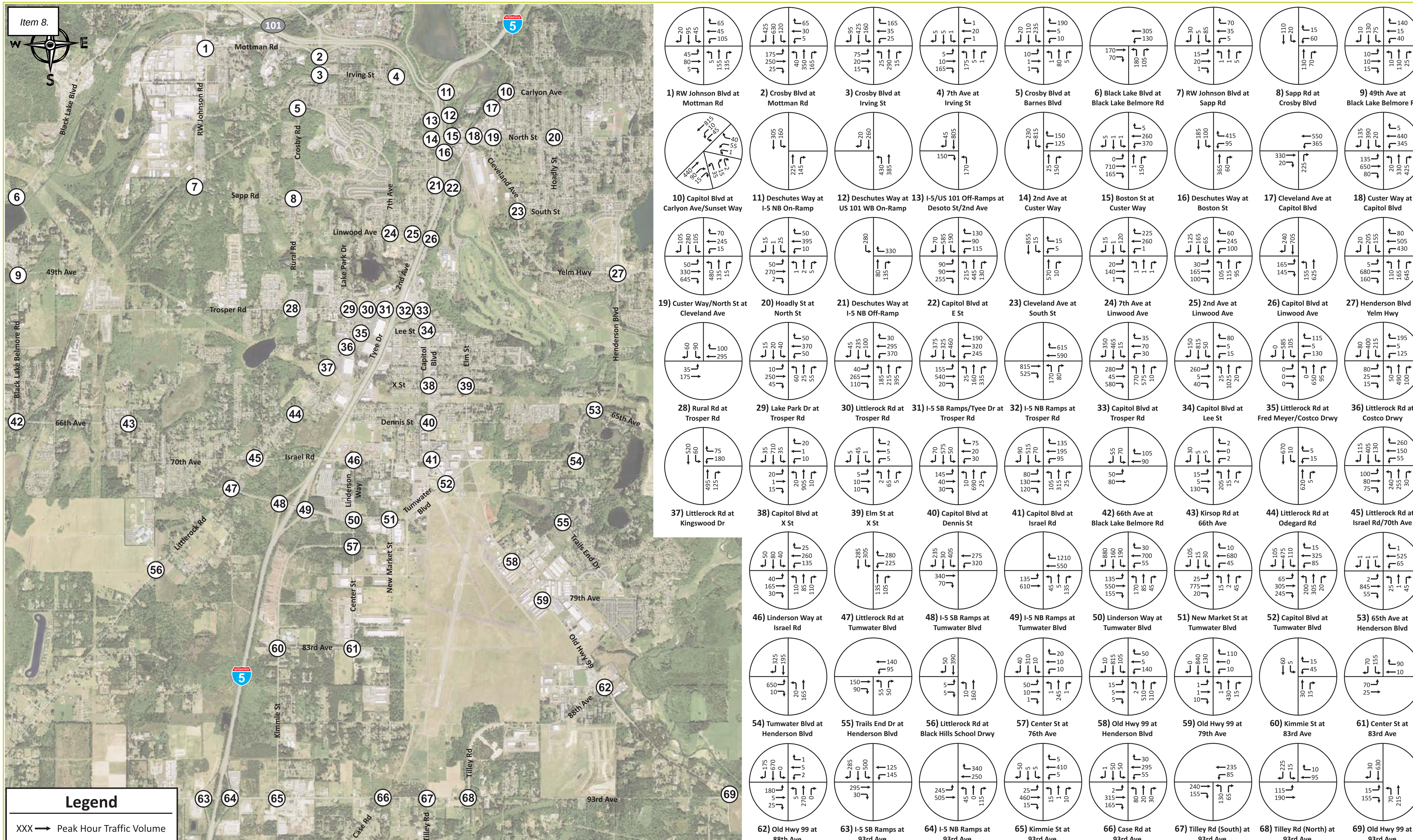
The existing intersection lane geometry and control types are provided on **Figure 2**.

1.2 CRASH HISTORY

A crash history analysis was performed for the study intersections. Washington State Department of Transportation provided collision data for all of the study intersections, including those in the UGA and WSDOT right-of-way. The data includes all reported vehicle crashes occurring over the most current complete five-year span of January 1, 2010 through December 31, 2014. A crash frequency rate per Millions of Entering Vehicles (MEV) was calculated for the study intersections based on the following formula:

$$\text{Crash Rate per MEV} = \frac{1{,}000{,}000 \text{ X Total Collisions}}{365 \text{ X Number of Years X Average Daily Entering Traffic}}$$

The crash rates by intersection are summarized in **Table 1**.



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Tumwater Transportation Master Plan

Tumwater, Washington

Figure 1
Existing 2015 PM Peak Hour Intersection Traffic Volumes

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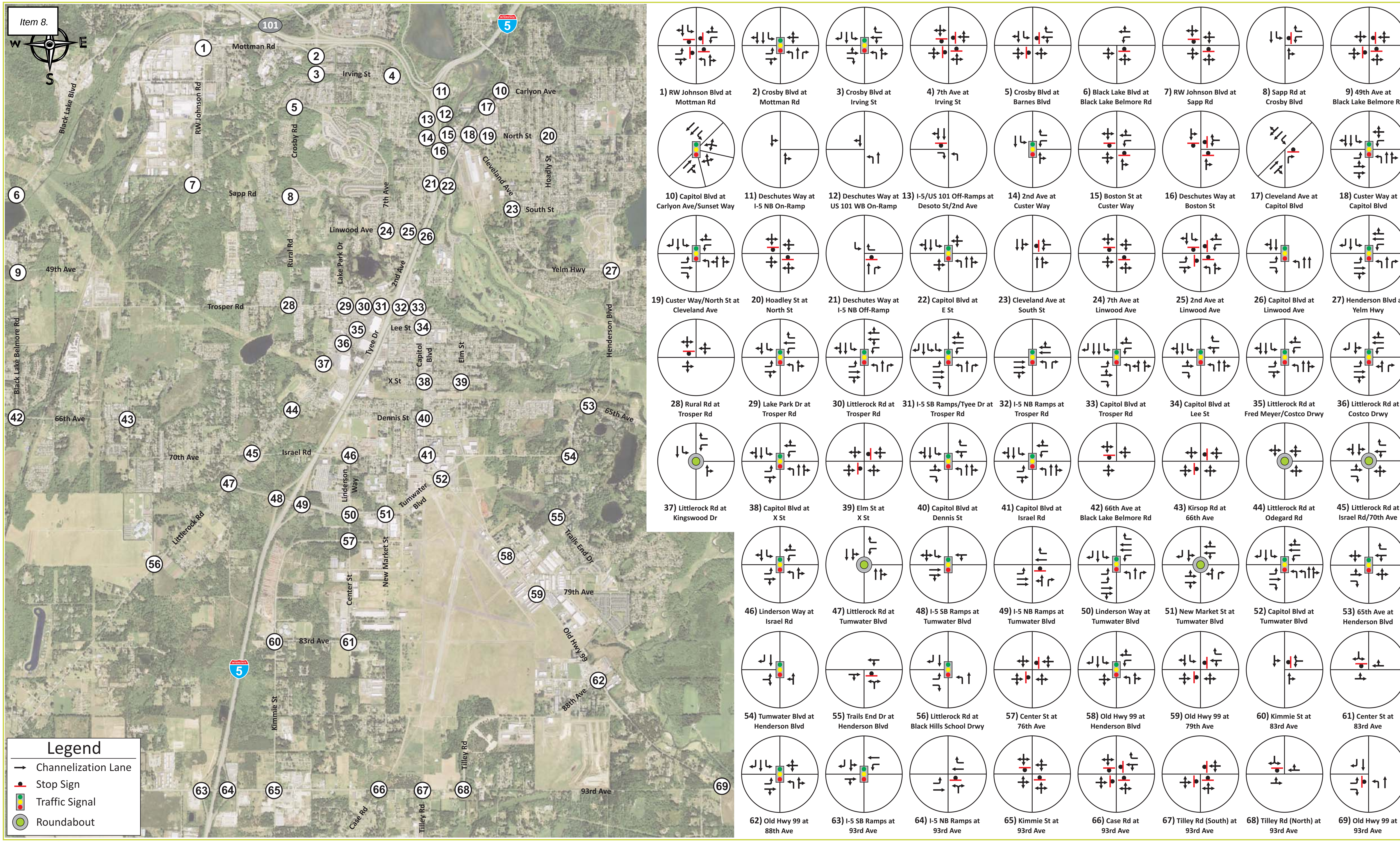

Tumwater Transportation Master Plan

Tumwater, Washington

Figure 2
Existing 2015
Intersection Channelization

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Table 1. Intersection Crash History 2010 through 2014

	Intersection	Total Number of Reported Crashes	Number Involving Injuries	Number Involving Bikes or Peds	Total Daily Entering Traffic Volume	Crash Rate per MEV
1	RW Johnson Blvd/Mottman Rd	8	3	0	7,950	0.551
2	Crosby Blvd/Mottman Rd	29	8	0	22,860	0.695
3	Crosby Blvd/Irving St	19	4	0	13,470	0.773
4	7th Ave/Irving St	0	0	0	3,880	0.000
5	Crosby Blvd/Barnes Blvd	1	0	0	6,670	0.082
6	Black Lake Blvd/Black Lake Belmore Rd	2	0	0	9,550	0.115
7	RW Johnson Blvd/Sapp Rd	1	0	0	2,700	0.203
8	Sapp Rd/Crosby Blvd	1	0	0	4,040	0.136
9	49th Ave/Black Lake Belmore Rd	2	1	0	6,050	0.181
10	Capitol Blvd/Carlyon Ave/Sunset Way	1	0	0	15,540	0.035
11	Deschutes Way/I-5 NB On-Ramp	0	0	0	8,310	0.000
12	Deschutes Way/US 101 WB On-Ramp	1	0	0	10,920	0.050
13	I-5/US 101 Off-Ramps/Desoto St/2nd Ave	18	5	0	11,700	0.843
14	2nd Ave/Custer Way	4	1	0	14,900	0.147
15	Boston St/Custer Way	5	3	1	16,640	0.165
16	Deschutes Way/Boston St	7	3	0	12,200	0.314
17	Cleveland Ave/Capitol Blvd	4	2	0	14,880	0.147
18	Custer Way/Capitol Blvd	18	4	1	29,760	0.331
19	Custer Way/North St/Cleveland Ave	19	7	1	24,740	0.421
20	Hoadly St/North St	2	1	0	8,250	0.133
21	Deschutes Way/I-5 NB Off-Ramp	0	0	0	8,210	0.000
22	Capitol Blvd/E St	11	6	1	24,120	0.250
23	Cleveland Ave/South St	2	2	0	14,720	0.074
24	7th Ave/Linwood Ave	3	2	0	7,890	0.208
25	2nd Ave/Linwood Ave	11	3	0	13,670	0.441
26	Capitol Blvd/Linwood Ave	8	3	0	20,390	0.215
27	Henderson Blvd/Yelm Hwy	37	14	1	31,600	0.642
28	Rural Rd/Trosper Rd	4	1	0	7,540	0.291
29	Lake Park Dr/Trosper Rd	4	3	1	9,930	0.221
30	Littlerock Rd/Trosper Rd	32	6	0	22,890	0.766
31	I-5 SB Ramps/Tyee Dr/Trosper Rd	65	16	1	31,540	1.129
32	I-5 NB Ramps/Trosper Rd	28	8	0	27,960	0.549
33	Capitol Blvd/Trosper Rd	35	8	0	32,230	0.595
34	Capitol Blvd/Lee St	42	9	3	24,930	0.923
35	Littlerock Rd/Fred Meyer-Costco Drwy	2	1	1	16,800	0.065
36	Littlerock Rd/Costco Drwy	3	1	1	17,740	0.093
37	Littlerock Rd/Kingswood Dr	15	7	1	14,520	0.566
38	Capitol Blvd/X St	4	3	0	17,900	0.122
39	Elm St/X St	1	0	0	1,600	0.342
40	Capitol Blvd/Dennis St	9	4	0	17,630	0.280

Table 1 Cont. Intersection Crash History 2010 through 2014

	Intersection	Total Number of Reported Crashes	Number Involving Injuries	Number Involving Bikes or Peds	Total Daily Entering Traffic Volume	Crash Rate per MEV
41	Capitol Blvd/Israel Rd	20	7	2	18,750	0.584
42	66th Ave/Black Lake Belmore Rd	5	2	0	4,470	0.613
43	Kirsop Rd/66th Ave	4	3	0	4,120	0.532
44	Littlerock Rd/Odegard Rd	5	1	1	13,200	0.208
45	Littlerock Rd/Israel Rd/70th Ave	12	1	0	18,910	0.348
46	Linderson Way/Israel Rd	7	2	0	11,300	0.339
47	Littlerock Rd/Tumwater Blvd	19	3	0	13,300	0.783
48	I-5 SB Ramps/Tumwater Blvd	15	2	0	16,780	0.490
49	I-5 NB Ramps/Tumwater Blvd	14	4	0	26,910	0.285
50	Linderson Way/Tumwater Blvd	15	6	0	31,510	0.261
51	New Market St/Tumwater Blvd	8	2	0	17,690	0.248
52	Capitol Blvd/Tumwater Blvd	27	8	0	22,500	0.658
53	65th Ave/Henderson Blvd	2	1	0	15,630	0.070
54	Tumwater Blvd/Henderson Blvd	5	2	0	13,700	0.200
55	Trails End Dr/Henderson Blvd	1	1	0	5,810	0.094
56	Littlerock Rd/Black Hills School Drwy	1	0	0	6,160	0.089
57	Center St/76th Ave	0	0	0	7,030	0.000
58	Old Hwy 99/Henderson Blvd	15	8	0	17,820	0.461
59	Old Hwy 99/79th Ave	4	1	0	15,540	0.141
60	Kimmie St/83rd Ave	0	0	0	1,700	0.000
61	Center St/83rd Ave	2	1	0	4,230	0.259
62	Old Hwy 99/88th Ave	3	0	0	13,370	0.123
63	I-5 SB Ramps/93rd Ave	22	5	0	13,770	0.875
64	I-5 NB Ramps/93rd Ave	5	2	0	15,000	0.183
65	Kimmie St/93rd Ave	5	5	0	10,020	0.273
66	Case Rd/93rd Ave	0	0	0	10,950	0.000
67	Tilley Rd (South)/93rd Ave	9	1	0	9,140	0.540
68	Tilley Rd (North)/93rd Ave	4	3	0	6,500	0.337
69	Old Hwy 99/93rd Ave	4	3	0	11,120	0.197

*"Under 23U.S. Code §148 and 23 U.S. § 409, Safety Data, reports, surveys, schedules, lists compiled or collected for the purposes of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Fedeeral or State court proceeding or considered for other purposes in any action for damages arising from any occurance at a location mentioned or addressed in such reports, surveys, schedules, lists, or data"

A crash rate under 1.00 per MEV is typically considered within normal range for an urban intersection. In the study area one intersection exceeded the 1.00 crash rate and three others were over 0.80. Those locations are discussed below.

1.2.1 I-5/US 101 Off-Ramps/Desoto St/2nd Ave

This intersection had 18 reported crashes over the 5-year period, a crash rate of 0.843 with an average of 3.6 per crashes per year. The primary collision type was rear-end collision for vehicles on the off-ramp. This could likely be a result of occasional congestion and queuing on the off-ramp, compounded by vehicles weaving to get into the inside lane to eventually make a left-turn onto Custer Way. The next most common type involved collisions between a vehicle turning left and vehicle going straight. This could reflect occasional driver confusion over the unusual intersection configuration.

There is a planned improvement to allow for two left-turn lanes on 2nd Avenue for vehicles turning onto Custer Way. This is intended to improve the lane utilization on the off-ramp and reduce weaving conflicts as both off-ramp lanes could be used to get into the double left-turn lanes at Custer Way. This intersection should continue to be monitored.

1.2.2 I-5 SB Ramps/Tyee Dr/Trosper Rd

This intersection experienced 65 crashes and a rate of 1.129 crashes per MEV over the five-year study period. Over half of the collisions at this intersection are rear-end collisions, with the primary circumstance being vehicles traveling eastbound on Trosper Rd. This is likely the result of congestion between the SB Ramps/Tyee Drive intersection and the 2nd Ave/Littlerock Rd intersection. The next primary circumstance for rear-end collisions occurs in the NB right-turn lane, likely the result of vehicles unable to make right-turn-on-red maneuvers.

There is a planned improvement to install a two-lane roundabout at this location. It will be built in conjunction with a roundabout at Trosper Rd/2nd Ave/Littlerock Rd, and together they should reduce the congestion experienced today along Trosper Road, which should reduce the number of rear-end collisions.

1.2.3 Capitol Blvd/Lee St

This intersection had 42 reported collisions between 2010 and 2014, equating to a crash rate of 0.923 crashes per MEV. The primary collision type for this intersection was rear-end collisions for vehicles traveling NB on Capitol Blvd. This is likely a result of the congestion and resultant queues created by the Trosper Rd/Capitol Blvd intersection.

There is no improvement specifically planned for this location, however the Trosper Road Interchange project is being constructed to relieve the congestion currently caused by the Trosper Rd/Capitol Blvd intersection. The completion of this improvement should improve congestion along Capitol Blvd and reduce the number of rear-end collisions at this location.

1.2.4 I-5 SB Ramps/93rd Avenue (SR 121)

This intersection experienced 22 crashes over a five year period, resulting in a crash rate of 0.875 crashes per MEV. There was not a predominant collision type at this intersection, but the majority of crashes occurred by vehicles traveling SB on the I-5 SB ramp. 21 of the 22 recorded crashes occurred in 2010 and 2011. After 2011 a traffic signal was installed at this intersection to improve traffic operations for the SB approach. This improvement has seen the crash rate drop to almost zero, with only 1 crash occurring between 2012-2014.

The intersection crash data is provided in **Appendix A-2**.

2. TRAFFIC VOLUME FORECASTS

2.1 Overview

This report provides operational assessment of the City roadway network for the existing year (2015) for the forecast years of 2022 and 2040. The traffic volume forecasts were prepared using the TRPC regional travel demand model as the basis. The regional model has been calibrated to a 2014 base year and has a 2040 forecast horizon.

2.2 Travel Demand Modeling process

A travel demand model is a computer model that uses mathematical representations of transportation facilities and transportation demand to estimate travel patterns in a specific geographic area. Travel demand modeling typically uses the four-step modeling process described below:

- Trip Generation – is the process of estimating the amount of person-trips that will be generated within the modeled area. Households and employment are the primary drivers of trip generation.
- Trip Distribution – evaluates the attractiveness of compatible land-uses to connect two ends of the same trip, e.g., a work-to-home trip is common during the evening peak hour with an employment base producing an outbound trip and a household attracting an inbound trip.
- Mode Choice – reflects the process of estimating the traveling public's selection of a travel mode such as passenger vehicle (SOV or HOV), heavy vehicle, walk, bike or transit. The availability (supply) of a particular mode affects the demand of that mode, for example, close proximity to a transit stop with good headways makes the transit option more attractive and can influence a traveler's mode choice.
- Assignment – is the final step of determining each traveler's route from their origin to their destination. There are almost always multiple options for a route between two points. The primary consideration in route choice is travel time, which can be affected by roadway speed limits, traffic signals, congestion and other frictions.

2.3 TRPC Travel Demand Model

The TRPC regional travel demand model was built using INRO's Emme software. The model provides a detailed representation of the arterial and collector roadways throughout Thurston County. Particular detail has been provided in the urban areas of the county, including Tumwater and environs. The model uses household and employment information as a basis for estimating the trip-producing characteristics of neighborhoods, employment centers, retail districts, schools, etc. within the cities and unincorporated county. Measured local travel parameters were incorporated to calibrate the model to local conditions. When model-produced traffic characteristics closely match measured traffic characteristics the model is considered calibrated.

A calibrated model can be used to test the effects of changes of one or many variables on the system. Adding a new roadway provides different route choices which can affect traffic flows, adding transit service or enhanced walk and bike facilities can affect mode choice. Changes to the amount or type of land-use will also affect the volume and characteristics of travel in an area.

The TRPC model has been updated and calibrated to a 2014 base year. The model update was completed with oversight from a regional Transportation Advisory Committee (TAC) that included representation from the City of Tumwater and multiple other affected jurisdictions in the Thurston County. The regional model has a planning horizon year of 2040. The 2040 model reflects predicted changes to household and employment throughout the region consistent with regional forecasting and Tumwater land-use planning.

The 2040 forecast model also includes transportation improvements consistent with the Regional Transportation Plan. The specific improvements that are assumed to be completed in the "base" 2040 network within the City of Tumwater UGA are listed below.

2040 "Base" Model Planned Network Improvements

- Tyee Drive Extension – New street connection from Kingswood Drive to Prine Drive
- E Street Extension – New multi-lane roadway from Capitol Boulevard to Cleveland Avenue
- Old Highway 99 Improvements – Widen existing roadway from 73rd Avenue to 88th Avenue
- Tumwater Boulevard Interchange – Widen over-crossing and improve ramps at existing Tumwater Boulevard/Interstate 5 interchange
- Capitol Boulevard Improvements – Intersection and capacity improvements on Capitol Boulevard between Trosper Road and Israel Road, construction of new 6th Avenue collector, relocation of I-5 NB off-ramp terminal at Trosper Road to 6th Avenue
- Brewery District Plan – Incorporate lane reductions and intersection improvements per the Brewery District Plan

While additional improvements were evaluated, no additional roadway projects were added to the 2040 "base" model for traffic volume forecasting purposes.

Model plots showing the Traffic Analysis Zone structure, roadway network and "raw" model traffic volumes are included in **Appendix A-3**.

2.4 MODEL VOLUME POST-PROCESSING

While the model is calibrated to replicate existing travel patterns, traffic volumes on individual roadways vary somewhat from existing traffic counts. To account for this variance, the transportation model traffic volume assignments were post-processed to align them with existing ground counts. Specifically, the traffic volume growth increment between the 2014 base year model and 2040 forecast model was calculated for each individual study intersection. The traffic growth predicted by the model was then added to the actual counted traffic volumes at each intersection. All traffic volume forecasts were individually reviewed and manually adjusted as appropriate.

For the 2022 horizon the model growth was calculated between the 2014 and 2040 models and 7 years of that growth was added to the 2015 actual counts. The 2040 model was run assuming none of the RTP projects in place by the 2022 horizon.

The 2022 and 2040 traffic volume forecasts are provided on **Figure 3** and **Figure 4**. The traffic volume calculation spreadsheet showing the 2022 and 2040 forecasts attached in **Appendix A-4**.

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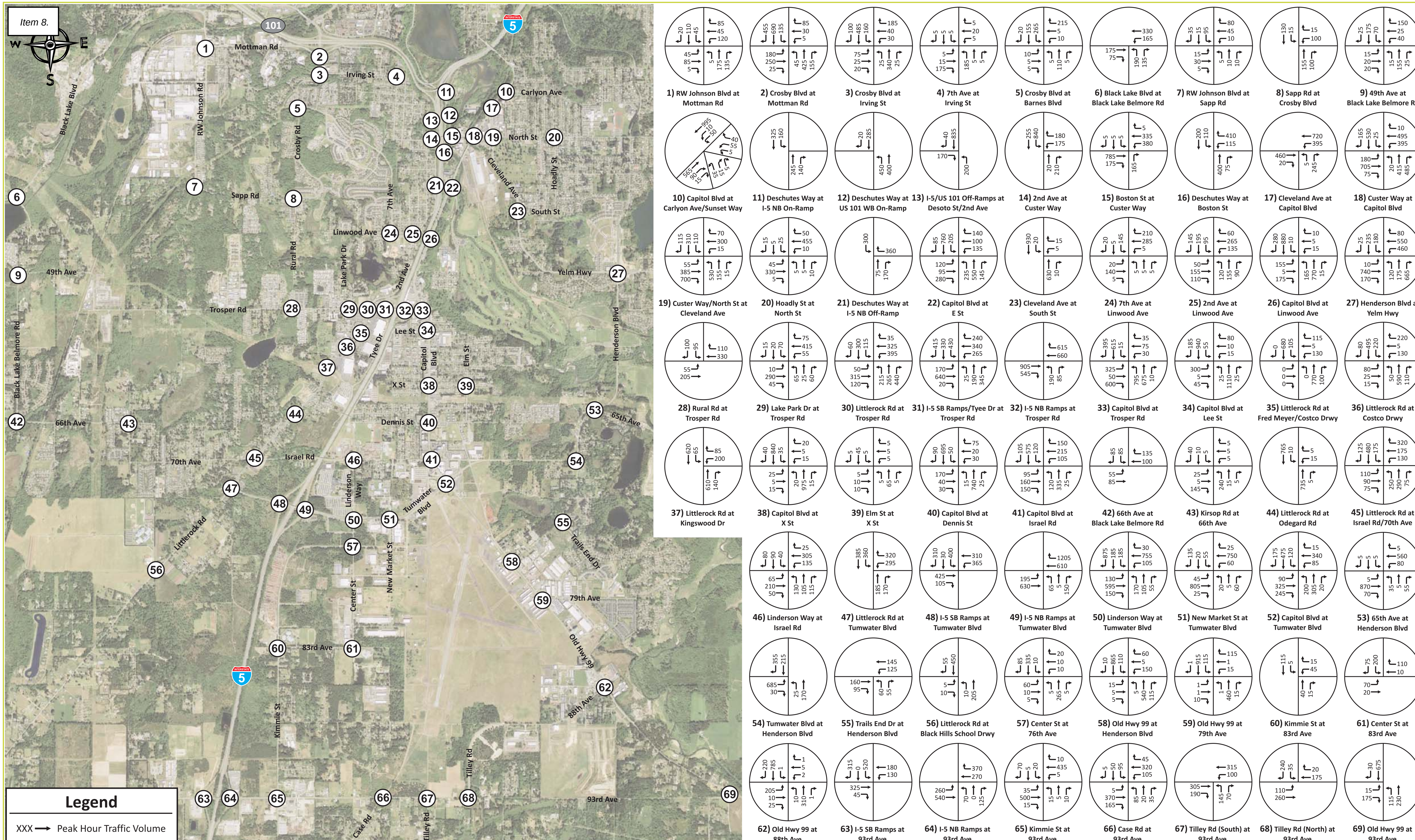

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Tumwater Transportation Master Plan

Tumwater, Washington

Figure 3
Projected 2022 PM Peak Hour Intersection Traffic Volumes

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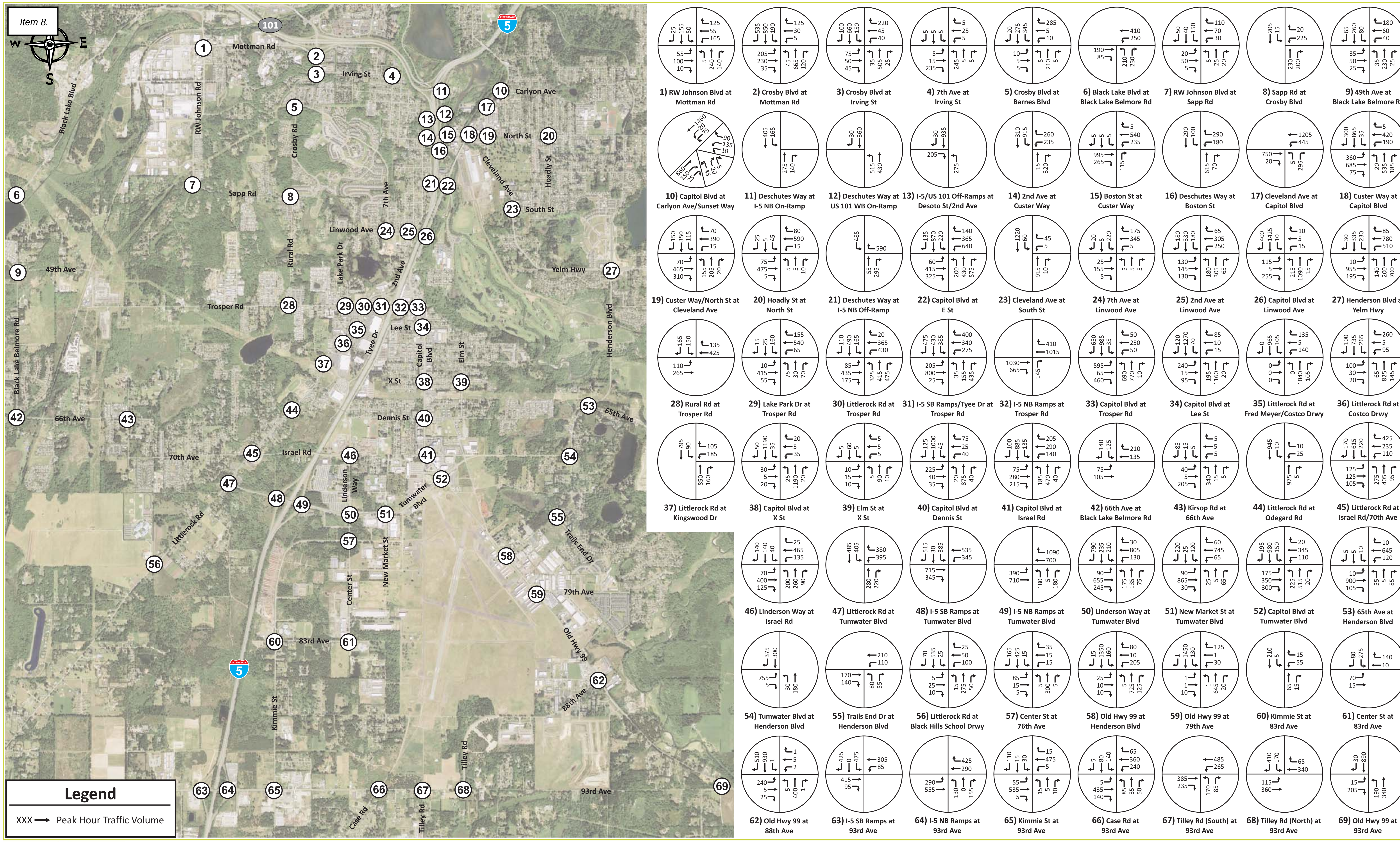


Tumwater Transportation Master Plan

Tumwater, Washington

Figure 4
Projected 2040 PM Peak Hour Intersection Traffic Volumes

3. ROADWAY AND INTERSECTION OPERATIONS SUMMARY

3.1 ANALYSIS METHODOLOGIES

The acknowledged source for determining overall capacity for intersections is the current edition of the Highway Capacity Manual (HCM). Intersection analysis was performed using version 9 of the Synchro/SimTraffic software package. This software implements the methods of the 2010 HCM. Capacity analysis calculations for intersections determine the amount of “control delay” (in seconds) that drivers will experience while proceeding through an intersection. Control delay includes all deceleration delay, stopped delay and acceleration delay caused by the traffic control device. The LOS is directly related to the amount of delay experienced. Capacity analysis results are described in terms of level of service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion).

For intersections under traffic signal, modern roundabout and all-way stop-control (AWSC) the intersection average delay is considered to represent the intersection LOS. For intersections under two-way stop-control (TWSC), the LOS/delay criteria are different than for signalized intersections because driver expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay. **Table 2** shows the level of service criteria for signalized, modern roundabout and stop sign-controlled intersections.

A planning level evaluation of roadway segments was prepared for most collector and arterial roadway segments within the study area. The analysis was based on the volume to capacity ratio (v/c). This ratio compares the measured or forecasted traffic volume on a roadway segment to the theoretical vehicle carrying capacity of the roadway segment. A roadway segment with a v/c of 1.0 or greater is determined to have higher traffic demand than it can functionally handle. In this analysis the roadway capacities used were taken from the TRPC Regional demand model. The roadway segment LOS standards are also shown on **Table 2**.

Table 2. Level of Service/Delay Criteria for Intersections

Level of Service	Signalized Intersection Delay (seconds/vehicle)	Stop Sign-Controlled and RAB Delay (seconds/vehicle)	Roadway Segment (v/c)
A	≤ 10	≤ 10	0.0 – 0.59
B	> 10-20	> 10-15	0.60 – 0.69
C	> 20-35	> 15-25	0.70 – 0.79
D	> 35-55	> 25-35	0.80 – 0.89
E	> 55-80	> 35-50	0.90 – 0.99
F	> 80	> 50	1.00>

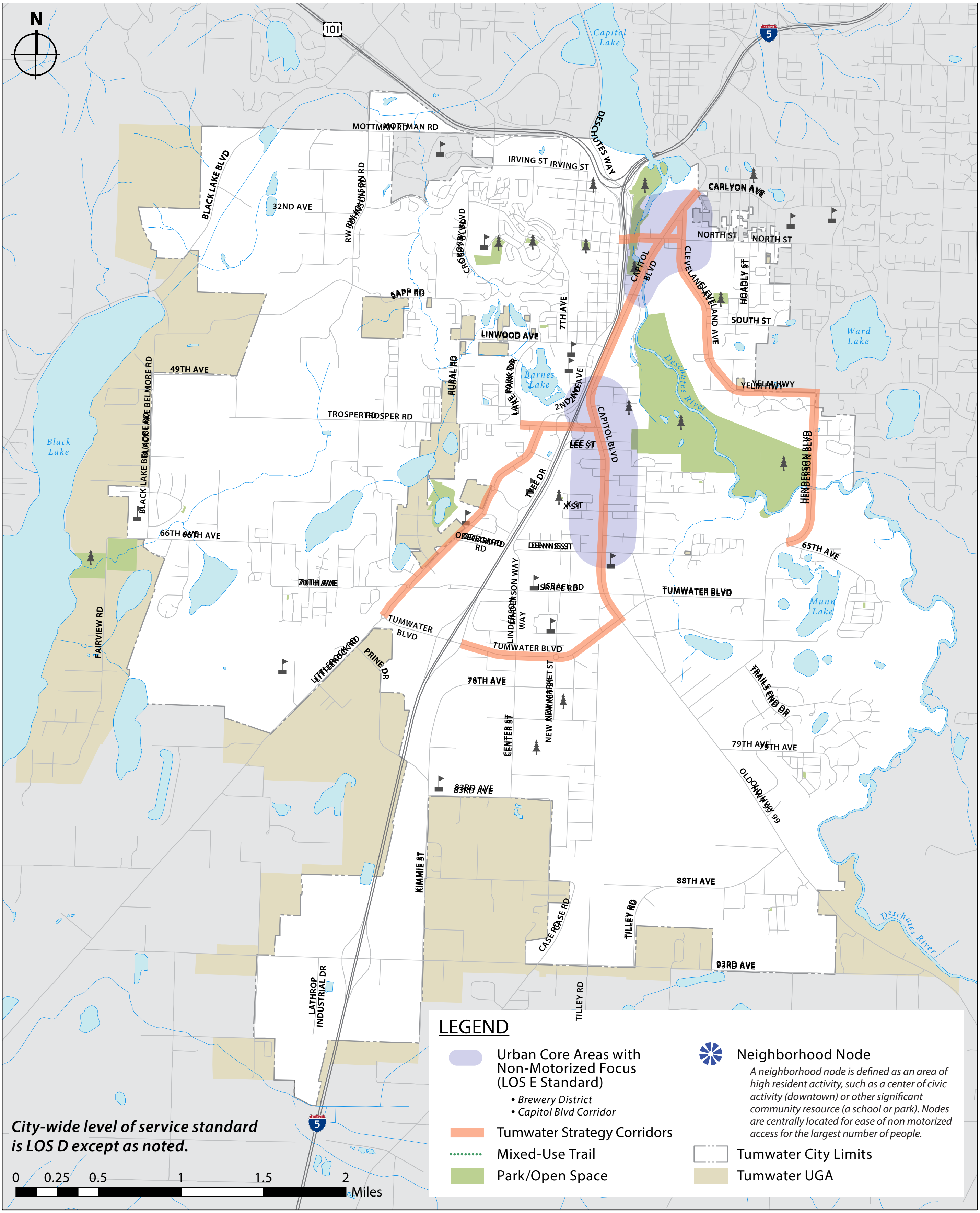
3.1.1 Level of Service Standard

The following LOS designations describe Tumwater's policy in the city and its urban growth area:

- For the designated "Urban Core Areas" LOS E is the acceptable standard of system performance. The Urban Core Areas are shown on **Figure 5** (Figure 9 of the Tumwater Master Plan).
- For the rest of the City and its urban growth area, LOS D will apply.
- The City has established Tumwater Strategy Corridors where the local LOS standard still applies, but it is acknowledged that some intersections or roadways may experience periodic congestion that exceeds the applicable standard. The Tumwater Strategy Corridors are also shown on **Figure 5**.

3.2 Existing Operations

Table 3 shows the existing level of service at each study intersection. For intersections under minor street stop-sign control, the LOS of the most difficult movement (typically the minor street left-turn) represents the intersection level of service for purposes of assessing potential impacts. The intersection average LOS is commonly used as the concurrency threshold for reviewing new development impacts. The operational analysis worksheets are provided in **Appendix A-5**.



CITY OF TUMWATER
Transportation Master Plan

Figure 5
Motorized Level of Service Standards

Table 3. Existing 2015 PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2015 Base Year LOS (Delay)	2015 Base Year Worst v/c
1	RW Johnson Blvd/Mottman Rd	AWSC	B (12)	0.50
2	Crosby Blvd/Mottman Rd	Signal	B (16)	0.78
3	Crosby Blvd/Irving St	Signal	B (11)	0.59
4	7th Ave/Irving St	AWSC	A (9)	0.25
5	Crosby Blvd/Barnes Blvd	TWSC	C (22)	0.22
6	Black Lake Blvd/Black Lake Belmore Rd	TWSC	E (37)	0.75
7	RW Johnson Blvd/Sapp Rd	TWSC	B (10)	0.17
8	Sapp Rd/Crosby Blvd	TWSC	B (12)	0.11
9	49th Ave/Black Lake Belmore Rd[1]	TWSC	A (9)	
10	Capitol Blvd/Carlyon Ave/Sunset Way[2]	Signal	B (10)	0.51
11	Deschutes Way/I-5 NB On-Ramp	Yield	A (9)	0.18
12	Deschutes Way/US 101 WB On-Ramp	Yield	A (10)	0.37
13	I-5/US 101 Off-Ramps/Desoto St/2nd Ave[1]	TWSC	D (32)	
14	2nd Ave/Custer Way	Signal	B (15)	0.79
15	Boston St/Custer Way	TWSC	D (30)	0.52
16	Deschutes Way/Boston St	AWSC	D (29)	0.87
17	Cleveland Ave/Capitol Blvd	TWSC	B (11)	0.35
18	Custer Way/Capitol Blvd	Signal	D (39)	0.90
19	Custer Way/North St/Cleveland Ave	Signal	D (48)	0.96
20	Hoadly St/North St	TWSC	C (20)	0.16
21	Deschutes Way/I-5 NB Off-Ramp[1]	TWSC	B (12)	
22	Capitol Blvd/E St	Signal	C (23)	0.83
23	Cleveland Ave/South St	TWSC	B (15)	0.06
24	7th Ave/Linwood Ave	TWSC	C (18)	0.34
25	2nd Ave/Linwood Ave	AWSC	C (25)	0.76
26	Capitol Blvd/Linwood Ave	Signal	B (17)	0.81
27	Henderson Blvd/Yelm Hwy	Signal	D (49)	1.01
28	Rural Rd/Trosper Rd	TWSC	C (16)	0.23
29	Lake Park Dr/Trosper Rd	Signal	B (14)	0.69
30	Littlerock Rd/Trosper Rd	Signal	D (42)	0.81
31	I-5 SB Ramps/Tyee Dr/Trosper Rd	Signal	D (45)	0.91
32	I-5 NB Ramps/Trosper Rd	Signal	A (7)	0.87
33	Capitol Blvd/Trosper Rd[3]	Signal	F (30)	0.85
34	Capitol Blvd/Lee St[2]	Signal	C (24)	0.86
35	Littlerock Rd/Fred Meyer Drwy/Costco Drwy	Signal	A (8)	0.51
36	Littlerock Rd/Costco Drwy[2]	Signal	C (21)	0.79
37	Littlerock Rd/Kingswood Dr	RAB	A (6)	0.61
38	Capitol Blvd/X St	Signal	A (7)	0.49

Table 3 Cont. Existing 2015 PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2015 Base Year LOS (Delay)	2015 Base Year Worst v/c
39	Elm St/X St	TWSC	A (10)	0.04
40	Capitol Blvd/Dennis St[2]	Signal	B (12)	0.67
41	Capitol Blvd/Israel Rd	Signal	C (22)	0.82
42	66th Ave/Black Lake Belmore Rd	TWSC	B (11)	0.18
43	Kirsop Rd/66th Ave	TWSC	B (13)	0.21
44	Littlerock Rd/Odegard Rd	RAB	A (5)	0.59
45	Littlerock Rd/Israel Rd/70th Ave	RAB	A (9)	0.61
46	Linderson Way/Israel Rd	Signal	B (17)	0.71
47	Littlerock Rd/Tumwater Blvd	RAB	A (8)	0.37
48	I-5 SB Ramps/Tumwater Blvd	Signal	B (12)	0.83
49	I-5 NB Ramps/Tumwater Blvd	TWSC	F (106)	0.66
50	Linderson Way/Tumwater Blvd	Signal	C (35)	1.09
51	New Market St/Tumwater Blvd	RAB	A (4)	0.32
52	Capitol Blvd/Tumwater Blvd	Signal	D (36)	0.93
53	65th Ave/Henderson Blvd	Signal	A (7)	0.70
54	Tumwater Blvd/Henderson Blvd	Signal	C (34)	0.91
55	Trails End Dr/Henderson Blvd	TWSC	B (13)	0.22
56	Littlerock Rd/Black Hills School Drwy	Signal	A (3)	0.33
57	Center St/76th Ave	TWSC	C (17)	0.19
58	Old Hwy 99/Henderson Blvd	Signal	B (13)	0.70
59	Old Hwy 99/79th Ave	TWSC	F (64)	0.19
60	Kimmie St/83rd Ave	TWSC	A (9)	0.08
61	Center St/83rd Ave	TWSC	B (12)	0.33
62	Old Hwy 99/88th Ave	Signal	A (9)	0.66
63	I-5 SB Ramps/93rd Ave	Signal	B (20)	0.83
64	I-5 NB Ramps/93rd Ave	TWSC	B (12)	0.24
65	Kimmie St/93rd Ave	TWSC	C (21)	0.14
66	Case Rd/93rd Ave	AWSC	C (20)	0.78
67	Tilley Rd (South)/93rd Ave	AWSC	B (15)	0.62
68	Tilley Rd (North)/93rd Ave	TWSC	B (14)	0.28
69	Old Hwy 99/93rd Ave	TWSC	C (18)	0.37

1. Due to the unique nature of this intersection control, HCM cannot be used to calculate delay. Sim-Traffic simulation was used to calculate average delay.
2. HCM 2000 was used at this signal because the shared through-left lane is not accurately analyzed in HCM 2010.
3. This intersection is being graded based on the known congestion along Capitol Boulevard as a result of the signal.

3.3 2040 Baseline Conditions

To accommodate the Regional Transportation Projects included in the forecast model, several intersection improvements are assumed to be in place for the 2040 baseline condition. A brief summary of the Regional Transportation Projects that affect study intersections and the impacted intersections are provided below:

3.3.1 Brewery District Plan

The Brewery District Plan aims to change the focus of the transportation network around the brewery properties to accommodate multiple modes of travel. Lane reductions along Custer Way and Capitol Blvd are planned to improve pedestrian and bicycle mobility. To accommodate these lane reductions, several roundabouts are planned. The following motorized facilities are impacted by this project:

- Capitol Blvd/Carlyon Ave/Sunset Way – Install Roundabout
- Boston Ave/Custer Way – Install Roundabout
- Deschutes Way/Boston St – Install Signal
- Capitol Blvd/Cleveland Ave – Install Roundabout
- Capitol Blvd/Custer Way – Install Roundabout
- Cleveland Ave/Custer Way/North St – Install Roundabout

3.3.2 E Street Extension

To provide congestion relief to the Custer Way corridor and facilitate the Brewery District Plan, an extension of E Street across Tumwater Valley to Cleveland Avenue is planned. To accommodate this improvement, the following study intersections will be affected:

- Capitol Blvd/E St intersection – Install Roundabout

3.3.3 Old Highway 99 Improvements

The widening of Old Highway 99 from 73rd Avenue to 88th Avenue is planned to accommodate growing traffic volumes to and from the area southeast of Tumwater. This widening project affects the following study intersections:

- Henderson Blvd/Old Hwy 99 – Install Roundabout
- 79th Ave/Old Hwy 99 – Include additional NB and SB through lane
- 88th Ave/Old Hwy 99 – Install Roundabout

3.3.4 Tumwater Boulevard Interchange

The Tumwater Boulevard Interchange will be rebuilt with a wider bridge crossing over I-5 and improved ramps. The following study intersections will be affected by this project:

- Tumwater Blvd/I-5 SB Ramps – Install Roundabout
- Tumwater Blvd/I-5 NB Ramps – Install Roundabout

The operational results for the 2040 baseline conditions are provided in **Table 4**. The intersections that fail to meet the proposed level of service standard are in bold.

Table 4. Projected 2040 Baseline PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2040 Base Year	
			LOS (Delay)	Worst v/c
1	RW Johnson Blvd/Mottman Rd	AWSC	C (17)	0.73
2	Crosby Blvd/Mottman Rd	Signal	B (17)	0.64
3	Crosby Blvd/Irving St	Signal	B (12)	0.77
4	7th Ave/Irving St	AWSC	B (10)	0.35
5	**Crosby Blvd/Barnes Blvd**	**TWSC**	**F (60)**	**0.37**
6	**Black Lake Blvd/Black Lake Belmore Rd**	**TWSC**	**F (200+)**	**1.66**
7	RW Johnson Blvd/Sapp Rd	TWSC	B (15)	0.40
8	Sapp Rd/Crosby Blvd	TWSC	C (21)	0.51
9	49th Ave/Black Lake Belmore Rd[1]	TWSC	B (12)	
10	Capitol Blvd/Carlyon Ave/Sunset Way[2]	RAB	B (12)	0.73
11	Deschutes Way/I-5 NB On-Ramp	Yield	A (9)	0.15
12	Deschutes Way/US 101 WB On-Ramp	Yield	B (11)	0.47
13	**I-5/US 101 Off-Ramps/Desoto St/2nd Ave[1]**	**TWSC**	**F (200+)**	
14	2nd Ave/Custer Way	Signal	D (40)	0.90
15	Boston St/Custer Way	RAB	B (12)	0.70
16	Deschutes Way/Boston St	Signal	C (20)	0.92
17	Cleveland Ave/Capitol Blvd	RAB	B (10)	0.66
18	Custer Way/Capitol Blvd	RAB	D (36)	1.03
19	Custer Way/North St/Cleveland Ave	RAB	B (13)	0.68
20	**Hoadly St/North St**	**TWSC**	**F (54)**	**0.52**
21	Deschutes Way/I-5 NB Off-Ramp[1]	TWSC	D (30)	
22	Capitol Blvd/E St	RAB	D (38)	1.06
23	Cleveland Ave/South St	TWSC	C (21)	0.19
24	7th Ave/Linwood Ave	TWSC	D (33)	0.68
25	**2nd Ave/Linwood Ave**	**AWSC**	**F (58)**	**1.03**
26	Capitol Blvd/Linwood Ave	Signal	D (44)	1.06
27	**Henderson Blvd/Yelm Hwy**	**Signal**	**F (82)**	**1.13**
28	**Rural Rd/Trosper Rd**	**TWSC**	**F (53)**	**0.71**
29	Lake Park Dr/Trosper Rd	Signal	B (14)	0.77
30	Littlerock Rd/Trosper Rd	Signal	E (58)	1.01
31	I-5 SB Ramps/Tyee Dr/Trosper Rd	Signal	D (50)	0.92
32	I-5 NB Ramps/Trosper Rd	TWSC	C (19)	0.37
33	**Capitol Blvd/Trosper Rd**	**Signal**	**F (112)**	**1.31**
34	Capitol Blvd/Lee St[2]	Signal	C (25)	0.92
35	Littlerock Rd/Fred Meyer Drwy/Costco Drwy	Signal	A (10)	0.68
36	Littlerock Rd/Costco Drwy[2]	Signal	C (27)	0.87
37	Littlerock Rd/Kingswood Dr	RAB	B (14)	1.01
38	Capitol Blvd/X St	Signal	A (10)	0.63
39	Elm St/X St	TWSC	A (10)	0.05

Table 4 Cont. Projected 2040 Baseline PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2040 Base Year LOS (Delay)	2040 Base Year Worst v/c
40	Capitol Blvd/Dennis St[2]	Signal	B (16)	0.76
41	Capitol Blvd/Israel Rd	Signal	D (42)	1.00
42	66th Ave/Black Lake Belmore Rd	TWSC	C (16)	0.46
43	Kirsop Rd/66th Ave	TWSC	C (19)	0.41
44	Littlerock Rd/Odegard Rd	RAB	A (5)	0.83
45	Littlerock Rd/Israel Rd/70th Ave	RAB	C (25)	1.06
46	Linderson Way/Israel Rd	Signal	D (49)	1.15
47	Littlerock Rd/Tumwater Blvd	RAB	A (9)	0.64
48	I-5 SB Ramps/Tumwater Blvd	RAB	C (22)	0.99
49	I-5 NB Ramps/Tumwater Blvd	RAB	A (7)	0.67
50	Linderson Way/Tumwater Blvd	Signal	D (47)	1.27
51	New Market St/Tumwater Blvd	RAB	A (6)	0.42
52	Capitol Blvd/Tumwater Blvd	Signal	D (55)	1.41
53	65th Ave/Henderson Blvd	Signal	B (10)	0.78
54	Tumwater Blvd/Henderson Blvd	Signal	D (45)	1.01
55	Trails End Dr/Henderson Blvd	TWSC	C (16)	0.31
56	Littlerock Rd/Black Hills School Drwy	Signal	A (4)	0.46
57	Center St/76th Ave	TWSC	D (33)	0.46
58	Old Hwy 99/Henderson Blvd	RAB	B (11)	0.69
59	**Old Hwy 99/79th Ave**	**TWSC**	**F (177)**	**0.67**
60	Kimmie St/83rd Ave	TWSC	B (11)	0.11
61	Center St/83rd Ave	TWSC	C (15)	0.51
62	Old Hwy 99/88th Ave	RAB	A (8)	0.53
63	I-5 SB Ramps/93rd Ave	Signal	D (35)	1.07
64	**I-5 NB Ramps/93rd Ave**	**TWSC**	**F (112)**	**1.06**
65	Kimmie St/93rd Ave	TWSC	D (34)	0.52
66	**Case Rd/93rd Ave**	**AWSC**	**F (53)**	**1.30**
67	**Tilley Rd (South)/93rd Ave**	**AWSC**	**F (54)**	**1.28**
68	**Tilley Rd (North)/93rd Ave**	**TWSC**	**F (60)**	**0.78**
69	**Old Hwy 99/93rd Ave**	**TWSC**	**E (36)**	**0.67**

1. Due to the unique nature of this intersection control, HCM cannot be used to calculate delay. Sim-Traffic simulation was used to calculate average delay.
2. HCM 2000 was used at this signal because the shared through-left lane is not accurately analyzed in HCM 2010.

3.4 Proposed Capital Improvements

The City of Tumwater has, through different subarea studies and previous planning efforts, identified future roadway improvements that address the majority of the projected operational deficiencies, several of which are designed to improve network connectivity or secondary modes of travel. All of these previously identified improvement projects have been consolidated into the proposed project list, with the inclusion of a few new improvements to address new projected operational deficiencies. These projects are summarized below by project type.

3.4.1 Roadway Improvements

R-1 Littlerock Road: Tumwater Blvd to Western City Limits

This is currently a two-lane facility running north/south and providing access from Tumwater to southwest Thurston County. It is planned to be widened to three lanes in the future, providing a two-way left-turn lane (TWLTL). This roadway is a primary entry point to the City, and the current volume projections approach the threshold for multiple through lanes each direction. It is suggested that the roadway operations be monitored and that all future development along the roadway be set back to accommodate a five-lane section.

R-2 Tyee Drive: Bishop Rd to Israel Rd

Tyee Drive is currently a two-lane roadway traveling parallel to Littlerock and providing access to the commercial properties. This project would extend Tyee Drive from its current southern terminus at Bishop Road, south to Israel Road. This extension will be a two lane roadway and will include the installation of a roundabout at Israel Road.

R-3 Tyee Drive: Israel Rd to Tumwater Blvd

This project will continue the extension of Tyee Drive south to Tumwater Blvd. This portion of Tyee Drive is currently planned to be four/five lanes, however the need for this additional capacity should be reassessed as the surrounding properties are developed.

R-4 Tyee Drive: Tumwater Blvd to Prine Dr

This project will continue the extension of Tyee Drive south to Prine Dr. This portion of Tyee Drive will continue to be planned for four/five lanes. As with project R-3, the need for the additional width should be reassessed as the adjacent properties are developed.

R-5 Tyee Drive: Prine Dr to Littlerock Rd

This project will complete the extension of Tyee Drive, connecting into Littlerock Road at the existing Black Hills High School driveway. This portion of Tyee Drive will serve residential properties and is planned as a three lane roadway. This project will also include improvements to the traffic signal at Black Hills High School driveway/Littlerock Rd

R-6 Trosper Road: Lake Park Dr to Rural Rd

This roadway is currently two lanes with on-street parking provided at the west end of the segment and partial bicycle lanes. Repurposing the existing asphalt will allow this roadway to be converted into a three lane section with continuous bicycle lanes.

R-7 Tumwater Boulevard: Capitol Blvd to Henderson Blvd

This roadway is currently two lanes. This improvement will widen Tumwater Blvd to three lanes and include intersection improvements at Bonniewood Dr.

R-8 Tumwater Boulevard: I-5 Interchange

The Tumwater Boulevard interchange is currently a three-lane bridge with stop-control for the NB ramps and signal control for the SB ramps. This improvement will install roundabouts at both ramp terminals and widen the bridge to accommodate these roundabouts. Since WSDOT has jurisdiction over the interchange, this will become a WSDOT project.

R-9 Tumwater Boulevard: Tyee Dr extension to I-5 SB Ramps

Currently this portion of Tumwater Boulevard is three lanes, with two travel lanes eastbound and one travel lane westbound. With the completion of Tyee Dr, this portion of Tumwater Boulevard is projected to experience an increase in traffic. This improvement will widen Tumwater Boulevard to five lanes, providing two travel lanes in each direction and a TWLTL.

R-10 E Street: Capitol Blvd to Cleveland Ave

Currently E Street is a short two-lane roadway connecting Deschutes Way to Capitol Blvd. To facilitate better network connectivity and relieve congestion along Custer Way, this improvement will extend E Street east across the Deschutes River valley to Cleveland Ave. This extension will be four lanes will also provide access to valley floor properties on the east side of the railroad tracks. A separate access is planned for properties on the west side of the railroad tracks. This project will include the installation of roundabouts at Capitol Blvd and Cleveland Ave.

R-11 Old Highway 99: Tumwater Blvd to 73rd Ave

This section of Old Highway 99 is currently a two-lane roadway south Tumwater Blvd. This improvement will widen Old Highway 99 to five lanes and has already been funded.

R-12 Old Highway 99: 73rd Ave to 88th Ave

This section of Old Highway 99 is currently two lanes. This improvement will widen Old Highway 99 to five lanes, continuing the widening of project R-11 south. This project will include intersection improvements at Bonniewood Dr, Henderson Blvd and 88th Ave. The Henderson Blvd and 88th Ave intersections will be converted from signals to roundabouts. This improvement is a Regional Transportation Project.

R-13 Old Highway 99: 88th Ave to 93rd Ave

This portion of Old Highway 99 is currently two lanes. This improvement will widen Old Highway 99 to three lanes, adding a TWLTL and/or median section. The projected 2040 volumes are approaching the threshold for a five-lane section and it is recommended that future development along this segment be constructed with setbacks adequate to accommodate five lanes. To realize full benefit of a five lane roadway section would require Old Highway 99 to be widened to five lanes past the southern boundary of the Tumwater UGA. The segments of Old Highway 99 north and south of 93rd Ave should continue to be monitored.

R-14 Henderson Boulevard: Tumwater Blvd to 65th Ave

This portion of Henderson Boulevard is currently a two-lane roadway. This improvement will widen Henderson Boulevard to three lanes, providing left-turn lanes at intersecting roadways and a TWLTL or a median along the rest of the segment.

R-15 Henderson Boulevard: Old Hwy 99 to Tumwater Blvd

This portion of Henderson Boulevard is currently a two-lane roadway. This improvement will widen Henderson Boulevard to three lanes, providing left-turn lanes at intersecting roadways and a TWLTL or a median along the rest of the segment.

R-16 32nd Avenue: Ferguson St to Black Lake Blvd

32nd Avenue is currently a three-lane roadway between RW Johnson Blvd and Ferguson St, with single travel lanes in each direction and a TWLTL. This improvement will extend 32nd Avenue west to Black Lake Blvd, continuing the three lane section. This improvement will include intersection improvements at Black Lake Blvd. This project will be constructed as development occurs in the surrounding area, and is expected to be developer funded.

R-17 70th Avenue: Kirsop Rd to 73rd/66th Connector

70th Avenue is currently a two-lane roadway. This improvement will extend 70th Avenue west to a future north/south roadway to provide access to the property west of Black Hills High School. This extension will be a three-lane roadway, including a TWLTL. The project will include intersection improvements at Kirsop Rd. This improvement will occur as the property west of Black Hills High School develops, and is expected to be developer funded.

R-18 73rd Avenue: Prine Dr extension to 73rd/66th Connector

73rd Avenue is currently a two-lane road serving a small community of homes east of Littlerock Rd. This project will construct a new segment of 73rd Avenue west of Littlerock Rd, between the extension of Prine Dr and a future north/south roadway further west. This new roadway will be three lanes and will serve the future development of property west of Black Hills High School. It will be constructed as development occurs and the need for a third lane will be reassessed at that time. It is expected to be developer funded.

R-19 Prine Drive: Tyee Dr to 73rd Ave

Prine Drive is currently a two lane neighborhood road east of Littlerock Rd. This improvement will extend Prine Drive west to the proposed 73rd Ave roadway and will widen the existing segment of Prine Drive between Littlerock Rd and the Tyee Dr extension. This roadway improvement is part of the proposed access plan for the property west of Black Hills High School and will be constructed as development occurs. It is expected to be developer funded.

R-20 93rd Avenue: Lathrop Industrial Dr to I-5 SB Ramps

This portion of 93rd Avenue is currently a two lane roadway. This improvement will widen 93rd Avenue to five lanes, providing two lanes in each direction and either a TWLTL or a median. This project will include intersection improvements at Lathrop Industrial Dr. This improvement is driven by the expected development of properties on both sides of 93rd Avenue. The additional through-lanes will add/drop at Lathrop Industrial Dr.

R-21 SR 121 (93rd Avenue): I-5 NB Ramps to Kimmie St

This portion of 93rd Avenue is currently two lanes. This improvement will widen 93rd Avenue to five lanes, providing two lanes in each direction and a TWLTL. This improvement will include intersection improvements at Kimmie St.

R-22 SR 121 (93rd Avenue): Kimmie St to Tilley Rd (south)

This portion of 93rd Avenue is two lanes. This improvement will add a TWLTL, creating a three lane roadway. Previous studies have found that a five lane section may be needed along this portion of 93rd Avenue, depending on how the area develops. As development occurs, setbacks should allow for a five lane roadway.

R-23 93rd Avenue: Lathrop Industrial Dr to Western City Limits

This segment of 93rd Avenue is currently a two-lane roadway. This improvement will widen 93rd Avenue to include a TWLTL or median control.

R-24 SR 121 (93rd Avenue): I-5 Interchange

Currently the interchange bridge over I-5 is two lanes. As the properties on each side of I-5 develop, the bridge will require widening. This improvement will widen the bridge to five lanes, providing two travel lanes and left-turn pockets for both on-ramps. It is anticipated that this will become a WSDOT project.

R-25 6th Avenue: T St to Lee St

This project is to construct a new north/south roadway west of Capitol Blvd. With the completion of the Trosper Rd interchange project, the NB ramps will be relocated to 6th Avenue north of this location. This improvement will extend the new roadway south to Lee St to provide better network connectivity. It will be a three-lane roadway and will include intersection improvements at Lee St.

R-26 Custer Way: Boston St to Cleveland Ave

This project is a part of the Brewery District Plan. Currently this portion of Custer Way is a four-lane road with sidewalk and no bicycle lanes. The improvement will reduce the travel lanes to three, with the EB direction providing a single through lane and the WB direction providing two through lanes. This lane reduction will allow for the addition a median and an EB bicycle lane. This project requires the construction of roundabouts at brewery area intersections, projects I-2, I-4, I-6, I-7 and I-8.

R-27 Capitol Boulevard: E St to Cleveland Ave

This project is a part of the Brewery District Plan. Currently this segment of Capitol Boulevard is five lanes, with sidewalks and no bicycle lanes. This improvement will reduce the travel lanes to three, providing one NB lane and two SB lanes. With this lane reduction a center median will be installed and bicycle lanes will be constructed in both directions. This improvement requires the construction of roundabouts at brewery area intersections, projects I-2, I-4, I-6, I-7 and I-8.

R-28 Capitol Boulevard: Cleveland Ave to Carlyon Ave

This improvement is a part of the Brewery District Plan. This section of Capitol Boulevard is currently five lanes with sidewalks and no bicycle lanes. This project will reduce the travel lanes to four, with two lanes in each direction. With this reduction bicycle lanes and a center median will be constructed. This improvement requires the construction of roundabouts at brewery area intersections, projects I-2, I-4, I-6, I-7 and I-8.

R-29 Capitol Boulevard: Israel to M St

This project is a part of the Capitol Boulevard Corridor Plan. This section of Capitol Boulevard currently provides five travel lanes and sidewalks, with no bicycle lanes. The improvement will remove the TWLTL, allowing for the addition of bicycle lanes in both directions and a raised median. This project requires the construction of roundabouts along the corridor, projects I-15, I-16, I-17 and I-18

R-30 North/South Connector: Lee St to Trosper Rd

This project is a part of the Capitol Boulevard Corridor Plan. This improvement will construct a new north/south roadway east of Capitol Blvd. The roadway will provide two travel lanes, and bicycle lanes in both directions. This improvement will provide better access to the commercial properties.

R-31 Odegard Road: Littlerock Rd to Tyee Dr

Odegard Road is currently a two lane roadway extending east from Littlerock Rd, providing access to a small collection of residential units. This improvement constructs a three-lane extension of Odegard Road east to the proposed Tyee Dr extension, providing enhanced network connectivity.

R-32 Bishop Road: Littlerock Rd to Tyee Dr

Bishop Road is currently a two-lane roadway extending east from Littlerock Rd, providing access to commercial and residential properties. This improvement will construct a three lane extension of Bishop Road east to the proposed Tyee Dr extension, providing enhanced network connectivity.

R-33 73rd/66th Connector: 66th Ave to 73rd Ave

This project will construct a new north/south roadway west of Black Hills High School, connecting 66th Ave and 73rd Ave. It will be constructed as a three-lane roadway and will be constructed as development occurs. It is expected to be developer funded.

R-34 New Market Street: Tumwater Blvd to Israel Rd

Currently New Market Street is a two-lane roadway extending north from Tumwater Blvd and providing access to the New Market Skills Center. This improvement will construct a three-lane extension of New Market Street north to Israel Rd.

R-35 Town Center Connector: Tumwater Blvd to Israel Rd

This project will construct a new north/south three-lane roadway east of New Market St, connecting Tumwater Blvd and Israel Rd.

R-36 72nd Avenue: Cleanwater Dr to Linderson Way

This roadway is currently a site access road to property west of Tumwater Blvd. This improvement will improve the existing roadway to a three lane roadway and construct an extension east to Linderson Way, providing a parallel route to Tumwater Blvd to enhance connectivity for the properties north of Tumwater Blvd.

R-37 Doelman Property: South of 73rd Ave

The Doelman property is located south of 73rd Avenue and west of Black Hills High School. This property will construct an internal roadway network to serve the future development, and is expected to be developer funded.

R-38 Trosper Road Interchange: NB Ramps

The existing NB ramps for the Trosper Road interchange provide right turn on-ramp movements in both directions and a full access off-ramp. To address the projected deficiency at Trosper Rd/Capitol Blvd, this improvement will relocate the NB ramp termini south of Trosper Road. The current ramps will be constructed as 6th Ave and provide limited access to Trosper Road The WB to NB right turn on-ramp will remain. Traffic traveling NB on Capitol Blvd will be able to access the NB on-ramp south of Trosper Road, using Lee St and 6th Ave. This project will include improvements to the existing NB Ramp intersection.

R-39 Deschutes Way: E St to US 101 On-ramp

This portion of Deschutes Way is currently two travel lanes with sidewalks and no bicycle lanes. Parking is provided on the west side of the road south of Boston St and on the east side of the road north of Boston St. Multiple improvement alternatives are still under consideration for this roadway, designed to accommodate the additional traffic as a result of the E St extension. The final design recommendation will be determined in the E St extension study.

3.4.2 Intersection Improvements

I-1 Black Lake Belmore at Black Lake Boulevard

This intersection is currently under stop-sign control for the minor street approach, Black Lake Belmore. The intersection is projected to operate at an LOS F in 2040. This project will construct a single lane roundabout.

I-2 Capitol Boulevard at Carlyon Avenue/Sunset Way

This intersection is currently under traffic signal control. It has an unusual layout, with both Carlyon Ave and Sunset Way being WB approaches. This intersection is not projected to have operational issues in the future, but to accommodate the Brewery District Plan improvements along Capitol Boulevard this improvement will construct a two lane roundabout. A roundabout will also better accommodate the unusual intersection configuration.

I-3 2nd Avenue at Custer Way

This intersection is currently under traffic signal control. The projected intersection operations do not require improvements, but the upstream I-5/US-101 off-ramp intersection projects to operate an LOS F. To improve the operations of the upstream intersection, this improvement will restripe the SB approach to convert the existing through lane into a shared through-left lane, providing a second SB left-turn lane. This will greatly improve the lane utilization at the upstream intersection, and will also improve the projected operations at this intersection.

I-4 Boston Street at Custer Way

This intersection currently operates under stop sign-control for the minor street approaches. The NB approach it restricted to through and right turn movements. The Brewery District Plan includes a roundabout at this location to facilitate the lane reduction along Custer Way. This improvement will construct a teardrop roundabout at this location, with the east side of the roundabout connecting to a median and limiting the NB approach to right-turns only.

I-5 Deschutes Way at Boston St

This intersection is currently under all-way stop-control. With the construction of the E Street crossing this intersection will experience a large increase of through traffic along Deschutes Way, which will result in the operations falling below the proposed level of service standard. This improvement will install a traffic signal as a part of the Brewery District Plan.

I-6 Capitol Boulevard at Cleveland Ave

This intersection currently operates under stop-control for the Cleveland Avenue approach. Due to the approach angle of the NB Capitol Boulevard and NB Cleveland Avenue approaches, the Cleveland Ave approach only allows a right-turn movement. This improvement will construct a two lane roundabout, to better serve the existing approach angles and to facilitate the Brewery District Plan's lane reduction along Capitol Boulevard.

I-7 Capitol Boulevard at Custer Way

This intersection is currently operated with a traffic signal. To accommodate the lane reductions along both Custer Way and Capitol Boulevard proposed in the Brewery District Plan, this improvement will construct a two-lane roundabout.

I-8 Cleveland Avenue at Custer Way/North Street

This intersection is currently operated with a traffic signal. As part of the Brewery District Plan, this improvement will construct a two lane roundabout to accommodate the lane reduction along Custer Way.

I-9 Linwood Avenue at 2nd Avenue

This intersection is currently under all-way stop-control. The projected intersection operations are below the proposed level of service standard. This improvement will construct a two-lane roundabout.

I-10 Capitol Boulevard at Linwood Avenue

This intersection is currently under traffic signal control. Although the projected operational analysis is within the proposed level of service standard, to accommodate the median treatment along Capitol Boulevard proposed in the Capitol Boulevard Corridor Plan, this improvement will construct a two-lane roundabout.

I-11 Henderson Avenue at Yelm Highway

This intersection currently operates under traffic signal control. The existing operational analysis results suggests the intersection may experience operational issues in the near future. The projected 2040 analysis falls below the proposed level of service standard. This improvement will widen the WB approach to provide a 2nd left-turn lane. Construction of a two lane roundabout could also provide the same operational benefit. Both improvements present right-of-way challenges. A future intersection design study would identify the preferred solution.

I-12 Trosper Road at Rural Road

This intersection is currently under stop sign-control for Rural Road. The projected 2040 operational analysis will fall below the proposed level of service standard. This improvement will construct an EB left-turn lane. This and the addition of a TWLTL on Trosper Road east of Rural Road completed in project R-6 will allow for the intersection to remain under stop-sign control.

I-13 Trosper Road at 2nd Avenue/Littlerock Road

This intersection is currently under traffic signal control. The projected 2040 level of service is expected to be within the proposed level of service standard, but with some long queues during the peak periods. To provide congestion relief and improve the operations of the intersection, this improvement will construct a two lane roundabout. Due to the close proximity to the Trosper Road/Tyee Drive intersection, this improvement must be constructed with I-14.

I-14 Trosper Road at Tyee Drive/I-5 SB Ramps

This intersection is currently under traffic signal control. The projected 2040 operations are within the proposed LOS Standard, but with heavy congestion along most of the approaches. To improve the projected congestion, this improvement will construct a two lane roundabout. This improvement will require project I-13 to be completed. Construction of a roundabout should also improve the safety performance of the intersection by improving the alignment of the north and south approaches.

I-15 Trosper Road at Capitol Boulevard

Currently this intersection is under traffic signal control. While the existing level of service is within the LOS standard, the current congestion and extended queues experienced during the PM peak period results in this intersection being graded as failing. The Trosper Road interchange improvement, project R-38, was developed to address the existing and projected operational issues at this intersection. This improvement will construct a two-lane roundabout.

I-16 T Street at Capitol Boulevard

This intersection is currently stop sign-controlled. Future redevelopment of the WSDOT Olympic Region property is expected to use T Street as a primary access, which will require intersection improvements. As part of the Capitol Boulevard Corridor Plan and to accommodate the Trosper Road interchange improvement, this project will construct a two-lane roundabout. With the completion of the 6th Avenue roadway project, project R-25, this roundabout will allow for the existing traffic signal at Lee Street to be removed, creating better intersection control spacing along Capitol Boulevard.

I-17 X Street at Capitol Boulevard

This intersection currently operates under traffic signal control. As part of the Capitol Boulevard Corridor Plan, this improvement will construct a two-lane roundabout. This improvement is not needed to improve an operational deficiency, but will facilitate the redevelopment of Capitol Boulevard.

I-18 Dennis Street at Capitol Boulevard

This intersection currently operates under traffic signal control. As part of the Capitol Boulevard Corridor Plan, this improvement will construct a two-lane roundabout. This improvement is not needed to improve an operational deficiency, but will facilitate the redevelopment of Capitol Boulevard.

I-19 Old Highway 99 at 79th Avenue

This intersection is currently under stop sign-control for the 79th Avenue approach. The minor street movement currently operates below the accepted LOS standards, but the volumes are not sufficient to meet traffic signal warrants. In the future the volumes on Old highway 99 are expected to grow enough that intersection control improvements become warranted. This improvement will construct a two-lane roundabout.

I-20 93rd Avenue at I-5 Northbound Ramps

Currently this intersection operates under stop sign-control for the I-5 NB off-ramp. This intersection is projected to operate below the proposed LOS standard in 2040. This improvement will construct a traffic signal.

I-21 93rd Avenue at Kimmie Street

This intersection currently operates with stop sign-control for both approaches of Kimmie Street. Based on the volume projections from the travel demand model, this intersection will operate within the proposed LOS standards. Previous studies have identified operational deficiencies at this location, and if the properties along 93rd Avenue develop, improvements will be needed. This project will construct a traffic signal, which should be built as development occurs.

I-22 93rd Avenue at Case Road

This intersection currently operates under all-way stop-control. This intersection is projected to operate below the proposed LOS standard in 2040. This project is currently identified on the City’s traffic impact fee program and will construct a single-lane roundabout. This roundabout should be designed to accommodate widening of 93rd Avenue to five lanes.

I-23 93rd Avenue at Tilley Road (south)

Currently this intersection operates with all-way stop-control. The projected 2040 operational results are below the proposed LOS standard. This improvement will construct a single-lane roundabout. Should median control be implemented along 93rd Avenue between Tilley Road and Case Road, construction of this roundabout would be required.

I-24 93rd Avenue at Tilley Road (north)

This intersection currently operates under all-way stop-control. This intersection is projected to operate below the proposed LOS standard in 2040. This improvement will construct a single-lane roundabout.

I-25 93rd Avenue at Old Highway 99

This intersection is currently operated with stop sign control for the 93rd Avenue approach. Currently acceleration lanes have been constructed for both NB and SB directions on Old Highway 99. As traffic volumes increase along Old Highway 99, these acceleration lanes will not be sufficient to accommodate the traffic on 93rd Avenue. This improvement will construct a single-lane roundabout. This roundabout should be designed to accommodate future widening along Old Highway 99.

3.4.3 Additional Intersection Deficiencies

With completion of the entire roadway and intersection project lists, the projected 2040 operational analysis still indicates a few locations that may operate below the proposed LOS standard. Here is a brief description of these locations:

Crosby Boulevard at Barnes Road

This intersection is projected to operate at an LOS F for the EB approach and an LOS E for the WB approach. The EB approach serves as a driveway for a small apartement complex and has very low peak hour volumes. The WB approach has more volume, but the heavy movement is right-turning traffic, which is provided with a separate turn lane. The peak hour traffic signal volume warrants were reviewed at this location and the forecasted volumes don’t meet applicable traffic volume thresholds. This intersection should be monitored, but until signal warrants can be met no intersection improvements are proposed.

Hoadly Street at North Street

This intersection in currently stop sign-controlled for the north and south approaches. The projected 2040 operational analysis indicates the SB approach will operate at an LOS F. This is a low volume approach and is not projected to meet the peak hour traffic signal volume warrant. This intersection should be monitored, but until signal warrants can be met no intersection improvements are proposed.

3.4.4 Roadway Deficiencies

A planning level evaluation of roadway segments was prepared for most collector and arterial roadway segments within the study area. The analysis was based on the volume to capacity ratio (v/c). In this analysis the roadway capacities used were taken from the TRPC Regional demand model. In general, these capacities tend to be conservatively low and offer a “first-screening” of roadways that may be approaching capacity difficulties. In most urban settings the intersections are what determine the success of the roadway segments. However, in some instances it may be appropriate to consider addressing roadway segment capacity deficiencies, in the following ways:

- Adding through capacity lanes
- Improving signal progression
- Adding right and/or left-turn lanes at intersections
- Adding a continuous two-way left-turn lane or center median
- Consolidating driveways to reduce conflicts

The roadway segment analysis results are provided on **Figures 10, 11 and 12** of the Tumwater Master Plan. The complete roadway segment analysis results are provided in Appendix A-4. Below is a discussion of some of the notable roadway segments.

Henderson Boulevard - Between 65th Avenue and Yelm Highway

Currently this portion of Henderson Boulevard is a two lane roadway with turn lanes at all significant intersections. The 2040 roadway segment analysis indicates that Henderson Blvd will have a v/c ratio greater than 1.0. Given that the intersections already have turn lanes provided, the only meaningful improvement to address the projected volume would be additional through lanes. This segment of Henderson Boulevard has multiple geographic constraints that make roadway widening undesirable. Since the current corridor is built to the long term vision for this roadway, Henderson Boulevard has been designated a Tumwater Strategy Corridor. This roadway should continue to be monitored.

Deschutes Way – Between E Street and US-101 Ramps

This portion of Deschutes Way is currently a two lane roadway. With the completion of the E Street extension Deschutes Way will experience an increase in volume accessing the US-101 and I-5 on-ramps. This roadway is included on the Capital Improvements list, with the exact roadway improvement to be determined in the E Street extension study. Eventually, either with this initial improvement or a future improvement, a 2nd NB travel lane may be needed to accommodate this growth in volume.

Israel Road – Between Linderson Way and Littlerock Road

This portion of Israel Road is a two lane section. The projected 2040 v/c ratio indicates this roadway will operate with a v/c ratio above 1.0. Given the current lack of driveway interruptions along this portion of Israel Road, the intersection analysis at Israel Rd/Linderson Way and Israel Rd/Littlerock Rd should provide a more meaningful indication of how Israel Road is operating. As development occurs on this segment of Israel Road, additional right-turn or left-turn lanes and/or turn movement restrictions at cross-streets may need need to be evaluated to minimize friction on through traffic.

Linderson Way – Between Tumwater Boulevard and Israel Road

Linderson Way north of Tumwater Boulevard is currently a five lane section, which narrows down to three lanes north of 73rd Avenue until Israel Road. Based on the existing counts, this roadway has a v/c ratio above 1.0 during the PM peak hour SB approaching Tumwater Boulevard. Congestion on this roadway tends to be of short duration as the office buildings generate spikes of outbound traffic. As traffic increases this roadway should be monitored for potential efficiency improvements including right turn lanes at cross-streets/major driveways.

Old Highway 99 – South of 93rd Avenue

This portion of Old Highway 99 is currently a two lane section. The segments of Old Highway 99 north of 93rd Avenue are listed in the Capital Improvements list, widening to five lanes north of 88th Avenue and to three lanes between 88th Avenue and 93rd Avenue. As growth continues south of the City, this roadway may require additional through lanes. Although this improvement may not provide meaningful benefit unless it extends south beyond the City boundary.

3.5 2040 With Proposed Capital Improvements

The operational results were prepared for 2040 volume conditions with the proposed improvements in place for affected intersections. The 2040 operational analysis results with the proposed improvements are provided in **Table 5**.

Table 5. Projected 2040 With Improvements PM Peak Hour Level of Service

				2040 With Improvement	
Number	**Intersection**	**Existing Intersection Control**	**Improvement**	**LOS (Delay)**	**Worst v/c**
6	Black Lake Blvd/Black Lake Belmore Rd	TWSC	RAB	B (11)	0.64
13	I-5/US 101 Off-Ramps/Desoto St/2nd Ave	TWSC	Lanes	E (50)	
14	2nd Ave/Custer Way	Signal	Lanes	C (25)	0.85
25	2nd Ave/Linwood Ave	AWSC	RAB	B (19)	0.80
26	Capitol Blvd/Linwood Ave	Signal	RAB	B (17)	0.84
27	Henderson Blvd/Yelm Hwy	Signal	Signal	D (55)	1.01
28	Rural Rd/Trosper Rd	TWSC	Lanes	C (18)	0.37
30	2nd Ave/Littlerock Rd/Trosper Rd	Signal	RAB	C (32)	0.96
31	Tyee Dr/SB I-5 Ramps/Trosper Rd	Signal	RAB	C (23)	0.92
33	Capitol Blvd/Trosper Rd	Signal	RAB	C (26)	0.94
38	Capitol Blvd/X St	Signal	RAB	A (8)	0.50
40	Capitol Blvd/Dennis St	Signal	RAB	A (9)	0.56
56	Littlerock Rd/Black Hills School Drwy	Signal	Lanes	C (27)	0.83
59	Old Hwy 99/79th Ave	TWSC	RAB	A (8)	0.59
63	I-5 SB Ramps/93rd Ave	Signal	Lanes	B (15)	0.67
64	I-5 NB Ramps/93rd Ave	TWSC	Signal	A (9)	0.77
65	Kimmie St/93rd Ave	TWSC	Signal	B (14)	0.73
66	Case Rd/93rd Ave	AWSC	RAB	B (16)	0.79
67	Tilley Rd (South)/93rd Ave	AWSC	RAB	B (17)	0.79
68	Tilley Rd (North)/93rd Ave	TWSC	RAB	B (12)	0.71
69	Old Hwy 99/93rd Ave	TWSC	RAB	C (24)	0.92

1. Due to the unique nature of this intersection control, HCM cannot be used to calculate delay. Sim-Traffic simulation was used to calculate average delay.
2. HCM 2000 was used at this signal because the shared through-left lane is not accurately analyzed in HCM 2010.

3.6 2022 Baseline Conditions

The Capital Facilities Plan contains all the perceived roadway and intersection improvements the City will need to construct to maintain the proposed LOS standards in 2040. To determine which of these improvements may be warranted or needed in the short term, a 2022 analysis was performed.

To prepare the analysis volumes for the 2022 analysis, a 2040 forecast was prepared using the TRPC travel demand model, with all of the regional transportation projects removed. Then a portion of the model growth between the existing 2014 travel demand model and this unimproved 2040 travel demand model was added to the existing 2015 turning movement counts to produce 2022 analysis volumes. The operational results for these intersections are provided below in **Table 6**.

Table 6. Projected 2022 PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2022 Base Year LOS (Delay)	2022 Base Year Worst v/c
1	RW Johnson Blvd/Mottman Rd	AWSC[1]	B (13)	0.55
2	Crosby Blvd/Mottman Rd	Signal	B (17)	0.77
3	Crosby Blvd/Irving St	Signal	B (10)	0.67
4	7th Ave/Irving St	AWSC	A (9)	0.26
5	Crosby Blvd/Barnes Blvd	TWSC[2]	D (29)	0.26
6	Black Lake Blvd/Black Lake Belmore Rd	TWSC	F (72)	0.96
7	RW Johnson Blvd/Sapp Rd	TWSC	B (11)	0.23
8	Sapp Rd/Crosby Blvd	TWSC	B (13)	0.23
9	49th Ave/Black Lake Belmore Rd[1]	TWSC	A (9)	
10	Capitol Blvd/Carlyon Ave/Sunset Way[2]	Signal	B (11)	0.49
11	Deschutes Way/I-5 NB On-Ramp	Yield	A (9)	0.19
12	Deschutes Way/US 101 WB On-Ramp	Yield	A (10)	0.40
13	I-5/US 101 Off-Ramps/Desoto St/2nd Ave[1]	TWSC	C (24)	
14	2nd Ave/Custer Way	Signal	C (31)	1.10
15	Boston St/Custer Way	TWSC	E (42)	0.58
16	Deschutes Way/Boston St	AWSC	E (41)	0.95
17	Cleveland Ave/Capitol Blvd	TWSC	B (13)	0.43
18	Custer Way/Capitol Blvd	Signal	E (60)	1.00
19	Custer Way/North St/Cleveland Ave	Signal	E (70)	1.15
20	Hoadly St/North St	TWSC	C (23)	0.19
21	Deschutes Way/I-5 NB Off-Ramp[1]	TWSC	D (26)	
22	Capitol Blvd/E St	Signal	C (33)	0.87
23	Cleveland Ave/South St	TWSC	C (16)	0.07
24	7th Ave/Linwood Ave	TWSC	C (20)	0.43
25	2nd Ave/Linwood Ave	AWSC	E (38)	0.93
26	Capitol Blvd/Linwood Ave	Signal	C (28)	1.00
27	Henderson Blvd/Yelm Hwy	Signal	E (68)	1.13
28	Rural Rd/Trosper Rd	TWSC	C (20)	0.30
29	Lake Park Dr/Trosper Rd	Signal	B (14)	0.72
30	Littlerock Rd/Trosper Rd	Signal	D (44)	0.83
31	I-5 SB Ramps/Tyee Dr/Trosper Rd	Signal	D (46)	0.92
32	I-5 NB Ramps/Trosper Rd	Signal	A (7)	0.89
33	Capitol Blvd/Trosper Rd[3]	Signal	F (31)	0.89
34	Capitol Blvd/Lee St[2]	Signal	C (26)	0.88
35	Littlerock Rd/Fred Meyer Drwy/Costco Drwy	Signal	A (8)	0.59
36	Littlerock Rd/Costco Drwy[2]	Signal	C (22)	0.84
37	Littlerock Rd/Kingswood Dr	RAB	A (6)	0.75
38	Capitol Blvd/X St	Signal	A (8)	0.53

Table 6 Cont. Projected 2022 PM Peak Hour Level of Service

Number	Intersection	Intersection Control	2022 Base Year	
			LOS (Delay)	Worst v/c
39	Elm St/X St	TWSC	A (10)	0.04
40	Capitol Blvd/Dennis St[2]	Signal	B (13)	0.71
41	Capitol Blvd/Israel Rd	Signal	C (25)	0.85
42	66th Ave/Black Lake Belmore Rd	TWSC	B (12)	0.25
43	Kirsop Rd/66th Ave	TWSC	B (15)	0.28
44	Littlerock Rd/Odegard Rd	RAB	A (5)	0.68
45	Littlerock Rd/Israel Rd/70th Ave	RAB	B (11)	0.76
46	Linderson Way/Israel Rd	Signal	B (19)	0.76
47	Littlerock Rd/Tumwater Blvd	RAB	A (8)	0.49
48	I-5 SB Ramps/Tumwater Blvd	Signal	B (13)	0.87
49	I-5 NB Ramps/Tumwater Blvd	TWSC	F (200+)	1.47
50	Linderson Way/Tumwater Blvd	Signal	D (37)	1.09
51	New Market St/Tumwater Blvd	RAB	A (5)	0.36
52	Capitol Blvd/Tumwater Blvd	Signal	D (39)	1.03
53	65th Ave/Henderson Blvd	Signal	A (8)	0.74
54	Tumwater Blvd/Henderson Blvd	Signal	D (43)	0.99
55	Trails End Dr/Henderson Blvd	TWSC	C (15)	0.27
56	Littlerock Rd/Black Hills School Drwy	Signal	A (3)	0.38
57	Center St/76th Ave	TWSC	C (20)	0.24
58	Old Hwy 99/Henderson Blvd	Signal	B (15)	0.75
59	Old Hwy 99/79th Ave	TWSC	F (79)	0.25
60	Kimmie St/83rd Ave	TWSC	A (10)	0.09
61	Center St/83rd Ave	TWSC	B (13)	0.41
62	Old Hwy 99/88th Ave	Signal	B (12)	0.79
63	I-5 SB Ramps/93rd Ave	Signal	C (22)	0.88
64	I-5 NB Ramps/93rd Ave	TWSC	B (14)	0.35
65	Kimmie St/93rd Ave	TWSC	C (25)	0.28
66	Case Rd/93rd Ave	AWSC	E (43)	1.00
67	Tilley Rd (South)/93rd Ave	AWSC	C (25)	0.84
68	Tilley Rd (North)/93rd Ave	TWSC	C (18)	0.34
69	Old Hwy 99/93rd Ave	TWSC	C (20)	0.45

1. Due to the unique nature of this intersection control, HCM cannot be used to calculate delay. Sim-Traffic simulation was used to calculate average delay.
2. HCM 2000 was used at this signal because the shared through-left lane is not accurately analyzed in HCM 2010.
3. This intersection is being graded based on the known congestion along Capitol Boulevard as a result of the signal.

Based on this analysis, the following intersections are projected to operate at an LOS E or worse by 2022:

- 6) Black Lake Boulevard at Black Lake Belmore
- 15) Boston Street at Custer Way
- 16) Deschutes Way at Boston St
- 18) Custer Way at Capitol Boulevard
- 19) Custer Way/North Street at Cleveland Avenue
- 25) 2nd Avenue at Linwood Avenue
- 27) Henderson Boulevard at Yelm Highway
- 49) I-5 NB Ramps at Tumwater Boulevard
- 59) Old Highway 99 at 79th Avenue
- 66) Case Road at 93rd Avenue

Each of these intersections has an improvement identified in the 2040 improvement package that will accommodate the 2022 traffic volumes.

4. PROJECT COST ESTIMATES

4.1 PLANNING LEVEL ROADWAY PROJECT COST ESTIMATES

Planning level cost estimates were developed using eight elements:

- Preparation
- Roadwork
- Construction Staging
- Right-of-Way
- Environmental
- Utilities
- Engineering
- Permitting

Preparation and Roadwork element estimates were developed by using WSDOT unit bid data and current comparable project bid data. This data was organized to estimate standard project items in basic units: linear feet, square feet and cubic feet. Projects were then measured in GIS and CAD software to estimate each item.

Construction Staging was estimated by using a percentage of the Roadwork estimation based on three different levels:

- Typical Construction (5%) – Typical construction using simple stages and efficient construction practices.
- Staging (20%) – Moderately complex construction that will require more complex staging to complete construction.
- Difficult/Inefficient (35%) – Difficult or inefficient construction that will require complex staging and atypical construction practices to complete.

The Right-of-Way element was estimated using data from Thurston County's Geodata GIS data base. Right-of-Way impact was measured to evaluate how many parcels could be affected by the project. Geodata was used to create an average cost per square foot of the affected parcels. This cost per square foot was combined with typical Right-of-Way acquisition fees to develop the total Right-of-Way cost estimate.

Environmental and Utilities elements were estimated using different levels of risk associated with a percentage of the Roadwork estimation: low (5%), medium (10%) and high (2. This risk was calculated by viewing aerial images and assessing risk of environmental and utilities impact.

The Engineering element was estimated by using industry standards of 15% of construction costs for design and 10% of construction costs for construction engineering.

Permitting was estimated by assuming City specific projects would require 3% of construction costs. Projects involving WSDOT were estimated to require an additional 10% of construction costs for permitting.

A 30% conceptual contingency was included in each project estimate.

The planning level cost estimates for roadway projects is provided in **Table 7**.

4.2 Planning Level Intersection Project Cost Estimates

Planning level intersection cost estimates were developed using WSDOT unit bid data and current comparable project construction cost data. Each intersection was evaluated using aerial images to determine size and type of intersection improvements. Based on the type of intersection improvements, potential Right-of-Way acquisition area was calculated. Potential Right-of-Way acquisition and size of intersection improvements were compared to recent intersection project construction cost information to develop intersection cost estimates.

The planning level cost estimates for intersections are provided in **Table 8**. A summary of the total Capital Improvements is provided is **Table 9**.

Table 7. Planning Level Cost Estimates – Roadway Projects

Project Number	Project	Total Cost
R-1	Littlerock Road	$8,470,000
R-2	Tyee Drive[1]	$4,800,000
R-3	Tyee Drive	$7,000,000
R-4	Tyee Drive	$6,770,000
R-5	Tyee Drive	$9,220,000
R-6	Trosper Road	$1,050,000
R-7	Tumwater Boulevard	$6,540,000
R-8	Tumwater Boulevard	$15,425,793
R-9	Tumwater Boulevard	$2,370,000
R-10	E Street	$37,790,000
R-11	Old Highway 99[1]	$610,000
R-12	Old Highway 99	$20,270,000
R-13	Old Highway 99	$10,090,000
R-14	Henderson Boulevard	$3,970,000
R-15	Henderson Boulevard	$8,840,000
R-16	32nd Street[2]	$7,770,000
R-17	70th Street[2]	$3,700,000
R-18	73rd Street[2]	$9,640,000
R-19	Prine Drive[2]	$5,730,000
R-20	93rd Avenue	$2,140,000
R-21	93rd Avenue	$4,410,000
R-22	93rd Avenue	$9,770,000
R-23	93rd Avenue	$3,400,000
R-24	93rd Avenue	$10,810,000
R-25	6th Avenue	$5,800,000
R-26	Custer Way	$290,000
R-27	Capitol Boulevard	$1,030,000
R-28	Capitol Boulevard	$1,030,000
R-29	Capitol Boulevard	$3,340,000
R-30	New North/South Street	$2,740,000
R-31	Odegard Road	$3,610,000
R-32	Bishop Road	$937,792
R-33	73rd/66th Connector[2]	$6,030,000
R-34	New Market Street	$4,040,000
R-35	Town Center Connector	$3,480,000
R-36	72nd Avenue	$5,360,000
R-37	Doelman Property[2]	$22,260,000
R-38	Trosper Road Interchange	$5,650,000
R-39	Deschutes Way	$2,850,000
TOTAL		$269,033,585

1. Project is already funded
2. Projected expected to be developer funded

Table 8. Planning Level Cost Estimates – Intersection Projects

Project Number	Project	Total Cost
I-1	Black Lake Belmore/Black Lake Blvd	$2,500,000
I-2	Capitol Blvd/Carlyon Ave	$3,500,000
I-3	2nd Ave/Custer Way	$100,000
I-4	Boston St/Custer Way	$4,000,000
I-5	Deschutes Way/Boston St	$500,000
I-6	Capitol Blvd/Cleveland Ave	$3,500,000
I-7	Capitol Blvd/Custer Way	$3,500,000
I-8	Cleveland Ave/Custer Way/North St	$4,500,000
I-9	Linwood Ave/2nd Ave	$2,500,000
I-10	Capitol Blvd/Linwood Ave	$2,500,000
I-11	Henderson Blvd/Yelm Hwy	$2,500,000
I-12	Trosper Rd/Rural Rd	$500,000
I-13	Trosper Rd/2nd Ave/Littlerock Rd	$2,500,000
I-14	Trosper Rd/Tyee Dr/SB I-5 Ramps	$2,500,000
I-15	Trosper Rd/Capitol Blvd	$6,000,000
I-16	T St/Capitol Blvd	$5,500,000
I-17	X St/Capitol Blvd	$4,000,000
I-18	Dennis St/Capitol Blvd	$3,000,000
I-19	Old Hwy 99/79th Ave	$2,000,000
I-20	93rd Ave/I-5 NB Ramps	$500,000
I-21	93rd Ave/Kimmie St	$500,000
I-22	93rd Ave/Case Rd	$2,500,000
I-23	93rd Ave/Tilley Rd (south)	$2,500,000
I-24	93rd Ave/Tilley Rd (north)	$2,500,000
I-25	93rd Ave/Old Hwy 99	$2,500,000
TOTAL		$66,100,000

Table 9. Planning Level Cost Estimates – Cost Summary

Total Roadway Cost	$269,033,585
Total Intersection Cost	$66,100,000
Total Cost	**$335,133,585**
Developer Funded/ Already Funded	-$60,540,000
Potential Cost for City	**$274,593,585**

APPENDIX A-1
TURNING MOVEMENT COUNTS

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

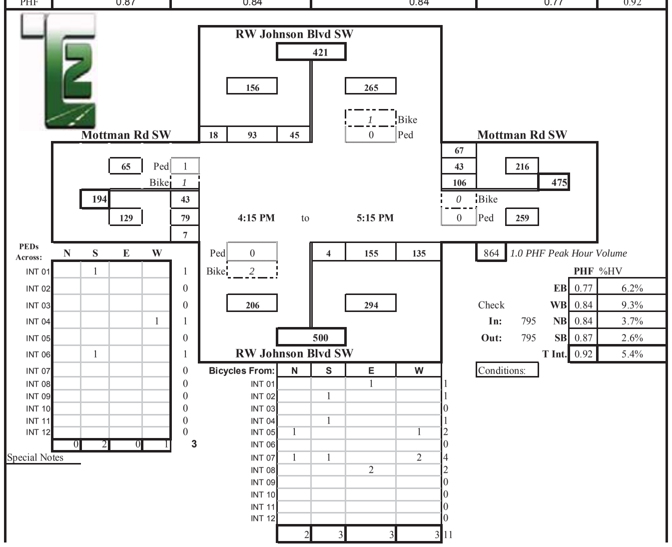
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: RW Johnson Blvd SW & Mottman Rd SW **Date of Count:** Tues 6/30/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) RW Johnson Blvd SW				From South on (NB) RW Johnson Blvd SW				From East on (WB) Mottman Rd SW				From West on (EB) Mottman Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	4	7	22	9	4	1	44	30	8	25	12	13	4	17	14	2	196
4:30 P	2	17	23	5	3	1	31	30	5	24	9	10	1	6	14	4	174
4:45 P	1	8	19	2	3	0	44	34	7	33	10	18	2	13	26	3	210
5:00 P	0	9	23	5	4	2	29	36	6	24	17	23	2	9	18	0	195
5:15 P	1	11	28	6	1	1	51	35	2	25	7	16	3	15	21	0	216
5:30 P	0	9	15	3	3	0	22	29	4	23	7	21	1	4	6	0	139
5:45 P	1	9	24	4	3	1	40	34	6	15	6	17	1	9	8	1	168
6:00 P	2	4	26	2	1	0	25	20	4	21	5	17	1	4	1	0	125
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	11	74	180	36	22	6	286	248	42	190	73	135	15	77	108	10	1423
	Peak Hour: 4:15 PM to 5:15 PM																
Total	4	45	93	18	11	4	155	135	20	106	43	67	8	43	79	7	795
Approach	156				294				216				129				795
%HV	2.6%				3.7%				9.3%				6.2%				5.4%
PHF	0.87				0.84				0.84				0.77				0.92



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

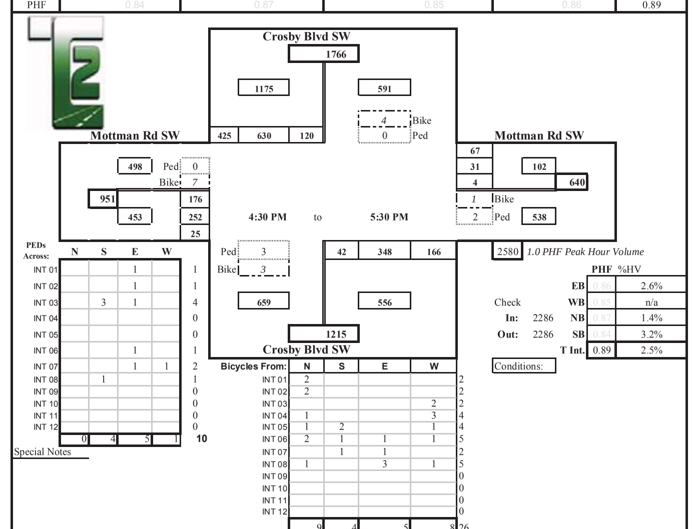
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Crosby Blvd SW & Mottman Rd SW **Date of Count:** Wed 10/08/2014

Location: Tumwater, Washinton **Checked By:** Jess

Time Interval Ending at	From North on (SB) Crosby Blvd SW				From South on (NB) Crosby Blvd SW				From East on (WB) Mottman Rd SW				From West on (EB) Mottman Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	10	23	131	90	4	11	75	51	1	2	2	21	1	46	92	7	551
4:30 P	11	30	123	90	2	12	76	40	0	0	3	14	2	28	48	8	472
4:45 P	16	21	133	86	1	9	87	37	0	1	8	21	2	41	84	6	534
5:00 P	10	28	143	82	3	5	72	35	0	1	3	13	5	42	58	3	485
5:15 P	7	37	169	125	0	14	92	53	0	0	8	18	3	57	62	10	645
5:30 P	5	34	185	132	4	14	97	41	0	2	12	15	2	36	48	6	622
5:45 P	5	30	152	71	1	9	83	30	0	3	6	19	1	28	52	4	487
6:00 P	7	21	128	84	2	7	85	20	1	1	4	21	6	14	44	5	434
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	71	224	1164	760	17	81	667	307	2	10	46	142	22	292	488	49	4230
	Peak Hour: 4:30 PM to 5:30 PM																
Total	38	120	630	425	8	42	348	166	0	4	31	67	12	176	252	25	2286
Approach	1175				556				102				453				2286
%HV	3.2%				1.4%				n/a				2.6%				2.5%
PHF	0.84				0.87				0.85				0.86				0.89



SCJ14105M_01p

Prepared for: **SCJ Alliance**

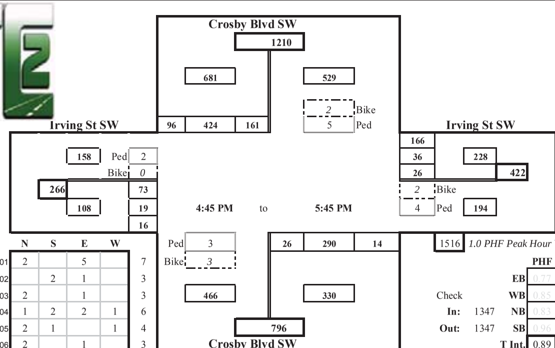
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Crosby Blvd SW & Irving St SW **Date of Count:** Wed 10/08/2014
Location: Tumwater, Washinton **Checked By:** Jess

Time Interval Ending at	From North on (SB) Crosby Blvd SW				From South on (NB) Crosby Blvd SW				From East on (WB) Irving St SW				From West on (EB) Irving St SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	43	88	13	2	1	60	3	1	3	3	44	1	32	8	2	300
4:30 P	2	34	80	8	1	1	62	2	0	3	2	43	3	21	1	1	258
4:45 P	2	35	94	15	1	2	62	3	0	4	2	45	0	19	3	2	286
5:00 P	3	43	82	23	1	3	54	2	0	9	8	35	4	23	5	3	290
5:15 P	3	46	109	23	0	7	84	8	0	6	12	49	0	24	8	3	379
5:30 P	2	34	113	30	1	13	79	3	1	3	12	44	3	16	2	3	352
5:45 P	3	38	120	20	1	3	73	1	0	8	4	38	2	10	4	7	326
6:00 P	1	36	78	19	1	4	65	4	0	2	4	34	3	14	0	6	266
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	19	309	764	151	8	34	539	26	2	38	47	332	16	159	31	27	2457
	Peak Hour: 4:45 PM to 5:45 PM																
Total	11	161	424	96	3	26	290	14	1	26	36	166	9	73	19	16	1347
Approach	681				330				228				108				1347
%HV	1.6%				0.9%				0.4%				8.3%				1.8%
PHF	0.96				0.83				0.85				0.77				0.89



1516 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	2		5		7
INT 02		2	1		3
INT 03	2		1		3
INT 04	1	2	2	1	6
INT 05	2	1		1	4
INT 06	2		1		3
INT 07			1		1
INT 08				1	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	9	5	11	3	**28**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1		1	2
INT 03	1				1
INT 04		1			1
INT 05	1	1	1		3
INT 06	1		1		2
INT 07		1			1
INT 08	2	1		1	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	5	5	2	2	14

Check
In: 1347
Out: 1347

	PHF	%HV
EB	0.77	8.3%
WB	0.85	0.4%
NB	0.83	0.9%
SB	0.96	1.6%
T Int.	0.89	1.8%

Conditions:

Prepared for: **SCJ Alliance**

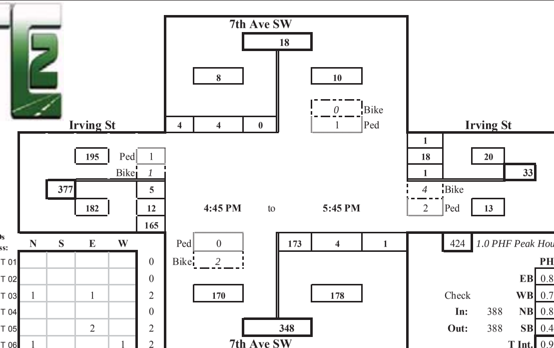
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: 7th Ave SW & Irving St **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) 7th Ave SW				From South on (NB) 7th Ave SW				From East on (WB) Irving St				From West on (EB) Irving St				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	1	40	1	1	0	0	1	0	0	1	6	36	86
4:30 P	0	0	0	0	0	46	0	0	0	1	9	1	0	0	6	39	102
4:45 P	0	0	0	1	0	46	0	0	1	0	3	1	1	1	5	29	86
5:00 P	0	0	0	0	0	50	1	1	0	1	5	1	1	0	5	39	103
5:15 P	0	0	0	2	0	35	0	0	0	0	2	0	0	1	3	49	92
5:30 P	0	0	4	1	1	47	1	0	0	0	5	0	0	1	2	45	106
5:45 P	0	0	0	1	0	41	2	0	0	0	6	0	0	3	2	32	87
6:00 P	0	0	2	2	0	49	1	1	0	0	6	1	1	1	4	30	97
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	6	7	2	354	6	3	1	2	37	4	3	8	33	299	759
	Peak Hour: 4:45 PM to 5:45 PM																
Total	0	0	4	4	1	173	4	1	0	1	18	1	1	5	12	165	388
Approach	8				178				20				182				388
%HV	n/a				0.6%				n/a				0.5%				0.5%
PHF	0.40				0.86				0.71				0.86				0.92



424 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	1		1		2
INT 04					0
INT 05			2		2
INT 06	1			1	2
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	0	3	1	**6**

Special Notes

Bicycles From:	N	S	E	W	
INT 01		1			1
INT 02					0
INT 03					0
INT 04		1	1		2
INT 05				1	1
INT 06			1		1
INT 07		1	2		3
INT 08	1			1	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	4	2	10

Check
In: 388
Out: 388

	PHF	%HV
EB	0.86	0.5%
WB	0.71	n/a
NB	0.86	0.6%
SB	0.40	n/a
T Int.	0.92	0.5%

Conditions:

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

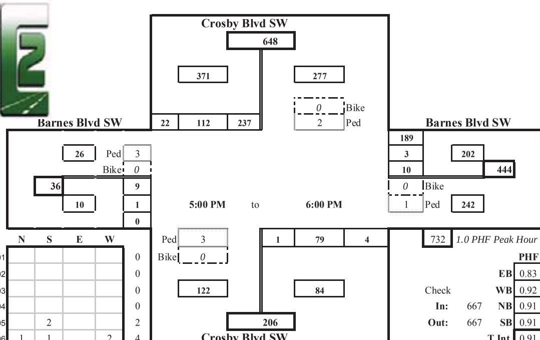
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Crosby Blvd SW & Barnes Blvd SW **Date of Count:** Tues 6/30/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Crosby Blvd SW				From South on (NB) Crosby Blvd SW				From East on (WB) Barnes Blvd SW				From West on (EB) Barnes Blvd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	45	25	3	0	0	20	1	2	2	1	46	1	3	0	1	147
4:30 P	0	42	21	3	0	0	22	1	1	1	0	32	0	0	0	0	122
4:45 P	2	42	29	5	0	0	17	2	0	1	0	29	0	2	0	0	127
5:00 P	1	58	27	3	0	0	14	2	3	3	0	33	0	1	0	0	141
5:15 P	2	45	28	5	2	0	14	2	0	4	2	40	0	2	0	0	142
5:30 P	0	66	25	8	0	0	22	0	2	1	0	47	0	2	1	0	172
5:45 P	3	63	24	5	0	0	22	1	0	3	0	50	0	2	0	0	170
6:00 P	2	63	35	4	1	1	21	1	2	2	1	52	1	3	0	0	183
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	12	424	214	36	3	1	152	10	10	17	4	329	2	15	1	1	1204
	Peak Hour: 5:00 PM to 6:00 PM																
Total	7	237	112	22	3	1	79	4	4	10	3	189	1	9	1	0	667
Approach	371				84				202				10				667
%HV	1.9%				3.6%				2.0%				10.0%				2.2%
PHF	0.91				0.91				0.92				0.83				0.91



732 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.83	10.0%
WB	0.92	2.0%
NB	0.91	3.6%
SB	0.91	1.9%
T Int.	0.91	2.2%

Check In: 667 Out: 667

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05		2			2
INT 06	1	1		2	4
INT 07					0
INT 08	1		1	1	3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	3	1	3	9

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03				1	1
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	1	1

SCJ15075M_34p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

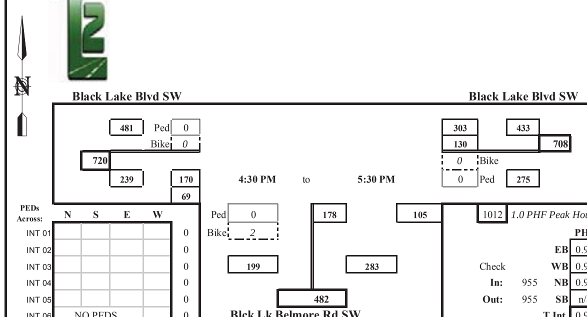
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Black Lake Belmore Rd SW & Black Lake Blvd SW **Date of Count:** Tues 6/30/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) 0				From South on (NB) Blck Lk Belmore Rd SW				From East on (WB) Black Lake Blvd SW				From West on (EB) Black Lake Blvd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	0	33	0	13	2	31	64	0	0	0	31	21	193
4:30 P	0	0	0	0	1	35	0	32	1	32	71	0	2	0	46	27	243
4:45 P	0	0	0	0	0	47	0	29	0	37	75	0	2	0	43	17	248
5:00 P	0	0	0	0	0	34	0	27	0	35	67	0	1	0	44	12	219
5:15 P	0	0	0	0	2	41	0	29	0	25	77	0	1	0	44	19	235
5:30 P	0	0	0	0	0	56	0	20	0	33	84	0	3	0	39	21	253
5:45 P	0	0	0	0	0	38	0	18	3	20	81	0	0	0	42	16	215
6:00 P	0	0	0	0	0	40	0	23	0	28	89	0	0	0	54	14	248
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	3	324	0	191	6	241	608	0	9	0	343	147	1854
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	0	0	0	2	178	0	105	0	130	303	0	7	0	170	69	955
Approach	0				283				433				239				955
%HV	n/a				0.7%				n/a				2.9%				0.9%
PHF	n/a				0.93				0.93				0.95				0.94



1012 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.95	2.9%
WB	0.93	n/a
NB	0.93	0.7%
SB	n/a	n/a
T Int.	0.94	0.9%

Check In: 955 Out: 955

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03		1			1
INT 04		1			1
INT 05					0
INT 06					0
INT 07		1	2	1	4
INT 08		2	4	3	9
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	5	6	4	15

Prepared for: **SCJ Alliance**

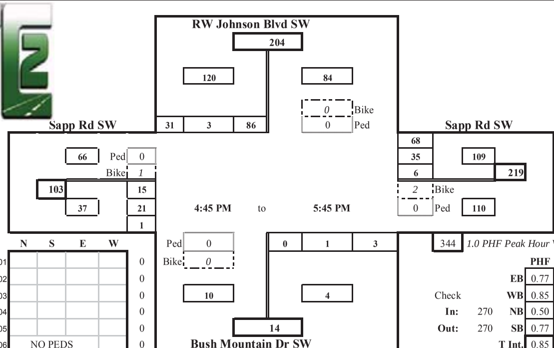
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: RW Johnson Blvd SW/Bush Mountain Dr SW & Sapp Rd SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) RW Johnson Blvd SW				From South on (NB) Bush Mountain Dr SW				From East on (WB) Sapp Rd SW				From West on (EB) Sapp Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	24	2	14	0	0	0	2	0	0	9	18	0	3	14	0	86
4:30 P	0	14	2	7	0	0	1	0	1	1	7	10	0	4	6	0	52
4:45 P	1	16	0	8	0	0	0	0	0	0	5	12	0	6	5	0	52
5:00 P	0	19	1	7	0	0	0	0	1	1	5	16	1	2	4	0	55
5:15 P	1	28	1	10	0	0	1	1	0	2	9	15	0	3	8	1	79
5:30 P	1	13	0	8	0	0	0	0	0	2	10	17	0	5	5	0	60
5:45 P	1	26	1	6	0	0	0	2	0	1	11	20	0	5	4	0	76
6:00 P	0	15	1	5	0	0	1	1	0	2	13	6	0	6	0	2	52
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	5	155	8	65	0	0	3	6	2	9	69	114	1	34	46	3	512
	Peak Hour: 4:45 PM to 5:45 PM																
Total	3	86	3	31	0	0	1	3	1	6	35	68	1	15	21	1	270
Approach	120				4				109				37				270
%HV	2.5%				n/a				0.9%				2.7%				1.9%
PHF	0.77				0.50				0.85				0.77				0.85



344 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.77	2.7%
WB	0.85	0.9%
NB	0.50	n/a
SB	0.77	2.5%
T Int.	0.85	1.9%

Check
In: 270
Out: 270

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	1				1
INT 04					0
INT 05				1	1
INT 06					0
INT 07			2		2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	2	1	4

Special Notes

Prepared for: **SCJ Alliance**

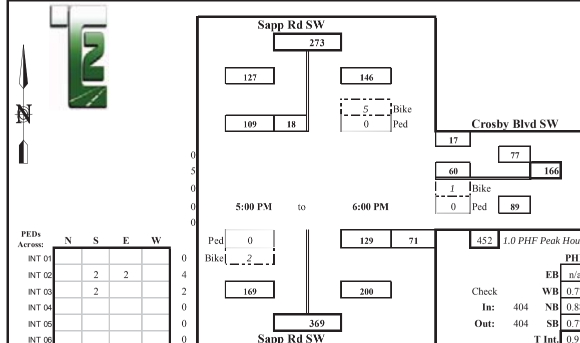
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Sapp Rd SW & Crosby Blvd SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Sapp Rd SW				From South on (NB) Sapp Rd SW				From East on (WB) Crosby Blvd SW				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	6	44	0	0	0	34	13	1	14	0	2	0	0	0	0	113
4:30 P	0	2	24	0	2	0	30	23	0	16	0	4	0	0	0	0	99
4:45 P	0	2	29	0	0	0	24	15	0	10	0	3	0	0	0	0	83
5:00 P	0	0	22	0	1	0	28	12	1	22	0	2	0	0	0	0	86
5:15 P	0	4	37	0	2	0	32	13	0	20	0	5	0	0	0	0	111
5:30 P	0	6	24	0	0	0	36	21	0	17	0	3	0	0	0	0	107
5:45 P	0	4	27	0	0	0	30	23	1	11	0	4	0	0	0	0	99
6:00 P	0	4	21	0	0	0	31	14	0	12	0	5	0	0	0	0	87
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	28	228	0	5	0	245	134	3	122	0	28	0	0	0	0	785
	Peak Hour: 5:00 PM to 6:00 PM																
Total	0	18	109	0	2	0	129	71	1	60	0	17	0	0	0	0	404
Approach	127				200				77				0				404
%HV	n/a				1.0%				1.3%				n/a				0.7%
PHF	0.77				0.88				0.77				n/a				0.91



452 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	n/a	n/a
WB	0.77	1.3%
NB	0.88	1.0%
SB	0.77	n/a
T Int.	0.91	0.7%

Check
In: 404
Out: 404

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02		2	2		4
INT 03		2			2
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	4	2	0	6

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		3			3
INT 03	1	2			3
INT 04		1			1
INT 05					0
INT 06		1			1
INT 07	5	1		5	11
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	8	1	5	20

Special Notes

SCJ15075M_33p

Prepared for: **SCJ Alliance**

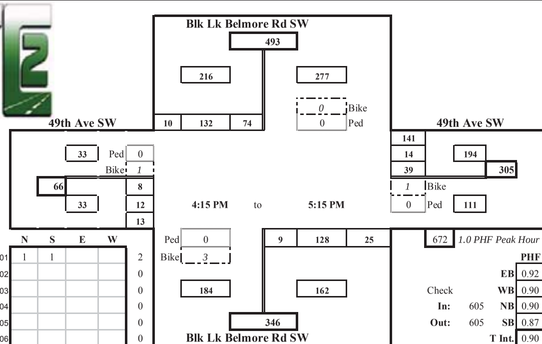
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Black Lake Belmore Rd SW & 49th Ave SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Blk Lk Belmore Rd SW				From South on (NB) Blk Lk Belmore Rd SW				From East on (WB) 49th Ave SW				From West on (EB) 49th Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	18	29	2	0	2	19	6	0	9	1	26	0	1	3	0	116
4:30 P	1	21	36	5	2	4	23	3	0	8	3	42	1	3	3	2	153
4:45 P	0	24	34	2	0	2	33	10	1	9	4	41	0	3	2	4	168
5:00 P	0	16	29	2	0	0	37	5	0	13	2	31	0	0	5	4	144
5:15 P	0	13	33	1	1	3	35	7	0	9	5	27	0	2	2	3	140
5:30 P	1	18	34	3	0	2	33	2	0	12	2	27	0	8	1	5	147
5:45 P	0	11	25	4	0	1	20	6	0	12	5	22	0	1	3	3	113
6:00 P	0	10	16	1	1	4	25	4	0	8	3	22	0	3	2	3	101
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	131	236	20	4	18	225	43	1	80	25	238	1	21	21	24	1082
	Peak Hour: 4:15 PM to 5:15 PM																
Total	1	74	132	10	3	9	128	25	1	39	14	141	1	8	12	13	605
Approach	216				162				194				33				605
%HV	0.5%				1.9%				0.5%				3.0%				1.0%
PHF	0.87				0.90				0.90				0.92				0.90



672 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	1			2
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	1	0	0	**2**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03			1	1	2
INT 04		2			2
INT 05					0
INT 06		1			1
INT 07					0
INT 08	3	1			4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	5	1	1	10

Check
In: 605
Out: 605

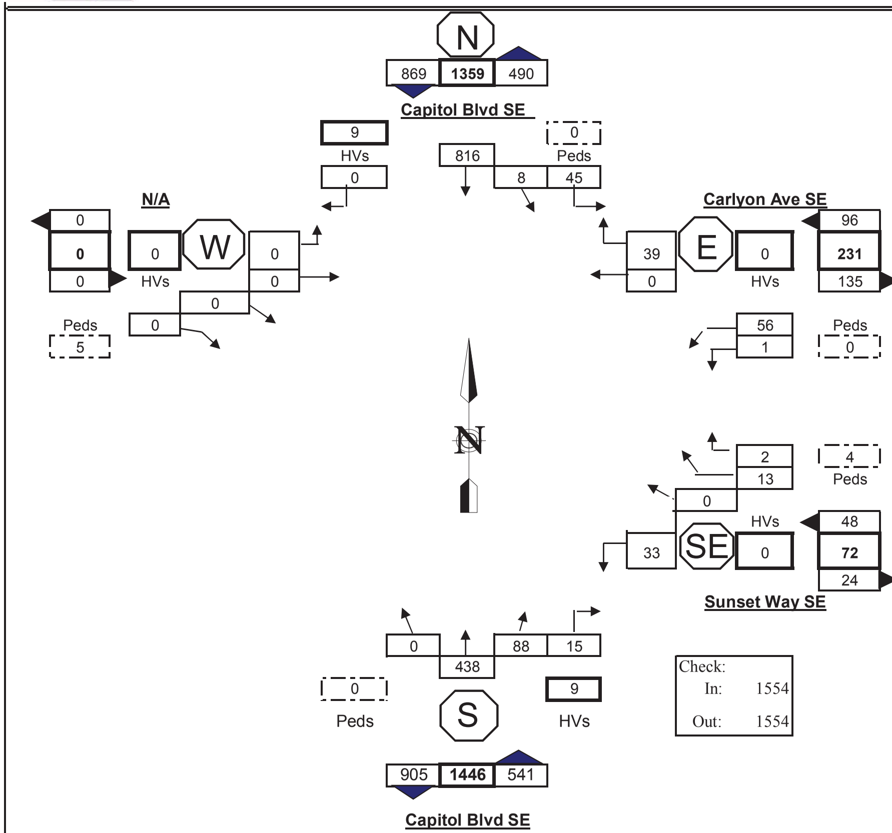
	PHF	%HV
EB	0.92	3.0%
WB	0.90	0.5%
NB	0.90	1.9%
SB	0.87	0.5%
T Int.	0.90	1.0%

Conditions:

SCJ15075M_37p

Traffic Count Consultants, Inc. DBE/WBE DBE/WBE

Phone: (425) 253 926-6009 E-Mail: Team@TC2inc.com



Check:
In: 1554
Out: 1554

Intersection: Capitol Blvd SE & Carlyon Ave SE & Sunset Way SE
Location: Tumwater, Washington
Date of Count: Thurs 6/25/2015
Peak Period: 4:30 P - 5:30 P
Checked By: Jess
Prepared For: SCJ Alliance

	%HV	PHF
SB	1.0%	0.80
WB	n/a	0.67
NWB	n/a	0.92
NB	1.7%	0.95
	0.0%	0.00
EB	n/a	n/a
Intersection	1.2%	0.85

SCJ15075M_01p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

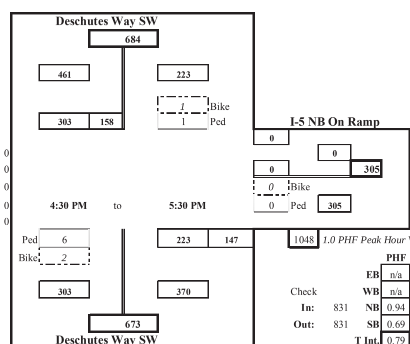
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Deschutes Way SW & I-5 NB On Ramp **Date of Count:** Wed 7/01/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Deschutes Way SW				From South on (NB) Deschutes Way SW				From East on (WB) I-5 NB On Ramp				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	38	49	0	1	0	37	51	0	0	0	0	0	0	0	0	175
4:30 P	0	25	53	0	2	0	36	30	0	0	0	0	0	0	0	0	144
4:45 P	0	32	71	0	0	0	54	38	0	0	0	0	0	0	0	0	195
5:00 P	0	27	48	0	0	0	47	38	0	0	0	0	0	0	0	0	160
5:15 P	0	64	103	0	0	0	56	39	0	0	0	0	0	0	0	0	262
5:30 P	0	35	81	0	1	0	66	32	0	0	0	0	0	0	0	0	214
5:45 P	0	34	51	0	0	0	64	33	0	0	0	0	0	0	0	0	182
6:00 P	0	24	45	0	1	0	43	49	0	0	0	0	0	0	0	0	161
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	279	501	0	5	0	403	310	0	0	0	0	0	0	0	0	1493
Peak Hour: 4:30 PM to 5:30 PM																	
Total	0	158	303	0	1	0	223	147	0	0	0	0	0	0	0	0	831
Approach	461				370				0				0				831
%HV	n/a				0.3%				n/a				n/a				0.1%
PHF	0.69				0.94				n/a				n/a				0.79



1048 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	n/a	n/a
WB	n/a	n/a
NB	0.94	0.3%
SB	0.69	n/a
T Int.	0.79	0.1%

Check In: 831 Out: 831

Conditions:

PEDs Across:	N	S	E	W	
INT 01	2				2
INT 02					0
INT 03		1			1
INT 04		2			2
INT 05		2			2
INT 06	1	1			2
INT 07		5			5
INT 08	2				2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	5	11	0	0	16

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03	1	1			2
INT 04		1			1
INT 05					0
INT 06					0
INT 07		1			1
INT 08		3			3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	7	0	0	8

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

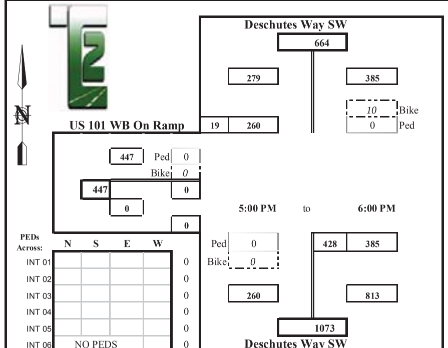
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Deschutes Way SW & US 101 WB On Ramp **Date of Count:** Wed 7/01/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Deschutes Way SW				From South on (NB) Deschutes Way SW				From East on (WB) 0				From West on (EB) US 101 WB On Ramp				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	0	45	2	3	95	87	0	0	0	0	0	0	0	0	0	229
4:30 P	0	0	47	0	2	88	67	0	0	0	0	0	0	0	0	0	202
4:45 P	0	0	72	2	0	93	89	0	0	0	0	0	0	0	0	0	256
5:00 P	0	0	47	4	1	113	81	0	0	0	0	0	0	0	0	0	245
5:15 P	0	0	92	7	0	101	98	0	0	0	0	0	0	0	0	0	298
5:30 P	0	0	76	5	1	105	96	0	0	0	0	0	0	0	0	0	282
5:45 P	0	0	49	3	0	116	97	0	0	0	0	0	0	0	0	0	265
6:00 P	0	0	43	4	1	106	94	0	0	0	0	0	0	0	0	0	247
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	0	471	27	8	817	709	0	0	0	0	0	0	0	0	0	2024
Peak Hour: 5:00 PM to 6:00 PM																	
Total	0	0	260	19	2	428	385	0	0	0	0	0	0	0	0	0	1092
Approach	279				813				0				0				1092
%HV	n/a				0.2%				n/a				n/a				0.2%
PHF	0.70				0.95				n/a				n/a				0.92



1192 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	n/a	n/a
WB	n/a	n/a
NB	0.95	0.2%
SB	0.70	n/a
T Int.	0.92	0.2%

Check In: 1092 Out: 1092

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02	1				1
INT 03	1				1
INT 04	2				2
INT 05					0
INT 06					0
INT 07					0
INT 08	10				10
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	14	0	0	0	14

Item 8.

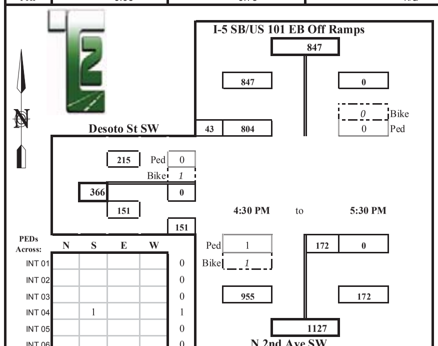
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: I-5 SB/US 101 EB Off Ramps/N 2nd Ave SW & Desoto St SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) I-5 SB/US 101 EB Off Ramp				From South on (NB) N 2nd Ave SW				From East on (WB) 0				From West on (EB) Desoto St SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	0	195	9	0	33	0	0	0	0	0	0	0	0	0	28	265
4:30 P	1	0	200	9	0	26	0	0	0	0	0	0	0	0	0	33	268
4:45 P	0	0	197	8	0	42	0	0	0	0	0	0	1	0	0	31	278
5:00 P	1	0	195	15	0	38	0	0	0	0	0	0	0	0	0	33	281
5:15 P	1	0	198	13	0	33	0	0	0	0	0	0	0	0	0	37	281
5:30 P	4	0	214	7	0	59	0	0	0	0	0	0	0	0	0	50	330
5:45 P	1	0	202	11	0	36	0	0	0	0	0	0	0	0	0	18	267
6:00 P	0	0	199	9	0	41	0	0	0	0	0	0	1	0	0	28	277
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	9	0	1600	81	0	308	0	0	0	0	0	0	2	0	0	258	2247
	Peak Hour: 4:30 PM to 5:30 PM																
Total	6	0	804	43	0	172	0	0	0	0	0	0	1	0	0	151	1170
Approach	847				172				0				151				1170
%HV	0.7%				n/a				n/a				0.7%				0.6%
PHF	0.96				0.73				n/a				0.76				0.89



PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1			1
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	0	0	1

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03		1			1
INT 04					0
INT 05					0
INT 06				1	1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	0	1	3

1320 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.76	0.7%
Check	WB	n/a	n/a
In: 1170	NB	0.73	n/a
Out: 1170	SB	0.96	0.7%
	T Int.	0.89	0.6%

Conditions:

SCJ15075M_28p

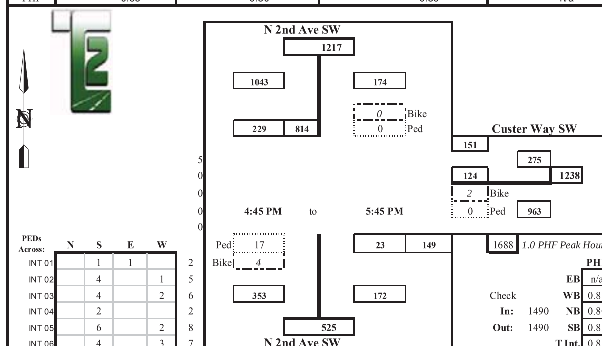
Prepared for: **TENW**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: N 2nd Ave SW & Custer Way SW **Date of Count:** Tues 2/10/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) N 2nd Ave SW				From South on (NB) N 2nd Ave SW				From East on (WB) Custer Way SW				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	215	47	0	0	0	4	36	0	18	0	32	0	0	0	0	352
4:30 P	3	199	68	0	1	0	6	25	1	21	0	30	0	0	0	0	349
4:45 P	0	186	45	0	0	0	5	27	0	31	0	27	0	0	0	0	321
5:00 P	0	200	51	0	0	0	5	35	1	28	0	38	0	0	0	0	357
5:15 P	0	186	55	0	1	0	5	49	1	27	0	40	0	0	0	0	362
5:30 P	0	240	65	0	1	0	5	31	1	42	0	39	0	0	0	0	422
5:45 P	0	188	58	0	0	0	8	34	0	27	0	34	0	0	0	0	349
6:00 P	0	160	50	0	0	0	2	40	1	22	0	32	0	0	0	0	306
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	1574	439	0	3	0	40	277	5	216	0	272	0	0	0	0	2818
	Peak Hour: 4:45 PM to 5:45 PM																
Total	0	814	229	0	2	0	23	149	3	124	0	151	0	0	0	0	1490
Approach	1043				172				275				0				1490
%HV	n/a				1.2%				1.1%				n/a				0.3%
PHF	0.85				0.80				0.85				n/a				0.88



PEDs Across:	N	S	E	W	
INT 01		1	1		2
INT 02		4		1	5
INT 03		4		2	6
INT 04		2			2
INT 05		6		2	8
INT 06		4		3	7
INT 07		5			5
INT 08		6			6
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	32	1	8	41

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03		1	1		2
INT 04			1		1
INT 05		2	1		3
INT 06		1			1
INT 07		1			1
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	6	3	0	9

1688 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	n/a	n/a
Check	WB	0.85	1.1%
In: 1490	NB	0.80	1.2%
Out: 1490	SB	0.85	n/a
	T Int.	0.88	0.3%

Conditions:

TENW15020M_01p

Item 8.

Prepared for: **SCJ Alliance**

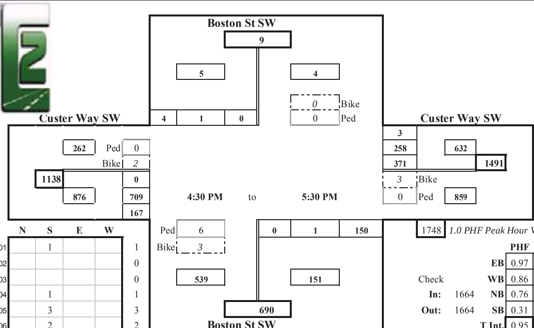
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Boston St SW & Custer Way SW
Location: Tumwater, Washington
Date of Count: Thurs 6/25/2015
Checked By: Jess

Time Interval Ending at	From North on (SB) Boston St SW				From South on (NB) Boston St SW				From East on (WB) Custer Way SW				From West on (EB) Custer Way SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	1	0	0	0	31	3	80	47	0	1	1	199	40	399
4:30 P	0	0	0	0	0	0	1	34	2	96	53	0	1	0	172	30	386
4:45 P	0	0	0	1	0	0	0	36	1	80	62	0	0	0	184	34	397
5:00 P	0	0	1	3	0	0	1	33	1	92	58	1	3	0	183	42	414
5:15 P	0	0	0	0	0	0	0	50	0	91	64	1	0	0	172	38	416
5:30 P	0	0	0	0	0	0	0	31	1	108	74	1	4	0	170	53	437
5:45 P	0	0	0	1	0	0	0	32	0	111	56	1	0	0	143	35	379
6:00 P	0	0	0	0	0	0	0	24	1	96	46	0	1	0	149	27	342
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	1	6	0	0	2	271	9	754	460	4	10	1	1372	299	3170
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	0	1	4	0	0	1	150	3	371	258	3	7	0	709	167	1664
Approach	5				151				632				876				1664
%HV	n/a				n/a				0.5%				0.8%				0.6%
PHF	0.31				0.76				0.86				0.97				0.95



1748 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01		1			1
INT 02					0
INT 03					0
INT 04		1			1
INT 05		3			3
INT 06		2			2
INT 07					0
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	8	0	0	8

Special Notes

Bicycles From:	N	S	E	W	
INT 01		1			1
INT 02			1	2	3
INT 03				1	1
INT 04			1	1	2
INT 05		1			1
INT 06		2	2		4
INT 07		1	5	2	8
INT 08		1	2	4	7
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	6	11	10	27

Check
In: 1664
Out: 1664

	PHF	%HV
EB	0.97	0.8%
WB	0.86	0.5%
NB	0.76	n/a
SB	0.31	n/a
T Int.	0.95	0.6%

Conditions:

SCJ15075M_19p

Prepared for: **SCJ Alliance**

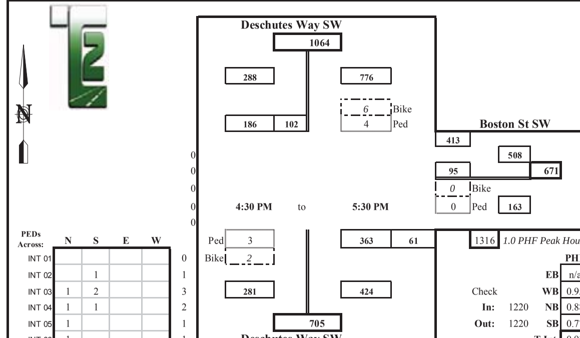
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Deschutes Way SW & Boston St SW
Location: Tumwater, Washington
Date of Count: Wed 7/01/2015
Checked By: Jess

Time Interval Ending at	From North on (SB) Deschutes Way SW				From South on (NB) Deschutes Way SW				From East on (WB) Boston St SW				From West on (EB) 0				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	14	29	0	1	0	75	13	2	19	0	106	0	0	0	0	256
4:30 P	0	19	30	0	2	0	60	10	0	34	0	94	0	0	0	0	247
4:45 P	0	21	50	0	0	0	83	14	0	15	0	106	0	0	0	0	289
5:00 P	0	17	31	0	0	0	82	12	1	28	0	105	0	0	0	0	275
5:15 P	0	36	57	0	0	0	97	15	0	22	0	102	0	0	0	0	329
5:30 P	0	28	48	0	0	0	101	20	1	30	0	100	0	0	0	0	327
5:45 P	0	12	37	0	0	0	111	13	0	14	0	102	0	0	0	0	289
6:00 P	0	10	33	0	1	0	91	11	0	12	0	107	0	0	0	0	264
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	157	315	0	4	0	700	108	4	174	0	822	0	0	0	0	2276
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	102	186	0	0	0	363	61	2	95	0	413	0	0	0	0	1220
Approach	288				424				508				0				1220
%HV	n/a				n/a				0.4%				n/a				0.2%
PHF	0.77				0.88				0.95				n/a				0.93



1316 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03	1	2			3
INT 04	1	1			2
INT 05	1				1
INT 06	1				1
INT 07		2			2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	6	0	0	10

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02	2				2
INT 03	2				2
INT 04	1				1
INT 05	2	2			4
INT 06	1				1
INT 07	1	1			2
INT 08	10	1			11
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	19	4	0	0	23

Check
In: 1220
Out: 1220

	PHF	%HV
EB	n/a	n/a
WB	0.95	0.4%
NB	0.88	n/a
SB	0.77	n/a
T Int.	0.93	0.2%

Conditions:

SCJ15075M_22p

Item 8.

Prepared for: **SCJ Alliance**

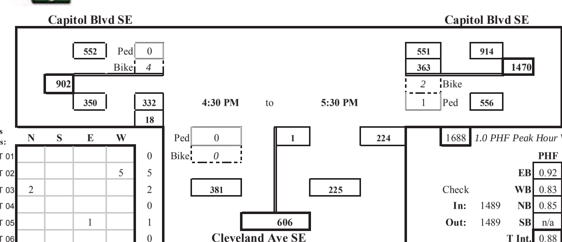
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Cleveland Ave SE & Capitol Blvd SE **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) 0				From South on (NB) Cleveland Ave SE				From East on (WB) Capitol Blvd SE				From West on (EB) Capitol Blvd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	4	0	0	51	3	66	82	0	2	0	70	8	277
4:30 P	0	0	0	0	3	0	0	51	2	57	96	0	1	0	69	7	280
4:45 P	0	0	0	0	3	0	0	66	5	89	116	0	1	0	78	7	356
5:00 P	0	0	0	0	2	0	0	51	1	64	110	0	0	0	72	4	301
5:15 P	0	0	0	0	1	0	0	52	2	110	165	0	1	0	90	5	422
5:30 P	0	0	0	0	3	1	0	55	2	100	160	0	0	0	92	2	410
5:45 P	0	0	0	0	1	0	0	44	3	64	100	0	1	0	61	8	277
6:00 P	0	0	0	0	3	0	0	53	1	53	75	0	0	0	72	4	257
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	20	1	0	423	19	603	904	0	6	0	604	45	2580
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	0	0	0	9	1	0	224	10	363	551	0	2	0	332	18	1489
Approach	0				225				914				350				1489
%HV	n/a				4.0%				1.1%				0.6%				1.4%
PHF	n/a				0.85				0.83				0.92				0.88



PEDs Across:	N	S	E	W	
INT 01					0
INT 02				5	5
INT 03	2				2
INT 04					0
INT 05			1		1
INT 06					0
INT 07				2	2
INT 08			2	1	3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	0	3	8	**13**

Special Notes

Bicycles From:	N	S	E	W	
INT 01				2	2
INT 02				1	1
INT 03			1	1	2
INT 04					0
INT 05			1	1	2
INT 06				2	2
INT 07				3	3
INT 08		1	1	2	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	3	12	16

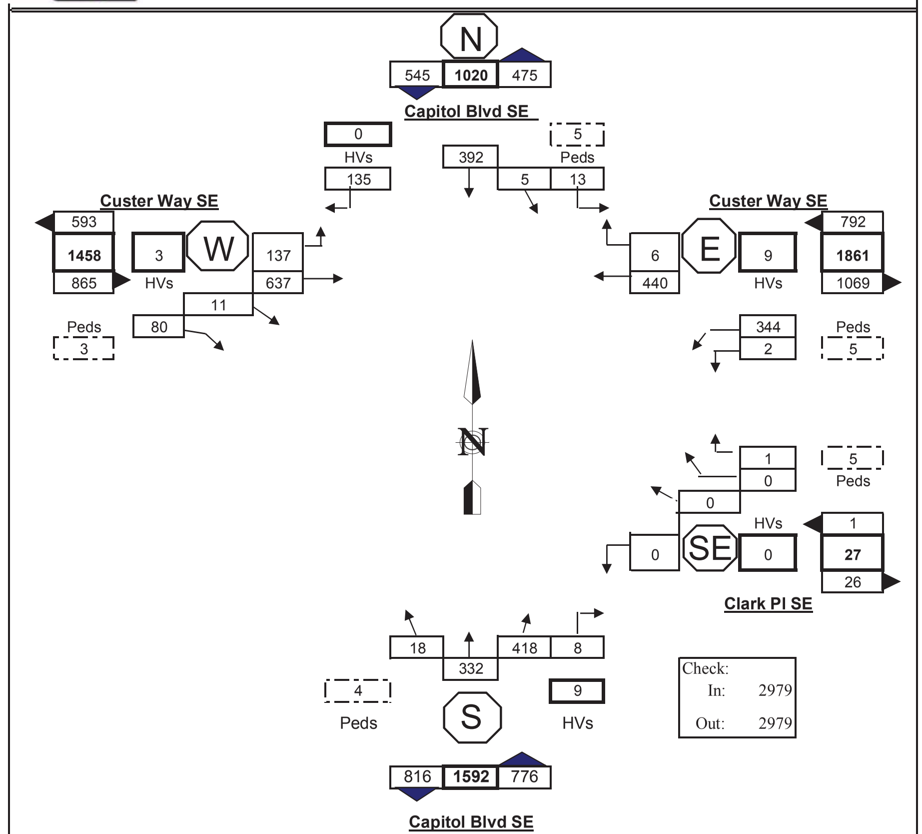
Check
In: 1489
Out: 1489

	PHF	%HV
EB	0.92	0.6%
WB	0.83	1.1%
NB	0.85	4.0%
SB	n/a	n/a
T Int.	0.88	1.4%

Conditions:

Traffic Count Consultants, Inc. DBE/WBE DBE/WBE

Phone: (425) 253 926-6009 E-Mail: Team@TC2inc.com



Intersection: Capitol Blvd SE & Custer Way SE & Clark Pl SE
Location: Tumwater, Washington
Date of Count: Tues 2/10/2015
Peak Period: 4:45 P - 5:45 P
Checked By: Jess
Prepared For: TENW

	%HV	PHF
SB	n/a	0.71
WB	1.1%	0.88
NWB	n/a	0.25
NB	1.2%	0.97
	0.0%	0.00
EB	0.3%	0.92
Intersection	0.7%	0.90

TENW15020M_02p

Item 8.

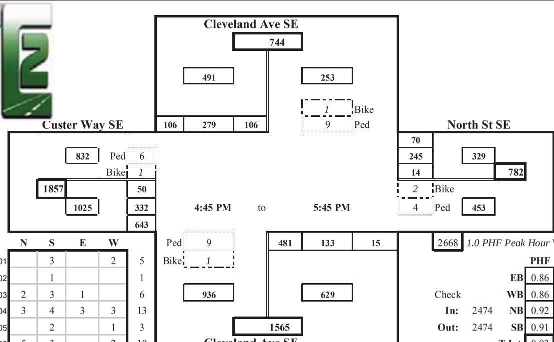
Prepared for: **TENW**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Cleveland Ave SE & North St SE/Custer Way SE **Date of Count:** Tues 2/10/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Cleveland Ave SE				From South on (NB) Cleveland Ave SE				From East on (WB) North St SE				From West on (EB) Custer Way SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	13	44	23	0	117	25	4	2	2	64	19	3	14	83	134	542
4:30 P	4	30	56	29	1	131	26	2	0	5	38	20	1	14	73	147	571
4:45 P	3	26	54	20	0	132	27	2	2	3	52	12	3	23	78	135	564
5:00 P	2	22	59	27	1	123	41	7	0	6	50	15	1	12	57	135	554
5:15 P	2	25	80	30	0	112	26	2	2	5	60	20	3	6	86	162	614
5:30 P	3	28	79	18	0	130	34	3	0	2	62	13	1	17	99	182	667
5:45 P	2	31	61	31	0	116	32	3	1	1	73	22	3	15	90	164	639
6:00 P	3	15	54	29	0	115	33	1	0	4	57	18	2	14	79	131	550
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	20	190	487	207	2	976	244	24	7	28	456	139	17	115	645	1190	4701
	Peak Hour: 4:45 PM to 5:45 PM																
Total	9	106	279	106	1	481	133	15	3	14	245	70	8	50	332	643	2474
Approach	491				629				329				1025				2474
%HV	1.8%				0.2%				0.9%				0.8%				0.8%
PHF	0.91				0.92				0.86				0.86				0.93



2668 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01		3		2	5
INT 02		1			1
INT 03	2	3	1		6
INT 04	3	4	3	3	13
INT 05		2		1	3
INT 06	5	3		2	10
INT 07	1		1		2
INT 08	4		2	1	7
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	15	16	7	9	47

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03				1	1
INT 04	1				1
INT 05			1	1	2
INT 06			1		1
INT 07		1			1
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	1	2	2	6

Check
In: 2474
Out: 2474

	PHF	%HV
EB	0.86	0.8%
WB	0.86	0.9%
NB	0.92	0.2%
SB	0.91	1.8%
T Int.	0.93	0.8%

Conditions:

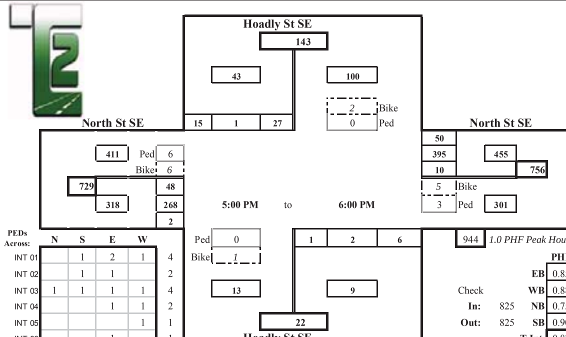
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Hoadly St SE & North St SE **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Hoadly St SE				From South on (NB) Hoadly St SE				From East on (WB) North St SE				From West on (EB) North St SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	9	0	5	0	1	0	0	1	2	73	9	3	7	51	1	158
4:30 P	0	8	1	3	0	0	0	1	2	2	68	10	1	1	51	0	145
4:45 P	0	9	0	3	0	1	2	1	2	0	100	12	2	4	48	0	180
5:00 P	1	7	2	5	0	0	0	0	1	1	103	11	1	2	52	4	187
5:15 P	0	8	1	1	0	1	0	1	1	1	106	13	1	5	70	0	207
5:30 P	0	6	0	4	0	0	0	2	1	0	92	12	0	5	75	1	197
5:45 P	0	5	0	7	0	0	0	2	0	3	86	13	1	8	60	1	185
6:00 P	0	8	0	3	0	0	2	1	1	6	111	12	0	30	63	0	236
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	60	4	31	0	3	4	8	9	15	739	92	9	62	470	7	1495
	Peak Hour: 5:00 PM to 6:00 PM																
Total	0	27	1	15	0	1	2	6	3	10	395	50	2	48	268	2	825
Approach	43				9				455				318				825
%HV	n/a				n/a				0.7%				0.6%				0.6%
PHF	0.90				0.75				0.88				0.85				0.87



944 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01		1	2	1	4
INT 02		1	1		2
INT 03	1	1	1	1	4
INT 04			1	1	2
INT 05				1	1
INT 06			1		1
INT 07				2	2
INT 08			2	3	5
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	8	9	21

Special Notes

Bicycles From:	N	S	E	W	
INT 01			3		3
INT 02				3	3
INT 03	1	1			2
INT 04		1	4	2	7
INT 05			3	2	5
INT 06	1				1
INT 07	1	1	1	1	4
INT 08			1	3	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	3	12	11	29

Check
In: 825
Out: 825

	PHF	%HV
EB	0.85	0.6%
WB	0.88	0.7%
NB	0.75	n/a
SB	0.90	n/a
T Int.	0.87	0.6%

Conditions:

SCJ15075M_48p

Item 8.

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

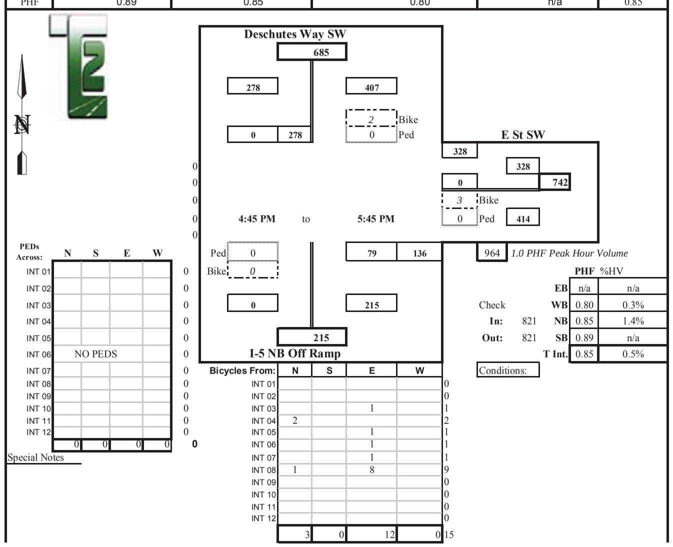
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Deschutes Way SW/I-5 NB Off Ramp & E St SW **Date of Count:** Thurs 6/25/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Deschutes Way SW				From South on (NB) I-5 NB Off Ramp				From East on (WB) E St SW				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	60	0	0	2	0	25	29	2	0	0	58	0	0	0	0	172
4:30 P	1	48	0	0	1	0	15	31	1	0	0	58	0	0	0	0	152
4:45 P	0	63	0	0	0	0	21	29	0	0	0	52	0	0	0	0	165
5:00 P	0	56	0	0	0	0	18	33	0	0	0	55	0	0	0	0	162
5:15 P	0	78	0	0	1	0	22	33	1	0	0	72	0	0	0	0	205
5:30 P	0	68	0	0	1	0	14	32	0	0	0	99	0	0	0	0	213
5:45 P	0	76	0	0	1	0	25	38	0	0	0	102	0	0	0	0	241
6:00 P	0	36	0	0	0	0	15	26	0	0	0	74	0	0	0	0	151
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	2	485	0	0	6	0	155	251	4	0	0	570	0	0	0	0	1461
Peak Hour: 4:45 PM to 5:45 PM																	
Total	0	278	0	0	3	0	79	136	1	0	0	328	0	0	0	0	821
Approach	278				215				328				0				821
%HV	n/a				1.4%				0.3%				n/a				0.5%
PHF	0.89				0.85				0.80				n/a				0.85



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

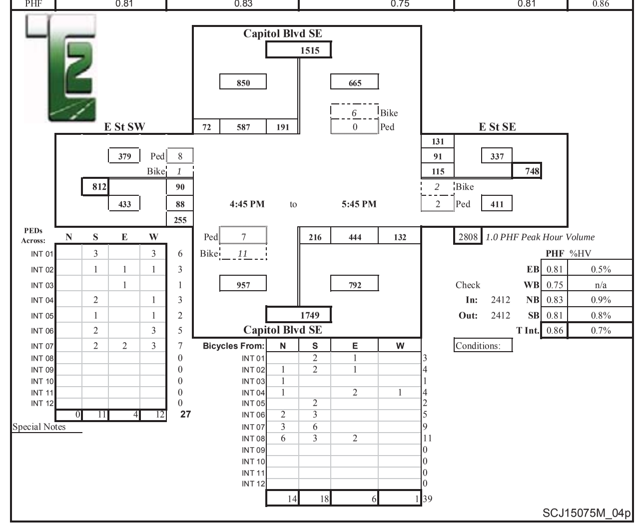
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & E St SE **Date of Count:** Thurs 6/25/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) E St SE				From West on (EB) E St SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	43	111	17	3	39	98	23	0	18	11	25	0	17	19	51	472
4:30 P	4	46	106	9	2	42	89	21	0	19	19	23	1	20	19	44	457
4:45 P	4	23	142	5	2	28	130	17	0	14	14	16	0	21	20	56	486
5:00 P	1	47	105	6	1	41	105	33	0	22	19	23	0	21	18	40	480
5:15 P	1	44	175	14	2	53	126	35	0	25	18	30	2	19	25	64	628
5:30 P	3	60	182	20	1	65	130	45	0	35	21	31	0	24	27	62	702
5:45 P	2	40	125	32	3	57	83	19	0	33	33	47	0	26	18	89	602
6:00 P	1	26	116	22	1	38	97	23	0	22	24	30	0	23	8	39	468
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	18	329	1062	125	15	363	858	216	0	188	159	225	3	171	154	445	4295
Peak Hour: 4:45 PM to 5:45 PM																	
Total	7	191	587	72	7	216	444	132	0	115	91	131	2	90	88	255	2412
Approach	850				792				337				433				2412
%HV	0.8%				0.9%				n/a				0.5%				0.7%
PHF	0.81				0.83				0.75				0.81				0.86



SCJ15075M_04p

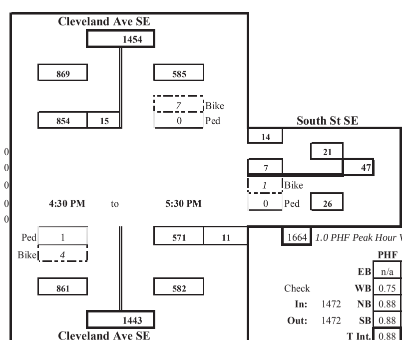
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Cleveland Ave SE & South St SE **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Cleveland Ave SE T	L	S	R	From South on (NB) Cleveland Ave SE T	L	S	R	From East on (WB) South St SE T	L	S	R	From West on (EB) 0 T	L	S	R	Interval Total
4:15 P	1	2	185	0	1	0	141	2	0	1	0	5	0	0	0	0	336
4:30 P	2	4	183	0	4	0	126	1	0	1	0	0	0	0	0	0	315
4:45 P	1	2	197	0	0	0	133	1	0	0	0	7	0	0	0	0	340
5:00 P	1	5	212	0	0	0	132	5	0	2	0	3	0	0	0	0	359
5:15 P	4	5	202	0	2	0	144	2	0	3	0	1	0	0	0	0	357
5:30 P	2	3	243	0	0	0	162	3	0	2	0	3	0	0	0	0	416
5:45 P	2	3	197	0	0	0	131	1	0	0	0	1	0	0	0	0	333
6:00 P	1	5	176	0	0	0	151	1	1	4	0	5	0	0	0	0	342
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	14	29	1595	0	7	0	1120	16	1	13	0	25	0	0	0	0	2798
Peak Hour: 4:30 PM to 5:30 PM																	
Total	8	15	854	0	2	0	571	11	0	7	0	14	0	0	0	0	1472
Approach	869				582				21				0				1472
%HV	0.9%				0.3%				n/a				n/a				0.7%
PHF	0.88				0.88				0.75				n/a				0.88



1664 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	n/a	n/a
WB	0.75	n/a
NB	0.88	0.3%
SB	0.88	0.9%
T Int.	0.88	0.7%

Check In: 1472 Out: 1472

Conditions:

PEDs Across:	N	S	E	W	
INT 01	1		1		2
INT 02					0
INT 03		1			1
INT 04					0
INT 05					0
INT 06					0
INT 07		1			1
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	1	0	5

Bicycles From:	N	S	E	W	
INT 01	1				1
INT 02		2			2
INT 03	4				4
INT 04	1				1
INT 05		1	1		2
INT 06	2	3			5
INT 07		2			2
INT 08	1	2			3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	9	10	1	0	20

Special Notes

SCJ15075M_49p

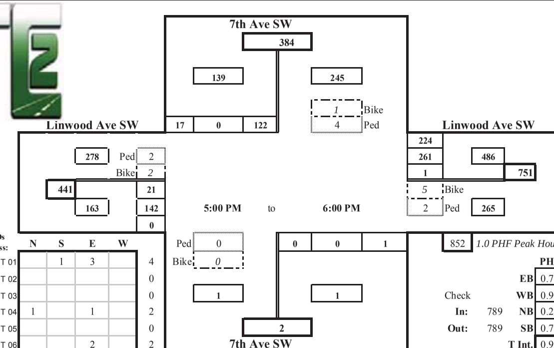
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: 7th Ave SW & Linwood Ave SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) 7th Ave SW T	L	S	R	From South on (NB) 7th Ave SW T	L	S	R	From East on (WB) Linwood Ave SW T	L	S	R	From West on (EB) Linwood Ave SW T	L	S	R	Interval Total
4:15 P	1	21	0	4	0	0	0	0	1	0	49	55	0	5	49	0	183
4:30 P	0	15	0	3	0	0	0	0	1	0	64	33	1	2	36	0	153
4:45 P	3	27	0	7	0	0	0	0	0	0	50	43	0	2	35	0	164
5:00 P	1	38	0	4	0	0	0	0	2	0	42	30	1	4	31	0	149
5:15 P	1	40	0	4	0	0	0	0	1	0	57	46	2	8	33	0	188
5:30 P	0	26	0	4	0	0	0	0	1	0	65	70	2	5	36	0	206
5:45 P	1	24	0	7	0	0	0	0	0	0	75	48	0	3	25	0	182
6:00 P	0	32	0	2	0	0	0	1	1	1	64	60	1	5	48	0	213
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	7	223	0	35	0	0	0	1	7	1	466	385	7	34	293	0	1438
Peak Hour: 5:00 PM to 6:00 PM																	
Total	2	122	0	17	0	0	0	1	3	1	261	224	5	21	142	0	789
Approach	139				1				486				163				789
%HV	1.4%				n/a				0.6%				3.1%				1.3%
PHF	0.79				0.25				0.90				0.77				0.93



852 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.77	3.1%
WB	0.90	0.6%
NB	0.25	n/a
SB	0.79	1.4%
T Int.	0.93	1.3%

Check In: 789 Out: 789

Conditions:

PEDs Across:	N	S	E	W	
INT 01		1	3		4
INT 02					0
INT 03					0
INT 04	1		1		2
INT 05					0
INT 06			2		2
INT 07					0
INT 08	4			2	6
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	5	1	6	2	14

Bicycles From:	N	S	E	W	
INT 01				1	1
INT 02	2				2
INT 03					0
INT 04			2		2
INT 05	1			1	2
INT 06			2		2
INT 07			2		2
INT 08			1	1	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	0	7	3	13

Special Notes

Item 8.

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

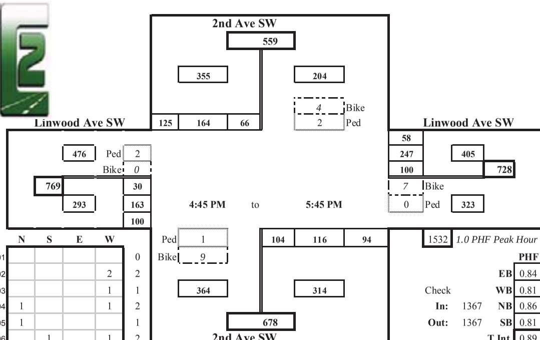
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: 2nd Ave SW & Linwood Ave SW **Date of Count:** Tues 6/30/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) 2nd Ave SW				From South on (NB) 2nd Ave SW				From East on (WB) Linwood Ave SW				From West on (EB) Linwood Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	18	47	25	0	30	26	17	0	25	49	15	1	10	39	26	327
4:30 P	1	8	41	25	0	25	24	23	1	17	52	11	1	13	31	14	284
4:45 P	0	21	37	26	1	26	28	15	1	24	43	9	2	15	28	31	303
5:00 P	1	13	37	24	0	23	26	29	1	23	35	14	1	12	40	26	302
5:15 P	0	16	40	29	0	29	38	24	0	21	53	15	1	2	49	36	352
5:30 P	1	25	45	39	0	39	22	22	1	24	75	20	1	11	43	18	383
5:45 P	0	12	42	33	0	13	30	19	0	32	84	9	1	5	31	20	330
6:00 P	1	9	25	32	0	37	28	13	1	25	55	7	1	8	46	16	301
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	122	314	233	1	222	222	162	5	191	446	100	9	76	307	187	2582
	Peak Hour: 4:45 PM to 5:45 PM																
Total	2	66	164	125	0	104	116	94	2	100	247	58	4	30	163	100	1367
Approach	355				314				405				293				1367
%HV	0.6%				n/a				0.5%				1.4%				0.6%
PHF	0.81				0.86				0.81				0.84				0.89



1532 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.84	1.4%
WB	0.81	0.5%
NB	0.86	n/a
SB	0.81	0.6%
T Int.	0.89	0.6%

Check In: 1367 Out: 1367

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02				2	2
INT 03				1	1
INT 04	1			1	2
INT 05	1				1
INT 06		1		1	2
INT 07					0
INT 08	1	1		2	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	2	0	7	12

Special Notes

Bicycles From:	N	S	E	W	
INT 01				1	1
INT 02				1	1
INT 03		1			1
INT 04	2	2	1		5
INT 05		1	1		2
INT 06	1	4	4		9
INT 07	1	2	1		4
INT 08	1	2		1	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	5	12	7	3	27

SCJ15075M_25p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

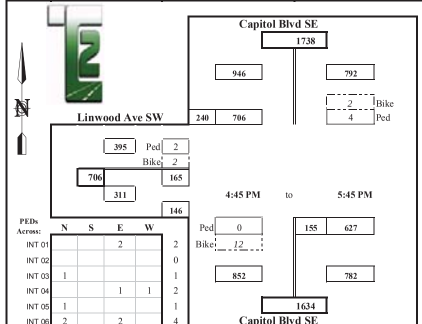
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & Linwood Ave SW **Date of Count:** Thurs 6/25/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) 0				From West on (EB) Linwood Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	0	133	47	2	36	123	0	0	0	0	0	2	37	0	31	407
4:30 P	3	0	145	37	1	45	117	0	0	0	0	0	1	35	0	31	410
4:45 P	3	0	150	54	4	41	140	0	0	0	0	0	1	35	0	26	446
5:00 P	3	0	145	34	1	31	144	0	0	0	0	0	0	35	0	40	429
5:15 P	1	0	195	64	1	46	162	0	0	0	0	0	1	52	0	35	554
5:30 P	1	0	199	83	1	50	196	0	0	0	0	0	1	44	0	36	608
5:45 P	2	0	167	59	3	28	125	0	0	0	0	0	1	34	0	35	448
6:00 P	1	0	124	35	1	32	121	0	0	0	0	0	0	36	0	23	371
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	17	0	1258	413	14	309	1128	0	0	0	0	0	7	308	0	257	3673
	Peak Hour: 4:45 PM to 5:45 PM																
Total	7	0	706	240	6	155	627	0	0	0	0	0	3	165	0	146	2039
Approach	946				782				0				311				2039
%HV	0.7%				0.8%				n/a				1.0%				0.8%
PHF	0.84				0.79				n/a				0.89				0.84



2432 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.89	1.0%
WB	n/a	n/a
NB	0.79	0.8%
SB	0.84	0.7%
T Int.	0.84	0.8%

Check In: 2039 Out: 2039

PEDs Across:	N	S	E	W	
INT 01			2		2
INT 02					0
INT 03	1				1
INT 04			1	1	2
INT 05	1				1
INT 06	2		2		4
INT 07	1			1	2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	5	0	5	2	12

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01		1			1		0		
INT 02	2	2			4		0		
INT 03					0		0		
INT 04	1				1		0		
INT 05		3			3		1		
INT 06		5		1	6		0		
INT 07	1	4		1	6		0		
INT 08	2	2		1	5		0		
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	6	17	0	3	26	0	1	0	0

SCJ15075M_05p

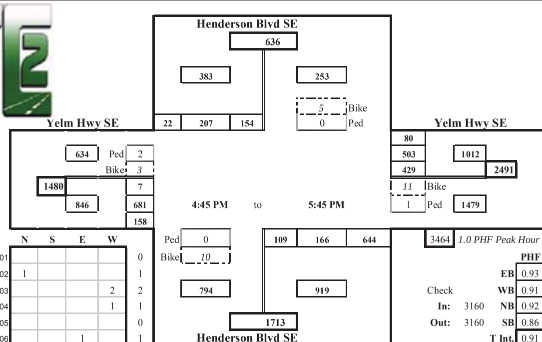
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Henderson Blvd SE & Yelm Hwy SE **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Henderson Blvd SE				From South on (NB) Henderson Blvd SE				From East on (WB) Yelm Hwy SE				From West on (EB) Yelm Hwy SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	37	32	5	2	24	20	123	4	72	111	12	1	1	142	27	606
4:30 P	1	46	40	9	0	12	20	115	3	85	113	14	0	0	154	22	630
4:45 P	0	32	33	1	1	29	33	169	2	100	118	25	0	1	148	34	723
5:00 P	1	31	42	7	0	33	33	142	0	98	112	21	1	1	178	35	733
5:15 P	0	42	56	2	1	24	40	172	3	90	145	20	2	2	158	30	781
5:30 P	2	51	53	7	1	27	50	174	1	134	125	18	1	1	182	44	866
5:45 P	1	30	56	6	4	25	43	156	1	107	121	21	2	3	163	49	780
6:00 P	1	24	51	2	0	18	40	106	5	87	85	11	1	2	109	26	561
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	7	293	363	39	9	192	279	1157	19	773	930	142	8	11	1234	267	5680
	Peak Hour: 4:45 PM to 5:45 PM																
Total	4	154	207	22	6	109	166	644	5	429	503	80	6	7	681	158	3160
Approach	383				919				1012				846				3160
%HV	1.0%				0.7%				0.5%				0.7%				0.7%
PHF	0.86				0.92				0.91				0.93				0.91



3464 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02	1				1
INT 03				2	2
INT 04				1	1
INT 05					0
INT 06			1		1
INT 07				1	1
INT 08				1	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	1	5	**7**

Special Notes

Bicycles From:	N	S	E	W	
INT 01		3		1	4
INT 02	1	1		1	3
INT 03	3				3
INT 04	1	4	1	1	7
INT 05	1	1	1		3
INT 06	2	2	4	2	10
INT 07	1	3	5		9
INT 08	1		1		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	10	14	12	5	41

Check
In: 3160
Out: 3160

	PHF	%HV
EB	0.93	0.7%
WB	0.91	0.5%
NB	0.92	0.7%
SB	0.86	1.0%
T Int.	0.91	0.7%

Conditions:

SCJ15075M_02p

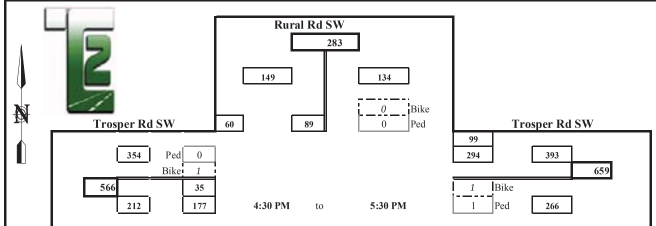
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Rural Rd SW & Trosper Rd SW **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Rural Rd SW				From South on (NB) 0				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	16	0	9	0	0	0	0	1	0	69	16	1	8	46	0	164
4:30 P	1	23	0	12	0	0	0	0	4	0	63	19	1	6	49	0	172
4:45 P	0	23	0	14	0	0	0	0	0	0	69	30	0	7	48	0	191
5:00 P	2	17	0	10	0	0	0	0	3	0	75	14	0	10	43	0	169
5:15 P	0	23	0	24	0	0	0	0	0	0	64	26	0	10	43	0	190
5:30 P	1	26	0	12	0	0	0	0	1	0	86	29	0	8	43	0	204
5:45 P	0	25	0	17	0	0	0	0	0	0	68	19	1	7	49	0	185
6:00 P	1	14	0	14	0	0	0	0	1	0	61	20	0	5	32	0	146
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	6	167	0	112	0	0	0	0	10	0	555	173	3	61	353	0	1421
	Peak Hour: 4:30 PM to 5:30 PM																
Total	3	89	0	60	0	0	0	0	4	0	294	99	0	35	177	0	754
Approach	149				0				393				212				754
%HV	2.0%				n/a				1.0%				n/a				0.9%
PHF	0.79				n/a				0.85				0.96				0.92



816 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04			1		1
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	0	**1**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05			1	1	2
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	1	2

Check
In: 754
Out: 754

	PHF	%HV
EB	0.96	n/a
WB	0.85	1.0%
NB	n/a	n/a
SB	0.79	2.0%
T Int.	0.92	0.9%

Conditions:

SCJ15075M_43p

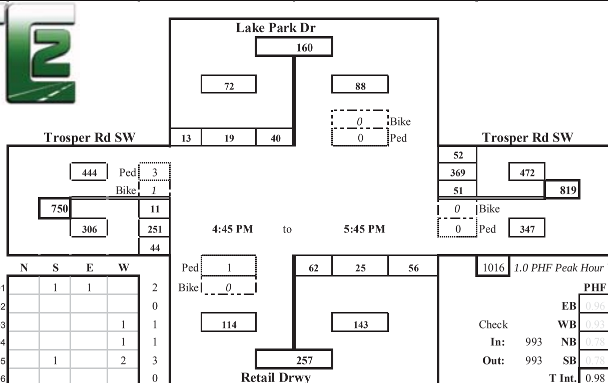
Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Lake Park Dr & Trosper Rd SW
Location: Tumwater, Washington
Date of Count: Wed 3/05/2014
Checked By: Jess

Time Interval	From North on (SB) Lake Park Dr				From South on (NB) Retail Drwy				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	9	3	5	0	6	7	7	0	9	87	6	0	2	60	8	209
4:30 P	0	9	1	4	0	10	3	12	1	8	87	8	1	2	62	8	214
4:45 P	0	6	6	2	0	12	2	15	0	17	75	8	0	4	75	10	232
5:00 P	0	12	3	1	0	11	5	14	1	11	103	13	1	2	63	13	251
5:15 P	0	12	5	6	0	17	4	8	0	13	91	11	0	5	59	10	241
5:30 P	0	10	9	1	0	17	5	16	2	16	87	13	1	2	67	11	254
5:45 P	0	6	2	5	0	17	11	18	0	11	88	15	0	2	62	10	247
6:00 P	0	10	2	1	0	12	5	10	1	12	92	5	1	3	56	8	216
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	74	31	25	0	102	42	100	5	97	710	79	4	22	504	78	1864
	Peak Hour: 4:45 PM to 5:45 PM																
Total	0	40	19	13	0	62	25	56	3	51	369	52	2	11	251	44	993
Approach	72				143				472				306				993
%HV	n/a				n/a				0.6%				0.7%				0.5%
PHF	0.78				0.78				0.93				0.96				0.98



PEDs Across:

	N	S	E	W	
INT 01		1	1		2
INT 02					0
INT 03				1	1
INT 04				1	1
INT 05		1		2	3
INT 06					0
INT 07					0
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	3	1	4	8

Special Notes

Bicycles From:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04				1	1
INT 05					0
INT 06					0
INT 07					0
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	1	2

Check			PHF	%HV
		EB	0.96	0.7%
		WB	0.93	0.6%
In:	993	NB	0.78	n/a
Out:	993	SB	0.78	n/a
		T Int.	0.98	0.5%

Conditions:

SCJ14026M_01p

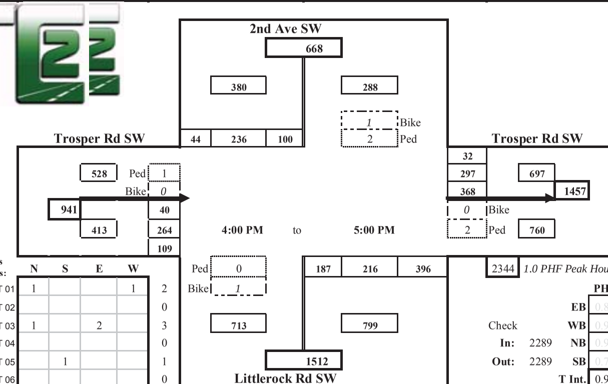
Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: 2nd Ave SW/Littlerock Rd SW & Trosper Rd SW
Location: Tumwater, Washington
Date of Count: Wed 3/05/2014
Checked By: Jess

Time Interval	From North on (SB) 2nd Ave SW				From South on (NB) Littlerock Rd SW				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	29	49	9	1	41	44	102	1	113	65	13	0	7	63	28	563
4:30 P	0	29	82	11	1	45	57	97	2	71	66	7	3	12	59	36	572
4:45 P	1	23	58	6	1	52	46	95	1	94	87	7	0	11	80	27	586
5:00 P	0	19	47	18	3	49	69	102	0	90	79	5	2	10	62	18	568
5:15 P	0	24	51	7	0	45	57	93	2	104	69	9	0	11	61	21	552
5:30 P	0	13	58	15	1	44	59	95	2	74	59	11	2	13	60	27	528
5:45 P	0	21	62	9	0	31	58	110	0	70	70	10	0	8	68	21	538
6:00 P	1	12	39	13	2	34	47	102	0	68	51	8	1	9	40	22	445
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	2	170	446	88	9	341	437	796	8	684	546	70	8	81	493	200	4352
	Peak Hour: 4:00 PM to 5:00 PM																
Total	1	100	236	44	6	187	216	396	4	368	297	32	5	40	264	109	2289
Approach	380				799				697				413				2289
%HV	0.3%				0.8%				0.6%				1. %				0.7%
PHF	0.78				0.91				0.91				0.88				0.98



PEDs Across:

	N	S	E	W	
INT 01	1			1	2
INT 02					0
INT 03	1		2		3
INT 04					0
INT 05		1			1
INT 06					0
INT 07	1		2	1	4
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	1	4	2	10

Special Notes

Bicycles From:

	N	S	E	W	
INT 01					0
INT 02	1				1
INT 03					0
INT 04		1			1
INT 05					0
INT 06		2			2
INT 07		1			1
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	4	1	0	6

Check			PHF	%HV
		EB	0.88	1.2%
		WB	0.91	0.6%
In:	2289	NB	0.91	0.8%
Out:	2289	SB	0.78	0.3%
		T Int.	0.98	0.7%

Conditions:

SCJ14026M_02p

Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

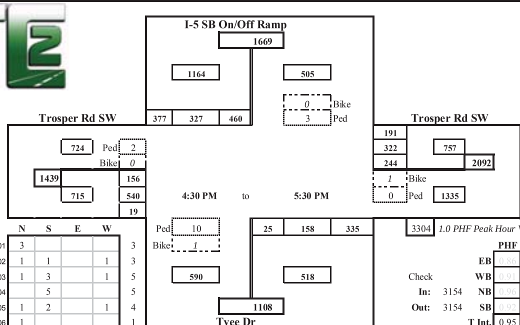
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: I-5 SB On/Off Ramp/Tyee Dr & Trosper Rd SW **Date of Count:** Wed 3/05/2014

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) I-5 SB On/Off Ramp				From South on (NB) Tyee Dr				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	112	93	114	1	7	36	71	4	60	79	46	1	30	165	3	816
4:30 P	6	98	87	87	0	8	31	85	0	55	59	30	0	35	130	8	713
4:45 P	2	117	67	105	4	6	35	80	0	67	99	42	2	45	156	7	826
5:00 P	0	129	90	97	3	5	41	82	1	65	69	58	4	30	123	6	795
5:15 P	1	115	76	89	2	6	45	84	2	57	81	48	0	35	131	4	771
5:30 P	3	99	94	86	0	8	37	89	2	55	73	43	0	46	130	2	762
5:45 P	4	116	94	75	0	3	42	78	0	48	61	63	0	37	153	8	778
6:00 P	1	105	47	62	0	5	33	102	1	62	65	24	2	40	113	4	662
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	19	891	648	715	10	48	300	671	10	469	586	354	9	298	1101	42	6123
	Peak Hour: 4:30 PM to 5:30 PM																
Total	6	460	327	377	9	25	158	335	5	244	322	191	6	156	540	19	3154
Approach	1164				518				757				715				3154
%HV	0.5%				1.7%				0.7%				0.8%				0.8%
PHF	0.9				0.96				0.91				0.86				0.95



3304 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	3				3
INT 02	1	1		1	3
INT 03	1	3		1	5
INT 04		5			5
INT 05	1	2		1	4
INT 06	1				1
INT 07	1	1			2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	8	12	0	3	23

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1			1
INT 05			1		1
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	1	0	2

			PHF	%HV
		EB	0.86	0.8%
Check		WB	0.91	0.7%
In:	3154	NB	0.96	1.7%
Out:	3154	SB	0.92	0.5%
		T Int.	0.95	0.8%

Conditions:

SC 1 0 6 03

Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

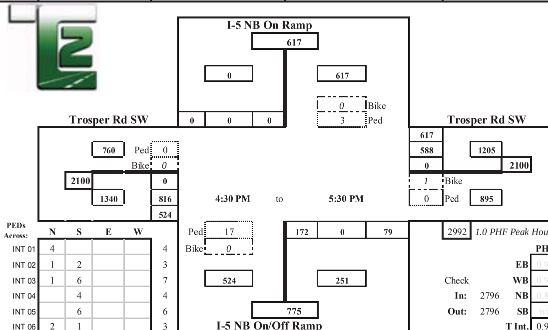
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: I-5 NB On/Off Ramp & Trosper Rd SW **Date of Count:** Wed 3/05/2014

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) I-5 NB On Ramp				From South on (NB) I-5 NB On/Off Ramp				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	0	40	0	10	4	0	145	147	2	0	208	140	690
4:30 P	0	0	0	0	2	29	0	22	1	0	115	112	3	0	191	122	591
4:45 P	0	0	0	0	0	49	0	23	5	0	159	164	2	0	216	137	748
5:00 P	0	0	0	0	1	53	0	23	1	0	140	164	3	0	208	129	717
5:15 P	0	0	0	0	1	33	0	12	2	0	155	139	3	0	196	136	671
5:30 P	0	0	0	0	1	37	0	21	3	0	134	150	2	0	196	122	660
5:45 P	0	0	0	0	0	31	0	17	1	0	141	115	3	0	205	143	652
6:00 P	0	0	0	0	0	27	0	6	2	0	125	105	0	0	203	117	583
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	5	299	0	134	19	0	1114	1096	18	0	1623	1046	5312
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	0	0	0	3	172	0	79	11	0	588	617	10	0	816	524	2796
Approach	0				251				1205				1340				2796
%HV	n/a				1. %				0.9%				0.7%				0.9%
PHF	n/a				0.83				0.93				0.95				0.93



2992 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	4				4
INT 02	1	2			3
INT 03	1	6			7
INT 04		4			4
INT 05		6			6
INT 06	2	1			3
INT 07	1	1			2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	9	20	0	0	29

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05			1		1
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	0	1

			PHF	%HV
		EB	0.95	0.7%
Check		WB	0.93	0.9%
In:	2796	NB	0.83	1.2%
Out:	2796	SB	n/a	n/a
		T Int.	0.93	0.9%

Conditions:

SC 1 0 6 0

Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

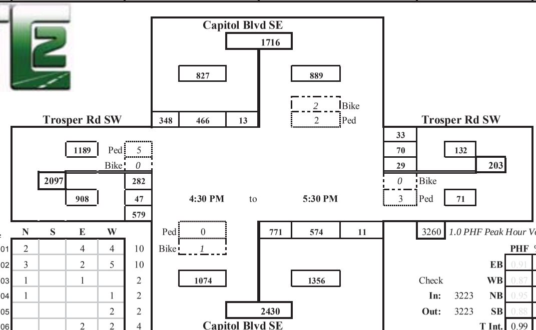
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & Trosper Rd SW **Date of Count:** Wed 3/05/2014

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	6	3	88	92	4	190	123	3	0	5	16	3	1	64	10	150	747
4:30 P	1	5	95	51	1	162	86	3	0	7	10	4	1	76	16	144	659
4:45 P	1	4	97	78	2	206	137	5	0	9	17	12	0	83	12	154	814
5:00 P	1	1	105	92	3	225	130	3	0	7	15	6	0	62	15	131	792
5:15 P	3	6	135	95	2	166	146	2	0	6	18	8	2	63	10	160	815
5:30 P	1	2	129	83	6	174	161	1	0	7	20	7	1	74	10	134	802
5:45 P	1	6	128	90	1	184	107	0	0	11	10	9	4	81	6	143	775
6:00 P	1	6	84	72	2	150	89	2	0	6	14	5	1	91	5	137	661
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	15	33	861	653	21	1457	979	19	0	58	120	54	10	594	84	1153	6065
	Peak Hour: 4:30 PM to 5:30 PM																
Total	6	13	466	348	13	771	574	11	0	29	70	33	3	282	47	579	3223
Approach	827				1356				132				908				3223
%HV	0.7%				1.0%				n/a				0.3%				0.7%
PHF	0.88				0.95				0.87				0.91				0.99



3260 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.91	0.3%
WB	0.87	n/a
NB	0.95	1.0%
SB	0.88	0.7%
T Int.	0.99	0.7%

Check In: 3223 Out: 3223

PEDs Across:	N	S	E	W	
INT 01	2		4	4	10
INT 02	3		2	5	10
INT 03	1		1		2
INT 04	1			1	2
INT 05				2	2
INT 06			2	2	4
INT 07	1		2		3
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	8	0	11	14	33

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0				0
INT 02					0				0
INT 03					0				0
INT 04	1	1			2				1
INT 05	1				1				0
INT 06					0				0
INT 07					0				0
INT 08	1				1				0
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	3	1	0	0	4	0	0	0	1

SC 1 0 6 05

Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

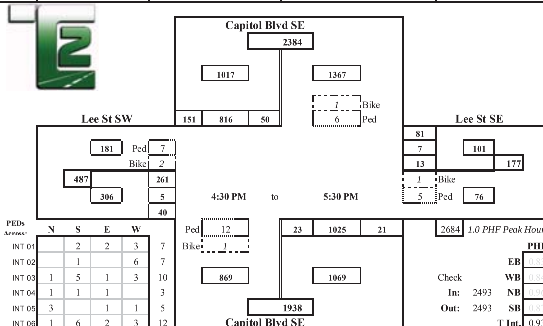
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & Lee St SE/SW **Date of Count:** Wed 3/05/2014

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) Lee St SE				From West on (EB) Lee St SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	13	184	29	2	9	235	6	0	5	1	11	2	70	0	14	577
4:30 P	2	8	190	31	1	4	204	4	0	1	1	10	0	50	1	5	509
4:45 P	1	10	214	25	1	7	248	10	0	2	2	19	1	78	1	13	629
5:00 P	2	13	166	33	3	6	266	5	0	3	2	13	0	56	1	3	567
5:15 P	3	15	230	46	2	2	260	4	0	6	1	23	0	73	1	10	671
5:30 P	2	12	206	47	8	8	251	2	0	2	2	26	0	54	2	14	626
5:45 P	5	10	229	34	2	3	193	0	0	3	2	16	0	52	2	6	550
6:00 P	2	14	175	31	1	10	179	2	0	1	3	16	1	42	0	14	487
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	20	95	1594	276	20	49	1836	33	0	23	14	134	4	475	8	79	4616
	Peak Hour: 4:30 PM to 5:30 PM																
Total	8	50	816	151	14	23	1025	21	0	13	7	81	1	261	5	40	2493
Approach	1017				1069				101				306				2493
%HV	0.8%				1.3%				n/a				0.3%				0.9%
PHF	0.87				0.96				0.8				0.83				0.93



2684 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.83	0.3%
WB	0.84	n/a
NB	0.96	1.3%
SB	0.87	0.8%
T Int.	0.93	0.9%

Check In: 2493 Out: 2493

Conditions:

PEDs Across:	N	S	E	W	
INT 01		2	2	3	7
INT 02		1		6	7
INT 03	1	5	1	3	10
INT 04	1	1	1		3
INT 05	3		1	1	5
INT 06	1	6	2	3	12
INT 07	1				1
INT 08	1	1	1		3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	8	16	8	16	48

Special Notes

Bicycles From:	N	S	E	W	
INT 01		1		1	2
INT 02					0
INT 03					0
INT 04	1		1	1	3
INT 05		1		1	2
INT 06					0
INT 07					0
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	1	3	8

SC 1 0 6 08

Prepared for: **SCJ Alliance**

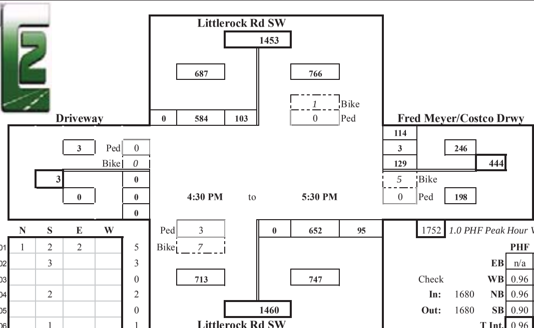
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Fred Meyer/Costco Drwy **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Fred Meyer/Costco Drwy				From West on (EB) Driveway				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	20	135	0	1	0	149	18	0	27	1	29	0	0	0	1	380
4:30 P	3	28	152	0	1	0	135	23	1	26	1	26	0	0	0	0	391
4:45 P	1	34	156	0	0	0	167	26	0	31	0	24	0	0	0	0	438
5:00 P	2	27	144	0	1	0	175	19	1	35	1	28	0	0	0	0	429
5:15 P	0	22	144	0	0	0	157	30	0	30	0	33	0	0	0	0	416
5:30 P	1	20	140	0	1	0	153	20	0	33	2	29	0	0	0	0	397
5:45 P	0	18	111	0	0	0	123	25	0	26	0	28	0	0	0	0	331
6:00 P	0	19	114	0	2	0	128	16	1	28	1	18	0	0	0	0	324
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	8	188	1096	0	6	0	1187	177	3	236	6	215	0	0	0	1	3106
	Peak Hour: 4:30 PM to 5:30 PM																
Total	4	103	584	0	2	0	652	95	1	129	3	114	0	0	0	0	1680
Approach	687				747				246				0				1680
%HV	0.6%				0.3%				0.4%				n/a				0.4%
PHF	0.90				0.96				0.96				n/a				0.96



1752 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	2	2		5
INT 02		3			3
INT 03					0
INT 04		2			2
INT 05					0
INT 06		1			1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	8	2	0	11

Special Notes

Bicycles From:	N	S	E	W	
INT 01	1				1
INT 02	1	2			3
INT 03		2	1		3
INT 04		1			1
INT 05		3	2		5
INT 06	1	1	2		4
INT 07	1	1			2
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	11	5	0	20

Check In: 1680 Out: 1680

	PHF	%HV
EB	n/a	n/a
WB	0.96	0.4%
NB	0.96	0.3%
SB	0.90	0.6%
T Int.	0.96	0.4%

Conditions:

SCJ15075M_11p

Prepared for: **SCJ Alliance**

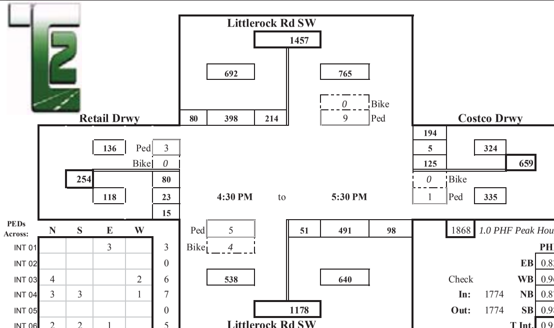
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Costco Drwy **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Costco Drwy				From West on (EB) Retail Drwy				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	53	87	25	2	8	100	27	1	27	5	48	0	16	9	8	413
4:30 P	3	43	101	30	0	4	98	24	0	33	1	46	0	15	7	9	411
4:45 P	1	53	99	24	0	10	148	26	0	30	0	53	0	16	7	1	467
5:00 P	3	59	92	26	1	13	96	22	0	25	0	59	0	21	8	3	424
5:15 P	0	46	101	20	0	9	128	25	0	36	1	38	0	27	3	6	440
5:30 P	1	56	106	10	1	19	119	25	0	34	4	44	0	16	5	5	443
5:45 P	0	40	91	14	1	15	81	24	0	21	3	38	0	18	8	8	361
6:00 P	3	41	87	0	1	9	86	21	0	13	0	43	0	21	5	13	339
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	12	391	764	149	6	87	856	194	1	219	14	369	0	150	52	53	3298
	Peak Hour: 4:30 PM to 5:30 PM																
Total	5	214	398	80	2	51	491	98	0	125	5	194	0	80	23	15	1774
Approach	692				640				324				118				1774
%HV	0.7%				0.3%				n/a				n/a				0.4%
PHF	0.98				0.87				0.96				0.82				0.95



1868 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01			3		3
INT 02					0
INT 03	4			2	6
INT 04	3	3		1	7
INT 05					0
INT 06	2	2	1		5
INT 07		1			1
INT 08	1		1		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	10	6	5	3	24

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02	3	2	2		7
INT 03		2			2
INT 04					0
INT 05		1			1
INT 06		1			1
INT 07					0
INT 08		1	1		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	7	3	0	13

Check In: 1774 Out: 1774

	PHF	%HV
EB	0.82	n/a
WB	0.96	n/a
NB	0.87	0.3%
SB	0.98	0.7%
T Int.	0.95	0.4%

Conditions:

SCJ15075M_12p

Item 8.

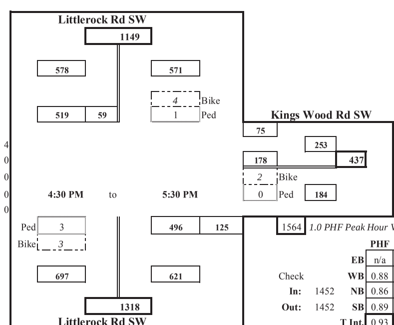
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Littlerock Rd SW & Kings Wood Dr SW **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Kings Wood Rd SW				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	12	129	0	2	0	99	37	0	41	0	22	0	0	0	0	340
4:30 P	2	16	137	0	1	0	103	30	0	28	0	18	0	0	0	0	332
4:45 P	1	20	119	0	0	0	124	33	0	47	0	25	0	0	0	0	368
5:00 P	3	21	118	0	1	0	108	30	1	49	0	14	0	0	0	0	340
5:15 P	0	9	128	0	0	0	114	32	1	48	0	22	0	0	0	0	353
5:30 P	1	9	154	0	1	0	150	30	0	34	0	14	0	0	0	0	391
5:45 P	0	12	138	0	0	0	98	39	0	52	0	14	0	0	0	0	353
6:00 P	2	12	116	0	2	0	76	22	0	50	0	17	0	0	0	0	293
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	10	111	1039	0	7	0	872	253	2	349	0	146	0	0	0	0	2770
	Peak Hour: 4:30 PM to 5:30 PM																
Total	5	59	519	0	2	0	496	125	2	178	0	75	0	0	0	0	1452
Approach	578				621				253				0				1452
%HV	0.9%				0.3%				0.8%				n/a				0.6%
PHF	0.89				0.86				0.88				n/a				0.93



1564 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	n/a	n/a
WB	0.88	0.8%
NB	0.86	0.3%
SB	0.89	0.9%
T Int.	0.93	0.6%

Check
In: 1452
Out: 1452

PEDs Across:	N	S	E	W	
INT 01	1		1	2	4
INT 02			3		3
INT 03	1	2		2	5
INT 04					0
INT 05					0
INT 06		1		2	3
INT 07				2	2
INT 08				2	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	3	4	10	19

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01	1	1	4		6	0	1	0	
INT 02	3	1			4	4	3	1	
INT 03	2	1			3	3	5	0	
INT 04	1		1		2	3	0	0	
INT 05	1	1	1		3	1	3	0	
INT 06		1			1	1	1	0	
INT 07		1			1	1	2	0	
INT 08	1	1			2	2	0	0	
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	9	7	6	0	22	15	15	1	0

SCJ15075M_15p

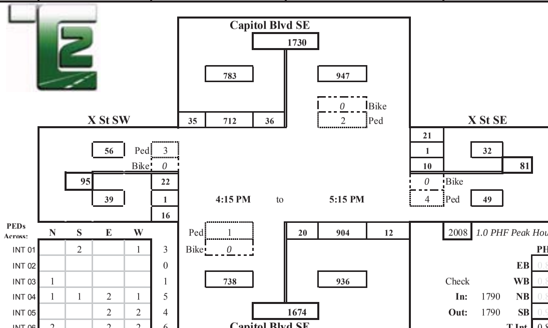
Prepared for: **SCJ Alliance/Shea Carr Jewell**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Capitol Blvd SE & X St SE/SW **Date of Count:** Wed 3/05/2014
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) X St SE				From West on (EB) X St SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	9	173	5	2	2	190	7	0	0	0	3	0	5	1	2	397
4:30 P	3	8	176	10	2	3	192	1	0	2	1	4	0	4	0	2	403
4:45 P	1	6	185	8	2	7	214	3	0	1	0	7	0	5	1	5	442
5:00 P	2	7	161	8	1	7	235	6	0	4	0	5	0	6	0	4	443
5:15 P	2	15	190	9	5	3	263	2	0	3	0	5	0	7	0	5	502
5:30 P	1	10	168	7	2	5	167	0	0	3	1	3	0	2	0	5	371
5:45 P	4	7	195	4	1	5	191	1	0	1	0	3	0	4	0	0	411
6:00 P	2	9	146	9	1	1	121	4	0	3	0	4	0	5	0	1	303
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	17	71	1394	60	16	33	1573	24	0	17	2	34	0	38	2	24	3272
	Peak Hour: 4:15 PM to 5:15 PM																
Total	8	36	712	35	10	20	904	12	0	10	1	21	0	22	1	16	1790
Approach	783				936				32				39				1790
%HV	1.0%				1.1%				n/a				n/a				1.0%
PHF	0.91				0.87				0.89				0.81				0.89



2008 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.81	n/a
WB	0.89	n/a
NB	0.87	1.1%
SB	0.91	1.0%
T Int.	0.89	1.0%

Check
In: 1790
Out: 1790

Conditions:

PEDs Across:	N	S	E	W	
INT 01		2		1	3
INT 02					0
INT 03	1				1
INT 04	1	1	2	1	5
INT 05			2	2	4
INT 06	2		2	2	6
INT 07	2		2		4
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	3	8	6	23

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08	2				2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	0	0	0	2

SC 1 0 6 10

Item 8.

Prepared for: **SCJ Alliance**

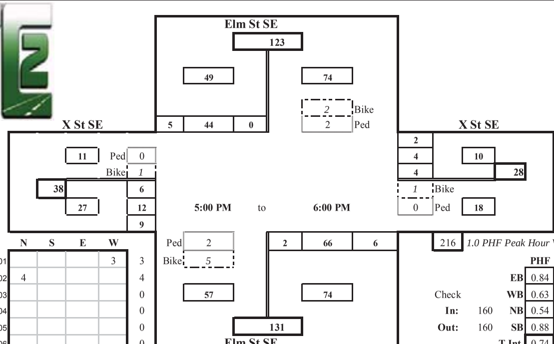
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Elm St SE & X St SE **Date of Count:** Thurs 6/25/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Elm St SE				From South on (NB) Elm St SE				From East on (WB) X St SE				From West on (EB) X St SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	0	3	0	0	2	13	0	0	0	1	0	0	1	1	1	22
4:30 P	0	0	13	0	0	1	12	1	0	0	2	0	0	0	3	3	35
4:45 P	0	0	10	2	0	1	12	0	0	1	0	0	0	1	3	0	30
5:00 P	0	0	11	2	0	1	7	2	0	1	1	0	0	3	0	0	28
5:15 P	0	0	12	0	0	1	29	4	0	2	0	1	0	1	2	2	54
5:30 P	1	0	8	2	0	1	16	0	0	0	2	0	0	4	1	1	35
5:45 P	0	0	13	1	0	0	10	2	0	0	0	1	0	0	4	4	35
6:00 P	0	0	11	2	0	0	11	0	0	2	2	0	0	1	5	2	36
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	2	0	81	9	0	7	110	9	0	6	8	2	0	11	19	13	275
	Peak Hour: 5:00 PM to 6:00 PM																
Total	1	0	44	5	0	2	66	6	0	4	4	2	0	6	12	9	160
Approach	49				74				10				27				160
%HV	2.0%				n/a				n/a				n/a				0.6%
PHF	0.88				0.54				0.63				0.84				0.74



216 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01				3	3
INT 02	4				4
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07	2				2
INT 08		2			2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	2	0	3	11

Special Notes

Bicycles From:	N	S	E	W	
INT 01	2	1	2		5
INT 02		1	1	1	3
INT 03					0
INT 04					0
INT 05		1			1
INT 06	1	3	1		5
INT 07	1			1	2
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	7	4	2	17

Check
In: 160
Out: 160

	PHF	%HV
EB	0.84	n/a
WB	0.63	n/a
NB	0.54	n/a
SB	0.88	2.0%
T Int.	0.74	0.6%

Conditions:

Prepared for: **SCJ Alliance/Shea Carr Jewell**

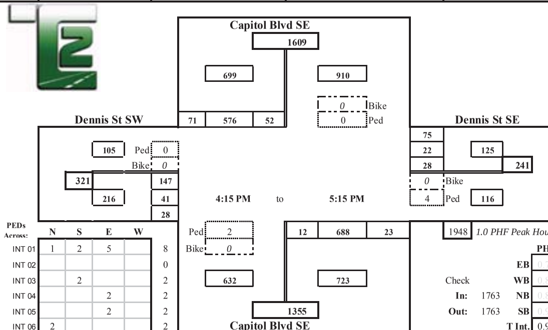
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & Dennis St SE/SW **Date of Count:** Wed 3/05/2014
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) Dennis St SE				From West on (EB) Dennis St SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	14	135	19	2	2	144	15	0	16	4	15	0	28	7	4	403
4:30 P	3	17	139	13	2	4	151	4	0	7	5	14	0	30	4	7	395
4:45 P	1	7	152	12	2	4	155	7	0	8	8	23	0	32	12	5	425
5:00 P	0	16	134	23	2	3	196	6	0	7	5	16	0	42	4	4	456
5:15 P	2	12	151	23	3	1	186	6	0	6	4	22	1	43	21	12	487
5:30 P	2	15	125	19	2	5	136	4	0	7	4	11	0	25	9	6	366
5:45 P	4	17	156	13	1	3	148	4	0	6	8	18	0	19	7	3	402
6:00 P	2	11	116	15	1	2	91	3	0	8	4	17	1	13	9	4	293
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	16	109	1108	137	15	24	1207	49	0	65	42	136	2	232	73	45	3227
	Peak Hour: 4:15 PM to 5:15 PM																
Total	6	52	576	71	9	12	688	23	0	28	22	75	1	147	41	28	1763
Approach	699				723				125				216				1763
%HV	0.9%				1. %				n/a				0.5%				0.9%
PHF	0.9				0.88				0.80				0.71				0.91



1948 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	2	5		8
INT 02					0
INT 03		2			2
INT 04			2		2
INT 05			2		2
INT 06	2				2
INT 07			1		1
INT 08	1			1	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	4	10	1	19

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06				1	1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	1	1

Check
In: 1763
Out: 1763

	PHF	%HV
EB	0.71	0.5%
WB	0.80	n/a
NB	0.88	1.2%
SB	0.94	0.9%
T Int.	0.91	0.9%

Conditions:

SC 1 0 6 11

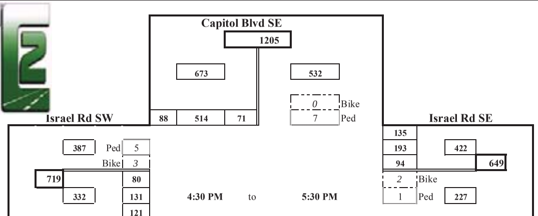
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Capitol Blvd SE & Israel Rd SE/SW **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Capitol Blvd SE				From South on (NB) Capitol Blvd SE				From East on (WB) Israel Rd SE				From West on (EB) Israel Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	20	94	13	1	34	61	12	3	14	53	25	0	35	34	35	430
4:30 P	1	15	106	29	3	19	77	7	1	12	40	25	1	24	31	25	410
4:45 P	1	21	110	22	1	20	78	8	2	30	45	41	0	15	39	28	457
5:00 P	3	17	110	17	2	23	88	11	3	20	40	40	0	21	31	21	439
5:15 P	1	20	137	21	1	32	75	3	1	30	68	34	0	22	30	49	521
5:30 P	3	13	157	28	1	31	76	3	1	14	40	20	0	22	31	23	458
5:45 P	3	13	104	18	2	24	65	4	2	14	28	20	0	29	22	16	357
6:00 P	2	10	94	21	2	23	76	1	5	22	26	9	0	21	22	57	382
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	15	129	912	169	13	206	596	49	18	156	340	214	1	189	240	254	3454
	Peak Hour: 4:30 PM to 5:30 PM																
Total	8	71	514	88	5	106	317	25	7	94	193	135	0	80	131	121	1875
Approach	673				448				422				332				1875
%HV	1.2%				1.1%				1.7%				n/a				1.1%
PHF	0.85				0.92				0.80				0.82				0.90



2084 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.82	n/a
WB	0.80	1.7%
NB	0.92	1.1%
SB	0.85	1.2%
T Int.	0.90	1.1%

Check
In: 1875
Out: 1875

Conditions:

PEDs Across:	N	S	E	W	
INT 01	2		2		4
INT 02	1	1		1	3
INT 03	1	6		4	11
INT 04	6				6
INT 05				1	1
INT 06		2	1		3
INT 07			1		1
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	10	9	5	6	**30**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1		1	2
INT 03				1	1
INT 04			1	1	2
INT 05				1	1
INT 06			1		1
INT 07					0
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	2	4	8

SCJ15075M_06p

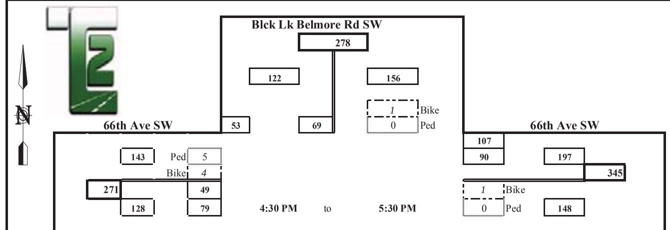
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Black Lake Belmore Rd SW & 66th Ave SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Blck Lk Belmore Rd SW				From South on (NB) 0				From East on (WB) 66th Ave SW				From West on (EB) 66th Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	16	0	17	0	0	0	0	0	0	20	12	0	6	10	0	81
4:30 P	2	21	0	13	0	0	0	0	3	0	19	23	0	10	10	0	96
4:45 P	0	17	0	18	0	0	0	0	1	0	29	25	0	9	20	0	118
5:00 P	0	8	0	19	0	0	0	0	0	0	18	18	0	13	27	0	103
5:15 P	0	22	0	10	0	0	0	0	0	0	21	24	1	18	14	0	109
5:30 P	0	22	0	6	0	0	0	0	0	0	22	40	0	9	18	0	117
5:45 P	0	19	0	12	0	0	0	0	0	0	22	15	0	4	15	0	87
6:00 P	0	10	0	5	0	0	0	0	1	0	22	24	0	7	11	0	79
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	135	0	100	0	0	0	0	5	0	173	181	1	76	125	0	790
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	69	0	53	0	0	0	0	1	0	90	107	1	49	79	0	447
Approach	122				0				197				128				447
%HV	n/a				n/a				0.5%				0.8%				0.4%
PHF	0.87				n/a				0.79				0.80				0.95



472 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.80	0.8%
WB	0.79	0.5%
NB	n/a	n/a
SB	0.87	n/a
T Int.	0.95	0.4%

Check
In: 447
Out: 447

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05				1	1
INT 06				4	4
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	5	**5**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04				2	2
INT 05				1	1
INT 06	1		1	1	3
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	1	4	6

Prepared for: **SCJ Alliance**

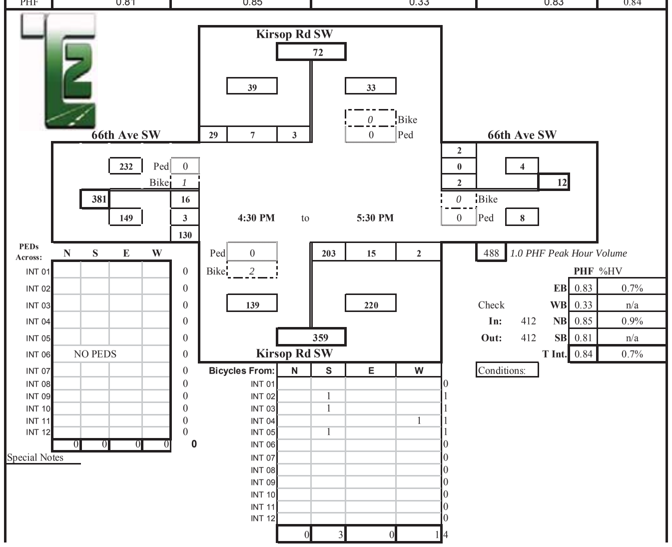
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Kirsop Rd SW & 66th Ave SW **Date of Count:** Tues 6/30/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Kirsop Rd SW T	L	S	R	From South on (NB) Kirsop Rd SW T	L	S	R	From East on (WB) 66th Ave SW T	L	S	R	From West on (EB) 66th Ave SW T	L	S	R	Interval Total
4:15 P	0	0	1	2	1	41	7	0	0	0	0	0	1	4	2	21	78
4:30 P	0	2	5	3	0	53	6	0	0	0	1	0	1	4	0	27	101
4:45 P	0	1	3	8	1	63	2	0	0	0	0	0	0	4	1	40	122
5:00 P	0	0	2	9	0	35	6	0	0	0	0	0	0	4	0	35	91
5:15 P	0	0	1	7	0	50	2	1	0	1	0	0	1	4	1	27	94
5:30 P	0	2	1	5	1	55	5	1	0	1	0	2	0	4	1	28	105
5:45 P	1	4	2	11	1	45	2	0	0	1	0	0	1	4	1	35	105
6:00 P	2	2	2	4	1	44	4	0	0	0	2	1	0	2	2	26	89
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	11	17	49	5	386	34	2	0	3	3	3	4	30	8	239	785
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	3	7	29	2	203	15	2	0	2	0	2	1	16	3	130	412
Approach	39				220				4				149				412
%HV	n/a				0.9%				n/a				0.7%				0.7%
PHF	0.81				0.85				0.33				0.83				0.84



Prepared for: **SCJ Alliance**

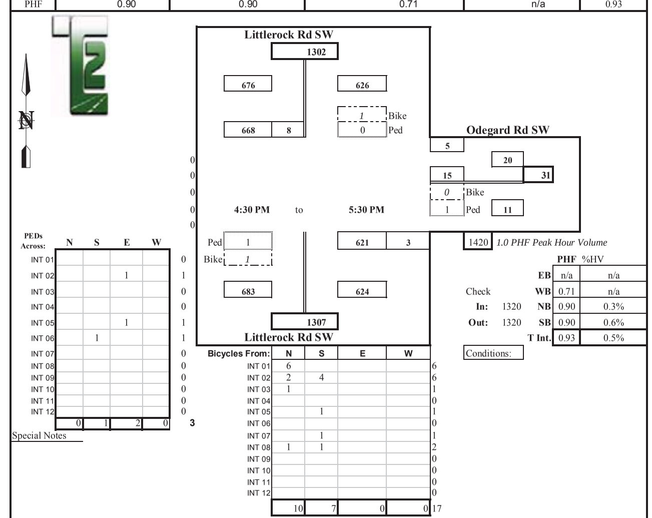
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Odegard Rd SW **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW T	L	S	R	From South on (NB) Littlerock Rd SW T	L	S	R	From East on (WB) Odegard Rd SW T	L	S	R	From West on (EB) 0 T	L	S	R	Interval Total
4:15 P	0	1	151	0	2	0	134	1	0	1	0	0	0	0	0	0	288
4:30 P	1	0	184	0	0	0	126	0	0	0	0	1	0	0	0	0	311
4:45 P	1	2	164	0	1	0	160	0	0	3	0	2	0	0	0	0	331
5:00 P	2	0	158	0	0	0	125	3	0	2	0	1	0	0	0	0	289
5:15 P	0	3	161	0	1	0	174	0	0	5	0	2	0	0	0	0	345
5:30 P	1	3	185	0	0	0	162	0	0	5	0	0	0	0	0	0	355
5:45 P	0	3	173	0	2	0	138	0	0	2	0	1	0	0	0	0	317
6:00 P	2	1	149	0	0	0	91	1	0	3	0	0	0	0	0	0	245
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	7	13	1325	0	6	0	1110	5	0	21	0	7	0	0	0	0	2481
	Peak Hour: 4:30 PM to 5:30 PM																
Total	4	8	668	0	2	0	621	3	0	15	0	5	0	0	0	0	1320
Approach	676				624				20				0				1320
%HV	0.6%				0.3%				n/a				n/a				0.5%
PHF	0.90				0.90				0.71				n/a				0.93



SCJ15075M_16p

Prepared for: **SCJ Alliance**

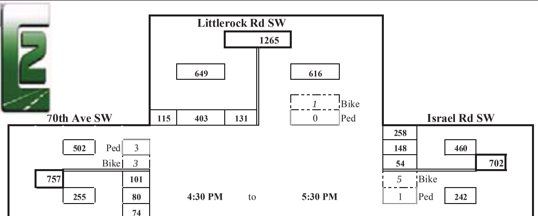
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Israel Rd SW/70th Ave SW
Location: Tumwater, Washington
Date of Count: Wed 6/24/2015
Checked By: Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Israel Rd SW				From West on (EB) 70th Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	31	81	23	3	40	51	6	2	12	26	60	1	18	13	24	385
4:30 P	1	29	111	26	1	45	52	7	0	11	27	50	0	15	18	21	412
4:45 P	1	38	102	20	1	62	71	4	0	14	37	62	1	20	19	20	469
5:00 P	4	35	91	32	0	52	65	9	1	5	28	45	1	24	25	15	426
5:15 P	0	30	104	26	1	62	46	6	2	26	54	81	1	29	20	15	499
5:30 P	1	28	106	37	0	63	75	12	1	9	29	70	0	28	16	24	497
5:45 P	1	27	99	37	2	47	65	5	1	9	35	52	0	15	24	16	431
6:00 P	2	30	102	33	0	64	50	4	0	7	25	28	2	23	17	23	406
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	10	248	796	234	8	435	475	53	7	93	261	448	6	172	152	158	3525
	Peak Hour: 4:30 PM to 5:30 PM																
Total	6	131	403	115	2	239	257	31	4	54	148	258	3	101	80	74	1891
Approach	649				527				460				255				1891
%HV	0.9%				0.4%				0.9%				1.2%				0.8%
PHF	0.95				0.88				0.71				0.94				0.95



1996 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.94	1.2%
WB	0.71	0.9%
NB	0.88	0.4%
SB	0.95	0.9%
T Int.	0.95	0.8%

Check
In: 1891
Out: 1891

PEDs Across:	N	S	E	W	
INT 01		3			3
INT 02					0
INT 03				2	2
INT 04					0
INT 05				1	1
INT 06			1		1
INT 07				1	1
INT 08	1				1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	1	4	9

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01	2				2	5	0		0
INT 02	1	2	1		4	2	2		0
INT 03	1		1		2	3	2		0
INT 04		1	2	1	4	1	1		1
INT 05			2	1	3	2	0		0
INT 06				1	1	1	2		0
INT 07					0	2	0		0
INT 08		2	1		3	2	1		0
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	4	5	7	3	19	18	8	0	1

SCJ15075M_17p

Prepared for: **SCJ Alliance**

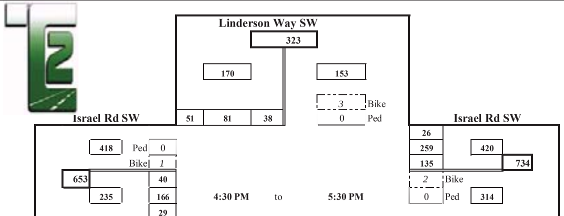
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Linderson Way SW/11th Ave SW & Israel Rd SW
Location: Tumwater, Washington
Date of Count: Wed 6/24/2015
Checked By: Jess

Time Interval Ending at	From North on (SB) Linderson Way SW				From South on (NB) 11th Ave SW				From East on (WB) Israel Rd SW				From West on (EB) Israel Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	6	27	14	0	22	13	29	3	46	79	15	0	6	32	19	308
4:30 P	0	10	18	12	1	22	13	16	1	29	62	4	0	2	40	10	238
4:45 P	1	10	22	11	0	35	27	37	2	26	65	7	1	6	46	10	302
5:00 P	0	8	14	7	0	16	21	23	1	27	49	3	2	17	43	7	235
5:15 P	0	15	27	23	1	43	22	30	2	49	79	6	0	6	38	4	342
5:30 P	0	5	18	10	0	14	17	20	1	33	66	10	0	11	39	8	251
5:45 P	0	5	15	12	0	18	21	1	2	30	63	4	1	8	35	10	222
6:00 P	0	2	11	13	0	5	15	16	1	17	50	4	0	14	28	9	184
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	61	152	102	2	175	149	172	13	257	513	53	4	70	301	77	2082
	Peak Hour: 4:30 PM to 5:30 PM																
Total	1	38	81	51	1	108	87	110	6	135	259	26	3	40	166	29	1130
Approach	170				305				420				235				1130
%HV	0.6%				0.3%				1.4%				1.3%				1.0%
PHF	0.65				0.77				0.78				0.88				0.83



1368 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.88	1.3%
WB	0.78	1.4%
NB	0.77	0.3%
SB	0.65	0.6%
T Int.	0.83	1.0%

Check
In: 1130
Out: 1130

Conditions:

PEDs Across:	N	S	E	W	
INT 01			1		1
INT 02				1	1
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08	1	1	1		3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	1	2	1	5

Special Notes

Bicycles From:	N	S	E	W	
INT 01			2		2
INT 02				1	1
INT 03	1	3	1		5
INT 04	1	1	1	1	4
INT 05		1			1
INT 06	1				1
INT 07		1	1		2
INT 08		1		1	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	7	5	3	18

SCJ15075M_10p

Item 8.

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

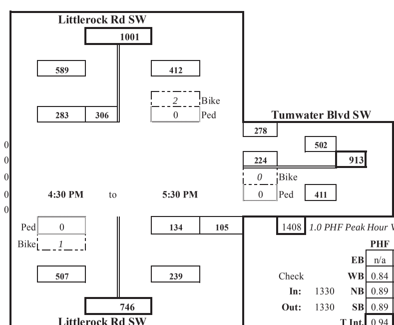
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Tumwater Blvd SW **Date of Count:** Wed 6/24/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Tumwater Blvd SW				From West on (EB) 0				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	75	61	0	1	0	33	9	3	49	0	54	0	0	0	0	281
4:30 P	0	67	89	0	0	0	32	19	0	48	0	58	0	0	0	0	313
4:45 P	1	74	70	0	0	0	31	28	1	80	0	69	0	0	0	0	352
5:00 P	3	77	54	0	0	0	36	27	1	36	0	69	0	0	0	0	299
5:15 P	0	75	91	0	0	0	35	15	1	71	0	60	0	0	0	0	347
5:30 P	0	80	68	0	0	0	32	35	0	37	0	80	0	0	0	0	332
5:45 P	1	79	68	0	1	0	43	11	1	49	0	67	0	0	0	0	317
6:00 P	2	60	48	0	0	0	29	33	0	43	0	64	0	0	0	0	277
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	7	587	549	0	2	0	271	177	7	413	0	521	0	0	0	0	2518
	Peak Hour: 4:30 PM to 5:30 PM																
Total	4	306	283	0	0	0	134	105	3	224	0	278	0	0	0	0	1330
Approach	589				239				502				0				1330
%HV	0.7%				n/a				0.6%				n/a				0.5%
PHF	0.89				0.89				0.84				n/a				0.94



	PHF	%HV
EB	n/a	n/a
WB	0.84	0.6%
NB	0.89	n/a
SB	0.89	0.7%
T Int.	0.94	0.5%

Check In: 1330 Out: 1330

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01	2	1			3
INT 02	1	1			2
INT 03	1				1
INT 04		1			1
INT 05					0
INT 06	1				1
INT 07	1				1
INT 08		1	1		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	4	1	0	11

Special Notes

SCJ15075M_18p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

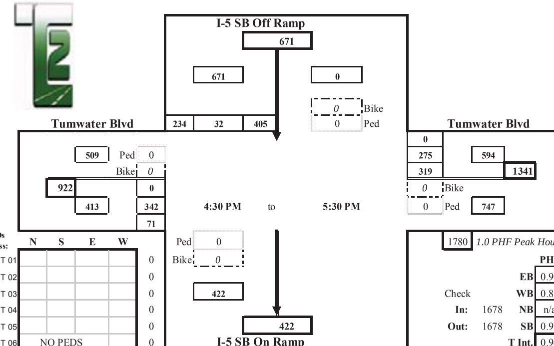
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: I-5 SB Ramps & Tumwater Blvd **Date of Count:** Wed 6/24/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) I-5 SB Off Ramp				From South on (NB) I-5 SB On Ramp				From East on (WB) Tumwater Blvd				From West on (EB) Tumwater Blvd				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	5	119	9	50	0	0	0	0	1	69	53	0	1	0	60	19	379
4:30 P	5	96	6	46	0	0	0	0	0	60	60	0	0	0	79	12	359
4:45 P	3	101	6	60	0	0	0	0	2	77	89	0	0	0	92	11	436
5:00 P	8	102	10	46	0	0	0	0	0	62	58	0	1	0	90	15	383
5:15 P	7	104	8	68	0	0	0	0	0	112	63	0	0	0	64	26	445
5:30 P	6	98	8	60	0	0	0	0	2	68	65	0	0	0	96	19	414
5:45 P	3	94	3	42	0	0	0	0	0	58	66	0	0	0	70	10	343
6:00 P	7	83	9	51	0	0	0	0	0	35	56	0	2	0	85	18	337
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	44	797	59	423	0	0	0	0	5	541	510	0	4	0	636	130	3096
	Peak Hour: 4:30 PM to 5:30 PM																
Total	24	405	32	234	0	0	0	0	4	319	275	0	1	0	342	71	1678
Approach	671				0				594				413				1678
%HV	3.6%				n/a				0.7%				0.2%				1.7%
PHF	0.93				n/a				0.85				0.90				0.94



	PHF	%HV
EB	0.90	0.2%
WB	0.85	0.7%
NB	n/a	n/a
SB	0.93	3.6%
T Int.	0.94	1.7%

Check In: 1678 Out: 1678

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Item 8.

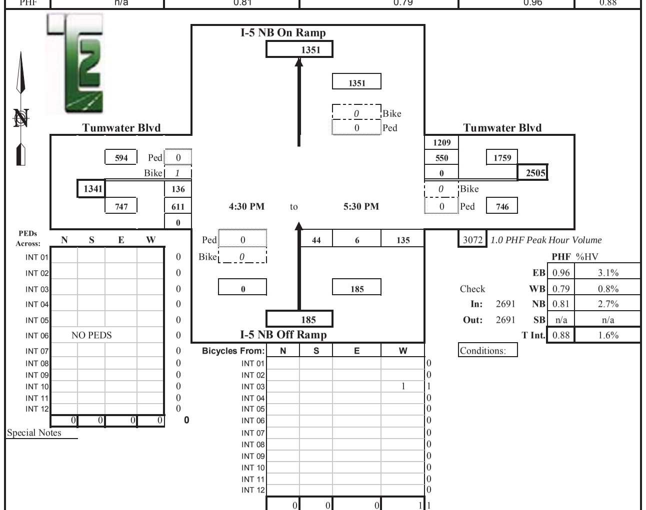
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: I-5 NB Ramps & Tumwater Blvd **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) I-5 NB On Ramp				From South on (NB) I-5 NB Off Ramp				From East on (WB) Tumwater Blvd				From West on (EB) Tumwater Blvd				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	1	10	1	21	3	0	112	253	7	19	161	0	577
4:30 P	0	0	0	0	4	13	5	23	3	0	107	197	4	38	137	0	520
4:45 P	0	0	0	0	1	16	1	34	6	0	150	359	1	44	149	0	753
5:00 P	0	0	0	0	2	6	2	29	3	0	114	252	10	28	164	0	595
5:15 P	0	0	0	0	1	5	2	33	1	0	177	383	6	25	143	0	768
5:30 P	0	0	0	0	1	17	1	39	4	0	109	215	6	39	155	0	575
5:45 P	0	0	0	0	1	9	2	31	4	0	116	191	2	40	134	0	523
6:00 P	0	0	0	0	1	12	1	25	2	0	79	131	9	41	129	0	418
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	12	88	15	235	26	0	964	1981	45	274	1172	0	4729
	Peak Hour: 4:30 PM to 5:30 PM																
Total	0	0	0	0	5	44	6	135	14	0	550	1209	23	136	611	0	2691
Approach	0				185				1759				747				2691
%HV	n/a				2.7%				0.8%				3.1%				1.6%
PHF	n/a				0.81				0.79				0.96				0.88



SCJ15075M_20p

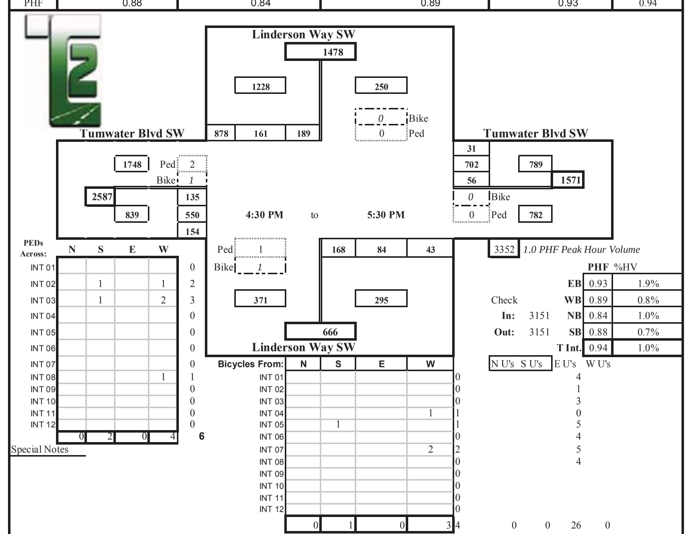
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Linderson Way SW & Tumwater Blvd SW **Date of Count:** Tues 3/03/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Linderson Way SW				From South on (NB) Linderson Way SW				From East on (WB) Tumwater Blvd SW				From West on (EB) Tumwater Blvd SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	6	41	27	138	0	34	9	13	1	11	164	12	9	28	133	30	640
4:30 P	2	32	18	125	1	19	11	11	4	5	128	7	13	39	129	47	571
4:45 P	4	55	27	268	2	49	20	13	0	16	185	9	4	23	131	29	825
5:00 P	1	39	38	171	1	48	28	12	2	10	141	8	6	41	138	46	720
5:15 P	1	61	27	261	0	42	13	8	2	15	196	10	3	36	128	41	838
5:30 P	2	34	69	178	0	29	23	10	2	15	180	4	3	35	153	38	768
5:45 P	2	40	23	136	3	48	28	14	0	13	170	8	1	21	127	23	651
6:00 P	1	16	13	63	1	21	11	12	0	12	119	3	3	24	128	27	449
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	19	318	242	1340	8	290	143	93	11	97	1283	61	42	247	1067	281	5462
	Peak Hour: 4:30 PM to 5:30 PM																
Total	8	189	161	878	3	168	84	43	6	56	702	31	16	135	550	154	3151
Approach	1228				295				789				839				3151
%HV	0.7%				1.0%				0.8%				1.9%				1.0%
PHF	0.88				0.84				0.89				0.93				0.94



SCJ15030M_02p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

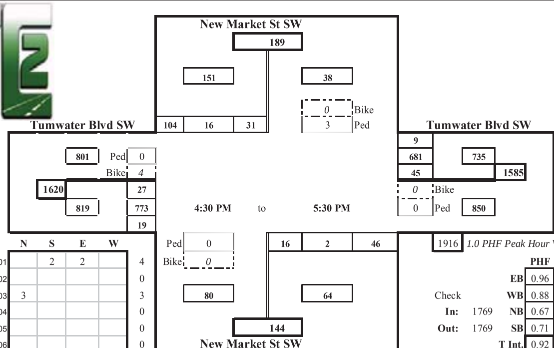
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: New Market St SW& Tumwater Blvd SW **Date of Count:** Tues 3/03/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) New Market St SW T	L	S	R	From South on (NB) New Market St SW T	L	S	R	From East on (WB) Tumwater Blvd SW T	L	S	R	From West on (EB) Tumwater Blvd SW T	L	S	R	Interval Total
4:15 P	0	1	1	10	1	3	0	10	3	3	174	1	5	8	176	2	389
4:30 P	0	1	1	7	1	0	1	3	4	7	134	1	6	2	153	4	314
4:45 P	1	3	0	14	0	7	1	16	0	12	189	0	9	5	197	3	447
5:00 P	0	6	4	24	0	5	1	10	5	12	133	1	5	3	187	6	392
5:15 P	4	12	4	31	0	2	0	17	1	12	193	3	15	13	186	6	479
5:30 P	1	10	8	35	0	2	0	3	7	9	166	5	5	6	203	4	451
5:45 P	1	4	3	33	1	3	0	7	3	10	160	2	2	2	175	6	405
6:00 P	0	2	0	12	1	5	0	4	3	3	123	3	7	2	168	2	324
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	7	39	21	166	4	27	3	70	26	68	1272	16	54	41	1445	33	3201
Peak Hour: 4:30 PM to 5:30 PM																	
Total	6	31	16	104	0	16	2	46	13	45	681	9	34	27	773	19	1769
Approach	151				64				735				819				1769
%HV	4.0%				n/a				1.8%				4.2%				3.0%
PHF	0.71				0.67				0.88				0.96				0.92



1916 *1.0 PHF Peak Hour Volume*

		PHF	%HV
Check	EB	0.96	4.2%
In: 1769	WB	0.88	1.8%
Out: 1769	NB	0.67	n/a
	SB	0.71	4.0%
	T Int.	0.92	3.0%

PEDs Across:	N	S	E	W	
INT 01		2	2		4
INT 02					0
INT 03	3				3
INT 04					0
INT 05					0
INT 06					0
INT 07	1				1
INT 08	2				2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	2	2	0	10

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01			1		1			2	
INT 02					0			1	
INT 03				2	2			5	
INT 04				2	2			3	
INT 05					0			6	
INT 06					0			3	
INT 07				2	2			1	
INT 08					0			4	
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	0	0	1	6	7	0	0	25	0

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

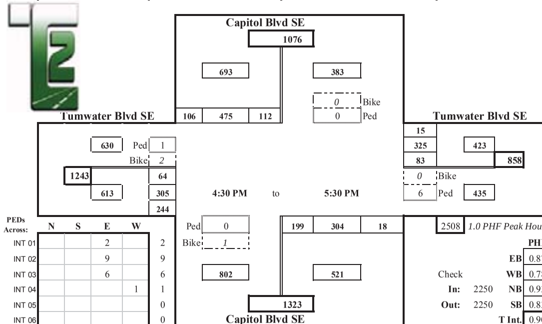
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Capitol Blvd SE & Tumwater Blvd SE **Date of Count:** Wed 6/24/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Capitol Blvd SE T	L	S	R	From South on (NB) Capitol Blvd SE T	L	S	R	From East on (WB) Tumwater Blvd SE T	L	S	R	From West on (EB) Tumwater Blvd SE T	L	S	R	Interval Total
4:15 P	2	16	118	19	0	54	85	3	2	12	58	1	7	19	63	59	507
4:30 P	1	11	121	23	2	54	67	4	1	12	53	3	3	24	54	42	468
4:45 P	0	37	94	33	0	52	76	5	0	24	72	1	7	17	82	78	571
5:00 P	4	16	106	19	1	47	72	3	0	14	70	5	5	20	81	62	515
5:15 P	0	33	141	36	4	53	83	4	1	28	104	4	4	13	78	50	627
5:30 P	3	26	134	18	1	47	73	6	1	17	79	5	5	14	64	54	537
5:45 P	3	23	105	28	2	67	69	1	4	14	57	2	3	10	61	52	489
6:00 P	7	20	85	14	1	50	75	3	1	10	45	8	3	7	39	43	399
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	20	182	904	190	11	424	600	29	10	131	538	29	37	124	522	440	4113
Peak Hour: 4:30 PM to 5:30 PM																	
Total	7	112	475	106	6	199	304	18	2	83	325	15	21	64	305	244	2250
Approach	693				521				423				613				2250
%HV	1.0%				1.2%				0.5%				3.4%				1.6%
PHF	0.83				0.93				0.78				0.87				0.90



2508 *1.0 PHF Peak Hour Volume*

		PHF	%HV
Check	EB	0.87	3.4%
In: 2250	WB	0.78	0.5%
Out: 2250	NB	0.93	1.2%
	SB	0.83	1.0%
	T Int.	0.90	1.6%

Conditions:

PEDs Across:	N	S	E	W	
INT 01			2		2
INT 02			9		9
INT 03			6		6
INT 04				1	1
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	17	1	18

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02		1	1		2
INT 03				1	1
INT 04		1		1	2
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	1	2	5

SCJ15075M_07p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

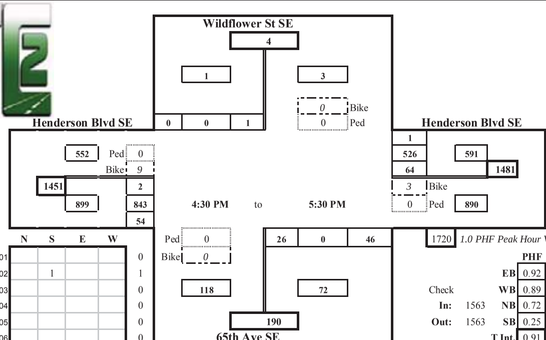
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Wildflower St SE/65th Ave SE & Henderson Blvd SE **Date of Count:** Wed 7/01/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Wildflower St SE				From South on (NB) 65th Ave SE				From East on (WB) Henderson Blvd SE				From West on (EB) Henderson Blvd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	2	0	1	0	5	0	6	1	10	97	2	0	0	146	10	279
4:30 P	0	0	0	0	0	10	0	6	1	16	105	0	1	0	157	14	308
4:45 P	0	0	0	0	0	4	0	13	0	14	111	0	0	1	205	12	360
5:00 P	0	0	0	0	0	9	0	7	2	12	126	1	0	1	184	14	354
5:15 P	0	1	0	0	0	3	0	11	3	17	149	0	1	0	222	16	419
5:30 P	0	0	0	0	0	10	0	15	0	21	140	0	2	0	232	12	430
5:45 P	0	0	0	0	0	13	0	7	1	17	129	0	2	1	178	10	355
6:00 P	0	0	0	0	0	6	0	17	4	18	139	0	0	0	131	13	324
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	3	0	1	0	60	0	82	12	125	996	3	6	3	1455	101	2829
Peak Hour: 4:30 PM to 5:30 PM																	
Total	0	1	0	0	0	26	0	46	5	64	526	1	3	2	843	54	1563
Approach	1				72				591				899				1563
%HV	n/a				n/a				0.8%				0.3%				0.5%
PHF	0.25				0.72				0.89				0.92				0.91



1720 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02		1			1
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	0	0	1

Special Notes

Bicycles From:	N	S	E	W	
INT 01				2	2
INT 02				2	2
INT 03				3	3
INT 04			1	1	2
INT 05			2	4	6
INT 06				1	1
INT 07			1	3	4
INT 08		1		1	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	4	17	22

Check			PHF	%HV
		EB	0.92	0.3%
		WB	0.89	0.8%
In:	1563	NB	0.72	n/a
Out:	1563	SB	0.25	n/a
		T Int.	0.91	0.5%

Conditions:

SCJ15075M_03p

Prepared for: **City of Tumwater**

Traffic Count Consultants, Inc.

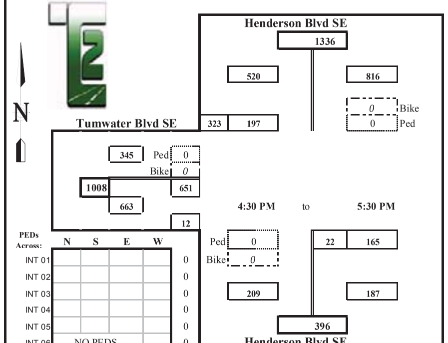
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Henderson Blvd SE & Tumwater Blvd SE **Date of Count:** Thurs 11/13/2014

Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Henderson Blvd SE				From South on (NB) Henderson Blvd SE				From East on (WB) 0				From West on (EB) Tumwater Blvd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	0	39	57	0	4	34	0	0	0	0	0	0	155	0	7	296
4:30 P	3	0	35	66	0	7	35	0	0	0	0	0	0	124	0	0	267
4:45 P	2	0	46	90	0	8	36	0	0	0	0	0	1	169	0	1	350
5:00 P	0	0	37	72	2	6	38	0	0	0	0	0	1	142	0	2	297
5:15 P	0	0	40	72	0	4	52	0	0	0	0	0	0	201	0	6	375
5:30 P	0	0	74	89	0	4	39	0	0	0	0	0	0	139	0	3	348
5:45 P	1	0	56	61	0	7	29	0	0	0	0	0	0	130	0	3	286
6:00 P	0	0	36	42	0	5	25	0	0	0	0	0	0	93	0	3	204
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	8	0	363	549	2	45	288	0	0	0	0	0	2	1153	0	25	2423
Peak Hour: 4:30 PM to 5:30 PM																	
Total	2	0	197	323	2	22	165	0	0	0	0	0	2	651	0	12	1370
Approach	520				187				0				663				1370
%HV	0.4%				1.1%				n/a				0.3%				0.4%
PHF	0.80				0.83				n/a				0.80				0.91



1500 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Check			PHF	%HV
		EB	0.80	0.3%
		WB	n/a	n/a
In:	1370	NB	0.83	1.1%
Out:	1370	SB	0.80	0.4%
		T Int.	0.91	0.4%

Conditions:

TUM14125M_01p

Prepared for: **SCJ Alliance**

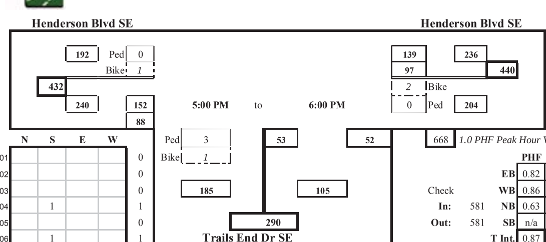
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Trails End Dr SE & Henderson Blvd SE **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) 0				From South on (NB) Trails End Dr SE				From East on (WB) Henderson Blvd SE				From West on (EB) Henderson Blvd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	0	8	0	22	3	15	37	0	1	0	24	12	118
4:30 P	0	0	0	0	0	7	0	10	1	16	31	0	0	0	35	13	112
4:45 P	0	0	0	0	0	5	0	9	0	19	29	0	0	0	31	11	104
5:00 P	0	0	0	0	0	10	0	14	0	15	32	0	0	0	35	17	123
5:15 P	0	0	0	0	0	13	0	12	1	34	35	0	0	0	54	19	167
5:30 P	0	0	0	0	0	9	0	11	0	29	39	0	1	0	28	33	149
5:45 P	0	0	0	0	0	20	0	22	0	14	30	0	0	0	40	13	139
6:00 P	0	0	0	0	0	11	0	7	0	20	35	0	1	0	30	23	126
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	0	83	0	107	5	162	268	0	3	0	277	141	1038
	Peak Hour: 5:00 PM to 6:00 PM																
Total	0	0	0	0	0	53	0	52	1	97	139	0	2	0	152	88	581
Approach	0				105				236				240				581
%HV	n/a				n/a				0.4%				0.8%				0.5%
PHF	n/a				0.63				0.86				0.82				0.87



668 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.82	0.8%
WB	0.86	0.4%
NB	0.63	n/a
SB	n/a	n/a
T Int.	0.87	0.5%

Check In: 581 Out: 581

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1			1
INT 05					0
INT 06		1			1
INT 07					0
INT 08		2			2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	4	0	0	4

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02			1		1
INT 03		1			1
INT 04					0
INT 05		1			1
INT 06				1	1
INT 07					0
INT 08			2		2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	3	1	6

SCJ15075M_45p

Prepared for: **SCJ Alliance**

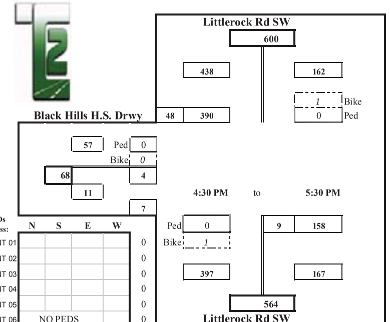
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Black Hills High School Drwy **Date of Count:** Wed 6/24/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) 0				From West on (EB) Black Hills H.S. Drwy				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	0	88	3	1	1	39	0	0	0	0	0	0	1	0	0	132
4:30 P	0	0	97	15	0	3	38	0	0	0	0	0	1	3	0	2	158
4:45 P	1	0	92	16	0	2	47	0	0	0	0	0	0	1	0	2	160
5:00 P	0	0	83	15	0	2	42	0	0	0	0	0	0	0	0	2	144
5:15 P	0	0	108	6	0	1	35	0	0	0	0	0	0	2	0	1	153
5:30 P	0	0	107	11	1	4	34	0	0	0	0	0	0	1	0	2	159
5:45 P	0	0	94	10	1	2	48	0	0	0	0	0	1	1	0	0	155
6:00 P	1	0	80	17	0	2	35	0	0	0	0	0	0	4	0	2	140
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	0	749	93	3	17	318	0	0	0	0	0	2	13	0	11	1201
	Peak Hour: 4:30 PM to 5:30 PM																
Total	1	0	390	48	1	9	158	0	0	0	0	0	0	4	0	7	616
Approach	438				167				0				11				616
%HV	0.2%				0.6%				n/a				n/a				0.3%
PHF	0.93				0.85				n/a				0.92				0.96



640 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.92	n/a
WB	n/a	n/a
NB	0.85	0.6%
SB	0.93	0.2%
T Int.	0.96	0.3%

Check In: 616 Out: 616

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02	1	2			3
INT 03	1				1
INT 04		1			1
INT 05					0
INT 06					0
INT 07	1			1	2
INT 08		3			3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	6	0	1	10

SCJ15075M_14p

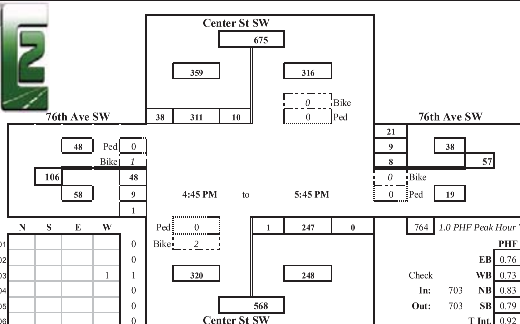
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Center St SW & 76th Ave SW **Date of Count:** Tues 3/03/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Center St SW				From South on (NB) Center St SW				From East on (WB) 76th Ave SW				From West on (EB) 76th Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	7	1	57	12	0	1	20	1	0	0	1	5	0	12	2	1	113
4:30 P	9	0	48	15	1	0	30	0	2	0	3	4	1	10	3	0	113
4:45 P	4	2	58	10	1	0	47	0	3	0	4	6	2	24	8	0	159
5:00 P	3	5	71	13	0	1	60	0	1	2	1	5	1	17	2	0	177
5:15 P	3	1	76	9	0	0	53	0	1	1	3	8	0	6	2	0	159
5:30 P	1	2	101	11	1	0	59	0	0	2	2	1	0	10	3	0	191
5:45 P	2	2	63	5	1	0	75	0	2	3	3	7	1	15	2	1	176
6:00 P	2	2	42	4	0	0	39	0	0	0	1	1	0	7	1	0	97
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	31	15	516	79	4	2	383	1	9	8	18	37	5	101	23	2	1185
	Peak Hour: 4:45 PM to 5:45 PM																
Total	9	10	311	38	2	1	247	0	4	8	9	21	2	48	9	1	703
Approach	359				248				38				58				703
%HV	2.5%				0.8%				10.5%				3.4%				2.4%
PHF	0.79				0.83				0.73				0.76				0.92



764 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.76	3.4%
Check	WB	0.73	10.5%
In: 703	NB	0.83	0.8%
Out: 703	SB	0.79	2.5%
	T Int.	0.92	2.4%

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03				1	1
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	1	1

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1		1	2
INT 05					0
INT 06		1			1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	0	1	3

Special Notes

SCJ15030M_06p

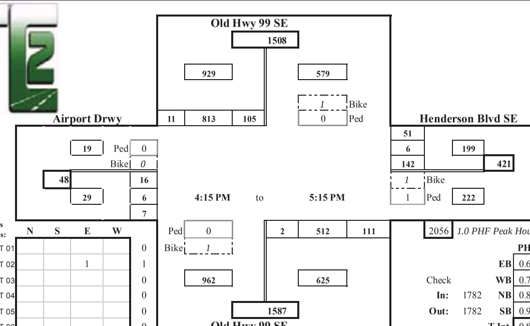
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Old Hwy 99 SE & Henderson Blvd SE **Date of Count:** Tues 6/23/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Old Hwy 99 SE				From South on (NB) Old Hwy 99 SE				From East on (WB) Henderson Blvd SE				From West on (EB) Airport Drwy				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	11	20	191	0	2	1	119	25	0	31	0	15	0	5	2	1	410
4:30 P	3	26	207	5	6	1	126	25	0	34	0	12	0	1	0	3	440
4:45 P	2	26	196	2	1	0	145	24	0	19	2	14	0	7	2	2	439
5:00 P	3	24	188	3	2	0	95	21	1	37	2	12	0	4	2	1	389
5:15 P	5	29	222	1	1	1	146	41	1	52	2	13	1	4	2	1	514
5:30 P	2	26	224	2	1	0	86	23	0	32	1	21	0	7	3	0	425
5:45 P	6	17	176	1	2	0	93	23	0	28	1	14	0	6	2	1	362
6:00 P	3	26	189	0	3	0	79	30	0	0	0	0	0	3	1	3	331
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	35	194	1593	14	18	3	889	212	2	233	8	101	1	37	14	12	3310
	Peak Hour: 4:15 PM to 5:15 PM																
Total	13	105	813	11	10	2	512	111	2	142	6	51	1	16	6	7	1782
Approach	929				625				199				29				1782
%HV	1.4%				1.6%				1.0%				3.4%				1.5%
PHF	0.92				0.83				0.74				0.66				0.87



2056 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.66	3.4%
Check	WB	0.74	1.0%
In: 1782	NB	0.83	1.6%
Out: 1782	SB	0.92	1.4%
	T Int.	0.87	1.5%

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02			1		1
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	2	0	2

Bicycles From:	N	S	E	W	
INT 01		1			1
INT 02					0
INT 03			1		1
INT 04		1			1
INT 05	1				1
INT 06					0
INT 07			1		1
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	3	2	0	6

Special Notes

SCJ15075M_08p

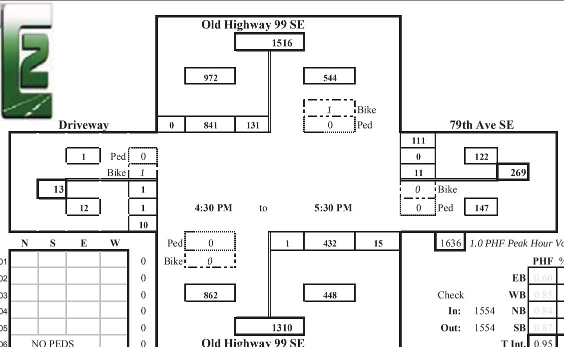
Prepared for: **City of Tumwater**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Old Highway 99 SE & 79th Ave SE **Date of Count:** Tues 10/28/2014
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Old Highway 99 SE				From South on (NB) Old Highway 99 SE				From East on (WB) 79th Ave SE				From West on (EB) Driveway				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	25	174	0	2	0	101	3	1	6	0	30	0	0	0	1	340
4:30 P	2	31	170	0	1	1	92	2	0	5	0	36	0	0	0	0	337
4:45 P	3	31	184	0	1	0	108	5	0	2	0	34	0	1	1	1	367
5:00 P	2	27	209	0	2	0	104	1	1	3	0	25	0	0	0	3	372
5:15 P	0	40	201	0	1	1	130	2	0	2	0	29	0	0	0	1	406
5:30 P	0	33	247	0	0	0	90	7	0	4	0	23	0	0	0	5	409
5:45 P	1	36	205	0	1	0	85	6	0	2	0	26	0	0	1	0	361
6:00 P	3	29	160	0	1	0	78	3	0	1	0	19	0	0	0	1	291
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	12	252	1550	0	9	2	788	29	2	25	0	222	0	1	2	12	2883
	Peak Hour: 4:30 PM to 5:30 PM																
Total	5	131	841	0	4	1	432	15	1	11	0	111	0	1	1	10	1554
Approach	972				448				122				12				1554
%HV	0.5%				0.9%				0.8%				n/a				0.6%
PHF	0.87				0.84				0.85				0.60				0.95



1636 *1.0 PHF Peak Hour Volume*

Check
In: 1554
Out: 1554

	PHF	%HV
EB	0.60	n/a
WB	0.85	0.8%
NB	0.84	0.9%
SB	0.87	0.5%
T Int.	0.95	0.6%

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01		1			1
INT 02	1	1			2
INT 03					0
INT 04					0
INT 05	1			1	2
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	2	0	1	5

Special Notes

TUM14120M_01p

Prepared for: **SCJ Alliance**

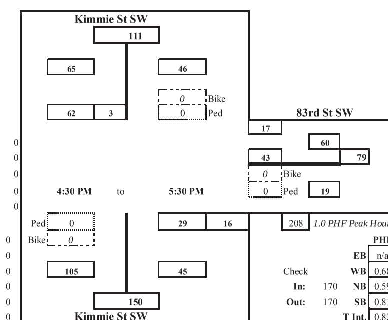
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Kimmie St SW & 83rd Ave SW **Date of Count:** Tues 3/03/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval	From North on (SB) Kimmie St SW				From South on (NB) Kimmie St SW				From East on (WB) 83rd St SW				From West on (EB) 0				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	9	0	2	0	7	3	2	5	0	2	0	0	0	0	26
4:30 P	0	2	14	0	7	0	19	2	0	2	0	1	0	0	0	0	40
4:45 P	1	1	19	0	2	0	4	3	1	6	0	3	0	0	0	0	36
5:00 P	0	0	17	0	2	0	7	4	1	14	0	8	0	0	0	0	50
5:15 P	1	1	13	0	0	0	7	1	0	7	0	3	0	0	0	0	32
5:30 P	0	1	13	0	0	0	11	8	0	16	0	3	0	0	0	0	52
5:45 P	1	0	9	0	0	0	3	2	0	15	0	5	0	0	0	0	34
6:00 P	0	1	7	0	0	0	7	4	1	6	0	1	0	0	0	0	26
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	6	101	0	13	0	65	27	5	71	0	26	0	0	0	0	296
	Peak Hour: 4:30 PM to 5:30 PM																
Total	2	3	62	0	4	0	29	16	2	43	0	17	0	0	0	0	170
Approach	65				45				60				0				170
%HV	3.1%				8.9%				3.3%				n/a				4.7%
PHF	0.81				0.59				0.68				n/a				0.82

N



208 *1.0 PHF Peak Hour Volume*

Check
In: 170
Out: 170

	PHF	%HV
EB	n/a	n/a
WB	0.68	3.3%
NB	0.59	8.9%
SB	0.81	3.1%
T Int.	0.82	4.7%

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08			1		1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	0	1

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

SCJ15030M_08p

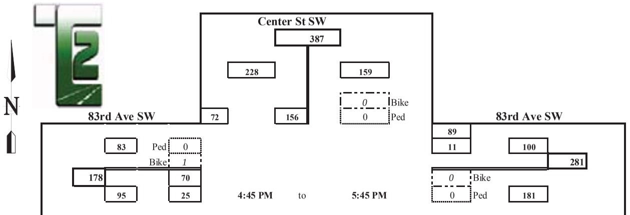
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Center St SW & 83rd Ave SW **Date of Count:** Tues 3/03/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Center St SW				From South on (NB) 0				From East on (WB) 83rd Ave SW				From West on (EB) 83rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	30	0	23	0	0	0	0	3	0	3	12	0	13	4	0	85
4:30 P	0	13	0	15	0	0	0	0	0	0	4	9	0	10	2	0	53
4:45 P	2	25	0	13	0	0	0	0	0	0	2	12	2	15	4	0	71
5:00 P	1	33	0	16	0	0	0	0	0	0	4	17	1	28	6	0	104
5:15 P	0	36	0	23	0	0	0	0	0	0	3	20	0	8	6	0	96
5:30 P	1	56	0	16	0	0	0	0	2	0	4	26	0	16	2	0	120
5:45 P	0	31	0	17	0	0	0	0	1	0	0	26	0	18	11	0	103
6:00 P	1	15	0	13	0	0	0	0	0	0	0	13	0	6	3	0	50
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	6	239	0	136	0	0	0	0	6	0	20	135	3	114	38	0	682
	Peak Hour: 4:45 PM to 5:45 PM																
Total	2	156	0	72	0	0	0	0	3	0	11	89	1	70	25	0	423
Approach	228				0				100				95				423
%HV	0.9%				n/a				3.0%				1.1%				1.4%
PHF	0.79				n/a				0.83				0.70				0.88



480 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04		1			1
INT 05					0
INT 06					0
INT 07		1			1
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	2	0	0	**2**

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0	0			
INT 02					0	1			
INT 03					0	0			
INT 04				1	1	0			
INT 05					0	0			
INT 06					0	0			
INT 07					0	0			
INT 08					0	0			
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	0	0	0	1	1	1	0	0	0

Check			PHF	%HV
		EB	0.70	1.1%
		WB	0.83	3.0%
In:	423	NB	n/a	n/a
Out:	423	SB	0.79	0.9%
		T Int.	0.88	1.4%

SCJ15030M_09p

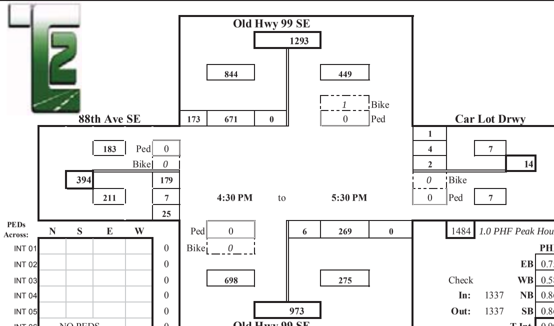
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: Old Hwy 99 SE & 88th Ave SE **Date of Count:** Tues 6/23/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Old Hwy 99 SE				From South on (NB) Old Hwy 99 SE				From East on (WB) Car Lot Drwy				From West on (EB) 88th Ave SE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	5	1	144	43	4	1	65	0	0	0	0	0	3	39	3	8	304
4:30 P	3	0	147	48	1	0	76	0	0	0	0	0	2	29	2	2	304
4:45 P	1	0	166	33	0	2	66	0	0	0	0	1	1	53	1	2	324
5:00 P	0	0	138	43	1	1	61	0	0	1	1	0	2	41	2	6	294
5:15 P	3	0	172	48	2	1	79	0	0	0	1	0	2	56	3	11	371
5:30 P	0	0	195	49	0	2	63	0	0	1	2	0	1	29	1	6	348
5:45 P	2	0	142	42	1	1	59	0	0	0	0	0	0	28	0	4	276
6:00 P	2	0	149	32	0	0	50	0	0	0	0	0	0	26	0	4	261
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	16	1	1253	338	9	8	519	0	0	2	4	1	11	301	12	43	2482
	Peak Hour: 4:30 PM to 5:30 PM																
Total	4	0	671	173	3	6	269	0	0	2	4	1	6	179	7	25	1337
Approach	844				275				7				211				1337
%HV	0.5%				1.1%				n/a				2.8%				1.0%
PHF	0.86				0.86				0.58				0.75				0.90



1484 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	**0**

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04	1				1
INT 05					0
INT 06					0
INT 07					0
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	1	0	0	2

Check			PHF	%HV
		EB	0.75	2.8%
		WB	0.58	n/a
In:	1337	NB	0.86	1.1%
Out:	1337	SB	0.86	0.5%
		T Int.	0.90	1.0%

Conditions:

SCJ15075M_09p

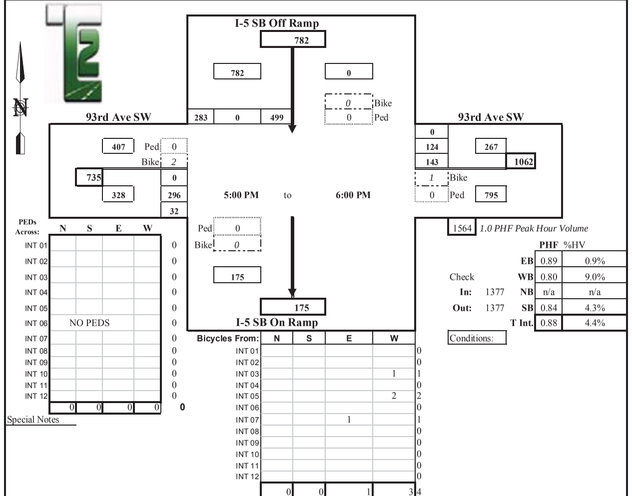
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: I-5 SB Ramps & 93rd Ave SW
Location: Tumwater, Washington
Date of Count: Tues 6/23/2015
Checked By: Jess

Time Interval	From North on (SB) I-5 SB Off Ramp				From South on (NB) I-5 SB On Ramp				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	20	101	0	47	0	0	0	0	5	19	23	0	3	0	62	5	257
4:30 P	12	122	0	46	0	0	0	0	9	38	23	0	2	0	50	5	284
4:45 P	14	100	2	47	0	0	0	0	8	59	26	0	0	0	72	5	311
5:00 P	10	117	1	49	0	0	0	0	7	34	22	0	0	0	54	3	280
5:15 P	6	115	0	64	0	0	0	0	6	48	35	0	2	0	80	12	354
5:30 P	7	135	0	98	0	0	0	0	8	35	37	0	1	0	78	8	391
5:45 P	10	133	0	66	0	0	0	0	6	30	28	0	0	0	85	5	347
6:00 P	11	116	0	55	0	0	0	0	4	30	24	0	0	0	53	7	285
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	90	939	3	472	0	0	0	0	53	293	218	0	8	0	534	50	2509
Peak Hour: 5:00 PM to 6:00 PM																	
Total	34	499	0	283	0	0	0	0	24	143	124	0	3	0	296	32	1377
Approach	782				0				267				328				1377
%HV	4.3%				n/a				9.0%				0.9%				4.4%
PHF	0.84				n/a				0.80				0.89				0.88



PHF		%HV
EB	0.89	0.9%
WB	0.80	9.0%
NB	n/a	n/a
SB	0.84	4.3%
T Int.	0.88	4.4%

Check In: 1377 Out: 1377

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03				1	1
INT 04					0
INT 05				2	2
INT 06					0
INT 07			1		1
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	3	4

Special Notes

SCJ15075M_13p

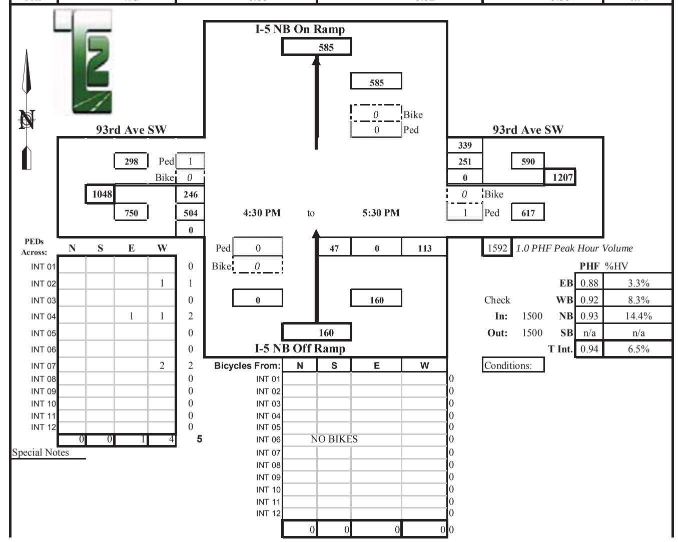
Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com
WBE/DBE

Intersection: I-5 NB Ramps & 93rd Ave SW
Location: Tumwater, Washington
Date of Count: Tues 6/23/2015
Checked By: Jess

Time Interval	From North on (SB) I-5 NB On Ramp				From South on (NB) I-5 NB Off Ramp				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	8	5	2	24	15	0	42	77	15	44	119	0	313
4:30 P	0	0	0	0	11	4	0	33	12	0	52	88	9	46	126	0	349
4:45 P	0	0	0	0	7	14	0	27	17	0	70	88	10	47	125	0	371
5:00 P	0	0	0	0	4	9	0	28	9	0	47	88	7	54	117	0	343
5:15 P	0	0	0	0	8	16	0	27	16	0	67	94	5	87	107	0	398
5:30 P	0	0	0	0	4	8	0	31	7	0	67	69	3	58	155	0	388
5:45 P	0	0	0	0	4	7	0	17	11	0	48	71	11	69	149	0	361
6:00 P	0	0	0	0	2	7	0	23	11	0	47	73	12	39	130	0	319
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	48	70	2	210	98	0	440	648	72	444	1028	0	2842
Peak Hour: 4:30 PM to 5:30 PM																	
Total	0	0	0	0	23	47	0	113	49	0	251	339	25	246	504	0	1500
Approach	0				160				590				750				1500
%HV	n/a				14.4%				8.3%				3.3%				6.5%
PHF	n/a				0.93				0.92				0.88				0.94



PHF		%HV
EB	0.88	3.3%
WB	0.92	8.3%
NB	0.93	14.4%
SB	n/a	n/a
T Int.	0.94	6.5%

Check In: 1500 Out: 1500

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02				1	1
INT 03					0
INT 04			1	1	2
INT 05					0
INT 06					0
INT 07				2	2
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	4	5

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

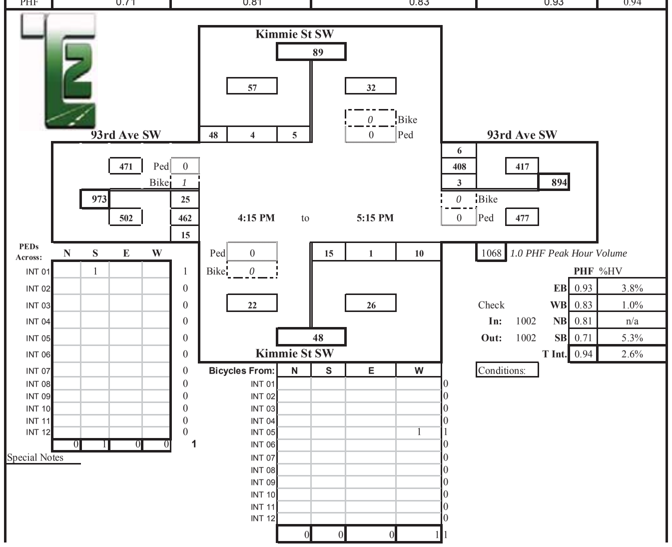
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Kimmie St SW & 93rd Ave SW **Date of Count:** Tues 6/23/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Kimmie St SW				From South on (NB) Kimmie St SW				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	4	6	12	0	4	0	3	1	0	78	0	7	13	109	2	231
4:30 P	1	2	1	17	0	3	0	2	0	1	97	0	7	9	120	6	258
4:45 P	0	2	0	16	0	5	0	1	1	0	102	0	6	6	118	0	250
5:00 P	1	1	1	7	0	5	0	3	0	2	84	5	4	5	108	6	227
5:15 P	1	0	2	8	0	2	1	4	3	0	125	1	2	5	116	3	267
5:30 P	1	2	2	14	0	1	2	1	0	2	80	1	1	15	129	4	253
5:45 P	1	3	1	8	0	6	0	3	1	0	66	1	3	11	113	6	218
6:00 P	2	0	3	3	0	3	1	2	1	1	72	1	2	4	117	4	211
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	10	14	16	85	0	29	4	19	7	6	704	9	32	68	930	31	1915
	Peak Hour: 4:15 PM to 5:15 PM																
Total	3	5	4	48	0	15	1	10	4	3	408	6	19	25	462	15	1002
Approach	57				26				417				502				1002
%HV	5.3%				n/a				1.0%				3.8%				2.6%
PHF	0.71				0.81				0.83				0.93				0.94



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

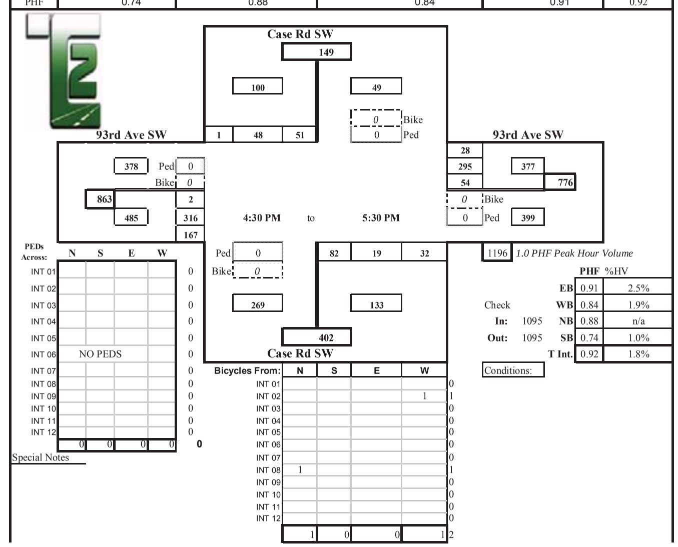
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Case Rd SW & 93rd Ave SW **Date of Count:** Tues 6/23/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Case Rd SW				From South on (NB) Case Rd SW				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	8	9	0	2	16	1	6	1	9	59	5	9	0	73	38	224
4:30 P	0	10	7	0	0	26	2	7	0	12	75	7	6	0	69	44	259
4:45 P	0	10	10	1	0	22	4	9	1	14	73	5	5	0	77	43	268
5:00 P	1	9	8	0	0	25	5	8	0	12	65	10	2	0	72	40	254
5:15 P	0	22	12	0	0	16	6	11	3	15	92	5	3	2	76	42	299
5:30 P	0	10	18	0	0	19	4	4	3	13	65	8	2	0	91	42	274
5:45 P	0	13	12	0	0	16	4	9	0	20	51	3	1	0	70	46	244
6:00 P	0	9	9	0	0	20	4	3	0	9	40	4	1	0	81	36	215
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	2	91	85	1	2	160	30	57	8	104	520	47	29	2	609	331	2037
	Peak Hour: 4:30 PM to 5:30 PM																
Total	1	51	48	1	0	82	19	32	7	54	295	28	12	2	316	167	1095
Approach	100				133				377				485				1095
%HV	1.0%				n/a				1.9%				2.5%				1.8%
PHF	0.74				0.88				0.84				0.91				0.92



Item 8.

Prepared for: **SCJ Alliance**

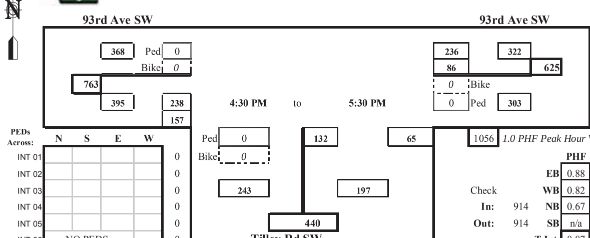
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Tilley Rd SW (South Leg) & 93rd Ave SW **Date of Count:** Tues 6/23/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) 0				From South on (NB) Tilley Rd SW				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	0	22	0	14	1	19	49	0	10	0	49	37	190
4:30 P	0	0	0	0	0	48	0	16	0	14	53	0	5	0	51	33	215
4:45 P	0	0	0	0	1	43	0	30	0	13	42	0	4	0	55	42	225
5:00 P	0	0	0	0	0	20	0	14	0	24	65	0	3	0	49	36	208
5:15 P	0	0	0	0	0	40	0	14	3	24	74	0	3	0	78	34	264
5:30 P	0	0	0	0	1	29	0	7	2	25	55	0	3	0	56	45	217
5:45 P	0	0	0	0	0	24	0	6	0	14	51	0	1	0	46	46	187
6:00 P	0	0	0	0	0	16	0	5	0	18	35	0	1	0	59	33	166
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	2	242	0	106	6	151	424	0	30	0	443	306	1672
Peak Hour: 4:30 PM to 5:30 PM																	
Total	0	0	0	0	2	132	0	65	5	86	236	0	13	0	238	157	914
Approach	0				197				322				395				914
%HV	n/a				1.0%				1.6%				3.3%				2.2%
PHF	n/a				0.67				0.82				0.88				0.87



1056 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.88	3.3%
WB	0.82	1.6%
NB	0.67	1.0%
SB	n/a	n/a
T Int.	0.87	2.2%

Check In: 914 Out: 914

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0				1
INT 02					0				0
INT 03					0				0
INT 04					0				0
INT 05					0				0
INT 06	NO BIKES				0				0
INT 07					0				0
INT 08					0				0
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	0	0	0	0	0	0	0	0	1

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

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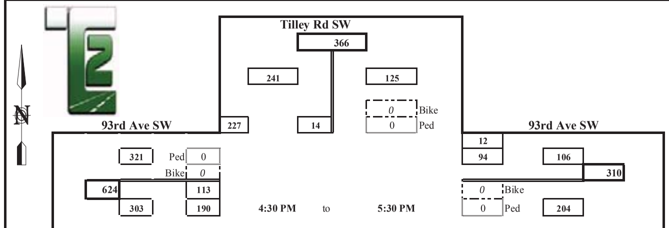
WBE/DBE

Intersection: Tilley Rd SW (North Leg) & 93rd Ave SW **Date of Count:** Tues 6/23/2015
Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Tilley Rd SW				From South on (NB) 0				From East on (WB) 93rd Ave SW				From West on (EB) 93rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	4	0	50	0	0	0	0	0	0	18	5	8	22	43	0	142
4:30 P	1	5	0	39	0	0	0	0	1	0	26	2	3	22	38	0	132
4:45 P	0	4	0	40	0	0	0	0	0	0	15	4	2	39	45	0	147
5:00 P	0	2	0	55	0	0	0	0	0	0	35	3	3	34	36	0	165
5:15 P	1	3	0	78	0	0	0	0	2	0	18	3	2	25	62	0	189
5:30 P	1	5	0	54	0	0	0	0	1	0	26	2	0	15	47	0	149
5:45 P	0	3	0	44	0	0	0	0	0	0	22	4	0	21	34	0	128
6:00 P	0	4	0	28	0	0	0	0	0	0	23	0	1	14	53	0	122
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	30	0	388	0	0	0	0	4	0	183	23	19	192	358	0	1174
Peak Hour: 4:30 PM to 5:30 PM																	
Total	2	14	0	227	0	0	0	0	3	0	94	12	7	113	190	0	650
Approach	241				0				106				303				650
%HV	0.8%				n/a				2.8%				2.3%				1.8%
PHF	0.74				n/a				0.70				0.87				0.86



756 1.0 PHF Peak Hour Volume

	PHF	%HV
EB	0.87	2.3%
WB	0.70	2.8%
NB	n/a	n/a
SB	0.74	0.8%
T Int.	0.86	1.8%

Check In: 650 Out: 650

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0				0
INT 02					0				0
INT 03					0				0
INT 04					0				0
INT 05					0				1
INT 06	NO BIKES				0				0
INT 07					0				0
INT 08					0				0
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	0	0	0	0	0	0	0	0	1

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

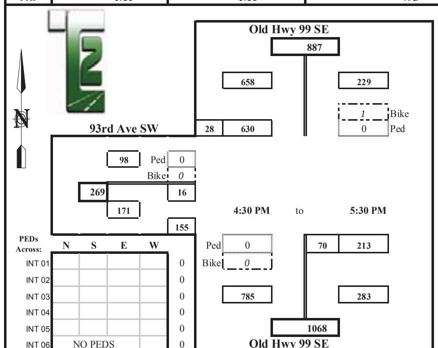
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Old Hwy 99 SE & 93rd Ave SW **Date of Count:** Tues 6/23/2015

Location: Tumwater, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Old Hwy 99 SE				From South on (NB) Old Hwy 99 SE				From East on (WB) 0				From West on (EB) 93rd Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	0	122	3	2	12	41	0	0	0	0	0	4	4	0	31	213
4:30 P	1	0	129	10	1	20	53	0	0	0	0	0	1	7	0	26	245
4:45 P	0	0	152	6	0	14	57	0	0	0	0	0	0	3	0	39	271
5:00 P	0	0	130	8	0	21	59	0	0	0	0	0	0	3	0	26	247
5:15 P	2	0	170	7	2	13	48	0	0	0	0	0	2	4	0	51	293
5:30 P	0	0	178	7	3	22	49	0	0	0	0	0	0	6	0	39	301
5:45 P	1	0	121	6	1	16	52	0	0	0	0	0	0	4	0	25	224
6:00 P	1	0	138	7	0	17	37	0	0	0	0	0	1	1	0	38	238
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	8	0	1140	54	9	135	396	0	0	0	0	0	8	32	0	275	2032
	Peak Hour: 4:30 PM to 5:30 PM																
Total	2	0	630	28	5	70	213	0	0	0	0	0	2	16	0	155	1112
Approach	658				283				0				171				1112
%HV	0.3%				1.8%				n/a				1.2%				0.8%
PHF	0.89				0.88				n/a				0.78				0.92



1204 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.78	1.2%
WB	n/a	n/a
NB	0.88	1.8%
SB	0.89	0.3%
T Int.	0.92	0.8%

Check In: 1112 Out: 1112

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05	1				1
INT 06					0
INT 07		1			1
INT 08		1			1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	2	0	0	3

SCJ15075M_42p

APPENDIX A-2

INTERSECTION CRASH DATA

Item 8.

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK

1 - R W Johnson Blvd /Mottman Rd

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	R W JOHNSON BLVD SW		2400	MOTTMAN RD SW	4/2/2010	11:40	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	R W JOHNSON BLVD SW		2400	MOTTMAN RD SW	9/8/2010	14:29	Possible Injury	1	0	1	0	0	At Intersection and Related	Vehicle overturned
City Street	R W JOHNSON BLVD SW		2400	MOTTMAN RD SW	11/3/2011	16:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	R W JOHNSON BLVD SW		2400	MOTTMAN RD SW	10/30/2013	14:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	R W JOHNSON BLVD SW		2400	MOTTMAN RD SW	6/25/2012	16:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	MOTTMAN RD SW		3100	R W JOHNSON BLVD SW	8/7/2014	11:58	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	MOTTMAN RD SW		3200	R W JOHNSON BLVD SW	11/6/2012	16:12	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	MOTTMAN RD SW		3200	R W JOHNSON BLVD SW	11/4/2013	13:03	Evident Injury	2	0	2	0	0	At Intersection and Related	Entering at angle

2 - Crosby Blvd /Mottman Rd

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CROSBY BLVD SW		1000	MOTTMAN RD SW	11/16/2011	13:00	Possible Injury	1	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	CROSBY BLVD SW		1000		9/9/2013	17:46	No Injury	0	0	3	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - one stopped - rear-end
City Street	CROSBY BLVD SW		1000		12/26/2013	12:59	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	CROSBY BLVD SW		1000		6/27/2013	17:47	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		1000		1/9/2014	22:50	No Injury	0	0	2	0	0	At Driveway	From same direction - one left turn - one straight
City Street	CROSBY BLVD SW		1000		6/16/2014	15:00	No Injury	0	0	1	0	0	At Driveway	Fire Hydrant
City Street	MOTTMAN RD SW		1700	CROSBY BLVD SW	10/9/2010	15:01	Evident Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	MOTTMAN RD SW		1700		1/14/2010	15:51	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	MOTTMAN RD SW		1100		12/4/2014	7:51	No Injury	0	0	2	0	0	At Driveway	Entering at angle
State Route	101LX36642	0.24			11/18/2013	18:40	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	101LX36642	0.24			11/20/2013	17:50	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	101LX36642	0.24			11/3/2014	8:42	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	101LX36642	0.24			9/2/2014	16:40	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
State Route	101LX36642	0.24			8/7/2014	17:10	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			1/23/2010	17:45	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			2/11/2011	12:56	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	101LX36642	0.24			12/2/2013	17:43	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			5/26/2010	18:59	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	101LX36642	0.24			10/15/2011	20:05	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			1/19/2013	13:22	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
State Route	101LX36642	0.24			5/10/2010	13:23	No Injury	0	0	3	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
State Route	101LX36642	0.24			6/1/2012	11:39	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			2/19/2010	14:53	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
State Route	101LX36642	0.24			6/9/2012	9:15	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			9/4/2012	13:17	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			1/13/2010	12:23	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			11/21/2012	16:22	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			5/24/2013	16:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	101LX36642	0.24			2/4/2010	19:08	Evident Injury	3	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

3 - Crosby Blvd/Irving St

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CROSBY BLVD SW		1000	IRVING ST SW	3/5/2010	13:24	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CROSBY BLVD SW		2800	IRVING ST SW	6/1/2014	17:04	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		2800	IRVING ST SW	11/22/2010	9:46	No Injury	0	0	1	0	0	At Intersection and Related	Signal Pole
City Street	CROSBY BLVD SW		2800	IRVING ST SW	11/17/2010	10:59	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CROSBY BLVD SW		2800	IRVING ST SW	7/23/2010	17:51	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW			IRVING ST SW	7/2/2014	17:09	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CROSBY BLVD SW		2800	IRVING ST SW	10/14/2014	7:33	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		2800	IRVING ST SW	6/24/2010	20:07	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CROSBY BLVD SW		2800	IRVING ST SW	12/11/2013	13:05	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CROSBY BLVD SW		1000	IRVING ST SW	3/2/2010	16:35	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		1000	IRVING ST SW	12/11/2012	10:39	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		1000	IRVING ST SW	1/15/2013	17:09	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CROSBY BLVD SW		2800		8/2/2010	13:41	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - all others
City Street	CROSBY LOOP			IRVING ST SW	2/23/2011	7:17	Evident Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - all others
City Street	IRVING ST SW		1500	CROSBY BLVD SW	2/21/2013	18:10	No Injury	0	0	1	0	0	At Intersection and Related	Curb, Raised Traffic Island or Raised Median Curb
City Street	IRVING ST SW		1550		6/25/2014	13:23	No Injury	0	0	2	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end
City Street	IRVING ST SW				9/2/2014	15:12	No Injury	0	0	2	0	0	At Driveway	From same direction - both going straight - both moving - rear-end
City Street	IRVING ST SW		1400		5/17/2013	14:39	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
Miscellaneous Tr	SPSCC DRIVEWAY				9/25/2012	13:14	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end

4 - 7th Ave/Irving St

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
5 - Crosby Blvd/Barnes Blvd														
City Street	CROSBY BLVD SW		3000	BARNES BLVD SW	10/8/2012	14:37	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From same direction - both going straight - one stopped - rear-end
6 - Black Lake Blvd/Black Lake Belmore Rd														
City Street	BLACK LAKE BLVD SW		3510		3/2/2012	14:21	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	BLACK LAKE BLVD SW		3400		7/7/2010	14:38	No Injury	0	0	2	0	0	At Driveway	From same direction - one left turn - one straight
7 - R W Johnson Blvd /Sapp Rd														
City Street	R W JOHNSON BLVD SW		4600	SAPP RD SW	8/24/2012	2:34	No Injury	0	0	1	0	0	At Intersection and Related	Tree or Stump (stationary)
8 -Sapp Rd/Crosby Blvd														
City Street	SAPP RD SW		2000	CROSBY BLVD SW	4/25/2011	6:30	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
9 - 49th Ave/Black Lake Belmore Rd														
City Street	49TH AVE SW			BLACK LAKE BELMORE RD SW	8/8/2011	19:51	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	49TH AVE SW		3700	BLACK LAKE BELMORE RD SW	11/1/2010	15:52	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
10 - Capitol Blvd at Carlyon Ave/Sunset Way														
City Street	CAPITOL BLVD S		3100	CARLYON AVE SE	7/24/2012	12:19	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
11 -Deschutes Way / I-5 NB On-Ramp														
12 -Deschutes Way /US 101 WB On-Ramp														
State Route	005P210402	0.00			7/1/2011	20:51	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
13 -I-5/US 101 Off-Ramp at Desoto St/2nd Avenue														
State Route	005R110435	0.28			2/13/2012	17:07	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.29			9/25/2014	12:55	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.29			10/23/2010	13:20	Possible Injury	2	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.29			1/20/2011	18:25	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			4/19/2013	13:55	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			3/12/2013	7:01	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005R110435	0.30			7/6/2012	12:08	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005R110435	0.30			7/22/2012	11:38	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			5/28/2010	13:00	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005R110435	0.30			7/18/2014	11:05	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			10/31/2012	19:49	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005R110435	0.30			12/12/2013	15:16	Evident Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005R110435	0.30			11/19/2012	7:01	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005R110435	0.30			12/9/2010	7:30	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			9/30/2014	18:47	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			2/19/2014	13:51	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110435	0.30			6/5/2012	13:54	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005S210373	0.22			6/3/2011	14:44	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
14 - 2nd Ave/Custer Way														
City Street	CUSTER WAY SW		100	N 2ND AVE SW	2/10/2010	7:02	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	CUSTER WAY SW		100	N 2ND AVE SW	7/31/2014	17:36	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	N 2 AV SW			CUSTER WY	11/2/2011	17:23	No Injury	0	0	1	0	0	At Intersection and Related	Bridge Rail - Face
City Street	N 2ND AVE SW		100	CUSTER WAY SW	10/14/2014	8:00	No Injury	0	0	1	0	0	At Intersection and Related	Curb, Raised Traffic Island or Raised Median Curb
15 - Boston St /Custer Way														
City Street	CUSTER WAY SW		100	BOSTON ST SE	2/19/2012	12:48	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
City Street	CUSTER WAY SW		200	BOSTON ST SE	8/5/2013	21:20	Evident Injury	1	0	1	0	1	At Intersection and Related	Vehicle - Pedalcyclist
City Street	CUSTER WAY SW		200	BOSTON ST SE	5/24/2011	8:00	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SW		200	BOSTON ST SE	6/14/2012	7:51	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SW		200	BOSTON ST SE	1/21/2011	17:40	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
16 - Deschutes Way/Boston St														
City Street	BOSTON ST SE		3600	DESCHUTES WAY SW	8/9/2013	12:25	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	BOSTON ST SE			DESCHUTES WAY SW	10/18/2011	21:09	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- sideswipe
City Street	BOSTON ST SE		3600	DESCHUTES WAY SW	4/25/2012	17:24	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight
City Street	BOSTON ST SE		3600	DESCHUTES WAY SW	7/16/2013	18:29	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	BOSTON ST SE		3600	DESCHUTES WAY SW	4/1/2014	9:31	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	BOSTON ST SE		3600		6/22/2011	17:29	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
City Street	DESCHUTES WAY SW				10/29/2011	16:49	No Injury	0	0	2	0	0	At Driveway	Entering at angle
17 - Cleveland Ave /Capitol Blvd														

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JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CLEVELAND AVE			CAPITOL BLVD	9/10/2014	22:33	Evident Injury	1	0	1	1	0	At Intersection and Related	Vehicle turning right hits pedestrian
City Street	CLEVELAND AVE SE		500	CAPITOL BLVD S	11/15/2013	14:15	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CLEVELAND AVE SE		500	CAPITOL BLVD S	9/4/2013	17:20	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CLEVELAND AVE SE		500	CAPITOL BLVD S	9/26/2014	18:00	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

18 - Custer Way /Capitol Blvd

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CAPITOL BLVD S		3500	CUSTER WAY SE	2/8/2014	9:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			CUSTER WAY SE	1/6/2012	6:20	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		3300	CUSTER WAY SE	8/9/2010	13:47	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		3400	CUSTER WAY SE	9/19/2014	12:40	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	CAPITOL BLVD S		3300	CUSTER WAY SW	9/22/2012	15:55	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight
City Street	CAPITOL BLVD S		3300	CUSTER WAY SW	1/22/2011	9:42	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			CUSTER WY SW	10/11/2011	12:08	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		3400		7/29/2010	15:55	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY		300	CAPITOL BLVD S	8/20/2011	15:59	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SE		400	CAPITOL BLVD S	9/11/2014	18:00	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	CUSTER WAY SE		400	CAPITOL BLVD S	8/13/2013	13:09	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	CUSTER WAY SE		400	CAPITOL BLVD S	12/18/2013	10:19	Possible Injury	1	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SE		400	CAPITOL BLVD S	5/20/2014	15:45	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SW		300	CAPITOL BLVD S	6/30/2010	7:33	No Injury	0	0	1	0	1	At Intersection and Related	Vehicle - Pedalcyclist
City Street	CUSTER WAY SW		300	CAPITOL BLVD S	9/15/2012	9:30	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
City Street	CUSTER WAY SW		300	CAPITOL BLVD S	7/27/2013	14:45	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	CUSTER WAY SW		3500	CAPITOL BLVD S	11/25/2013	12:04	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SW		300	CAPITOL BLVD S	1/27/2013	16:50	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

19 - Custer Way /North St at Cleveland Ave

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	10/11/2014	14:20	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	11/6/2014	17:18	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	12/22/2011	17:30	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	9/10/2012	18:27	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	12/14/2014	8:43	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	10/22/2012	14:01	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CUSTER WAY SE		500	CLEVELAND AVE SE	5/21/2010	8:33	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CUSTER WAY SE		500		2/11/2011	12:32	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
City Street	NORTH ST SE			CLEVELAND AV SE	10/11/2011	11:40	Evident Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	NORTH ST SE		300	CLEVELAND AVE SE	1/21/2011	7:59	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	NORTH ST SE		200	CLEVELAND AVE SE	9/1/2011	18:06	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe
City Street	NORTH ST SE			CLEVELAND AVE SE	3/14/2013	11:20	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	NORTH ST SE		300	CLEVELAND AVE SE	2/5/2013	16:03	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CLEVELAND AVE SE		500	NORTH ST	9/24/2013	17:55	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	CLEVELAND AVE SE		400	NORTH ST SE	9/25/2013	16:01	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CLEVELAND AVE SE		200	NORTH ST SE	9/16/2011	12:19	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CLEVELAND AVE SE		400	NORTH ST SE	10/6/2013	15:36	Possible Injury	1	0	1	1	0	At Intersection and Related	Vehicle going straight hits pedestrian
City Street	CLEVELAND AVE SE			NORTH ST SE	3/17/2012	21:15	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CLEVELAND AVE SE		400	NORTH ST SE	8/28/2013	18:43	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight

20 - Hoadly St /North St

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	NORTH ST SE		800		5/23/2012	16:58	No Injury	0	0	2	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end
City Street	NORTH ST SE		900		11/7/2012	7:30	Possible Injury	2	0	2	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end

21 - Deschutes Way / E Street / I-5 NB Off-Ramp

22 - Capitol Blvd / E St

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CAPITOL BLVD S		3700	E ST SW	5/18/2014	19:12	Possible Injury	3	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		0	E ST SW	12/15/2011	18:02	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		4100	E ST SW	11/12/2014	11:03	Possible Injury	1	0	1	1	0	At Intersection and Related	Vehicle turning left hits pedestrian
City Street	CAPITOL BLVD S		4100	E ST SW	9/12/2014	12:39	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		3700	E ST SW	3/25/2011	14:34	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		3700	E ST SW	7/3/2012	14:19	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
City Street	E ST SW		100	CAPITOL BLVD S	5/21/2010	15:13	Possible Injury	1	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	E ST SW		100	CAPITOL BLVD S	5/23/2014	12:36	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	E ST SW		100	CAPITOL BLVD S	11/4/2013	17:39	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	E ST SW		100	CAPITOL BLVD S	8/18/2010	18:29	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	E ST SW		4100		4/7/2010	17:01	No Injury	0	0	2	0	0	At Driveway	Entering at angle

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23 - Cleveland Ave / South St

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CLEVELAND AVE SE		4200	SOUTH ST SE	8/25/2014	18:37	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	SOUTH ST SE		500	CLEVELAND AVE SE	6/4/2012	19:14	Evident Injury	2	0	2	0	0	At Intersection and Related	Entering at angle

24 - 7th Ave / Linwood Ave

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	LINWOOD AVE SW		400	S 7TH AVE SW	4/28/2013	21:41	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW		400	S 7TH AVE SW	5/7/2010	17:36	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW			S 7TH AVE SW	5/12/2014	16:30	Unknown	0	0	1	0	0	At Intersection and Related	Fence

25 - 2nd Ave / Linwood Ave

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	LINWOOD AVE SW			S 2ND AVE SW	12/20/2013	17:24	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW			S 2ND AVE SW	10/10/2012	16:08	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW		300	S 2ND AVE SW	11/13/2012	9:09	No Injury	0	0	3	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW		300	S 2ND AVE SW	3/27/2014	20:30	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one right turn
City Street	S 2ND AVE SW			LINWOOD AVE SW	4/10/2014	13:19	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	S 2ND AVE SW		1000	LINWOOD AVE SW	6/27/2010	12:05	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	S 2ND AVE SW		1000	LINWOOD AVE SW	10/19/2013	11:21	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	S 2ND AVE SW			LINWOOD AVE SW	4/12/2011	7:48	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	S 2ND AVE SW		1000	LINWOOD AVE SW	11/25/2014	11:54	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	S 2ND AVE SW		1000	LINWOOD AVE SW	10/31/2010	11:56	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	S 2ND AVE SW		1000		12/3/2013	9:40	No Injury	0	0	2	0	0	At Driveway	Entering at angle

26 - Capitol Blvd / Linwood Ave

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CAPITOL BLVD SE		4000	LINWOOD AVE SW	11/1/2013	20:14	No Injury	0	0	1	0	0	At Intersection and Related	Bridge Abutment
City Street	CAPITOL BLVD SE		4700	LINWOOD AVE SW	3/2/2012	12:17	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SE			LINWOOD AVE SW	7/29/2011	15:16	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe
City Street	CAPITOL BLVD SW			LINWOOD AVE SW	3/30/2013	17:15	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		4100	LINWOOD AVE SW	11/21/2014	12:27	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW			LINWOOD AVE SW	5/3/2014	20:42	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LINWOOD AVE SW			CAPITOL BLVD SE	8/3/2010	7:59	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LINWOOD AVE SW			CAPITOL BLVD SW	11/20/2012	14:42	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

27 - Henderson Blvd / Yelm Hwy

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	HENDERSON BLVD SE		4600	YELM HWY SE	9/20/2014	21:22	Evident Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	8/31/2012	14:55	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE			YELM HWY SE	9/21/2014	10:35	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	11/24/2010	13:40	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	4/4/2011	6:59	Evident Injury	1	0	2	0	0	At Intersection and Related	From same direction - all others
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	8/2/2013	21:41	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	12/18/2012	9:13	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	8/9/2012	19:01	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	12/31/2012	19:15	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	HENDERSON BLVD SE			YELM HWY SE	10/31/2014	14:46	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	HENDERSON BLVD SE			YELM HWY SE	10/14/2013	18:00	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	HENDERSON BLVD SE		1300	YELM HWY SE	11/19/2011	19:05	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	4/23/2010	19:10	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	10/19/2012	7:18	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	4/17/2013	18:40	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	2/5/2013	15:12	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE		4600	YELM HWY SE	7/7/2014	19:23	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	HENDERSON BLVD SE		4600	YELM HWY SE	1/9/2014	17:40	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	HENDERSON BLVD SE			YELM HWY SE	3/21/2014	15:20	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	5/13/2010	8:08	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	HENDERSON BLVD SE		4500	YELM HWY SE	6/30/2013	16:24	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY			HENDERSON BLVD	7/21/2011	22:42	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	9/22/2010	18:08	Evident Injury	1	0	1	0	1	At Intersection and Related	Vehicle - Pedalcyclist
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	4/30/2010	17:53	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
City Street	YELM HWY SE			HENDERSON BLVD SE	10/17/2014	11:40	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	3/7/2014	19:05	Evident Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE			HENDERSON BLVD SE	3/21/2014	7:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	7/11/2013	11:25	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	3/17/2014	18:45	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	1/4/2010	21:20	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	12/10/2014	16:40	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	5/3/2013	13:38	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	11/24/2010	13:28	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	9/25/2010	14:13	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	9/21/2010	20:07	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	7/12/2010	18:06	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	YELM HWY SE		1700	HENDERSON BLVD SE	7/13/2012	13:44	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle

28 - Rural Rd / Trosper Rd

City Street	TROSPER RD SW		2100	RURAL RD SW	5/27/2010	17:46	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		2100	RURAL RD SW	7/17/2012	15:48	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW		2100	RURAL RD SW	1/8/2011	10:35	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		2100	RURAL RD SW	3/13/2012	8:14	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

29 - Lake Park Dr / Trosper Rd

City Street	TROSPER RD SW		800	LAKE PARK DR SW	6/1/2012	17:35	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		800	LAKE PARK DR SW	11/11/2013	19:51	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	TROSPER RD SW		800	LAKE PARK DR SW	9/17/2013	11:08	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW		1000		4/28/2010	18:49	Serious Injury	1	0	1	0	1	At Driveway	Vehicle - Pedalcyclist

30 - Littlerock Rd / Trosper Rd

City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	12/8/2013	17:09	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one right turn
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	1/9/2013	17:16	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	12/6/2012	17:11	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	7/20/2013	13:13	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	10/7/2011	13:39	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	1/29/2010	8:18	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	5/18/2013	15:01	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	9/12/2012	14:37	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		5300	TROSPER RD SW	2/3/2014	22:30	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
City Street	LITTLEROCK RD SW		5300		3/18/2010	19:39	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW		5300		4/17/2012	16:49	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	11/14/2013	13:23	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - all others
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	1/11/2014	12:41	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW			LITTLEROCK RD SW	1/10/2012	10:15	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	8/25/2010	19:09	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	4/16/2010	18:00	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	10/25/2010	12:22	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	9/27/2013	14:49	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW		600	LITTLEROCK RD SW	8/14/2010	11:19	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	LITTLEROCK RD SW		5300		12/30/2013	16:33	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5300		11/10/2014	10:58	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW		5300		10/14/2012	19:24	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW		5300		11/9/2013	13:20	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW		5300		2/10/2010	15:51	Possible Injury	1	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW		5300		11/6/2011	9:00	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LITTLEROCK RD SW			S 2ND AVE SW	12/1/2014	17:00	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5300		9/24/2012	7:21	No Injury	0	0	1	0	0	At Driveway	Fence
City Street	LITTLEROCK RD SW		5300		7/26/2012	17:17	Possible Injury	1	0	2	0	0	At Driveway	Entering at angle
City Street	S 2ND AVE SW		500	TROSPER RD SW	11/24/2011	11:48	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	S 2ND AVE SW		1700		6/24/2010	11:36	No Injury	0	0	2	0	0	At Driveway	Same direction -- both turning right -- both moving -- sideswipe
City Street	TROSPER RD SW		600	S 2ND AVE SW	3/17/2010	16:21	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	TROSPER RD SW		600	S 2ND AVE SW	8/26/2011	20:27	Possible Injury	3	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

31 - I-5 SB Ramps/Tyee Dr at Trosper Rd

State Route	005LX10279	0.02			10/7/2014	13:36	Possible Injury	2	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			6/18/2012	22:44	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			5/1/2013	17:30	Possible Injury	3	0	3	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.02			11/14/2014	13:58	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			10/23/2010	18:24	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			10/13/2012	14:35	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			2/9/2012	17:38	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.02			10/1/2013	13:30	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
State Route	005LX10279	0.02			11/9/2012	16:55	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			2/14/2014	11:38	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
State Route	005LX10279	0.02			5/18/2011	19:05	Possible Injury	1	0	4	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			10/29/2010	16:15	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.02			10/28/2013	11:46	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
State Route	005LX10279	0.02			2/24/2011	16:40	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			5/7/2014	11:54	Possible Injury	3	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			8/8/2012	13:23	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			9/25/2010	21:38	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10279	0.02			1/10/2014	13:10	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
State Route	005LX10279	0.02			8/17/2011	16:07	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
State Route	005LX10279	0.02			1/9/2011	11:17	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			2/1/2014	12:48	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			5/19/2014	16:01	Possible Injury	1	0	3	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			5/5/2011	12:51	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
State Route	005LX10279	0.02			11/26/2012	8:42	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			12/21/2010	17:55	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			6/16/2011	19:09	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From opposite direction - both going straight - sideswipe
State Route	005LX10279	0.02			4/7/2010	15:46	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
State Route	005LX10279	0.02			2/8/2013	14:23	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			8/3/2012	18:00	No Injury	0	0	3	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.02			9/16/2011	11:18	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			10/5/2010	16:47	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			8/25/2011	11:55	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			7/30/2014	12:46	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			9/4/2013	15:43	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			3/29/2012	11:32	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			9/16/2013	18:05	No Injury	0	0	3	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			12/23/2014	20:40	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			8/28/2013	20:00	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
State Route	005LX10279	0.02			9/6/2013	14:40	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			9/10/2014	17:31	Evident Injury	1	0	3	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			3/16/2012	16:28	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			9/15/2013	14:32	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.02			8/12/2014	17:20	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.02			3/20/2013	14:54	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.02			8/12/2014	18:29	Possible Injury	1	0	1	0	1	At Intersection and Related	Vehicle - Pedalcyclist
State Route	005LX10279	0.02			11/23/2013	12:55	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	005LX10279	0.02			9/14/2013	11:42	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005S510247	0.02			12/12/2013	17:07	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110303	0.28			7/11/2011	14:26	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end
State Route	005R110303	0.30			2/1/2011	16:20	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - all others
State Route	005R110303	0.30			8/18/2011	20:45	No Injury	0	0	1	0	0	Intersection Related but Not at Intersection	Vehicle overturned
State Route	005R110303	0.31			12/31/2014	10:35	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110303	0.32			4/1/2011	12:39	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
State Route	005R110303	0.32			3/7/2012	19:44	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110303	0.32			4/7/2011	16:22	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			10/5/2010	12:38	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
State Route	005R110303	0.32			10/7/2012	16:13	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			5/21/2012	14:25	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110303	0.32			4/19/2011	12:16	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			2/16/2011	18:06	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			8/24/2011	12:26	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			10/21/2014	11:40	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R110303	0.32			12/9/2011	9:26	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005R110303	0.32			5/7/2010	14:10	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	TROSPER RD SW		500		8/23/2014	11:35	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight

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State Route	005LX10279	0.12			10/28/2013	17:15	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.12			12/27/2011	11:30	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.12			12/28/2010	16:40	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.16			3/6/2012	14:52	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.18			3/10/2010	11:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
State Route	005LX10279	0.18			4/20/2010	8:03	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.18			1/13/2010	6:56	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			1/15/2010	15:13	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			11/3/2010	11:00	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			1/14/2010	18:00	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			11/1/2014	20:48	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			8/13/2010	8:02	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.19			4/14/2013	15:29	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			3/31/2010	17:38	Unknown	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			7/1/2014	13:37	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			5/24/2013	16:26	No Injury	0	0	3	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			7/22/2011	13:56	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
State Route	005LX10279	0.19			5/25/2014	16:10	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			6/28/2014	14:29	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			7/28/2014	16:48	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.19			3/16/2012	19:24	Possible Injury	1	0	4	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10279	0.19			6/22/2014	16:58	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10279	0.21			12/19/2011	17:55	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe
State Route	005LX10279	0.21			12/5/2011	11:18	Possible Injury	1	0	4	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005P110255	0.31			9/6/2013	18:00	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005P110255	0.31			6/2/2011	8:03	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005P110255	0.31			12/6/2010	12:40	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
State Route	005P110255	0.31			4/26/2014	16:30	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end

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JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	TROSPER RD SW			CAPITOL BLVD SW	2/14/2013	18:44	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
City Street	TROSPER RD SW			CAPITOL BLVD SW	9/1/2014	9:30	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
City Street	TROSPER RD SW			CAPITOL BLVD SW	2/14/2013	18:44	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	TROSPER RD SW			CAPITOL BLVD SW	9/5/2012	8:05	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
City Street	TROSPER RD SW			CAPITOL BLVD SW	2/10/2010	9:47	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
City Street	TROSPER RD SW			CAPITOL BLVD SW	10/29/2010	12:19	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW			CAPITOL BLVD SW	3/21/2012	12:38	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	TROSPER RD SW			CAPITOL BLVD SW	10/1/2013	12:13	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TROSPER RD SW			CAPITOL BLVD SW	3/7/2014	8:29	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW			CAPITOL BLVD SW	7/7/2010	7:43	Possible Injury	2	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TROSPER RD SW			CAPITOL BLVD SW	7/20/2010	11:11	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	9/26/2014	16:40	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	10/22/2013	12:11	Possible Injury	1	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	1/21/2011	13:53	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	8/23/2014	12:30	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	12/28/2010	11:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	9/18/2014	19:59	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	4/26/2012	11:29	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	CAPITOL BLVD SW			TROSPER RD SW	8/7/2014	15:04	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	6/13/2013	13:04	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	4/12/2014	13:24	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	4/10/2010	9:13	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW			TROSPER RD SW	2/8/2012	16:37	Possible Injury	1	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	4/5/2014	16:11	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	6/18/2012	10:58	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	1/18/2014	12:11	Evident Injury	1	0	1	0	0	At Intersection and Related	Vehicle overturned
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	5/6/2011	15:54	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
City Street	CAPITOL BLVD SW		5100	TROSPER RD SW	11/21/2014	13:20	No Injury	0	0	1	0	0	At Intersection and Related	Signal Pole
City Street	CAPITOL BLVD SW			TROSPER RD SW	6/26/2012	14:53	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	7/21/2010	21:57	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	11/17/2014	15:31	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one right turn
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	10/15/2014	12:21	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
City Street	CAPITOL BLVD SW		5200	TROSPER RD SW	3/10/2011	16:04	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		5200		8/29/2014	23:30	Serious Injury	1	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		1000		12/12/2010	14:15	No Injury	0	0	2	0	0	At Driveway	Entering at angle

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JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	CAPITOL BLVD SE			LEE ST SE	10/26/2011	12:01	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		5400	LEE ST SE	2/6/2013	11:26	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5600	LEE ST SE	9/25/2014	12:19	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5600	LEE ST SE	9/4/2014	20:48	No Injury	0	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW		5400	LEE ST SE	11/5/2012	16:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	12/21/2013	10:36	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		5400	LEE ST SE	3/29/2011	15:16	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	11/27/2013	13:47	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW			LEE ST SE	10/30/2011	21:53	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		100	LEE ST SE	3/7/2012	16:04	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	6/21/2012	10:39	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	8/9/2012	13:12	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	11/1/2012	14:29	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SE	2/24/2010	16:10	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SW	4/21/2012	11:35	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SW	1/31/2014	12:42	No Injury	0	0	1	0	0	At Intersection and Related	Signal Pole
City Street	CAPITOL BLVD SW		5400	LEE ST SW	2/8/2010	16:13	Possible Injury	4	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SW	5/21/2012	13:36	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW			LEE ST SW	5/7/2013	10:32	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		5400	LEE ST SW	1/11/2010	16:49	Evident Injury	1	0	1	1	0	At Intersection and Related	Vehicle going straight hits pedestrian
City Street	CAPITOL BLVD SW		5400	LEE ST SW	2/2/2010	16:08	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SW	10/8/2012	13:55	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5600	LEE ST SW	9/2/2014	16:36	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5400	LEE ST SW	11/15/2013	16:55	Evident Injury	1	0	1	1	0	At Intersection and Related	Vehicle going straight hits pedestrian
City Street	CAPITOL BLVD SW		5400	LEE ST SW	6/14/2011	8:52	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5600	LEE ST SW	12/15/2014	11:57	No Injury	0	0	1	0	0	At Intersection and Related	Signal Pole
City Street	CAPITOL BLVD SW		5400	LEE ST SW	8/18/2010	15:50	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		5600	LEE ST SW	10/12/2014	13:14	Possible Injury	1	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - both moving - sideswipe
City Street	CAPITOL BLVD SW		5500		8/12/2010	17:08	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end
City Street	CAPITOL BLVD SW		5600		1/15/2013	12:24	No Injury	0	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - one stopped - rear-end
City Street	LEE ST SE			CAPITOL BLVD SE	3/30/2010	10:59	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
City Street	LEE ST SE		100	CAPITOL BLVD SW	4/3/2012	15:30	Possible Injury	1	0	1	1	0	At Intersection and Related	Vehicle turning left hits pedestrian
City Street	LEE ST SE		100		6/15/2013	19:38	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LEE ST SE		100		5/10/2011	17:27	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LEE ST SE		100		7/16/2013	11:45	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LEE ST SW		200	CAPITOL BLVD SW	8/27/2013	12:14	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	LEE ST SW		100	MCDONALDS	10/6/2010	12:26	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LEE ST SW		200		9/20/2010	16:37	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	LEE ST SW		200		3/20/2013	10:38	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	LEE ST SW		200		2/20/2012	15:37	No Injury	0	0	2	0	0	At Driveway	From same direction - one right turn - one straight
City Street	LEE ST SW		200		8/26/2013	12:23	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LEE ST SW		200		8/17/2012	12:19	No Injury	0	0	1	0	0	At Driveway	Utility Pole

35 - Littlerock Rd at Fred Meyer / Costco Drwy

City Street	LITTLEROCK RD SW		5700	FRED MEYER COSTCO	12/2/2013	17:02	Possible Injury	1	0	1	1	0	At Intersection and Related	Vehicle turning left hits pedestrian
City Street	LITTLEROCK RD SW		5400	FRED MEYER COSTCO ENTRAN(	5/24/2014	9:35	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

36 - Littlerock Rd / Costco Drwy

City Street	LITTLEROCK RD SW		5400	COSTCO	10/25/2014	11:19	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	LITTLEROCK RD SW		5600	COSTCO DR	11/10/2014	15:45	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		5700	COSTCO DRVWY	11/14/2012	22:00	Evident Injury	1	0	1	1	0	At Intersection and Related	Vehicle going straight hits pedestrian

37 - Littlerock Rd / Kingswood Dr

City Street	LITTLEROCK RD SW		6300	KINGSWOOD DR SW	5/14/2012	14:24	No Injury	0	0	1	0	0	Circulating Roundabout	Street Light Pole or Base
City Street	LITTLEROCK RD SW		5700	KINGSWOOD DR SW	6/6/2012	14:55	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5700	KINGSWOOD DR SW	12/31/2014	18:11	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5900	KINGSWOOD DR SW	1/23/2014	17:23	Possible Injury	1	0	2	0	0	Entering Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		5900	KINGSWOOD DR SW	12/9/2014	7:28	No Injury	0	0	2	0	0	Circulating Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		6300	KINGSWOOD DR SW	11/14/2011	16:04	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		6300	KINGSWOOD DR SW	8/16/2011	13:37	Evident Injury	1	0	1	0	0	Circulating Roundabout	Street Light Pole or Base
City Street	LITTLEROCK RD SW		6300	KINGSWOOD DR SW	7/7/2010	12:20	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
City Street	LITTLEROCK RD SW		5900	KINGSWOOD DR SW	11/4/2014	12:43	Possible Injury	1	0	2	0	0	Entering Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		5700	KINGSWOOD DR SW	11/10/2014	16:05	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

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JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	LITTLEROCK RD SW		6000		3/8/2010	13:39	No Injury	0	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		6000		10/30/2012	12:22	No Injury	0	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		5700		7/28/2012	12:05	Evident Injury	1	0	1	0	1	At Driveway	Vehicle - Pedalcyclist
City Street	LITTLEROCK RD SW		5700		10/1/2011	13:29	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LITTLEROCK RD SW		5700		9/21/2011	19:43	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
38 - Capitol Blvd / X St														
City Street	CAPITOL BLVD SW		6200	X ST SE	10/6/2014	17:17	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		6200	X ST SE	5/11/2013	11:24	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		6200	X ST SW	4/26/2011	17:57	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		6200		9/11/2013	13:59	Possible Injury	1	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end
39 - Elm St / X St														
City Street	ELM ST SE		6200	X ST SE	12/14/2012	11:24	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
40 - Capitol Blvd /Dennis St														
City Street	CAPITOL BLVD S		6600	DENNIS ST SE	4/21/2012	10:37	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		6600		7/9/2014	17:09	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	CAPITOL BLVD SW		6500	DENNIS ST SE	2/2/2011	18:12	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD SW		6500	DENNIS ST SE	2/24/2012	11:37	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		6500	DENNIS ST SE	3/2/2012	17:32	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD SW		6500	DENNIS ST SE	1/15/2010	14:28	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD SW		6500	DENNIS ST SW	8/9/2012	23:15	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	CAPITOL BLVD SW		6500	DENNIS ST SW	5/7/2014	17:50	Serious Injury	1	0	1	0	0	At Intersection and Not Related	Curb, Raised Traffic Island or Raised Median Curb
City Street	CAPITOL BLVD SW		6500		5/13/2014	16:05	No Injury	0	0	2	0	0	At Driveway	Entering at angle
41 - Capitol Blvd /Israel Rd														
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	6/28/2013	16:27	Serious Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	12/4/2013	12:54	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S			ISRAEL RD SE	1/24/2012	11:51	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	5/25/2010	7:41	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S			ISRAEL RD SE	3/26/2012	20:24	Evident Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	6/13/2013	9:09	Evident Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6800	ISRAEL RD SE	10/11/2014	0:16	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	2/12/2013	18:01	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		6800	ISRAEL RD SE	10/23/2014	13:44	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	3/5/2011	18:18	No Injury	0	0	2	0	0	At Driveway within Major Intersection	From same direction - one right turn - one straight
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	5/16/2013	18:12	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	6/18/2013	13:06	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S			ISRAEL RD SE	11/17/2011	16:02	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	3/1/2010	8:25	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6800	ISRAEL RD SE	9/25/2014	0:00	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S		6700	ISRAEL RD SE	7/26/2012	13:55	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	ISRAEL RD SE			CAPITOL BLVD S	1/30/2014	19:41	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	ISRAEL RD SE		0	CAPITOL BLVD S	6/15/2010	17:16	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	ISRAEL RD SE		0	CAPITOL BLVD S	5/8/2010	13:36	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	ISRAEL RD SE		200		6/17/2011	8:31	No Injury	0	0	2	0	0	At Driveway	Entering at angle
42 - Black Lake Belmore Rd /66th Ave														
City Street	66TH AVE SW		3800	BLACK LAKE BELMORE RD SW	3/27/2014	7:29	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	BLACK LAKE BELMORE RD S		6400	66TH AVE SW	12/5/2014	14:54	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	BLACK LAKE BELMORE RD S		6400	66TH AVE SW	11/16/2012	23:52	Evident Injury	1	0	1	0	0	At Intersection and Related	Tree or Stump (stationary)
City Street	BLACK LAKE BELMORE RD S		6400	66TH AVE SW	7/12/2012	17:49	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
City Street	BLACK LAKE BELMORE RD S		6400	66TH AVE SW	9/12/2014	21:28	No Injury	0	0	1	0	0	At Intersection and Related	Over Embankment - No Guardrail Present
43 - Kirsop Rd /66th Ave														
City Street	66TH AVE SW		3100	KIRSOP RD SW	8/1/2011	17:33	No Injury	0	0	1	0	0	At Intersection and Related	Utility Pole
City Street	KIRSOP RD SW		3100	66TH AVE SW	1/6/2012	22:00	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	KIRSOP RD SW		6200		7/24/2010	18:38	Evident Injury	1	0	1	0	0	At Intersection and Not Related	Tree or Stump (stationary)
City Street	KIRSOP RD SW		6200		5/25/2012	1:13	No Injury	0	0	2	0	0	At Driveway	Entering at angle
44 - Littlerock Rd / Odegard Rd														
City Street	LITTLEROCK RD SW			ODEGARD RD SW	10/25/2013	12:17	No Injury	0	0	2	0	0	Entering Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		6500	ODEGARD RD SW	11/21/2012	14:41	No Injury	0	0	2	0	0	Entering Roundabout	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		6400		9/11/2014	17:40	Possible Injury	1	0	2	0	0	Roundabout Related but not at Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		6500		11/10/2011	14:58	No Injury	0	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end

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JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	LITTLEROCK RD SW		6600		7/3/2013	15:32	No Injury	0	0	1	0	1	At Driveway	Vehicle - Pedalcyclist
45 - Littlerock Rd at Israel Rd / 70th Ave														
City Street	ISRAEL RD SW			LITTLEROCK RD SW	4/14/2014	15:04	No Injury	0	0	1	0	0	At Intersection and Related	Metal Sign Post
City Street	LITTLEROCK RD SW		3300	ISRAEL RD SW	8/11/2013	18:59	No Injury	0	0	1	0	0	Circulating Roundabout	Curb, Raised Traffic Island or Raised Median Curb
City Street	LITTLEROCK RD SW			ISRAEL RD SW	10/12/2012	13:32	No Injury	0	0	1	0	0	Exiting Roundabout	Wood Sign Post
City Street	LITTLEROCK RD SW			ISRAEL RD SW	6/19/2013	17:57	No Injury	0	0	2	0	0	Entering Roundabout	Entering at angle
City Street	LITTLEROCK RD SW			ISRAEL RD SW	2/23/2013	3:04	No Injury	0	0	1	0	0	Circulating Roundabout	Curb, Raised Traffic Island or Raised Median Curb
City Street	LITTLEROCK RD SW		0		7/5/2014	16:45	No Injury	0	0	1	0	0	Driveway Related but Not at Driveway	Curb, Raised Traffic Island or Raised Median Curb
City Street	LITTLEROCK RD SW		1200		12/21/2014	20:45	Unknown	0	0	1	0	0	Circulating Roundabout	Wood Sign Post
City Street	LITTLEROCK RD SW			70TH AVE SW	10/15/2014	19:11	No Injury	0	0	2	0	0	Entering Roundabout	Entering at angle
City Street	LITTLEROCK RD SW		6900	70TH AVE SW	12/13/2014	16:57	Possible Injury	1	0	1	0	0	Exiting Roundabout	Over Embankment - No Guardrail Present
City Street	LITTLEROCK RD SW			70TH AVE SW	10/7/2014	15:39	No Injury	0	0	2	0	0	Circulating Roundabout	Same direction -- both turning left -- both moving -- sideswipe
City Street	70TH AVE SW			LITTLEROCK RD SW	6/28/2010	13:35	No Injury	0	0	2	0	0	Entering Roundabout	Entering at angle
City Street	70TH AVE SW			LITTLEROCK RD SW	4/5/2010	11:34	No Injury	0	0	1	0	0	Exiting Roundabout	Retaining Wall (concrete, rock, brick, etc.)
46 - Linderson Way / Israel Rd														
City Street	ISRAEL RD SW		900	LINDERSON WAY SW	10/2/2013	7:40	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	ISRAEL RD SW		900	LINDERSON WAY SW	10/23/2013	17:04	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	ISRAEL RD SW		900	LINDERSON WAY SW	10/31/2012	14:24	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	ISRAEL RD SW			LINDERSON WAY SW	11/18/2011	18:05	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	ISRAEL RD SW		900	LINDERSON WAY SW	12/10/2010	14:35	Possible Injury	1	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end
City Street	LINDERSON WAY SW		6900		5/6/2014	14:24	No Injury	0	0	2	0	0	At Driveway	Entering at angle
City Street	LINDERSON WAY SW		6800		11/23/2011	7:27	No Injury	0	0	2	0	0	At Driveway	From same direction - one left turn - one straight
47 - Littlerock Rd /Tumwater Blvd														
City Street	LITTLEROCK RD SW		7200	TUMWATER BLVD SW	10/14/2014	14:20	No Injury	0	0	2	0	0	Circulating Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	8/29/2013	11:27	No Injury	0	0	2	0	0	Circulating Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		1700	TUMWATER BLVD SW	4/3/2014	10:31	Possible Injury	1	0	2	0	0	Entering Roundabout	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		7200	TUMWATER BLVD SW	11/5/2013	11:59	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW		7200	TUMWATER BLVD SW	8/7/2014	10:46	No Injury	0	0	2	0	0	Circulating Roundabout	Same direction -- both turning left -- both moving -- sideswipe
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	3/2/2011	12:28	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	3/26/2013	23:50	No Injury	0	0	1	0	0	Entering Roundabout	Concrete Barrier/Jersey Barrier - Face
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	3/26/2010	17:04	Possible Injury	1	0	2	0	0	Entering Roundabout	From same direction - both going straight - one stopped - rear-end
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	12/15/2010	17:22	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - one left turn - one straight
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	5/19/2010	17:12	No Injury	0	0	2	0	0	Circulating Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	LITTLEROCK RD SW		5100	TUMWATER BLVD SW	2/27/2014	7:29	No Injury	0	0	2	0	0	At Intersection and Related	Curb, Raised Traffic Island or Raised Median Curb
City Street	LITTLEROCK RD SW			TUMWATER BLVD SW	5/25/2013	14:50	No Injury	0	0	1	0	0	Exiting Roundabout	Metal Sign Post
City Street	LITTLEROCK RD SW		100		8/7/2013	13:11	No Injury	0	0	2	0	0	Circulating Roundabout	Wood Sign Post
City Street	LITTLEROCK RD SW				1/10/2011	8:41	No Injury	0	0	2	0	0	Entering Roundabout	From same direction - both going straight - both moving - rear-end
City Street	LITTLEROCK RD SW		7100		12/6/2014	16:10	No Injury	0	0	1	0	0	Entering Roundabout	Curb, Raised Traffic Island or Raised Median Curb
City Street	LITTLEROCK RD SW				10/27/2012	13:30	No Injury	0	0	2	0	0	Roundabout Related but not at Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	TUMWATER BLVD SW			LITTLEROCK RD SW	1/29/2010	5:15	No Injury	0	0	1	0	0	Exiting Roundabout	Metal Sign Post
City Street	TUMWATER BLVD SW		5500	LITTLEROCK RD SW	9/13/2014	16:25	Evident Injury	1	0	1	0	0	Exiting Roundabout	Vehicle overturned
City Street	TUMWATER BLVD SW			LITTLEROCK RD SW	9/17/2010	18:40	No Injury	0	0	2	0	0	Entering Roundabout	From same direction - one right turn - one straight
48 - I-5 SB Ramps /Tumwater Blvd														
State Route	005R110162	0.36			11/20/2014	6:59	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10130	0.00			2/14/2013	14:30	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10130	0.00			10/23/2014	19:01	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.00			12/7/2012	7:29	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10130	0.00			4/6/2010	17:09	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10130	0.00			1/24/2014	18:11	No Injury	0	0	3	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.00			2/22/2014	17:21	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.00			3/3/2014	10:00	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
State Route	005LX10130	0.00			1/25/2012	17:06	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX10130	0.00			3/5/2014	7:17	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.00			12/4/2012	18:14	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.00			11/3/2012	16:58	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.00			10/20/2011	15:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - all others
State Route	005LX10130	0.00			5/15/2014	12:25	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
State Route	005LX10130	0.00			7/24/2014	16:26	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
49 - I-5 SB Ramps /Tumwater Blvd														
State Route	005LX10130	0.16			6/15/2012	14:18	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
State Route	005LX10130	0.16			1/7/2013	16:19	No Injury	0	0	1	0	0	At Intersection and Related	Guardrail - Face
State Route	005LX10130	0.16			5/10/2011	20:36	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.16			3/1/2014	9:44	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.16			2/5/2014	14:44	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.16			11/27/2014	17:12	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.16			10/25/2010	10:46	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.16			7/21/2014	11:03	Evident Injury	3	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.16			1/23/2013	11:47	Evident Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX10130	0.16			6/24/2014	22:33	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX10130	0.16			9/23/2014	16:28	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005P110093	0.39			12/7/2010	7:35	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005P110093	0.39			3/3/2013	15:15	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005P110093	0.39			6/10/2011	14:02	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

50 - Linderson Way /Tumwater Blvd

City Street	CENTER ST SW		7500	TUMWATER BLVD SW	1/24/2014	7:15	No Injury	0	0	1	0	0	At Intersection and Related	Curb, Raised Traffic Island or Raised Median Curb
City Street	TUMWATER BLVD SW			CENTER ST SW	9/26/2014	7:53	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SW			CENTER ST SW	4/26/2012	17:12	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	TUMWATER BLVD SW			CENTER ST SW	1/27/2014	9:54	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TUMWATER BLVD SW			CENTER ST SW	3/15/2013	18:04	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SW			CENTER ST SW	12/12/2013	17:00	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	LINDERSON WAY SW		7400	TUMWATER BLVD SW	12/6/2013	17:01	Possible Injury	1	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	LINDERSON WAY SW		7400	TUMWATER BLVD SW	3/5/2014	8:22	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	1/21/2010	10:55	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	TUMWATER BLVD SW		1000	LINDERSON WAY SW	12/10/2014	16:29	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	10/26/2012	15:45	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	7/12/2012	14:42	Possible Injury	1	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	2/17/2011	6:32	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	3/19/2013	18:01	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	TUMWATER BLVD SW			LINDERSON WAY SW	3/27/2012	18:15	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end

51 - New Market St / Tumwater Blvd

City Street	NEW MARKET ST SW			TUMWATER BLVD SW	7/17/2013	10:50	Possible Injury	1	0	1	0	0	Circulating Roundabout	Street Light Pole or Base
City Street	TUMWATER BLVD SW		200	NEW MARKET ST SW	10/1/2010	7:11	No Injury	0	0	2	0	0	Entering Roundabout	From same direction - one right turn - one straight
City Street	TUMWATER BLVD SW			NEW MARKET ST SW	7/2/2011	7:21	Possible Injury	1	0	1	0	0	Entering Roundabout	Curb, Raised Traffic Island or Raised Median Curb
City Street	TUMWATER BLVD SW			NEW MARKET ST SW	7/26/2012	7:31	No Injury	0	0	2	0	0	Circulating Roundabout	From same direction - one left turn - one straight
City Street	TUMWATER BLVD SW			NEW MARKET ST SW	2/18/2010	14:12	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	TUMWATER BLVD SW			NEW MARKET ST SW	12/30/2012	1:40	No Injury	0	0	1	0	0	Entering Roundabout	Curb, Raised Traffic Island or Raised Median Curb
City Street	TUMWATER BLVD SW			NEW MARKET ST SW	6/5/2012	11:43	No Injury	0	0	2	0	0	Exiting Roundabout	From same direction - both going straight - both moving - sideswipe
City Street	TUMWATER BLVD SW				9/28/2012	12:35	No Injury	0	0	3	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - one stopped - rear-end

52 -Capitol Blvd / Tumwater Blvd

City Street	CAPITOL BLVD S			TUMWATER BLVD SE	9/3/2013	15:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	8/21/2014	17:18	Possible Injury	1	0	3	0	0	At Intersection and Related	Entering at angle
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	1/29/2013	22:01	Possible Injury	1	0	2	0	0	At Driveway within Major Intersection	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	10/20/2014	13:47	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	3/11/2014	17:51	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one right turn
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	10/1/2012	12:44	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SE	5/3/2014	13:30	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SW	2/15/2010	20:05	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning left -- both moving -- sideswipe
City Street	CAPITOL BLVD S			TUMWATER BLVD SW	9/12/2010	13:55	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SW	5/25/2010	18:46	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S			TUMWATER BLVD SW	7/15/2012	11:12	Evident Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S				1/12/2011	11:59	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S		7200		5/30/2014	7:23	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
City Street	CAPITOL BLVD S				2/11/2012	16:18	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	CAPITOL BLVD S				2/25/2012	6:36	Possible Injury	1	0	1	0	0	At Intersection and Not Related	Metal Sign Post
City Street	TUMWATER BLVD SE			CAPITOL BLVD S	10/24/2012	11:50	Possible Injury	1	0	1	0	0	At Intersection and Not Related	Street Light Pole or Base
City Street	TUMWATER BLVD SE			CAPITOL BLVD S	1/16/2013	7:58	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SE				3/23/2011	12:30	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SE		100		8/28/2010	17:18	No Injury	0	0	2	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SE		100		2/1/2011	14:30	No Injury	0	0	2	0	0	At Driveway	From opposite direction - one left turn - one straight
City Street	TUMWATER BLVD SE		0		1/9/2010	17:54	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

Item 8.

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
City Street	TUMWATER BLVD SW		7200	CAPITOL BLVD S	7/24/2011	10:58	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- one stopped -- rear end
City Street	TUMWATER BLVD SW		100	CAPITOL BLVD S	9/29/2014	7:59	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SW			CAPITOL BLVD S	2/9/2013	15:03	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	TUMWATER BLVD SW			CAPITOL BLVD S	2/19/2010	4:05	Possible Injury	1	0	2	0	0	At Driveway within Major Intersection	Entering at angle
City Street	TUMWATER BLVD SW			CAPITOL BLVD S	9/24/2012	12:55	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - sideswipe
City Street	TUMWATER BLVD SW			CAPITOL BLVD S	11/1/2012	7:03	No Injury	0	0	2	0	0	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end

53 - 65th Ave / Henderson Blvd

County Road	12120	1.280		16620	9/6/2012	16:40	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
County Road	12120	1.280		16620	9/11/2014	8:55	Possible Injury	3	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end

54 -Tumwater Blvd/ Henderson Blvd

City Street	HENDERSON BLVD SE		6900	TUMWATER BLVD SE	3/30/2010	15:34	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	HENDERSON BLVD SE		7000	TUMWATER BLVD SE	12/31/2012	12:19	No Injury	0	0	1	0	0	At Intersection and Related	Fence
City Street	TUMWATER BLVD SE		1100	HENDERSON BLVD SE	8/8/2013	17:16	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
City Street	TUMWATER BLVD SE		1100	HENDERSON BLVD SE	6/23/2012	13:45	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	TUMWATER BLVD SE		1100	HENDERSON BLVD SE	7/9/2010	15:08	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

55 -Trails End Dr / Henderson Blvd

City Street	HENDERSON BLVD SE		7500		10/25/2012	7:24	Possible Injury	2	0	2	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end

56 - Littlerock Rd / Black Hills School Drwy

City Street	LITTLEROCK RD SW		7741	THS	1/8/2014	12:45	No Injury	0	0	1	0	0	At Intersection and Related	Signal Pole

57 - Old Hwy 99 / Henderson Blvd

City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	5/15/2014	11:45	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	6/27/2013	18:03	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	7/11/2013	11:15	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	7/20/2010	19:24	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	11/24/2012	14:35	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7700	HENDERSON BLVD SE	12/1/2014	16:30	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7700	HENDERSON BLVD SE	9/20/2011	16:44	No Injury	0	0	3	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	10/13/2013	15:18	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE			HENDERSON BLVD SE	1/16/2013	22:22	No Injury	0	0	1	0	0	At Intersection and Related	Utility Pole
City Street	OLD HIGHWAY 99 SE		7700	HENDERSON BLVD SE	1/9/2012	9:21	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	2/22/2010	8:44	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600	HENDERSON BLVD SE	5/15/2011	13:20	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7600		5/7/2011	14:21	Possible Injury	1	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		7700		11/12/2010	7:34	No Injury	0	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end
City Street	OLD HWY 99 SE			HENDERSON BLVD SE	3/8/2010	8:33	Possible Injury	2	0	2	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - both moving - rear-end

58 - Old Hwy 99 / 79th Ave

City Street	OLD HIGHWAY 99 SE		7900	79TH AVE SE	8/17/2013	13:15	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
City Street	OLD HIGHWAY 99 SE		7900	79TH AVE SE	3/13/2010	15:19	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	OLD HIGHWAY 99 SE		8000		5/27/2011	15:58	No Injury	0	0	3	0	0	At Driveway	From same direction - both going straight - one stopped - rear-end
City Street	OLD HIGHWAY 99 SE		8000		9/16/2011	15:03	No Injury	0	0	2	0	0	At Driveway	From same direction - both going straight - both moving - rear-end

59 - Kimmie St / 83rd Ave

60 - Center St / 83rd Ave

City Street	83RD AVE SW		1300	CENTER ST SW	8/26/2014	17:34	Possible Injury	2	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
City Street	83RD AVE SW		800	CENTER ST SW	6/5/2014	11:10	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

61 - Old Hwy 99 / 88th Ave

County Road	13765	19.722			5/20/2013	15:35	No Injury	0	0	2	0	0	At Driveway	From same direction - one right turn - one straight
County Road	13765	19.730			7/3/2010	15:25	No Injury	0	0	3	0	0	Driveway Related but Not at Driveway	From same direction - both going straight - one stopped - rear-end
County Road	13765	19.741			3/28/2012	10:35	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

62 - I-5 SB Ramps / 93rd Ave

State Route	005LX09928	0.00			1/22/2011	13:39	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			6/21/2011	22:55	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			9/18/2010	22:17	No Injury	0	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX09928	0.00			4/22/2010	11:54	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			11/1/2010	18:41	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			8/22/2011	12:15	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			7/21/2011	13:06	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- both moving -- sideswipe
State Route	005LX09928	0.00			3/3/2011	6:55	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle

JURISDICTION	PRIMARY TRAFFICWAY	MILE POST	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DATE	TIME	MOST SEVERE INJURY TYPE	# INJ	#FAT	#VEH	#PEDS	#PEDAL	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK
State Route	005LX09928	0.00			7/15/2011	18:05	Possible Injury	2	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005LX09928	0.00			9/27/2010	13:36	Evident Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005LX09928	0.00			4/13/2012	17:23	Possible Injury	1	0	2	0	0	At Intersection and Related	From opposite direction - one left turn - one straight
State Route	005LX09928	0.00			11/22/2011	16:38	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	005R109958	0.31			3/7/2011	15:15	No Injury	0	0	2	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end
State Route	005R109958	0.32			1/5/2011	16:15	Possible Injury	2	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end
State Route	005R109958	0.33			7/13/2010	15:50	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight
State Route	005R109958	0.33			3/30/2010	16:18	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe
State Route	005R109958	0.33			1/3/2011	18:25	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight
State Route	005R109958	0.33			2/17/2011	18:03	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R109958	0.33			8/30/2010	10:02	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
State Route	005R109958	0.33			8/24/2010	13:32	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one left turn - one straight
State Route	005R109958	0.33			4/27/2011	15:27	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005R109958	0.33			9/16/2011	13:13	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - one right turn - one straight

63 - I-5 NB Ramps / 93rd Ave

State Route	005P109890	0.40			4/17/2012	12:55	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005P109890	0.40			9/17/2010	16:18	Evident Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	005Q109977	0.00			11/21/2014	19:05	No Injury	0	0	1	0	0	At Intersection and Related	All other non-collision
State Route	005Q109977	0.01			9/22/2014	17:29	No Injury	0	0	2	0	0	At Intersection and Related	Same direction -- both turning right -- both moving -- rear end
State Route	005Q109977	0.02			11/22/2014	23:26	No Injury	0	0	1	0	0	At Intersection and Related	Roadway Ditch

64 - Kimmie St / 93rd Ave

State Route	121	7.24			1/21/2013	7:26	Evident Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	121	7.24			4/25/2013	7:00	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
State Route	121	7.24			9/27/2013	10:20	Possible Injury	2	0	2	0	0	At Intersection and Related	From same direction - both going straight - both moving - rear-end
State Route	121	7.24			5/4/2014	17:08	Evident Injury	1	0	1	0	0	At Intersection and Related	Utility Pole
State Route	121	7.25			5/8/2013	14:42	Possible Injury	1	0	3	0	0	Intersection Related but Not at Intersection	From same direction - both going straight - both moving - rear-end

65 - Case Rd / 93rd Ave

66 - Tilley Rd (south) / 93rd Ave

State Route	121	6.24			5/26/2012	13:08	Evident Injury	1	0	1	0	0	At Intersection and Related	Vehicle overturned
State Route	121	6.24			1/22/2010	19:57	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	121	6.24			2/11/2011	5:25	No Injury	0	0	1	0	0	At Intersection and Related	Fence
State Route	121	6.24			7/5/2011	18:23	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
State Route	121	6.24			12/3/2011	6:48	No Injury	0	0	1	0	0	At Intersection and Related	Fence
State Route	121	6.24			7/19/2012	17:19	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	121	6.24			9/3/2013	9:49	No Injury	0	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
State Route	121	6.24			9/11/2014	0:00	No Injury	0	0	1	0	0	At Intersection and Related	Utility Pole
State Route	121	6.24			12/3/2014	18:38	No Injury	0	0	2	0	0	At Driveway within Major Intersection	Other Objects

67 - Tilley Rd (north) / 93rd Ave

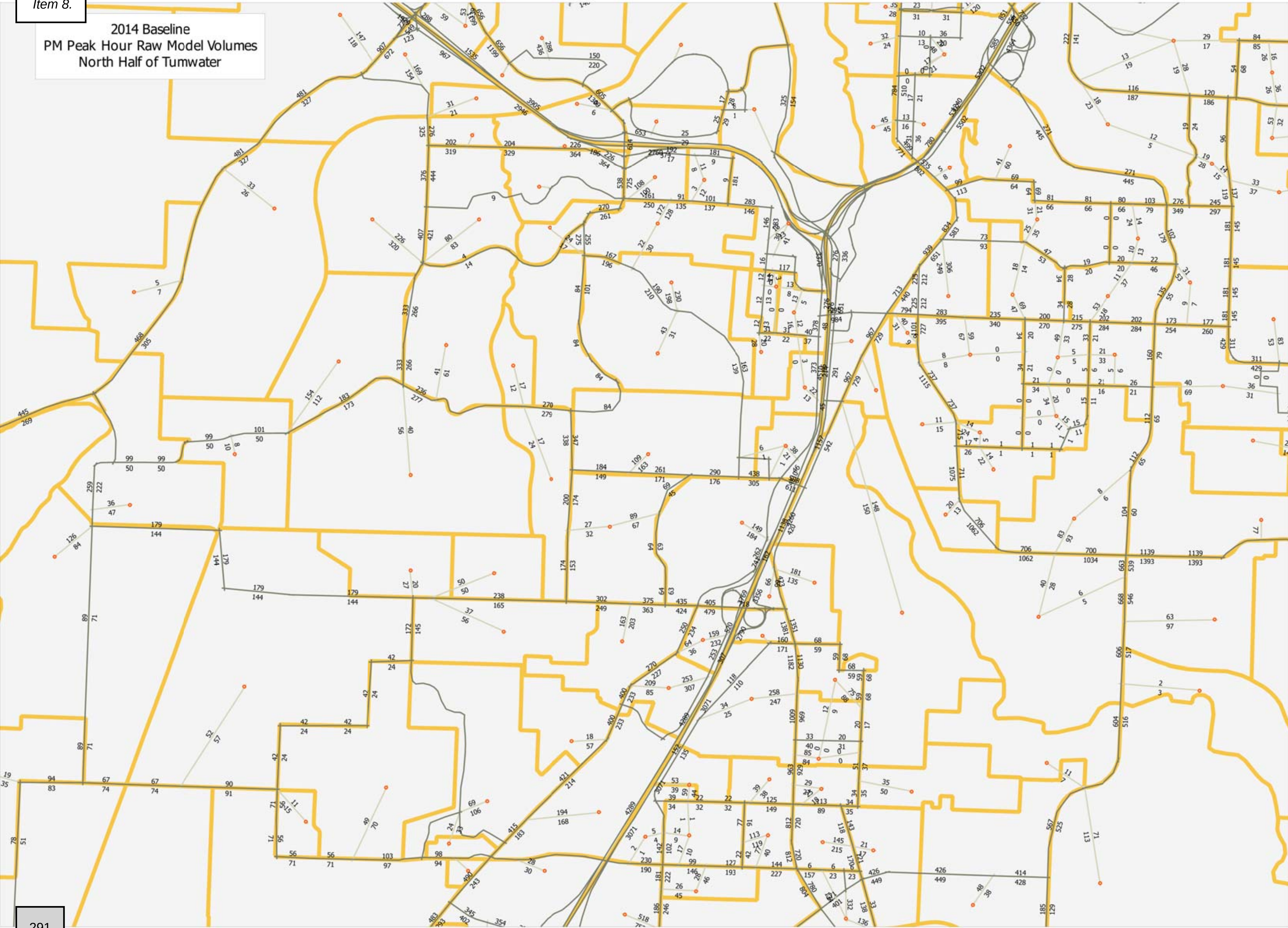
City Street	88TH AVE SE		800		5/14/2010	12:01	Possible Injury	2	0	2	0	0	At Driveway	From same direction - one right turn - one straight
City Street	93RD AVE SE		300		9/26/2012	20:30	Possible Injury	1	0	2	0	0	Not at Intersection and Not Related	From same direction - both going straight - both moving - rear-end
City Street	TILLEY RD SE		400	93RD AVE SE	12/11/2013	7:45	Unknown	0	0	1	0	0	At Intersection and Related	Utility Pole
City Street	TILLEY RD SE		8900		5/10/2014	0:01	Evident Injury	1	0	1	0	0	Not at Intersection and Not Related	Street Light Pole or Base

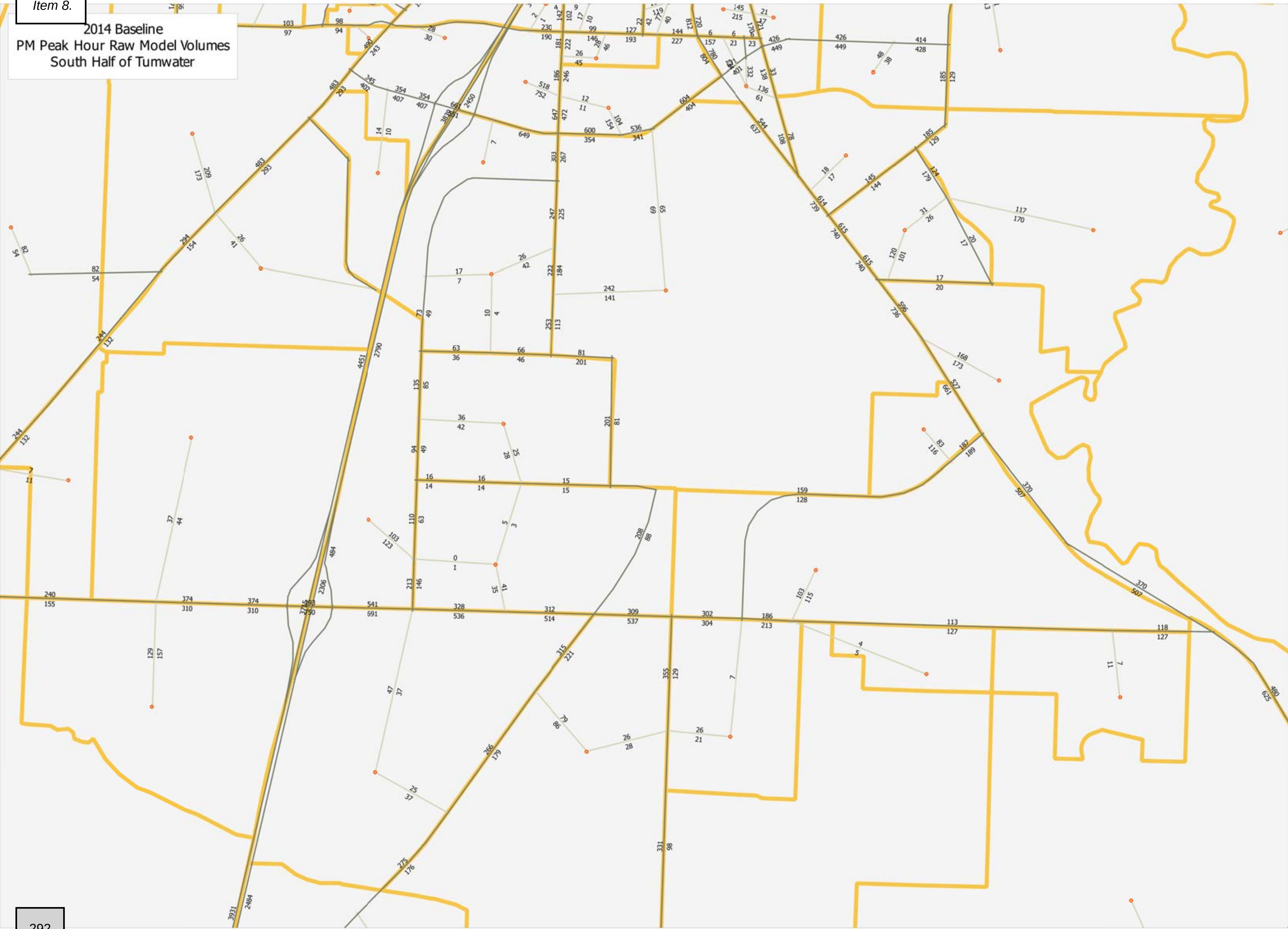
68 - Old Highway 99 / 93rd Ave

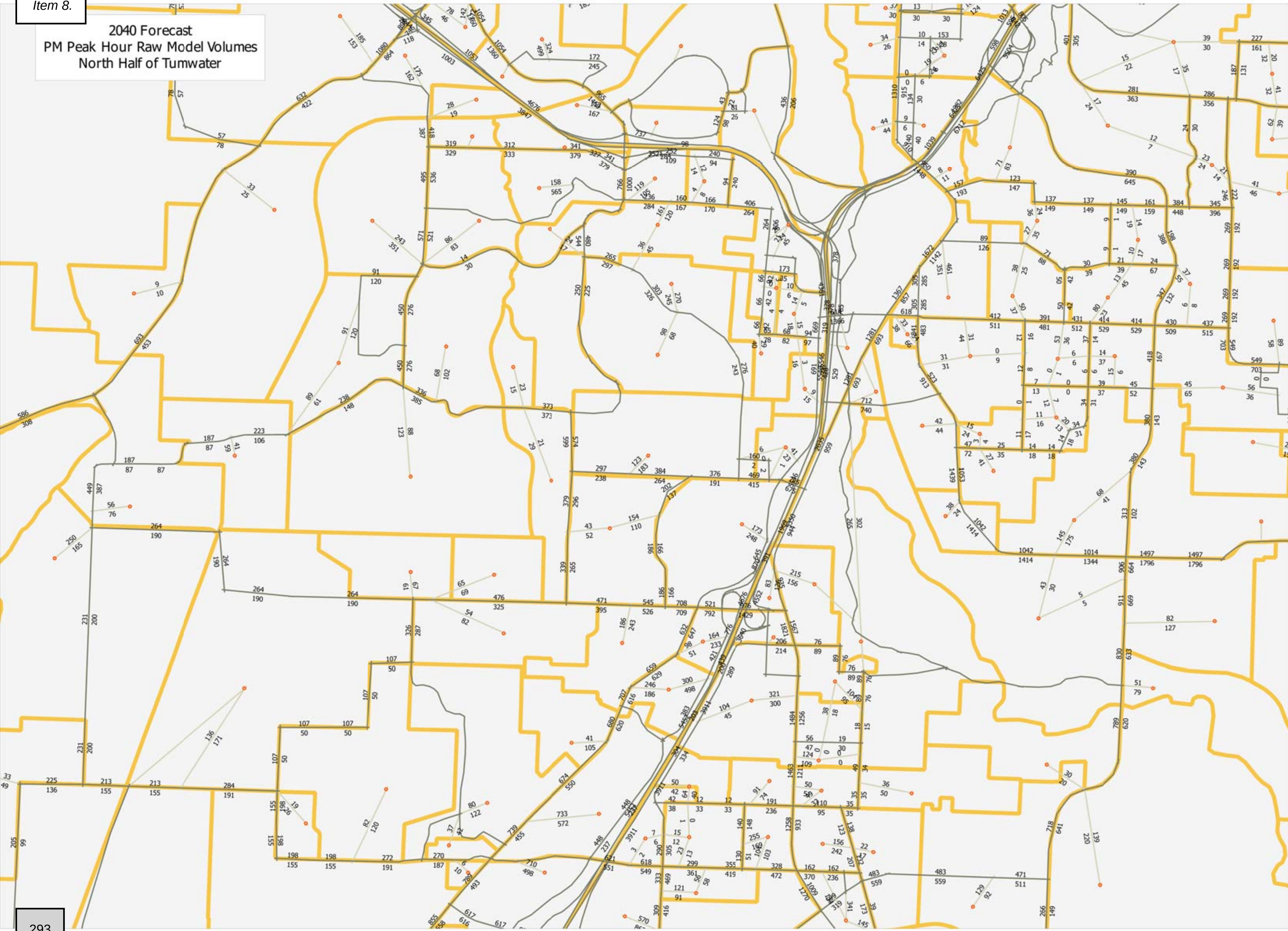
County Road	17010	16.065		13765	8/30/2013	19:23	Possible Injury	1	0	2	0	0	At Intersection and Related	From same direction - both going straight - one stopped - rear-end
County Road	13765	18.610		17010	8/5/2010	15:44	Evident Injury	1	0	2	0	0	At Intersection and Related	Vehicle overturned
County Road	13765	18.610		17010	12/1/2010	16:48	No Injury	0	0	2	0	0	At Intersection and Related	Entering at angle
County Road	13765	18.610		17010	4/12/2013	19:43	Evident Injury	1	0	1	0	0	At Intersection and Related	Wood Sign Post

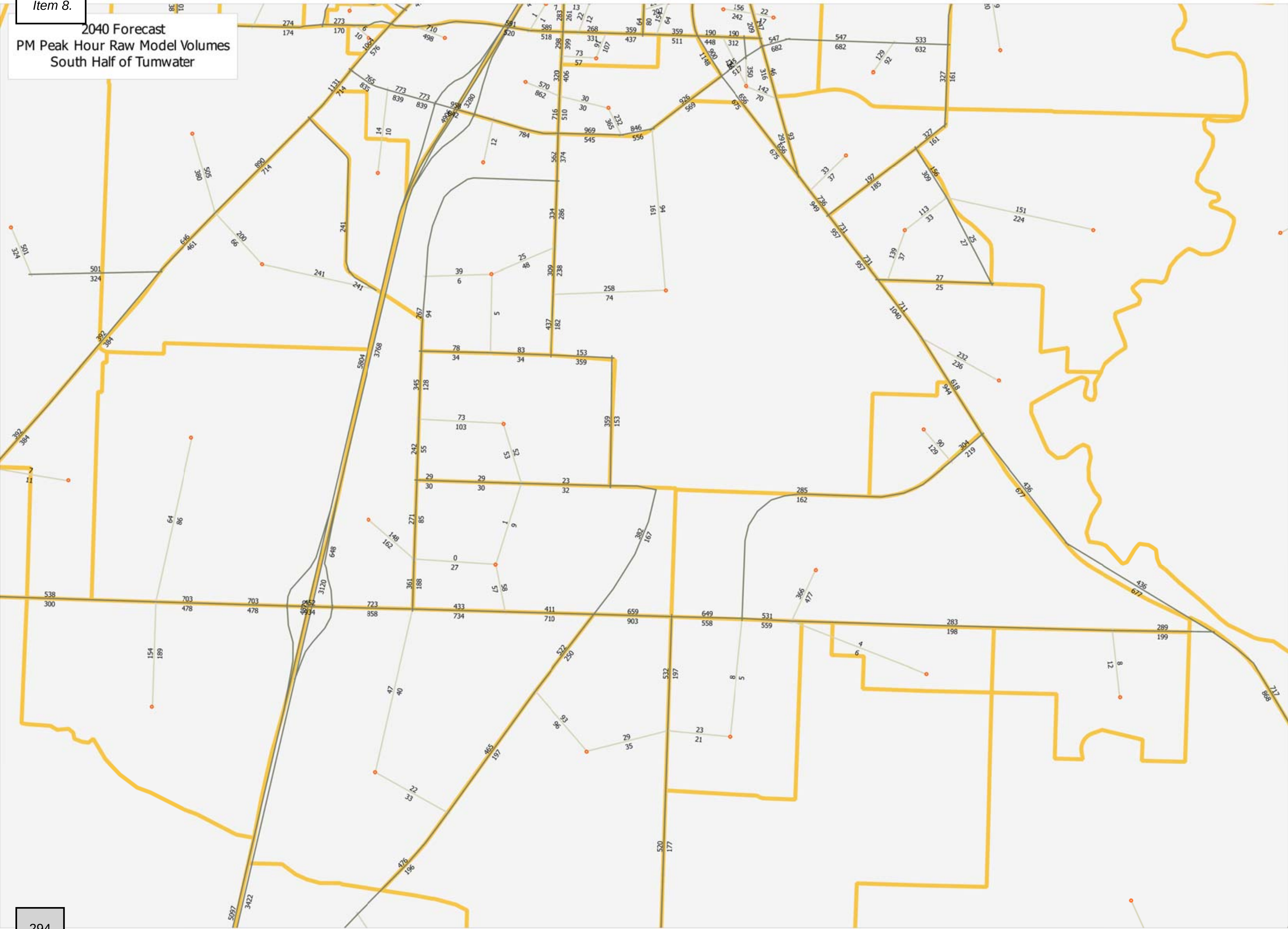
69 -Center / 76th

APPENDIX A-3
TRAVEL DEMAND MODEL PLOTS


2014 Baseline
PM Peak Hour Raw Model Volumes
North Half of Tumwater


2014 Baseline
PM Peak Hour Raw Model Volumes
South Half of Tumwater


2040 Forecast
PM Peak Hour Raw Model Volumes
North Half of Tumwater


2040 Forecast
PM Peak Hour Raw Model Volumes
South Half of Tumwater

APPENDIX A-4

TRAFFIC VOLUME CALCULATION WORKSHEETS

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	43	-	-	-	0	3	46	-	0	12	55
	EB	T	79	-	-	-	0	5	84	-	0	22	101
		R	7	-	-	-	0	0	7	-	0	2	9
1		L	106	158	215	57	15		121	218	60		166
RW Johnson Blvd SW	WB	T	43	-	-	-	0	3	46	-	0	12	55
Mottman Rd SW		R	67	44	102	58	16		83	101	57		124
		L	4	-	-	-	0	0	4	-	0	1	5
TMC Date: 06/30/15	NB	T	155	232	314	82	22		177	317	85		240
		R	135	212	218	6	2		137	219	7		142
Peak Hour: 4:15 - 5:15		L	45	107	111	4	1		46	110	3		48
PHF: .92	SB	T	93	217	280	63	17		110	277	60		153
		R	18	-	-	-	0	1	19	-	0	5	23
			795	970	1,240	270	28%	6%	880	1,242	272	28%	1,121
		L	176	184	203	19	5		181	211	27		203
	EB	T	252	168	157	-11	-3		249	148	-20		232
		R	25	12	20	8	2		27	20	8		33
2		L	4	0	0	0	0		4	0	0		4
Crosby Blvd SW	WB	T	31	21	23	2	1		32	21	0		31
Mottman Rd SW		R	67	165	225	60	16		83	225	60		127
		L	42	15	23	8	2		44	20	5		47
TMC Date: 10/08/2014	NB	T	348	509	804	295	79		427	825	316		664
		R	166	201	167	-34	-9		157	155	-46		120
Peak Hour: 4:30 - 5:30		L	120	16	63	47	13		133	84	68		188
PHF: .89	SB	T	630	526	740	214	58		688	746	220		850
		R	425	189	293	104	28		453	299	110		535
			2,286	2,006	2,718					2,754			
		L	73	299	304	5	1		74	301	2		75
	EB	T	19	82	112	30	8		27	112	30		49
		R	16	29	54	25	7		23	56	27		43
3		L	26	6	17	11	3		29	19	13		39
Crosby Blvd SW	WB	T	36	25	34	9	2		38	35	10		46
Irving St SW		R	166	200	271	71	19		185	256	56		222
		L	26	14	19	5	1		27	21	7		33
TMC Date: 10/08/2014	NB	T	290	226	420	194	52		342	443	217		507
		R	14	20	56	36	10		24	32	12		26
Peak Hour: 4:45 - 5:45		L	161	209	201	-8	-2		159	199	-10		151
PHF: .89	SB	T	424	235	458	223	60		484	470	235		659
		R	96	94	100	6	2		98	97	3		99
			1,347	1,439	2,046	607	42%	10%		2,041	602	42%	
		L	5	0	0	0	0	0	5	0	0	2	7
	EB	T	12	0	0	0	0	1	13	0	0	5	17
		R	165	0	0	0	0	11	176	0	0	69	234
4		L	1	0	0	0	0	0	1	0	0	0	1
7th Ave SW	WB	T	18	0	0	0	0	1	19	0	0	8	26
Irving St		R	1	0	0	0	0	0	1	0	0	0	1
		L	173	0	0	0	0	11	184	0	0	72	245
TMC Date: 06/30/15	NB	T	4	0	0	0	0	0	4	0	0	2	6
		R	1	0	0	0	0	0	1	0	0	0	1
Peak Hour: 4:45 - 5:45		L	0	0	0	0	0	0	0	0	0	0	0
PHF: .92	SB	T	4	0	0	0	0	0	4	0	0	2	6
		R	4	0	0	0	0	0	4	0	0	2	6
			388	0	0			10%	413	0		42%	550
		L	9	12	12	0	0		9	12	0		9
	EB	T	1	2	2	0	0		1	2	0		1
		R	0	2	2	0	0		0	3	1		1
5		L	10	10	9	-1	0		10	11	1		11
Crosby Blvd SW	WB	T	3	4	4	0	0		3	4	0		3
Barnes Blvd SW		R	189	153	246	93	25		214	249	96		285
		L	1	2	2	0	0		1	2	0		1
TMC Date: 06/30/15	NB	T	79	90	207	117	32		111	219	129		208
		R	4	9	4	-5	-1		3	4	-5	5	4
Peak Hour: 5:00 - 6:00		L	237	185	282	97	26		263	291	106		343
PHF: .91	SB	T	112	71	230	159	43		155	235	164		276
		R	22	19	18	-1	0		22	18	-1		21
			667	559	1,018				792	1,050			1,163
		L	0	-	-	-	0		0	-	0		0
	EB	T	170	183	206	23	6		176	205	22		192
		R	69	86	102	16	4		73	103	17		86
6		L	130	174	303	129	35		165	292	118		248
Black Lake Belmore Rd SW	WB	T	303	293	398	105	28		331	401	108		411
Black Lake Blvd SW		R	0	-	-	-	0		0	-	0		0
		L	178	152	191	39	11		189	185	33		211
TMC Date: 06/30/15	NB	T	0	-	-	-	0		0	-	0		0
		R	105	122	239	117	32		137	248	126		231
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .94	SB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
			955	1,010	1,439				1,071	1,434			1,379
		L	15	103	41	-62	-17	1	16	46	-57	5	20
	EB	T	21	67	95	28	8		29	97	30		51
		R	1	2	5	3	1		2	6	4		5
7		L	6	21	45	24	6		12	46	25		31
RW Johnson Blvd SW	WB	T	35	74	107	33	9		44	109	35		70
Sapp Rd SW		R	68	141	182	41	11		79	182	41		109
		L	0	2	6	4	1		1	6	4		4
TMC Date: 06/30/15	NB	T	1	22	48	26	7		8	48	26		27
		R	3	16	34	18	5		8	33	17		20
Peak Hour: 4:45 - 5:45		L	86	194	235	41	11		97	256	62		148
PHF: .85	SB	T	3	33	72	39	11		14	71	38		41
		R	31	106	126	20	5		36	123	17		48
			270	781	996	215	28%	6%	346	1,023	242	31%	574

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	0	-	-	-	0		0	-	0		0
	EB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
8		L	60	71	227	156	42		102	234	163		223
Sapp Rd SW	WB	T	0	-	-	-	0		0	-	0		0
Crosby Blvd SW		R	17	13	13	0	0		17	16	3		20
		L	0	-	-	-	0		0	-	0		0
TMC Date: 06/30/15	NB	T	129	258	362	104	28		157	358	100		229
		R	71	89	205	116	31		102	217	128		199
Peak Hour: 5:00 - 6:00		L	18	12	8	-4	-1		17	8	-4		14
PHF: .91	SB	T	109	267	348	81	22		131	365	98		207
		R	0	-	-	-	0		0	-	0		0
			404	710	1,163				526	1,198			892
		L	8	38	65	27	7		15	65	27		35
	EB	T	12	43	80	37	10		22	82	39		51
		R	13	3	21	18	5		18	17	14		27
9		L	39	0	0	0	0		39	0	0		39
Black Lake Belmore Rd SW	WB	T	14	60	106	46	12		26	105	45		59
49th Ave SW		R	141	119	160	41	11		152	159	40		181
		L	9	5	29	24	6		15	30	25		34
TMC Date: 06/30/15	NB	T	128	66	166	100	27		155	170	104		232
		R	25	0	0	0	0		25	0	0		25
Peak Hour: 4:15 - 5:15		L	74	101	90	-11	-3		71	108	7		81
PHF: .90	SB	T	132	86	249	163	44		176	213	127		259
		R	10	61	115	54	15		25	115	54		64
			605	582	1,081				739	1,064			1,087
		SB Cap	33	196	281	85	23	3	36	281	85	-75	43
	Sunset	NB Cap	13	93	146	53	14	1	14	146	53	-45	21
		Carlyon	2	33	34	1	0		2	35	2		4
10		Sunset	1	12	21	9	2		3	22	10		11
Capitol Blvd SE	Carlyon	SB Cap	56	33	34	1	0		56	35	2	75	133
Carlyon Ave SE/Sunset Way SE		NB Cap	39	28	32	4	1		40	32	4	45	88
		NB Cap	438	462	937	475	128		566	884	422		860
TMC Date: 06/25/15	NB	Carlyon	88	44	54	10	3		91	50	6	54	148
		Sunset	15	145	209	64	17	1	16	209	64	-54	25
Peak Hour: 4:30 - 5:30		SB Cap	816	710	1,367	657	177		993	1,356	646		1,462
PHF: .85	SB	Sunset	8	92	120	28	8	1	9	120	28	-18	18
		Carlyon	45	32	43	11	3		48	43	11	18	74
			1,554	1,880	3,278	266	38%	9%	1,874	3,213			2,887
		L	0	-	-	-	0		0	-	0		0
	EB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
11		L	0	-	-	-	0		0	-	0		0
Deschutes Way SW	WB	T	0	-	-	-	0		0	-	0		0
I-5 NB On Ramp		R	0	-	-	-	0		0	-	0		0
		L	0	-	-	-	0		0	-	0		0
TMC Date: 07/01/15	NB	T	223	154	227	73	20		243	206	52		275
		R	147	182	159	-23	-6		141	175	-7		140
Peak Hour: 4:30 - 5:30		L	158	49	63	14	4		162	58	9		167
PHF: .79	SB	T	303	276	362	86	23		326	378	102		405
		R	0	-	-	-	0		0	-	0		0
			831	661	811				872	817			987
		L	0	-	-	-	0		0	-	0		0
	EB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
12		L	0	-	-	-	0		0	-	0		0
Deschutes Way SW	WB	T	0	-	-	-	0		0	-	0		0
US 101 WB On Ramp		R	0	-	-	-	0		0	-	0		0
		L	428	316	391	75	20		448	403	87		515
TMC Date: 07/01/15	NB	T	385	336	386	50	13		398	381	45		430
		R	0	-	-	-	0		0	-	0		0
Peak Hour: 5:00 - 6:00		L	0	-	-	-	0		0	-	0		0
PHF: .92	SB	T	260	276	362	86	23		283	378	102		362
		R	19	0	0	0	0		19	0	0	10	29
			1,092	928	1,139					1,162		50%	1,336
		L	0	-	-	-	0		0	-	0		0
	EB	T	0	-	-	-	0		0	-	0		0
		R	151	145	218	73	20		171	200	55		206
13		L	0	-	-	-	0		0	-	0		0
I-5 SB/US 101 EB Off Ramps/N 2nd Ave SW	WB	T	0	-	-	-	0		0	-	0		0
Desoto St SW		R	0	-	-	-	0		0	-	0		0
		L	172	276	382	106	29		201	378	102		274
TMC Date: 06/30/15	NB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .89	SB	T	804	1151	1274	123	33		837	1280	129		933
		R	43	40	29	-11	-3		40	27	-13		30
			1,170	1,612	1,903					1,885			
		L	0	-	-	-	0		0	-	0		0
	EB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
14		L	124	28	219	191	51		175	237	209	-96	237
N 2nd Ave SW	WB	T	0	-	-	-	0		0	-	0		0
Custer Way SW		R	151	267	382	115	31		182	378	111		262
		L	0	-	-	-	0		0	-	0		0
TMC Date: 02/10/15	NB	T	23	9	0	-9	-2		21	0	-9		14
		R	149	39	269	230	62		211	319	280	-110	319
Peak Hour: 4:45 - 5:45		L	814	945	1,039	94	25		839	1,047	102		916
PHF: .88	SB	T	229	350	452	102	27		256	433	83		312
		R	0	-	-	-	0		0	-	0		0
			1,490	1,638	2,361				1,684	2,414			2,060

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**709**	917	1,208	291	78		**787**	1,203	286		**995**
		R	**167**	67	101	34	9		**176**	164	97		**264**
15		L	**371**	368	401	33	9		**380**	234	-134		**237**
Boston St SW	WB	T	**258**	247	530	283	76		**334**	529	282		**540**
Custer Way SW		R	**3**	-	-	-	0		**3**	-	0		**3**
		L	**0**	48	71	23	6	-6	**0**	85	37	-37	**0**
TMC Date: 06/25/15	NB	T	**1**	-	-	-	0		**1**	-	0	-1	**0**
		R	**150**	126	179	53	14		**164**	92	-34		**116**
Peak Hour: 4:30 - 5:30		L	**0**	-	-	-	0		**0**	-	0		**0**
PHF: .95	SB	T	**1**	-	-	-	0		**1**	-	0		**1**
		R	**4**	-	-	-	0		**4**	-	0		**4**
			1,664	1,773	2,490				**1,850**	2,307			**2,160**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
16		L	**95**	64	135	71	19		**114**	148	84		**179**
Deschutes Way SW	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
Boston St SW		R	**413**	371	366	-5	-1		**412**	250	-121		**292**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 07/01/15	NB	T	**363**	281	410	129	35		**398**	535	254		**617**
		R	**61**	75	121	46	12		**73**	83	8		**69**
Peak Hour: 4:30 - 5:30		L	**102**	98	129	31	8		**110**	95	-3		**99**
PHF: .93	SB	T	**186**	178	234	56	15		**201**	283	105		**291**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,220	1,067	1,395	328	31%	7%	**1,308**	1,394			**1,547**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**332**	440	916	476	128		**460**	857	417		**749**
		R	**18**	0	0	0	0		**18**	0	0		**18**
17		L	**363**	225	342	117	32		**395**	305	80		**443**
Cleveland Ave SE	WB	T	**551**	713	1341	628	169		**720**	1367	654		**1,205**
Capitol Blvd SE		R	**0**	-	-	-	0		**0**	-	0		**0**
		L	**0**	0	0	0	0		**0**	0	0		**0**
TMC Date: 06/25/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**224**	212	284	72	19		**243**	285	73		**297**
Peak Hour: 4:30 - 5:30		L	**0**	-	-	-	0		**0**	-	0		**0**
PHF: .88	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,488	1,590	2,883				**1,836**	2,814			**2,712**
		L	**137**	116	270	154	41		**178**	337	221		**358**
	EB	T	**648**	880	1,084	204	55		**703**	916	36		**684**
		R	**80**	47	33	-14	-4		**76**	42	-5		**75**
18		L	**344**	337	534	197	53		**397**	182	-155		**189**
Custer Way SE	WB	T	**440**	491	700	209	56		**496**	469	-22		**418**
Capitol Blvd SE		R	**6**	7	17	10	3		**9**	0	-7	6	**5**
		L	**18**	0	0	0	0		**18**	4	4		**22**
TMC Date: 02/10/15	NB	T	**332**	317	629	312	84		**416**	520	203		**535**
		R	**426**	412	624	212	57		**483**	169	-243		**183**
Peak Hour: 4:45 - 5:45		L	**18**	5	22	17	5		**23**	20	15		**33**
PHF: .90	SB	T	**392**	584	1088	504	136		**528**	1057	473		**865**
		R	**135**	124	231	107	29		**164**	290	166		**301**
			2,976	3,320	5,232				**3,491**	4,006			**3,668**
		L	**50**	0	0	0	0	5	**55**	0	0	21	**71**
	EB	T	**332**	375	572	197	53		**385**	510	135		**467**
		R	**643**	892	1,099	207	56		**699**	557	-335		**308**
19		L	**14**	1	4	3	1		**15**	4	3		**17**
Custer Way SE/North St SE	WB	T	**245**	265	465	200	54		**299**	412	147		**392**
Cleveland Ave SE		R	**70**	16	16	0	0		**70**	16	0		**70**
		L	**481**	529	706	177	48		**529**	205	-324		**157**
TMC Date: 02/10/15	NB	T	**133**	195	269	74	20		**153**	269	74		**207**
		R	**15**	2	6	4	1		**16**	9	7		**22**
Peak Hour: 4:45 - 5:45		L	**106**	18	27	9	2		**108**	26	8		**114**
PHF: .93	SB	T	**279**	208	315	107	29		**308**	279	71		**350**
		R	**106**	0	0	0	0	10	**116**	0	0	44	**150**
			2,474	2,501	3,479	978	39%	9%	**2,752**	2,287	445	41%	**2,324**
		L	**48**	51	36	-15	-4		**44**	36	-15	28	**76**
	EB	T	**268**	255	485	230	62		**330**	463	208		**476**
		R	**2**	33	26	-7	-2		**0**	12	-21	1	**3**
20		L	**10**	0	0	0	0		**10**	0	0	6	**16**
Hoadley St SE	WB	T	**395**	183	404	221	60		**455**	378	195		**590**
North St SE		R	**50**	18	14	-4	-1		**49**	14	-4	29	**79**
		L	**1**	20	18	-2	-1		**0**	7	-13	1	**2**
TMC Date: 06/24/15	NB	T	**2**	0	0	0	0		**2**	0	0	1	**3**
		R	**6**	0	15	15	4		**10**	8	8	3	**9**
Peak Hour: 5:00 - 6:00		L	**27**	14	10	-4	-1		**26**	10	-4	16	**43**
PHF: .87	SB	T	**1**	0	0	0	0		**1**	0	0	1	**2**
		R	**15**	32	27	-5	-1		**14**	27	-5	9	**24**
			825	606	1,035				**941**	955	349	58%	**1,321**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
21		L	**0**	-	-	-	0		**0**	-	0		**0**
Deshcutes Way SW/I-5 NB Off Ramp	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
E St SW		R	**328**	162	273	111	30		**358**	424	262		**590**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/25/15	NB	T	**79**	129	114	-15	-4		**75**	105	-24		**55**
		R	**136**	326	444	118	32		**168**	483	157		**293**
Peak Hour: 4:45 - 5:45		L	**278**	214	303	89	24		**302**	420	206		**484**
PHF: .85	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			821	831	1,134				**903**	1,432			**1,422**

SCJ ALLIANCE

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement		EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2022 Volumes: 2040 EXISTING MODEL VOLUMES	2022 Volumes: BASE MODEL Δ GROWTH	2022 Volumes: 7 YEAR GROWTH	2022 Volumes: BASE MODEL ADJUST	2022 Volumes: PROJECTED 2022 VOLUMES	2040 Base Model: 2040 BASE MODEL VOLUMES	2040 Base Model: BASE MODEL Δ GROWTH	2040 Base Model: BASE MODEL ADJUST	2040 Base Model: PROJECTED 2040 VOLUMES
		L	**90**	295	399	104	28		**118**	264	-31		**59**
	EB	T	**88**	37	54	17	5		**93**	363	326		**414**
		R	**255**	209	294	85	23		**278**	277	68		**323**
22		L	**115**	63	145	82	22		**137**	589	526		**641**
Capitol Blvd SE	WB	T	**91**	50	90	40	11		**102**	326	276		**367**
E St SE		R	**131**	35	67	32	9		**140**	42	7		**138**
		L	**216**	112	183	71	19		**235**	98	-14		**202**
TMC Date: 06/25/15	NB	T	**444**	399	788	389	105		**549**	387	-12		**432**
		R	**132**	32	76	44	12		**144**	475	443		**575**
Peak Hour: 4:45 - 5:45		L	**191**	82	134	52	14		**205**	111	29		**220**
PHF: .86	SB	T	**587**	886	1521	635	171		**758**	1169	283		**870**
		R	**72**	0	0	0	0	12	**84**	0	0	62	**134**
			2,412	2,200	3,751	1,551	71%	16%		4,101	1,901	86%	**4,375**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
23		L	**7**	6	7	1	0		**7**	5	-1		**6**
Cleveland Ave SE	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
South St SE		R	**14**	11	21	10	3		**17**	42	31		**45**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/25/15	NB	T	**571**	703	931	228	61		**632**	1,046	343		**914**
		R	**11**	8	8	0	0		**11**	7	-1		**10**
Peak Hour: 4:30 - 5:30		L	**15**	18	33	15	4		**19**	65	47		**62**
PHF: .88	SB	T	**854**	1069	1356	287	77		**931**	1434	365		**1,219**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,472	1,815	2,356					2,599			**2,256**
		L	**21**	5	8	3	1		**22**	9	4		**25**
	EB	T	**142**	171	163	-8	-2		**140**	182	11		**153**
		R	**0**	-	-	-	0		**0**	-	0		**0**
24		L	**1**	-	-	-	0		**1**	-	0		**1**
7th Ave SW	WB	T	**261**	284	374	90	24		**285**	366	82		**343**
Linwood Ave SW		R	**224**	154	95	-59	-16		**208**	103	-51		**173**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/30/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**1**	-	-	-	0		**1**	-	0		**1**
Peak Hour: 5:00 - 6:00		L	**122**	134	227	93	25		**147**	233	99		**221**
PHF: .93	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**17**	6	10	4	1		**18**	10	4		**21**
			789	754	877				**822**	903			**938**
		L	**30**	3	86	83	22		**52**	104	101		**131**
	EB	T	**163**	258	228	-30	-8		**155**	241	-17		**146**
		R	**100**	43	74	31	8		**108**	71	28		**128**
25		L	**100**	170	308	138	37		**137**	320	150		**250**
2nd Ave SW	WB	T	**247**	309	371	62	17		**264**	368	59		**306**
Linwood Ave SW		R	**58**	28	28	0	0		**58**	37	9		**67**
		L	**104**	47	115	68	18		**122**	123	76		**180**
TMC Date: 06/30/15	NB	T	**116**	15	166	151	41		**157**	202	187		**303**
		R	**94**	163	150	-13	-4		**90**	132	-31		**63**
Peak Hour: 4:45 - 5:45		L	**66**	190	304	114	31		**97**	302	112		**178**
PHF: .89	SB	T	**164**	78	202	124	33		**197**	246	168		**332**
		R	**125**	81	146	65	18		**143**	137	56		**181**
			1,367	1,385	2,178				**1,580**	2,283			**2,265**
		L	**165**	291	260	-31	-8		**157**	243	-48		**117**
	EB	T	**0**	-	-	-	0	5	**5**	-	0	5	**5**
		R	**146**	320	423	103	28		**174**	431	111		**257**
26		L	**0**	-	-	-	0	15	**15**	-	0	15	**15**
Capitol Blvd SE	WB	T	**0**	-	-	-	0	5	**5**	-	0	5	**5**
Linwood Ave SW		R	**0**	-	-	-	0	10	**10**	-	0	10	**10**
		L	**155**	169	212	43	12		**167**	228	59		**214**
TMC Date: 06/25/15	NB	T	**627**	251	788	537	145		**772**	716	465		**1,092**
		R	**0**	-	-	-	0	15	**15**	-	0	15	**15**
Peak Hour: 4:45 - 5:45		L	**0**	-	-	-	0	10	**10**	-	0	10	**10**
PHF: .84	SB	T	**706**	818	1464	646	174		**880**	1538	720		**1,426**
		R	**240**	339	495	156	42		**282**	497	158		**398**
			2,039	2,188	3,642				**2,492**	3,653			**3,564**
		L	**7**	2	5	3	1		**8**	5	3		**10**
	EB	T	**681**	942	1,156	214	58		**739**	1,214	272		**953**
		R	**158**	90	130	40	11		**169**	125	35		**193**
27		L	**429**	488	607	119	32		**461**	567	79		**508**
Henderson Blvd	WB	T	**503**	635	814	179	48		**551**	911	276		**779**
Yelm Hwy SE		R	**80**	15	19	4	1		**81**	19	4		**84**
		L	**109**	62	102	40	11		**120**	94	32		**141**
TMC Date: 06/25/15	NB	T	**166**	42	78	36	10		**176**	78	36		**202**
		R	**644**	435	516	81	22		**666**	491	56		**700**
Peak Hour: 4:45 - 5:45		L	**154**	16	108	92	25		**179**	90	74		**228**
PHF: .91	SB	T	**207**	85	188	103	28		**235**	214	129		**336**
		R	**22**	3	8	5	1		**23**	9	6		**28**
			3,160	2,815	3,731				**3,408**	3,817			**4,162**
		L	**35**	36	108	72	19		**54**	110	74		**109**
	EB	T	**177**	129	232	103	28		**205**	215	86		**263**
		R	**0**	-	-	-	0		**0**	-	0		**0**
28		L	**0**	-	-	-	0		**0**	-	0		**0**
Rural Rd SW	WB	T	**294**	185	320	135	36		**330**	317	132		**426**
Trosper Rd SW		R	**99**	117	149	32	9		**108**	154	37		**136**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/25/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
Peak Hour: 4:30 - 5:30		L	**89**	121	150	29	8		**97**	180	59		**148**
PHF: .92	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**60**	54	194	140	38		**98**	159	105		**165**
			754	642	1,153				**892**	1,135			**1,247**

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	**11**	2	2	0	0		**11**	2	0		**11**
	EB	T	**251**	361	511	150	40		**291**	524	163		**414**
		R	**44**	-	-	-	0	3	**47**	-	0	11	**55**
29		L	**51**	-	-	-	0	3	**54**	-	0	12	**63**
Lake Park Dr	WB	T	**369**	373	542	169	46		**415**	544	171		**540**
Trosper Rd SW		R	**52**	61	155	94	25		**77**	164	103		**155**
		L	**62**	-	-	-	0	4	**66**	-	0	15	**77**
TMC Date: 03/05/14	NB	T	**25**	-	-	-	0	2	**27**	-	0	6	**31**
		R	**56**	-	-	-	0	3	**59**	-	0	13	**69**
Peak Hour: 4:45 - 5:45		L	**40**	63	176	113	30		**70**	185	122		**162**
PHF: .98	SB	T	**19**	-	-	-	0	1	**20**	-	0	5	**24**
		R	**13**	1	1	0	0		**13**	1	0		**13**
			993	861	1,387			6%	**1,149**	1,420	559	24%	**1,614**
		L	**40**	60	95	35	9		**49**	107	47		**87**
	EB	T	**264**	313	505	192	52		**316**	483	170		**434**
		R	**109**	51	86	35	9		**118**	118	67		**176**
30		L	**368**	90	192	102	27		**395**	153	63		**431**
2nd Ave SW/Littlerock Rd SW	WB	T	**297**	282	390	108	29		**326**	351	69		**366**
Trosper Rd SW		R	**32**	32	38	6	2		**34**	18	-14		**18**
		L	**187**	75	171	96	26		**213**	215	140		**327**
TMC Date: 03/05/14	NB	T	**216**	69	251	182	49		**265**	266	197		**413**
		R	**396**	90	257	167	45		**441**	167	77		**473**
Peak Hour: 4:00 - 5:00		L	**100**	77	138	61	16		**116**	142	65		**165**
PHF: .98	SB	T	**236**	108	338	230	62		**298**	361	253		**489**
		R	**44**	77	137	60	16		**60**	142	65		**109**
			2,289	1,324	2,598				**2,631**	2,523			**3,488**
		L	**156**	182	234	52	14		**170**	233	51		**207**
	EB	T	**540**	297	666	369	99		**639**	559	262		**802**
		R	**19**	0	0	0	0		**19**	0	0	6	**25**
31		L	**244**	205	277	72	19		**263**	238	33		**277**
I-5 SB Ramps/Tyee Dr	WB	T	**322**	216	285	69	19		**341**	233	17		**339**
Trosper Rd SW		R	**191**	298	483	185	50		**241**	505	207		**398**
		L	**25**	0	0	0	0		**25**	0	0	8	**33**
TMC Date: 03/05/14	NB	T	**158**	40	157	117	32		**190**	38	-2		**156**
		R	**335**	463	495	32	9		**344**	564	101		**436**
Peak Hour: 4:30 - 5:30		L	**460**	380	266	-114	-31		**429**	306	-74		**386**
PHF: .95	SB	T	**327**	172	182	10	3		**330**	277	105		**432**
		R	**377**	189	336	147	40		**417**	287	98		**475**
			3,154	2,442	3,381				**3,408**	3,240	798	33%	**3,966**
		L	**0**	0	0	0	0		**0**	0	0		**0**
	EB	T	**816**	575	913	338	91		**907**	788	213		**1,029**
		R	**524**	566	647	81	22		**546**	707	141		**665**
32		L	**0**	-	-	-	0		**0**	-	0		**0**
I-5 NB Ramps	WB	T	**588**	550	817	267	72		**660**	976	426		**1,014**
Trosper Rd SW		R	**617**	903	899	-4	-1		**616**	798	-105	-100	**412**
		L	**172**	169	228	59	16		**188**	0	-169	-3	**0**
TMC Date: 03/05/14	NB	T	**0**	0	-	-	0		**0**	-	0		**0**
		R	**79**	112	133	21	6		**85**	178	66		**145**
Peak Hour: 4:30 - 5:30		L	**0**	-	-	-	0		**0**	-	0		**0**
PHF: .93	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			2,796	2,875	3,637					3,447			**3,265**
		L	**282**	77	228	151	41		**323**	391	314		**596**
	EB	T	**47**	-	-	-	0	5	**52**	-	0	20	**67**
		R	**579**	611	685	74	20		**599**	510	-101	-20	**458**
33		L	**29**	-	-	-	0	3	**32**	-	0	21	**50**
Capitol Blvd SE	WB	T	**70**	-	-	-	0	7	**77**	-	0	180	**250**
Trosper Rd SW		R	**33**	-	-	-	0	3	**36**	-	0	17	**50**
		L	**771**	1,005	1,088	83	22		**793**	1,023	18	-100	**689**
TMC Date: 03/05/14	NB	T	**574**	347	730	383	103		**677**	544	197		**771**
		R	**11**	-	-	-	0	1	**12**	-	0		**11**
Peak Hour: 4:30 - 5:30		L	**13**	-	-	-	0	1	**14**	-	0	20	**33**
PHF: .99	SB	T	**466**	771	1320	549	148		**614**	1311	540	-20	**986**
		R	**348**	448	628	180	48		**396**	750	302		**650**
			3,223	3,259	4,679	1,420	44%	10%		4,529			**4,611**
		L	**261**	159	307	148	40		**301**	136	-23		**238**
	EB	T	**5**	0	0	0	0	0	**5**	12	12		**17**
		R	**40**	12	19	7	2	4	**46**	65	53		**93**
34		L	**13**	0	0	0	0	1	**14**	0	0		**13**
Capitol Blvd SE	WB	T	**7**	0	0	0	0	1	**8**	4	4		**11**
Lee St SW		R	**81**	68	69	1	0		**81**	72	4		**85**
		L	**23**	6	10	4	1		**24**	80	74	100	**197**
TMC Date: 03/05/14	NB	T	**1,025**	1,124	1,442	318	86		**1,111**	1,359	235	-100	**1,160**
		R	**21**	0	0	0	0	2	**23**	0	0		**21**
Peak Hour: 4:30 - 5:30		L	**50**	59	83	24	6		**56**	77	18		**68**
PHF: .93	SB	T	**816**	1170	1638	468	126		**942**	1622	452		**1,268**
		R	**151**	153	284	131	35		**186**	122	-31		**120**
			2,493	2,751	3,852	1,101	40%	9%	**2,797**	3,549			**3,291**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
35		L	**129**	37	46	9	2		**131**	47	10		**139**
Littlerock Rd SW	WB	T	**3**	-	-	-	0		**3**	-	0		**3**
Fred Meyer/Costco Drwy		R	**114**	27	32	5	1		**115**	50	23		**137**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/24/15	NB	T	**652**	207	647	440	118		**770**	597	390		**1,042**
		R	**95**	20	36	16	4		**99**	32	12		**107**
Peak Hour: 4:30 - 5:30		L	**103**	17	19	2	1		**104**	20	3		**106**
PHF: .96	SB	T	**584**	233	598	365	98		**682**	612	379		**963**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,680	541	1,378				**1,904**	1,358			**2,497**

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	**80**	-	-	-	0		**80**	-	0	20	**100**
	EB	T	**23**	-	-	-	0		**23**	-	0	6	**29**
		R	**15**	-	-	-	0		**15**	-	0	4	**19**
36		L	**125**	160	170	10	3		**128**	131	-29		**96**
Littlerock Rd SW	WB	T	**5**	-	-	-	0		**5**	-	0	1	**6**
Costco Drwy		R	**194**	49	142	93	25		**219**	115	66		**260**
		L	**51**	-	-	-	0		**51**	-	0	13	**64**
TMC Date: 06/24/15	NB	T	**491**	178	541	363	98		**589**	514	336		**827**
		R	**98**	55	108	53	14		**112**	103	48		**146**
Peak Hour: 4:30 - 5:30		L	**214**	31	45	14	4		**218**	83	52		**266**
PHF: .95	SB	T	**398**	240	599	359	97		**495**	577	337		**735**
		R	**80**	-	-	-	0		**80**	-	0	20	**100**
			1,774	713	1,605	170	58%	13%	**2,015**	1,523	810	25%	**2,648**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
37		L	**178**	0	0	0	0	24	**202**	5	5		**183**
Littlerock Rd SW	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
Kingswood Dr SW		R	**75**	0	0	0	0	10	**85**	29	29		**104**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/24/15	NB	T	**496**	233	649	416	112		**608**	587	354		**850**
		R	**125**	0	0	0	0	17	**142**	33	33		**158**
Peak Hour: 4:30 - 5:30		L	**59**	0	0	0	0	8	**67**	32	32		**91**
PHF: .93	SB	T	**519**	400	769	369	99		**618**	675	275		**794**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,452	633	1,418			13%	**1,721**	1,361			**2,180**
		L	**22**	-	-	-	0	2	**24**	-	0	8	**30**
	EB	T	**1**	-	-	-	0	0	**1**	-	0	0	**1**
		R	**16**	-	-	-	0	1	**17**	-	0	6	**22**
38		L	**10**	11	37	26	7		**17**	36	25		**35**
Capitol Blvd SE	WB	T	**1**	-	-	-	0	0	**1**	-	0	0	**1**
X St SE		R	**21**	21	21	0	0		**21**	20	-1		**20**
		L	**20**	-	-	-	0	2	**22**	-	0	7	**27**
TMC Date: 03/05/14	NB	T	**904**	948	1,218	270	73		**977**	1,236	288		**1,192**
		R	**12**	8	17	9	2		**14**	16	8		**20**
Peak Hour: 4:15 - 5:15		L	**36**	32	31	-1	0		**36**	31	-1		**35**
PHF: .89	SB	T	**712**	977	1448	471	127		**839**	1453	476		**1,188**
		R	**35**	-	-	-	0	3	**38**	-	0	13	**48**
			1,790	1,997	2,772	775	39%	9%	**2,008**	2,792		36%	**2,619**
		L	**6**	0	0	0	0		**6**	0	0	2	**8**
	EB	T	**12**	-	-	-	0	0	**12**	-	0	4	**16**
		R	**9**	31	30	-1	0		**9**	30	-1	3	**12**
39		L	**4**	-	-	-	0	0	**4**	-	0	1	**5**
Elm St SE	WB	T	**4**	-	-	-	0	0	**4**	-	0	1	**5**
X St SE		R	**2**	-	-	-	0	0	**2**	-	0	1	**3**
		L	**2**	20	19	-1	0		**2**	19	-1	1	**3**
TMC Date: 06/25/15	NB	T	**66**	17	20	3	1		**67**	15	-2	24	**90**
		R	**6**	-	-	-	0	0	**6**	-	0	2	**8**
Peak Hour: 5:00 - 6:00		L	**0**	-	-	-	0	0	**0**	-	0	0	**0**
PHF: .74	SB	T	**44**	20	25	5	1		**45**	18	-2	16	**60**
		R	**5**	0	0	0	0	0	**5**	0	0	2	**7**
			160	88	94	6	7%	2%	**163**	82		36%	**218**
		L	**147**	113	194	81	22		**169**	190	77		**224**
	EB	T	**41**	2	3	1	0		**41**	3	1		**42**
		R	**28**	35	53	18	5		**33**	42	7		**35**
40		L	**28**	15	31	16	4		**32**	28	13		**41**
Capitol Blvd SE	WB	T	**22**	2	3	1	0		**22**	3	1		**23**
Dennis St SE/SW		R	**75**	105	106	1	0		**75**	104	-1		**74**
		L	**12**	23	36	13	4		**16**	33	10		**22**
TMC Date: 03/05/14	NB	T	**688**	682	867	185	50		**738**	867	185		**873**
		R	**23**	16	25	9	2		**25**	33	17		**40**
Peak Hour: 4:30 - 5:15		L	**52**	74	71	-3	-1		**51**	69	-5		**47**
PHF: .91	SB	T	**576**	763	1198	435	117		**693**	1187	424		**1,000**
		R	**71**	100	165	65	18		**89**	156	56		**127**
			1,763	1,930	2,752				**1,984**	2,715			**2,548**
		L	**80**	46	101	55	15		**95**	43	-3		**77**
	EB	T	**131**	32	144	112	30		**161**	183	151		**282**
		R	**121**	150	266	116	31		**152**	246	96		**217**
41		L	**94**	0	0	0	0	10	**104**	0	0	47	**141**
Capitol Blvd SE	WB	T	**193**	6	111	105	28	21	**214**	98	92	97	**290**
Israel Rd SE/SW		R	**135**	0	79	79	21	15	**150**	64	64	68	**203**
		L	**106**	106	153	47	13		**119**	183	77		**183**
TMC Date: 06/25/15	NB	T	**317**	675	748	73	20		**337**	826	151		**468**
		R	**25**	0	0	0	0		**25**	0	0	13	**38**
Peak Hour: 4:30 - 5:30		L	**71**	125	304	179	48		**119**	187	62		**133**
PHF: .90	SB	T	**514**	654	882	228	61		**575**	1024	370		**884**
		R	**88**	33	96	63	17		**105**	47	14		**102**
			1,875	1,827	2,884	873	48%	11%	**2,157**	2,901	918	50%	**3,018**
		L	**49**	46	73	27	7		**56**	74	28		**77**
	EB	T	**79**	37	62	25	7		**86**	63	26		**105**
		R	**0**	-	-	-	0		**0**	-	0		**0**
42		L	**0**	-	-	-	0		**0**	-	0		**0**
Black Lake Belmore Rd SW	WB	T	**90**	42	88	46	12		**102**	87	45		**135**
66th Ave SW		R	**107**	25	122	97	26		**133**	126	101		**208**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/30/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
Peak Hour: 4:30 - 5:30		L	**69**	37	89	52	14		**83**	92	55		**124**
PHF: .95	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**53**	52	180	128	34		**87**	139	87		**140**
			447	239	614					581			**789**

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	**16**	21	62	41	11		**27**	45	24		**40**
	EB	T	**3**	4	6	2	1		**4**	7	3		**6**
		R	**130**	65	120	55	15		**145**	139	74		**204**
43		L	**2**	6	9	3	1		**3**	10	4		**6**
Kirsop Rd SW	WB	T	**0**	3	5	2	1		**1**	5	2		**2**
66th Ave SW		R	**2**	3	5	2	1		**3**	4	1		**3**
		L	**203**	50	190	140	38		**241**	188	138		**341**
TMC Date: 06/30/15	NB	T	**15**	0	0	0	0		**15**	0	0		**15**
		R	**2**	6	11	5	1		**3**	10	4		**6**
Peak Hour: 4:30 - 5:30		L	**3**	5	9	4	1		**4**	9	4		**7**
PHF: .84	SB	T	**7**	0	9	9	2		**9**	6	6		**13**
		R	**29**	37	87	50	13		**42**	92	55		**84**
			412	200	513					515			**727**
		L	**0**	0	0	0	0		**0**	0	0		**0**
	EB	T	**0**	0	0	0	0		**0**	0	0		**0**
		R	**0**	0	0	0	0		**0**	0	0		**0**
44		L	**15**	0	0	0	0	1	**16**	0	0	8	**23**
Littlerock Rd SW	WB	T	**0**	0	0	0	0		**0**	0	0		**0**
Odegard Rd SW		R	**5**	0	0	0	0	0	**5**	0	0	3	**8**
		L	**0**	0	0	0	0		**0**	0	0		**0**
TMC Date: 06/24/15	NB	T	**621**	0	0	416	112		**733**	0	354		**975**
		R	**3**	0	0	0	0	0	**3**	0	0	2	**5**
Peak Hour: 4:30 - 5:30		L	**8**	0	0	0	0	1	**9**	0	0	4	**12**
PHF: .93	SB	T	**668**	0	0	369	99		**767**	0	275		**943**
		R	**0**	0	0	0	0		**0**	0	0		**0**
			1,320	0	0			9%	**1,534**	0		50%	**1,965**
		L	**101**	9	38	29	8		**109**	31	22		**123**
	EB	T	**80**	34	78	44	12		**92**	78	44		**124**
		R	**74**	51	58	7	2		**76**	81	30		**104**
45		L	**54**	103	386	283	76		**130**	159	56		**110**
Littlerock Rd SW	WB	T	**148**	35	136	101	27		**175**	122	87		**235**
Israel Rd SW/70th Ave SW		R	**258**	109	348	239	64		**322**	277	168		**426**
		L	**239**	41	90	49	13		**252**	79	38		**277**
TMC Date: 06/24/15	NB	T	**257**	162	283	121	33		**290**	311	149		**406**
		R	**31**	39	203	164	44		**75**	103	64		**95**
Peak Hour: 4:30 - 5:30		L	**131**	135	305	170	46		**177**	225	90		**221**
PHF: .95	SB	T	**403**	336	620	284	76		**479**	549	213		**616**
		R	**115**	22	54	32	9		**124**	76	54		**169**
			1,891	1,076	2,599				**2,301**	2,091			**2,906**
		L	**40**	25	114	89	24		**64**	54	29		**69**
	EB	T	**166**	105	272	167	45		**211**	339	234		**400**
		R	**29**	60	132	72	19		**48**	156	96		**125**
46		L	**135**	15	21	6	2		**137**	13	-2		**133**
Linderson Way SE/11th Ave SW	WB	T	**259**	90	258	168	45		**304**	297	207		**466**
Israel Rd SW		R	**26**	1	1	0	0		**26**	1	0		**26**
		L	**108**	105	194	89	24		**132**	197	92		**200**
TMC Date: 06/24/15	NB	T	**87**	76	146	70	19		**106**	251	175		**262**
		R	**110**	40	59	19	5		**115**	22	-18		**92**
Peak Hour: 4:30 - 5:30		L	**38**	1	1	0	0		**38**	1	0		**38**
PHF: .83	SB	T	**81**	106	145	39	11		**92**	164	58		**139**
		R	**51**	35	137	102	27		**78**	125	90		**141**
			1,130	659	1,480				**1,351**	1,620			**2,091**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
47		L	**224**	217	487	270	73		**297**	387	170		**394**
Littlerock Rd SW	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
Tumwater Blvd SW		R	**278**	129	278	149	40		**318**	231	102		**380**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/24/15	NB	T	**134**	114	299	185	50		**184**	262	148		**282**
		R	**105**	179	415	236	64		**169**	296	117		**222**
Peak Hour: 4:30 - 5:30		L	**306**	223	420	197	53		**359**	320	97		**403**
PHF: .94	SB	T	**283**	267	644	377	102		**385**	469	202		**485**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			1,330	1,129	2,543				**1,712**	1,965			**2,166**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**342**	267	581	314	85		**427**	641	374		**716**
		R	**71**	140	259	119	32		**103**	415	275		**346**
48		L	**319**	473	639	166	45		**364**	499	26		**345**
I-5 SB Ramps	WB	T	**275**	188	320	132	36		**311**	448	260		**535**
Tumwater Blvd SW		R	**0**	-	-	-	0		**0**	-	0		**0**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/24/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
Peak Hour: 4:30 - 5:30		L	**405**	285	261	-24	-6		**399**	263	-22		**383**
PHF: .94	SB	T	**32**	0	0	0	0		**32**	0	0		**32**
		R	**234**	166	453	287	77		**311**	448	282		**516**
			1,678	1,519	2,513				**1,947**	2,714			**2,873**
		L	**136**	136	358	222	60		**196**	388	252		**388**
	EB	T	**611**	415	484	69	19		**630**	516	101		**712**
		R	**0**	-	-	-	0		**0**	-	0		**0**
49		L	**0**	-	-	-	0		**0**	-	0		**0**
I-5 NB Ramps	WB	T	**550**	553	767	214	58		**608**	703	150		**700**
Tumwater Blvd SW		R	**1,209**	485	466	-19	-5		**1,204**	364	-121		**1,088**
		L	**44**	107	191	84	23		**67**	244	137		**181**
TMC Date: 06/24/15	NB	T	**6**	0	0	0	0		**6**	0	0		**6**
		R	**135**	233	297	64	17		**152**	280	47		**182**
Peak Hour: 4:30 - 5:30		L	**0**	-	-	-	0		**0**	-	0		**0**
PHF: .88	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			2,691	1,929	2,563				**2,863**	2,495			**3,257**

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

					2022 Volumes						2040 Base Model			
Intersection	Movement		EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	135	305	285	-20	-5		130	261	-44		91
	EB	T	550	183	354	171	46		596	288	105		655
		R	154	161	146	-15	-4		150	250	89		243
50		L	56	72	259	187	50		106	148	76		132
Linderson Way SE	WB	T	702	417	611	194	52		754	522	105		807
Tumwater Blvd SW		R	31	110	99	-11	-3		28	109	-1		30
		L	168	179	178	-1	0		168	185	6		174
TMC Date: 03/03/15	NB	T	84	57	126	69	19		103	109	52		136
		R	43	32	69	37	10		53	63	31		74
Peak Hour: 4:30 - 5:30		L	189	139	123	-16	-4		185	161	22		211
PHF: .94	SB	T	161	70	158	88	24		185	145	75		236
		R	878	438	436	-2	-1		877	352	-86		792
			3,151	2,163	2,844				3,335	2,593			3,581
		L	27	59	126	67	18		45	124	65		92
	EB	T	773	294	420	126	34		807	388	94		867
		R	19	-	-	-	0	6	25	-	0	9	28
51		L	45	-	-	-	0	14	59	-	0	21	66
New Market St SW	WB	T	681	492	740	248	67		748	554	62		743
Tumwater Blvd SW		R	9	45	106	61	16		25	97	52		61
		L	16	-	-	-	0	5	21	-	0	7	23
TMC Date: 03/03/15	NB	T	2	-	-	-	0	1	3	-	0	1	3
		R	46	-	-	-	0	14	60	-	0	21	67
Peak Hour: 4:30 - 5:30		L	31	46	136	90	24		55	135	89		120
PHF: .92	SB	T	16	-	-	-	0	5	21	-	0	7	23
		R	104	108	229	121	33		137	225	117		221
			1,769	1,044	1,757	713	131%	30%	2,005	1,523	479	46%	2,314
		L	64	37	135	98	26		90	146	109		173
	EB	T	305	276	358	82	22		327	319	43		348
		R	244	91	-	-	0		244	145	54		298
52		L	83	0	-	-	0	4	87	0	0	29	112
Capitol Blvd SE	WB	T	325	396	457	61	16		341	417	21		346
Tumwater Blvd SE		R	15	275	189	-86	-23	1	16	182	-93	5	20
		L	199	75	-	-	0		199	101	26		225
TMC Date: 06/24/15	NB	T	304	469	-	-	0		304	680	211		515
		R	18	0	-	-	0	1	19	0	0		18
Peak Hour: 4:30 - 5:30		L	112	125	159	34	9		121	0	-125	39	151
PHF: .90	SB	T	475	546	-	-	0		475	1050	504		979
		R	106	133	389	256	69		175	221	88		194
			2,250	2,423	1,687	445	18%	4%		3,261	838	35%	3,379
		L	2	4	12	8	2		4	12	8		10
	EB	T	843	475	574	99	27		870	534	59		902
		R	54	45	97	52	14		68	95	50		104
53		L	64	68	123	55	15		79	125	57		121
Wildflower St SE/65th Ave SE	WB	T	526	529	672	143	39		565	646	117		643
Henderson Blvd SE		R	1	7	18	11	3		4	18	11		12
		L	26	34	69	35	9		35	65	31		57
TMC Date: 07/01/15	NB	T	0	0	0	0	0		0	0	0		0
		R	46	37	69	32	9		55	74	37		83
Peak Hour: 4:30 - 5:30		L	1	4	11	7	2		3	12	8		9
PHF: .91	SB	T	0	0	0	0	0		0	0	0		0
		R	0	3	9	6	2		2	8	5		5
			1,563	1,206	1,654					1,589			1,946
		L	651	399	532	133	36		687	502	103		754
	EB	T	0	-	-	-	0		0	-	0		0
		R	12	29	100	71	19		31	10	-19	12	5
54		L	0	-	-	-	0		0	-	0		0
Tumwater Blvd SE	WB	T	0	-	-	-	0		0	-	0		0
Henderson Blvd SE		R	0	-	-	-	0		0	-	0		0
		L	22	4	10	6	2		24	10	6		28
TMC Date: 11/13/14	NB	T	165	126	151	25	7		172	139	13		178
		R	0	-	-	-	0		0	-	0		0
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .91	SB	T	197	156	226	70	19		216	257	101		298
		R	323	410	524	114	31		354	462	52		375
			1,370	1,124	1,543				1,484	1,380			1,638
		L	0	-	-	-	0		0	-	0		0
	EB	T	152	74	95	21	6		158	91	17		169
		R	88	70	90	20	5		93	124	54		142
55		L	97	108	219	111	30		127	120	12		109
Trails End Dr SE	WB	T	139	77	107	30	8		147	146	69		208
Henderson Blvd SE		R	0	-	-	-	0		0	-	0		0
		L	53	68	90	22	6		59	94	26		79
TMC Date: 06/24/15	NB	T	0	-	-	-	0		0	-	0		0
		R	52	56	66	10	3		55	58	2		54
Peak Hour: 5:00 - 6:00		L	0	-	-	-	0		0	-	0		0
PHF: .87	SB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
			581	453	667				639	633			761
		L	4	143	275	132	36	1	5	277	134	2	6
	EB	T	0	0	3	3	1	0	0	3	3	25	25
		R	7	31	103	72	19	1	8	101	70	4	11
56		L	0	4	53	49	13	0	0	52	48	100	100
Littlerock Rd SW	WB	T	0	0	2	2	1	0	0	2	2	50	50
Black Hills High School Drwy		R	0	22	144	122	33	0	0	35	13	25	25
		L	9	21	102	81	22	1	10	95	74	5	14
TMC Date: 06/24/15	NB	T	158	129	295	166	45		203	246	117		275
		R	0	4	64	60	16	0	0	61	57	50	50
Peak Hour: 4:30 - 5:30		L	0	36	0	-36	-10	0	0	43	7	25	25
PHF: .96	SB	T	390	259	490	231	62		452	403	144		534
		R	48	188	400	212	57	7	55	408	220	24	72
			616	837	1,931			14%	733	1,726		50%	1,186

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement				2022 Volumes					2040 Base Model			
			EXISTING	EXISTING	2040 EXISTING	BASE	7 YEAR	BASE	PROJECTED	2040 BASE	BASE	BASE	PROJECTED
			2015	MODEL	MODEL	MODEL		MODEL	2022	MODEL	MODEL	MODEL	2040
			VOLUMES	VOLUMES	VOLUMES	Δ GROWTH	GROWTH	ADJUST	VOLUMES	VOLUMES	Δ GROWTH	ADJUST	VOLUMES
		L	**48**	42	88	46	12		**60**	78	36		**84**
	EB	T	**9**	-	-	-	0		**9**	-	0	5	**14**
		R	**1**	0	0	0	0		**1**	0	0	1	**2**
57		L	**8**	-	-	-	0		**8**	-	0	5	**13**
Center St SW	WB	T	**9**	-	-	-	0		**9**	-	0	5	**14**
76th Ave SW		R	**21**	-	-	-	0		**21**	-	0	12	**33**
		L	**1**	0	0	0	0		**1**	0	0	1	**2**
TMC Date: 03/03/15	NB	T	**247**	225	286	61	16		**263**	279	54		**301**
		R	**0**	-	-	-	0		**0**	-	0	0	**0**
Peak Hour: 4:45 - 5:45		L	**10**	-	-	-	0		**10**	-	0	6	**16**
PHF: .92	SB	T	**311**	247	334	87	23		**334**	361	114		**425**
		R	**38**	56	228	172	46		**84**	183	127		**165**
			703	570	936				**800**	901	331	58%	**1,068**
		L	**16**	-	-	-	0		**16**	-	0	9	**25**
	EB	T	**6**	-	-	-	0		**6**	-	0	3	**9**
		R	**7**	-	-	-	0		**7**	-	0	4	**11**
58		L	**142**	75	102	27	7		**149**	140	65		**207**
Old Hwy 99	WB	T	**6**	-	-	-	0		**6**	-	0	3	**9**
Henderson Blvd SE		R	**51**	70	95	25	7		**58**	100	30		**81**
		L	**2**	-	-	-	0		**2**	-	0	1	**3**
TMC Date: 06/23/15	NB	T	**512**	544	640	96	26		**538**	755	211		**723**
		R	**111**	71	91	20	5		**116**	87	16		**127**
Peak Hour: 4:15 - 5:15		L	**105**	73	94	21	6		**111**	127	54		**159**
PHF: .87	SB	T	**813**	666	855	189	51		**864**	1205	539		**1,352**
		R	**11**	-	-	-	0		**11**	-	0	6	**17**
			1,782	1,499	1,877				**1,884**	2,414	165	57%	**2,724**
		L	**1**	-	-	-	0		**1**	-	0	0	**1**
	EB	T	**1**	-	-	-	0		**1**	-	0	0	**1**
		R	**10**	-	-	-	0		**10**	-	0	1	**11**
59		L	**11**	64	84	20	5		**16**	83	19		**30**
Old Hwy 99	WB	T	**0**	-	-	-	0		**0**	-	0	0	**0**
79th Ave SE		R	**111**	73	82	9	2		**113**	86	13		**124**
		L	**1**	-	-	-	0		**1**	-	0	0	**1**
TMC Date: 10/28/14	NB	T	**432**	543	650	107	29		**461**	756	213		**645**
		R	**15**	53	61	8	2		**17**	60	7		**22**
Peak Hour: 4:30 - 5:30		L	**131**	68	1	-67	-18		**113**	67	-1		**130**
PHF: .95	SB	T	**841**	672	956	284	76		**917**	1279	607		**1,448**
		R	**0**	-	-	-	0		**0**	-	0	0	**0**
			1,554	1,473	1,834				**1,650**	2,331	38	15%	**2,414**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
60		L	**43**	63	78	15	4		**47**	73	10		**53**
Kimmie St SW	WB	T	**0**	-	-	-	0		**0**	-	0		**0**
83rd Ave SW		R	**17**	0	0	0	0		**17**	0	0		**17**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 03/03/15	NB	T	**29**	49	94	45	12		**41**	84	35		**64**
		R	**16**	36	34	-2	-1		**15**	34	-2		**14**
Peak Hour: 4:30 - 5:30		L	**3**	0	0	0	0		**3**	0	0		**3**
PHF: .82	SB	T	**62**	73	267	194	52		**114**	221	148		**210**
		R	**0**	-	-	-	0		**0**	-	0		**0**
			170	221	473				**237**	412			**361**
		L	**70**	36	34	-2	-1		**69**	34	-2		**68**
	EB	T	**25**	10	0	-10	-3		**22**	0	-10		**15**
		R	**0**	-	-	-	0		**0**	-	0		**0**
61		L	**0**	-	-	-	0		**0**	-	0		**0**
Center St SW	WB	T	**11**	4	5	1	0		**11**	5	1		**12**
83rd Ave SW		R	**89**	77	148	71	19		**108**	126	49		**138**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 03/03/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
Peak Hour: 4:45 - 5:45		L	**156**	191	359	168	45		**201**	309	118		**274**
PHF: .88	SB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**72**	63	78	15	4		**76**	73	10		**82**
			423	381	624				**487**	547			**589**
		L	**179**	170	201	31	8	18	**205**	230	60		**239**
	EB	T	**7**	-	-	-	0	1	**8**	-	0		**7**
		R	**25**	19	18	-1	0	2	**27**	18	-1		**24**
62		L	**2**	-	-	-	0	0	**2**	-	0		**2**
Old Hwy 99	WB	T	**4**	-	-	-	0	0	**4**	-	0		**4**
88th Ave SE		R	**1**	-	-	-	0	0	**1**	-	0		**1**
		L	**6**	13	18	5	1	1	**8**	14	1		**7**
TMC Date: 06/23/15	NB	T	**269**	357	417	60	16	27	**312**	486	129		**398**
		R	**0**	-	-	-	0	0	**0**	-	0		**0**
Peak Hour: 4:30 - 5:30		L	**0**	-	-	-	0	0	**0**	-	0		**0**
PHF: .90	SB	T	**671**	487	659	172	46	67	**784**	748	261		**932**
		R	**173**	174	285	111	30	17	**220**	510	336		**509**
			1,337	1,220	1,598			0		2,006			**2,123**
		L	**0**	-	-	-	0		**0**	-	0		**0**
	EB	T	**296**	259	371	112	30		**326**	376	117		**413**
		R	**32**	51	107	56	15		**47**	115	64		**96**
63		L	**143**	166	111	-55	-15		**128**	107	-59		**84**
I-5 SB Ramps	WB	T	**124**	127	341	214	58		**182**	309	182		**306**
93rd Ave SW		R	**0**	-	-	-	0		**0**	-	0		**0**
		L	**0**	-	-	-	0		**0**	-	0		**0**
TMC Date: 06/23/15	NB	T	**0**	-	-	-	0		**0**	-	0		**0**
		R	**0**	-	-	-	0		**0**	-	0		**0**
Peak Hour: 5:00 - 6:00		L	**499**	491	563	72	19		**518**	466	-25		**474**
PHF: .88	SB	T	**0**	0	0	0	0		**0**	0	0		**0**
		R	**283**	246	362	116	31		**314**	386	140		**423**
			1,377	1,340	1,855					1,759			**1,796**

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

					2022 Volumes					2040 Base Model			
Intersection	Movement		EXISTING 2015 VOLUMES	EXISTING MODEL VOLUMES	2040 EXISTING MODEL VOLUMES	BASE MODEL Δ GROWTH	7 YEAR GROWTH	BASE MODEL ADJUST	PROJECTED 2022 VOLUMES	2040 BASE MODEL VOLUMES	BASE MODEL Δ GROWTH	BASE MODEL ADJUST	PROJECTED 2040 VOLUMES
		L	246	190	248	58	16		262	233	43		289
	EB	T	504	560	686	126	34		538	609	49		553
		R	0	-	-	-	0		0	-	0		0
64		L	0	-	-	-	0		0	-	0		0
I-5 NB Ramps	WB	T	251	247	323	76	20		271	286	39		290
93rd Ave SW		R	339	294	400	106	29		368	382	88		427
		L	47	46	129	83	22		69	129	83		130
TMC Date: 06/23/15	NB	T	0	0	0	0	0		0	0	0		0
		R	113	131	172	41	11		124	171	40		153
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .94	SB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
			1,500	1,468	1,958				1,632	1,810			1,842
		L	25	134	164	30	8		33	162	28		53
	EB	T	462	518	662	144	39		501	591	73		535
		R	15	39	32	-7	-2		13	27	-12		3
65		L	3	0	0	0	0		3	0	0		3
Kimmie St SW	WB	T	408	317	414	97	26		434	382	65		473
93rd Ave SW		R	6	11	18	7	2		8	18	7		13
		L	15	36	34	-2	-1		14	34	-2		13
TMC Date: 06/23/15	NB	T	1	1	6	5	1		2	1	0		1
		R	10	0	0	0	0		10	0	0		10
Peak Hour: 4:15 - 5:15		L	5	18	72	54	15		20	41	23		28
PHF: .94	SB	T	4	8	15	7	2		6	19	11		15
		R	48	188	274	86	23		71	252	64		112
			1,002	1,270	1,691				1,115	1,527			1,259
		L	2	0	0	0	0		2	0	0		2
	EB	T	316	355	550	195	53		369	475	120		436
		R	167	159	160	1	0		167	134	-25		142
66		L	54	71	262	191	51		105	255	184		238
Case Rd SW	WB	T	295	190	282	92	25		320	253	63		358
93rd Ave SW		R	28	48	115	67	18		46	87	39		67
		L	82	122	128	6	2		84	123	1		83
TMC Date: 06/23/15	NB	T	19	40	51	11	3		22	58	18		37
		R	32	59	71	12	3		35	78	19		51
Peak Hour: 4:30 - 5:30		L	51	122	282	160	43		94	212	90		141
PHF: .92	SB	T	48	86	100	14	4		52	120	34		82
		R	1	0	0	0	0		1	0	0		1
			1,095	1,252	2,001				1,297	1,795			1,638
		L	0	-	-	-	0		0	-	0		0
	EB	T	238	247	490	243	65		303	395	148		386
		R	157	290	413	123	33		190	370	80		237
67		L	86	66	119	53	14		100	245	179		265
Tilley Rd SW (south leg)	WB	T	236	236	531	295	79		315	485	249		485
93rd Ave SW		R	0	-	-	-	0		0	-	0		0
		L	132	73	129	56	15		147	110	37		169
TMC Date: 06/23/15	NB	T	0	-	-	-	0		0	-	0		0
		R	65	57	68	11	3		68	79	22		87
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .87	SB	T	0	-	-	-	0		0	-	0		0
		R	0	-	-	-	0		0	-	0		0
			914	969	1,750				1,123	1,684			1,629
		L	113	114	108	-6	-2		111	116	2		115
	EB	T	190	190	450	260	70		260	358	168		358
		R	0	0	0	0	0		0	0	0		0
68		L	0	3	3	0	0		0	3	0		0
Tilley Rd SW (north leg)	WB	T	94	169	477	308	83		177	415	246		340
93rd AVE SW		R	12	14	51	37	10		22	68	54		66
		L	0	0	0	0	0		0	0	0		0
TMC Date: 06/23/15	NB	T	0	0	3	3	1		1	3	3		3
		R	0	0	2	2	1		1	2	2		2
Peak Hour: 4:30 - 5:30		L	14	23	108	85	23		37	179	156		170
PHF: .86	SB	T	0	4	5	1	0		0	7	3		3
		R	227	133	172	39	11		238	315	182		409
			650	650	1,379				847	1,466			1,466
		L	16	4	3	-1	0		16	5	1		17
	EB	T	0	-	-	-	0		0	-	0		0
		R	155	123	196	73	20		175	171	48		203
69		L	0	-	-	-	0		0	-	0		0
Old Hwy 99 SE	WB	T	0	-	-	-	0		0	-	0		0
93rd Ave SW		R	0	-	-	-	0		0	-	0		0
		L	70	114	284	170	46		116	236	122		192
TMC Date: 06/23/15	NB	T	213	366	433	67	18		231	495	129		342
		R	0	-	-	-	0		0	-	0		0
Peak Hour: 4:30 - 5:30		L	0	-	-	-	0		0	-	0		0
PHF: .92	SB	T	630	503	672	169	46		676	761	258		888
		R	28	4	5	1	0		28	6	2		30
			1,112	1,114	1,593	479	43%	10%	1,242	1,674			1,672

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
1	EB	129	65	165	83	550	550	550	550	550	550	0.23	0.12	0.30	0.15	0.30	0.15
RW Johnson Blvd SW **Mottman Rd SW**	WB	216	259	345	291	550	550	550	550	550	550	0.39	0.47	0.63	0.53	0.63	0.53
TMC Date: 06/30/15	NB	294	206	387	328	550	550	550	550	550	550	0.53	0.37	0.70	0.60	0.70	0.60
Peak Hour: 4:15 - 5:15 PHF: .92	SB	156	265	224	419	550	550	550	550	550	550	0.28	0.48	0.41	0.76	0.41	0.76
		795															
2	EB	453	498	468	613	550	550	550	550	550	550	0.82	0.91	0.85	1.11	0.85	1.11
Crosby Blvd SW **Mottman Rd SW**	WB	102	538	162	540	450	450	450	450	450	450	0.23	1.20	0.36	1.20	0.36	1.20
TMC Date: 10/08/2014	NB	556	659	831	887	1800	1800	1800	1800	1800	1800	0.31	0.37	0.46	0.49	0.46	0.49
Peak Hour: 4:30 - 5:30 PHF: .89	SB	1,175	591	1,573	994	1800	1800	1800	1800	1800	1800	0.65	0.33	0.87	0.55	0.87	0.55
		2,286															
3	EB	108	158	167	178	450	450	450	450	450	450	0.24	0.35	0.37	0.40	0.37	0.40
Crosby Blvd SW **Irving St SW**	WB	228	194	307	226	450	450	450	450	450	450	0.51	0.43	0.68	0.50	0.68	0.50
TMC Date: 10/08/2014	NB	330	466	566	741	750	750	750	750	750	750	0.44	0.62	0.75	0.99	0.75	0.99
Peak Hour: 4:45 - 5:45 PHF: .89	SB	681	529	909	804	1800	1800	1800	1800	1800	1800	0.38	0.29	0.51	0.45	0.51	0.45
		1,347															
4	EB	182	195	258	277	450	450	450	450	450	450	0.40	0.43	0.57	0.61	0.57	0.61
7th Ave SW **Irving St**	WB	20	13	28	18	450	450	450	450	450	450	0.04	0.03	0.06	0.04	0.06	0.04
TMC Date: 06/30/15	NB	178	170	252	241	450	450	450	450	450	450	0.40	0.38	0.56	0.54	0.56	0.54
Peak Hour: 4:45 - 5:45 PHF: .92	SB	8	10	11	14	450	450	450	450	450	450	0.02	0.02	0.03	0.03	0.03	0.03
		388															

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	10	26	11	25	450	450	450	450	450	450	0.02	0.06	0.02	0.06	0.02	0.06
5 **Crosby Blvd SW** **Barnes Blvd SW**	WB	202	242	299	348	450	450	450	450	450	450	0.45	0.54	0.66	0.77	0.66	0.77
TMC Date: 06/30/15	NB	84	122	213	288	450	450	450	450	450	450	0.19	0.27	0.47	0.64	0.47	0.64
Peak Hour: 5:00 - 6:00 PHF: .91	SB	371	277	640	502	750	750	750	750	750	750	0.49	0.37	0.85	0.67	0.85	0.67
		667															
	EB	239	481	278	622	750	750	750	750	750	750	0.32	0.64	0.37	0.83	0.37	0.83
6 **Black Lake Belmore Rd SW** **Black Lake Blvd SW**	WB	433	275	659	423	750	750	750	750	750	750	0.58	0.37	0.88	0.56	0.88	0.56
TMC Date: 06/30/15	NB	283	199	442	334	450	450	450	450	450	450	0.63	0.44	0.98	0.74	0.98	0.74
Peak Hour: 4:30 - 5:30 PHF: .94	SB	0	0	0	0	0	0	0	0	0	0						
		955															
	EB	37	66	76	122	450	450	450	450	450	450	0.08	0.15	0.17	0.27	0.17	0.27
7 **RW Johnson Blvd SW** **Sapp Rd SW**	WB	109	110	210	219	550	550	550	550	550	550	0.20	0.20	0.38	0.40	0.38	0.40
TMC Date: 06/30/15	NB	4	10	51	77	450	450	450	450	450	450	0.01	0.02	0.11	0.17	0.11	0.17
Peak Hour: 4:45 - 5:45 PHF: .85	SB	120	84	237	156	550	550	550	550	550	550	0.22	0.15	0.43	0.28	0.43	0.28
		270															
	EB	0	0	0	0	0	0	0	0	0	0						
8 **Sapp Rd SW** **Crosby Blvd SW**	WB	77	89	243	213	450	450	450	450	450	450	0.17	0.20	0.54	0.47	0.54	0.47
TMC Date: 06/30/15	NB	200	169	428	430	550	550	550	550	550	550	0.36	0.31	0.78	0.78	0.78	0.78
Peak Hour: 5:00 - 6:00 PHF: .91	SB	127	146	221	249	550	550	550	550	550	550	0.23	0.27	0.40	0.45	0.40	0.45
		404															

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	33	33	113	157	450	450	450	450	450	450	0.07	0.07	0.25	0.35	0.25	0.35
9 **Black Lake Belmore Rd SW** **49th Ave SW**	WB	194	111	279	157	450	450	450	450	450	450	0.43	0.25	0.62	0.35	0.62	0.35
TMC Date: 06/30/15	NB	162	184	291	325	450	450	450	450	450	450	0.36	0.41	0.65	0.72	0.65	0.72
Peak Hour: 4:15 - 5:15 PHF: .90	SB	216	277	404	448	450	450	450	450	450	450	0.48	0.62	0.90	1.00	0.90	1.00
		605															
	Sunset	48	24	68	54	450	450	450	450	450	450	0.11	0.05	0.15	0.12	0.15	0.12
10 **Capitol Blvd SE** **Carlyon Ave SE/Sunset Way SE**	Carlyon	96	135	232	226	550	550	550	550	550	550	0.17	0.25	0.42	0.41	0.42	0.41
TMC Date: 06/25/15	NB	541	905	1,033	1,638	1800	1800	1800	1800	1800	1800	0.30	0.50	0.57	0.91	0.57	0.91
Peak Hour: 4:30 - 5:30 PHF: .85	SB	869	490	1,554	969	1800	1800	1800	1800	1800	1800	0.48	0.27	0.86	0.54	0.86	0.54
		1,554															
	EB	0	0	0	0	0	0	0	0	0	0						
11 **Deschutes Way SW** **I-5 NB On Ramp**	WB	0	305	0	307	1060	1060	1060	1060	1060	1060	0.00	0.29	0.00	0.29	0.00	0.29
TMC Date: 07/01/15	NB	370	303	415	405	550	550	550	550	550	550	0.67	0.55	0.75	0.74	0.75	0.74
Peak Hour: 4:30 - 5:30 PHF: .79	SB	461	223	572	275	550	550	550	550	550	550	0.84	0.41	1.04	0.50	1.04	0.50
		831															
	EB	0	447	0	544	1060	1060	1060	1060	1060	1060	0.00	0.42	0.00	0.51	0.00	0.51
12 **Deschutes Way SW** **US 101 WB On Ramp**	WB	0	0	0	0	0	0	0	0	0	0						
TMC Date: 07/01/15	NB	813	260	945	362	550	550	550	550	550	550	1.48	0.47	1.72	0.66	1.72	0.66
Peak Hour: 5:00 - 6:00 PHF: .92	SB	279	385	391	430	550	550	550	550	550	550	0.84	0.41	1.04	0.50	1.04	0.50
		1,092															

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
Intersection	Movement	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK
	EB	151	215	206	304	450	450	450	450	450	450	0.34	0.48	0.46	0.68	0.46	0.68
13 I-5 SB/US 101 EB Off Ramps/N 2nd Ave SW Desoto St SW	WB	0	0	0	0	0	0	0	0	0	0						
TMC Date: 06/30/15	NB	172	955	274	1,139	750	1500	750	1500	750	1500	0.23	0.64	0.37	0.76	0.37	0.76
Peak Hour: 4:30 - 5:30 PHF: .89	SB	847	0	963	0	2120	2120	2120	2120	2120	2120	0.40	0.00	0.45	0.00	0.45	0.00
		1,170															
	EB	0	0	0	0	0	0	0	0	0	0						
14 N 2nd Ave SW Custer Way SW	WB	275	963	499	1,235	900	1800	900	1800	900	1800	0.31	0.54	0.55	0.69	0.55	0.69
TMC Date: 02/10/15	NB	172	353	333	549	750	750	750	750	750	750	0.23	0.47	0.44	0.73	0.44	0.73
Peak Hour: 4:45 - 5:45 PHF: .88	SB	1,043	174	1,228	276	1500	750	1500	750	1500	750	0.70	0.23	0.82	0.37	0.82	0.37
		1,490															
	EB	876	262	1,259	544	1800	900	1800	900	1800	900	0.49	0.29	0.70	0.60	0.70	0.60
15 Boston St SW Custer Way SW	WB	632	859	780	1,111	900	1800	900	1800	900	1800	0.70	0.48	0.87	0.62	0.87	0.62
TMC Date: 06/25/15	NB	151	539	116	502	450	450	450	450	450	450	0.34	1.20	0.26	1.12	0.26	1.12
Peak Hour: 4:30 - 5:30 PHF: .95	SB	5	4	5	3	450	450	450	450	450	450	0.01	0.01	0.01	0.01	0.01	0.01
		1,664															
	EB	0	0	0	0	0	0	0	0	0	0						
16 Deschutes Way SW Boston St SW	WB	508	163	471	168	450	450	450	450	450	450	1.13	0.36	1.05	0.37	1.05	0.37
TMC Date: 07/01/15	NB	424	281	686	470	550	550	550	550	550	550	0.77	0.51	1.25	0.85	1.25	0.85
Peak Hour: 4:30 - 5:30 PHF: .93	SB	288	776	390	909	550	550	550	550	550	550	0.52	1.41	0.71	1.65	0.71	1.65
		1,220															

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Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
17 **Cleveland Ave SE** **Capitol Blvd SE** TMC Date: 06/25/15 Peak Hour: 4:30 - 5:30 PHF: .88	EB	350	551	767	1,205	1800	1800	900	1800	900	1800	0.19	0.31	0.85	0.67	0.85	0.67
	WB	914	556	1,648	1,046	1800	1800	1800	1800	1800	1800	0.51	0.31	0.92	0.58	0.92	0.58
	NB	224	381	297	461	900	900	750	750	750	750	0.25	0.42	0.40	0.61	0.40	0.61
	SB	0	0	0	0	0	0	0	0	0	0						
		1,488															
18 **Custer Way SE** **Capitol Blvd SE** TMC Date: 02/10/15 Peak Hour: 4:45 - 5:45 PHF: .90	EB	865	593	1,117	741	1800	900	1800	900	1800	900	0.48	0.66	0.62	0.82	0.62	0.82
	WB	790	1092	612	900	1800	1800	900	1800	900	1800	0.44	0.61	0.68	0.50	0.68	0.50
	NB	776	816	740	1,129	1800	1800	900	1800	900	1800	0.43	0.45	0.82	0.63	0.82	0.63
	SB	545	475	1,199	898	1800	1800	1800	900	1800	900	0.44	0.61	0.68	0.50	0.68	0.50
		2,976															
19 **Custer Way SE/North St SE** **Cleveland Ave SE** TMC Date: 02/10/15 Peak Hour: 4:45 - 5:45 PHF: .93	EB	1,025	832	846	699	1800	1800	1800	900	1800	900	0.57	0.46	0.47	0.78	0.47	0.78
	WB	329	453	479	603	750	750	750	750	750	750	0.44	0.60	0.64	0.80	0.64	0.80
	NB	629	936	386	675	1800	1800	900	1800	900	1800	0.35	0.52	0.43	0.38	0.43	0.38
	SB	491	253	614	348	900	900	750	750	750	750	0.55	0.28	0.82	0.46	0.82	0.46
		2,474															
20 **Hoadley St SE** **North St SE** TMC Date: 06/24/15 Peak Hour: 5:00 - 6:00 PHF: .87	EB	318	411	555	615	750	750	750	750	750	750	0.42	0.55	0.74	0.82	0.74	0.82
	WB	455	301	685	528	750	750	750	750	750	750	0.61	0.40	0.91	0.70	0.91	0.70
	NB	9	13	14	20	450	450	450	450	450	450	0.02	0.03	0.03	0.05	0.03	0.05
	SB	43	100	68	158	450	450	450	450	450	450	0.10	0.22	0.15	0.35	0.15	0.35
		825															

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Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement	Link Volumes: Existing APPROACH LINK	Link Volumes: Existing DEPART LINK	Link Volumes: 2040 Baseline APPROACH LINK	Link Volumes: 2040 Baseline DEPART LINK	Link Capacity: Existing APPROACH LINK	Link Capacity: Existing DEPART LINK	Link Capacity: 2040 Baseline APPROACH LINK	Link Capacity: 2040 Baseline DEPART LINK	Link Capacity: 2040 With Imp APPROACH LINK	Link Capacity: 2040 With Imp DEPART LINK	Volume to Capacity Ratio: Existing APPROACH LINK	Volume to Capacity Ratio: Existing DEPART LINK	Volume to Capacity Ratio: 2040 Baseline APPROACH LINK	Volume to Capacity Ratio: 2040 Baseline DEPART LINK	Volume to Capacity Ratio: 2040 With Imp APPROACH LINK	Volume to Capacity Ratio: 2040 With Imp DEPART LINK
	EB	0	0	0	0	0	0	0	0	0	0						
21 **Deshcutes Way SW/I-5 NB Off Ramp** **E St SW**	WB	328	414	590	777	550	550	1100	1100	1100	1100	0.60	0.75	0.54	0.71	0.54	0.71
TMC Date: 06/25/15	NB	215	0	348	0	1060	1060	1060	1060	1060	1060	0.20	0.00	0.33	0.00	0.33	0.00
Peak Hour: 4:45 - 5:45 PHF: .85	SB	278	407	484	645	550	550	550	550	550	550	0.51	0.74	0.88	1.17	0.88	1.17
		821															
	EB	433	379	796	703	550	550	1100	1100	1100	1100	0.79	0.69	0.72	0.64	0.72	0.64
22 **Capitol Blvd SE** **E St SE**	WB	337	411	1,146	1,209	450	450	1800	1800	1800	1800	0.75	0.91	0.64	0.67	0.64	0.67
TMC Date: 06/25/15	NB	792	957	1,209	1,834	2100	2100	2100	2100	2100	2100	0.38	0.46	0.58	0.87	0.58	0.87
Peak Hour: 4:45 - 5:45 PHF: .86	SB	850	665	1,224	629	1800	1800	1800	900	1800	900	0.47	0.37	0.68	0.70	0.68	0.70
		2,412															
	EB	0	0	0	0	450	450	450	450	450	450	0.00	0.00	0.00	0.00	0.00	0.00
23 **Cleveland Ave SE** **South St SE**	WB	21	26	51	72	450	450	450	450	450	450	0.05	0.06	0.11	0.16	0.11	0.16
TMC Date: 06/25/15	NB	582	861	924	1,225	1800	1800	1800	1800	1800	1800	0.32	0.48	0.51	0.68	0.51	0.68
Peak Hour: 4:30 - 5:30 PHF: .88	SB	869	585	1,281	959	1800	1800	1800	1800	1800	1800	0.48	0.33	0.71	0.53	0.71	0.53
		1,472															
	EB	163	278	178	364	550	550	550	550	550	550	0.30	0.51	0.32	0.66	0.32	0.66
24 **7th Ave SW** **Linwood Ave SW**	WB	486	265	517	375	550	550	550	550	550	550	0.88	0.48	0.94	0.68	0.94	0.68
TMC Date: 06/30/15	NB	1	1	1	1	450	450	450	450	450	450	0.00	0.00	0.00	0.00	0.00	0.00
Peak Hour: 5:00 - 6:00 PHF: .93	SB	139	245	242	198	450	450	450	450	450	450	0.88	0.48	0.94	0.68	0.94	0.68
		789															

Item 8.

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	293	476	405	667	550	550	550	550	550	550	0.53	0.87	0.74	1.21	0.74	1.21
25 **2nd Ave SW** **Linwood Ave SW**	WB	405	323	623	387	550	550	550	550	550	550	0.74	0.59	1.13	0.70	1.13	0.70
TMC Date: 06/30/15	NB	314	364	546	710	750	750	750	750	750	750	0.42	0.49	0.73	0.95	0.73	0.95
Peak Hour: 4:45 - 5:45 PHF: .89	SB	355	204	691	501	750	750	750	750	750	750	0.47	0.27	0.92	0.67	0.92	0.67
		1,367															
	EB	311	395	379	617	550	550	550	550	550	550	0.57	0.72	0.69	1.12	0.69	1.12
26 **Capitol Blvd SE** **Linwood Ave SW**	WB	0	0	30	30	450	450	450	450	450	450	0.00	0.00	0.07	0.07	0.07	0.07
TMC Date: 06/25/15	NB	782	852	1,321	1,698	2100	2100	2100	2100	2100	2100	0.37	0.41	0.63	0.81	0.63	0.81
Peak Hour: 4:45 - 5:45 PHF: .84	SB	946	792	1,834	1,219	2100	2100	2100	2100	2100	2100	0.45	0.38	0.87	0.58	0.87	0.58
		2,039															
	EB	846	634	1,156	948	1800	1800	2100	2100	2100	2100	0.47	0.35	0.55	0.45	0.55	0.45
27 **Henderson Blvd** **Yelm Hwy SE**	WB	1012	1479	1,371	1,881	1800	1800	2100	2100	2100	2100	0.56	0.82	0.65	0.90	0.65	0.90
TMC Date: 06/25/15	NB	919	794	1,043	1,037	750	750	750	750	750	750	1.23	1.06	1.39	1.38	1.39	1.38
Peak Hour: 4:45 - 5:45 PHF: .91	SB	383	253	592	296	750	750	750	750	750	750	0.51	0.34	0.79	0.39	0.79	0.39
		3,160															
	EB	212	354	372	591	550	550	550	550	550	550	0.39	0.64	0.68	1.07	0.68	1.07
28 **Rural Rd SW** **Trosper Rd SW**	WB	393	266	562	411	550	550	550	550	650	650	0.71	0.48	1.02	0.75	0.86	0.63
TMC Date: 06/25/15	NB	0	0	0	0	0	0	0	0	0	0						
Peak Hour: 4:30 - 5:30 PHF: .92	SB	149	134	313	245	550	550	550	550	550	550	0.27	0.24	0.57	0.45	0.57	0.45
		754															

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Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
Intersection	Movement	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK	APPROACH LINK	DEPART LINK
29	EB	306	444	480	630	550	550	550	550	650	650	0.56	0.81	0.87	1.15	0.74	0.97
Lake Park Dr **Trosper Rd SW**	WB	472	347	758	645	1100	1100	1100	1100	1100	1100	0.43	0.32	0.69	0.59	0.69	0.59
TMC Date: 03/05/14	NB	143	114	177	141	450	450	450	450	450	450	0.32	0.25	0.39	0.31	0.39	0.31
Peak Hour: 4:45 - 5:45 PHF: .98	SB	72	88	199	197	450	450	450	450	450	450	0.16	0.20	0.44	0.44	0.44	0.44
		993															
30	EB	413	528	697	802	1100	1100	1100	1100	1100	1100	0.38	0.48	0.63	0.73	0.63	0.73
2nd Ave SW/Littlerock Rd SW **Trosper Rd SW**	WB	697	760	815	1,072	1500	1500	1500	1500	1500	1500	0.46	0.51	0.54	0.71	0.54	0.71
TMC Date: 03/05/14	NB	799	713	1,213	1,096	1800	1800	1800	1800	1800	1800	0.44	0.40	0.67	0.61	0.67	0.61
Peak Hour: 4:00 - 5:00 PHF: .98	SB	380	288	763	518	750	750	750	750	750	750	0.46	0.51	0.54	0.71	0.54	0.71
		2,289															
31	EB	715	724	1,034	847	1500	1500	1500	1500	1500	1500	0.48	0.48	0.69	0.56	0.69	0.56
I-5 SB Ramps/Tyee Dr **Trosper Rd SW**	WB	757	1335	1,014	1,624	1500	1500	1500	1500	1500	1500	0.50	0.89	0.68	1.08	0.68	1.08
TMC Date: 03/05/14	NB	518	590	625	734	550	550	550	550	550	550	0.94	1.07	1.14	1.33	1.14	1.33
Peak Hour: 4:30 - 5:30 PHF: .95	SB	1,164	505	1,293	761	4240	1060	4240	1060	4240	1060	0.27	0.48	0.30	0.72	0.30	0.72
		3,154															
32	EB	1,340	760	1,694	1,014	2250	1500	2250	1500	2250	1500	0.60	0.51	0.75	0.68	0.75	0.68
I-5 NB Ramps **Trosper Rd SW**	WB	1205	895	1,426	1,174	1500	2250	1500	1500	1500	1500	0.80	0.40	0.95	0.78	0.95	0.78
TMC Date: 03/05/14	NB	251	524	145	665	1060	1060	550	550	550	550	0.24	0.49	0.26	1.21	0.26	1.21
Peak Hour: 4:30 - 5:30 PHF: .93	SB	0	617	0	412	1060	1060	1060	1060	1060	1060	0.00	0.58	0.00	0.39	0.00	0.39
		2,796															

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
33 **Capitol Blvd SE** **Trosper Rd SW**	EB	908	1,189	1,121	1,589	2250	1500	1500	1500	1500	1500	0.40	0.79	0.75	1.06	0.75	1.06
	WB	132	71	350	111	450	450	450	450	450	450	0.29	0.16	0.78	0.25	0.78	0.25
TMC Date: 03/05/14	NB	1,356	1,074	1,471	1,494	1800	1800	2100	2100	2100	2100	0.75	0.60	0.70	0.71	0.70	0.71
Peak Hour: 4:30 - 5:30 PHF: .99	SB	827	889	1,669	1,417	2100	2100	2100	2100	2100	2100	0.39	0.42	0.79	0.67	0.79	0.67
		3,223															
34 **Capitol Blvd SE** **Lee St SW**	EB	306	181	348	328	550	550	550	550	550	550	0.56	0.33	0.63	0.60	0.63	0.60
	WB	101	76	109	106	450	450	450	450	450	450	0.22	0.17	0.24	0.24	0.24	0.24
TMC Date: 03/05/14	NB	1,069	869	1,378	1,374	1800	1800	2100	2100	2100	2100	0.59	0.48	0.66	0.65	0.66	0.65
Peak Hour: 4:30 - 5:30 PHF: .93	SB	1,017	1,367	1,456	1,483	1800	1800	2100	2100	2100	2100	0.57	0.76	0.69	0.71	0.69	0.71
		2,493															
35 **Littlerock Rd SW** **Fred Meyer/Costco Drwy**	EB	0	3	0	3	450	450	450	450	450	450	0.00	0.01	0.00	0.01	0.00	0.01
	WB	246	198	279	213	450	450	450	450	450	450	0.55	0.44	0.62	0.47	0.62	0.47
TMC Date: 06/24/15	NB	747	713	1,149	1,102	1800	1800	1800	1800	1800	1800	0.42	0.40	0.64	0.61	0.64	0.61
Peak Hour: 4:30 - 5:30 PHF: .96	SB	687	766	1,069	1,179	1800	1800	1800	1800	1800	1800	0.38	0.43	0.59	0.66	0.59	0.66
		1,680															
36 **Littlerock Rd SW** **Costco Drwy**	EB	118	136	148	170	450	450	450	450	450	450	0.26	0.30	0.33	0.38	0.33	0.38
	WB	324	335	362	441	450	450	450	450	450	450	0.72	0.74	0.81	0.98	0.81	0.98
TMC Date: 06/24/15	NB	640	538	1,037	850	1800	1800	1800	1800	1800	1800	0.36	0.30	0.58	0.47	0.58	0.47
Peak Hour: 4:30 - 5:30 PHF: .95	SB	692	765	1,101	1,187	1800	1800	1800	1800	1800	1800	0.72	0.74	0.81	0.98	0.81	0.98
		1,774															

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Tumwater Transportation Master Plan

PM Peak Hour Volumes

Intersection	Movement	Link Volumes: Existing APPROACH LINK	Link Volumes: Existing DEPART LINK	Link Volumes: 2040 Baseline APPROACH LINK	Link Volumes: 2040 Baseline DEPART LINK	Link Capacity: Existing APPROACH LINK	Link Capacity: Existing DEPART LINK	Link Capacity: 2040 Baseline APPROACH LINK	Link Capacity: 2040 Baseline DEPART LINK	Link Capacity: 2040 With Imp APPROACH LINK	Link Capacity: 2040 With Imp DEPART LINK	V/C Ratio: Existing APPROACH LINK	V/C Ratio: Existing DEPART LINK	V/C Ratio: 2040 Baseline APPROACH LINK	V/C Ratio: 2040 Baseline DEPART LINK	V/C Ratio: 2040 With Imp APPROACH LINK	V/C Ratio: 2040 With Imp DEPART LINK
	EB	0	0	0	0	0	0	0	0	0	0						
37																	
Littlerock Rd SW	WB	253	184	287	249	550	550	550	550	550	550	0.46	0.33	0.52	0.45	0.52	0.45
Kingswood Dr SW																	
TMC Date: 06/24/15	NB	621	697	1,008	977	1100	1100	1100	1100	1100	1100	0.56	0.63	0.92	0.89	0.92	0.89
Peak Hour: 4:30 - 5:30																	
PHF: .93	SB	578	571	885	954	1800	1800	1800	1800	1800	1800	0.32	0.32	0.49	0.53	0.49	0.53
		1,452															
	EB	39	56	53	76	450	450	450	450	450	450	0.09	0.12	0.12	0.17	0.12	0.17
38																	
Capitol Blvd SE	WB	32	49	56	56	450	450	450	450	450	450	0.07	0.11	0.13	0.13	0.13	0.13
X St SE																	
TMC Date: 03/05/14	NB	936	738	1,239	1,245	1800	1800	2100	2100	2100	2100	0.52	0.41	0.59	0.59	0.59	0.59
Peak Hour: 4:15 - 5:15																	
PHF: .89	SB	783	947	1,271	1,242	1800	1800	2100	2100	2100	2100	0.44	0.53	0.61	0.59	0.61	0.59
		1,790															
	EB	27	11	37	15	450	450	450	450	450	450	0.06	0.02	0.08	0.03	0.08	0.03
39																	
Elm St SE	WB	10	18	14	24	450	450	450	450	450	450	0.02	0.04	0.03	0.05	0.03	0.05
X St SE																	
TMC Date: 06/25/15	NB	74	57	101	78	450	450	450	450	450	450	0.16	0.13	0.22	0.17	0.22	0.17
Peak Hour: 5:00 - 6:00																	
PHF: .74	SB	49	74	67	101	450	450	450	450	450	450	0.11	0.16	0.15	0.22	0.15	0.22
		160															
	EB	216	105	301	172	450	450	450	450	450	450	0.48	0.23	0.67	0.38	0.67	0.38
40																	
Capitol Blvd SE	WB	125	116	138	129	450	450	450	450	450	450	0.28	0.26	0.31	0.29	0.31	0.29
Dennis St SE/SW																	
TMC Date: 03/05/14	NB	723	632	935	1,076	1800	1800	2100	2100	2100	2100	0.40	0.35	0.45	0.51	0.45	0.51
Peak Hour: 4:30 - 5:15																	
PHF: .91	SB	699	910	1,174	1,171	1800	1800	2100	2100	2100	2100	0.39	0.51	0.56	0.56	0.56	0.56
		1,763															

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Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	332	387	576	575	750	750	750	750	750	750	0.44	0.52	0.77	0.77	0.77	0.77
41																	
Capitol Blvd SE	WB	422	227	635	453	750	750	750	750	750	750	0.56	0.30	0.85	0.60	0.85	0.60
Israel Rd SE/SW																	
TMC Date: 06/25/15	NB	448	729	689	1,242	1800	1800	1800	1800	1800	1800	0.25	0.41	0.38	0.69	0.38	0.69
Peak Hour: 4:30 - 5:30																	
PHF: .90	SB	673	532	1,119	748	1800	1800	2100	2100	2100	2100	0.37	0.30	0.53	0.36	0.53	0.36
		1,875															
	EB	128	143	182	275	450	450	450	450	450	450	0.28	0.32	0.40	0.61	0.40	0.61
42																	
Black Lake Belmore Rd SW	WB	197	148	343	229	450	450	450	450	450	450	0.44	0.33	0.76	0.51	0.76	0.51
66th Ave SW																	
TMC Date: 06/30/15	NB	0	0	0	0	0	0	0	0	0	0						
Peak Hour: 4:30 - 5:30																	
PHF: .95	SB	122	156	264	285	450	450	450	450	450	450	0.44	0.33	0.76	0.51	0.76	0.51
		447															
	EB	149	232	250	427	450	450	450	450	450	450	0.33	0.52	0.56	0.95	0.56	0.95
43																	
Kirsop Rd SW	WB	4	8	11	19	450	450	450	450	450	450	0.01	0.02	0.02	0.04	0.02	0.04
66th Ave SW																	
TMC Date: 06/30/15	NB	220	139	362	223	450	450	450	450	450	450	0.49	0.31	0.80	0.50	0.80	0.50
Peak Hour: 4:30 - 5:30																	
PHF: .84	SB	39	33	104	58	450	450	450	450	450	450	0.09	0.07	0.23	0.13	0.23	0.13
		412															
	EB	0	0	0	0	0	0	0	0	0	0						
44																	
Littlerock Rd SW	WB	20	11	30	17	450	450	450	450	450	450	0.04	0.02	0.07	0.04	0.07	0.04
Odegard Rd SW																	
TMC Date: 06/24/15	NB	624	683	980	966	1100	1100	1100	1100	1100	1100	0.57	0.62	0.89	0.88	0.89	0.88
Peak Hour: 4:30 - 5:30																	
PHF: .93	SB	676	626	955	983	1100	1100	1100	1100	1100	1100	0.61	0.57	0.87	0.89	0.87	0.89
		1,320															

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
45 **Littlerock Rd SW** **Israel Rd SW/70th Ave SW** TMC Date: 06/24/15 Peak Hour: 4:30 - 5:30 PHF: .95	EB	255	502	351	681	450	450	450	450	450	450	0.57	1.12	0.78	1.51	0.78	1.51
	WB	460	242	771	440	750	750	750	750	750	750	0.61	0.32	1.03	0.59	1.03	0.59
	NB	527	531	778	830	1100	2000	1100	2000	1100	2000	0.48	0.27	0.71	0.42	0.71	0.42
	SB	649	616	1,006	955	1100	1100	1100	1100	1100	1100	0.59	0.56	0.91	0.87	0.91	0.87
		1,891															
46 **Linderson Way SE/11th Ave SW** **Israel Rd SW** TMC Date: 06/24/15 Peak Hour: 4:30 - 5:30 PHF: .83	EB	235	418	594	807	750	750	750	750	750	750	0.31	0.56	0.79	1.08	0.79	1.08
	WB	420	314	625	530	750	750	750	750	750	750	0.56	0.42	0.83	0.71	0.83	0.71
	NB	305	245	554	397	550	550	550	550	550	550	0.55	0.45	1.01	0.72	1.01	0.72
	SB	170	153	318	357	550	550	550	550	550	550	0.31	0.28	0.58	0.65	0.58	0.65
		1,130															
47 **Littlerock Rd SW** **Tumwater Blvd SW** TMC Date: 06/24/15 Peak Hour: 4:30 - 5:30 PHF: .94	EB	0	0	0	0	0	0	0	0	0	0						
	WB	502	411	774	625	900	900	900	900	900	900	0.56	0.46	0.86	0.69	0.86	0.69
	NB	239	507	504	879	750	750	750	750	900	900	0.32	0.68	0.67	1.17	0.56	0.98
	SB	589	412	888	662	2000	1100	2000	1100	2000	1100	0.29	0.37	0.44	0.60	0.44	0.60
		1,330															
48 **I-5 SB Ramps** **Tumwater Blvd SW** TMC Date: 06/24/15 Peak Hour: 4:30 - 5:30 PHF: .94	EB	413	509	1,062	1,051	1500	750	1500	1500	1500	1500	0.28	0.68	0.71	0.70	0.71	0.70
	WB	594	747	880	1,099	900	1800	1800	1800	1800	1800	0.66	0.42	0.49	0.61	0.49	0.61
	NB	0	422	0	723	1060	1060	1060	1060	1060	1060	0.00	0.40	0.00	0.68	0.00	0.68
	SB	671	0	931	0	1060	1060	1060	1060	1060	1060	0.66	0.42	0.49	0.61	0.49	0.61
		1,678															

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	747	594	1,100	881	1800	900	1800	1800	1800	1800	0.42	0.66	0.61	0.49	0.61	0.49
49 **I-5 NB Ramps** **Tumwater Blvd SW**	WB	1759	746	1,788	894	1800	1800	1800	1800	1800	1800	0.98	0.41	0.99	0.50	0.99	0.50
TMC Date: 06/24/15	NB	185	0	369	0	1060	1060	1060	1060	1060	1060	0.17	0.00	0.35	0.00	0.35	0.00
Peak Hour: 4:30 - 5:30 PHF: .88	SB	0	1,351	0	1,482	1060	1060	1060	1060	1060	1060	0.00	1.27	0.00	1.40	0.00	1.40
		2,691															
	EB	839	1,748	989	1,773	1800	1800	1800	1800	1800	1800	0.47	0.97	0.55	0.99	0.55	0.99
50 **Linderson Way SE** **Tumwater Blvd SW**	WB	789	782	969	940	1800	1800	1800	1800	1800	1800	0.44	0.43	0.54	0.52	0.54	0.52
TMC Date: 03/03/15	NB	295	371	384	611	550	550	550	550	550	550	0.54	0.67	0.70	1.11	0.70	1.11
Peak Hour: 4:30 - 5:30 PHF: .94	SB	1,228	250	1,239	257	550	550	550	550	550	550	2.23	0.45	2.25	0.47	2.25	0.47
		3,151															
	EB	819	801	987	987	1800	1800	1800	1800	1800	1800	0.46	0.45	0.55	0.55	0.55	0.55
51 **New Market St SW** **Tumwater Blvd SW**	WB	735	850	870	1,054	1800	1800	1800	1800	1800	1800	0.41	0.47	0.48	0.59	0.48	0.59
TMC Date: 03/03/15	NB	64	80	93	117	550	550	550	550	550	550	0.12	0.15	0.17	0.21	0.17	0.21
Peak Hour: 4:30 - 5:30 PHF: .92	SB	151	38	364	156	450	450	550	550	550	550	0.34	0.08	0.66	0.28	0.66	0.28
		1,769															
	EB	613	630	819	765	1800	1800	1800	1800	1800	1800	0.34	0.35	0.46	0.43	0.46	0.43
52 **Capitol Blvd SE** **Tumwater Blvd SE**	WB	423	435	478	517	1800	1800	1800	1800	1800	1800	0.24	0.24	0.27	0.29	0.27	0.29
TMC Date: 06/24/15	NB	521	802	758	1,389	900	900	1950	1950	1950	1950	0.58	0.89	0.39	0.71	0.39	0.71
Peak Hour: 4:30 - 5:30 PHF: .90	SB	693	383	1,324	708	1800	1800	1950	1950	1950	1950	0.39	0.21	0.68	0.36	0.68	0.36
		2,250															

Item 8.

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	899	552	1,016	705	750	750	750	750	900	900	1.20	0.74	1.35	0.94	1.13	0.78
53																	
Wildflower St SE/65th Ave SE	WB	591	890	776	994	750	750	750	750	750	750	0.79	1.19	1.03	1.33	1.03	1.33
Henderson Blvd SE																	
TMC Date: 07/01/15	NB	72	118	140	225	550	550	550	550	550	550	0.13	0.21	0.25	0.41	0.25	0.41
Peak Hour: 4:30 - 5:30																	
PHF: .91	SB	1	3	14	22	450	450	450	450	450	450	0.00	0.01	0.03	0.05	0.03	0.05
		1,563															
	EB	663	345	759	403	750	750	750	750	900	900	0.88	0.46	1.01	0.54	0.84	0.45
54																	
Tumwater Blvd SE	WB	0	0	0	0	0	0	0	0	0	0						
Henderson Blvd SE																	
TMC Date: 11/13/14	NB	187	209	206	303	750	750	750	750	900	900	0.25	0.28	0.27	0.40	0.23	0.34
Peak Hour: 4:30 - 5:30																	
PHF: .91	SB	520	816	673	932	750	750	750	750	900	900	0.69	1.09	0.90	1.24	0.75	1.04
		1,370															
	EB	240	192	311	287	750	750	750	750	900	900	0.32	0.26	0.41	0.38	0.35	0.32
55																	
Trails End Dr SE	WB	236	204	317	223	750	750	750	750	900	900	0.31	0.27	0.42	0.30	0.35	0.25
Henderson Blvd SE																	
TMC Date: 06/24/15	NB	105	185	133	251	450	450	450	450	450	450	0.23	0.41	0.30	0.56	0.30	0.56
Peak Hour: 5:00 - 6:00																	
PHF: .87	SB	0	0	0	0	0	0	0	0	0	0						
		581															
	EB	11	57	42	136	450	450	450	450	450	450	0.02	0.13	0.09	0.30	0.09	0.30
56																	
Littlerock Rd SW	WB	0	0	175	100	0	0	450	450	450	450			0.39	0.22	0.39	0.22
Black Hills High School Drwy																	
TMC Date: 06/24/15	NB	167	397	339	645	900	900	900	900	900	900	0.19	0.44	0.38	0.72	0.38	0.72
Peak Hour: 4:30 - 5:30																	
PHF: .96	SB	438	162	631	306	750	750	750	750	900	900	0.58	0.22	0.84	0.41	0.70	0.34
		616															

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	58	48	100	181	450	450	450	450	450	450	0.13	0.11	0.22	0.40	0.22	0.40
57 **Center St SW** **76th Ave SW**	WB	38	19	60	30	450	450	450	450	450	450	0.08	0.04	0.13	0.07	0.13	0.07
TMC Date: 03/03/15	NB	248	320	303	439	550	550	550	550	550	550	0.45	0.58	0.55	0.80	0.55	0.80
Peak Hour: 4:45 - 5:45 PHF: .92	SB	359	316	606	418	550	550	550	550	550	550	0.65	0.57	1.10	0.76	1.10	0.76
		703															
	EB	29	19	46	30	450	450	450	450	450	450	0.06	0.04	0.10	0.07	0.10	0.07
58 **Old Hwy 99** **Henderson Blvd SE**	WB	199	222	297	295	750	750	750	750	750	750	0.27	0.30	0.40	0.39	0.40	0.39
TMC Date: 06/23/15	NB	625	962	853	1,570	900	900	900	900	1950	1950	0.69	1.07	0.95	1.74	0.44	0.81
Peak Hour: 4:15 - 5:15 PHF: .87	SB	929	579	1,528	829	900	900	900	900	1950	1950	1.03	0.64	1.70	0.92	0.78	0.43
		1,782															
	EB	12	1	14	1	450	450	450	450	450	450	0.03	0.00	0.03	0.00	0.03	0.00
59 **Old Hwy 99** **79th Ave SE**	WB	122	147	154	153	450	450	450	450	450	450	0.27	0.33	0.34	0.34	0.34	0.34
TMC Date: 10/28/14	NB	448	862	668	1,489	900	900	900	900	1950	1950	0.50	0.96	0.74	1.65	0.34	0.76
Peak Hour: 4:30 - 5:30 PHF: .95	SB	972	544	1,578	770	900	900	900	900	1950	1950	1.08	0.60	1.75	0.86	0.81	0.39
		1,554															
	EB	0	0	0	0	0	0	0	0	0	0						
60 **Kimmie St SW** **83rd Ave SW**	WB	60	19	70	17	450	450	450	450	450	450	0.13	0.04	0.16	0.04	0.16	0.04
TMC Date: 03/03/15	NB	45	105	78	263	450	450	450	450	450	450	0.10	0.23	0.17	0.58	0.17	0.58
Peak Hour: 4:30 - 5:30 PHF: .82	SB	65	46	213	81	450	450	450	450	450	450	0.13	0.04	0.16	0.04	0.16	0.04
		170															

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	95	83	83	94	450	450	450	450	450	450	0.21	0.18	0.18	0.21	0.18	0.21
61 **Center St SW** **83rd Ave SW**	WB	100	181	150	289	450	450	450	450	450	450	0.22	0.40	0.33	0.64	0.33	0.64
TMC Date: 03/03/15	NB	0	0	0	0	0	0	0	0	0	0	0.21	0.18	0.18	0.21	0.18	0.21
Peak Hour: 4:45 - 5:45 PHF: .88	SB	228	159	356	206	450	450	450	450	450	450	0.51	0.35	0.79	0.46	0.79	0.46
		423															
	EB	211	183	270	520	750	750	750	750	750	750	0.28	0.24	0.36	0.69	0.36	0.69
62 **Old Hwy 99** **88th Ave SE**	WB	7	7	7	7	450	450	450	450	450	450	0.02	0.02	0.02	0.02	0.02	0.02
TMC Date: 06/23/15	NB	275	698	405	958	900	900	900	900	1050	1050	0.31	0.78	0.45	1.06	0.39	0.91
Peak Hour: 4:30 - 5:30 PHF: .90	SB	844	449	1,441	638	900	900	900	900	1950	1950	0.94	0.50	1.60	0.71	0.74	0.33
		1,337															
	EB	328	407	509	729	900	900	900	900	1800	1800	0.36	0.45	0.57	0.81	0.28	0.41
63 **I-5 SB Ramps** **93rd Ave SW**	WB	267	795	390	887	900	900	900	900	1800	1800	0.30	0.88	0.43	0.99	0.22	0.49
TMC Date: 06/23/15	NB	0	175	0	180	1060	1060	1060	1060	1060	1060	0.00	0.17	0.00	0.17	0.00	0.17
Peak Hour: 5:00 - 6:00 PHF: .88	SB	782	0	897	0	1060	1060	1060	1060	1060	1060	0.74	0.00	0.85	0.00	0.85	0.00
		1,377															
	EB	750	298	842	420	900	900	900	900	1800	1800	0.83	0.33	0.94	0.47	0.47	0.23
64 **I-5 NB Ramps** **93rd Ave SW**	WB	590	617	717	706	900	900	900	900	1800	1800	0.66	0.69	0.80	0.78	0.40	0.39
TMC Date: 06/23/15	NB	160	0	283	0	1060	1060	1060	1060	1060	1060	0.15	0.00	0.27	0.00	0.27	0.00
Peak Hour: 4:30 - 5:30 PHF: .94	SB	0	585	0	716	1060	1060	1060	1060	1060	1060	0.00	0.55	0.00	0.68	0.00	0.68
		1,500															

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ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	502	471	591	598	900	900	900	900	1800	1800	0.56	0.52	0.66	0.66	0.33	0.33
65																	
Kimmie St SW	WB	417	477	489	573	900	900	900	900	1050	1050	0.46	0.53	0.54	0.64	0.47	0.55
93rd Ave SW																	
TMC Date: 06/23/15	NB	26	22	24	21	450	450	450	450	450	450	0.06	0.05	0.05	0.05	0.05	0.05
Peak Hour: 4:15 - 5:15																	
PHF: .94	SB	57	32	155	67	450	450	450	450	450	450	0.13	0.07	0.34	0.15	0.34	0.15
		1,002															
	EB	485	378	580	442	900	900	900	900	1050	1050	0.54	0.42	0.64	0.49	0.55	0.42
66																	
Case Rd SW	WB	377	399	663	628	900	900	900	900	1050	1050	0.42	0.44	0.74	0.70	0.63	0.60
93rd Ave SW																	
TMC Date: 06/23/15	NB	133	269	171	462	750	750	750	750	750	750	0.18	0.36	0.23	0.62	0.23	0.62
Peak Hour: 4:30 - 5:30																	
PHF: .92	SB	100	49	224	106	450	450	450	450	450	450	0.42	0.44	0.74	0.70	0.63	0.60
		1,095															
	EB	395	368	623	654	900	900	900	900	1050	1050	0.44	0.41	0.69	0.73	0.59	0.62
67																	
Tilley Rd SW (south leg)	WB	322	303	750	473	750	750	750	750	750	750	0.43	0.40	1.00	0.63	1.00	0.63
93rd Ave SW																	
TMC Date: 06/23/15	NB	197	243	256	502	900	900	900	900	900	900	0.22	0.27	0.28	0.56	0.28	0.56
Peak Hour: 4:30 - 5:30																	
PHF: .87	SB	0	0	0	0	0	0	0	0	0	0						
		914															
	EB	303	321	473	749	750	750	750	750	750	750	0.40	0.43	0.63	1.00	0.63	1.00
68																	
Tilley Rd SW (north leg)	WB	106	204	406	530	750	750	750	750	750	750	0.14	0.27	0.54	0.71	0.54	0.71
93rd AVE SW																	
TMC Date: 06/23/15	NB	0	0	5	3	0	0	0	0	0	0						
Peak Hour: 4:30 - 5:30																	
PHF: .86	SB	241	125	582	184	750	750	750	750	750	750	0.32	0.17	0.78	0.25	0.78	0.25
		650															

SCJ ALLIANCE
ENGINEERING AND PLANNING SERVICES

Traffic Volume Calculation Worksheet

Tumwater Transportation Master Plan

PM Peak Hour Volumes

		Link Volumes				Link Capacity						Volume to Capacity Ratio					
		Existing		2040 Baseline		Existing		2040 Baseline		2040 With Imp		Existing		2040 Baseline		2040 With Imp	
		APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART	APPROACH	DEPART
Intersection	Movement	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK
	EB	171	98	220	222	750	750	750	750	750	750	0.23	0.13	0.29	0.30	0.29	0.30
69 **Old Hwy 99 SE** **93rd Ave SW**	WB	0	0	0	0	0	0	0	0	0	0						
TMC Date: 06/23/15	NB	283	785	534	1,091	900	900	900	900	900	900	0.31	0.87	0.59	1.21	0.59	1.21
Peak Hour: 4:30 - 5:30 PHF: .92	SB	658	229	918	359	900	900	900	900	1050	1050	0.73	0.25	1.02	0.40	0.87	0.34

APPENDIX A-5
CAPACITY ANALYSIS WORKSHEETS

Intersection												
Intersection Delay, s/veh	11.7											
Intersection LOS	B											
Movement	**EBU**	**EBL**	**EBT**	**EBR**	**WBU**	**WBL**	**WBT**	**WBR**	**NBU**	**NBL**	**NBT**	**NBR**
Traffic Vol, veh/h	0	45	80	5	0	105	45	65	0	5	155	135
Future Vol, veh/h	0	45	80	5	0	105	45	65	0	5	155	135
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	6	6	6	2	9	9	9	2	4	4	4
Mvmt Flow	0	49	87	5	0	114	49	71	0	5	168	147
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.4	10.8	13.7
HCM LOS	B	B	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	53%	0%	94%	0%	41%	0%	83%
Vol Right, %	0%	47%	0%	6%	0%	59%	0%	17%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	290	45	85	105	110	45	115
LT Vol	5	0	45	0	105	0	45	0
Through Vol	0	155	0	80	0	45	0	95
RT Vol	0	135	0	5	0	65	0	20
Lane Flow Rate	5	315	49	92	114	120	49	125
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.01	0.495	0.094	0.164	0.217	0.196	0.091	0.21
Departure Headway (Hd)	6.488	5.652	6.937	6.387	6.832	5.906	6.67	6.04
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	552	637	516	561	525	606	537	594
Service Time	4.227	3.391	4.687	4.138	4.578	3.651	4.415	3.785
HCM Lane V/C Ratio	0.009	0.495	0.095	0.164	0.217	0.198	0.091	0.21
HCM Control Delay	9.3	13.8	10.4	10.4	11.5	10.1	10.1	10.4
HCM Lane LOS	A	B	B	B	B	B	B	B
HCM 95th-tile Q	0	2.8	0.3	0.6	0.8	0.7	0.3	0.8

Intersection				
Intersection Delay, s/veh				
Intersection LOS				
Movement	**SBU**	**SBL**	**SBT**	**SBR**
Traffic Vol, veh/h	0	45	95	20
Future Vol, veh/h	0	45	95	20
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	3	3
Mvmt Flow	0	49	103	22
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	10.3
HCM LOS	B

Lane

Lanes, Volumes, Timings
2: Crosby Blvd & Mottman Rd

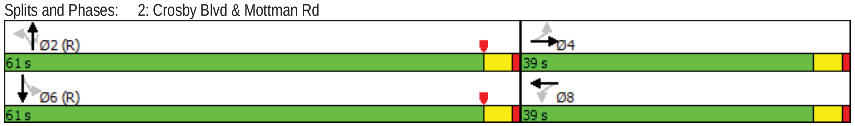
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	250	25	5	30	65	40	350	165	120	630	425
Future Volume (vph)	175	250	25	5	30	65	40	350	165	120	630	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	200		0	100		0
Storage Lanes	1		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		940			1116			645			417	
Travel Time (s)		21.4			25.4			14.7			9.5	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		20.5	20.5	20.5	20.5	20.5	
Total Split (s)	39.0	39.0		39.0	39.0		61.0	61.0	61.0	61.0	61.0	
Total Split (%)	39.0%	39.0%		39.0%	39.0%		61.0%	61.0%	61.0%	61.0%	61.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 82 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow
Natural Cycle: 50
Control Type: Actuated-Coordinated

Splits and Phases: 2: Crosby Blvd & Mottman Rd



HCM 2010 Signalized Intersection Summary
2: Crosby Blvd & Mottman Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	250	25	5	30	65	40	350	165	120	630	425
Future Volume (veh/h)	175	250	25	5	30	65	40	350	165	120	630	425
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1900	1900	1900	1881	1881	1881	1845	1845	1900
Adj Flow Rate, veh/h	197	281	28	6	34	73	45	393	185	135	708	0
Adj No. of Lanes	1	1	0	0	1	0	1	1	1	1	2	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	0	0	0	1	1	1	3	3	3
Cap, veh/h	357	358	36	44	123	236	517	1304	1108	561	2430	0
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.69	0.69	0.69	0.69	0.69	0.00
Sat Flow, veh/h	1269	1651	165	29	567	1089	745	1881	1599	824	3597	0
Grp Volume(v), veh/h	197	0	309	113	0	0	45	393	185	135	708	0
Grp Sat Flow(s),veh/h/ln	1269	0	1816	1686	0	0	745	1881	1599	824	1752	0
Q Serve(g_s), s	9.0	0.0	16.1	0.0	0.0	0.0	2.6	8.1	4.0	8.0	7.8	0.0
Cycle Q Clear(g_c), s	13.5	0.0	16.1	5.6	0.0	0.0	12.2	8.1	4.0	17.9	7.8	0.0
Prop In Lane	1.00		0.09	0.05		0.65	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	357	0	394	403	0	0	517	1304	1108	561	2430	0
V/C Ratio(X)	0.55	0.00	0.78	0.28	0.00	0.00	0.09	0.30	0.17	0.24	0.29	0.00
Avail Cap(c_a), veh/h	519	0	626	615	0	0	517	1304	1108	561	2430	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.96	0.96	0.96	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.7	0.0	37.0	32.8	0.0	0.0	8.6	5.9	5.3	9.9	5.9	0.0
Incr Delay (d2), s/veh	1.3	0.0	3.5	0.4	0.0	0.0	0.3	0.6	0.3	1.0	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.0	8.4	2.6	0.0	0.0	0.6	4.4	1.8	2.0	3.8	0.0
LnGrp Delay(d),s/veh	37.1	0.0	40.4	33.2	0.0	0.0	8.9	6.5	5.6	10.9	6.2	0.0
LnGrp LOS	D		D	C			A	A	A	B	A	
Approach Vol, veh/h		506			113			623			843	
Approach Delay, s/veh		39.1			33.2			6.4			7.0	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		74.1		25.9		74.1		25.9
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		56.5		34.5		56.5		34.5
Max Q Clear Time (g_c+I1), s		14.2		18.1		19.9		7.6
Green Ext Time (p_c), s		12.7		3.0		12.2		3.4

Intersection Summary

HCM 2010 Ctrl Delay	16.0
HCM 2010 LOS	B

Lanes, Volumes, Timings
3: Crosby Blvd & Irving St

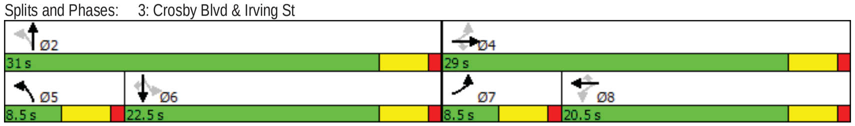
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	20	15	165	35	25	25	290	15	160	425	95
Future Volume (vph)	75	20	15	165	35	25	25	290	15	160	425	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		200	0		150	200		0	0		250
Storage Lanes	0		1	0		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			2725			1710			645	
Travel Time (s)		10.6			61.9			38.9			14.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	8%	8%	8%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.5	20.5	20.5	20.5	20.5	20.5	8.5	20.5		20.5	20.5	20.5
Total Split (s)	8.5	29.0	29.0	20.5	20.5	20.5	8.5	31.0		22.5	22.5	22.5
Total Split (%)	14.2%	48.3%	48.3%	34.2%	34.2%	34.2%	14.2%	51.7%		37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 51.7
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Crosby Blvd & Irving St



HCM 2010 Signalized Intersection Summary
3: Crosby Blvd & Irving St

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	20	15	165	35	25	25	290	15	160	425	95
Future Volume (veh/h)	75	20	15	165	35	25	25	290	15	160	425	95
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1759	1759	1900	1881	1881	1881	1881	1900	1863	1863	1863
Adj Flow Rate, veh/h	84	22	17	185	39	28	28	326	17	180	478	0
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	8	8	8	1	1	1	1	1	1	2	2	2
Cap, veh/h	137	20	387	370	61	414	416	980	51	598	807	686
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.03	0.55	0.55	0.43	0.43	0.00
Sat Flow, veh/h	11	77	1495	898	236	1599	1792	1772	92	1033	1863	1583
Grp Volume(v), veh/h	106	0	17	224	0	28	28	0	343	180	478	0
Grp Sat Flow(s),veh/h/ln	88	0	1495	1134	0	1599	1792	0	1865	1033	1863	1583
Q Serve(g_s), s	3.1	0.0	0.4	6.6	0.0	0.6	0.4	0.0	4.8	5.7	9.4	0.0
Cycle Q Clear(g_c), s	3.1	0.0	0.4	9.7	0.0	0.6	0.4	0.0	4.8	5.7	9.4	0.0
Prop In Lane	0.79		1.00	0.83		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	0	0	387	431	0	414	416	0	1032	598	807	686
V/C Ratio(X)	0.00	0.00	0.04	0.52	0.00	0.07	0.07	0.00	0.33	0.30	0.59	0.00
Avail Cap(c_a), veh/h	0	0	765	539	0	534	519	0	1032	598	807	686
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	13.3	17.8	0.0	13.4	7.5	0.0	5.9	9.3	10.3	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	1.0	0.0	0.1	0.1	0.0	0.9	1.3	3.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.2	2.9	0.0	0.3	0.2	0.0	2.7	1.8	5.5	0.0
LnGrp Delay(d),s/veh	0.0	0.0	13.4	18.8	0.0	13.5	7.5	0.0	6.7	10.6	13.5	0.0
LnGrp LOS			B	B		B	A		A	B	B	
Approach Vol, veh/h		123			252			371			658	
Approach Delay, s/veh		1.8			18.2			6.8			12.7	
Approach LOS		A			B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		8
Phs Duration (G+Y+Rc), s		31.0		16.9	5.7	25.3		16.9
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		26.5		24.5	4.0	18.0		16.0
Max Q Clear Time (g_c+I1), s		6.8		5.1	2.4	11.4		11.7
Green Ext Time (p_c), s		6.1		2.0	0.0	3.2		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Item 8.

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	5	10	165	0	1	20	1	0	175	5	1
Future Vol, veh/h	0	5	10	165	0	1	20	1	0	175	5	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1	2	0	0	0	2	1	1	1
Mvmt Flow	0	5	11	179	0	1	22	1	0	190	5	1
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8	7.7	9.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	97%	3%	5%	0%
Vol Thru, %	3%	6%	91%	50%
Vol Right, %	1%	92%	5%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	181	180	22	10
LT Vol	175	5	1	0
Through Vol	5	10	20	5
RT Vol	1	165	1	5
Lane Flow Rate	197	196	24	11
Geometry Grp	1	1	1	1
Degree of Util (X)	0.246	0.212	0.03	0.013
Departure Headway (Hd)	4.497	3.901	4.579	4.282
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	787	925	785	837
Service Time	2.59	1.904	2.588	2.3
HCM Lane V/C Ratio	0.25	0.212	0.031	0.013
HCM Control Delay	9.1	8	7.7	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.8	0.1	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	5	5
Future Vol, veh/h	0	0	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	0	5	5
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.4
HCM LOS	A

Lane

HCM 2010 TWSC
5: Crosby Blvd & Barnes Rd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	1	0	10	5	190	1	80	5	235	110	20
Future Vol, veh/h	10	1	0	10	5	190	1	80	5	235	110	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	10	10	10	2	2	2	4	4	4	2	2	2
Mvmt Flow	11	1	0	11	5	209	1	88	5	258	121	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	744	744	132	742	752	91	143	0	0	93	0	0
Stage 1	648	648	-	93	93	-	-	-	-	-	-	-
Stage 2	96	96	-	649	659	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.12	6.52	6.22	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.518	4.018	3.318	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	321	333	896	332	339	967	1427	-	-	1501	-	-
Stage 1	446	454	-	914	818	-	-	-	-	-	-	-
Stage 2	891	800	-	458	461	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	215	275	896	287	280	967	1427	-	-	1501	-	-
Mov Cap-2 Maneuver	215	275	-	287	280	-	-	-	-	-	-	-
Stage 1	446	376	-	913	817	-	-	-	-	-	-	-
Stage 2	693	799	-	378	382	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	22.4	10.3	0.1	5.1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1427	-	-	219	285	967	1501	-	-
HCM Lane V/C Ratio	0.001	-	-	0.055	0.058	0.216	0.172	-	-
HCM Control Delay (s)	7.5	0	-	22.4	18.4	9.7	7.9	-	-
HCM Lane LOS	A	A	-	C	C	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	0.8	0.6	-	-

HCM 2010 TWSC
6: Black Lake Belmore Rd & Black Lake Blvd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	11.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	170	70	130	305	180	105
Future Vol, veh/h	170	70	130	305	180	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	3	0	0	1	1
Mvmt Flow	181	74	138	324	191	112

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	255	0	819	218
Stage 1	-	-	-	-	218	-
Stage 2	-	-	-	-	601	-
Critical Hdwy	-	-	4.1	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.2	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1322	-	346	824
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	549	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1322	-	310	824
Mov Cap-2 Maneuver	-	-	-	-	310	-
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	492	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.4	36.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	403	-	-	1322	-
HCM Lane V/C Ratio	0.752	-	-	0.105	-
HCM Control Delay (s)	36.5	-	-	8	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	6.1	-	-	0.3	-

HCM 2010 TWSC
7: RW Johnson Rd & Sapp Rd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	20	1	5	35	70	0	1	5	85	5	30
Future Vol, veh/h	15	20	1	5	35	70	0	1	5	85	5	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	3	3	3
Mvmt Flow	18	24	1	6	41	82	0	1	6	100	6	35

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	25	0	0	174	194	24	157	154	82
Stage 1	-	-	-	-	-	-	59	59	-	94	94	-
Stage 2	-	-	-	-	-	-	115	135	-	63	60	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.527	4.027	3.327
Pot Cap-1 Maneuver	1457	-	-	1596	-	-	793	705	1058	807	736	975
Stage 1	-	-	-	-	-	-	958	850	-	910	815	-
Stage 2	-	-	-	-	-	-	895	789	-	945	843	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1457	-	-	1596	-	-	750	693	1058	791	724	975
Mov Cap-2 Maneuver	-	-	-	-	-	-	750	693	-	791	724	-
Stage 1	-	-	-	-	-	-	946	839	-	898	812	-
Stage 2	-	-	-	-	-	-	853	786	-	926	832	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.1	0.3	8.7	10.2
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	973	1457	-	-	1596	-	-	827
HCM Lane V/C Ratio	0.007	0.012	-	-	0.004	-	-	0.171
HCM Control Delay (s)	8.7	7.5	0	-	7.3	0	-	10.2
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.6

HCM 2010 TWSC
8: Sapp Rd & Crosby Blvd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	60	15	130	70	20	110
Future Vol, veh/h	60	15	130	70	20	110
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	66	16	143	77	22	121

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	241	181	0	0	181	220
Stage 1	181	-	-	-	0	0
Stage 2	60	-	-	-	181	220
Critical Hdwy	7.11	6.21	-	-	7.1	6.5
Critical Hdwy Stg 1	6.11	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	6.1	5.5
Follow-up Hdwy	3.509	3.309	-	-	3.5	4
Pot Cap-1 Maneuver	715	864	-	-	785	682
Stage 1	823	-	-	-	-	-
Stage 2	-	-	-	-	825	725
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	618	864	-	-	770	682
Mov Cap-2 Maneuver	618	-	-	-	770	682
Stage 1	823	-	-	-	-	-
Stage 2	-	-	-	-	809	725

Approach	WB	NB	SB
HCM Control Delay, s	11	0	11.2
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBLn1	SBLn2
Capacity (veh/h)	-	-	618	864	770	682
HCM Lane V/C Ratio	-	-	0.107	0.019	0.029	0.177
HCM Control Delay (s)	-	-	11.5	9.2	9.8	11.4
HCM Lane LOS	-	-	B	A	A	B
HCM 95th %tile Q(veh)	-	-	0.4	0.1	0.1	0.6

SimTraffic Performance Report

9: Black Lake Belmore Rd & 49th Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Del/Veh (s)	5.9	6.9	3.4	7.0	8.7	4.6	6.2	8.3	4.7	0.8	1.1	0.8

9: Black Lake Belmore Rd & 49th Ave Performance by movement

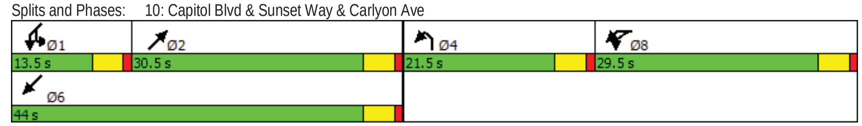
Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	4.4

Lanes, Volumes, Timings
10: Capitol Blvd & Sunset Way & Carlyon Ave

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	1	55	40	35	15	2	440	90	15	45	10	815
Future Volume (vph)	1	55	40	35	15	2	440	90	15	45	10	815
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	0	0	0			0			150	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		25		25							25	
Right Turn on Red			Yes			Yes			Yes			
Link Speed (mph)		30		30			30					30
Link Distance (ft)		840		629			731					791
Travel Time (s)		19.1		14.3			16.6					18.0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	Prot		Prot			NA			Prot	Prot	NA
Protected Phases	8	8		4			2			1	1	6
Permitted Phases												
Detector Phase	8	8		4			2			1	1	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0			10.0			6.0	6.0	10.0
Minimum Split (s)	29.5	29.5		21.5			29.5			10.5	10.5	20.0
Total Split (s)	29.5	29.5		21.5			30.5			13.5	13.5	44.0
Total Split (%)	31.1%	31.1%		22.6%			32.1%			14.2%	14.2%	46.3%
Yellow Time (s)	3.5	3.5		3.5			3.5			3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0			1.0			1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0			0.0				0.0	0.0
Total Lost Time (s)		4.5		4.5			4.5				4.5	4.5
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None			Max			None	None	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 95	
Actuated Cycle Length: 62.3	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 10: Capitol Blvd & Sunset Way & Carlyon Ave



HCM Signalized Intersection Capacity Analysis
10: Capitol Blvd & Sunset Way & Carlyon Ave

Existing 2015
PM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	1	55	40	35	15	2	440	90	15	45	10	815
Future Volume (vph)	1	55	40	35	15	2	440	90	15	45	10	815
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5			4.5				4.5	4.5
Lane Util. Factor		1.00		1.00			0.95				1.00	0.95
Frt		0.94		0.96			0.97				1.00	1.00
Flt Protected		0.97		0.97			1.00				0.95	1.00
Satd. Flow (prot)		1742		1757			3437				1787	3574
Flt Permitted		0.97		0.97			1.00				0.95	1.00
Satd. Flow (perm)		1742		1757			3437				1787	3574
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1	65	47	41	18	2	518	106	18	53	12	959
RTOR Reduction (vph)	0	104	0	58	0	0	1	0	0	0	0	0
Lane Group Flow (vph)	0	9	0	3	0	0	641	0	0	0	65	959
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Prot	Prot		Prot			NA			Prot	Prot	NA
Protected Phases	8	8		4			2			1	1	6
Permitted Phases												
Actuated Green, G (s)		5.3		3.4			35.6				4.8	44.9
Effective Green, g (s)		5.3		3.4			35.6				4.8	44.9
Actuated g/C Ratio		0.08		0.05			0.53				0.07	0.67
Clearance Time (s)		4.5		4.5			4.5				4.5	4.5
Vehicle Extension (s)		3.0		3.0			3.0				3.0	3.0
Lane Grp Cap (vph)		137		89			1823				127	2391
v/s Ratio Prot		c0.01		c0.00			0.19				0.04	c0.27
v/s Ratio Perm												
v/c Ratio		0.07		0.03			0.35				0.51	0.40
Uniform Delay, d1		28.6		30.3			9.1				30.0	5.0
Progression Factor		1.00		1.00			1.00				1.00	1.00
Incremental Delay, d2		0.2		0.2			0.5				3.5	0.5
Delay (s)		28.8		30.4			9.6				33.5	5.5
Level of Service		C		C			A				C	A
Approach Delay (s)		28.8		30.4			9.6					7.3
Approach LOS		C		C			A					A

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM 2010 TWSC
11: Deschutes Way & I-5 NB On-Ramp

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	1.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Traffic Vol, veh/h	160	305	225	145	0	0
Future Vol, veh/h	160	305	225	145	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	203	386	285	184	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	468	0	-	0	1168	377
Stage 1	-	-	-	-	377	-
Stage 2	-	-	-	-	791	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1104	-	-	-	216	674
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	450	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1104	-	-	-	165	674
Mov Cap-2 Maneuver	-	-	-	-	165	-
Stage 1	-	-	-	-	698	-
Stage 2	-	-	-	-	345	-

Approach	SE	NW	SW
HCM Control Delay, s	3.1	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1104	-	-
HCM Lane V/C Ratio	-	-	0.183	-	-
HCM Control Delay (s)	-	-	9	0	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.7	-	-

12: Deschutes Way & US 101 WB On-Ramp

Intersection						
Int Delay, s/veh	3.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	0	430	385	260	20
Future Vol, veh/h	0	0	430	385	260	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	0	0	467	418	283	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1646	-	304	0	-	0
Stage 1	293	-	-	-	-	-
Stage 2	1353	-	-	-	-	-
Critical Hdwy	6.4	-	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	-	2.209	-	-	-
Pot Cap-1 Maneuver	111	0	1263	-	-	-
Stage 1	762	0	-	-	-	-
Stage 2	243	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	70	-	1263	-	-	-
Mov Cap-2 Maneuver	70	-	-	-	-	-
Stage 1	762	-	-	-	-	-
Stage 2	153	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1263	-	-	-	-
HCM Lane V/C Ratio	0.37	-	-	-	-
HCM Control Delay (s)	9.5	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	1.7	-	-	-	-

13: 2nd Ave/US 101/I-5 Off-Ramps Performance by movement

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.5	0.5	0.4
Total Del/Veh (s)	0.7	1.0	0.9	32.0	12.2	22.6

Lanes, Volumes, Timings
14: 2nd Ave & Custer Way

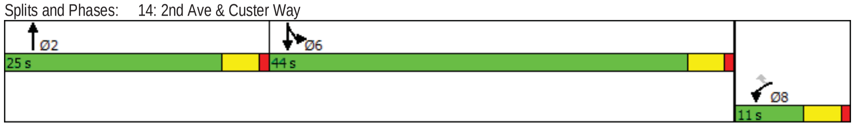
Existing 2015
PM Peak Hour

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	125	150	25	150	815	230
Future Volume (vph)	125	150	25	150	815	230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	225		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	662		2035			505
Travel Time (s)	15.0		46.3			11.5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	NA		Split	NA
Protected Phases	8		2		6	6
Permitted Phases		8				
Detector Phase	8	8	2		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	10.0	10.0	24.5		20.0	20.0
Total Split (s)	11.0	11.0	25.0		44.0	44.0
Total Split (%)	13.8%	13.8%	31.3%		55.0%	55.0%
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 66.3
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 14: 2nd Ave & Custer Way



HCM 2010 Signalized Intersection Summary
14: 2nd Ave & Custer Way

Existing 2015
PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	125	150	25	150	815	230
Future Volume (veh/h)	125	150	25	150	815	230
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900
Adj Flow Rate, veh/h	142	5	28	5	926	261
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	0	0
Cap, veh/h	181	162	44	8	1174	1233
Arrive On Green	0.10	0.10	0.03	0.03	0.65	0.65
Sat Flow, veh/h	1792	1599	1555	278	1810	1900
Grp Volume(v), veh/h	142	5	0	33	926	261
Grp Sat Flow(s),veh/h/ln	1792	1599	0	1832	1810	1900
Q Serve(g_s), s	4.7	0.2	0.0	1.1	22.4	3.4
Cycle Q Clear(g_c), s	4.7	0.2	0.0	1.1	22.4	3.4
Prop In Lane	1.00	1.00		0.15	1.00	
Lane Grp Cap(c), veh/h	181	162	0	51	1174	1233
V/C Ratio(X)	0.78	0.03	0.00	0.64	0.79	0.21
Avail Cap(c_a), veh/h	191	171	0	617	1174	1233
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.7	24.7	0.0	29.3	7.7	4.3
Incr Delay (d2), s/veh	16.3	0.0	0.0	4.9	5.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.1	0.0	0.6	12.6	1.9
LnGrp Delay(d),s/veh	43.0	24.7	0.0	34.1	13.1	4.7
LnGrp LOS	D	C		C	B	A
Approach Vol, veh/h	147		33			1187
Approach Delay, s/veh	42.4		34.1			11.2
Approach LOS	D		C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		6.2				44.0		10.7
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		20.5				39.5		6.5
Max Q Clear Time (g_c+I1), s		3.1				24.4		6.7
Green Ext Time (p_c), s		0.1				5.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		15.1
HCM 2010 LOS		B

HCM 2010 TWSC
15: Boston St & Custer Way

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	710	165	370	260	5	0	1	150	0	1	5
Future Vol, veh/h	0	710	165	370	260	5	0	1	150	0	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	425	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	747	174	389	274	5	0	1	158	0	1	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	279	0	0	921	0	0	-	1892	461	1429	1976	276
Stage 1	-	-	-	-	-	-	-	834	-	1055	1055	-
Stage 2	-	-	-	-	-	-	-	1058	-	374	921	-
Critical Hdwy	4.115	-	-	4.115	-	-	-	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	-	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1289	-	-	744	-	-	0	71	553	105	63	768
Stage 1	-	-	-	-	-	-	0	386	-	275	305	-
Stage 2	-	-	-	-	-	-	0	304	-	624	352	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1289	-	-	744	-	-	-	34	553	43	30	768
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	34	-	43	30	-
Stage 1	-	-	-	-	-	-	-	386	-	275	146	-
Stage 2	-	-	-	-	-	-	-	145	-	445	352	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.8	15.5	29.9
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	502	1289	-	-	744	-	-	151
HCM Lane V/C Ratio	0.317	-	-	-	0.523	-	-	0.042
HCM Control Delay (s)	15.5	0	-	-	15	-	-	29.9
HCM Lane LOS	C	A	-	-	C	-	-	D
HCM 95th %tile Q(veh)	1.3	0	-	-	3.1	-	-	0.1

HCM 2010 AWSC
16: Deschutes Way & Boston St

Existing 2015
PM Peak Hour

Intersection	
Intersection Delay, s/veh	29
Intersection LOS	D

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	95	415	0	365	60	0	100	185
Future Vol, veh/h	0	95	415	0	365	60	0	100	185
Peak Hour Factor	0.92	0.93	0.93	0.92	0.93	0.93	0.92	0.93	0.93
Heavy Vehicles, %	2	1	1	2	0	0	2	0	0
Mvmt Flow	0	102	446	0	392	65	0	108	199
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	36	28	17.8
HCM LOS	E	D	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	19%	35%
Vol Thru, %	86%	0%	65%
Vol Right, %	14%	81%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	425	510	285
LT Vol	0	95	100
Through Vol	365	0	185
RT Vol	60	415	0
Lane Flow Rate	457	548	306
Geometry Grp	1	1	1
Degree of Util (X)	0.783	0.875	0.561
Departure Headway (Hd)	6.167	5.742	6.587
Convergence, Y/N	Yes	Yes	Yes
Cap	585	631	545
Service Time	4.216	3.782	4.642
HCM Lane V/C Ratio	0.781	0.868	0.561
HCM Control Delay	28	36	17.8
HCM Lane LOS	D	E	C
HCM 95th-tile Q	7.4	10.2	3.4

Item 8.

Intersection						
Int Delay, s/veh	4.1					

Movement	NBL	NBR	NET	NER	SWL	SWT
Traffic Vol, veh/h	0	225	330	20	365	550
Future Vol, veh/h	0	225	330	20	365	550
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	0	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	1	1
Mvmt Flow	0	256	375	23	415	625

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	188	0	0	375	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.98	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.34	-	-	2.21	-
Pot Cap-1 Maneuver	0	816	-	-	1187	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	816	-	-	1187	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

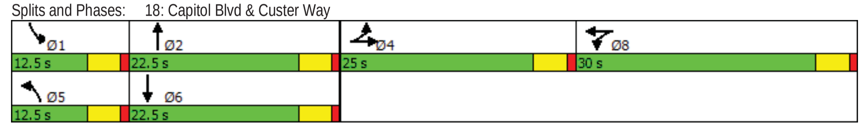
Approach	NB	NE	SW
HCM Control Delay, s	11.4	0	3.9
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	816	1187	-
HCM Lane V/C Ratio	-	-	0.313	0.349	-
HCM Control Delay (s)	-	-	11.4	9.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	1.3	1.6	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	650	80	345	440	5	20	330	425	20	390	135
Future Volume (vph)	135	650	80	345	440	5	20	330	425	20	390	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			631			2019			1179	
Travel Time (s)		15.5			14.3			45.9			26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)	10%			10%								
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		12.5	22.0		12.5	22.0	
Total Split (s)	25.0	25.0		30.0	30.0		12.5	22.5		12.5	22.5	
Total Split (%)	27.8%	27.8%		33.3%	33.3%		13.9%	25.0%		13.9%	25.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 82.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 18: Capitol Blvd & Custer Way



HCM 2010 Signalized Intersection Summary
18: Capitol Blvd & Custer Way

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	650	80	345	440	5	20	330	425	20	390	135
Future Volume (veh/h)	135	650	80	345	440	5	20	330	425	20	390	135
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	150	722	0	383	489	6	22	367	189	22	433	150
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	410	861	0	525	543	7	69	505	256	70	580	199
Arrive On Green	0.23	0.23	0.00	0.29	0.29	0.29	0.04	0.22	0.22	0.04	0.22	0.22
Sat Flow, veh/h	1792	3762	0	1792	1854	23	1792	2298	1165	1810	2639	906
Grp Volume(v), veh/h	150	722	0	383	0	495	22	284	272	22	295	288
Grp Sat Flow(s),veh/h/ln	1792	1881	0	1792	0	1877	1792	1787	1676	1810	1805	1740
Q Serve(g_s), s	5.8	15.0	0.0	15.7	0.0	20.7	1.0	12.1	12.4	1.0	12.5	12.7
Cycle Q Clear(g_c), s	5.8	15.0	0.0	15.7	0.0	20.7	1.0	12.1	12.4	1.0	12.5	12.7
Prop In Lane	1.00		0.00	1.00		0.01	1.00		0.70	1.00		0.52
Lane Grp Cap(c), veh/h	410	861	0	525	0	550	69	393	368	70	397	383
V/C Ratio(X)	0.37	0.84	0.00	0.73	0.00	0.90	0.32	0.72	0.74	0.32	0.74	0.75
Avail Cap(c_a), veh/h	449	942	0	558	0	585	175	393	368	177	397	383
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.6	30.1	0.0	26.0	0.0	27.8	38.3	29.6	29.7	38.3	29.8	29.9
Incr Delay (d2), s/veh	0.5	6.3	0.0	4.5	0.0	16.4	2.6	11.0	12.4	2.6	11.9	12.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	8.5	0.0	8.4	0.0	13.2	0.5	7.1	7.0	0.5	7.5	7.5
LnGrp Delay(d),s/veh	27.1	36.5	0.0	30.6	0.0	44.2	40.9	40.6	42.2	40.9	41.7	42.7
LnGrp LOS	C	D		C		D	D	D	D	D	D	D
Approach Vol, veh/h		872			878			578			605	
Approach Delay, s/veh		34.9			38.2			41.4			42.1	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	22.5		23.2	7.6	22.5		28.5
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	8.0	18.0		20.5	8.0	18.0		25.5
Max Q Clear Time (g_c+I1), s	3.0	14.4		17.0	3.0	14.7		22.7
Green Ext Time (p_c), s	0.0	2.2		1.7	0.0	2.1		1.3

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Notes

Lanes, Volumes, Timings
19: Cleveland Ave & Custer Way/North St

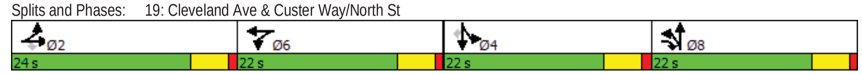
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	330	645	15	245	70	480	135	15	105	280	105
Future Volume (vph)	50	330	645	15	245	70	480	135	15	105	280	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	200		0	300		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		631			2207			2922			341	
Travel Time (s)		14.3			50.2			66.4			7.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)							50%					
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	Perm
Protected Phases	2	2	8	6	6		8	8		4	4	
Permitted Phases			2									4
Detector Phase	2	2	8	6	6		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	6.0	8.0	6.0	6.0		8.0	8.0		6.0	6.0	6.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0		22.0	22.0		22.0	22.0	22.0
Total Split (s)	24.0	24.0	22.0	22.0	22.0		22.0	22.0		22.0	22.0	22.0
Total Split (%)	26.7%	26.7%	24.4%	24.4%	24.4%		24.4%	24.4%		24.4%	24.4%	24.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	None		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 19: Cleveland Ave & Custer Way/North St



HCM 2010 Signalized Intersection Summary
19: Cleveland Ave & Custer Way/North St

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	330	645	15	245	70	480	135	15	105	280	105
Future Volume (veh/h)	50	330	645	15	245	70	480	135	15	105	280	105
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900	1881	1881	1900	1863	1863	1863
Adj Flow Rate, veh/h	54	355	586	16	263	75	516	145	16	113	301	22
Adj No. of Lanes	1	1	1	1	1	0	2	1	0	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	2	2	2
Cap, veh/h	391	411	625	350	275	79	619	287	32	325	342	290
Arrive On Green	0.22	0.22	0.22	0.20	0.20	0.20	0.17	0.17	0.17	0.18	0.18	0.18
Sat Flow, veh/h	1792	1881	1599	1792	1409	402	3583	1665	184	1774	1863	1583
Grp Volume(v), veh/h	54	355	586	16	0	338	516	0	161	113	301	22
Grp Sat Flow(s),veh/h/ln	1792	1881	1599	1792	0	1810	1792	0	1849	1774	1863	1583
Q Serve(g_s), s	2.1	15.8	19.0	0.6	0.0	16.1	12.1	0.0	6.9	4.8	13.7	1.0
Cycle Q Clear(g_c), s	2.1	15.8	19.0	0.6	0.0	16.1	12.1	0.0	6.9	4.8	13.7	1.0
Prop In Lane	1.00		1.00	1.00		0.22	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	391	411	625	350	0	354	619	0	319	325	342	290
V/C Ratio(X)	0.14	0.86	0.94	0.05	0.00	0.96	0.83	0.00	0.50	0.35	0.88	0.08
Avail Cap(c_a), veh/h	391	411	625	350	0	354	700	0	361	347	364	310
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	32.7	21.9	28.4	0.0	34.6	34.8	0.0	32.6	31.0	34.6	29.4
Incr Delay (d2), s/veh	0.2	17.1	21.8	0.1	0.0	36.1	7.8	0.0	1.2	0.5	20.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	10.1	17.8	0.3	0.0	11.5	6.6	0.0	3.6	2.4	8.9	0.4
LnGrp Delay(d),s/veh	27.5	49.8	43.7	28.5	0.0	70.7	42.6	0.0	33.8	31.4	54.7	29.5
LnGrp LOS	C	D	D	C		E	D		C	C	D	C
Approach Vol, veh/h		995			354			677			436	
Approach Delay, s/veh		45.0			68.8			40.5			47.4	
Approach LOS		D			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		24.0		21.0		22.0		20.0
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		19.0		17.0		17.0		17.0
Max Q Clear Time (g_c+I1), s		21.0		15.7		18.1		14.1
Green Ext Time (p_c), s		0.0		0.3		0.0		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	47.6
HCM 2010 LOS	D

Notes

HCM 2010 TWSC
20: Hoadly St & North St

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	270	2	10	395	50	1	2	5	25	1	15
Future Vol, veh/h	50	270	2	10	395	50	1	2	5	25	1	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	57	310	2	11	454	57	1	2	6	29	1	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	511	0	0	313	0	0	941	960	311	936	934	483
Stage 1	-	-	-	-	-	-	426	426	-	506	506	-
Stage 2	-	-	-	-	-	-	515	534	-	430	428	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1059	-	-	1253	-	-	245	259	734	247	268	588
Stage 1	-	-	-	-	-	-	610	589	-	552	543	-
Stage 2	-	-	-	-	-	-	546	528	-	607	588	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1059	-	-	1253	-	-	223	239	734	229	248	588
Mov Cap-2 Maneuver	-	-	-	-	-	-	223	239	-	229	248	-
Stage 1	-	-	-	-	-	-	570	551	-	516	536	-
Stage 2	-	-	-	-	-	-	523	522	-	561	550	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.2	14.1	19.5
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	407	1059	-	-	1253	-	-	296
HCM Lane V/C Ratio	0.023	0.054	-	-	0.009	-	-	0.159
HCM Control Delay (s)	14.1	8.6	0	-	7.9	0	-	19.5
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	0.6

Existing 2015
PM Peak Hour

SimTraffic Performance Report

21: I-5 NB Off-Ramp/Deschutes Way & E St Performance by movement

Movement	WBR	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.3	0.2	0.2	0.2	0.2
Total Del/Veh (s)	1.3	12.2	2.7	0.8	2.4

Lanes, Volumes, Timings
22: E St & Capitol Blvd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	90	255	115	90	130	215	445	130	190	585	70
Future Volume (vph)	90	90	255	115	90	130	215	445	130	190	585	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	175		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		282			479			1902			2019	
Travel Time (s)		6.4			10.9			43.2			45.9	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		9.5	26.5		9.5	26.5	
Total Split (s)	34.0	34.0		34.0	34.0		18.0	30.0		16.0	28.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		22.5%	37.5%		20.0%	35.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	Min	

Intersection Summary
Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.9
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 22: E St & Capitol Blvd

Item 8.

HCM 2010 Signalized Intersection Summary
22: E St & Capitol Blvd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	90	255	115	90	130	215	445	130	190	585	70
Future Volume (veh/h)	90	90	255	115	90	130	215	445	130	190	585	70
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	105	105	0	134	105	151	250	517	151	221	680	81
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	258	231	0	223	156	190	302	906	263	269	1008	120
Arrive On Green	0.30	0.30	0.00	0.30	0.30	0.30	0.17	0.33	0.33	0.15	0.31	0.31
Sat Flow, veh/h	567	767	0	483	516	631	1792	2734	795	1792	3218	383
Grp Volume(v), veh/h	210	0	0	390	0	0	250	337	331	221	377	384
Grp Sat Flow(s),veh/h/ln	1333	0	0	1630	0	0	1792	1787	1741	1792	1787	1814
Q Serve(g_s), s	0.0	0.0	0.0	5.5	0.0	0.0	8.4	9.7	9.8	7.4	11.4	11.5
Cycle Q Clear(g_c), s	7.9	0.0	0.0	13.3	0.0	0.0	8.4	9.7	9.8	7.4	11.4	11.5
Prop In Lane	0.50		0.00	0.34		0.39	1.00		0.46	1.00		0.21
Lane Grp Cap(c), veh/h	489	0	0	569	0	0	302	592	577	269	560	568
V/C Ratio(X)	0.43	0.00	0.00	0.69	0.00	0.00	0.83	0.57	0.57	0.82	0.67	0.68
Avail Cap(c_a), veh/h	732	0	0	837	0	0	389	732	713	331	675	685
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.6	0.0	0.0	19.7	0.0	0.0	25.0	17.2	17.2	25.6	18.6	18.6
Incr Delay (d2), s/veh	0.6	0.0	0.0	1.5	0.0	0.0	11.1	0.9	0.9	12.6	2.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	0.0	6.3	0.0	0.0	5.1	4.9	4.8	4.6	5.9	6.1
LnGrp Delay(d),s/veh	18.2	0.0	0.0	21.1	0.0	0.0	36.2	18.0	18.1	38.2	20.6	20.6
LnGrp LOS	B			C			D	B	B	D	C	C
Approach Vol, veh/h		210			390			918			982	
Approach Delay, s/veh		18.2			21.1			23.0			24.6	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	13.9	25.1		23.3	15.0	24.0		23.3
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	11.5	25.5		29.5	13.5	23.5		29.5
Max Q Clear Time (g_c+I1), s	9.4	11.8		9.9	10.4	13.5		15.3
Green Ext Time (p_c), s	0.1	7.5		3.9	0.2	6.0		3.4

Intersection Summary		
HCM 2010 Ctrl Delay		22.9
HCM 2010 LOS		C

HCM 2010 TWSC
23: Cleveland Ave & South St

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	15	570	10	15	855
Future Vol, veh/h	5	15	570	10	15	855
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	6	17	648	11	17	972

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1173	330	0	0	659	0
Stage 1	653	-	-	-	-	-
Stage 2	520	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.12	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.21	-
Pot Cap-1 Maneuver	188	672	-	-	932	-
Stage 1	485	-	-	-	-	-
Stage 2	567	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	180	672	-	-	932	-
Mov Cap-2 Maneuver	180	-	-	-	-	-
Stage 1	485	-	-	-	-	-
Stage 2	544	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.6	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	399	932	-
HCM Lane V/C Ratio	-	-	0.057	0.018	-
HCM Control Delay (s)	-	-	14.6	8.9	0.2
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

HCM 2010 TWSC
24: Linwood Ave & 7th Ave

Existing 2015
PM Peak Hour

Intersection												
Int Delay, s/veh	3.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	20	140	0	1	260	225	0	0	1	120	0	15
Future Vol, veh/h	20	140	0	1	260	225	0	0	1	120	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	1	1	1
Mvmt Flow	22	151	0	1	280	242	0	0	1	129	0	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	522	0	0	151	0	0	605	718	151	597	597	401
Stage 1	-	-	-	-	-	-	194	194	-	403	403	-
Stage 2	-	-	-	-	-	-	411	524	-	194	194	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.509	4.009	3.309
Pot Cap-1 Maneuver	1039	-	-	1436	-	-	413	357	901	416	418	651
Stage 1	-	-	-	-	-	-	812	744	-	626	601	-
Stage 2	-	-	-	-	-	-	622	533	-	810	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1039	-	-	1436	-	-	395	348	901	408	408	651
Mov Cap-2 Maneuver	-	-	-	-	-	-	395	348	-	408	408	-
Stage 1	-	-	-	-	-	-	793	727	-	612	600	-
Stage 2	-	-	-	-	-	-	606	532	-	790	725	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	9	17.8
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	901	1039	-	-	1436	-	-	426
HCM Lane V/C Ratio	0.001	0.021	-	-	0.001	-	-	0.341
HCM Control Delay (s)	9	8.5	0	-	7.5	0	-	17.8
HCM Lane LOS	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	1.5

HCM 2010 AWSC
25: Linwood Ave & 2nd Ave

Existing 2015
PM Peak Hour

Intersection												
Intersection Delay, s/veh	25											
Intersection LOS	C											

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	30	165	100	0	100	245	60	0	105	115	95
Future Vol, veh/h	0	30	165	100	0	100	245	60	0	105	115	95
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	1	1	1	2	1	1	1	2	0	0	0
Mvmt Flow	0	34	185	112	0	112	275	67	0	118	129	107
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	25.2	28.5	18.5
HCM LOS	D	D	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	55%	0%	62%	0%	80%	0%	57%
Vol Right, %	0%	45%	0%	38%	0%	20%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	105	210	30	265	100	305	65	290
LT Vol	105	0	30	0	100	0	65	0
Through Vol	0	115	0	165	0	245	0	165
RT Vol	0	95	0	100	0	60	0	125
Lane Flow Rate	118	236	34	298	112	343	73	326
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.296	0.536	0.084	0.678	0.272	0.768	0.18	0.728
Departure Headway (Hd)	9.024	8.176	8.986	8.193	8.73	8.07	8.874	8.043
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	398	441	399	441	411	449	405	450
Service Time	6.782	5.933	6.742	5.948	6.487	5.826	6.629	5.797
HCM Lane V/C Ratio	0.296	0.535	0.085	0.676	0.273	0.764	0.18	0.724
HCM Control Delay	15.6	20	12.6	26.6	14.7	33	13.6	29.6
HCM Lane LOS	C	C	B	D	B	D	B	D
HCM 95th-tile Q	1.2	3.1	0.3	4.9	1.1	6.6	0.6	5.8

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	65	165	125
Future Vol, veh/h	0	65	165	125
Peak Hour Factor	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	73	185	140
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	26.7
HCM LOS	D

Lane

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	165	145	155	625	705	240
Future Volume (vph)	165	145	155	625	705	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	489			2664	1902	
Travel Time (s)	11.1			60.5	43.2	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	22.5	19.5	19.5	20.0	21.5	
Total Split (s)	22.6	19.6	19.6	47.4	27.8	
Total Split (%)	32.3%	28.0%	28.0%	67.7%	39.7%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	Max	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 63.3	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 26: Capitol Blvd & Linwood Ave

HCM 2010 Signalized Intersection Summary
26: Capitol Blvd & Linwood Ave

Existing 2015
PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	165	145	155	625	705	240
Future Volume (veh/h)	165	145	155	625	705	240
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	196	173	185	744	839	286
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	260	610	598	2526	1038	353
Arrive On Green	0.15	0.15	0.24	0.71	0.40	0.40
Sat Flow, veh/h	1792	1599	1792	3668	2713	892
Grp Volume(v), veh/h	196	173	185	744	572	553
Grp Sat Flow(s),veh/h/ln	1792	1599	1792	1787	1787	1724
Q Serve(g_s), s	6.4	4.6	2.3	4.7	17.3	17.3
Cycle Q Clear(g_c), s	6.4	4.6	2.3	4.7	17.3	17.3
Prop In Lane	1.00	1.00	1.00			0.52
Lane Grp Cap(c), veh/h	260	610	598	2526	708	683
V/C Ratio(X)	0.75	0.28	0.31	0.29	0.81	0.81
Avail Cap(c_a), veh/h	534	854	620	2526	708	683
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	13.0	8.4	3.3	16.3	16.3
Incr Delay (d2), s/veh	1.7	0.1	0.1	0.3	9.6	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	4.7	1.4	2.4	10.3	10.0
LnGrp Delay(d),s/veh	26.6	13.1	8.5	3.6	25.9	26.3
LnGrp LOS	C	B	A	A	C	C
Approach Vol, veh/h	369			929	1125	
Approach Delay, s/veh	20.3			4.6	26.1	
Approach LOS	C			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.4		13.3	18.8	28.6		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		42.9		18.1	15.1	23.3		
Max Q Clear Time (g_c+I1), s		6.7		8.4	4.3	19.3		
Green Ext Time (p_c), s		15.1		0.5	0.2	3.2		

Intersection Summary			
HCM 2010 Ctrl Delay			16.9
HCM 2010 LOS			B

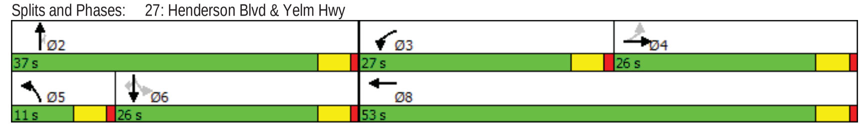
Lanes, Volumes, Timings
27: Henderson Blvd & Yelm Hwy

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	680	160	430	505	80	110	165	645	155	205	20
Future Volume (vph)	5	680	160	430	505	80	110	165	645	155	205	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	450		0	200		100	0		150
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1947			1645			3441			1606	
Travel Time (s)		44.3			37.4			78.2			36.5	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Prot	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4								2	6		6
Detector Phase	4	4		3	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	24.5	24.5		9.5	24.5		9.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	26.0	26.0		27.0	53.0		11.0	37.0	37.0	26.0	26.0	26.0
Total Split (%)	28.9%	28.9%		30.0%	58.9%		12.2%	41.1%	41.1%	28.9%	28.9%	28.9%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	Yes
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 85.2	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 27: Henderson Blvd & Yelm Hwy



HCM 2010 Signalized Intersection Summary
27: Henderson Blvd & Yelm Hwy

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	680	160	430	505	80	110	165	645	155	205	20
Future Volume (veh/h)	5	680	160	430	505	80	110	165	645	155	205	20
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	5	747	176	473	555	88	121	181	0	170	225	22
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	289	738	174	482	1792	283	139	589	501	306	342	291
Arrive On Green	0.26	0.26	0.26	0.27	0.58	0.58	0.08	0.31	0.00	0.18	0.18	0.18
Sat Flow, veh/h	791	2872	677	1792	3093	489	1792	1881	1599	1210	1881	1599
Grp Volume(v), veh/h	5	465	458	473	320	323	121	181	0	170	225	22
Grp Sat Flow(s),veh/h/ln	791	1787	1762	1792	1787	1795	1792	1881	1599	1210	1881	1599
Q Serve(g_s), s	0.4	21.5	21.5	22.0	7.7	7.7	5.6	6.1	0.0	11.2	9.3	1.0
Cycle Q Clear(g_c), s	0.4	21.5	21.5	22.0	7.7	7.7	5.6	6.1	0.0	11.2	9.3	1.0
Prop In Lane	1.00		0.38	1.00		0.27	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	289	459	452	482	1035	1040	139	589	501	306	342	291
V/C Ratio(X)	0.02	1.01	1.01	0.98	0.31	0.31	0.87	0.31	0.00	0.56	0.66	0.08
Avail Cap(c_a), veh/h	289	459	452	482	1035	1040	139	730	621	397	483	411
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.3	31.1	31.1	30.4	9.0	9.0	38.2	21.9	0.0	32.6	31.8	28.4
Incr Delay (d2), s/veh	0.1	45.2	45.5	36.3	0.8	0.8	40.6	0.3	0.0	1.6	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	16.2	16.0	15.6	4.0	4.0	4.3	3.2	0.0	3.9	5.0	0.4
LnGrp Delay(d),s/veh	23.4	76.3	76.7	66.7	9.8	9.8	78.8	22.1	0.0	34.2	34.0	28.5
LnGrp LOS	C	F	F	E	A	A	E	C		C	C	C
Approach Vol, veh/h		928			1116			302			417	
Approach Delay, s/veh		76.2			33.9			44.8			33.8	
Approach LOS		E			C			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6		8
Phs Duration (G+Y+Rc), s		30.7	27.0	26.0	11.0	19.7		53.0
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		32.5	22.5	21.5	6.5	21.5		48.5
Max Q Clear Time (g_c+I1), s		8.1	24.0	23.5	7.6	13.2		9.7
Green Ext Time (p_c), s		3.1	0.0	0.0	0.0	2.0		14.0

Intersection Summary	
HCM 2010 Ctrl Delay	49.3
HCM 2010 LOS	D

HCM 2010 TWSC
28: Trosper Rd & Rural Rd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	35	175	295	100	90	60
Future Vol, veh/h	35	175	295	100	90	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	38	190	321	109	98	65

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	429	0	-	0	641	375
Stage 1	-	-	-	-	375	-
Stage 2	-	-	-	-	266	-
Critical Hdwy	4.1	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1141	-	-	-	439	671
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	779	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1141	-	-	-	423	671
Mov Cap-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	695	-
Stage 2	-	-	-	-	750	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1141	-	-	-	423	671
HCM Lane V/C Ratio	0.033	-	-	-	0.231	0.097
HCM Control Delay (s)	8.3	0	-	-	16.1	10.9
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9	0.3

Lanes, Volumes, Timings
29: Lake Park Dr & Trosper Rd

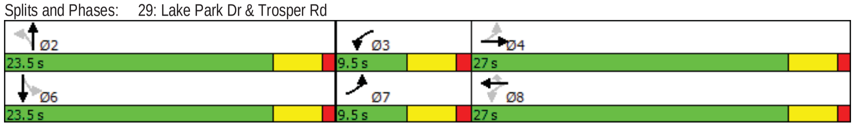
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	250	45	50	370	50	60	25	55	40	20	15
Future Volume (vph)	10	250	45	50	370	50	60	25	55	40	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		150	225		0	100		0	125		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2012			652			269			583	
Travel Time (s)		45.7			14.8			6.1			13.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	26.5		9.5	26.5	26.5	21.5	21.5		21.5	21.5	
Total Split (s)	9.5	27.0		9.5	27.0	27.0	23.5	23.5		23.5	23.5	
Total Split (%)	15.8%	45.0%		15.8%	45.0%	45.0%	39.2%	39.2%		39.2%	39.2%	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 45
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 29: Lake Park Dr & Trosper Rd



HCM 2010 Signalized Intersection Summary
29: Lake Park Dr & Trosper Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	250	45	50	370	50	60	25	55	40	20	15
Future Volume (veh/h)	10	250	45	50	370	50	60	25	55	40	20	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	11	263	47	53	389	53	63	26	58	42	21	16
Adj No. of Lanes	1	2	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	289	791	139	451	563	479	693	210	469	646	402	306
Arrive On Green	0.01	0.26	0.26	0.05	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1792	3038	536	1792	1881	1599	1393	524	1169	1335	1002	763
Grp Volume(v), veh/h	11	153	157	53	389	53	63	0	84	42	0	37
Grp Sat Flow(s),veh/h/ln	1792	1787	1787	1792	1881	1599	1393	0	1694	1335	0	1765
Q Serve(g_s), s	0.2	3.3	3.4	1.0	8.6	1.1	1.4	0.0	1.5	1.0	0.0	0.6
Cycle Q Clear(g_c), s	0.2	3.3	3.4	1.0	8.6	1.1	2.0	0.0	1.5	2.4	0.0	0.6
Prop In Lane	1.00		0.30	1.00		1.00	1.00		0.69	1.00		0.43
Lane Grp Cap(c), veh/h	289	466	465	451	563	479	693	0	680	646	0	708
V/C Ratio(X)	0.04	0.33	0.34	0.12	0.69	0.11	0.09	0.00	0.12	0.07	0.00	0.05
Avail Cap(c_a), veh/h	452	849	849	545	894	760	693	0	680	646	0	708
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.0	14.2	14.2	11.6	14.7	12.0	9.3	0.0	8.9	9.7	0.0	8.7
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.1	1.5	0.1	0.3	0.0	0.4	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.7	1.7	0.5	4.7	0.5	0.6	0.0	0.7	0.4	0.0	0.3
LnGrp Delay(d),s/veh	13.1	14.6	14.6	11.7	16.2	12.1	9.5	0.0	9.3	9.9	0.0	8.8
LnGrp LOS	B	B	B	B	B	B	A		A	A		A
Approach Vol, veh/h		321			495			147			79	
Approach Delay, s/veh		14.5			15.3			9.4			9.4	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.5	7.0	16.8		23.5	5.2	18.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.0	5.0	22.5		19.0	5.0	22.5
Max Q Clear Time (g_c+I1), s		4.0	3.0	5.4		4.4	2.2	10.6
Green Ext Time (p_c), s		0.8	0.0	4.2		0.8	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.8
HCM 2010 LOS	B

Item 8.

Lanes, Volumes, Timings
30: Littlerock Rd/2nd Ave & Trosper Rd

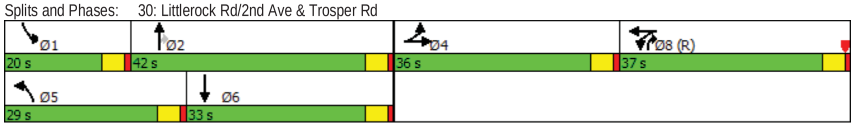
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	265	110	370	295	30	185	215	395	100	235	45
Future Volume (vph)	40	265	110	370	295	30	185	215	395	100	235	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		652			520			896			1861	
Travel Time (s)		14.8			11.8			20.4			42.3	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)				38%								
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	36.0	36.0		37.0	37.0		29.0	42.0	37.0	20.0	33.0	
Total Split (%)	26.7%	26.7%		27.4%	27.4%		21.5%	31.1%	27.4%	14.8%	24.4%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max		C-Max	C-Max		Max	Max	C-Max	None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 46 (34%), Referenced to phase 8:WBTL, Start of Red
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 30: Littlerock Rd/2nd Ave & Trosper Rd



HCM 2010 Signalized Intersection Summary
30: Littlerock Rd/2nd Ave & Trosper Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	265	110	370	295	30	185	215	395	100	235	45
Future Volume (veh/h)	40	265	110	370	295	30	185	215	395	100	235	45
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	41	270	51	237	499	31	189	219	286	102	240	46
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	417	700	130	430	842	52	324	604	897	126	632	119
Arrive On Green	0.23	0.23	0.23	0.40	0.40	0.40	0.18	0.32	0.32	0.07	0.21	0.21
Sat Flow, veh/h	1792	3009	560	1792	3507	217	1792	1881	1599	1792	3002	566
Grp Volume(v), veh/h	41	159	162	237	267	263	189	219	286	102	141	145
Grp Sat Flow(s),veh/h/ln	1792	1787	1782	1792	1881	1843	1792	1881	1599	1792	1787	1781
Q Serve(g_s), s	2.4	10.1	10.4	13.7	15.1	15.1	13.0	12.1	12.9	7.6	9.2	9.4
Cycle Q Clear(g_c), s	2.4	10.1	10.4	13.7	15.1	15.1	13.0	12.1	12.9	7.6	9.2	9.4
Prop In Lane	1.00		0.31	1.00		0.12	1.00		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	417	416	415	430	451	442	324	604	897	126	376	375
V/C Ratio(X)	0.10	0.38	0.39	0.55	0.59	0.59	0.58	0.36	0.32	0.81	0.38	0.39
Avail Cap(c_a), veh/h	417	416	415	430	451	442	324	604	897	204	376	375
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	0.97	0.87	0.87	0.87	0.91	0.91	0.91	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.7	43.6	43.7	34.9	35.3	35.3	50.6	35.2	15.8	61.9	45.7	45.8
Incr Delay (d2), s/veh	0.5	2.6	2.7	4.4	4.9	5.0	6.9	1.5	0.9	11.7	2.9	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	5.3	5.4	7.3	8.4	8.3	7.1	6.5	9.0	4.2	4.8	4.9
LnGrp Delay(d),s/veh	41.1	46.2	46.4	39.2	40.1	40.3	57.5	36.8	16.7	73.6	48.6	48.8
LnGrp LOS	D	D	D	D	D	D	E	D	B	E	D	D
Approach Vol, veh/h		362			767			694			388	
Approach Delay, s/veh		45.7			39.9			34.1			55.2	
Approach LOS		D			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	47.9		36.0	29.0	33.0		37.0
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6
Max Green Setting (Gmax), s	15.4	37.4		31.4	24.4	28.4		32.4
Max Q Clear Time (g_c+I1), s	9.6	14.9		12.4	15.0	11.4		17.1
Green Ext Time (p_c), s	0.1	3.2		1.5	0.3	3.0		3.5

Intersection Summary

HCM 2010 Ctrl Delay 41.7
HCM 2010 LOS D

Notes

Item 8.

Lanes, Volumes, Timings
31: Tyee Dr/I-5 SB Ramps & Trosper Rd

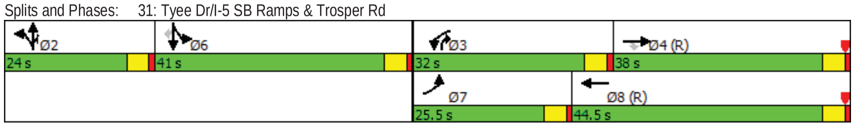
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	540	20	245	320	190	25	160	335	460	325	375
Future Volume (vph)	155	540	20	245	320	190	25	160	335	460	325	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	275		0	75		125	400		400
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		520			883			832			952	
Travel Time (s)		11.8			20.1			18.9			21.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	33.6	33.6	8.6	29.6		20.5	20.5		36.6	36.6	36.6
Total Split (s)	25.5	38.0	38.0	32.0	44.5		24.0	24.0		41.0	41.0	41.0
Total Split (%)	18.9%	28.1%	28.1%	23.7%	33.0%		17.8%	17.8%		30.4%	30.4%	30.4%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	4.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 46 (34%), Referenced to phase 4:EBT and 8:WBT, Start of Red
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 31: Tyee Dr/I-5 SB Ramps & Trosper Rd



HCM 2010 Signalized Intersection Summary
31: Tyee Dr/I-5 SB Ramps & Trosper Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	155	540	20	245	320	190	25	160	335	460	325	375
Future Volume (veh/h)	155	540	20	245	320	190	25	160	335	460	325	375
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900	1863	1863	1863	1881	1881	1881
Adj Flow Rate, veh/h	163	568	21	258	337	0	26	168	300	484	342	79
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	1	1	1
Cap, veh/h	187	1046	468	283	1237	0	255	268	477	628	507	431
Arrive On Green	0.21	0.59	0.59	0.26	0.58	0.00	0.14	0.14	0.14	0.27	0.27	0.27
Sat Flow, veh/h	1792	3574	1599	1792	3668	0	1774	1863	1583	2329	1881	1599
Grp Volume(v), veh/h	163	568	21	258	337	0	26	168	300	484	342	79
Grp Sat Flow(s),veh/h/ln	1792	1787	1599	1792	1787	0	1774	1863	1583	1165	1881	1599
Q Serve(g_s), s	11.9	13.0	0.8	18.9	6.4	0.0	1.7	11.5	19.4	25.9	21.9	5.1
Cycle Q Clear(g_c), s	11.9	13.0	0.8	18.9	6.4	0.0	1.7	11.5	19.4	25.9	21.9	5.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	187	1046	468	283	1237	0	255	268	477	628	507	431
V/C Ratio(X)	0.87	0.54	0.04	0.91	0.27	0.00	0.10	0.63	0.63	0.77	0.67	0.18
Avail Cap(c_a), veh/h	277	1046	468	364	1237	0	255	268	477	628	507	431
HCM Platoon Ratio	2.00	2.00	2.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.89	0.89	0.89	0.85	0.85	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.6	22.5	20.0	48.8	20.0	0.0	50.2	54.4	40.6	45.5	44.0	37.9
Incr Delay (d2), s/veh	16.2	1.8	0.2	20.6	0.5	0.0	0.8	10.7	6.2	8.9	7.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	6.6	0.4	10.9	3.2	0.0	0.9	6.7	10.4	9.1	12.4	2.4
LnGrp Delay(d),s/veh	68.7	24.3	20.1	69.4	20.4	0.0	51.0	65.1	46.8	54.3	51.0	38.8
LnGrp LOS	E	C	C	E	C		D	E	D	D	D	D
Approach Vol, veh/h		752			595			494			905	
Approach Delay, s/veh		33.8			41.7			53.2			51.7	
Approach LOS		C			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.0	25.9	44.1		41.0	18.7	51.3
Change Period (Y+Rc), s		4.6	4.6	4.6		4.6	4.6	4.6
Max Green Setting (Gmax), s		19.4	27.4	33.4		36.4	20.9	39.9
Max Q Clear Time (g_c+I1), s		21.4	20.9	15.0		27.9	13.9	8.4
Green Ext Time (p_c), s		0.0	0.5	5.6		3.3	0.2	6.6

Intersection Summary	
HCM 2010 Ctrl Delay	44.9
HCM 2010 LOS	D

Item 8.

Lanes, Volumes, Timings
32: I-5 NB Ramps & Trosper Rd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	815	525	0	590	615	170	0	80	0	0
Future Volume (vph)	0	815	525	0	590	615	170	0	80	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0		0	200	0	0
Storage Lanes	1		0	0		0		1	1	0	0
Taper Length (ft)	25			25				25		25	
Right Turn on Red			Yes			Yes			Yes		
Link Speed (mph)		30			30			30		30	
Link Distance (ft)		883			397			785		593	
Travel Time (s)		20.1			9.0			17.8		13.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)											
Turn Type		NA			NA		Prot		Prot		
Protected Phases		4			8		5		5		
Permitted Phases											
Detector Phase		4			8		5		5		
Switch Phase											
Minimum Initial (s)		10.0			10.0		6.0		6.0		
Minimum Split (s)		21.5			21.5		10.6		10.6		
Total Split (s)		96.0			96.0		39.0		39.0		
Total Split (%)		71.1%			71.1%		28.9%		28.9%		
Yellow Time (s)		3.6			3.6		3.6		3.6		
All-Red Time (s)		1.0			1.0		1.0		1.0		
Lost Time Adjust (s)		0.0			0.0		0.0		0.0		
Total Lost Time (s)		4.6			4.6		4.6		4.6		
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode		C-Max			C-Max		None		None		

Intersection Summary

Area Type: Other

Cycle Length: 135

Actuated Cycle Length: 135

Offset: 103 (76%), Referenced to phase 4:EBT and 8:WBT, Start of Red

Natural Cycle: 40

Control Type: Actuated-Coordinated

Splits and Phases: 32: I-5 NB Ramps & Trosper Rd

HCM 2010 Signalized Intersection Summary
32: I-5 NB Ramps & Trosper Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (veh/h)	0	815	525	0	590	615	170	0	80	0	0
Future Volume (veh/h)	0	815	525	0	590	615	170	0	80	0	0
Number	7	4	14	3	8	18	5	5	12		
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1900	0	1881	1900	1881	1881	1881		
Adj Flow Rate, veh/h	0	876	0	0	634	0	183	183	0		
Adj No. of Lanes	0	3	0	0	2	0	1	1	1		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1		
Cap, veh/h	0	4186	0	0	2913	0	209	209	187		
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00	0.12	0.12	0.00		
Sat Flow, veh/h	0	5474	0	0	3762	0	1792	1792	1599		
Grp Volume(v), veh/h	0	876	0	0	634	0	183	183	0		
Grp Sat Flow(s),veh/h/ln	0	1712	0	0	1787	0	1792	1792	1599		
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	13.6	13.6	0.0		
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	13.6	13.6	0.0		
Prop In Lane	0.00		0.00	0.00		0.00	1.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	4186	0	0	2913	0	209	209	187		
V/C Ratio(X)	0.00	0.21	0.00	0.00	0.22	0.00	0.87	0.87	0.00		
Avail Cap(c_a), veh/h	0	4186	0	0	2913	0	457	457	407		
HCM Platoon Ratio	1.00	2.00	2.00	1.00	1.67	1.67	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.70	0.00	0.00	0.61	0.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	58.6	58.6	0.0		
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.1	0.0	4.4	4.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	0.0		
LnGrp Delay(d),s/veh	0.0	0.1	0.0	0.0	0.1	0.0	63.1	63.1	0.0		
LnGrp LOS		A			A		E	E			
Approach Vol, veh/h		876			634		183	183			
Approach Delay, s/veh		0.1			0.1		63.1	63.1			
Approach LOS		A			A		E	E			

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		20.4		114.6				114.6
Change Period (Y+Rc), s		4.6		4.6				4.6
Max Green Setting (Gmax), s		34.4		91.4				91.4
Max Q Clear Time (g_c+I1), s		15.6		2.0				2.0
Green Ext Time (p_c), s		0.2		12.9				12.9

Intersection Summary	
HCM 2010 Ctrl Delay	6.9
HCM 2010 LOS	A

Item 8.

Item 8.

Lanes, Volumes, Timings
33: Capitol Blvd & Trosper Rd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	45	580	30	70	35	770	575	10	15	465	350
Future Volume (vph)	280	45	580	30	70	35	770	575	10	15	465	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	250		0	100		200
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		397			338			735			2664	
Travel Time (s)		9.0			7.7			16.7			60.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)	42%						42%					
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	Perm
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									6
Detector Phase	4	4	2	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	20.6	20.6	29.6	28.6	28.6		29.6	29.6		34.6	34.6	34.6
Total Split (s)	20.6	20.6	51.2	28.6	28.6		51.2	51.2		34.6	34.6	34.6
Total Split (%)	15.3%	15.3%	37.9%	21.2%	21.2%		37.9%	37.9%		25.6%	25.6%	25.6%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	4.6
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None		C-Min	C-Min		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 6 (4%), Referenced to phase 2:NBTL, Start of Red
Natural Cycle: 145
Control Type: Actuated-Coordinated

Splits and Phases: 33: Capitol Blvd & Trosper Rd

HCM 2010 Signalized Intersection Summary
33: Capitol Blvd & Trosper Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	45	580	30	70	35	770	575	10	15	465	350
Future Volume (veh/h)	280	45	580	30	70	35	770	575	10	15	465	350
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	315	0	359	30	71	35	456	1031	10	15	470	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	403	0	1015	134	89	44	936	1943	19	277	553	248
Arrive On Green	0.04	0.00	0.04	0.07	0.07	0.07	0.69	0.69	0.69	0.15	0.15	0.00
Sat Flow, veh/h	3583	0	1599	1810	1203	593	1792	3720	36	1792	3574	1599
Grp Volume(v), veh/h	315	0	359	30	0	106	456	521	520	15	470	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599	1810	0	1795	1792	1881	1875	1792	1787	1599
Q Serve(g_s), s	11.8	0.0	13.0	2.1	0.0	7.8	15.9	18.1	18.1	1.0	17.3	0.0
Cycle Q Clear(g_c), s	11.8	0.0	13.0	2.1	0.0	7.8	15.9	18.1	18.1	1.0	17.3	0.0
Prop In Lane	1.00		1.00	1.00		0.33	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	403	0	1015	134	0	133	936	982	979	277	553	248
V/C Ratio(X)	0.78	0.00	0.35	0.22	0.00	0.80	0.49	0.53	0.53	0.05	0.85	0.00
Avail Cap(c_a), veh/h	425	0	1025	322	0	319	936	982	979	398	794	355
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.00	0.94	1.00	0.00	1.00	0.86	0.86	0.86	0.55	0.55	0.00
Uniform Delay (d), s/veh	63.3	0.0	12.3	58.8	0.0	61.5	12.3	12.6	12.6	48.6	55.5	0.0
Incr Delay (d2), s/veh	7.3	0.0	0.1	0.3	0.0	4.0	1.6	1.8	1.8	0.0	2.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	0.0	13.5	1.1	0.0	4.0	8.1	9.8	9.8	0.5	8.7	0.0
LnGrp Delay(d),s/veh	70.7	0.0	12.4	59.1	0.0	65.5	13.8	14.4	14.4	48.6	58.0	0.0
LnGrp LOS	E		B	E		E	B	B	B	D	E	
Approach Vol, veh/h		674			136			1497			485	
Approach Delay, s/veh		39.6			64.1			14.2			57.7	
Approach LOS		D			E			B			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		75.1		19.8		25.5		14.6
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6
Max Green Setting (Gmax), s		46.6		16.0		30.0		24.0
Max Q Clear Time (g_c+I1), s		20.1		15.0		19.3		9.8
Green Ext Time (p_c), s		5.6		0.2		1.6		0.2

Intersection Summary

HCM 2010 Ctrl Delay	30.3
HCM 2010 LOS	C

Notes

Lanes, Volumes, Timings
34: Capitol Blvd & Lee St

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	5	40	15	5	80	25	1025	20	50	815	150
Future Volume (vph)	260	5	40	15	5	80	25	1025	20	50	815	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	250		0	200		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		718			814			621			735	
Travel Time (s)		16.3			18.5			14.1			16.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	12.0		6.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	30.0	30.0	30.0	11.0	25.0		11.0	25.0	
Total Split (s)	53.0	53.0	53.0	53.0	53.0	53.0	12.0	67.0		15.0	70.0	
Total Split (%)	39.3%	39.3%	39.3%	39.3%	39.3%	39.3%	8.9%	49.6%		11.1%	51.9%	
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		3.6	3.6	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 135	
Actuated Cycle Length: 135	
Offset: 130 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Red	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	

Splits and Phases: 34: Capitol Blvd & Lee St

HCM Signalized Intersection Capacity Analysis
34: Capitol Blvd & Lee St

Existing 2015
PM Peak Hour

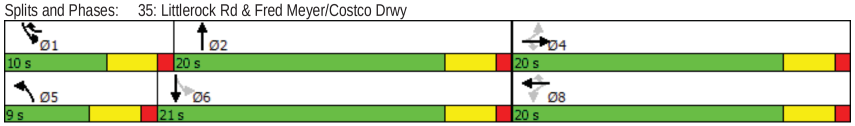
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	5	40	15	5	80	25	1025	20	50	815	150
Future Volume (vph)	260	5	40	15	5	80	25	1025	20	50	815	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1599		1830	1615	1787	3564		1787	3491	
Flt Permitted		0.71	1.00		0.74	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1344	1599		1414	1615	1787	3564		1787	3491	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	280	5	43	16	5	86	27	1102	22	54	876	161
RTOR Reduction (vph)	0	0	32	0	0	65	0	1	0	0	8	0
Lane Group Flow (vph)	0	285	11	0	21	21	27	1123	0	54	1029	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		33.6	33.6		33.6	33.6	4.3	80.4		7.2	83.3	
Effective Green, g (s)		33.6	33.6		33.6	33.6	4.3	80.4		7.2	83.3	
Actuated g/C Ratio		0.25	0.25		0.25	0.25	0.03	0.60		0.05	0.62	
Clearance Time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	1.5	3.0		1.6	3.0	
Lane Grp Cap (vph)		334	397		351	401	56	2122		95	2154	
v/s Ratio Prot							0.02	c0.32		c0.03	c0.29	
v/s Ratio Perm		c0.21	0.01		0.01	0.01						
v/c Ratio		0.85	0.03		0.06	0.05	0.48	0.53		0.57	0.48	
Uniform Delay, d1		48.3	38.3		38.7	38.6	64.3	16.1		62.4	14.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.83	0.98	
Incremental Delay, d2		18.0	0.0		0.0	0.0	2.4	0.9		3.9	0.7	
Delay (s)		66.3	38.3		38.7	38.6	66.6	17.1		55.9	14.3	
Level of Service		E	D		D	D	E	B		E	B	
Approach Delay (s)		62.7			38.6			18.2			16.4	
Approach LOS		E			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	130	5	115	0	650	95	105	585	0
Future Volume (vph)	0	0	0	130	5	115	0	650	95	105	585	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	175		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		390			426			713			896	
Travel Time (s)		8.9			9.7			16.2			20.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type			Perm	Perm	NA	pm+ov	Prot	NA		pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8				6		
Detector Phase	4	4	4	8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	9.0	9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	10.0	9.0	20.0		10.0	21.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	20.0%	18.0%	40.0%		20.0%	42.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag						Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 50	
Actuated Cycle Length: 42.1	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 35: Littlerock Rd & Fred Meyer/Costco Drwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	130	5	115	0	650	95	105	585	0
Future Volume (veh/h)	0	0	0	130	5	115	0	650	95	105	585	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	0	0	137	5	121	0	684	100	111	616	0
Adj No. of Lanes	0	1	1	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	0	285	243	400	8	387	5	1355	198	550	2263	0
Arrive On Green	0.00	0.00	0.00	0.15	0.15	0.15	0.00	0.43	0.43	0.09	0.63	0.00
Sat Flow, veh/h	0	1900	1615	1387	51	1599	1792	3130	457	1792	3668	0
Grp Volume(v), veh/h	0	0	0	142	0	121	0	390	394	111	616	0
Grp Sat Flow(s),veh/h/ln	0	1900	1615	1438	0	1599	1792	1787	1800	1792	1787	0
Q Serve(g_s), s	0.0	0.0	0.0	3.4	0.0	2.3	0.0	5.9	5.9	1.0	2.8	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.4	0.0	2.3	0.0	5.9	5.9	1.0	2.8	0.0
Prop In Lane	0.00		1.00	0.96		1.00	1.00		0.25	1.00		0.00
Lane Grp Cap(c), veh/h	0	285	243	407	0	387	5	774	780	550	2263	0
V/C Ratio(X)	0.00	0.00	0.00	0.35	0.00	0.31	0.00	0.50	0.51	0.20	0.27	0.00
Avail Cap(c_a), veh/h	0	823	699	814	0	840	242	774	780	676	2263	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	14.8	0.0	11.5	0.0	7.6	7.6	4.5	3.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.0	0.2	0.0	2.3	2.3	0.1	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.4	0.0	1.0	0.0	3.3	3.3	0.5	1.5	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	15.0	0.0	11.6	0.0	9.9	9.9	4.6	3.3	0.0
LnGrp LOS				B		B		A	A	A	A	
Approach Vol, veh/h		0			263			784			727	
Approach Delay, s/veh		0.0			13.5			9.9			3.5	
Approach LOS					B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.4	20.0		9.6	0.0	27.4		9.6
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	6.0	16.0		16.0	5.0	17.0		16.0
Max Q Clear Time (g_c+I1), s	3.0	7.9		0.0	0.0	4.8		5.4
Green Ext Time (p_c), s	0.0	4.6		0.0	0.0	6.1		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	7.8
HCM 2010 LOS	A

Lanes, Volumes, Timings
36: Littlerock Rd & Costco Drwy

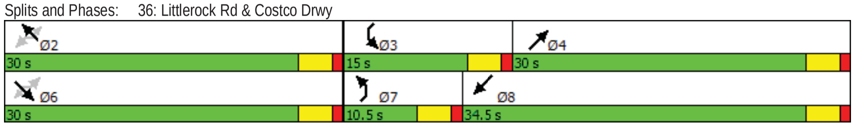
Existing 2015
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	80	25	15	125	5	195	50	490	100	215	400	80
Future Volume (vph)	80	25	15	125	5	195	50	490	100	215	400	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		100	150		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		325			608			995			713	
Travel Time (s)		7.4			13.8			22.6			16.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Detector Phase	6	6	6	2	2	2	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	9.5	30.0		9.5	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	10.5	30.0		15.0	34.5	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	14.0%	40.0%		20.0%	46.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 66.4
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 36: Littlerock Rd & Costco Drwy



HCM Signalized Intersection Capacity Analysis
36: Littlerock Rd & Costco Drwy

Existing 2015
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	80	25	15	125	5	195	50	490	100	215	400	80
Future Volume (vph)	80	25	15	125	5	195	50	490	100	215	400	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1830	1615		1813	1615	1787	3484		1787	3485	
Flt Permitted		0.74	1.00		0.68	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1406	1615		1287	1615	1787	3484		1787	3485	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	26	16	132	5	205	53	516	105	226	421	84
RTOR Reduction (vph)	0	0	10	0	0	126	0	25	0	0	23	0
Lane Group Flow (vph)	0	110	6	0	137	79	53	596	0	226	482	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Actuated Green, G (s)		26.1	26.1		26.1	26.1	3.7	19.0		10.9	26.2	
Effective Green, g (s)		26.1	26.1		26.1	26.1	3.7	19.0		10.9	26.2	
Actuated g/C Ratio		0.38	0.38		0.38	0.38	0.05	0.28		0.16	0.39	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		539	619		493	619	97	973		286	1342	
v/s Ratio Prot							0.03	c0.17		c0.13	0.14	
v/s Ratio Perm		0.08	0.00		c0.11	0.05						
v/c Ratio		0.20	0.01		0.28	0.13	0.55	0.61		0.79	0.36	
Uniform Delay, d1		14.0	13.0		14.5	13.6	31.3	21.3		27.5	14.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9	0.0		1.4	0.4	6.2	1.1		13.8	0.2	
Delay (s)		14.9	13.0		15.8	14.0	37.5	22.4		41.2	15.1	
Level of Service		B	B		B	B	D	C		D	B	
Approach Delay (s)		14.6			14.7			23.6			23.2	
Approach LOS		B			B			C			C	

Intersection Summary

HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

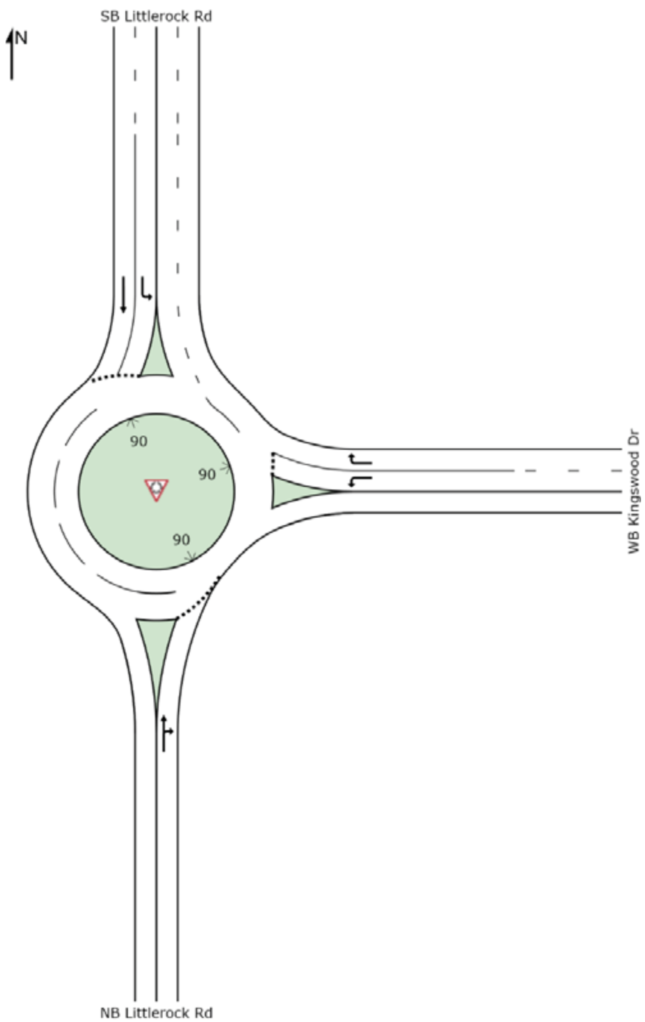
Item 8.

Item 8.

SITE LAYOUT

Site: 37) Littlerock Rd at Kingswood Dr

Existing 2015
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 37) Littlerock Rd at Kingswood Dr

Existing 2015
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Littlerock Rd											
8	T1	532	1.0	0.614	4.9	LOS A	5.4	136.6	0.38	0.44	36.5
18	R2	134	1.0	0.614	4.7	LOS A	5.4	136.6	0.38	0.44	35.5
Approach		667	1.0	0.614	4.8	LOS A	5.4	136.6	0.38	0.44	36.3
East: WB Kingswood Dr											
1	L2	194	1.0	0.198	12.3	LOS B	1.2	31.0	0.64	0.75	33.3
16	R2	81	1.0	0.049	4.2	LOS A	0.0	0.0	0.00	0.49	36.5
Approach		274	1.0	0.198	9.9	LOS A	1.2	31.0	0.45	0.67	34.2
North: SB Littlerock Rd											
7	L2	65	1.0	0.082	11.3	LOS B	0.4	10.7	0.44	0.65	33.8
4	T1	559	1.0	0.448	5.2	LOS A	3.5	89.2	0.53	0.52	36.0
Approach		624	1.0	0.448	5.8	LOS A	3.5	89.2	0.52	0.53	35.8
All Vehicles		1565	1.0	0.614	6.1	LOS A	5.4	136.6	0.45	0.52	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Friday, October 23, 2015 3:49:29 PM
SIDRA INTERSECTION 6.0.24.4877
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\Existing 2015 PM.sip6
8001450, 6017302, SCJ ALLIANCE, PLUS / 1PC

SIDRA INTERSECTION 6

Lanes, Volumes, Timings
38: Capitol Blvd & X St

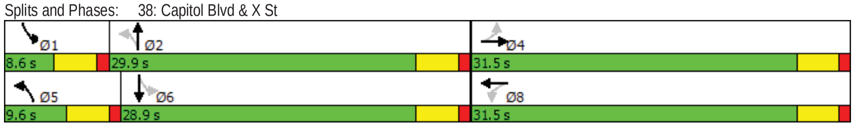
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	1	15	10	1	20	20	905	10	35	710	35
Future Volume (vph)	20	1	15	10	1	20	20	905	10	35	710	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	150		0	250		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		642			1326			1300			1368	
Travel Time (s)		14.6			30.1			29.5			31.1	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		9.5	25.5		8.5	26.5	
Total Split (s)	31.5	31.5		31.5	31.5		9.6	29.9		8.6	28.9	
Total Split (%)	45.0%	45.0%		45.0%	45.0%		13.7%	42.7%		12.3%	41.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 46.5
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 38: Capitol Blvd & X St



HCM 2010 Signalized Intersection Summary
38: Capitol Blvd & X St

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1	15	10	1	20	20	905	10	35	710	35
Future Volume (veh/h)	20	1	15	10	1	20	20	905	10	35	710	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	22	1	17	11	1	22	22	1017	11	39	798	39
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	260	7	125	264	6	126	511	2092	23	453	2048	100
Arrive On Green	0.08	0.08	0.08	0.08	0.08	0.08	0.02	0.58	0.58	0.03	0.59	0.59
Sat Flow, veh/h	1410	90	1538	1417	71	1555	1792	3622	39	1792	3469	170
Grp Volume(v), veh/h	22	0	18	11	0	23	22	502	526	39	411	426
Grp Sat Flow(s),veh/h/ln	1410	0	1629	1417	0	1626	1792	1787	1874	1792	1787	1851
Q Serve(g_s), s	0.6	0.0	0.5	0.3	0.0	0.6	0.2	7.3	7.3	0.4	5.4	5.4
Cycle Q Clear(g_c), s	1.2	0.0	0.5	0.8	0.0	0.6	0.2	7.3	7.3	0.4	5.4	5.4
Prop In Lane	1.00		0.94	1.00		0.96	1.00		0.02	1.00		0.09
Lane Grp Cap(c), veh/h	260	0	132	264	0	132	511	1032	1082	453	1055	1093
V/C Ratio(X)	0.08	0.00	0.14	0.04	0.00	0.17	0.04	0.49	0.49	0.09	0.39	0.39
Avail Cap(c_a), veh/h	1011	0	1000	1019	0	998	681	1032	1082	558	1055	1093
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	18.8	19.1	0.0	18.8	3.9	5.5	5.5	4.0	4.8	4.8
Incr Delay (d2), s/veh	0.1	0.0	0.5	0.1	0.0	0.6	0.0	1.6	1.6	0.1	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.2	0.1	0.0	0.3	0.1	4.0	4.1	0.2	2.9	3.0
LnGrp Delay(d),s/veh	19.5	0.0	19.2	19.2	0.0	19.5	3.9	7.1	7.0	4.1	5.9	5.8
LnGrp LOS	B		B	B		B	A	A	A	A	A	A
Approach Vol, veh/h		40			34			1050			876	
Approach Delay, s/veh		19.4			19.4			7.0			5.8	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	29.9		8.1	5.4	30.5		8.1
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	4.1	25.4		27.0	5.1	24.4		27.0
Max Q Clear Time (g_c+I1), s	2.4	9.3		3.2	2.2	7.4		2.8
Green Ext Time (p_c), s	0.0	10.7		0.3	0.0	11.1		0.3

Intersection Summary		
HCM 2010 Ctrl Delay		6.9
HCM 2010 LOS		A

HCM 2010 TWSC
39: Elm St & X St

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	10	10	5	5	2	2	65	5	0	45	5
Future Vol, veh/h	5	10	10	5	5	2	2	65	5	0	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	2	2	2
Mvmt Flow	7	14	14	7	7	3	3	88	7	0	61	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	165	164	64	175	165	91	68	0	0	95	0	0
Stage 1	64	64	-	97	97	-	-	-	-	-	-	-
Stage 2	101	100	-	78	68	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	804	732	1006	792	731	972	1546	-	-	1499	-	-
Stage 1	952	846	-	914	819	-	-	-	-	-	-	-
Stage 2	910	816	-	936	842	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	795	731	1006	769	730	972	1546	-	-	1499	-	-
Mov Cap-2 Maneuver	795	731	-	769	730	-	-	-	-	-	-	-
Stage 1	950	846	-	912	817	-	-	-	-	-	-	-
Stage 2	898	814	-	909	842	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	9.7	0.2	0
HCM LOS	A	A		

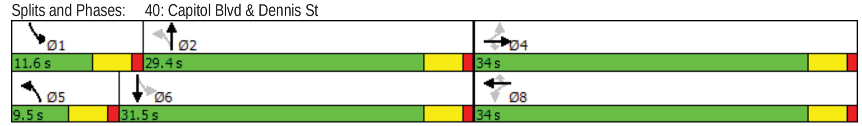
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1546	-	-	836	779	1499	-	-
HCM Lane V/C Ratio	0.002	-	-	0.04	0.021	-	-	-
HCM Control Delay (s)	7.3	0	-	9.5	9.7	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

Lanes, Volumes, Timings
40: Capitol Blvd & Dennis St

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	40	30	30	20	75	10	690	25	50	575	70
Future Volume (vph)	145	40	30	30	20	75	10	690	25	50	575	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	175		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		834			700			1337			1300	
Travel Time (s)		19.0			15.9			30.4			29.5	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	8.0		7.0	8.0	
Minimum Split (s)	33.5	33.5	33.5	33.5	33.5	33.5	9.5	27.5		11.5	27.5	
Total Split (s)	34.0	34.0	34.0	34.0	34.0	34.0	9.5	29.4		11.6	31.5	
Total Split (%)	45.3%	45.3%	45.3%	45.3%	45.3%	45.3%	12.7%	39.2%		15.5%	42.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 75	
Actuated Cycle Length: 58.5	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 40: Capitol Blvd & Dennis St



HCM Signalized Intersection Capacity Analysis
40: Capitol Blvd & Dennis St

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	40	30	30	20	75	10	690	25	50	575	70
Future Volume (vph)	145	40	30	30	20	75	10	690	25	50	575	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.96	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1810	1599		1845	1615	1787	3556		1787	3516	
Flt Permitted		0.74	1.00		0.77	1.00	0.38	1.00		0.27	1.00	
Satd. Flow (perm)		1384	1599		1459	1615	719	3556		512	3516	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	159	44	33	33	22	82	11	758	27	55	632	77
RTOR Reduction (vph)	0	0	26	0	0	64	0	3	0	0	9	0
Lane Group Flow (vph)	0	203	7	0	55	18	11	782	0	55	700	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		13.7	13.7		13.7	13.7	31.8	30.9		38.0	34.0	
Effective Green, g (s)		13.7	13.7		13.7	13.7	31.8	30.9		38.0	34.0	
Actuated g/C Ratio		0.22	0.22		0.22	0.22	0.51	0.50		0.61	0.55	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		305	352		321	356	383	1769		395	1925	
v/s Ratio Prot							0.00	c0.22		c0.01	c0.20	
v/s Ratio Perm		c0.15	0.00		0.04	0.01	0.01			0.08		
v/c Ratio		0.67	0.02		0.17	0.05	0.03	0.44		0.14	0.36	
Uniform Delay, d1		22.1	18.9		19.6	19.1	7.4	10.0		5.4	7.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.4	0.0		0.3	0.1	0.0	0.8		0.2	0.5	
Delay (s)		27.5	19.0		19.9	19.1	7.5	10.9		5.5	8.5	
Level of Service		C	B		B	B	A	B		A	A	
Approach Delay (s)		26.3			19.4			10.8			8.3	
Approach LOS		C			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	62.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

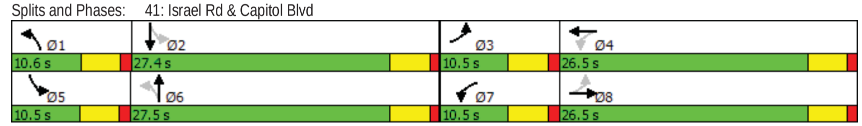
Lanes, Volumes, Timings
41: Israel Rd & Capitol Blvd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	130	120	95	195	135	105	315	25	70	515	90
Future Volume (vph)	80	130	120	95	195	135	105	315	25	70	515	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	150		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2751			725			934			1337	
Travel Time (s)		62.5			16.5			21.2			30.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	26.5		10.5	26.5	
Total Split (s)	10.5	26.5		10.5	26.5		10.6	27.5		10.5	27.4	
Total Split (%)	14.0%	35.3%		14.0%	35.3%		14.1%	36.7%		14.0%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary
Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 66.3
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 41: Israel Rd & Capitol Blvd



Item 8.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	130	120	95	195	135	105	315	25	70	515	90
Future Volume (veh/h)	80	130	120	95	195	135	105	315	25	70	515	90
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1863	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	89	144	66	106	217	150	117	350	28	78	572	100
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	2	2	2	1	1	1	1	1	1
Cap, veh/h	295	314	144	420	266	184	379	1147	91	493	1009	176
Arrive On Green	0.07	0.25	0.25	0.08	0.26	0.26	0.08	0.34	0.34	0.07	0.33	0.33
Sat Flow, veh/h	1810	1234	566	1774	1027	710	1792	3354	267	1792	3044	531
Grp Volume(v), veh/h	89	0	210	106	0	367	117	186	192	78	335	337
Grp Sat Flow(s),veh/h/ln	1810	0	1800	1774	0	1737	1792	1787	1834	1792	1787	1788
Q Serve(g_s), s	2.4	0.0	6.8	2.9	0.0	13.7	2.9	5.3	5.3	1.9	10.7	10.7
Cycle Q Clear(g_c), s	2.4	0.0	6.8	2.9	0.0	13.7	2.9	5.3	5.3	1.9	10.7	10.7
Prop In Lane	1.00		0.31	1.00		0.41	1.00		0.15	1.00		0.30
Lane Grp Cap(c), veh/h	295	0	458	420	0	450	379	611	627	493	593	593
V/C Ratio(X)	0.30	0.00	0.46	0.25	0.00	0.82	0.31	0.30	0.31	0.16	0.57	0.57
Avail Cap(c_a), veh/h	324	0	573	441	0	554	398	611	627	528	593	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.9	0.0	21.7	16.9	0.0	24.0	13.9	16.7	16.7	13.2	19.0	19.0
Incr Delay (d2), s/veh	0.7	0.0	0.9	0.4	0.0	8.1	0.6	1.3	1.3	0.2	3.9	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	3.5	1.5	0.0	7.5	1.5	2.8	2.9	1.0	5.9	5.9
LnGrp Delay(d),s/veh	18.6	0.0	22.6	17.2	0.0	32.1	14.4	18.0	18.0	13.4	22.9	22.9
LnGrp LOS	B		C	B		C	B	B	B	B	C	C
Approach Vol, veh/h		299			473			495			750	
Approach Delay, s/veh		21.4			28.8			17.1			21.9	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	27.4	9.4	22.4	9.2	28.1	9.7	22.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.1	22.9	6.0	22.0	6.0	23.0	6.0	22.0
Max Q Clear Time (g_c+I1), s	4.9	12.7	4.4	15.7	3.9	7.3	4.9	8.8
Green Ext Time (p_c), s	0.0	5.2	0.0	2.2	0.0	6.8	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	50	80	90	105	70	55
Future Vol, veh/h	50	80	90	105	70	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	53	84	95	111	74	58

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	205	0	-	0	339	150
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1372	-	-	-	661	902
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	848	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1372	-	-	-	634	902
Mov Cap-2 Maneuver	-	-	-	-	634	-
Stage 1	-	-	-	-	883	-
Stage 2	-	-	-	-	813	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1372	-	-	-	729
HCM Lane V/C Ratio	0.038	-	-	-	0.18
HCM Control Delay (s)	7.7	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

Item 8.

HCM 2010 TWSC
43: Kirsop Rd & 66th Ave

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	5	130	2	0	2	205	15	2	5	5	30
Future Vol, veh/h	15	5	130	2	0	2	205	15	2	5	5	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	0	0	0
Mvmt Flow	18	6	155	2	0	2	244	18	2	6	6	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	544	544	24	623	561	19	42	0	0	20	0	0
Stage 1	36	36	-	507	507	-	-	-	-	-	-	-
Stage 2	508	508	-	116	54	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.11	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.209	-	-	2.2	-	-
Pot Cap-1 Maneuver	451	448	1055	401	439	1065	1573	-	-	1609	-	-
Stage 1	982	867	-	552	543	-	-	-	-	-	-	-
Stage 2	549	540	-	894	854	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	395	376	1055	297	369	1065	1573	-	-	1609	-	-
Mov Cap-2 Maneuver	395	376	-	297	369	-	-	-	-	-	-	-
Stage 1	828	864	-	465	458	-	-	-	-	-	-	-
Stage 2	462	455	-	755	851	-	-	-	-	-	-	-

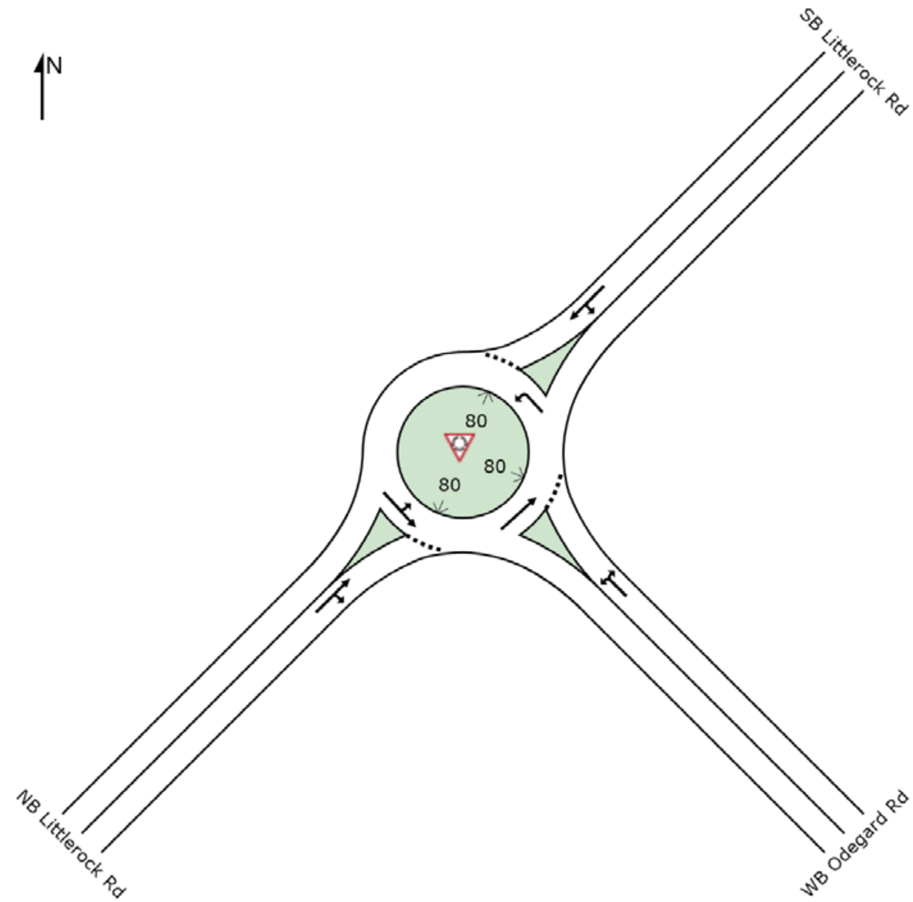
Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	12.8	7.1	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1573	-	-	860	464	1609	-	-
HCM Lane V/C Ratio	0.155	-	-	0.208	0.01	0.004	-	-
HCM Control Delay (s)	7.7	0	-	10.3	12.8	7.2	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	0.8	0	0	-	-

SITE LAYOUT

Site: 44) Littlerock Rd at Odegard Rd

Existing 2015
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 44) Littlerock Rd at Odegard Rd

Existing 2015
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: WB Odegard Rd											
3x	L2	16	0.0	0.030	13.6	LOS B	0.2	3.9	0.64	0.70	33.2
18x	R2	5	0.0	0.030	8.2	LOS A	0.2	3.9	0.64	0.70	32.4
Approach		22	0.0	0.030	12.2	LOS B	0.2	3.9	0.64	0.70	33.0
NorthEast: SB Littlerock Rd											
1x	L2	11	1.0	0.594	9.6	LOS A	6.8	172.4	0.21	0.39	36.7
6x	T1	720	1.0	0.594	4.4	LOS A	6.8	172.4	0.21	0.39	36.8
Approach		731	1.0	0.594	4.4	LOS A	6.8	172.4	0.21	0.39	36.8
SouthWest: NB Littlerock Rd											
2x	T1	667	1.0	0.541	4.3	LOS A	5.0	127.2	0.14	0.39	37.1
12x	R2	5	1.0	0.541	4.2	LOS A	5.0	127.2	0.14	0.39	36.1
Approach		672	1.0	0.541	4.3	LOS A	5.0	127.2	0.14	0.39	37.1
All Vehicles		1425	1.0	0.594	4.5	LOS A	6.8	172.4	0.18	0.39	36.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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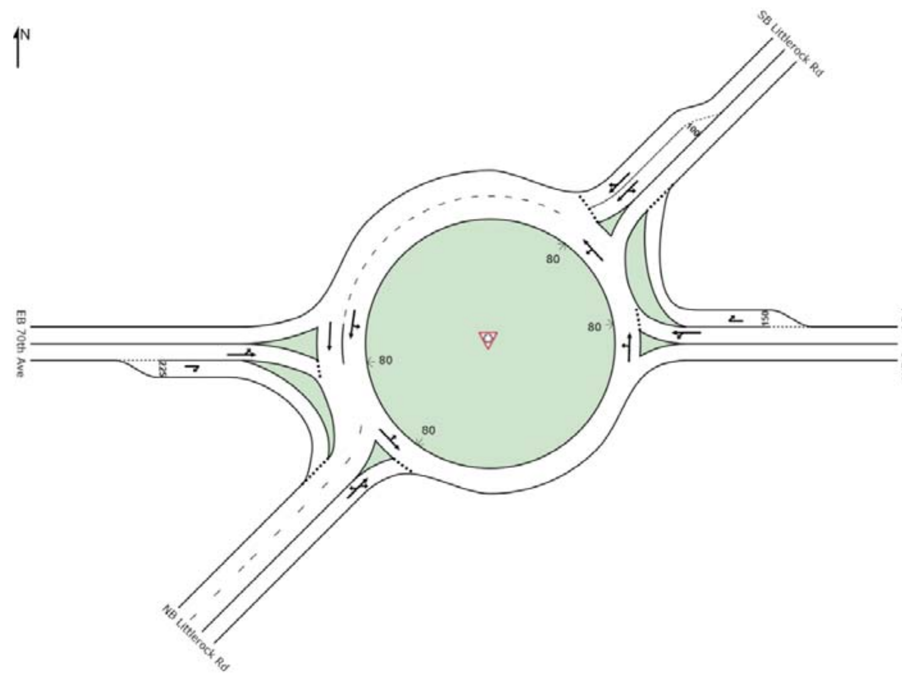
SIDRA INTERSECTION 6

SITE LAYOUT

Site: 45) Littlerock Rd at Israel Rd

Existing 2015
PM Peak Hour
Roundabout



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SIDRA INTERSECTION 6

Item 8.

MOVEMENT SUMMARY

Site: 45) Littlerock Rd at Israel Rd

Existing 2015
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB Israel Rd											
1a	L1	58	1.0	0.259	12.0	LOS B	1.8	44.8	0.76	0.76	34.2
6	T1	158	1.0	0.259	7.8	LOS A	1.8	44.8	0.76	0.76	34.5
16b	R3	274	1.0	0.258	6.1	LOS A	1.7	41.6	0.59	0.66	34.9
Approach		489	1.0	0.259	7.4	LOS A	1.8	44.8	0.66	0.71	34.7
NorthEast: SB Littlerock Rd											
1bx	L3	137	1.0	0.364	13.8	LOS B	2.4	60.0	0.69	0.76	34.3
6x	T1	426	1.0	0.364	7.3	LOS A	2.5	62.2	0.68	0.72	34.8
16ax	R1	121	1.0	0.364	6.6	LOS A	2.5	62.2	0.68	0.68	35.0
Approach		684	1.0	0.364	8.5	LOS A	2.5	62.2	0.68	0.72	34.7
West: EB 70th Ave											
5a	L1	105	1.0	0.221	10.5	LOS B	1.0	25.7	0.58	0.73	34.3
2	T1	84	1.0	0.221	6.5	LOS A	1.0	25.7	0.58	0.73	34.7
12b	R3	79	1.0	0.085	5.6	LOS A	0.3	8.8	0.48	0.65	35.3
Approach		268	1.0	0.221	7.8	LOS A	1.0	25.7	0.55	0.71	34.7
SouthWest: NB Littlerock Rd											
5bx	L3	253	1.0	0.606	14.9	LOS B	5.6	140.5	0.75	0.81	33.9
2x	T1	268	1.0	0.606	8.5	LOS A	5.6	140.5	0.75	0.81	33.6
12ax	R1	32	1.0	0.606	8.1	LOS A	5.6	140.5	0.75	0.81	33.4
Approach		553	1.0	0.606	11.4	LOS B	5.6	140.5	0.75	0.81	33.7
All Vehicles		1995	1.0	0.606	8.9	LOS A	5.6	140.5	0.68	0.74	34.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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SIDRA INTERSECTION 6

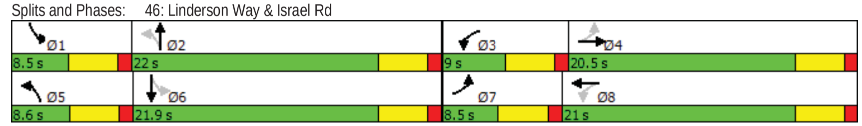
Lanes, Volumes, Timings
46: Linderson Way & Israel Rd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	165	30	135	260	25	110	85	110	40	80	50
Future Volume (vph)	40	165	30	135	260	25	110	85	110	40	80	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	150		0	100		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3505			2751			2073			847	
Travel Time (s)		79.7			62.5			47.1			19.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.5	20.5		8.5	20.5		8.5	21.5		8.5	21.5	
Total Split (s)	8.5	20.5		9.0	21.0		8.6	22.0		8.5	21.9	
Total Split (%)	14.2%	34.2%		15.0%	35.0%		14.3%	36.7%		14.2%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 52.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 46: Linderson Way & Israel Rd



Item 8.

HCM 2010 Signalized Intersection Summary
46: Linderson Way & Israel Rd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	165	30	135	260	25	110	85	110	40	80	50
Future Volume (veh/h)	40	165	30	135	260	25	110	85	110	40	80	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	42	174	32	142	274	26	116	89	42	42	84	53
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	286	277	51	378	388	37	597	435	205	590	356	224
Arrive On Green	0.03	0.18	0.18	0.09	0.23	0.23	0.07	0.36	0.36	0.03	0.33	0.33
Sat Flow, veh/h	1792	1547	284	1792	1692	161	1792	1210	571	1792	1080	681
Grp Volume(v), veh/h	42	0	206	142	0	300	116	0	131	42	0	137
Grp Sat Flow(s),veh/h/ln	1792	0	1831	1792	0	1853	1792	0	1780	1792	0	1761
Q Serve(g_s), s	1.0	0.0	5.5	3.3	0.0	7.9	2.2	0.0	2.7	0.8	0.0	3.0
Cycle Q Clear(g_c), s	1.0	0.0	5.5	3.3	0.0	7.9	2.2	0.0	2.7	0.8	0.0	3.0
Prop In Lane	1.00		0.16	1.00		0.09	1.00		0.32	1.00		0.39
Lane Grp Cap(c), veh/h	286	0	328	378	0	425	597	0	641	590	0	580
V/C Ratio(X)	0.15	0.00	0.63	0.38	0.00	0.71	0.19	0.00	0.20	0.07	0.00	0.24
Avail Cap(c_a), veh/h	360	0	555	378	0	579	619	0	641	663	0	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.0	0.0	20.0	15.7	0.0	18.7	10.4	0.0	11.7	10.9	0.0	12.9
Incr Delay (d2), s/veh	0.1	0.0	2.0	0.2	0.0	2.4	0.1	0.0	0.7	0.0	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	2.9	1.6	0.0	4.3	1.1	0.0	1.4	0.4	0.0	1.6
LnGrp Delay(d),s/veh	17.1	0.0	22.0	16.0	0.0	21.1	10.5	0.0	12.4	11.0	0.0	13.8
LnGrp LOS	B		C	B		C	B		B	B		B
Approach Vol, veh/h		248			442			247			179	
Approach Delay, s/veh		21.2			19.5			11.5			13.2	
Approach LOS		C			B			B			B	

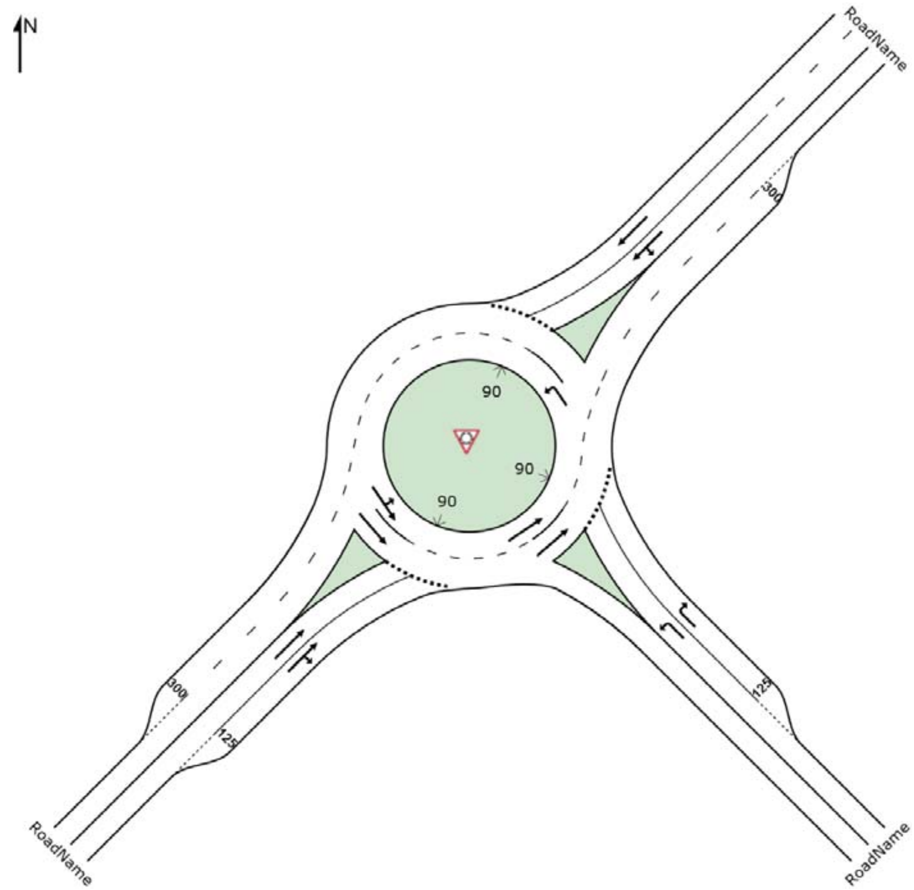
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.3	23.5	9.0	14.0	7.9	21.9	6.3	16.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	4.0	17.5	4.5	16.0	4.1	17.4	4.0	16.5
Max Q Clear Time (g_c+I1), s	2.8	4.7	5.3	7.5	4.2	5.0	3.0	9.9
Green Ext Time (p_c), s	0.0	1.2	0.0	2.0	0.0	1.2	0.0	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

SITE LAYOUT

Site: 47) Littlerock Rd at Tumwater Blvd

Existing 2015
PM Peak Hour
Roundabout



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8001450, 6017302, SCJ ALLIANCE, PLUS / 1PC

SIDRA INTERSECTION 6

MOVEMENT SUMMARY

Site: 47) Littlerock Rd at Tumwater Blvd

Existing 2015
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: RoadName											
3x	L2	239	1.0	0.212	10.4	LOS B	1.1	26.8	0.32	0.64	34.2
18x	R2	298	1.0	0.251	4.9	LOS A	1.3	33.2	0.33	0.51	35.8
Approach		537	1.0	0.251	7.3	LOS A	1.3	33.2	0.32	0.57	35.0
NorthEast: RoadName											
1x	L2	324	1.0	0.365	11.0	LOS B	2.1	52.2	0.45	0.67	34.4
6x	T1	303	1.0	0.365	5.6	LOS A	2.1	52.2	0.43	0.56	35.8
Approach		628	1.0	0.365	8.4	LOS A	2.1	52.2	0.44	0.62	35.1
SouthWest: RoadName											
2x	T1	144	0.0	0.137	5.6	LOS A	0.7	16.7	0.44	0.52	36.3
12x	R2	112	0.0	0.115	5.6	LOS A	0.5	13.5	0.44	0.58	35.5
Approach		255	0.0	0.137	5.6	LOS A	0.7	16.7	0.44	0.55	35.9
All Vehicles		1420	0.8	0.365	7.5	LOS A	2.1	52.2	0.40	0.59	35.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Friday, October 23, 2015 4:14:06 PM
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8001450, 6017302, SCJ ALLIANCE, PLUS / 1PC

SIDRA INTERSECTION 6

Lanes, Volumes, Timings
48: I-5 SB Ramps & Tumwater Blvd

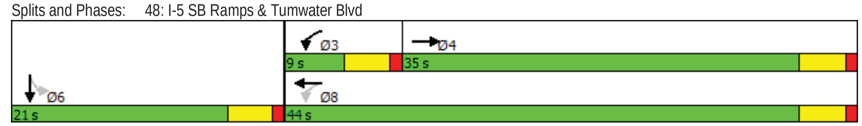
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	340	70	320	275	0	0	0	0	405	30	235
Future Volume (vph)	0	340	70	320	275	0	0	0	0	405	30	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	350		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1843			807			1457			1571	
Travel Time (s)		41.9			18.3			33.1			35.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										14%		
Turn Type		NA		pm+pt	NA					Perm	NA	
Protected Phases		4		3	8						6	
Permitted Phases				8						6		
Detector Phase		4		3	8					6	6	
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0					4.0	4.0	
Minimum Split (s)		20.5		8.5	20.5					20.5	20.5	
Total Split (s)		35.0		9.0	44.0					21.0	21.0	
Total Split (%)		53.8%		13.8%	67.7%					32.3%	32.3%	
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	
All-Red Time (s)		1.0		1.0	1.0					1.0	1.0	
Lost Time Adjust (s)		0.0			0.0					0.0	0.0	
Total Lost Time (s)		4.5			4.5					4.5	4.5	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Recall Mode		None		None	Max					None	None	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 64.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

Splits and Phases: 48: I-5 SB Ramps & Tumwater Blvd



HCM 2010 Signalized Intersection Summary
48: I-5 SB Ramps & Tumwater Blvd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	340	70	320	275	0	0	0	0	405	30	235
Future Volume (veh/h)	0	340	70	320	275	0	0	0	0	405	30	235
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900	1900	1881	0				1827	1827	1900
Adj Flow Rate, veh/h	0	362	74	340	293	0				269	259	74
Adj No. of Lanes	0	2	0	0	1	0				1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				0.94	0.94	0.94
Percent Heavy Veh, %	0	1	1	1	1	0				4	4	4
Cap, veh/h	0	1864	377	90	26	0				396	311	89
Arrive On Green	0.00	0.63	0.63	0.63	0.63	0.00				0.23	0.23	0.23
Sat Flow, veh/h	0	3057	599	2	42	0				1740	1367	391
Grp Volume(v), veh/h	0	217	219	633	0	0				269	0	333
Grp Sat Flow(s),veh/h/ln	0	1787	1775	44	0	0				1740	0	1758
Q Serve(g_s), s	0.0	3.2	3.3	17.2	0.0	0.0				8.9	0.0	11.3
Cycle Q Clear(g_c), s	0.0	3.2	3.3	17.2	0.0	0.0				8.9	0.0	11.3
Prop In Lane	0.00		0.34	0.54		0.00				1.00		0.22
Lane Grp Cap(c), veh/h	0	1124	1117	0	0	0				396	0	400
V/C Ratio(X)	0.00	0.19	0.20	0.00	0.00	0.00				0.68	0.00	0.83
Avail Cap(c_a), veh/h	0	1124	1117	0	0	0				457	0	462
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	4.9	4.9	0.0	0.0	0.0				22.2	0.0	23.1
Incr Delay (d2), s/veh	0.0	0.1	0.1	0.0	0.0	0.0				3.3	0.0	11.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.6	1.6	0.0	0.0	0.0				4.6	0.0	6.7
LnGrp Delay(d),s/veh	0.0	5.0	5.0	0.0	0.0	0.0				25.5	0.0	34.1
LnGrp LOS		A	A							C		C
Approach Vol, veh/h		436			633						602	
Approach Delay, s/veh		5.0			0.0						30.3	
Approach LOS		A			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				44.0		18.8		44.0
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				30.5		16.5		39.5
Max Q Clear Time (g_c+I1), s				5.3		13.3		19.2
Green Ext Time (p_c), s				9.0		0.9		8.2

Intersection Summary		
HCM 2010 Ctrl Delay		12.2
HCM 2010 LOS		B

Notes

HCM 2010 TWSC
49: I-5 NB Ramps & Tumwater Blvd

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	135	610	0	0	550	1210	45	5	135	0	0	0
Future Vol, veh/h	135	610	0	0	550	1210	45	5	135	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	150	-	-	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	1	1	1	3	3	3	0	0	0
Mvmt Flow	153	693	0	0	625	1375	51	6	153	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	625	0	-	-	-	0	1625	1625	347
Stage 1	-	-	-	-	-	-	1000	1000	-
Stage 2	-	-	-	-	-	-	625	625	-
Critical Hdwy	4.145	-	-	-	-	-	6.645	6.545	6.945
Critical Hdwy Stg 1	-	-	-	-	-	-	5.845	5.545	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.445	5.545	-
Follow-up Hdwy	2.2285	-	-	-	-	-	3.5285	4.0285	3.3285
Pot Cap-1 Maneuver	949	-	0	0	-	0	102	101	647
Stage 1	-	-	0	0	-	0	316	318	-
Stage 2	-	-	0	0	-	0	530	474	-
Platoon blocked, %		-			-				
Mov Cap-1 Maneuver	949	-	-	-	-	-	86	0	647
Mov Cap-2 Maneuver	-	-	-	-	-	-	86	0	-
Stage 1	-	-	-	-	-	-	265	0	-
Stage 2	-	-	-	-	-	-	530	0	-

Approach	EB	WB	NB
HCM Control Delay, s	1.7	0	37.5
HCM LOS			E

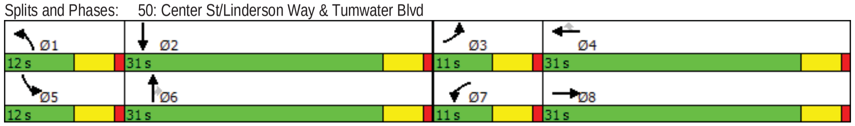
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT
Capacity (veh/h)	86	647	949	-	-
HCM Lane V/C Ratio	0.661	0.237	0.162	-	-
HCM Control Delay (s)	105.7	12.3	9.5	-	-
HCM Lane LOS	F	B	A	-	-
HCM 95th %tile Q(veh)	3.1	0.9	0.6	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	550	155	55	700	30	170	85	45	190	160	880
Future Volume (vph)	135	550	155	55	700	30	170	85	45	190	160	880
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	350		250	250		150	300		700
Storage Lanes	2		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			1275			1023			2073	
Travel Time (s)		20.3			29.0			23.3			47.1	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			6			Free
Detector Phase	3	8		7	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	31.0		11.0	31.0	31.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	11.0	31.0		11.0	31.0	31.0	12.0	31.0	31.0	12.0	31.0	
Total Split (%)	12.9%	36.5%		12.9%	36.5%	36.5%	14.1%	36.5%	36.5%	14.1%	36.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 85
Actuated Cycle Length: 70.7
Natural Cycle: 85
Control Type: Actuated-Uncoordinated

Splits and Phases: 50: Center St/Linderson Way & Tumwater Blvd



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	550	155	55	700	30	170	85	45	190	160	880
Future Volume (veh/h)	135	550	155	55	700	30	170	85	45	190	160	880
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	144	585	165	59	745	32	181	90	48	202	170	0
Adj No. of Lanes	2	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	284	1108	312	106	1369	612	185	258	219	185	258	219
Arrive On Green	0.08	0.41	0.41	0.06	0.38	0.38	0.10	0.14	0.14	0.10	0.14	0.00
Sat Flow, veh/h	3442	2729	768	1792	3574	1599	1792	1881	1599	1792	1881	1599
Grp Volume(v), veh/h	144	379	371	59	745	32	181	90	48	202	170	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1727	1792	1787	1599	1792	1881	1599	1792	1881	1599
Q Serve(g_s), s	2.7	11.0	11.0	2.2	11.0	0.9	6.8	2.9	1.8	7.0	5.8	0.0
Cycle Q Clear(g_c), s	2.7	11.0	11.0	2.2	11.0	0.9	6.8	2.9	1.8	7.0	5.8	0.0
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	284	719	701	106	1369	612	185	258	219	185	258	219
V/C Ratio(X)	0.51	0.53	0.53	0.56	0.54	0.05	0.98	0.35	0.22	1.09	0.66	0.00
Avail Cap(c_a), veh/h	304	719	701	158	1369	612	185	720	612	185	720	612
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	29.8	15.2	15.3	31.1	16.3	13.2	30.4	26.6	26.1	30.5	27.8	0.0
Incr Delay (d2), s/veh	1.4	2.8	2.8	4.5	1.6	0.2	60.2	0.8	0.5	93.5	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	5.9	5.8	1.2	5.7	0.4	6.4	1.6	0.8	8.2	3.2	0.0
LnGrp Delay(d),s/veh	31.2	18.0	18.1	35.5	17.9	13.4	90.6	27.4	26.6	123.9	30.7	0.0
LnGrp LOS	C	B	B	D	B	B	F	C	C	F	C	
Approach Vol, veh/h		894			836			319			372	
Approach Delay, s/veh		20.2			19.0			63.1			81.3	
Approach LOS		C			B			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	14.3	10.6	31.0	12.0	14.3	9.0	32.6
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	26.0	6.0	26.0	7.0	26.0	6.0	26.0
Max Q Clear Time (g_c+I1), s	8.8	7.8	4.7	13.0	9.0	4.9	4.2	13.0
Green Ext Time (p_c), s	0.0	1.5	0.1	7.9	0.0	1.6	0.0	7.9

Intersection Summary

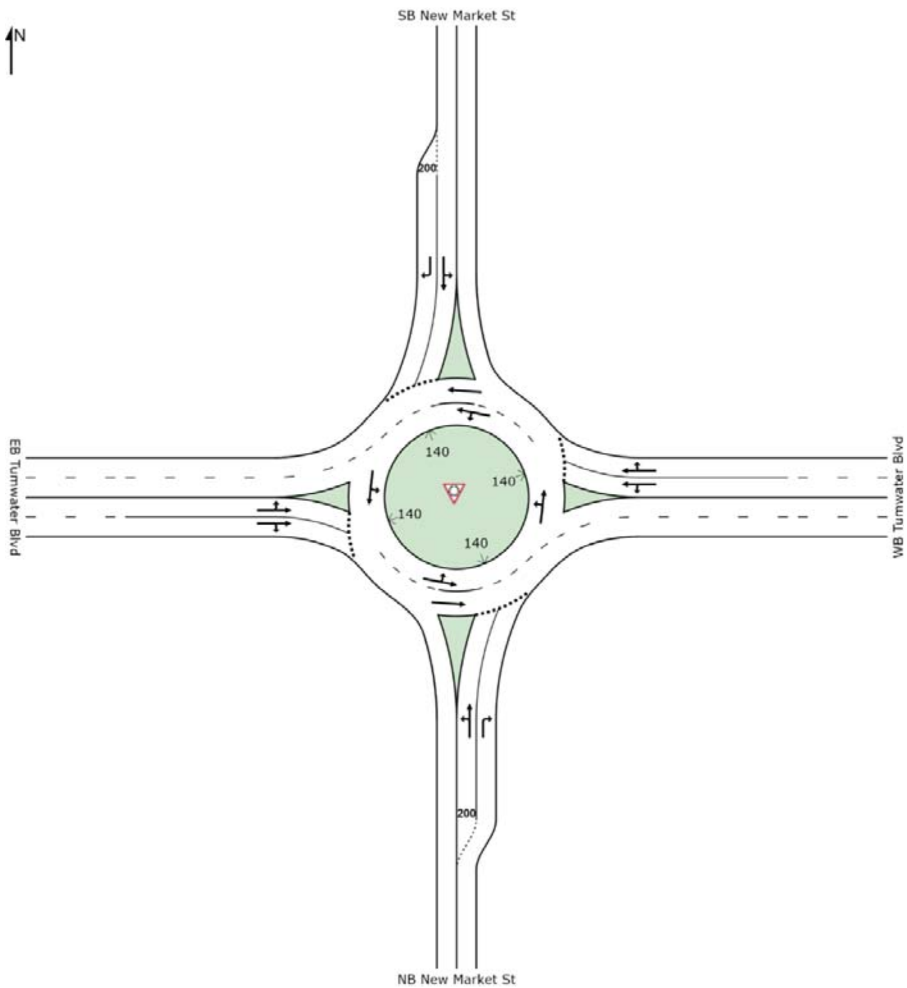
HCM 2010 Ctrl Delay 34.8
HCM 2010 LOS C

Item 8.

SITE LAYOUT

Site: 51) New Market Rd at Tumwater Blvd

Existing 2015
PM Peak Hour
Roundabout



Created: Thursday, October 29, 2015 2:28:24 PM
SIDRA INTERSECTION 6.0.24.4877

MOVEMENT SUMMARY

Site: 51) New Market Rd at Tumwater Blvd

Existing 2015
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB New Market St											
3	L2	16	0.0	0.029	13.3	LOS B	0.1	2.6	0.57	0.76	34.6
8	T1	2	0.0	0.029	6.2	LOS A	0.1	2.6	0.57	0.76	34.2
18	R2	49	0.0	0.052	5.6	LOS A	0.2	5.1	0.54	0.65	36.0
Approach		67	0.0	0.052	7.5	LOS A	0.2	5.1	0.55	0.68	35.6
East: WB Tumwater Blvd											
1	L2	49	2.0	0.271	10.5	LOS B	1.7	42.4	0.20	0.38	38.5
6	T1	739	2.0	0.271	3.4	LOS A	1.7	42.7	0.19	0.34	38.4
16	R2	11	2.0	0.271	3.8	LOS A	1.7	42.7	0.19	0.32	37.0
Approach		799	2.0	0.271	3.8	LOS A	1.7	42.7	0.19	0.35	38.4
North: SB New Market St											
7	L2	33	4.0	0.072	13.3	LOS B	0.3	6.6	0.54	0.76	35.2
4	T1	16	4.0	0.072	6.2	LOS A	0.3	6.6	0.54	0.76	34.8
14	R2	114	4.0	0.121	5.7	LOS A	0.5	12.0	0.52	0.66	36.0
Approach		163	4.0	0.121	7.2	LOS A	0.5	12.0	0.53	0.69	35.7
West: EB Tumwater Blvd											
5	L2	27	4.0	0.323	10.8	LOS B	2.1	54.2	0.32	0.39	38.2
2	T1	842	4.0	0.323	3.7	LOS A	2.1	54.9	0.31	0.38	38.0
12	R2	22	4.0	0.323	4.1	LOS A	2.1	54.9	0.30	0.36	36.5
Approach		891	4.0	0.323	3.9	LOS A	2.1	54.9	0.31	0.38	37.9
All Vehicles		1921	3.0	0.323	4.3	LOS A	2.1	54.9	0.29	0.40	37.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Processed: Friday, October 23, 2015 4:21:53 PM
SIDRA INTERSECTION 6.0.24.4877

Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra \Existing 2015 PM.sip6
8001450, 6017302, SCJ ALLIANCE, PLUS / 1PC

SIDRA INTERSECTION 6

Lanes, Volumes, Timings
52: Tumwater Blvd & Capitol Blvd

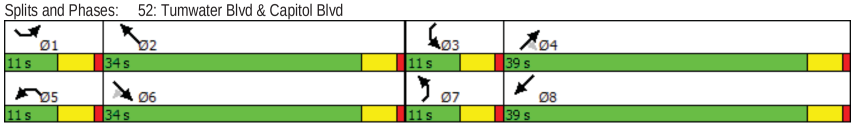
Existing 2015
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	110	475	105	200	305	20	65	305	245	85	325	15
Future Volume (vph)	110	475	105	200	305	20	65	305	245	85	325	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	200		0	275		0	200		0
Storage Lanes	1		1	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		934			3620			2404			1729	
Travel Time (s)		12.7			49.4			54.6			39.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4			
Detector Phase	1	6	6	5	2		7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (%)	11.6%	35.8%	35.8%	11.6%	35.8%		11.6%	41.1%	41.1%	11.6%	41.1%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 82.1
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 52: Tumwater Blvd & Capitol Blvd



HCM 2010 Signalized Intersection Summary
52: Tumwater Blvd & Capitol Blvd

Existing 2015
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	110	475	105	200	305	20	65	305	245	85	325	15
Future Volume (veh/h)	110	475	105	200	305	20	65	305	245	85	325	15
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	122	528	39	222	339	22	72	339	33	94	361	17
Adj No. of Lanes	1	1	1	2	2	0	1	1	1	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	1	1	1
Cap, veh/h	132	669	569	261	1237	80	107	461	392	120	877	41
Arrive On Green	0.08	0.36	0.36	0.08	0.36	0.36	0.06	0.24	0.24	0.07	0.25	0.25
Sat Flow, veh/h	1757	1845	1568	3476	3409	220	1792	1881	1599	1792	3476	163
Grp Volume(v), veh/h	122	528	39	222	177	184	72	339	33	94	185	193
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1738	1787	1842	1792	1881	1599	1792	1787	1852
Q Serve(g_s), s	5.5	20.4	1.3	5.0	5.6	5.7	3.1	13.3	1.3	4.1	6.9	7.0
Cycle Q Clear(g_c), s	5.5	20.4	1.3	5.0	5.6	5.7	3.1	13.3	1.3	4.1	6.9	7.0
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	132	669	569	261	648	668	107	461	392	120	451	467
V/C Ratio(X)	0.93	0.79	0.07	0.85	0.27	0.28	0.67	0.74	0.08	0.78	0.41	0.41
Avail Cap(c_a), veh/h	132	669	569	261	648	668	134	800	680	134	760	788
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.8	22.7	16.6	36.5	18.0	18.0	36.8	27.8	23.3	36.7	24.9	25.0
Incr Delay (d2), s/veh	56.0	9.2	0.2	22.6	1.0	1.0	4.8	2.3	0.1	19.8	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	12.1	0.6	3.2	2.9	3.1	1.7	7.2	0.6	2.7	3.5	3.6
LnGrp Delay(d),s/veh	92.8	31.9	16.9	59.1	19.1	19.1	41.6	30.1	23.4	56.6	25.5	25.5
LnGrp LOS	F	C	B	E	B	B	D	C	C	E	C	C
Approach Vol, veh/h		689			583			444			472	
Approach Delay, s/veh		41.8			34.3			31.5			31.7	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	34.0	10.4	24.6	11.0	34.0	9.8	25.2
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	6.0	29.0	6.0	34.0	6.0	29.0	6.0	34.0
Max Q Clear Time (g_c+I1), s	7.5	7.7	6.1	15.3	7.0	22.4	5.1	9.0
Green Ext Time (p_c), s	0.0	6.1	0.0	4.3	0.0	3.1	0.0	4.7

Intersection Summary

HCM 2010 Ctrl Delay	35.5
HCM 2010 LOS	D

Lanes, Volumes, Timings
53: 65th Ave & Henderson Blvd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	845	55	65	525	1	25	0	45	1	0	0
Future Volume (vph)	2	845	55	65	525	1	25	0	45	1	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2111			1760			704			354	
Travel Time (s)		48.0			40.0			16.0			8.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	27.5	27.5		27.5	27.5		12.5	12.5		27.5	27.5	
Total Split (s)	52.5	52.5		52.5	52.5		27.5	27.5		27.5	27.5	
Total Split (%)	65.6%	65.6%		65.6%	65.6%		34.4%	34.4%		34.4%	34.4%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 74.1
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 53: 65th Ave & Henderson Blvd

HCM 2010 Signalized Intersection Summary
53: 65th Ave & Henderson Blvd

Existing 2015
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	845	55	65	525	1	25	0	45	1	0	0
Future Volume (veh/h)	2	845	55	65	525	1	25	0	45	1	0	0
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	2	929	60	71	577	1	27	0	49	1	0	0
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	667	1334	86	397	1432	2	116	14	96	263	0	0
Arrive On Green	0.76	0.76	0.76	0.76	0.76	0.76	0.09	0.00	0.09	0.09	0.00	0.00
Sat Flow, veh/h	840	1748	113	573	1877	3	414	150	1023	1581	0	0
Grp Volume(v), veh/h	2	0	989	71	0	578	76	0	0	1	0	0
Grp Sat Flow(s),veh/h/ln	840	0	1861	573	0	1881	1587	0	0	1581	0	0
Q Serve(g_s), s	0.1	0.0	16.9	4.5	0.0	6.6	1.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.7	0.0	16.9	21.4	0.0	6.6	2.8	0.0	0.0	0.0	0.0	0.0
Prop In Lane	1.00		0.06	1.00		0.00	0.36		0.64	1.00		0.00
Lane Grp Cap(c), veh/h	667	0	1420	397	0	1435	227	0	0	263	0	0
V/C Ratio(X)	0.00	0.00	0.70	0.18	0.00	0.40	0.34	0.00	0.00	0.00	0.00	0.00
Avail Cap(c_a), veh/h	667	0	1420	397	0	1435	647	0	0	637	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.7	0.0	3.8	9.2	0.0	2.6	27.0	0.0	0.0	25.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	2.8	1.0	0.0	0.8	1.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	9.4	0.8	0.0	3.7	1.3	0.0	0.0	0.0	0.0	0.0
LnGrp Delay(d),s/veh	3.7	0.0	6.6	10.2	0.0	3.4	28.1	0.0	0.0	25.8	0.0	0.0
LnGrp LOS	A		A	B		A	C			C		
Approach Vol, veh/h		991			649			76			1	
Approach Delay, s/veh		6.6			4.1			28.1			25.8	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.5		10.4		52.5		10.4
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		48.0		23.0		48.0		23.0
Max Q Clear Time (g_c+I1), s		18.9		2.0		23.4		4.8
Green Ext Time (p_c), s		18.6		0.4		16.5		0.4

Intersection Summary

HCM 2010 Ctrl Delay	6.6
HCM 2010 LOS	A

Lanes, Volumes, Timings
54: Henderson Blvd & Tumwater Blvd

Existing 2015
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	650	10	20	165	195	325
Future Volume (vph)	650	10	20	165	195	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0			100
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	35	
Link Distance (ft)	3122			2394	2111	
Travel Time (s)	60.8			46.6	41.1	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot		Split	NA	NA	pm+ov
Protected Phases	2		8	8	4	2
Permitted Phases						4
Detector Phase	2		8	8	4	2
Switch Phase						
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0
Minimum Split (s)	20.5		10.5	10.5	30.0	20.5
Total Split (s)	44.0		16.0	16.0	30.0	44.0
Total Split (%)	48.9%		17.8%	17.8%	33.3%	48.9%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max		None	None	Max	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 89.8	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 54: Henderson Blvd & Tumwater Blvd

Ø2	Ø4	Ø8
44 s	30 s	16 s

HCM 2010 Signalized Intersection Summary
54: Henderson Blvd & Tumwater Blvd

Existing 2015
PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	650	10	20	165	195	325
Future Volume (veh/h)	650	10	20	165	195	325
Number	5	12	3	8	4	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1900	1881	1881	1881
Adj Flow Rate, veh/h	714	11	22	181	214	236
Adj No. of Lanes	0	0	0	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	786	12	26	214	547	1179
Arrive On Green	0.45	0.45	0.13	0.13	0.29	0.29
Sat Flow, veh/h	1759	27	203	1668	1881	1599
Grp Volume(v), veh/h	726	0	203	0	214	236
Grp Sat Flow(s),veh/h/ln	1788	0	1871	0	1881	1599
Q Serve(g_s), s	33.8	0.0	9.5	0.0	8.1	4.1
Cycle Q Clear(g_c), s	33.8	0.0	9.5	0.0	8.1	4.1
Prop In Lane	0.98	0.02	0.11			1.00
Lane Grp Cap(c), veh/h	800	0	240	0	547	1179
V/C Ratio(X)	0.91	0.00	0.85	0.00	0.39	0.20
Avail Cap(c_a), veh/h	800	0	251	0	547	1179
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	0.0	38.1	0.0	25.4	3.6
Incr Delay (d2), s/veh	16.0	0.0	22.3	0.0	2.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.1	0.0	6.4	0.0	4.5	5.0
LnGrp Delay(d),s/veh	39.1	0.0	60.5	0.0	27.5	4.0
LnGrp LOS	D		E		C	A
Approach Vol, veh/h	726			203	450	
Approach Delay, s/veh	39.1			60.5	15.2	
Approach LOS	D			E	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		44.0		30.0				15.5
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		40.0		26.0				12.0
Max Q Clear Time (g_c+I1), s		35.8		10.1				11.5
Green Ext Time (p_c), s		1.4		2.2				0.1

Intersection Summary		
HCM 2010 Ctrl Delay		34.4
HCM 2010 LOS		C

Notes

HCM 2010 TWSC
55: Henderson Blvd & Trails End Dr

Intersection	
Int Delay, s/veh	3.8

Movement	NWL	NWR	NET	NER	SWL	SWT
Traffic Vol, veh/h	55	50	150	90	95	140
Future Vol, veh/h	55	50	150	90	95	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	63	57	172	103	109	161

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	603	224	0	0	276	0
Stage 1	224	-	-	-	-	-
Stage 2	379	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	465	820	-	-	1293	-
Stage 1	818	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	422	820	-	-	1293	-
Mov Cap-2 Maneuver	422	-	-	-	-	-
Stage 1	818	-	-	-	-	-
Stage 2	631	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	13.4	0	3.3
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	549	1293	-
HCM Lane V/C Ratio	-	-	0.22	0.084	-
HCM Control Delay (s)	-	-	13.4	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.3	-

Lanes, Volumes, Timings
56: Littlerock Rd & Black Hills School Drwy

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	5	5	10	160	390	50
Future Volume (vph)	5	5	10	160	390	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	0	175			350
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	1065			1067	3970	
Travel Time (s)	24.2			24.3	90.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	8		1	6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	1	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	4.0	7.0	7.0	7.0
Minimum Split (s)	21.5	21.5	8.5	24.5	27.5	27.5
Total Split (s)	21.5	21.5	8.5	38.5	30.0	30.0
Total Split (%)	35.8%	35.8%	14.2%	64.2%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Max	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 54.5	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 56: Littlerock Rd & Black Hills School Drwy

HCM 2010 Signalized Intersection Summary
56: Littlerock Rd & Black Hills School Drwy

Existing 2015
PM Peak Hour

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	5	5	10	160	390	50
Future Volume (veh/h)	5	5	10	160	390	50
Number	3	18	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1881	1881	1881	1881
Adj Flow Rate, veh/h	5	5	11	168	411	53
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	33	30	715	1460	1245	1059
Arrive On Green	0.02	0.02	0.01	0.78	0.66	0.66
Sat Flow, veh/h	1810	1615	1792	1881	1881	1599
Grp Volume(v), veh/h	5	5	11	168	411	53
Grp Sat Flow(s),veh/h/ln	1810	1615	1792	1881	1881	1599
Q Serve(g_s), s	0.1	0.1	0.1	1.0	4.1	0.5
Cycle Q Clear(g_c), s	0.1	0.1	0.1	1.0	4.1	0.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	33	30	715	1460	1245	1059
V/C Ratio(X)	0.15	0.17	0.02	0.12	0.33	0.05
Avail Cap(c_a), veh/h	702	627	858	1460	1245	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	21.2	2.2	1.2	3.2	2.6
Incr Delay (d2), s/veh	2.1	2.7	0.0	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.1	0.0	0.5	2.1	0.2
LnGrp Delay(d),s/veh	23.2	23.8	2.2	1.4	3.4	2.6
LnGrp LOS	C	C	A	A	A	A
Approach Vol, veh/h	10			179	464	
Approach Delay, s/veh	23.5			1.4	3.3	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.0	33.5				38.5		5.3
Change Period (Y+Rc), s	4.5	4.5				4.5		4.5
Max Green Setting (Gmax), s	4.0	25.5				34.0		17.0
Max Q Clear Time (g_c+I1), s	2.1	6.1				3.0		2.1
Green Ext Time (p_c), s	0.0	4.4				5.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		3.1
HCM 2010 LOS		A

HCM 2010 TWSC
57: Center St & 76th Ave

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	50	10	1	10	10	20	1	245	1	10	310	40
Future Vol, veh/h	50	10	1	10	10	20	1	245	1	10	310	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	11	11	11	1	1	1	3	3	3
Mvmt Flow	54	11	1	11	11	22	1	266	1	11	337	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	665	650	359	655	671	267	380	0	0	267	0	0
Stage 1	380	380	-	269	269	-	-	-	-	-	-	-
Stage 2	285	270	-	386	402	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.21	6.61	6.31	4.11	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.599	4.099	3.399	2.209	-	-	2.227	-	-
Pot Cap-1 Maneuver	372	387	683	367	366	750	1184	-	-	1291	-	-
Stage 1	640	612	-	717	670	-	-	-	-	-	-	-
Stage 2	720	684	-	620	585	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	350	382	683	355	362	750	1184	-	-	1291	-	-
Mov Cap-2 Maneuver	350	382	-	355	362	-	-	-	-	-	-	-
Stage 1	639	605	-	716	669	-	-	-	-	-	-	-
Stage 2	687	683	-	601	579	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.3	13.2	0	0.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1184	-	-	358	485	1291	-	-
HCM Lane V/C Ratio	0.001	-	-	0.185	0.09	0.008	-	-
HCM Control Delay (s)	8	0	-	17.3	13.2	7.8	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.3	0	-	-

Item 8.

Item 8.

Lanes, Volumes, Timings
58: Old Hwy 99 & Henderson Blvd

Existing 2015
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	105	815	10	2	510	110	15	5	5	140	5	50
Future Volume (vph)	105	815	10	2	510	110	15	5	5	140	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		50	50		0	0		0	150		0
Storage Lanes	1		1	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		3620			1652			415			2274	
Travel Time (s)		49.4			22.5			9.4			51.7	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6		6	2			4			8		
Detector Phase	1	6	6	2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.5	25.5	25.5	26.5	26.5		33.5	33.5		33.5	33.5	
Total Split (s)	11.0	56.5	56.5	45.5	45.5		33.5	33.5		33.5	33.5	
Total Split (%)	12.2%	62.8%	62.8%	50.6%	50.6%		37.2%	37.2%		37.2%	37.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5			5.5		5.5	5.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	Max	Max	Max	Max		None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 77.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 58: Old Hwy 99 & Henderson Blvd

HCM 2010 Signalized Intersection Summary
58: Old Hwy 99 & Henderson Blvd

Existing 2015
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	105	815	10	2	510	110	15	5	5	140	5	50
Future Volume (veh/h)	105	815	10	2	510	110	15	5	5	140	5	50
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1863	1863	1900	1900	1845	1900	1881	1881	1900
Adj Flow Rate, veh/h	121	937	11	2	586	126	17	6	6	161	6	57
Adj No. of Lanes	1	1	1	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	2	2	2	3	3	3	1	1	1
Cap, veh/h	433	1342	1141	353	851	183	163	57	37	302	21	195
Arrive On Green	0.06	0.71	0.71	0.57	0.57	0.57	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1792	1881	1599	589	1487	320	627	428	275	1410	154	1468
Grp Volume(v), veh/h	121	937	11	2	0	712	29	0	0	161	0	63
Grp Sat Flow(s),veh/h/ln	1792	1881	1599	589	0	1806	1331	0	0	1410	0	1622
Q Serve(g_s), s	1.7	20.3	0.1	0.1	0.0	19.9	0.0	0.0	0.0	4.7	0.0	2.5
Cycle Q Clear(g_c), s	1.7	20.3	0.1	10.4	0.0	19.9	2.5	0.0	0.0	7.2	0.0	2.5
Prop In Lane	1.00		1.00	1.00		0.18	0.59		0.21	1.00		0.90
Lane Grp Cap(c), veh/h	433	1342	1141	353	0	1035	257	0	0	302	0	216
V/C Ratio(X)	0.28	0.70	0.01	0.01	0.00	0.69	0.11	0.00	0.00	0.53	0.00	0.29
Avail Cap(c_a), veh/h	457	1342	1141	353	0	1035	633	0	0	666	0	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.3	5.9	3.0	11.7	0.0	10.8	27.3	0.0	0.0	29.8	0.0	28.0
Incr Delay (d2), s/veh	0.1	3.0	0.0	0.0	0.0	3.7	0.1	0.0	0.0	0.5	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	11.5	0.1	0.0	0.0	10.8	0.5	0.0	0.0	3.1	0.0	1.1
LnGrp Delay(d),s/veh	8.4	8.9	3.0	11.7	0.0	14.5	27.4	0.0	0.0	30.4	0.0	28.2
LnGrp LOS	A	A	A	B		B	C			C		C
Approach Vol, veh/h		1069			714			29			224	
Approach Delay, s/veh		8.8			14.5			27.4			29.8	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		8
Phs Duration (G+Y+Rc), s	10.0	46.5		15.0		56.5		15.0
Change Period (Y+Rc), s	5.5	5.5		5.5		5.5		5.5
Max Green Setting (Gmax), s	5.5	40.0		28.0		51.0		28.0
Max Q Clear Time (g_c+I1), s	3.7	21.9		4.5		22.3		9.2
Green Ext Time (p_c), s	0.0	10.5		0.4		13.5		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.4
HCM 2010 LOS	B

HCM 2010 TWSC
59: Old Hwy 99 & 79th Ave

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Traffic Vol, veh/h	1	1	10	10	0	110	130	840	0	1	430	15
Future Vol, veh/h	1	1	10	10	0	110	130	840	0	1	430	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	300	250	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	11	11	0	116	137	884	0	1	453	16

Major/Minor	Minor1			Minor2			Major1			Major2		
Conflicting Flow All	1621	1629	884	1627	1621	461	468	0	0	884	0	0
Stage 1	1158	1158	-	463	463	-	-	-	-	-	-	-
Stage 2	463	471	-	1164	1158	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	83	102	344	82	103	603	1099	-	-	770	-	-
Stage 1	239	270	-	581	566	-	-	-	-	-	-	-
Stage 2	579	560	-	238	272	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	61	89	344	71	90	603	1099	-	-	770	-	-
Mov Cap-2 Maneuver	61	89	-	71	90	-	-	-	-	-	-	-
Stage 1	209	236	-	509	565	-	-	-	-	-	-	-
Stage 2	467	559	-	201	238	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	23.1	16.7	1.2	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	WBLn2	SEL	SET	SER
Capacity (veh/h)	770	-	-	212	71	603	1099	-	-
HCM Lane V/C Ratio	0.001	-	-	0.06	0.148	0.192	0.125	-	-
HCM Control Delay (s)	9.7	0	-	23.1	64.3	12.4	8.7	-	-
HCM Lane LOS	A	A	-	C	F	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.5	0.7	0.4	-	-

HCM 2010 TWSC
60: Kimmie St & 83rd Ave

Existing 2015
PM Peak Hour

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	45	15	30	15	5	60
Future Vol, veh/h	45	15	30	15	5	60
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	3	3	9	9	3	3
Mvmt Flow	55	18	37	18	6	73

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	131	46	0	0	55	0
Stage 1	46	-	-	-	-	-
Stage 2	85	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	861	1021	-	-	1544	-
Stage 1	974	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	858	1021	-	-	1544	-
Mov Cap-2 Maneuver	858	-	-	-	-	-
Stage 1	974	-	-	-	-	-
Stage 2	932	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	0.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	894	1544	-
HCM Lane V/C Ratio	-	-	0.082	0.004	-
HCM Control Delay (s)	-	-	9.4	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
61: 83rd Ave & Center St

Existing 2015
PM Peak Hour

Intersection						
Int Delay, s/veh	7.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	70	25	10	90	155	70
Future Vol, veh/h	70	25	10	90	155	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	3	3	1	1
Mvmt Flow	80	28	11	102	176	80

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	114	0	-	0	251	63
Stage 1	-	-	-	-	63	-
Stage 2	-	-	-	-	188	-
Critical Hdwy	4.11	-	-	-	7.11	6.21
Critical Hdwy Stg 1	-	-	-	-	6.11	-
Critical Hdwy Stg 2	-	-	-	-	6.11	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1481	-	-	-	704	1004
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1481	-	-	-	674	1004
Mov Cap-2 Maneuver	-	-	-	-	674	-
Stage 1	-	-	-	-	898	-
Stage 2	-	-	-	-	771	-

Approach	EB	WB	SB
HCM Control Delay, s	5.6	0	12.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1481	-	-	-	751
HCM Lane V/C Ratio	0.054	-	-	-	0.34
HCM Control Delay (s)	7.6	0	-	-	12.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.5

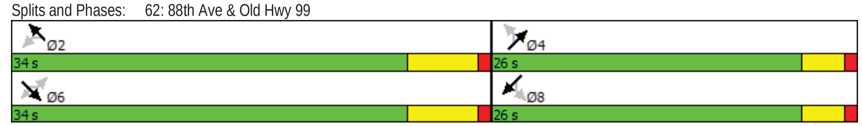
Lanes, Volumes, Timings
62: 88th Ave & Old Hwy 99

Existing 2015
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	670	175	5	270	0	180	5	25	2	5	1
Future Volume (vph)	0	670	175	5	270	0	180	5	25	2	5	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		150	150		0	150		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		3849			1410			1160			265	
Travel Time (s)		52.5			19.2			26.4			6.0	
Peak Hour Factor	0.92	0.90	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	2%	3%	2%	3%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6		6	2			4			8		
Detector Phase	6	6	6	2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	26.0	26.0	26.0	26.0	26.0		24.0	24.0		26.0	26.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		26.0	26.0		26.0	26.0	
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%		43.3%	43.3%		43.3%	43.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 55.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 62: 88th Ave & Old Hwy 99



HCM 2010 Signalized Intersection Summary
62: 88th Ave & Old Hwy 99

Existing 2015
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	670	175	5	270	0	180	5	25	2	5	1
Future Volume (veh/h)	0	670	175	5	270	0	180	5	25	2	5	1
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1881	1881	1881	1881	1900	1845	1847	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	744	194	6	300	0	200	5	28	2	5	1
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.90	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.92	0.92	0.92
Percent Heavy Veh, %	2	1	1	1	1	1	3	2	2	2	2	2
Cap, veh/h	155	1131	961	359	1131	0	412	45	251	136	243	40
Arrive On Green	0.00	0.60	0.60	0.60	0.60	0.00	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1075	1881	1599	601	1881	0	1391	243	1363	211	1319	219
Grp Volume(v), veh/h	0	744	194	6	300	0	200	0	33	8	0	0
Grp Sat Flow(s),veh/h/ln	1075	1881	1599	601	1881	0	1391	0	1607	1748	0	0
Q Serve(g_s), s	0.0	12.2	2.6	0.3	3.5	0.0	6.2	0.0	0.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	12.2	2.6	12.5	3.5	0.0	6.3	0.0	0.8	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.85	0.25		0.12
Lane Grp Cap(c), veh/h	155	1131	961	359	1131	0	412	0	296	419	0	0
V/C Ratio(X)	0.00	0.66	0.20	0.02	0.27	0.00	0.49	0.00	0.11	0.02	0.00	0.00
Avail Cap(c_a), veh/h	155	1131	961	359	1131	0	813	0	759	901	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	6.1	4.2	10.2	4.4	0.0	18.1	0.0	15.8	15.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	3.0	0.5	0.1	0.6	0.0	0.9	0.0	0.2	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	7.1	1.3	0.1	1.9	0.0	2.5	0.0	0.4	0.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	9.1	4.7	10.3	5.0	0.0	18.9	0.0	16.0	15.6	0.0	0.0
LnGrp LOS		A	A	B	A		B		B	B		
Approach Vol, veh/h		938			306			233			8	
Approach Delay, s/veh		8.2			5.1			18.5			15.6	
Approach LOS		A			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		34.0		12.6		34.0		12.6
Change Period (Y+Rc), s		6.0		4.0		6.0		4.0
Max Green Setting (Gmax), s		28.0		22.0		28.0		22.0
Max Q Clear Time (g_c+I1), s		14.5		8.3		14.2		2.2
Green Ext Time (p_c), s		5.8		0.6		5.9		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	9.2
HCM 2010 LOS	A

Lanes, Volumes, Timings
63: I-5 SB Ramps & 93rd Ave

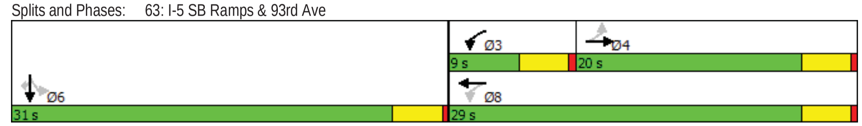
Existing 2015
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	295	30	145	125	0	0	0	0	500	0	285
Future Volume (vph)	0	295	30	145	125	0	0	0	0	500	0	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		300
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			40			30			30	
Link Distance (ft)		1124			936			1099			1644	
Travel Time (s)		25.5			16.0			25.0			37.4	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases	4			8						6		6
Detector Phase	4	4		3	8					6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		8.0	20.0					20.0	20.0	20.0
Total Split (s)	20.0	20.0		9.0	29.0					31.0	31.0	31.0
Total Split (%)	33.3%	33.3%		15.0%	48.3%					51.7%	51.7%	51.7%
Yellow Time (s)	3.5	3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	0.0
Total Lost Time (s)		4.0		4.0	4.0						4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None					Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 56.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 63: I-5 SB Ramps & 93rd Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	295	30	145	125	0	0	0	0	500	0	285
Future Volume (veh/h)	0	295	30	145	125	0	0	0	0	500	0	285
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1743	1743	0				1900	1827	1827
Adj Flow Rate, veh/h	0	335	34	165	142	0				568	0	131
Adj No. of Lanes	0	1	0	1	1	0				0	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	9	9	0				4	4	4
Cap, veh/h	0	402	41	315	689	0				812	0	725
Arrive On Green	0.00	0.24	0.24	0.09	0.40	0.00				0.47	0.00	0.47
Sat Flow, veh/h	0	1681	171	1660	1743	0				1740	0	1553
Grp Volume(v), veh/h	0	0	369	165	142	0				568	0	131
Grp Sat Flow(s),veh/h/ln	0	0	1851	1660	1743	0				1740	0	1553
Q Serve(g_s), s	0.0	0.0	11.0	4.1	3.1	0.0				15.0	0.0	2.8
Cycle Q Clear(g_c), s	0.0	0.0	11.0	4.1	3.1	0.0				15.0	0.0	2.8
Prop In Lane	0.00		0.09	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	0	443	315	689	0				812	0	725
V/C Ratio(X)	0.00	0.00	0.83	0.52	0.21	0.00				0.70	0.00	0.18
Avail Cap(c_a), veh/h	0	0	512	315	753	0				812	0	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	20.9	14.9	11.5	0.0				12.2	0.0	9.0
Incr Delay (d2), s/veh	0.0	0.0	10.0	1.6	0.1	0.0				5.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	6.8	2.0	1.5	0.0				8.2	0.0	1.3
LnGrp Delay(d),s/veh	0.0	0.0	30.9	16.5	11.7	0.0				17.2	0.0	9.5
LnGrp LOS			C	B	B					B		A
Approach Vol, veh/h		369			307						699	
Approach Delay, s/veh		30.9			14.3						15.8	
Approach LOS		C			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			9.0	17.9		31.0		26.9
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			5.0	16.0		27.0		25.0
Max Q Clear Time (g_c+I1), s			6.1	13.0		17.0		5.1
Green Ext Time (p_c), s			0.0	0.9		3.1		3.0

Intersection Summary		
HCM 2010 Ctrl Delay		19.5
HCM 2010 LOS		B

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	245	505	0	0	250	340	45	0	115	0	0	0
Future Vol, veh/h	245	505	0	0	250	340	45	0	115	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	Yield	-	-	None
Storage Length	125	-	-	-	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	8	8	8	14	14	14	0	0	0
Mvmt Flow	261	537	0	0	266	362	48	0	122	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	266	0	-	-	-	0	1325	1325	537
Stage 1	-	-	-	-	-	-	1059	1059	-
Stage 2	-	-	-	-	-	-	266	266	-
Critical Hdwy	4.13	-	-	-	-	-	6.54	6.64	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	5.54	5.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.54	5.64	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.626	4.126	3.426
Pot Cap-1 Maneuver	1292	-	0	0	-	-	162	147	521
Stage 1	-	-	0	0	-	-	316	287	-
Stage 2	-	-	0	0	-	-	752	667	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1292	-	-	-	-	-	129	0	521
Mov Cap-2 Maneuver	-	-	-	-	-	-	129	0	-
Stage 1	-	-	-	-	-	-	252	0	-
Stage 2	-	-	-	-	-	-	752	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.8	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	725	1292	-	-	-
HCM Lane V/C Ratio	0.235	0.202	-	-	-
HCM Control Delay (s)	11.5	8.5	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	0.9	0.8	-	-	-

Item 8.

HCM 2010 TWSC
65: Kimmie St & 93rd Ave

Existing 2015
PM Peak Hour

Intersection												
Int Delay, s/veh	1.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	25	460	15	5	410	5	15	1	10	5	5	50
Future Vol, veh/h	25	460	15	5	410	5	15	1	10	5	5	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	1	1	1	0	0	0	5	5	5
Mvmt Flow	27	489	16	5	436	5	16	1	11	5	5	53

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	441	0	0	505	0	0	1030	1003	497	1005	1008	439
Stage 1	-	-	-	-	-	-	551	551	-	449	449	-
Stage 2	-	-	-	-	-	-	479	452	-	556	559	-
Critical Hdwy	4.14	-	-	4.11	-	-	7.1	6.5	6.2	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Follow-up Hdwy	2.236	-	-	2.209	-	-	3.5	4	3.3	3.545	4.045	3.345
Pot Cap-1 Maneuver	1108	-	-	1065	-	-	214	244	577	217	238	612
Stage 1	-	-	-	-	-	-	522	519	-	584	567	-
Stage 2	-	-	-	-	-	-	571	574	-	510	506	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1108	-	-	1065	-	-	186	234	577	206	229	612
Mov Cap-2 Maneuver	-	-	-	-	-	-	186	234	-	206	229	-
Stage 1	-	-	-	-	-	-	504	501	-	564	564	-
Stage 2	-	-	-	-	-	-	513	571	-	483	489	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.1	20.9	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	254	1108	-	-	1065	-	-	469
HCM Lane V/C Ratio	0.109	0.024	-	-	0.005	-	-	0.136
HCM Control Delay (s)	20.9	8.3	0	-	8.4	0	-	13.9
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.4	0.1	-	-	0	-	-	0.5

HCM 2010 AWSC
66: Case Rd & 93rd Ave

Existing 2015
PM Peak Hour

Intersection	
Intersection Delay, s/veh	20.3
Intersection LOS	C

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NEU	NEL	NET	NER
Traffic Vol, veh/h	0	2	315	165	0	55	295	30	0	80	20	30
Future Vol, veh/h	0	2	315	165	0	55	295	30	0	80	20	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	3	3	2	2	2	2	2	0	0	0
Mvmt Flow	0	2	342	179	0	60	321	33	0	87	22	33
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	NE
Opposing Approach	WB	EB	SW
Opposing Lanes	2	1	1
Conflicting Approach Left	SW	NE	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NE	SW	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	25.4	18.8	12.2
HCM LOS	D	C	B

Lane	NELn1	EBLn1	WBLn1	WBLn2	SWLn1
Vol Left, %	62%	0%	16%	0%	50%
Vol Thru, %	15%	65%	84%	0%	50%
Vol Right, %	23%	34%	0%	100%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	130	482	350	30	101
LT Vol	80	2	55	0	50
Through Vol	20	315	295	0	50
RT Vol	30	165	0	30	1
Lane Flow Rate	141	524	380	33	110
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.266	0.784	0.648	0.048	0.213
Departure Headway (Hd)	6.769	5.388	6.132	5.341	7
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	534	665	582	663	515
Service Time	4.775	3.476	3.926	3.134	5.008
HCM Lane V/C Ratio	0.264	0.788	0.653	0.05	0.214
HCM Control Delay	12.2	25.4	19.7	8.4	11.9
HCM Lane LOS	B	D	C	A	B
HCM 95th-tile Q	1.1	7.6	4.7	0.2	0.8

HCM 2010 AWSC
66: Case Rd & 93rd Ave

Existing 2015
PM Peak Hour

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SWU	SWL	SWT	SWR
Traffic Vol, veh/h	0	50	50	1
Future Vol, veh/h	0	50	50	1
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	54	54	1
Number of Lanes	0	0	1	0

Approach	SW
Opposing Approach	NE
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	11.9
HCM LOS	B

Lane

HCM 2010 AWSC
67: Tilley Rd (South) & 93rd Ave

Existing 2015
PM Peak Hour

Intersection	
Intersection Delay, s/veh	14.5
Intersection LOS	B

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Traffic Vol, veh/h	0	240	155	0	85	235	0	130	65
Future Vol, veh/h	0	240	155	0	85	235	0	130	65
Peak Hour Factor	0.92	0.87	0.87	0.92	0.87	0.87	0.92	0.87	0.87
Heavy Vehicles, %	2	3	3	2	2	2	2	1	1
Mvmt Flow	0	276	178	0	98	270	0	149	75
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	15.8	14.4	12.2
HCM LOS	C	B	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	67%	0%	27%
Vol Thru, %	0%	61%	73%
Vol Right, %	33%	39%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	195	395	320
LT Vol	130	0	85
Through Vol	0	240	235
RT Vol	65	155	0
Lane Flow Rate	224	454	368
Geometry Grp	1	1	1
Degree of Util (X)	0.364	0.622	0.54
Departure Headway (Hd)	5.849	4.933	5.287
Convergence, Y/N	Yes	Yes	Yes
Cap	614	731	680
Service Time	3.889	2.965	3.321
HCM Lane V/C Ratio	0.365	0.621	0.541
HCM Control Delay	12.2	15.8	14.4
HCM Lane LOS	B	C	B
HCM 95th-tile Q	1.7	4.4	3.3

HCM 2010 TWSC
68: 93rd Ave & Tilley Rd (North)

Existing 2015
PM Peak Hour

Intersection						
Int Delay, s/veh	5.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	115	190	95	10	15	225
Future Vol, veh/h	115	190	95	10	15	225
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	250	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	3	3	1	1
Mvmt Flow	134	221	110	12	17	262

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	122	0	-	0	604	116
Stage 1	-	-	-	-	116	-
Stage 2	-	-	-	-	488	-
Critical Hdwy	4.12	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.218	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1465	-	-	-	463	939
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	619	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1465	-	-	-	415	939
Mov Cap-2 Maneuver	-	-	-	-	415	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	555	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1465	-	-	-	415	939
HCM Lane V/C Ratio	0.091	-	-	-	0.042	0.279
HCM Control Delay (s)	7.7	0	-	-	14.1	10.3
HCM Lane LOS	A	A	-	-	B	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.1	1.1

HCM 2010 TWSC
69: 93rd Ave & Old Hwy 99

Existing 2015
PM Peak Hour

Intersection						
Int Delay, s/veh	3.2					

Movement	EBT	EBR	WBL	WBT	NEL	NER
Traffic Vol, veh/h	630	30	70	215	15	155
Future Vol, veh/h	630	30	70	215	15	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	450	300	-	300	0
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	685	33	76	234	16	168

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	685	0	1071	685
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	386	-
Critical Hdwy	-	-	4.12	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.218	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	908	-	246	450
Stage 1	-	-	-	-	502	-
Stage 2	-	-	-	-	689	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	908	-	225	450
Mov Cap-2 Maneuver	-	-	-	-	419	-
Stage 1	-	-	-	-	502	-
Stage 2	-	-	-	-	631	-

Approach	EB	WB	NE
HCM Control Delay, s	0	2.3	17.4
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	419	450	-	-	908	-
HCM Lane V/C Ratio	0.039	0.374	-	-	0.084	-
HCM Control Delay (s)	13.9	17.7	-	-	9.3	-
HCM Lane LOS	B	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	1.7	-	-	0.3	-

Intersection												
Intersection Delay, s/veh	17.4											
Intersection LOS	C											

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	55	100	10	0	165	55	125	0	5	240	140
Future Vol, veh/h	0	55	100	10	0	165	55	125	0	5	240	140
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	6	6	6	2	9	9	9	2	4	4	4
Mvmt Flow	0	58	105	11	0	174	58	132	0	5	253	147
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	12.4	14	25.1
HCM LOS	B	B	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	63%	0%	91%	0%	31%	0%	86%
Vol Right, %	0%	37%	0%	9%	0%	69%	0%	14%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	380	55	110	165	180	50	180
LT Vol	5	0	55	0	165	0	50	0
Through Vol	0	240	0	100	0	55	0	155
RT Vol	0	140	0	10	0	125	0	25
Lane Flow Rate	5	400	58	116	174	189	53	189
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.011	0.732	0.13	0.241	0.372	0.353	0.112	0.372
Departure Headway (Hd)	7.36	6.588	8.061	7.482	7.712	6.704	7.671	7.059
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	486	548	445	479	467	536	467	510
Service Time	5.101	4.328	5.813	5.234	5.459	4.45	5.419	4.807
HCM Lane V/C Ratio	0.01	0.73	0.13	0.242	0.373	0.353	0.113	0.371
HCM Control Delay	10.2	25.3	12	12.6	15	13.1	11.4	14
HCM Lane LOS	B	D	B	B	B	B	B	B
HCM 95th-tile Q	0	6.1	0.4	0.9	1.7	1.6	0.4	1.7

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	50	155	25
Future Vol, veh/h	0	50	155	25
Peak Hour Factor	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	3	3	3
Mvmt Flow	0	53	163	26
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	13.4
HCM LOS	B

Lane

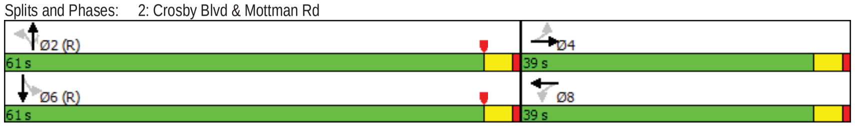
Lanes, Volumes, Timings
2: Crosby Blvd & Mottman Rd

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	230	35	5	30	125	45	665	120	190	850	535
Future Volume (vph)	205	230	35	5	30	125	45	665	120	190	850	535
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	200		0	100		0
Storage Lanes	1		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		940			1116			645			417	
Travel Time (s)		21.4			25.4			14.7			9.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		20.5	20.5	20.5	20.5	20.5	
Total Split (s)	39.0	39.0		39.0	39.0		61.0	61.0	61.0	61.0	61.0	
Total Split (%)	39.0%	39.0%		39.0%	39.0%		61.0%	61.0%	61.0%	61.0%	61.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 82 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 60	
Control Type: Actuated-Coordinated	

Splits and Phases: 2: Crosby Blvd & Mottman Rd



HCM 2010 Signalized Intersection Summary
2: Crosby Blvd & Mottman Rd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	230	35	5	30	125	45	665	120	190	850	535
Future Volume (veh/h)	205	230	35	5	30	125	45	665	120	190	850	535
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1900	1900	1900	1881	1881	1881	1845	1845	1900
Adj Flow Rate, veh/h	216	242	37	5	32	132	47	700	126	200	895	0
Adj No. of Lanes	1	1	0	0	1	0	1	1	1	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	0	0	0	1	1	1	3	3	3
Cap, veh/h	337	388	59	41	87	322	413	1245	1058	374	2319	0
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.66	0.66	0.66	0.66	0.66	0.00
Sat Flow, veh/h	1205	1563	239	15	349	1297	625	1881	1599	654	3597	0
Grp Volume(v), veh/h	216	0	279	169	0	0	47	700	126	200	895	0
Grp Sat Flow(s),veh/h/ln	1205	0	1802	1661	0	0	625	1881	1599	654	1752	0
Q Serve(g_s), s	11.4	0.0	13.8	0.0	0.0	0.0	3.7	20.1	2.9	23.7	11.6	0.0
Cycle Q Clear(g_c), s	19.9	0.0	13.8	8.5	0.0	0.0	15.3	20.1	2.9	43.8	11.6	0.0
Prop In Lane	1.00		0.13	0.03		0.78	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	337	0	448	450	0	0	413	1245	1058	374	2319	0
V/C Ratio(X)	0.64	0.00	0.62	0.38	0.00	0.00	0.11	0.56	0.12	0.54	0.39	0.00
Avail Cap(c_a), veh/h	454	0	622	608	0	0	413	1245	1058	374	2319	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.89	0.89	0.89	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.6	0.0	33.4	31.4	0.0	0.0	11.2	9.1	6.2	20.9	7.7	0.0
Incr Delay (d2), s/veh	2.0	0.0	1.4	0.5	0.0	0.0	0.5	1.6	0.2	5.4	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	0.0	7.0	4.0	0.0	0.0	0.7	10.9	1.3	4.8	5.8	0.0
LnGrp Delay(d),s/veh	38.7	0.0	34.8	31.9	0.0	0.0	11.7	10.8	6.4	26.3	8.2	0.0
LnGrp LOS	D		C	C			B	B	A	C	A	
Approach Vol, veh/h		495			169			873			1095	
Approach Delay, s/veh		36.5			31.9			10.2			11.5	
Approach LOS		D			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		70.7		29.3		70.7		29.3
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		56.5		34.5		56.5		34.5
Max Q Clear Time (g_c+I1), s		22.1		21.9		45.8		10.5
Green Ext Time (p_c), s		19.7		3.0		8.4		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

Lanes, Volumes, Timings
3: Crosby Blvd & Irving St

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	50	45	40	45	220	35	505	25	150	660	100
Future Volume (vph)	75	50	45	40	45	220	35	505	25	150	660	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		200	0		150	200		0	0		250
Storage Lanes	0		1	0		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			2725			1710			645	
Travel Time (s)		10.6			61.9			38.9			14.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	8%	8%	8%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.5	20.5	20.5	20.5	20.5	20.5	8.5	20.5		20.5	20.5	20.5
Total Split (s)	8.5	29.0	29.0	20.5	20.5	20.5	8.5	46.0		37.5	37.5	37.5
Total Split (%)	11.3%	38.7%	38.7%	27.3%	27.3%	27.3%	11.3%	61.3%		50.0%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 63.8
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Crosby Blvd & Irving St

HCM 2010 Signalized Intersection Summary
3: Crosby Blvd & Irving St

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	50	45	40	45	220	35	505	25	150	660	100
Future Volume (veh/h)	75	50	45	40	45	220	35	505	25	150	660	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1759	1759	1900	1881	1881	1881	1881	1900	1863	1863	1863
Adj Flow Rate, veh/h	79	53	47	42	47	232	37	532	26	158	695	0
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	8	8	8	1	1	1	1	1	1	2	2	2
Cap, veh/h	94	39	282	153	141	301	400	1186	58	561	1051	893
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.03	0.67	0.67	0.56	0.56	0.00
Sat Flow, veh/h	9	207	1495	357	750	1599	1792	1779	87	848	1863	1583
Grp Volume(v), veh/h	132	0	47	89	0	232	37	0	558	158	695	0
Grp Sat Flow(s),veh/h/ln	216	0	1495	1108	0	1599	1792	0	1866	848	1863	1583
Q Serve(g_s), s	6.0	0.0	1.6	0.6	0.0	8.6	0.5	0.0	8.8	6.8	16.1	0.0
Cycle Q Clear(g_c), s	6.0	0.0	1.6	6.6	0.0	8.6	0.5	0.0	8.8	9.2	16.1	0.0
Prop In Lane	0.60		1.00	0.47		1.00	1.00		0.05	1.00		1.00
Lane Grp Cap(c), veh/h	0	0	282	294	0	301	400	0	1244	561	1051	893
V/C Ratio(X)	0.00	0.00	0.17	0.30	0.00	0.77	0.09	0.00	0.45	0.28	0.66	0.00
Avail Cap(c_a), veh/h	0	0	589	401	0	411	461	0	1244	561	1051	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	21.2	22.1	0.0	24.0	7.2	0.0	4.9	8.6	9.4	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.3	0.6	0.0	6.0	0.1	0.0	1.2	1.3	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.7	1.5	0.0	4.2	0.2	0.0	4.9	1.8	9.1	0.0
LnGrp Delay(d),s/veh	0.0	0.0	21.4	22.6	0.0	29.9	7.3	0.0	6.1	9.9	12.7	0.0
LnGrp LOS			C	C		C	A		A	A	B	
Approach Vol, veh/h		179			321			595			853	
Approach Delay, s/veh		5.6			27.9			6.2			12.2	
Approach LOS		A			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		8
Phs Duration (G+Y+Rc), s		46.0		16.2	6.4	39.6		16.2
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		41.5		24.5	4.0	33.0		16.0
Max Q Clear Time (g_c+I1), s		10.8		8.0	2.5	18.1		10.6
Green Ext Time (p_c), s		12.1		2.1	0.0	8.3		1.2

Intersection Summary

HCM 2010 Ctrl Delay		12.3
HCM 2010 LOS		B

Item 8.

Intersection												
Intersection Delay, s/veh	9.5											
Intersection LOS	A											

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	5	15	235	0	1	25	1	0	245	5	1
Future Vol, veh/h	0	5	15	235	0	1	25	1	0	245	5	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	1	1	1	2	0	0	0	2	1	1	1
Mvmt Flow	0	5	16	247	0	1	26	1	0	258	5	1
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.9	8.1	10.3
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	98%	2%	4%	0%
Vol Thru, %	2%	6%	93%	50%
Vol Right, %	0%	92%	4%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	251	255	27	10
LT Vol	245	5	1	0
Through Vol	5	15	25	5
RT Vol	1	235	1	5
Lane Flow Rate	264	268	28	11
Geometry Grp	1	1	1	1
Degree of Util (X)	0.349	0.305	0.038	0.013
Departure Headway (Hd)	4.752	4.089	4.859	4.56
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	756	880	736	781
Service Time	2.788	2.109	2.895	2.608
HCM Lane V/C Ratio	0.349	0.305	0.038	0.014
HCM Control Delay	10.3	8.9	8.1	7.7
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	1.6	1.3	0.1	0

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	5	5
Future Vol, veh/h	0	0	5	5
Peak Hour Factor	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	0	5	5
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.7
HCM LOS	A

Lane

HCM 2010 TWSC
5: Crosby Blvd & Barnes Rd

Projected 2040 No Build
PM Peak Hour

Intersection												
Int Delay, s/veh	6.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	1	1	10	5	285	1	210	5	345	275	20
Future Vol, veh/h	10	1	1	10	5	285	1	210	5	345	275	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	10	10	10	2	2	2	4	4	4	2	2	2
Mvmt Flow	11	1	1	11	5	300	1	221	5	363	289	21

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1254	1254	300	1253	1263	224	311	0	0	226	0	0
Stage 1	1026	1026	-	226	226	-	-	-	-	-	-	-
Stage 2	228	228	-	1027	1037	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.12	6.52	6.22	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.518	4.018	3.318	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	143	166	721	149	170	815	1238	-	-	1342	-	-
Stage 1	274	302	-	777	717	-	-	-	-	-	-	-
Stage 2	757	701	-	283	308	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	69	121	721	117	124	815	1238	-	-	1342	-	-
Mov Cap-2 Maneuver	69	121	-	117	124	-	-	-	-	-	-	-
Stage 1	274	220	-	776	716	-	-	-	-	-	-	-
Stage 2	474	700	-	205	225	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	59.9	13.4	0	4.7
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1238	-	-	78	119	815	1342	-	-
HCM Lane V/C Ratio	0.001	-	-	0.162	0.133	0.368	0.271	-	-
HCM Control Delay (s)	7.9	0	-	59.9	39.8	12	8.7	-	-
HCM Lane LOS	A	A	-	F	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5	0.4	1.7	1.1	-	-

HCM 2010 TWSC
6: Black Lake Belmore Rd & Black Lake Blvd

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	111.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	190	85	250	410	210	230
Future Vol, veh/h	190	85	250	410	210	230
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	0	0	1	1
Mvmt Flow	200	89	263	432	221	242

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	289	0	1203	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	958	-
Critical Hdwy	-	-	4.1	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.2	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1284	-	~ 205	796
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	374	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1284	-	~ 163	796
Mov Cap-2 Maneuver	-	-	-	-	~ 163	-
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	297	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	$ 344.5
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	279	-	-	1284	-
HCM Lane V/C Ratio	1.66	-	-	0.205	-
HCM Control Delay (s)	$ 344.5	-	-	8.5	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	29	-	-	0.8	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 2010 TWSC
7: RW Johnson Rd & Sapp Rd

Projected 2040 No Build
PM Peak Hour

Intersection												
Int Delay, s/veh	7.7											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	20	50	5	30	70	110	5	25	20	150	40	50
Future Vol, veh/h	20	50	5	30	70	110	5	25	20	150	40	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	3	3	3
Mvmt Flow	21	53	5	32	74	116	5	26	21	158	42	53

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	189	0	0	58	0	0	339	350	55	316	295	132
Stage 1	-	-	-	-	-	-	97	97	-	195	195	-
Stage 2	-	-	-	-	-	-	242	253	-	121	100	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.527	4.027	3.327
Pot Cap-1 Maneuver	1379	-	-	1553	-	-	619	577	1018	635	615	915
Stage 1	-	-	-	-	-	-	914	819	-	804	737	-
Stage 2	-	-	-	-	-	-	766	701	-	881	810	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1379	-	-	1553	-	-	536	555	1018	582	591	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	536	555	-	582	591	-
Stage 1	-	-	-	-	-	-	899	806	-	791	720	-
Stage 2	-	-	-	-	-	-	664	685	-	821	797	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	1.1	10.8	14.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	675	1379	-	-	1553	-	-	631
HCM Lane V/C Ratio	0.078	0.015	-	-	0.02	-	-	0.4
HCM Control Delay (s)	10.8	7.7	0	-	7.4	0	-	14.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.1	-	-	1.9

HCM 2010 TWSC
8: Sapp Rd & Crosby Blvd

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	5.6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	225	20	230	200	15	205
Future Vol, veh/h	225	20	230	200	15	205
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	237	21	242	211	16	216

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	594	347	0	0	453	0
Stage 1	347	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.1	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.2	-
Pot Cap-1 Maneuver	469	698	-	-	1118	-
Stage 1	718	-	-	-	-	-
Stage 2	796	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	462	698	-	-	1118	-
Mov Cap-2 Maneuver	462	-	-	-	-	-
Stage 1	718	-	-	-	-	-
Stage 2	785	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.9	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	462	698	1118	-
HCM Lane V/C Ratio	-	-	0.513	0.03	0.014	-
HCM Control Delay (s)	-	-	20.7	10.3	8.3	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	2.9	0.1	0	-

9: Black Lake Belmore Rd & 49th Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Total Del/Veh (s)	8.2	9.5	5.0	10.7	12.0	7.2	10.8	11.7	7.4	1.8	2.2	1.2

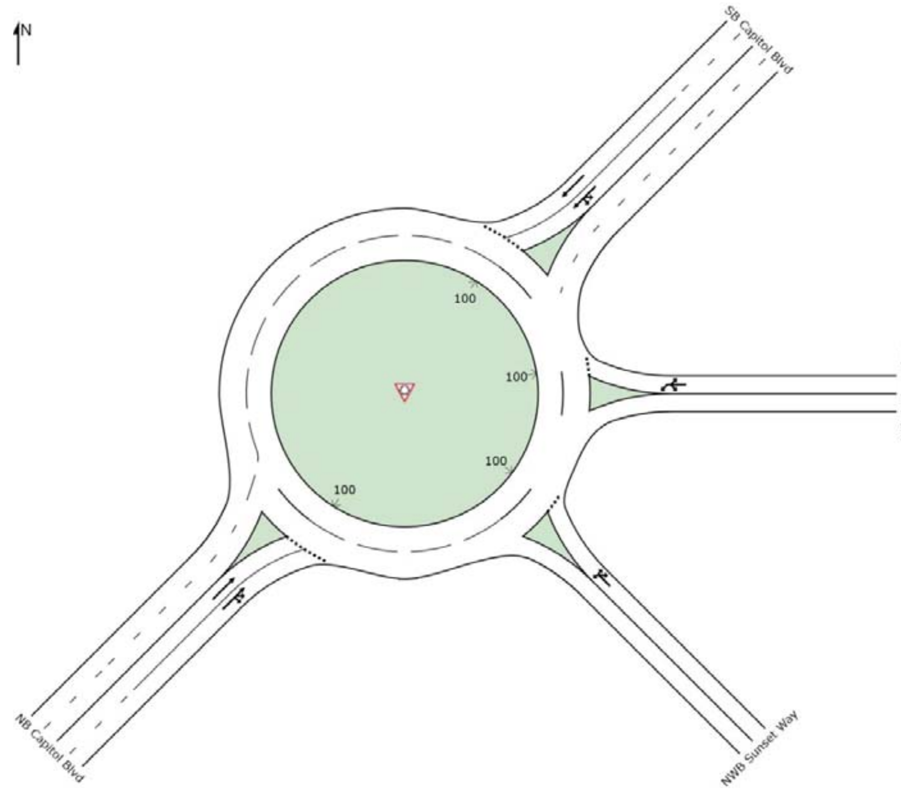
9: Black Lake Belmore Rd & 49th Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.3
Total Del/Veh (s)	6.7

SITE LAYOUT

Site: 10) Carlyon Ave at Capitol Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout



Organisation: SCJ ALLIANCE | Created: Tuesday, February 16, 2016 5:44:03 PM
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MOVEMENT SUMMARY

Site: 10) Carlyon Ave at Capitol Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NWB Sunset Way											
3x	L2	47	2.0	0.130	7.9	LOS A	0.5	12.8	0.65	0.65	32.2
18x	R2	21	2.0	0.130	7.9	LOS A	0.5	12.8	0.65	0.65	31.2
18bx	R3	5	2.0	0.130	7.9	LOS A	0.5	12.8	0.65	0.65	30.8
Approach		74	2.0	0.130	7.9	LOS A	0.5	12.8	0.65	0.65	31.8
East: WB Carlyon Ave											
1b	L3	11	2.0	0.476	15.4	LOS B	2.5	62.8	0.74	0.80	29.7
1a	L1	142	2.0	0.476	15.4	LOS B	2.5	62.8	0.74	0.80	29.0
16b	R3	95	2.0	0.476	15.4	LOS B	2.5	62.8	0.74	0.80	28.2
Approach		247	2.0	0.476	15.4	LOS B	2.5	62.8	0.74	0.80	28.7
NorthEast: SB Capitol Blvd											
1bx	L3	79	2.0	0.728	15.0	LOS B	8.0	203.6	0.71	0.54	30.7
1x	L2	21	2.0	0.728	15.0	LOS B	8.0	203.6	0.71	0.54	30.4
6x	T1	1537	2.0	0.728	14.9	LOS B	8.0	203.6	0.71	0.53	30.5
Approach		1637	2.0	0.728	14.9	LOS B	8.0	203.6	0.71	0.53	30.5
SouthWest: NB Capitol Blvd											
2x	T1	905	2.0	0.450	7.6	LOS A	3.2	80.2	0.38	0.21	33.9
12ax	R1	158	2.0	0.450	7.6	LOS A	3.2	80.2	0.38	0.21	33.6
12x	R2	26	2.0	0.450	7.6	LOS A	3.2	80.2	0.38	0.21	32.9
Approach		1089	2.0	0.450	7.6	LOS A	3.2	80.2	0.38	0.21	33.9
All Vehicles		3047	2.0	0.728	12.2	LOS B	8.0	203.6	0.59	0.44	31.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	1.4

Movement	SEL	SET	NWT	NWR	SWL	SWR
Traffic Vol, veh/h	165	405	275	140	0	0
Future Vol, veh/h	165	405	275	140	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	174	426	289	147	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	437	0	-	0	1137	363
Stage 1	-	-	-	-	363	-
Stage 2	-	-	-	-	774	-
Critical Hdwy	4.1	-	-	-	7.1	6.2
Critical Hdwy Stg 1	-	-	-	-	6.1	-
Critical Hdwy Stg 2	-	-	-	-	6.1	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1134	-	-	-	181	686
Stage 1	-	-	-	-	660	-
Stage 2	-	-	-	-	394	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1134	-	-	-	153	686
Mov Cap-2 Maneuver	-	-	-	-	153	-
Stage 1	-	-	-	-	527	-
Stage 2	-	-	-	-	315	-

Approach	SE	NW	SW
HCM Control Delay, s	2.5	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1134	-	-
HCM Lane V/C Ratio	-	-	0.153	-	-
HCM Control Delay (s)	-	-	8.7	0	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.5	-	-

12: Deschutes Way & US 101 WB On-Ramp

Intersection						
Int Delay, s/veh	4.2					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	0	515	430	360	30
Future Vol, veh/h	0	0	515	430	360	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	0	0	542	453	379	32

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1932	-	411	0	-	0
Stage 1	395	-	-	-	-	-
Stage 2	1537	-	-	-	-	-
Critical Hdwy	6.4	-	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	-	2.209	-	-	-
Pot Cap-1 Maneuver	74	0	1153	-	-	-
Stage 1	685	0	-	-	-	-
Stage 2	198	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	39	-	1153	-	-	-
Mov Cap-2 Maneuver	39	-	-	-	-	-
Stage 1	685	-	-	-	-	-
Stage 2	105	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	5.9	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1153	-	-	-	-
HCM Lane V/C Ratio	0.47	-	-	-	-
HCM Control Delay (s)	10.9	-	0	-	-
HCM Lane LOS	B	-	A	-	-
HCM 95th %tile Q(veh)	2.6	-	-	-	-

SimTraffic Performance Report

13: 2nd Ave/US 101/I-5 Off-Ramps Performance by movement

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	518.6	471.9	349.2
Total Del/Veh (s)	1.0	0.9	1.4	117.1	41.7	70.1

Item 8.

Lanes, Volumes, Timings
14: 2nd Ave & Custer Way

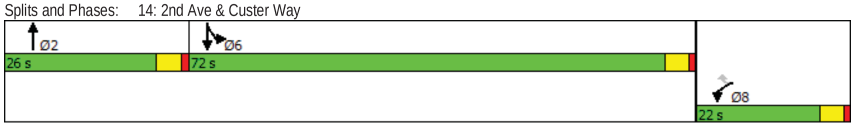
Projected 2040 No Build
PM Peak Hour

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	235	260	15	320	915	310
Future Volume (vph)	235	260	15	320	915	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	225		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	662		2035			505
Travel Time (s)	15.0		46.3			11.5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	NA		Split	NA
Protected Phases	8		2		6	6
Permitted Phases		8				
Detector Phase	8	8	2		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	10.0	10.0	24.5		20.0	20.0
Total Split (s)	22.0	22.0	26.0		72.0	72.0
Total Split (%)	18.3%	18.3%	21.7%		60.0%	60.0%
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 107.8
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 14: 2nd Ave & Custer Way



HCM 2010 Signalized Intersection Summary
14: 2nd Ave & Custer Way

Projected 2040 No Build
PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	235	260	15	320	915	310
Future Volume (veh/h)	235	260	15	320	915	310
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900
Adj Flow Rate, veh/h	247	121	16	184	963	326
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	0	0
Cap, veh/h	273	244	18	211	1065	1118
Arrive On Green	0.15	0.15	0.14	0.14	0.59	0.59
Sat Flow, veh/h	1792	1599	129	1489	1810	1900
Grp Volume(v), veh/h	247	121	0	200	963	326
Grp Sat Flow(s),veh/h/ln	1792	1599	0	1618	1810	1900
Q Serve(g_s), s	15.5	8.0	0.0	13.9	53.7	9.8
Cycle Q Clear(g_c), s	15.5	8.0	0.0	13.9	53.7	9.8
Prop In Lane	1.00	1.00		0.92	1.00	
Lane Grp Cap(c), veh/h	273	244	0	229	1065	1118
V/C Ratio(X)	0.90	0.50	0.00	0.87	0.90	0.29
Avail Cap(c_a), veh/h	273	244	0	303	1065	1118
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.8	44.6	0.0	48.2	20.8	11.7
Incr Delay (d2), s/veh	30.1	0.6	0.0	15.9	12.4	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	3.6	0.0	7.2	30.2	5.3
LnGrp Delay(d),s/veh	77.8	45.1	0.0	64.2	33.2	12.4
LnGrp LOS	E	D		E	C	B
Approach Vol, veh/h	368		200			1289
Approach Delay, s/veh	67.1		64.2			27.9
Approach LOS	E		E			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		20.7				72.0		22.0
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		21.5				67.5		17.5
Max Q Clear Time (g_c+I1), s		15.9				55.7		17.5
Green Ext Time (p_c), s		0.4				4.9		0.0

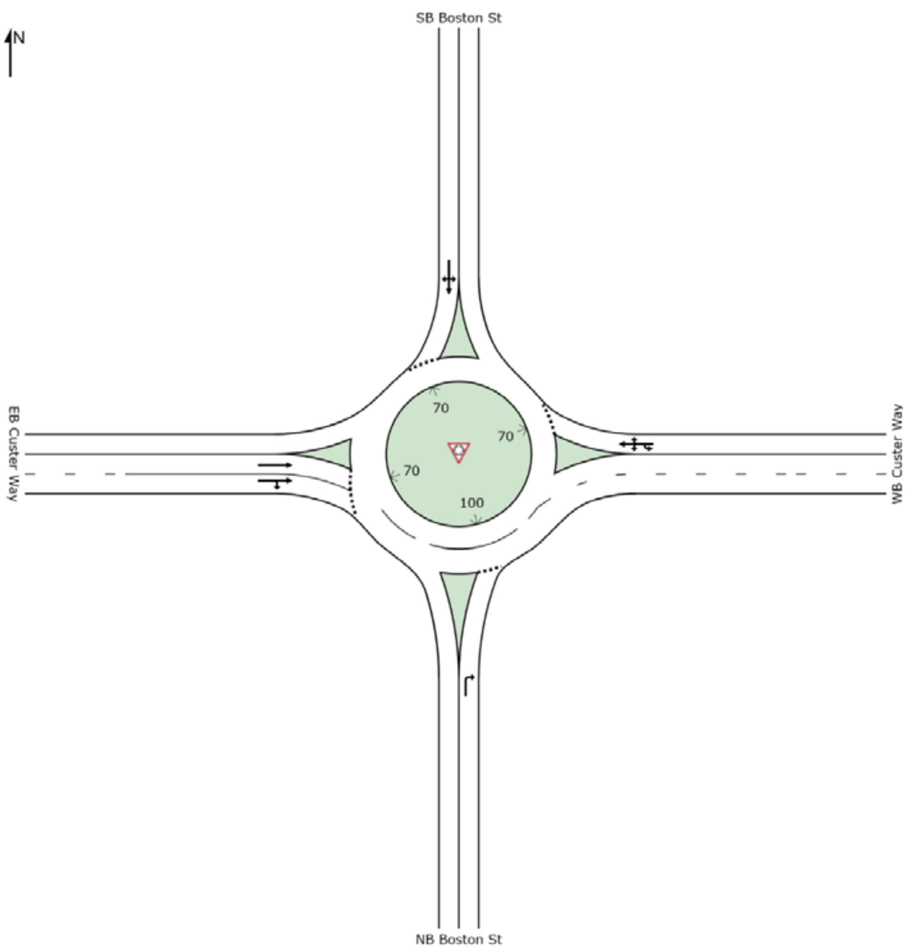
Intersection Summary

HCM 2010 Ctrl Delay	39.6
HCM 2010 LOS	D

SITE LAYOUT

Site: 15) Custer Way at Boston St

Projected 2040 Baseline
Roundabout



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MOVEMENT SUMMARY

Site: 15) Custer Way at Boston St

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Boston St											
18	R2	121	2.0	0.234	10.2	LOS B	1.1	26.8	0.72	0.72	31.7
Approach		121	2.0	0.234	10.2	LOS B	1.1	26.8	0.72	0.72	31.7
East: WB Custer Way											
1u	U	26	2.0	0.697	13.0	LOS B	0.0	0.0	0.00	0.00	37.1
1	L2	247	2.0	0.697	13.0	LOS B	0.0	0.0	0.00	0.00	36.1
6	T1	568	2.0	0.697	13.0	LOS B	0.0	0.0	0.00	0.00	36.3
16	R2	5	2.0	0.697	13.0	LOS B	0.0	0.0	0.00	0.00	35.4
Approach		847	2.0	0.697	13.0	LOS B	0.0	0.0	0.00	0.00	36.2
North: SB Boston St											
7	L2	5	2.0	0.027	6.5	LOS A	0.1	3.6	0.70	0.54	33.0
4	T1	5	2.0	0.027	6.5	LOS A	0.1	3.6	0.70	0.54	32.8
14	R2	5	2.0	0.027	6.5	LOS A	0.1	3.6	0.70	0.54	32.1
Approach		16	2.0	0.027	6.5	LOS A	0.1	3.6	0.70	0.54	32.6
West: EB Custer Way											
2	T1	1047	2.0	0.609	11.4	LOS B	5.4	136.1	0.67	0.55	31.7
12	R2	279	2.0	0.609	11.1	LOS B	5.3	134.8	0.67	0.53	30.7
Approach		1326	2.0	0.609	11.4	LOS B	5.4	136.1	0.67	0.54	31.4
All Vehicles		2311	2.0	0.697	11.9	LOS B	5.4	136.1	0.43	0.35	33.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6.1 | Copyright © 2000-2015 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: SCJ ALLIANCE | Processed: Tuesday, February 16, 2016 5:16:04 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\15-Custer Way at Boston St.sip6

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	180	290	615	70	100	290
Future Volume (vph)	180	290	615	70	100	290
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	679		1427			1098
Travel Time (s)	15.4		32.4			25.0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%
Shared Lane Traffic (%)						
Turn Type	Prot		NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases					6	
Detector Phase	8		2		6	6
Switch Phase						
Minimum Initial (s)	4.0		4.0		4.0	4.0
Minimum Split (s)	20.0		20.0		20.0	20.0
Total Split (s)	21.0		34.0		34.0	34.0
Total Split (%)	38.2%		61.8%		61.8%	61.8%
Yellow Time (s)	3.5		3.5		3.5	3.5
All-Red Time (s)	0.5		0.5		0.5	0.5
Lost Time Adjust (s)	0.0		0.0			0.0
Total Lost Time (s)	4.0		4.0			4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		Min		Min	Min

Intersection Summary

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 45.1
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 16: Deschutes Way & Boston St

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	180	290	615	70	100	290
Future Volume (veh/h)	180	290	615	70	100	290
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	189	305	647	74	105	305
Adj No. of Lanes	0	0	1	0	0	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0
Cap, veh/h	206	332	880	101	165	435
Arrive On Green	0.32	0.32	0.53	0.53	0.53	0.53
Sat Flow, veh/h	637	1028	1675	192	150	828
Grp Volume(v), veh/h	495	0	0	721	410	0
Grp Sat Flow(s),veh/h/ln	1668	0	0	1866	978	0
Q Serve(g_s), s	15.1	0.0	0.0	15.7	6.2	0.0
Cycle Q Clear(g_c), s	15.1	0.0	0.0	15.7	21.9	0.0
Prop In Lane	0.38	0.62		0.10	0.26	
Lane Grp Cap(c), veh/h	538	0	0	980	600	0
V/C Ratio(X)	0.92	0.00	0.00	0.74	0.68	0.00
Avail Cap(c_a), veh/h	538	0	0	1063	660	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.2	0.0	0.0	9.7	10.1	0.0
Incr Delay (d2), s/veh	21.1	0.0	0.0	2.5	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	0.0	0.0	8.7	5.7	0.0
LnGrp Delay(d),s/veh	38.3	0.0	0.0	12.1	12.7	0.0
LnGrp LOS	D			B	B	
Approach Vol, veh/h	495		721			410
Approach Delay, s/veh	38.3		12.1			12.7
Approach LOS	D		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		31.7				31.7		21.0
Change Period (Y+Rc), s		4.0				4.0		4.0
Max Green Setting (Gmax), s		30.0				30.0		17.0
Max Q Clear Time (g_c+I1), s		17.7				23.9		17.1
Green Ext Time (p_c), s		6.4				3.8		0.0

Intersection Summary

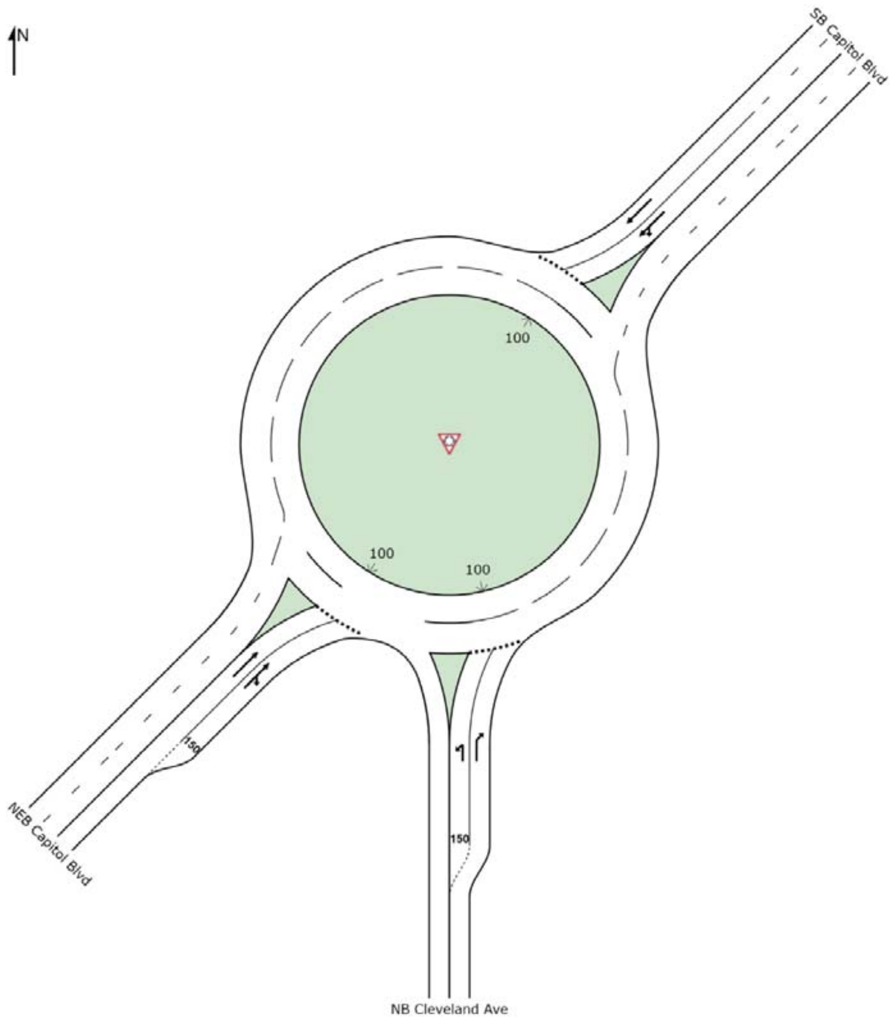
HCM 2010 Ctrl Delay 20.2
HCM 2010 LOS C

Notes

SITE LAYOUT

Site: 17) Cleveland Ave at Capitol Blvd

Projected 2040 Baseline
Roundabout



MOVEMENT SUMMARY

Site: 17) Cleveland Ave at Capitol Blvd

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Cleveland Ave											
3b	L3	26	2.0	0.059	8.8	LOS A	0.2	5.5	0.61	0.59	30.9
18a	R1	311	2.0	0.382	9.0	LOS A	1.9	49.2	0.67	0.68	33.0
Approach		337	2.0	0.382	9.0	LOS A	1.9	49.2	0.67	0.68	32.9
NorthEast: SB Capitol Blvd											
1ax	L1	468	2.0	0.663	11.3	LOS B	7.4	187.8	0.27	0.09	30.9
6x	T1	1268	2.0	0.663	11.3	LOS B	7.4	187.8	0.27	0.09	31.8
Approach		1737	2.0	0.663	11.3	LOS B	7.4	187.8	0.27	0.09	31.6
SouthWest: NEB Capitol Blvd											
2x	T1	789	2.0	0.434	8.9	LOS A	2.6	66.7	0.64	0.56	33.3
12bx	R3	21	2.0	0.434	8.8	LOS A	2.6	66.7	0.64	0.55	31.9
Approach		811	2.0	0.434	8.9	LOS A	2.6	66.7	0.64	0.56	33.2
All Vehicles		2884	2.0	0.663	10.4	LOS B	7.4	187.8	0.42	0.29	32.2

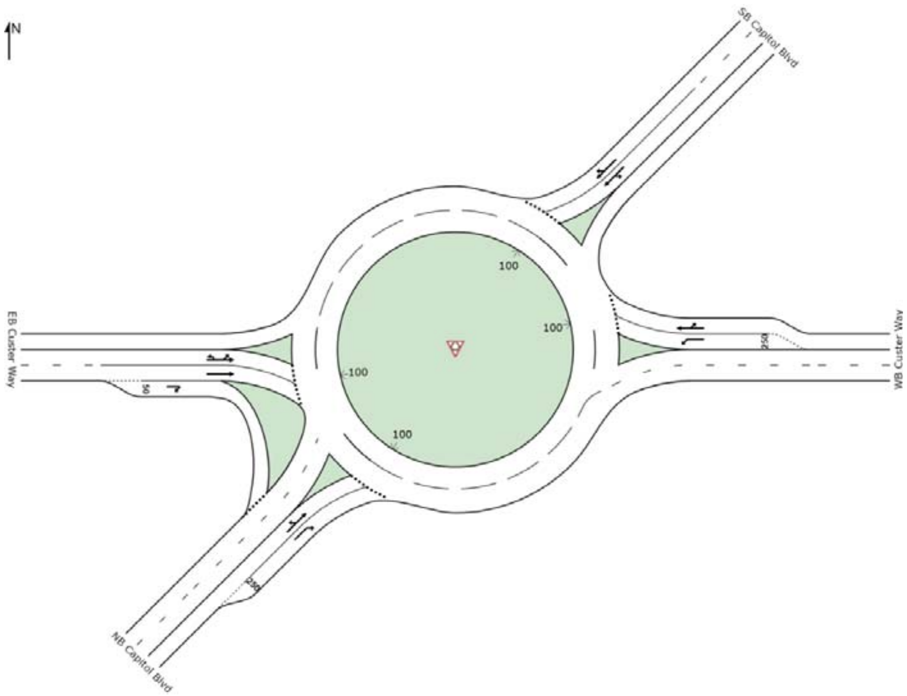
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Item 8.

SITE LAYOUT

Site: 18) Custer Way at Capitol Blvd

Projected 2040 Baseline
Roundabout



MOVEMENT SUMMARY

Site: 18) Custer Way at Capitol Blvd

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

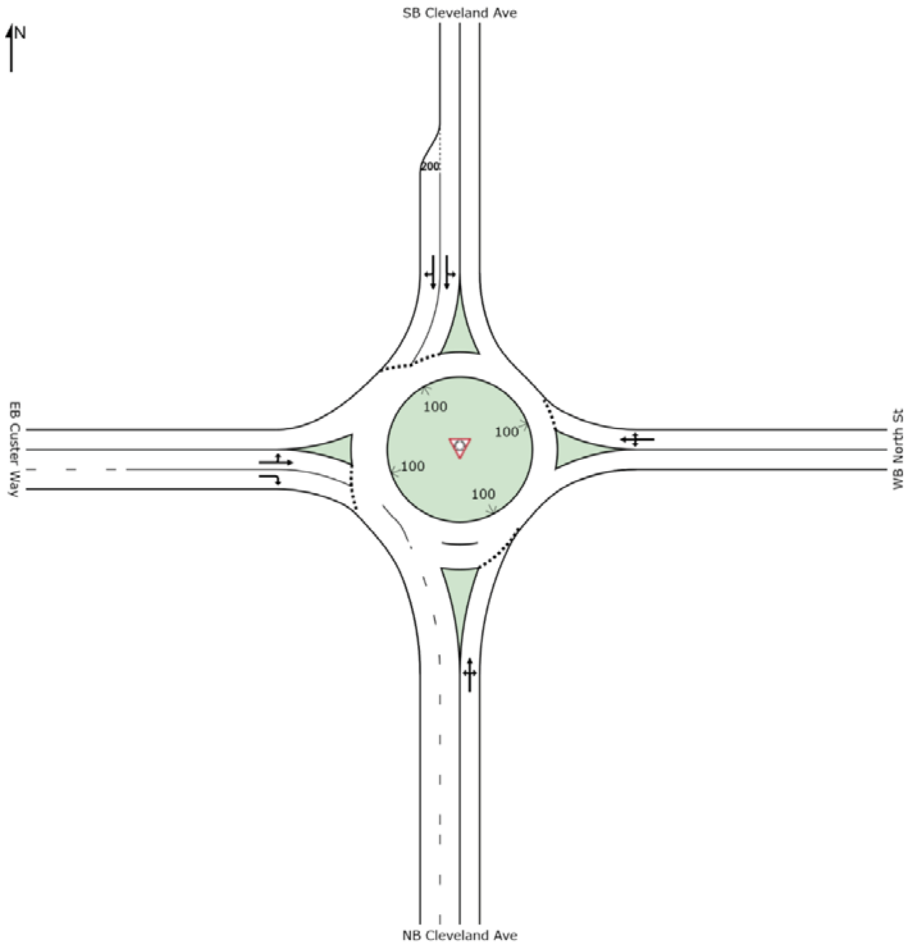
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB Custer Way											
1a	L1	200	2.0	0.508	20.8	LOS C	3.7	94.1	0.92	1.00	26.8
6	T1	442	2.0	0.841	37.2	LOS D	12.5	317.8	1.00	1.38	23.6
16b	R3	5	2.0	0.841	37.2	LOS D	12.5	317.8	1.00	1.38	22.9
Approach		647	2.0	0.841	32.1	LOS C	12.5	317.8	0.97	1.26	24.5
NorthEast: SB Capitol Blvd											
1bx	L3	37	2.0	0.830	28.4	LOS C	9.3	236.5	0.95	1.15	26.1
6x	T1	911	2.0	0.830	27.7	LOS C	9.6	244.8	0.95	1.15	26.1
16ax	R1	316	2.0	0.830	26.5	LOS C	9.6	244.8	0.96	1.15	26.3
Approach		1263	2.0	0.830	27.4	LOS C	9.6	244.8	0.95	1.15	26.1
West: EB Custer Way											
5u	U	26	2.0	0.850	36.4	LOS D	9.1	230.8	0.99	1.25	23.4
5a	L1	379	2.0	0.850	36.4	LOS D	9.1	230.8	0.99	1.25	22.8
2	T1	721	2.0	0.850	30.5	LOS C	10.3	261.1	1.00	1.27	25.2
12b	R3	79	2.0	0.099	5.5	LOS A	0.6	14.2	0.75	0.65	33.4
Approach		1205	2.0	0.850	30.8	LOS C	10.3	261.1	0.98	1.22	24.7
SouthWest: NB Capitol Blvd											
5bx	L3	21	2.0	1.032	73.4	LOS F	20.8	528.5	1.00	1.78	17.3
2x	T1	563	2.0	1.032	73.4	LOS F	20.8	528.5	1.00	1.78	17.2
12ax	R1	195	2.0	0.538	23.6	LOS C	2.9	73.8	0.84	0.90	27.2
Approach		779	2.0	1.032	60.9	LOS E	20.8	528.5	0.96	1.56	18.9
All Vehicles		3895	2.0	1.032	36.0	LOS D	20.8	528.5	0.97	1.27	23.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 19) Custer Way at Cleveland Ave/North St

Projected 2040 Baseline
Roundabout



MOVEMENT SUMMARY

Site: 19) Custer Way at Cleveland Ave/North St

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Cleveland Ave											
3	L2	163	2.0	0.683	21.8	LOS C	6.5	166.3	0.93	1.06	27.3
8	T1	216	2.0	0.683	21.8	LOS C	6.5	166.3	0.93	1.06	27.3
18	R2	21	2.0	0.683	21.8	LOS C	6.5	166.3	0.93	1.06	26.7
Approach		400	2.0	0.683	21.8	LOS C	6.5	166.3	0.93	1.06	27.3
East: WB North St											
1	L2	16	2.0	0.636	15.4	LOS B	6.5	165.5	0.88	0.88	30.3
6	T1	411	2.0	0.636	15.4	LOS B	6.5	165.5	0.88	0.88	30.3
16	R2	74	2.0	0.636	15.4	LOS B	6.5	165.5	0.88	0.88	29.5
Approach		500	2.0	0.636	15.4	LOS B	6.5	165.5	0.88	0.88	30.2
North: SB Cleveland Ave											
7	L2	121	2.0	0.397	9.9	LOS A	2.8	70.4	0.80	0.73	31.8
4	T1	368	2.0	0.397	9.3	LOS A	3.0	75.1	0.80	0.71	32.5
14	R2	158	2.0	0.397	8.7	LOS A	3.0	75.1	0.80	0.69	32.2
Approach		647	2.0	0.397	9.3	LOS A	3.0	75.1	0.80	0.71	32.3
West: EB Custer Way											
5	L2	74	2.0	0.587	11.9	LOS B	5.8	146.5	0.85	0.80	31.6
2	T1	489	2.0	0.587	11.9	LOS B	5.8	146.5	0.85	0.80	31.6
12	R2	326	2.0	0.427	10.3	LOS B	3.0	75.6	0.77	0.70	31.3
Approach		889	2.0	0.587	11.3	LOS B	5.8	146.5	0.82	0.76	31.5
All Vehicles		2437	2.0	0.683	13.3	LOS B	6.5	166.3	0.84	0.82	30.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 TWSC
20: Hoadly St & North St

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	75	475	5	15	590	80	2	5	10	45	2	25
Future Vol, veh/h	75	475	5	15	590	80	2	5	10	45	2	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	79	500	5	16	621	84	2	5	11	47	2	26

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	705	0	0	505	0	0	1370	1398	503	1363	1358	663
Stage 1	-	-	-	-	-	-	661	661	-	695	695	-
Stage 2	-	-	-	-	-	-	709	737	-	668	663	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	898	-	-	1065	-	-	125	142	573	126	150	465
Stage 1	-	-	-	-	-	-	455	463	-	436	447	-
Stage 2	-	-	-	-	-	-	428	428	-	451	462	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	898	-	-	1065	-	-	104	122	573	106	128	465
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	122	-	106	128	-
Stage 1	-	-	-	-	-	-	399	407	-	383	436	-
Stage 2	-	-	-	-	-	-	392	417	-	384	406	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.2	22.9	53.6
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	219	898	-	-	1065	-	-	146
HCM Lane V/C Ratio	0.082	0.088	-	-	0.015	-	-	0.519
HCM Control Delay (s)	22.9	9.4	0	-	8.4	0	-	53.6
HCM Lane LOS	C	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	0.3	0.3	-	-	0	-	-	2.5

SimTraffic Performance Report

Projected 2040 Baseline
PM Peak Hour

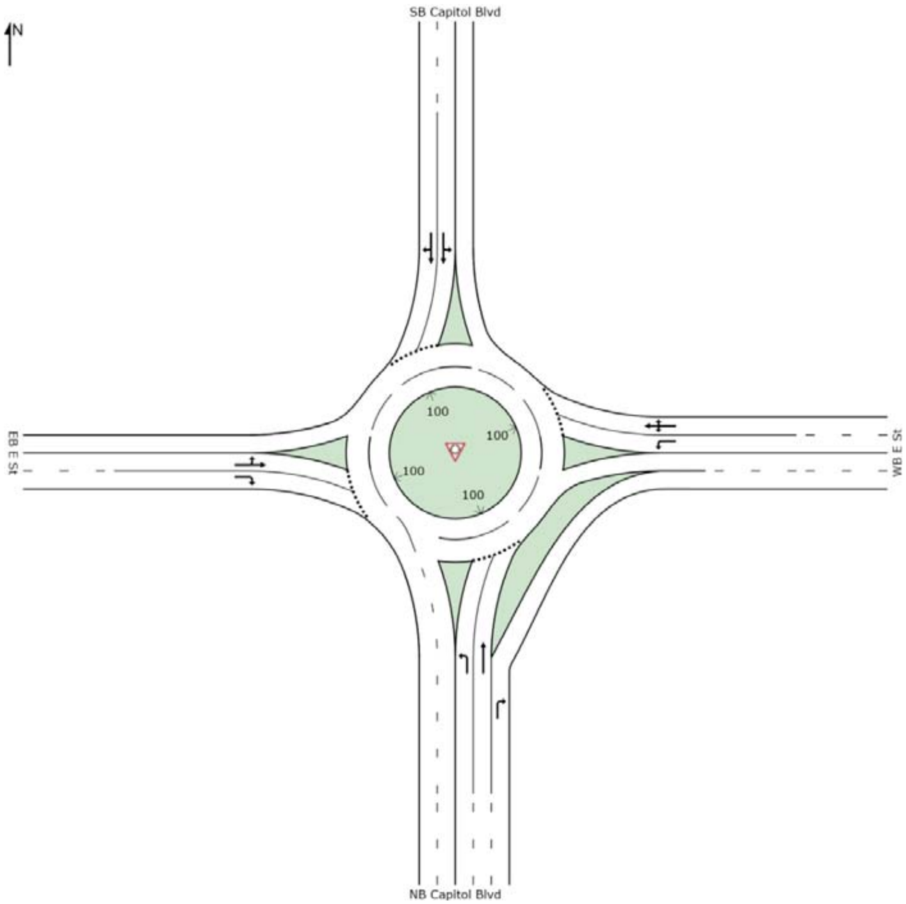
21: I-5 NB Off-Ramp/Deschutes Way & E St Performance by movement

Movement	WBR	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.5	0.3	0.3	0.4	0.4
Total Del/Veh (s)	2.3	30.3	4.8	1.2	3.5

SITE LAYOUT

Site: 22) E St at Capitol Blvd

Projected 2040 Baseline
Roundabout



MOVEMENT SUMMARY

Site: 22) E St at Capitol Blvd

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Capitol Blvd											
3	L2	211	2.0	0.274	7.8	LOS A	1.8	46.3	0.78	0.69	31.4
8	T1	453	2.0	0.439	8.4	LOS A	3.7	92.8	0.86	0.74	33.5
18	R2	605	2.0	0.369	0.1	LOS A	0.0	0.0	0.00	0.00	37.1
Approach		1268	2.0	0.439	4.3	LOS A	3.7	92.8	0.44	0.38	34.7
East: WB E St											
1	L2	674	2.0	0.710	18.3	LOS B	6.6	168.0	0.86	0.98	27.8
6	T1	384	2.0	0.710	16.4	LOS B	6.6	168.0	0.86	0.97	29.6
16	R2	147	2.0	0.710	16.4	LOS B	6.6	168.0	0.86	0.97	28.8
Approach		1205	2.0	0.710	17.4	LOS B	6.6	168.0	0.86	0.97	28.5
North: SB Capitol Blvd											
7	L2	232	2.0	1.062	85.0	LOS F	23.7	601.8	1.00	1.96	15.7
4	T1	916	2.0	1.062	79.3	LOS F	29.1	740.3	1.00	2.05	16.3
14	R2	142	2.0	1.062	76.1	LOS F	29.1	740.3	1.00	2.10	16.5
Approach		1289	2.0	1.062	79.9	LOS E	29.1	740.3	1.00	2.04	16.2
West: EB E St											
5	L2	63	2.0	0.917	47.9	LOS D	12.6	319.5	1.00	1.49	21.2
2	T1	437	2.0	0.917	47.9	LOS D	12.6	319.5	1.00	1.49	21.1
12	R2	342	2.0	0.895	56.2	LOS E	9.2	232.9	0.97	1.35	19.1
Approach		842	2.0	0.917	51.3	LOS D	12.6	319.5	0.99	1.44	20.3
All Vehicles		4605	2.0	1.062	37.5	LOS D	29.1	740.3	0.81	1.19	23.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM 2010 TWSC
23: Cleveland Ave & South St

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	1.5					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	45	915	10	60	1220
Future Vol, veh/h	5	45	915	10	60	1220
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	5	47	963	11	63	1284

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1736	487	0	0	974	0
Stage 1	968	-	-	-	-	-
Stage 2	768	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.12	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.21	-
Pot Cap-1 Maneuver	80	532	-	-	710	-
Stage 1	334	-	-	-	-	-
Stage 2	424	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	55	532	-	-	710	-
Mov Cap-2 Maneuver	55	-	-	-	-	-
Stage 1	334	-	-	-	-	-
Stage 2	293	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.5	0	1.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	285	710	-
HCM Lane V/C Ratio	-	-	0.185	0.089	-
HCM Control Delay (s)	-	-	20.5	10.6	1.5
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	0.7	0.3	-

HCM 2010 TWSC
24: Linwood Ave & 7th Ave

Projected 2040 No Build
PM Peak Hour

Intersection												
Int Delay, s/veh	8.5											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	25	155	0	1	345	175	0	0	1	220	0	20
Future Vol, veh/h	25	155	0	1	345	175	0	0	1	220	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	1	1	1
Mvmt Flow	26	163	0	1	363	184	0	0	1	232	0	21

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	547	0	0	163	0	0	684	765	163	673	673	455
Stage 1	-	-	-	-	-	-	216	216	-	457	457	-
Stage 2	-	-	-	-	-	-	468	549	-	216	216	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.509	4.009	3.309
Pot Cap-1 Maneuver	1017	-	-	1422	-	-	365	336	887	370	378	607
Stage 1	-	-	-	-	-	-	791	728	-	585	569	-
Stage 2	-	-	-	-	-	-	579	520	-	789	726	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1017	-	-	1422	-	-	345	326	887	361	367	607
Mov Cap-2 Maneuver	-	-	-	-	-	-	345	326	-	361	367	-
Stage 1	-	-	-	-	-	-	769	708	-	569	568	-
Stage 2	-	-	-	-	-	-	558	519	-	766	706	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0	9.1	32.5
HCM LOS			A	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	887	1017	-	-	1422	-	-	374
HCM Lane V/C Ratio	0.001	0.026	-	-	0.001	-	-	0.675
HCM Control Delay (s)	9.1	8.6	0	-	7.5	0	-	32.5
HCM Lane LOS	A	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	4.8

Intersection												
Intersection Delay, s/veh	57.6											
Intersection LOS	F											

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	130	145	130	0	250	305	65	0	180	305	65
Future Vol, veh/h	0	130	145	130	0	250	305	65	0	180	305	65
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	1	1	1	2	1	1	1	2	0	0	0
Mvmt Flow	0	137	153	137	0	263	321	68	0	189	321	68
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	35	62	61
HCM LOS	D	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	82%	0%	53%	0%	82%	0%	65%
Vol Right, %	0%	18%	0%	47%	0%	18%	0%	35%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	370	130	275	250	370	180	510
LT Vol	180	0	130	0	250	0	180	0
Through Vol	0	305	0	145	0	305	0	330
RT Vol	0	65	0	130	0	65	0	180
Lane Flow Rate	189	389	137	289	263	389	189	537
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.543	1	0.407	0.795	0.749	1	0.549	1
Departure Headway (Hd)	10.324	9.703	10.717	9.888	10.242	9.621	10.429	9.644
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	351	378	338	368	355	378	351	381
Service Time	8.049	7.428	8.428	7.599	7.964	7.343	8.062	7.317
HCM Lane V/C Ratio	0.538	1.029	0.405	0.785	0.741	1.029	0.538	1.409
HCM Control Delay	24.7	78.6	20.6	41.8	38	78.2	25	78.1
HCM Lane LOS	C	F	C	E	E	F	C	F
HCM 95th-tile Q	3.1	11.8	1.9	6.7	5.8	11.8	3.1	11.8

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	180	330	180
Future Vol, veh/h	0	180	330	180
Peak Hour Factor	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	189	347	189
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	64.2
HCM LOS	F

Lane

Lanes, Volumes, Timings
26: Capitol Blvd & Linwood Ave

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	5	255	15	5	10	215	1090	15	10	1425	400
Future Volume (vph)	115	5	255	15	5	10	215	1090	15	10	1425	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	100		0	150		0	150		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		489			427			2664			1902	
Travel Time (s)		11.1			9.7			60.5			43.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	1%	2%	2%	2%	1%	1%	2%	2%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		4.0	4.0		15.0	15.0		4.0	15.0	
Minimum Split (s)	22.5	22.5		20.5	20.5		19.5	20.0		8.5	21.5	
Total Split (s)	22.6	22.6		22.6	22.6		20.0	69.4		8.5	57.4	
Total Split (%)	22.5%	22.5%		22.5%	22.5%		19.9%	69.1%		8.5%	57.1%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 100.5
Actuated Cycle Length: 94.2
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 26: Capitol Blvd & Linwood Ave

HCM 2010 Signalized Intersection Summary
26: Capitol Blvd & Linwood Ave

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	5	255	15	5	10	215	1090	15	10	1425	400
Future Volume (veh/h)	115	5	255	15	5	10	215	1090	15	10	1425	400
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1863	1863	1900	1881	1881	1900	1863	1881	1900
Adj Flow Rate, veh/h	121	5	268	16	5	11	226	1147	16	11	1500	421
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	2	2	2	2	2	1	1	1	2	1	1
Cap, veh/h	317	5	286	88	94	208	270	2424	34	19	1482	398
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.15	0.67	0.67	0.01	0.53	0.53
Sat Flow, veh/h	1405	29	1574	1102	519	1142	1792	3609	50	1774	2787	749
Grp Volume(v), veh/h	121	0	273	16	0	16	226	568	595	11	938	983
Grp Sat Flow(s),veh/h/ln	1405	0	1603	1102	0	1661	1792	1787	1872	1774	1787	1749
Q Serve(g_s), s	7.7	0.0	16.7	1.4	0.0	0.8	12.2	15.2	15.2	0.6	51.4	52.9
Cycle Q Clear(g_c), s	8.5	0.0	16.7	18.1	0.0	0.8	12.2	15.2	15.2	0.6	51.4	52.9
Prop In Lane	1.00		0.98	1.00		0.69	1.00		0.03	1.00		0.43
Lane Grp Cap(c), veh/h	317	0	292	88	0	302	270	1200	1258	19	950	930
V/C Ratio(X)	0.38	0.00	0.94	0.18	0.00	0.05	0.84	0.47	0.47	0.59	0.99	1.06
Avail Cap(c_a), veh/h	317	0	292	88	0	302	279	1200	1258	71	950	930
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.1	0.0	40.1	49.1	0.0	33.6	41.1	7.9	7.9	49.0	22.9	23.3
Incr Delay (d2), s/veh	0.3	0.0	35.6	1.0	0.0	0.1	18.0	1.3	1.3	26.1	26.1	45.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	10.2	0.5	0.0	0.4	7.4	7.9	8.2	0.4	31.9	37.2
LnGrp Delay(d),s/veh	37.4	0.0	75.7	50.0	0.0	33.7	59.1	9.2	9.1	75.1	49.1	69.1
LnGrp LOS	D		E	D		C	E	A	A	E	D	F
Approach Vol, veh/h		394			32			1389			1932	
Approach Delay, s/veh		63.9			41.9			17.3			59.4	
Approach LOS		E			D			B			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.5	71.3		22.6	19.5	57.4		22.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	4.0	64.9		18.1	15.5	52.9		18.1
Max Q Clear Time (g_c+I1), s	2.6	17.2		18.7	14.2	54.9		20.1
Green Ext Time (p_c), s	0.0	35.6		0.0	0.0	0.0		0.0

Intersection Summary

HCM 2010 Ctrl Delay	44.1
HCM 2010 LOS	D

Item 8.

Lanes, Volumes, Timings
27: Henderson Blvd & Yelm Hwy

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	955	195	510	780	85	140	200	700	230	335	30
Future Volume (vph)	10	955	195	510	780	85	140	200	700	230	335	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	450		0	200		100	0		150
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1947			1645			3441			1606	
Travel Time (s)		44.3			37.4			78.2			36.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Prot	NA		Prot	NA	pm+ov	Perm	NA	Perm
Protected Phases		4		3	8		5	2	3		6	
Permitted Phases	4								2	6		6
Detector Phase	4	4		3	8		5	2	3	6	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		5.0	6.0		5.0	6.0	5.0	6.0	6.0	6.0
Minimum Split (s)	24.5	24.5		9.5	24.5		9.5	24.5	9.5	24.5	24.5	24.5
Total Split (s)	44.0	44.0		39.0	83.0		15.0	47.0	39.0	32.0	32.0	32.0
Total Split (%)	33.8%	33.8%		30.0%	63.8%		11.5%	36.2%	30.0%	24.6%	24.6%	24.6%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead			Lead		Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Natural Cycle: 140
Control Type: Actuated-Uncoordinated

Splits and Phases: 27: Henderson Blvd & Yelm Hwy

HCM 2010 Signalized Intersection Summary
27: Henderson Blvd & Yelm Hwy

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	955	195	510	780	85	140	200	700	230	335	30
Future Volume (veh/h)	10	955	195	510	780	85	140	200	700	230	335	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	11	1005	205	537	821	89	147	211	0	242	353	32
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	243	899	183	475	1965	213	145	615	947	304	398	338
Arrive On Green	0.30	0.30	0.30	0.27	0.60	0.60	0.08	0.33	0.00	0.21	0.21	0.21
Sat Flow, veh/h	617	2960	602	1792	3253	353	1792	1881	1599	1177	1881	1599
Grp Volume(v), veh/h	11	606	604	537	451	459	147	211	0	242	353	32
Grp Sat Flow(s),veh/h/ln	617	1787	1775	1792	1787	1819	1792	1881	1599	1177	1881	1599
Q Serve(g_s), s	1.6	39.5	39.5	34.5	17.4	17.4	10.5	11.1	0.0	26.5	23.7	2.1
Cycle Q Clear(g_c), s	1.6	39.5	39.5	34.5	17.4	17.4	10.5	11.1	0.0	26.5	23.7	2.1
Prop In Lane	1.00		0.34	1.00		0.19	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	243	543	539	475	1079	1098	145	615	947	304	398	338
V/C Ratio(X)	0.05	1.12	1.12	1.13	0.42	0.42	1.02	0.34	0.00	0.79	0.89	0.09
Avail Cap(c_a), veh/h	243	543	539	475	1079	1098	145	615	947	304	398	338
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.1	45.2	45.3	47.8	13.6	13.6	59.8	33.2	0.0	50.9	49.7	41.2
Incr Delay (d2), s/veh	0.4	74.6	76.1	81.8	1.2	1.2	79.1	0.3	0.0	13.6	20.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	30.7	30.7	27.8	8.9	9.0	8.4	5.8	0.0	9.8	14.6	0.9
LnGrp Delay(d),s/veh	32.4	119.8	121.3	129.5	14.8	14.8	138.9	33.5	0.0	64.4	70.5	41.4
LnGrp LOS	C	F	F	F	B	B	F	C		E	E	D
Approach Vol, veh/h		1221			1447			358			627	
Approach Delay, s/veh		119.8			57.4			76.8			66.7	
Approach LOS		F			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6		8
Phs Duration (G+Y+Rc), s		47.0	39.0	44.0	15.0	32.0		83.0
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		42.5	34.5	39.5	10.5	27.5		78.5
Max Q Clear Time (g_c+I1), s		13.1	36.5	41.5	12.5	28.5		19.4
Green Ext Time (p_c), s		4.9	0.0	0.0	0.0	0.0		26.7

Intersection Summary		
HCM 2010 Ctrl Delay		81.7
HCM 2010 LOS		F

Item 8.

HCM 2010 TWSC
28: Trosper Rd & Rural Rd

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	110	265	425	135	150	165
Future Vol, veh/h	110	265	425	135	150	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	116	279	447	142	158	174

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	589	0	-	0	1029	518
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	4.1	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	996	-	-	-	259	558
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	996	-	-	-	223	558
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	519	-

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	32.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	996	-	-	-	223	558
HCM Lane V/C Ratio	0.116	-	-	-	0.708	0.311
HCM Control Delay (s)	9.1	0	-	-	52.7	14.3
HCM Lane LOS	A	A	-	-	F	B
HCM 95th %tile Q(veh)	0.4	-	-	-	4.6	1.3

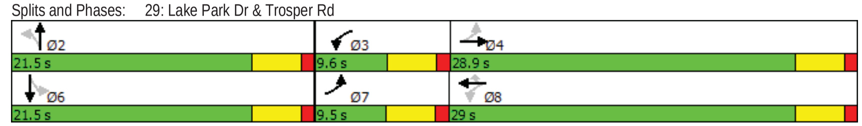
Lanes, Volumes, Timings
29: Lake Park Dr & Trosper Rd

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	415	55	65	540	155	75	30	70	160	25	15
Future Volume (vph)	10	415	55	65	540	155	75	30	70	160	25	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		150	225		0	100		0	125		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2012			652			269			583	
Travel Time (s)		45.7			14.8			6.1			13.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	26.5		9.5	26.5	26.5	21.5	21.5		21.5	21.5	
Total Split (s)	9.5	28.9		9.6	29.0	29.0	21.5	21.5		21.5	21.5	
Total Split (%)	15.8%	48.2%		16.0%	48.3%	48.3%	35.8%	35.8%		35.8%	35.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 47.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 29: Lake Park Dr & Trosper Rd



29: Lake Park Dr & Trosper Rd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	415	55	65	540	155	75	30	70	160	25	15
Future Volume (veh/h)	10	415	55	65	540	155	75	30	70	160	25	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	11	437	58	68	568	163	79	32	74	168	26	16
Adj No. of Lanes	1	2	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	261	1102	146	468	740	629	575	169	390	513	364	224
Arrive On Green	0.01	0.35	0.35	0.06	0.39	0.39	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1792	3175	419	1792	1881	1599	1386	511	1181	1308	1102	678
Grp Volume(v), veh/h	11	245	250	68	568	163	79	0	106	168	0	42
Grp Sat Flow(s),veh/h/ln	1792	1787	1807	1792	1881	1599	1386	0	1692	1308	0	1780
Q Serve(g_s), s	0.2	5.3	5.4	1.2	13.5	3.5	2.1	0.0	2.3	5.4	0.0	0.8
Cycle Q Clear(g_c), s	0.2	5.3	5.4	1.2	13.5	3.5	3.0	0.0	2.3	7.7	0.0	0.8
Prop In Lane	1.00		0.23	1.00		1.00	1.00		0.70	1.00		0.38
Lane Grp Cap(c), veh/h	261	621	628	468	740	629	575	0	559	513	0	588
V/C Ratio(X)	0.04	0.39	0.40	0.15	0.77	0.26	0.14	0.00	0.19	0.33	0.00	0.07
Avail Cap(c_a), veh/h	409	847	856	537	895	761	575	0	559	513	0	588
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.8	12.7	12.7	9.7	13.6	10.5	12.8	0.0	12.3	15.1	0.0	11.8
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.1	3.3	0.2	0.5	0.0	0.8	1.7	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	2.7	2.7	0.6	7.6	1.6	0.9	0.0	1.2	2.2	0.0	0.4
LnGrp Delay(d),s/veh	11.9	13.1	13.1	9.8	16.9	10.8	13.3	0.0	13.1	16.8	0.0	12.1
LnGrp LOS	B	B	B	A	B	B	B		B	B		B
Approach Vol, veh/h		506			799			185			210	
Approach Delay, s/veh		13.1			15.0			13.2			15.8	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.5	7.6	22.4		21.5	5.2	24.8
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		17.0	5.1	24.4		17.0	5.0	24.5
Max Q Clear Time (g_c+I1), s		5.0	3.2	7.4		9.7	2.2	15.5
Green Ext Time (p_c), s		1.3	0.0	7.0		1.0	0.0	4.8

Intersection Summary	
HCM 2010 Ctrl Delay	14.4
HCM 2010 LOS	B

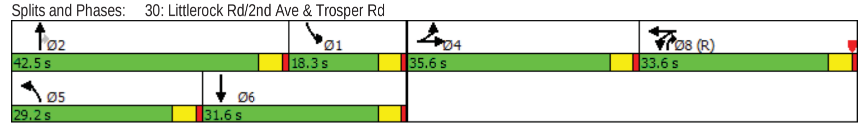
30: Littlerock Rd/2nd Ave & Trosper Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	435	175	430	365	20	325	415	475	165	490	110
Future Volume (vph)	85	435	175	430	365	20	325	415	475	165	490	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		652			520			896			1861	
Travel Time (s)		14.8			11.8			20.4			42.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)				38%								
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	35.6	35.6		33.6	33.6		29.2	42.5	33.6	18.3	31.6	
Total Split (%)	27.4%	27.4%		25.8%	25.8%		22.5%	32.7%	25.8%	14.1%	24.3%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max		C-Max	C-Max		Max	Max	C-Max	None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 126 (97%), Referenced to phase 8:WBTL, Start of Red
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 30: Littlerock Rd/2nd Ave & Trosper Rd



Item 8.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	435	175	430	365	20	325	415	475	165	490	110
Future Volume (veh/h)	85	435	175	430	365	20	325	415	475	165	490	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	89	458	121	286	618	21	342	437	379	174	516	116
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	427	668	175	400	807	27	339	548	823	189	603	135
Arrive On Green	0.24	0.24	0.24	0.37	0.37	0.37	0.19	0.29	0.29	0.11	0.21	0.21
Sat Flow, veh/h	1792	2803	735	1792	3618	123	1792	1881	1599	1792	2904	650
Grp Volume(v), veh/h	89	291	288	286	321	318	342	437	379	174	317	315
Grp Sat Flow(s),veh/h/ln	1792	1787	1751	1792	1881	1860	1792	1881	1599	1792	1787	1767
Q Serve(g_s), s	5.2	19.2	19.5	17.8	19.5	19.5	24.6	27.9	19.6	12.5	22.2	22.4
Cycle Q Clear(g_c), s	5.2	19.2	19.5	17.8	19.5	19.5	24.6	27.9	19.6	12.5	22.2	22.4
Prop In Lane	1.00		0.42	1.00		0.07	1.00		1.00	1.00		0.37
Lane Grp Cap(c), veh/h	427	426	418	400	420	415	339	548	823	189	371	367
V/C Ratio(X)	0.21	0.68	0.69	0.72	0.77	0.77	1.01	0.80	0.46	0.92	0.85	0.86
Avail Cap(c_a), veh/h	427	426	418	400	420	415	339	548	823	189	371	367
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	0.72	0.72	0.72	0.79	0.79	0.79	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.7	45.0	45.1	37.3	37.8	37.8	52.7	42.5	20.1	57.6	49.6	49.7
Incr Delay (d2), s/veh	1.0	7.9	8.3	7.7	9.3	9.4	45.7	9.2	1.5	43.8	21.3	22.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	10.5	10.4	9.6	11.2	11.1	16.5	15.9	13.0	8.5	13.1	13.2
LnGrp Delay(d),s/veh	40.7	52.9	53.5	45.0	47.1	47.2	98.4	51.7	21.5	101.4	70.9	71.9
LnGrp LOS	D	D	D	D	D	D	F	D	C	F	E	E
Approach Vol, veh/h		668			925			1158			806	
Approach Delay, s/veh		51.5			46.5			55.6			77.9	
Approach LOS		D			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.3	42.5		35.6	29.2	31.6		33.6
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6
Max Green Setting (Gmax), s	13.7	37.9		31.0	24.6	27.0		29.0
Max Q Clear Time (g_c+I1), s	14.5	29.9		21.5	26.6	24.4		21.5
Green Ext Time (p_c), s	0.0	2.2		2.3	0.0	1.1		2.9

Intersection Summary		
HCM 2010 Ctrl Delay		57.5
HCM 2010 LOS		E

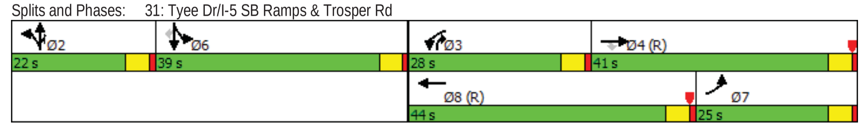
Notes

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	800	25	275	340	400	35	155	435	385	430	475
Future Volume (vph)	205	800	25	275	340	400	35	155	435	385	430	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	275		0	75		125	400		400
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		520			883			832			952	
Travel Time (s)		11.8			20.1			18.9			21.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	33.6	33.6	8.6	29.6		20.5	20.5		36.6	36.6	36.6
Total Split (s)	25.0	41.0	41.0	28.0	44.0		22.0	22.0		39.0	39.0	39.0
Total Split (%)	19.2%	31.5%	31.5%	21.5%	33.8%		16.9%	16.9%		30.0%	30.0%	30.0%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	4.6
Lead/Lag	Lag	Lag	Lag	Lead	Lead							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 118 (91%), Referenced to phase 4:EBT and 8:WBT, Start of Red
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 31: Tyee Dr/I-5 SB Ramps & Trosper Rd



Item 8.

HCM 2010 Signalized Intersection Summary
31: Tyee Dr/I-5 SB Ramps & Trosper Rd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	800	25	275	340	400	35	155	435	385	430	475
Future Volume (veh/h)	205	800	25	275	340	400	35	155	435	385	430	475
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900	1863	1863	1863	1881	1881	1881
Adj Flow Rate, veh/h	216	842	26	289	358	0	37	163	405	405	453	184
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	1	1	1
Cap, veh/h	281	1020	456	313	1083	0	237	249	489	616	498	423
Arrive On Green	0.31	0.57	0.57	0.17	0.30	0.00	0.13	0.13	0.13	0.26	0.26	0.26
Sat Flow, veh/h	1792	3574	1599	1792	3668	0	1774	1863	1583	2329	1881	1599
Grp Volume(v), veh/h	216	842	26	289	358	0	37	163	405	405	453	184
Grp Sat Flow(s),veh/h/ln	1792	1787	1599	1792	1787	0	1774	1863	1583	1165	1881	1599
Q Serve(g_s), s	14.2	24.9	0.9	20.6	10.1	0.0	2.4	10.8	17.4	20.1	30.3	12.4
Cycle Q Clear(g_c), s	14.2	24.9	0.9	20.6	10.1	0.0	2.4	10.8	17.4	20.1	30.3	12.4
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	281	1020	456	313	1083	0	237	249	489	616	498	423
V/C Ratio(X)	0.77	0.83	0.06	0.92	0.33	0.00	0.16	0.65	0.83	0.66	0.91	0.43
Avail Cap(c_a), veh/h	281	1020	456	322	1083	0	237	249	489	616	498	423
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.65	0.65	0.65	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.5	25.3	20.2	52.8	35.1	0.0	49.8	53.4	41.8	42.6	46.3	39.7
Incr Delay (d2), s/veh	8.2	5.1	0.2	30.7	0.8	0.0	1.4	12.6	14.9	5.4	23.2	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	12.9	0.4	12.9	5.1	0.0	1.3	6.4	15.5	6.9	18.9	5.9
LnGrp Delay(d),s/veh	50.6	30.4	20.3	83.5	35.9	0.0	51.2	66.1	56.7	48.0	69.5	43.0
LnGrp LOS	D	C	C	F	D		D	E	E	D	E	D
Approach Vol, veh/h		1084			647			605			1042	
Approach Delay, s/veh		34.2			57.2			58.9			56.5	
Approach LOS		C			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	27.3	41.7		39.0	25.0	44.0
Change Period (Y+Rc), s		4.6	4.6	4.6		4.6	4.6	4.6
Max Green Setting (Gmax), s		17.4	23.4	36.4		34.4	20.4	39.4
Max Q Clear Time (g_c+I1), s		19.4	22.6	26.9		32.3	16.2	12.1
Green Ext Time (p_c), s		0.0	0.1	4.2		1.2	2.3	2.4

Intersection Summary	
HCM 2010 Ctrl Delay	49.9
HCM 2010 LOS	D

HCM 2010 TWSC
32: I-5 NB Ramps & Trosper Rd

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SEL	SER
Traffic Vol, veh/h	0	1030	665	0	1015	410	0	145	0	0
Future Vol, veh/h	0	1030	665	0	1015	410	0	145	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	Free	-	Yield	-	-
Storage Length	300	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	0	0
Mvmt Flow	0	1084	700	0	1068	432	0	153	0	0

Major/Minor	Major1			Major2			Minor1	
Conflicting Flow All	-	0	-	-	-	0	-	542
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	7.12
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	3.91
Pot Cap-1 Maneuver	0	-	0	0	-	0	0	417
Stage 1	0	-	0	0	-	0	0	-
Stage 2	0	-	0	0	-	0	0	-
Platoon blocked, %		-			-			
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	417
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	18.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	417	-	-
HCM Lane V/C Ratio	0.366	-	-
HCM Control Delay (s)	18.5	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	1.6	-	-

Lanes, Volumes, Timings
33: Capitol Blvd & Trosper Rd

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	595	65	460	50	250	50	690	770	10	35	985	650
Future Volume (vph)	595	65	460	50	250	50	690	770	10	35	985	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	250		0	100		200
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		397			338			735			2664	
Travel Time (s)		9.0			7.7			16.7			60.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)	45%						31%					
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	Perm
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									6
Detector Phase	4	4	2	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	27.0	27.0	49.0	21.0	21.0		49.0	49.0		33.0	33.0	33.0
Total Split (%)	20.8%	20.8%	37.7%	16.2%	16.2%		37.7%	37.7%		25.4%	25.4%	25.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None		C-Min	C-Min		Min	Min	Min

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL, Start of Green, Master Intersection
Natural Cycle: 150
Control Type: Actuated-Coordinated

Splits and Phases: 33: Capitol Blvd & Trosper Rd

HCM 2010 Signalized Intersection Summary
33: Capitol Blvd & Trosper Rd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	595	65	460	50	250	50	690	770	10	35	985	650
Future Volume (veh/h)	595	65	460	50	250	50	690	770	10	35	985	650
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	675	0	247	53	263	53	516	1105	11	37	1037	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	634	0	836	237	201	40	620	1287	13	400	797	357
Arrive On Green	0.24	0.00	0.24	0.13	0.13	0.13	0.11	0.11	0.11	0.22	0.22	0.00
Sat Flow, veh/h	3583	0	1599	1810	1536	310	1792	3719	37	1792	3574	1599
Grp Volume(v), veh/h	675	0	247	53	0	316	516	559	557	37	1037	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599	1810	0	1845	1792	1881	1875	1792	1787	1599
Q Serve(g_s), s	23.0	0.0	11.2	3.4	0.0	17.0	36.6	37.9	37.9	2.1	29.0	0.0
Cycle Q Clear(g_c), s	23.0	0.0	11.2	3.4	0.0	17.0	36.6	37.9	37.9	2.1	29.0	0.0
Prop In Lane	1.00		1.00	1.00		0.17	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	634	0	836	237	0	241	620	651	649	400	797	357
V/C Ratio(X)	1.06	0.00	0.30	0.22	0.00	1.31	0.83	0.86	0.86	0.09	1.30	0.00
Avail Cap(c_a), veh/h	634	0	836	237	0	241	620	651	649	400	797	357
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.79	0.79	0.79	0.17	0.17	0.00
Uniform Delay (d), s/veh	49.7	0.0	16.2	50.6	0.0	56.5	53.9	54.4	54.4	40.1	50.5	0.0
Incr Delay (d2), s/veh	54.2	0.0	0.2	0.5	0.0	165.8	10.0	11.2	11.2	0.0	136.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	0.0	8.6	1.7	0.0	19.8	19.9	21.8	21.7	1.1	29.4	0.0
LnGrp Delay(d),s/veh	103.9	0.0	16.4	51.1	0.0	222.3	63.8	65.6	65.7	40.1	187.4	0.0
LnGrp LOS	F		B	D		F	E	E	E	D	F	
Approach Vol, veh/h		922			369			1632			1074	
Approach Delay, s/veh		80.5			197.7			65.1			182.3	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		49.0		27.0		33.0		21.0
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		45.0		23.0		29.0		17.0
Max Q Clear Time (g_c+I1), s		39.9		25.0		31.0		19.0
Green Ext Time (p_c), s		3.6		0.0		0.0		0.0

Intersection Summary

HCM 2010 Ctrl Delay	112.4
HCM 2010 LOS	F

Notes

Item 8.

Lanes, Volumes, Timings
34: Capitol Blvd & Lee St

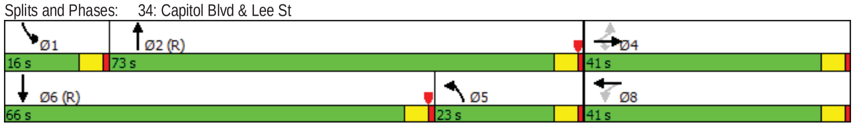
Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	15	95	15	10	85	195	1160	20	70	1270	120
Future Volume (vph)	240	15	95	15	10	85	195	1160	20	70	1270	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	250		0	200		0
Storage Lanes	0		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		718			814			621			735	
Travel Time (s)		16.3			18.5			14.1			16.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	30.0	30.0		11.0	25.0		11.0	25.0	
Total Split (s)	41.0	41.0	41.0	41.0	41.0		23.0	73.0		16.0	66.0	
Total Split (%)	31.5%	31.5%	31.5%	31.5%	31.5%		17.7%	56.2%		12.3%	50.8%	
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 116 (89%), Referenced to phase 2:NBT and 6:SBT, Start of Red
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 34: Capitol Blvd & Lee St



HCM Signalized Intersection Capacity Analysis
34: Capitol Blvd & Lee St

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	15	95	15	10	85	195	1160	20	70	1270	120
Future Volume (vph)	240	15	95	15	10	85	195	1160	20	70	1270	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00	1.00	1.00	1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85	1.00	0.87		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1797	1599	1805	1646		1787	3565		1787	3528	
Flt Permitted		0.64	1.00	0.36	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1208	1599	675	1646		1787	3565		1787	3528	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	253	16	100	16	11	89	205	1221	21	74	1337	126
RTOR Reduction (vph)	0	0	69	0	67	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	269	31	16	33	0	205	1241	0	74	1458	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		31.6	31.6	31.6	31.6		19.3	76.7		7.9	65.3	
Effective Green, g (s)		31.6	31.6	31.6	31.6		19.3	76.7		7.9	65.3	
Actuated g/C Ratio		0.24	0.24	0.24	0.24		0.15	0.59		0.06	0.50	
Clearance Time (s)		4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)		2.0	2.0	2.0	2.0		1.5	3.0		1.6	3.0	
Lane Grp Cap (vph)		293	388	164	400		265	2103		108	1772	
v/s Ratio Prot					0.02		c0.11	0.35		0.04	c0.41	
v/s Ratio Perm		c0.22	0.02	0.02								
v/c Ratio		0.92	0.08	0.10	0.08		0.77	0.59		0.69	0.82	
Uniform Delay, d1		47.9	38.0	38.1	38.0		53.2	16.8		59.8	27.4	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00		1.43	0.37	
Incremental Delay, d2		31.2	0.0	0.1	0.0		12.0	1.2		1.3	0.4	
Delay (s)		79.2	38.0	38.2	38.0		65.3	18.0		87.0	10.7	
Level of Service		E	D	D	D		E	B		F	B	
Approach Delay (s)		68.0			38.1			24.7			14.3	
Approach LOS		E			D			C			B	

Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

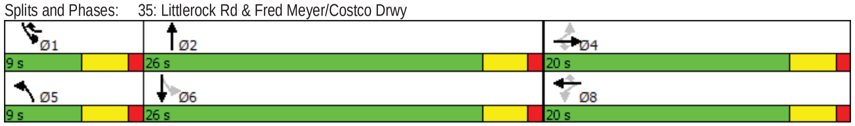
c Critical Lane Group

Item 8.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	140	5	135	0	1040	105	105	965	0
Future Volume (vph)	0	0	0	140	5	135	0	1040	105	105	965	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	175		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		390			426			713			896	
Travel Time (s)		8.9			9.7			16.2			20.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type			Perm	Perm	NA	pm+ov	Prot	NA		pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8				6		
Detector Phase	4	4	4	8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	9.0	9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	9.0	9.0	26.0		9.0	26.0	
Total Split (%)	36.4%	36.4%	36.4%	36.4%	36.4%	16.4%	16.4%	47.3%		16.4%	47.3%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag						Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 55	
Actuated Cycle Length: 48.2	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 35: Littlerock Rd & Fred Meyer/Costco Drwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	140	5	135	0	1040	105	105	965	0
Future Volume (veh/h)	0	0	0	140	5	135	0	1040	105	105	965	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	0	0	147	5	142	0	1095	111	111	1016	0
Adj No. of Lanes	0	1	1	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	0	291	247	372	7	379	4	1618	164	423	2385	0
Arrive On Green	0.00	0.00	0.00	0.15	0.15	0.15	0.00	0.49	0.49	0.08	0.67	0.00
Sat Flow, veh/h	0	1900	1615	1390	47	1599	1792	3278	332	1792	3668	0
Grp Volume(v), veh/h	0	0	0	152	0	142	0	597	609	111	1016	0
Grp Sat Flow(s),veh/h/ln	0	1900	1615	1437	0	1599	1792	1787	1823	1792	1787	0
Q Serve(g_s), s	0.0	0.0	0.0	4.5	0.0	3.3	0.0	11.3	11.3	1.1	5.9	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	4.5	0.0	3.3	0.0	11.3	11.3	1.1	5.9	0.0
Prop In Lane	0.00		1.00	0.97		1.00	1.00		0.18	1.00		0.00
Lane Grp Cap(c), veh/h	0	291	247	379	0	379	4	882	900	423	2385	0
V/C Ratio(X)	0.00	0.00	0.00	0.40	0.00	0.37	0.00	0.68	0.68	0.26	0.43	0.00
Avail Cap(c_a), veh/h	0	682	580	675	0	708	201	882	900	474	2385	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	17.9	0.0	14.2	0.0	8.6	8.6	6.0	3.4	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.3	0.0	0.2	0.0	4.1	4.1	0.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.8	0.0	1.5	0.0	6.5	6.6	0.6	3.0	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	18.1	0.0	14.5	0.0	12.7	12.7	6.2	4.0	0.0
LnGrp LOS				B		B		B	B	A	A	
Approach Vol, veh/h		0			294			1206			1127	
Approach Delay, s/veh		0.0			16.4			12.7			4.2	
Approach LOS					B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.7	26.0		10.8	0.0	33.7		10.8
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	5.0	22.0		16.0	5.0	22.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	13.3		0.0	0.0	7.9		6.5
Green Ext Time (p_c), s	0.0	6.9		0.0	0.0	10.3		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		9.5
HCM 2010 LOS		A

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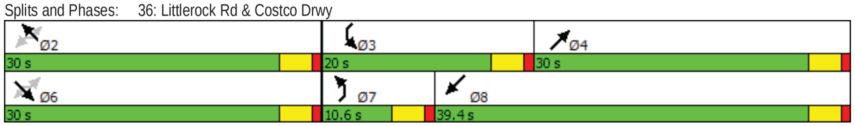
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	100	30	20	95	5	260	65	825	145	265	735	100
Future Volume (vph)	100	30	20	95	5	260	65	825	145	265	735	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		100	150		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		325			608			995			713	
Travel Time (s)		7.4			13.8			22.6			16.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Detector Phase	6	6	6	2	2	2	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	9.5	30.0		9.5	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	10.6	30.0		20.0	39.4	
Total Split (%)	37.5%	37.5%	37.5%	37.5%	37.5%	37.5%	13.3%	37.5%		25.0%	49.3%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 78.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 36: Littlerock Rd & Costco Drwy



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	100	30	20	95	5	260	65	825	145	265	735	100
Future Volume (vph)	100	30	20	95	5	260	65	825	145	265	735	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1830	1615		1814	1615	1787	3494		1787	3510	
Flt Permitted		0.73	1.00		0.67	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1389	1615		1278	1615	1787	3494		1787	3510	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	105	32	21	100	5	274	68	868	153	279	774	105
RTOR Reduction (vph)	0	0	14	0	0	184	0	18	0	0	13	0
Lane Group Flow (vph)	0	137	7	0	105	90	68	1003	0	279	866	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Actuated Green, G (s)		26.0	26.0		26.0	26.0	5.2	26.1		15.0	35.9	
Effective Green, g (s)		26.0	26.0		26.0	26.0	5.2	26.1		15.0	35.9	
Actuated g/C Ratio		0.33	0.33		0.33	0.33	0.07	0.33		0.19	0.45	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		456	530		420	530	117	1152		338	1593	
v/s Ratio Prot							0.04	c0.29		c0.16	0.25	
v/s Ratio Perm		c0.10	0.00		0.08	0.06						
v/c Ratio		0.30	0.01		0.25	0.17	0.58	0.87		0.83	0.54	
Uniform Delay, d1		19.8	17.9		19.4	18.9	35.9	24.9		30.8	15.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.7	0.0		1.4	0.7	7.2	7.4		15.0	0.4	
Delay (s)		21.5	17.9		20.8	19.6	43.1	32.3		45.8	16.0	
Level of Service		C	B		C	B	D	C		D	B	
Approach Delay (s)		21.0			19.9			33.0			23.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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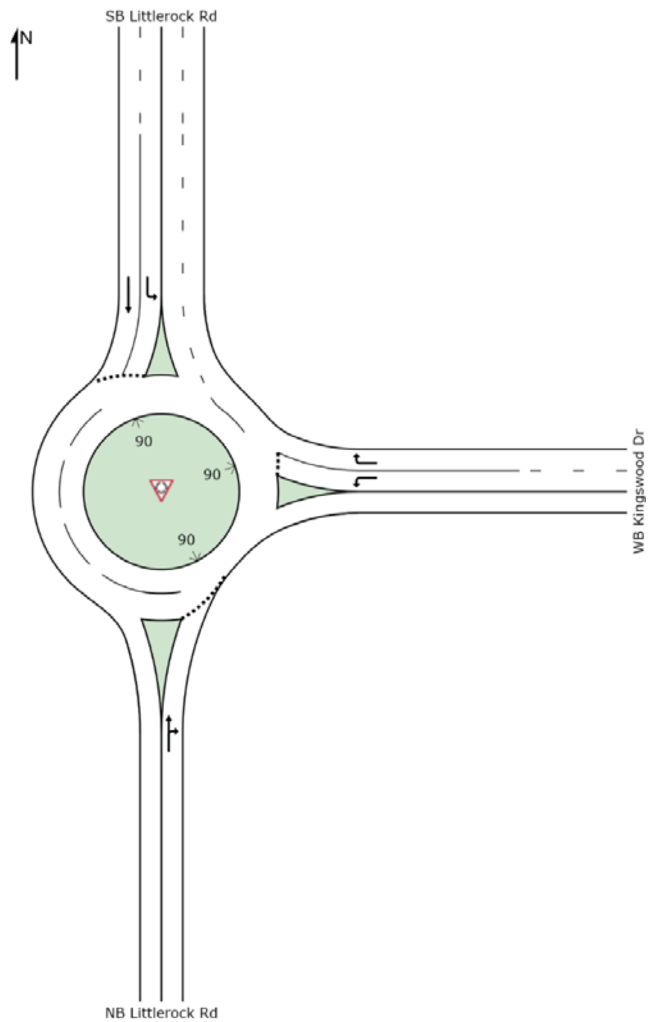
Item 8.

SITE LAYOUT

Site: 37) Littlerock Rd at Kingswood Dr

Projected 2040 Baseline
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 37) Littlerock Rd at Kingswood Dr

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Littlerock Rd											
8	T1	895	1.0	1.009	22.0	LOS F	48.8	1229.0	1.00	0.81	29.2
18	R2	168	1.0	1.009	21.9	LOS F	48.8	1229.0	1.00	0.81	28.5
Approach		1063	1.0	1.009	22.0	LOS C	48.8	1229.0	1.00	0.81	29.1
East: WB Kingswood Dr											
1	L2	195	1.0	0.364	16.1	LOS B	3.0	75.4	0.99	0.93	31.7
16	R2	111	1.0	0.067	4.2	LOS A	0.0	0.0	0.00	0.49	36.5
Approach		305	1.0	0.364	11.8	LOS B	3.0	75.4	0.63	0.77	33.2
North: SB Littlerock Rd											
7	L2	95	1.0	0.123	11.4	LOS B	0.7	17.4	0.48	0.66	33.7
4	T1	837	1.0	0.684	5.7	LOS A	7.7	195.2	0.75	0.57	35.2
Approach		932	1.0	0.684	6.3	LOS A	7.7	195.2	0.73	0.58	35.1
All Vehicles		2300	1.0	1.009	14.3	LOS B	48.8	1229.0	0.84	0.71	31.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 2:14:41 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\Projected 2040 Baseline PM.sip6

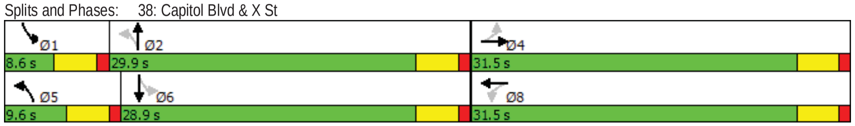
Lanes, Volumes, Timings
38: Capitol Blvd & X St

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1	20	35	1	20	25	1190	20	35	1190	50
Future Volume (vph)	30	1	20	35	1	20	25	1190	20	35	1190	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	150		0	250		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		642			1326			1300			1368	
Travel Time (s)		14.6			30.1			29.5			31.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		9.5	25.5		8.5	26.5	
Total Split (s)	31.5	31.5		31.5	31.5		9.6	29.9		8.6	28.9	
Total Split (%)	45.0%	45.0%		45.0%	45.0%		13.7%	42.7%		12.3%	41.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 46	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 38: Capitol Blvd & X St



HCM 2010 Signalized Intersection Summary
38: Capitol Blvd & X St

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	1	20	35	1	20	25	1190	20	35	1190	50
Future Volume (veh/h)	30	1	20	35	1	20	25	1190	20	35	1190	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	32	1	21	37	1	21	26	1253	21	37	1253	53
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	285	7	157	285	7	157	347	2034	34	365	2005	85
Arrive On Green	0.10	0.10	0.10	0.10	0.10	0.10	0.02	0.57	0.57	0.03	0.57	0.57
Sat Flow, veh/h	1412	74	1552	1412	74	1552	1792	3597	60	1792	3495	148
Grp Volume(v), veh/h	32	0	22	37	0	22	26	622	652	37	640	666
Grp Sat Flow(s),veh/h/ln	1412	0	1626	1412	0	1626	1792	1787	1871	1792	1787	1855
Q Serve(g_s), s	0.9	0.0	0.6	1.1	0.0	0.6	0.3	10.4	10.4	0.4	10.7	10.7
Cycle Q Clear(g_c), s	1.5	0.0	0.6	1.7	0.0	0.6	0.3	10.4	10.4	0.4	10.7	10.7
Prop In Lane	1.00		0.95	1.00		0.95	1.00		0.03	1.00		0.08
Lane Grp Cap(c), veh/h	285	0	164	285	0	164	347	1011	1058	365	1025	1064
V/C Ratio(X)	0.11	0.00	0.13	0.13	0.00	0.13	0.08	0.62	0.62	0.10	0.62	0.63
Avail Cap(c_a), veh/h	992	0	978	992	0	978	506	1011	1058	469	1025	1064
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.1	0.0	18.4	19.2	0.0	18.4	5.1	6.5	6.5	5.0	6.4	6.4
Incr Delay (d2), s/veh	0.2	0.0	0.4	0.2	0.0	0.4	0.1	2.8	2.7	0.1	2.9	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.3	0.4	0.0	0.3	0.1	5.8	6.0	0.2	6.0	6.2
LnGrp Delay(d),s/veh	19.3	0.0	18.8	19.4	0.0	18.8	5.2	9.3	9.2	5.1	9.2	9.1
LnGrp LOS	B		B	B		B	A	A	A	A	A	A
Approach Vol, veh/h		54			59			1300			1343	
Approach Delay, s/veh		19.1			19.1			9.2			9.1	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.0	29.9		9.0	5.6	30.3		9.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	4.1	25.4		27.0	5.1	24.4		27.0
Max Q Clear Time (g_c+I1), s	2.4	12.4		3.5	2.3	12.7		3.7
Green Ext Time (p_c), s	0.0	11.3		0.4	0.0	10.3		0.4

Intersection Summary		
HCM 2010 Ctrl Delay		9.5
HCM 2010 LOS		A

Item 8.

HCM 2010 TWSC
39: Elm St & X St

Projected 2040 No Build
PM Peak Hour

Intersection												
Int Delay, s/veh	2.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	15	10	5	5	5	5	90	10	0	60	5
Future Vol, veh/h	10	15	10	5	5	5	5	90	10	0	60	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	2	2	2
Mvmt Flow	11	16	11	5	5	5	5	95	11	0	63	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	182	182	66	190	179	100	68	0	0	105	0	0
Stage 1	66	66	-	111	111	-	-	-	-	-	-	-
Stage 2	116	116	-	79	68	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	784	716	1003	774	718	961	1546	-	-	1486	-	-
Stage 1	950	844	-	899	807	-	-	-	-	-	-	-
Stage 2	894	803	-	935	842	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	774	714	1003	751	716	961	1546	-	-	1486	-	-
Mov Cap-2 Maneuver	774	714	-	751	716	-	-	-	-	-	-	-
Stage 1	947	844	-	896	805	-	-	-	-	-	-	-
Stage 2	881	801	-	908	842	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	9.6	0.3	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1546	-	-	797	796	1486	-	-
HCM Lane V/C Ratio	0.003	-	-	0.046	0.02	-	-	-
HCM Control Delay (s)	7.3	0	-	9.7	9.6	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

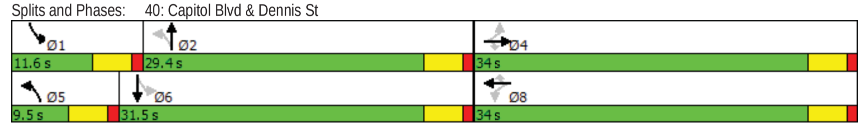
Lanes, Volumes, Timings
40: Capitol Blvd & Dennis St

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	40	35	40	25	75	20	875	40	45	1000	125
Future Volume (vph)	225	40	35	40	25	75	20	875	40	45	1000	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	175		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		834			700			1337			1300	
Travel Time (s)		19.0			15.9			30.4			29.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	8.0		7.0	8.0	
Minimum Split (s)	33.5	33.5	33.5	33.5	33.5	33.5	9.5	27.5		11.5	27.5	
Total Split (s)	34.0	34.0	34.0	34.0	34.0	34.0	9.5	29.4		11.6	31.5	
Total Split (%)	45.3%	45.3%	45.3%	45.3%	45.3%	45.3%	12.7%	39.2%		15.5%	42.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 75	
Actuated Cycle Length: 61.1	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 40: Capitol Blvd & Dennis St



Item 8.

HCM Signalized Intersection Capacity Analysis
40: Capitol Blvd & Dennis St

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	40	35	40	25	75	20	875	40	45	1000	125
Future Volume (vph)	225	40	35	40	25	75	20	875	40	45	1000	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.96	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1599		1843	1615	1787	3551		1787	3515	
Flt Permitted		0.71	1.00		0.74	1.00	0.16	1.00		0.18	1.00	
Satd. Flow (perm)		1337	1599		1402	1615	303	3551		348	3515	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	237	42	37	42	26	79	21	921	42	47	1053	132
RTOR Reduction (vph)	0	0	27	0	0	57	0	3	0	0	10	0
Lane Group Flow (vph)	0	279	10	0	68	22	21	960	0	47	1175	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		17.8	17.8		17.8	17.8	30.2	29.4		36.2	32.4	
Effective Green, g (s)		17.8	17.8		17.8	17.8	30.2	29.4		36.2	32.4	
Actuated g/C Ratio		0.28	0.28		0.28	0.28	0.47	0.46		0.56	0.50	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		368	441		386	445	160	1618		280	1765	
v/s Ratio Prot							0.00	0.27		c0.01	c0.33	
v/s Ratio Perm		c0.21	0.01		0.05	0.01	0.06			0.08		
v/c Ratio		0.76	0.02		0.18	0.05	0.13	0.59		0.17	0.67	
Uniform Delay, d1		21.4	17.0		17.8	17.1	10.0	13.1		7.6	12.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.7	0.0		0.2	0.0	0.4	1.6		0.3	2.0	
Delay (s)		30.0	17.0		18.0	17.2	10.3	14.7		7.9	14.0	
Level of Service		C	B		B	B	B	B		A	B	
Approach Delay (s)		28.5			17.6			14.6			13.8	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	64.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
41: Israel Rd & Capitol Blvd

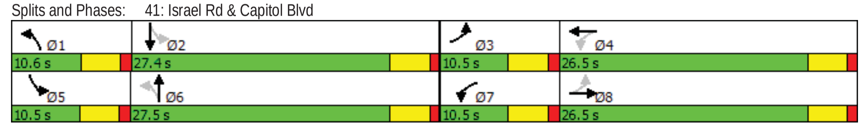
Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	280	215	140	290	205	185	470	40	135	885	100
Future Volume (vph)	75	280	215	140	290	205	185	470	40	135	885	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	150		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2751			725			934			1337	
Travel Time (s)		62.5			16.5			21.2			30.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	26.5		10.5	26.5	
Total Split (s)	10.5	26.5		10.5	26.5		10.6	27.5		10.5	27.4	
Total Split (%)	14.0%	35.3%		14.0%	35.3%		14.1%	36.7%		14.0%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 74.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 41: Israel Rd & Capitol Blvd



HCM 2010 Signalized Intersection Summary
41: Israel Rd & Capitol Blvd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	280	215	140	290	205	185	470	40	135	885	100
Future Volume (veh/h)	75	280	215	140	290	205	185	470	40	135	885	100
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1863	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	79	295	163	147	305	216	195	495	42	142	932	105
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	2	2	2	1	1	1	1	1	1
Cap, veh/h	215	328	181	276	305	216	261	1051	89	405	1001	113
Arrive On Green	0.07	0.29	0.29	0.08	0.30	0.30	0.08	0.31	0.31	0.08	0.31	0.31
Sat Flow, veh/h	1810	1151	636	1774	1016	720	1792	3336	282	1792	3239	365
Grp Volume(v), veh/h	79	0	458	147	0	521	195	265	272	142	514	523
Grp Sat Flow(s),veh/h/ln	1810	0	1788	1774	0	1736	1792	1787	1831	1792	1787	1817
Q Serve(g_s), s	2.2	0.0	18.2	4.2	0.0	22.2	5.5	8.8	8.9	3.9	20.7	20.7
Cycle Q Clear(g_c), s	2.2	0.0	18.2	4.2	0.0	22.2	5.5	8.8	8.9	3.9	20.7	20.7
Prop In Lane	1.00		0.36	1.00		0.41	1.00		0.15	1.00		0.20
Lane Grp Cap(c), veh/h	215	0	510	276	0	521	261	563	577	405	553	562
V/C Ratio(X)	0.37	0.00	0.90	0.53	0.00	1.00	0.75	0.47	0.47	0.35	0.93	0.93
Avail Cap(c_a), veh/h	244	0	531	277	0	521	261	563	577	413	553	562
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.4	0.0	25.4	18.9	0.0	25.9	18.8	20.4	20.4	15.7	24.8	24.8
Incr Delay (d2), s/veh	1.3	0.0	17.9	2.3	0.0	39.2	11.5	2.8	2.8	0.6	24.5	24.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	11.4	2.2	0.0	16.2	3.5	4.8	4.9	2.0	13.9	14.1
LnGrp Delay(d),s/veh	20.6	0.0	43.3	21.2	0.0	65.1	30.4	23.2	23.2	16.4	49.3	49.0
LnGrp LOS	C		D	C		E	C	C	C	B	D	D
Approach Vol, veh/h		537			668			732			1179	
Approach Delay, s/veh		40.0			55.5			25.1			45.2	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	27.4	9.3	26.7	10.2	27.8	10.4	25.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.1	22.9	6.0	22.0	6.0	23.0	6.0	22.0
Max Q Clear Time (g_c+I1), s	7.5	22.7	4.2	24.2	5.9	10.9	6.2	20.2
Green Ext Time (p_c), s	0.0	0.2	0.0	0.0	0.0	8.4	0.0	0.9

Intersection Summary		
HCM 2010 Ctrl Delay		41.8
HCM 2010 LOS		D

HCM 2010 TWSC
42: 66th Ave & Black Lake Belmore Rd

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	75	105	135	210	125	140
Future Vol, veh/h	75	105	135	210	125	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	79	111	142	221	132	147

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	363	0	-	0	521	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	268	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1201	-	-	-	519	791
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1201	-	-	-	483	791
Mov Cap-2 Maneuver	-	-	-	-	483	-
Stage 1	-	-	-	-	794	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	SB
HCM Control Delay, s	3.4	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1201	-	-	-	608
HCM Lane V/C Ratio	0.066	-	-	-	0.459
HCM Control Delay (s)	8.2	0	-	-	15.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	2.4

HCM 2010 TWSC
43: Kirsop Rd & 66th Ave

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	9.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	40	5	205	5	2	5	340	15	5	5	15	85
Future Vol, veh/h	40	5	205	5	2	5	340	15	5	5	15	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	0	0	0
Mvmt Flow	42	5	216	5	2	5	358	16	5	5	16	89

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	809	808	61	916	850	18	105	0	0	21	0	0
Stage 1	71	71	-	734	734	-	-	-	-	-	-	-
Stage 2	738	737	-	182	116	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.11	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.209	-	-	2.2	-	-
Pot Cap-1 Maneuver	300	316	1007	255	300	1066	1493	-	-	1608	-	-
Stage 1	941	838	-	415	429	-	-	-	-	-	-	-
Stage 2	411	426	-	824	803	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	240	238	1007	160	226	1066	1493	-	-	1608	-	-
Mov Cap-2 Maneuver	240	238	-	160	226	-	-	-	-	-	-	-
Stage 1	712	835	-	314	325	-	-	-	-	-	-	-
Stage 2	308	322	-	641	801	-	-	-	-	-	-	-

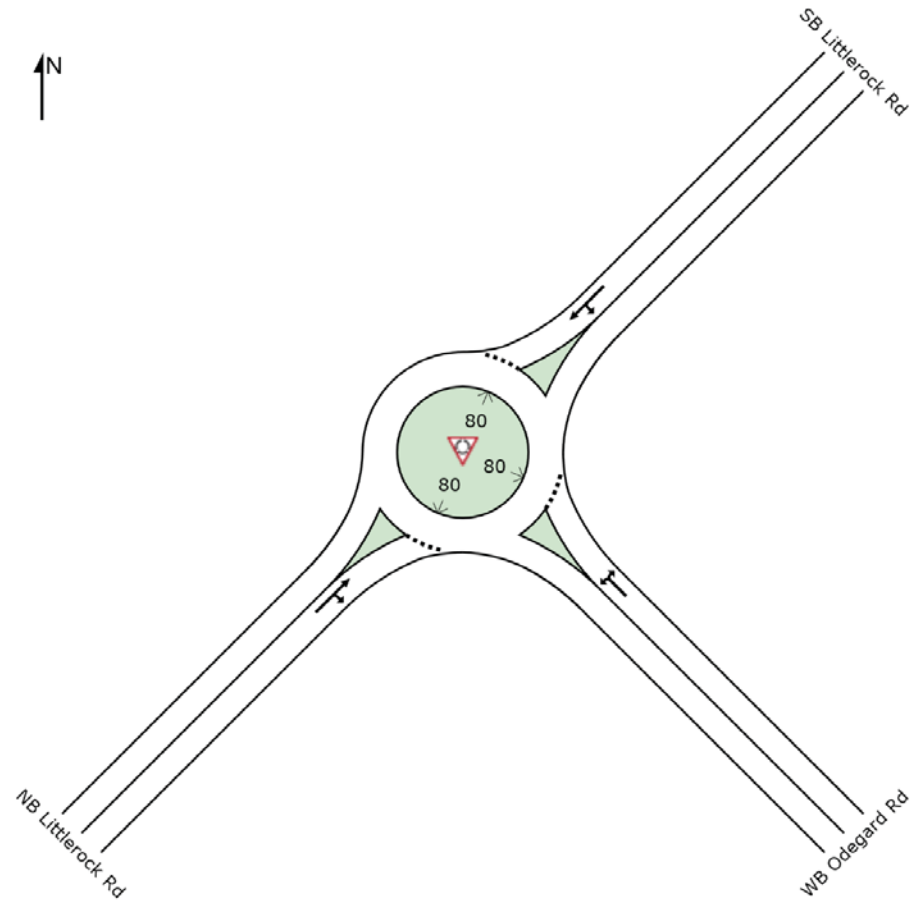
Approach	EB	WB	NB	SB
HCM Control Delay, s	14.5	19.1	7.7	0.3
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1493	-	-	639	268	1608	-	-
HCM Lane V/C Ratio	0.24	-	-	0.412	0.047	0.003	-	-
HCM Control Delay (s)	8.2	0	-	14.5	19.1	7.2	0	-
HCM Lane LOS	A	A	-	B	C	A	A	-
HCM 95th %tile Q(veh)	0.9	-	-	2	0.1	0	-	-

SITE LAYOUT

Site: 44) Littlerock Rd at Odegard Rd

Projected 2040 Baseline
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 44) Littlerock Rd at Odegard Rd

Projected 2040 Baseline
PM Peak Hour
Roundabout

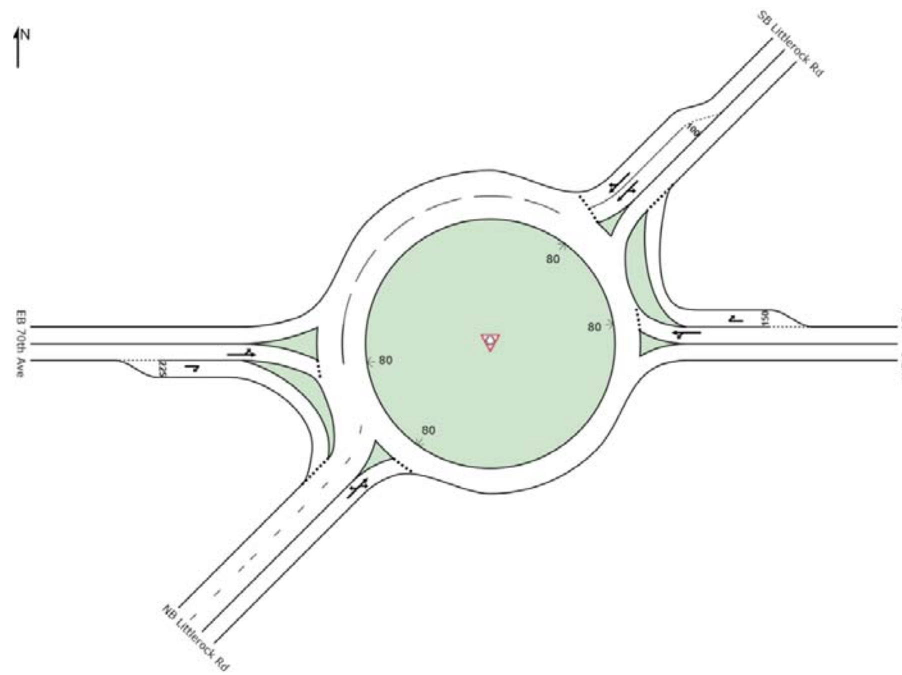
Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: WB Odegard Rd											
3x	L2	26	0.0	0.082	18.7	LOS B	0.5	12.5	0.85	0.84	31.0
18x	R2	11	0.0	0.082	13.4	LOS B	0.5	12.5	0.85	0.84	30.3
Approach		37	0.0	0.082	17.2	LOS B	0.5	12.5	0.85	0.84	30.8
NorthEast: SB Littlerock Rd											
1x	L2	11	1.0	0.829	10.2	LOS B	19.5	491.0	0.57	0.38	35.5
6x	T1	995	1.0	0.829	4.9	LOS A	19.5	491.0	0.57	0.38	35.6
Approach		1005	1.0	0.829	4.9	LOS A	19.5	491.0	0.57	0.38	35.6
SouthWest: NB Littlerock Rd											
2x	T1	1026	1.0	0.832	4.5	LOS A	20.5	517.5	0.35	0.36	36.3
12x	R2	5	1.0	0.832	4.4	LOS A	20.5	517.5	0.35	0.36	35.4
Approach		1032	1.0	0.832	4.5	LOS A	20.5	517.5	0.35	0.36	36.3
All Vehicles		2074	1.0	0.832	4.9	LOS A	20.5	517.5	0.47	0.38	35.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 45) Littlerock Rd at Israel Rd

Projected 2040 Baseline
PM Peak Hour
Roundabout



Item 8.

MOVEMENT SUMMARY

Site: 45) Littlerock Rd at Israel Rd

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB Israel Rd											
1a	L1	116	1.0	0.581	17.9	LOS B	5.9	148.5	1.00	1.06	31.6
6	T1	247	1.0	0.581	13.7	LOS B	5.9	148.5	1.00	1.06	31.8
16b	R3	447	1.0	0.504	8.3	LOS A	4.3	108.2	0.83	0.84	33.9
Approach		811	1.0	0.581	11.3	LOS B	5.9	148.5	0.91	0.94	32.9
NorthEast: SB Littlerock Rd											
1bx	L3	232	1.0	0.684	21.0	LOS C	7.7	193.8	0.95	1.10	31.1
6x	T1	647	1.0	0.684	13.9	LOS B	8.2	205.5	0.96	1.08	32.0
16ax	R1	179	1.0	0.684	12.8	LOS B	8.2	205.5	0.96	1.06	32.5
Approach		1058	1.0	0.684	15.2	LOS B	8.2	205.5	0.96	1.08	31.9
West: EB 70th Ave											
5a	L1	132	1.0	0.415	12.4	LOS B	2.4	59.3	0.79	0.89	33.6
2	T1	132	1.0	0.415	8.4	LOS A	2.4	59.3	0.79	0.89	34.0
12b	R3	121	1.0	0.159	6.3	LOS A	0.7	18.2	0.62	0.78	35.0
Approach		384	1.0	0.415	9.1	LOS A	2.4	59.3	0.73	0.86	34.1
SouthWest: NB Littlerock Rd											
5bx	L3	289	1.0	1.055	63.4	LOS F	39.7	1001.2	1.00	2.01	19.8
2x	T1	426	1.0	1.055	57.0	LOS F	39.7	1001.2	1.00	2.01	19.7
12ax	R1	100	1.0	1.055	56.7	LOS F	39.7	1001.2	1.00	2.01	19.6
Approach		816	1.0	1.055	59.2	LOS E	39.7	1001.2	1.00	2.01	19.7
All Vehicles		3068	1.0	1.055	25.1	LOS C	39.7	1001.2	0.93	1.26	27.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 2:17:41 PM
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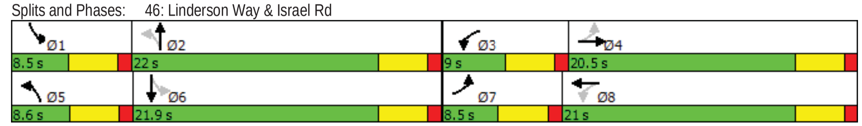
Lanes, Volumes, Timings
46: Linderson Way & Israel Rd

Projected 2040 No Build
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	400	125	135	465	25	200	260	90	40	140	140
Future Volume (vph)	70	400	125	135	465	25	200	260	90	40	140	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	150		0	100		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3505			2751			2073			847	
Travel Time (s)		79.7			62.5			47.1			19.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.5	20.5		8.5	20.5		8.5	21.5		8.5	21.5	
Total Split (s)	8.5	20.5		9.0	21.0		8.6	22.0		8.5	21.9	
Total Split (%)	14.2%	34.2%		15.0%	35.0%		14.3%	36.7%		14.2%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 58.3
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 46: Linderson Way & Israel Rd



HCM 2010 Signalized Intersection Summary
46: Linderson Way & Israel Rd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	400	125	135	465	25	200	260	90	40	140	140
Future Volume (veh/h)	70	400	125	135	465	25	200	260	90	40	140	140
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	74	421	132	142	489	26	211	274	21	42	147	147
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	227	366	115	254	521	28	400	560	43	395	251	251
Arrive On Green	0.05	0.27	0.27	0.08	0.29	0.29	0.07	0.32	0.32	0.03	0.29	0.29
Sat Flow, veh/h	1792	1374	431	1792	1770	94	1792	1726	132	1792	864	864
Grp Volume(v), veh/h	74	0	553	142	0	515	211	0	295	42	0	294
Grp Sat Flow(s),veh/h/ln	1792	0	1805	1792	0	1865	1792	0	1858	1792	0	1729
Q Serve(g_s), s	1.8	0.0	16.0	3.4	0.0	16.2	4.1	0.0	7.6	1.0	0.0	8.7
Cycle Q Clear(g_c), s	1.8	0.0	16.0	3.4	0.0	16.2	4.1	0.0	7.6	1.0	0.0	8.7
Prop In Lane	1.00		0.24	1.00		0.05	1.00		0.07	1.00		0.50
Lane Grp Cap(c), veh/h	227	0	481	254	0	549	400	0	603	395	0	501
V/C Ratio(X)	0.33	0.00	1.15	0.56	0.00	0.94	0.53	0.00	0.49	0.11	0.00	0.59
Avail Cap(c_a), veh/h	262	0	481	254	0	549	400	0	603	455	0	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.6	0.0	22.0	16.3	0.0	20.6	16.2	0.0	16.3	14.3	0.0	18.2
Incr Delay (d2), s/veh	0.3	0.0	88.7	1.7	0.0	24.1	0.7	0.0	2.8	0.0	0.0	5.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	19.8	1.7	0.0	12.0	1.2	0.0	4.4	0.5	0.0	4.9
LnGrp Delay(d),s/veh	16.9	0.0	110.7	17.9	0.0	44.7	16.9	0.0	19.1	14.4	0.0	23.2
LnGrp LOS	B		F	B		D	B		B	B		C
Approach Vol, veh/h		627			657			506			336	
Approach Delay, s/veh		99.7			38.9			18.2			22.1	
Approach LOS		F			D			B			C	

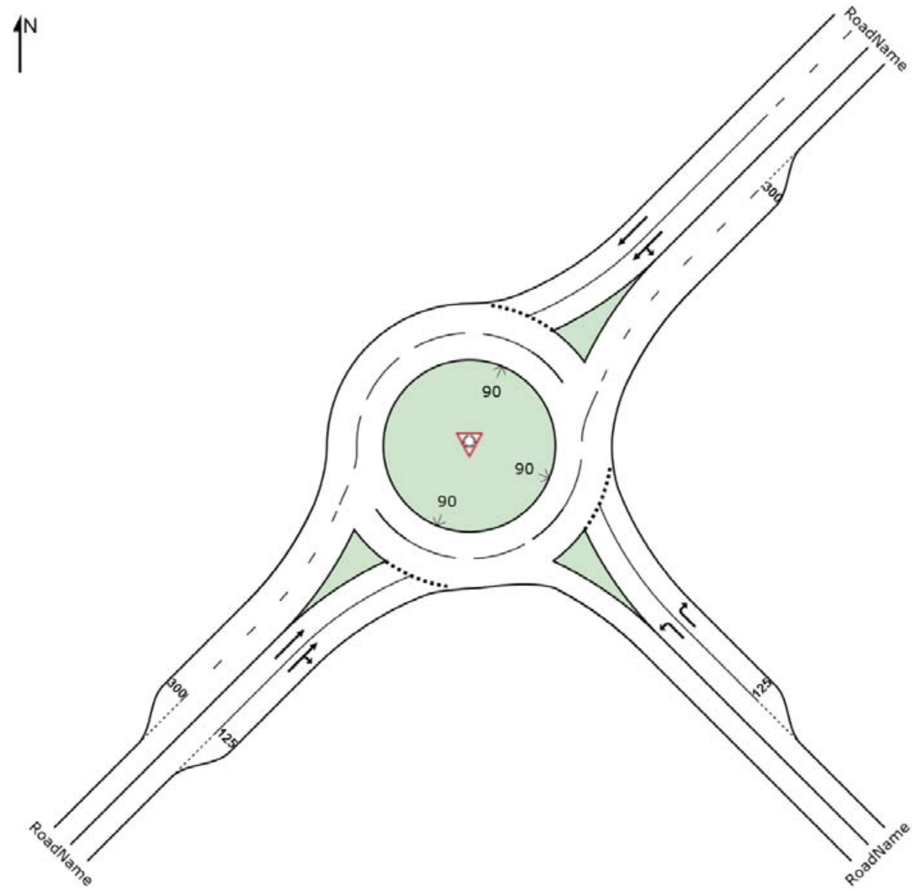
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.5	24.0	9.0	20.5	8.6	21.9	7.3	22.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	4.0	17.5	4.5	16.0	4.1	17.4	4.0	16.5
Max Q Clear Time (g_c+I1), s	3.0	9.6	5.4	18.0	6.1	10.7	3.8	18.2
Green Ext Time (p_c), s	0.0	2.3	0.0	0.0	0.0	2.0	0.0	0.0

Intersection Summary			
HCM 2010 Ctrl Delay			49.2
HCM 2010 LOS			D

SITE LAYOUT

Site: 47) Littlerock Rd at Tumwater Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout



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MOVEMENT SUMMARY

Site: 47) Littlerock Rd at Tumwater Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: RoadName											
3x	L2	416	1.0	0.396	11.3	LOS B	2.5	62.2	0.54	0.72	33.7
18x	R2	400	1.0	0.390	5.8	LOS A	2.4	60.5	0.54	0.63	35.2
Approach		816	1.0	0.396	8.6	LOS A	2.5	62.2	0.54	0.68	34.4
NorthEast: RoadName											
1x	L2	426	1.0	0.640	14.1	LOS B	6.0	150.6	0.77	0.87	33.5
6x	T1	511	1.0	0.640	7.7	LOS A	6.0	150.6	0.69	0.75	34.7
Approach		937	1.0	0.640	10.6	LOS B	6.0	150.6	0.73	0.80	34.1
SouthWest: RoadName											
2x	T1	295	0.0	0.314	6.4	LOS A	1.9	47.9	0.62	0.59	35.6
12x	R2	232	0.0	0.268	6.4	LOS A	1.5	38.5	0.60	0.69	35.1
Approach		526	0.0	0.314	6.4	LOS A	1.9	47.9	0.61	0.64	35.4
All Vehicles		2279	0.8	0.640	8.9	LOS A	6.0	150.6	0.63	0.72	34.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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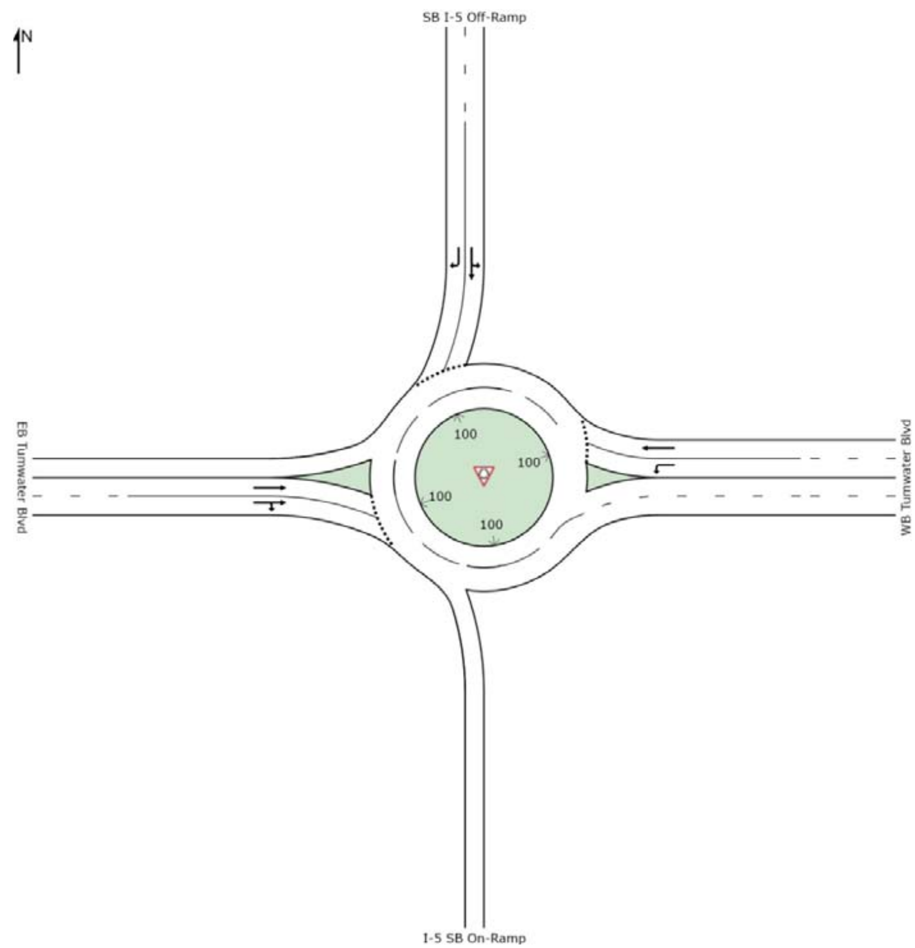
SITE LAYOUT

Site: 48) Tumwater Blvd at I-5 SB Ramps

Projected 2040 Baseline
Roundabout



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Item 8.

MOVEMENT SUMMARY

Site: 48) Tumwater Blvd at I-5 SB Ramps

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB Tumwater Blvd											
1	L2	363	2.0	0.243	4.4	LOS A	0.0	0.0	0.00	0.00	28.0
6	T1	563	2.0	0.315	4.5	LOS A	0.0	0.0	0.00	0.00	26.0
Approach		926	2.0	0.315	4.5	LOS A	0.0	0.0	0.00	0.00	26.8
North: SB I-5 Off-Ramp											
7	L2	405	2.0	0.568	13.5	LOS B	3.4	87.4	0.71	0.80	24.6
4	T1	32	2.0	0.568	13.5	LOS B	3.4	87.4	0.71	0.80	27.1
14	R2	542	2.0	0.600	12.8	LOS B	4.0	101.0	0.72	0.81	24.6
Approach		979	2.0	0.600	13.1	LOS B	4.0	101.0	0.71	0.81	24.7
West: EB Tumwater Blvd											
2	T1	753	2.0	0.988	37.4	LOS D	26.8	681.7	0.96	1.64	18.2
12	R2	363	2.0	0.988	54.4	LOS D	26.8	681.7	1.00	2.17	17.0
Approach		1116	2.0	0.988	42.9	LOS D	26.8	681.7	0.98	1.81	17.8
All Vehicles		3021	2.0	0.988	21.5	LOS C	26.8	681.7	0.59	0.93	22.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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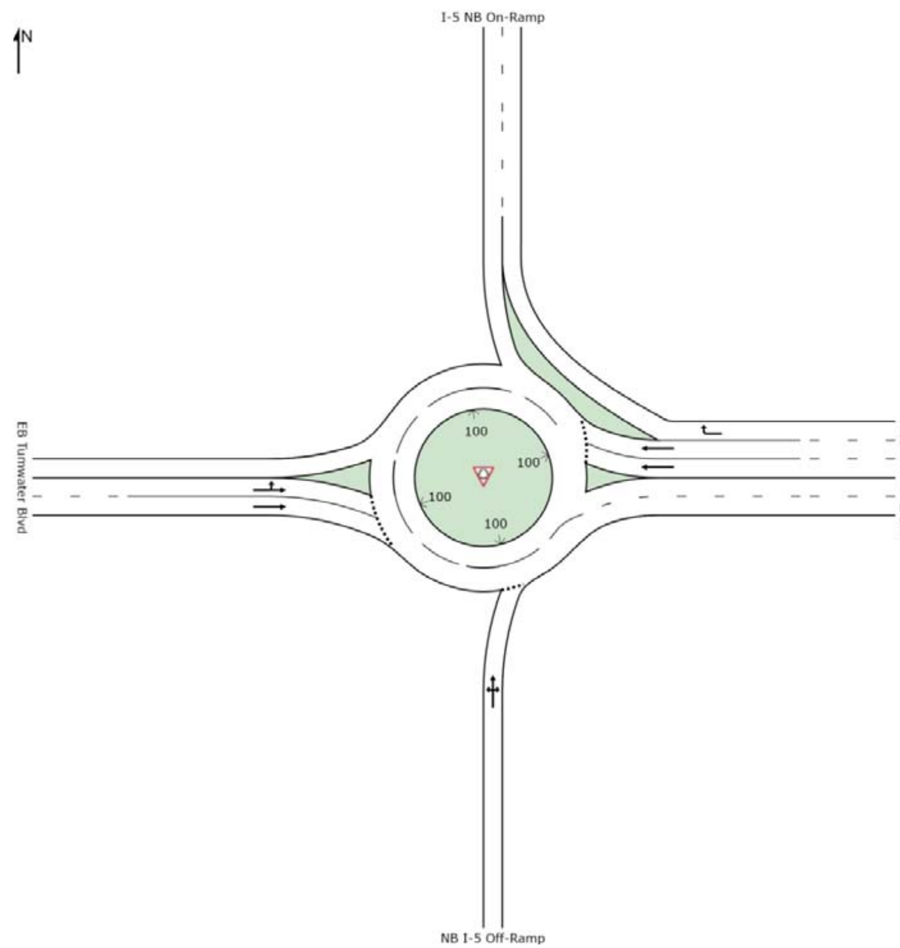
SITE LAYOUT

Site: 49) Tumwater Blvd at I-5 NB Ramps

Projected 2040 Baseline
Roundabout



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Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\49-Tumwater Blvd at I-5 NB Ramps.sip6

MOVEMENT SUMMARY

Site: 49) Tumwater Blvd at I-5 NB Ramps

Projected 2040 Baseline
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB I-5 Off-Ramp											
3	L2	182	2.0	0.571	15.6	LOS B	3.4	86.8	0.75	0.86	24.5
8	T1	5	2.0	0.571	15.6	LOS B	3.4	86.8	0.75	0.86	27.0
18	R2	182	2.0	0.571	15.6	LOS B	3.4	86.8	0.75	0.86	23.4
Approach		369	2.0	0.571	15.6	LOS B	3.4	86.8	0.75	0.86	24.0
East: WB Tumwater Blvd											
6	T1	737	2.0	0.654	12.8	LOS B	7.3	185.2	0.85	0.90	22.7
16	R2	1101	2.0	0.671	0.2	LOS A	0.0	0.0	0.00	0.00	25.0
Approach		1838	2.0	0.671	5.3	LOS A	7.3	185.2	0.34	0.36	24.0
West: EB Tumwater Blvd											
5	L2	394	2.0	0.294	5.0	LOS A	0.0	0.0	0.00	0.00	28.1
2	T1	747	2.0	0.420	5.7	LOS A	0.0	0.0	0.00	0.00	26.1
Approach		1141	2.0	0.420	5.5	LOS A	0.0	0.0	0.00	0.00	26.7
All Vehicles		3348	2.0	0.671	6.5	LOS A	7.3	185.2	0.27	0.29	24.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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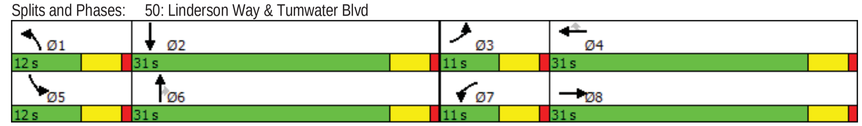
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\49-Tumwater Blvd at I-5 NB Ramps.sip6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	655	245	130	805	30	175	135	75	210	235	790
Future Volume (vph)	90	655	245	130	805	30	175	135	75	210	235	790
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	350		250	250		150	300		700
Storage Lanes	2		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			1275			1018			2073	
Travel Time (s)		20.3			29.0			23.1			47.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			6			Free
Detector Phase	3	8		7	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	31.0		11.0	31.0	31.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	11.0	31.0		11.0	31.0	31.0	12.0	31.0	31.0	12.0	31.0	
Total Split (%)	12.9%	36.5%		12.9%	36.5%	36.5%	14.1%	36.5%	36.5%	14.1%	36.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 85	
Actuated Cycle Length: 74	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 50: Linderson Way & Tumwater Blvd



Item 8.

HCM 2010 Signalized Intersection Summary
50: Linderson Way & Tumwater Blvd

Projected 2040 No Build
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	655	245	130	805	30	175	135	75	210	235	790
Future Volume (veh/h)	90	655	245	130	805	30	175	135	75	210	235	790
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	95	689	258	137	847	32	184	142	79	221	247	0
Adj No. of Lanes	2	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	244	909	340	149	1333	596	174	342	291	174	342	291
Arrive On Green	0.07	0.36	0.36	0.08	0.37	0.37	0.10	0.18	0.18	0.10	0.18	0.00
Sat Flow, veh/h	3442	2522	944	1792	3574	1599	1792	1881	1599	1792	1881	1599
Grp Volume(v), veh/h	95	484	463	137	847	32	184	142	79	221	247	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1696	1792	1787	1599	1792	1881	1599	1792	1881	1599
Q Serve(g_s), s	1.9	17.3	17.3	5.5	14.0	0.9	7.0	4.8	3.1	7.0	8.9	0.0
Cycle Q Clear(g_c), s	1.9	17.3	17.3	5.5	14.0	0.9	7.0	4.8	3.1	7.0	8.9	0.0
Prop In Lane	1.00		0.56	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	244	638	611	149	1333	596	174	342	291	174	342	291
V/C Ratio(X)	0.39	0.76	0.76	0.92	0.64	0.05	1.06	0.41	0.27	1.27	0.72	0.00
Avail Cap(c_a), veh/h	286	638	611	149	1333	596	174	678	576	174	678	576
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.0	20.3	20.3	32.8	18.6	14.5	32.6	26.1	25.4	32.6	27.8	0.0
Incr Delay (d2), s/veh	1.0	8.2	8.6	50.3	2.3	0.2	84.5	0.8	0.5	159.2	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	9.9	9.6	4.8	7.4	0.4	7.5	2.6	1.4	11.1	4.9	0.0
LnGrp Delay(d),s/veh	33.0	28.5	28.9	83.2	20.9	14.6	117.1	26.9	25.9	191.7	30.7	0.0
LnGrp LOS	C	C	C	F	C	B	F	C	C	F	C	
Approach Vol, veh/h		1042			1016			405			468	
Approach Delay, s/veh		29.1			29.1			67.7			106.7	
Approach LOS		C			C			E			F	

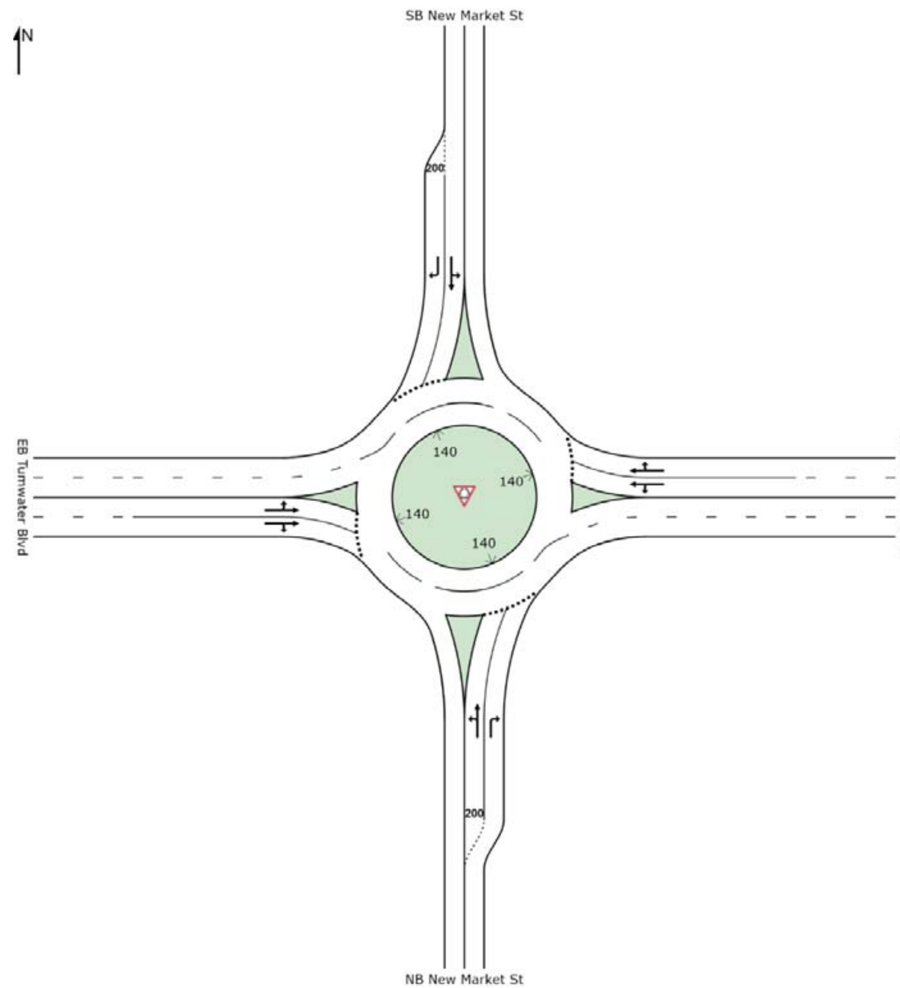
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	18.1	10.1	31.9	12.0	18.1	11.0	31.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	26.0	6.0	26.0	7.0	26.0	6.0	26.0
Max Q Clear Time (g_c+I1), s	9.0	10.9	3.9	16.0	9.0	6.8	7.5	19.3
Green Ext Time (p_c), s	0.0	2.2	0.0	7.4	0.0	2.4	0.0	5.3

Intersection Summary			
HCM 2010 Ctrl Delay			46.8
HCM 2010 LOS			D

SITE LAYOUT

Site: 51) New Market Rd at Tumwater Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout



Item 8.

MOVEMENT SUMMARY

Site: 51) New Market Rd at Tumwater Blvd

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB New Market St											
3	L2	26	0.0	0.055	13.9	LOS B	0.2	5.4	0.65	0.82	34.5
8	T1	5	0.0	0.055	6.8	LOS A	0.2	5.4	0.65	0.82	34.1
18	R2	68	0.0	0.085	6.2	LOS A	0.4	9.4	0.65	0.72	35.7
Approach		100	0.0	0.085	8.2	LOS A	0.4	9.4	0.65	0.75	35.3
East: WB Tumwater Blvd											
1	L2	68	2.0	0.335	11.0	LOS B	2.3	57.4	0.38	0.44	37.7
6	T1	784	2.0	0.335	3.8	LOS A	2.3	58.6	0.37	0.41	37.6
16	R2	63	2.0	0.335	4.2	LOS A	2.3	58.6	0.36	0.38	36.3
Approach		916	2.0	0.335	4.4	LOS A	2.3	58.6	0.37	0.41	37.5
North: SB New Market St											
7	L2	126	4.0	0.215	13.4	LOS B	0.9	22.7	0.61	0.84	34.6
4	T1	26	4.0	0.215	6.3	LOS A	0.9	22.7	0.61	0.84	34.3
14	R2	232	4.0	0.262	6.1	LOS A	1.1	29.7	0.61	0.71	35.7
Approach		384	4.0	0.262	8.5	LOS A	1.1	29.7	0.61	0.76	35.2
West: EB Tumwater Blvd											
5	L2	95	4.0	0.420	11.8	LOS B	3.0	77.5	0.54	0.52	36.9
2	T1	911	4.0	0.420	4.5	LOS A	3.1	80.0	0.52	0.47	36.9
12	R2	32	4.0	0.420	4.8	LOS A	3.1	80.0	0.51	0.44	35.7
Approach		1037	4.0	0.420	5.2	LOS A	3.1	80.0	0.53	0.48	36.9
All Vehicles		2437	3.1	0.420	5.5	LOS A	3.1	80.0	0.48	0.51	36.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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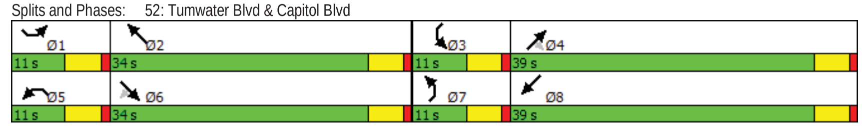
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	150	980	195	225	515	20	175	350	300	110	345	20
Future Volume (vph)	150	980	195	225	515	20	175	350	300	110	345	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	200		0	275		0	200		0
Storage Lanes	1		1	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		934			3620			2404			1729	
Travel Time (s)		12.7			49.4			54.6			39.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4			
Detector Phase	1	6	6	5	2		7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (%)	11.6%	35.8%	35.8%	11.6%	35.8%		11.6%	41.1%	41.1%	11.6%	41.1%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max		None	None	None	None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 95	
Actuated Cycle Length: 84.3	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 52: Tumwater Blvd & Capitol Blvd



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	150	980	195	225	515	20	175	350	300	110	345	20
Future Volume (veh/h)	150	980	195	225	515	20	175	350	300	110	345	20
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	158	1032	131	237	542	21	184	368	90	116	363	21
Adj No. of Lanes	1	2	1	2	2	0	1	1	1	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	1	1	1
Cap, veh/h	128	1233	552	253	1234	48	130	489	416	130	893	51
Arrive On Green	0.07	0.35	0.35	0.07	0.35	0.35	0.07	0.26	0.26	0.07	0.26	0.26
Sat Flow, veh/h	1757	3505	1568	3476	3509	136	1792	1881	1599	1792	3435	198
Grp Volume(v), veh/h	158	1032	131	237	276	287	184	368	90	116	188	196
Grp Sat Flow(s),veh/h/ln	1757	1752	1568	1738	1787	1857	1792	1881	1599	1792	1787	1846
Q Serve(g_s), s	6.0	22.3	4.9	5.6	9.8	9.8	6.0	14.8	3.6	5.3	7.2	7.2
Cycle Q Clear(g_c), s	6.0	22.3	4.9	5.6	9.8	9.8	6.0	14.8	3.6	5.3	7.2	7.2
Prop In Lane	1.00		1.00	1.00		0.07	1.00		1.00	1.00		0.11
Lane Grp Cap(c), veh/h	128	1233	552	253	629	653	130	489	416	130	465	480
V/C Ratio(X)	1.24	0.84	0.24	0.94	0.44	0.44	1.41	0.75	0.22	0.89	0.41	0.41
Avail Cap(c_a), veh/h	128	1233	552	253	629	653	130	776	659	130	737	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.2	24.5	18.9	38.0	20.5	20.5	38.2	28.1	23.9	37.9	25.2	25.2
Incr Delay (d2), s/veh	156.2	6.9	1.0	39.7	2.2	2.1	224.1	2.4	0.3	46.0	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	11.9	2.2	4.1	5.2	5.4	11.1	8.0	1.6	4.3	3.6	3.8
LnGrp Delay(d),s/veh	194.4	31.4	19.9	77.7	22.7	22.6	262.3	30.4	24.2	83.9	25.8	25.8
LnGrp LOS	F	C	B	E	C	C	F	C	C	F	C	C
Approach Vol, veh/h		1321			800			642			500	
Approach Delay, s/veh		49.8			39.0			96.0			39.3	
Approach LOS		D			D			F			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	34.0	11.0	26.4	11.0	34.0	11.0	26.4
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	6.0	29.0	6.0	34.0	6.0	29.0	6.0	34.0
Max Q Clear Time (g_c+I1), s	8.0	11.8	7.3	16.8	7.6	24.3	8.0	9.2
Green Ext Time (p_c), s	0.0	10.8	0.0	4.6	0.0	3.7	0.0	5.2

Intersection Summary	
HCM 2010 Ctrl Delay	54.6
HCM 2010 LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	900	105	120	645	10	55	0	85	10	0	5
Future Volume (vph)	10	900	105	120	645	10	55	0	85	10	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2111			1760			704			354	
Travel Time (s)		48.0			40.0			16.0			8.0	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	27.5	27.5		27.5	27.5		12.5	12.5		27.5	27.5	
Total Split (s)	52.5	52.5		52.5	52.5		27.5	27.5		27.5	27.5	
Total Split (%)	65.6%	65.6%		65.6%	65.6%		34.4%	34.4%		34.4%	34.4%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 53: 65th Ave & Henderson Blvd

Item 8.

HCM 2010 Signalized Intersection Summary
53: 65th Ave & Henderson Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	900	105	120	645	10	55	0	85	10	0	5
Future Volume (veh/h)	10	900	105	120	645	10	55	0	85	10	0	5
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	11	947	111	126	679	11	58	0	89	11	0	5
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	551	1216	143	315	1358	22	141	15	120	213	17	62
Arrive On Green	0.74	0.74	0.74	0.74	0.74	0.74	0.13	0.00	0.13	0.13	0.00	0.13
Sat Flow, veh/h	757	1653	194	536	1846	30	504	115	950	945	135	491
Grp Volume(v), veh/h	11	0	1058	126	0	690	147	0	0	16	0	0
Grp Sat Flow(s),veh/h/ln	757	0	1847	536	0	1876	1568	0	0	1571	0	0
Q Serve(g_s), s	0.4	0.0	23.2	12.4	0.0	10.0	4.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.4	0.0	23.2	35.6	0.0	10.0	5.8	0.0	0.0	0.5	0.0	0.0
Prop In Lane	1.00		0.10	1.00		0.02	0.39		0.61	0.69		0.31
Lane Grp Cap(c), veh/h	551	0	1358	315	0	1380	276	0	0	292	0	0
V/C Ratio(X)	0.02	0.00	0.78	0.40	0.00	0.50	0.53	0.00	0.00	0.05	0.00	0.00
Avail Cap(c_a), veh/h	551	0	1358	315	0	1380	623	0	0	610	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.8	0.0	5.3	16.4	0.0	3.6	27.4	0.0	0.0	25.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	4.5	3.8	0.0	1.3	1.9	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	13.1	2.1	0.0	5.5	2.7	0.0	0.0	0.3	0.0	0.0
LnGrp Delay(d),s/veh	5.9	0.0	9.8	20.1	0.0	4.9	29.3	0.0	0.0	25.2	0.0	0.0
LnGrp LOS	A		A	C		A	C			C		
Approach Vol, veh/h		1069			816			147			16	
Approach Delay, s/veh		9.8			7.3			29.3			25.2	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.5		12.8		52.5		12.8
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		48.0		23.0		48.0		23.0
Max Q Clear Time (g_c+I1), s		25.2		2.5		37.6		7.8
Green Ext Time (p_c), s		17.9		1.0		9.1		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

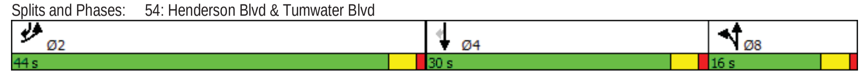
Lanes, Volumes, Timings
54: Henderson Blvd & Tumwater Blvd

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	755	5	30	180	300	375
Future Volume (vph)	755	5	30	180	300	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0			100
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	35	
Link Distance (ft)	3122			2394	2111	
Travel Time (s)	60.8			46.6	41.1	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot		Split	NA	NA	pm+ov
Protected Phases	2		8	8	4	2
Permitted Phases						4
Detector Phase	2		8	8	4	2
Switch Phase						
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0
Minimum Split (s)	20.5		10.5	10.5	30.0	20.5
Total Split (s)	44.0		16.0	16.0	30.0	44.0
Total Split (%)	48.9%		17.8%	17.8%	33.3%	48.9%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max		None	None	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 54: Henderson Blvd & Tumwater Blvd



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	755	5	30	180	300	375
Future Volume (veh/h)	755	5	30	180	300	375
Number	5	12	3	8	4	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1900	1881	1881	1881
Adj Flow Rate, veh/h	795	5	32	189	316	279
Adj No. of Lanes	0	0	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	790	5	36	213	543	1173
Arrive On Green	0.44	0.44	0.13	0.13	0.29	0.29
Sat Flow, veh/h	1777	11	270	1597	1881	1599
Grp Volume(v), veh/h	801	0	221	0	316	279
Grp Sat Flow(s),veh/h/ln	1790	0	1868	0	1881	1599
Q Serve(g_s), s	40.0	0.0	10.5	0.0	12.9	5.1
Cycle Q Clear(g_c), s	40.0	0.0	10.5	0.0	12.9	5.1
Prop In Lane	0.99	0.01	0.14			1.00
Lane Grp Cap(c), veh/h	796	0	249	0	543	1173
V/C Ratio(X)	1.01	0.00	0.89	0.00	0.58	0.24
Avail Cap(c_a), veh/h	796	0	249	0	543	1173
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	25.0	0.0	38.3	0.0	27.3	3.9
Incr Delay (d2), s/veh	33.5	0.0	29.9	0.0	4.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.1	0.0	7.5	0.0	7.3	6.1
LnGrp Delay(d),s/veh	58.6	0.0	68.2	0.0	31.8	4.4
LnGrp LOS	F		E		C	A
Approach Vol, veh/h	801			221	595	
Approach Delay, s/veh	58.6			68.2	19.0	
Approach LOS	E			E	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		44.0		30.0				16.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		40.0		26.0				12.0
Max Q Clear Time (g_c+I1), s		42.0		14.9				12.5
Green Ext Time (p_c), s		0.0		2.6				0.0

Intersection Summary		
HCM 2010 Ctrl Delay		45.3
HCM 2010 LOS		D

Notes

Intersection	
Int Delay, s/veh	4

Movement	NWL	NWR	NET	NER	SWL	SWT
Traffic Vol, veh/h	80	55	170	140	110	210
Future Vol, veh/h	80	55	170	140	110	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	84	58	179	147	116	221

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	706	253	0	0	326	0
Stage 1	253	-	-	-	-	-
Stage 2	453	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	405	791	-	-	1239	-
Stage 1	794	-	-	-	-	-
Stage 2	645	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	362	791	-	-	1239	-
Mov Cap-2 Maneuver	362	-	-	-	-	-
Stage 1	794	-	-	-	-	-
Stage 2	576	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	16.1	0	2.8
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	465	1239	-
HCM Lane V/C Ratio	-	-	0.306	0.093	-
HCM Control Delay (s)	-	-	16.1	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0.3	-

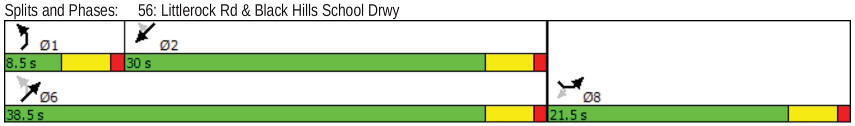
Lanes, Volumes, Timings
56: Littlerock Rd & Black Hills School Drwy

Projected 2040 No Build
PM Peak Hour

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	5	10	15	275	535	70
Future Volume (vph)	5	10	15	275	535	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	0	175			350
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	1065			1067	3970	
Travel Time (s)	24.2			24.3	90.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	8		1	6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	1	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	4.0	7.0	7.0	7.0
Minimum Split (s)	21.5	21.5	8.5	24.5	27.5	27.5
Total Split (s)	21.5	21.5	8.5	38.5	30.0	30.0
Total Split (%)	35.8%	35.8%	14.2%	64.2%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Max	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 53.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 56: Littlerock Rd & Black Hills School Drwy



HCM 2010 Signalized Intersection Summary
56: Littlerock Rd & Black Hills School Drwy

Projected 2040 No Build
PM Peak Hour

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	5	10	15	275	535	70
Future Volume (veh/h)	5	10	15	275	535	70
Number	3	18	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1881	1881	1881	1881
Adj Flow Rate, veh/h	5	11	16	289	563	74
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	51	46	590	1445	1224	1040
Arrive On Green	0.03	0.03	0.02	0.77	0.65	0.65
Sat Flow, veh/h	1810	1615	1792	1881	1881	1599
Grp Volume(v), veh/h	5	11	16	289	563	74
Grp Sat Flow(s),veh/h/ln	1810	1615	1792	1881	1881	1599
Q Serve(g_s), s	0.1	0.3	0.1	1.9	6.6	0.8
Cycle Q Clear(g_c), s	0.1	0.3	0.1	1.9	6.6	0.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	51	46	590	1445	1224	1040
V/C Ratio(X)	0.10	0.24	0.03	0.20	0.46	0.07
Avail Cap(c_a), veh/h	695	620	724	1445	1224	1040
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.0	21.0	2.7	1.4	3.9	2.8
Incr Delay (d2), s/veh	0.8	2.7	0.0	0.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.1	1.0	3.4	0.3
LnGrp Delay(d),s/veh	21.8	23.7	2.7	1.7	4.2	2.9
LnGrp LOS	C	C	A	A	A	A
Approach Vol, veh/h	16			305	637	
Approach Delay, s/veh	23.1			1.8	4.0	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.2	33.3				38.5		5.7
Change Period (Y+Rc), s	4.5	4.5				4.5		4.5
Max Green Setting (Gmax), s	4.0	25.5				34.0		17.0
Max Q Clear Time (g_c+I1), s	2.1	8.6				3.9		2.3
Green Ext Time (p_c), s	0.0	6.4				8.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		3.6
HCM 2010 LOS		A

Item 8.

HCM 2010 TWSC
57: Center St & 76th Ave

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	85	15	2	15	15	35	2	300	0	15	425	165
Future Vol, veh/h	85	15	2	15	15	35	2	300	0	15	425	165
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	11	11	11	1	1	1	3	3	3
Mvmt Flow	89	16	2	16	16	37	2	316	0	16	447	174

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	912	886	534	895	973	316	621	0	0	316	0	0
Stage 1	566	566	-	320	320	-	-	-	-	-	-	-
Stage 2	346	320	-	575	653	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.21	6.61	6.31	4.11	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.599	4.099	3.399	2.209	-	-	2.227	-	-
Pot Cap-1 Maneuver	254	282	544	252	243	704	965	-	-	1239	-	-
Stage 1	507	506	-	673	636	-	-	-	-	-	-	-
Stage 2	668	651	-	488	450	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	224	276	544	236	237	704	965	-	-	1239	-	-
Mov Cap-2 Maneuver	224	276	-	236	237	-	-	-	-	-	-	-
Stage 1	505	496	-	671	634	-	-	-	-	-	-	-
Stage 2	615	649	-	461	441	-	-	-	-	-	-	-

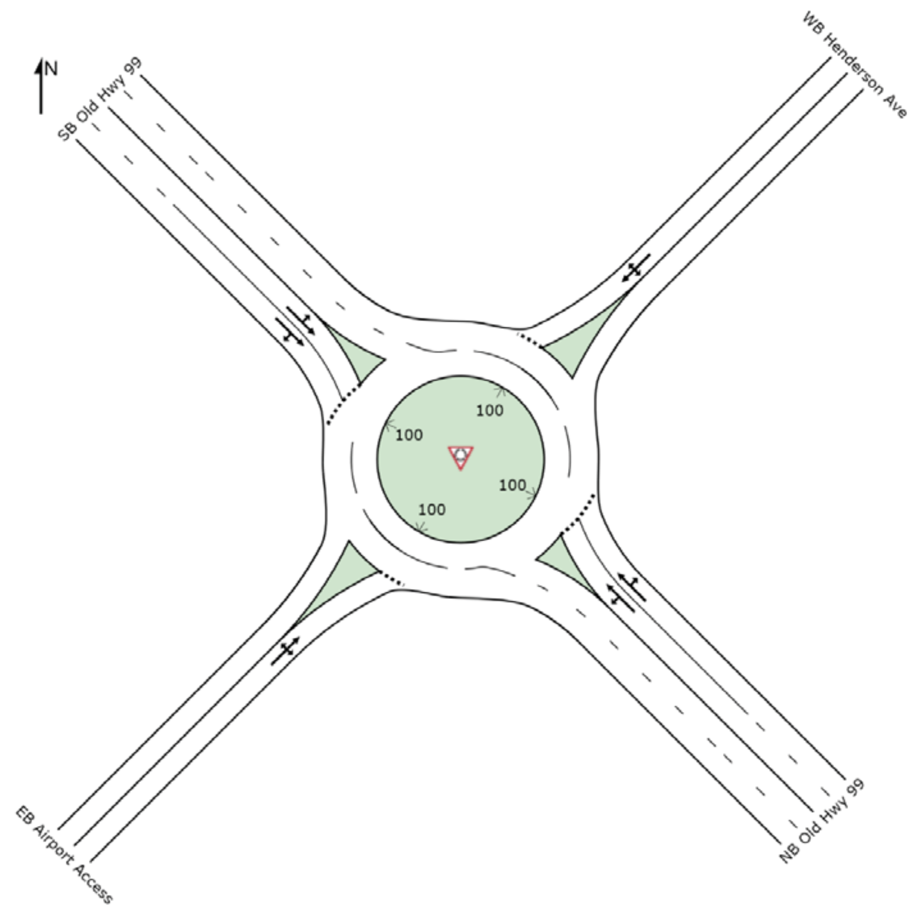
Approach	EB	WB	NB	SB
HCM Control Delay, s	33	17	0.1	0.2
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	965	-	-	233	368	1239	-	-
HCM Lane V/C Ratio	0.002	-	-	0.461	0.186	0.013	-	-
HCM Control Delay (s)	8.7	0	-	33	17	7.9	0	-
HCM Lane LOS	A	A	-	D	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.2	0.7	0	-	-

SITE LAYOUT

Site: 58) Henderson Ave at Old Hwy 99

Projected 2040 Baseline
PM Peak Hour
Roundabout



Organisation: SCJ ALLIANCE | Created: Thursday, June 9, 2016 1:50:01 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\58) Henderson Ave at Old Hwy 99.sip6

MOVEMENT SUMMARY

Site: 58) Henderson Ave at Old Hwy 99

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NB Old Hwy 99											
3x	L2	5	2.0	0.381	7.1	LOS A	2.7	69.3	0.52	0.35	34.2
8x	T1	763	2.0	0.381	6.8	LOS A	2.8	70.9	0.52	0.34	34.2
18x	R2	132	2.0	0.381	6.6	LOS A	2.8	70.9	0.51	0.33	33.2
Approach		900	2.0	0.381	6.8	LOS A	2.8	70.9	0.51	0.34	34.1
NorthEast: WB Henderson Ave											
1x	L2	216	1.0	0.468	12.5	LOS B	2.5	63.9	0.71	0.75	30.1
6x	T1	11	1.0	0.468	12.5	LOS B	2.5	63.9	0.71	0.75	30.0
16x	R2	84	1.0	0.468	12.5	LOS B	2.5	63.9	0.71	0.75	29.3
Approach		311	1.0	0.468	12.5	LOS B	2.5	63.9	0.71	0.75	29.9
NorthWest: SB Old Hwy 99											
7x	L2	168	1.0	0.690	13.6	LOS B	7.9	199.3	0.78	0.60	30.7
4x	T1	1421	1.0	0.690	13.1	LOS B	7.9	199.3	0.77	0.57	31.2
14x	R2	16	1.0	0.690	12.7	LOS B	7.8	197.2	0.76	0.56	30.6
Approach		1605	1.0	0.690	13.1	LOS B	7.9	199.3	0.77	0.58	31.1
SouthWest: EB Airport Access											
5x	L2	26	3.0	0.146	13.7	LOS B	0.6	16.5	0.81	0.81	29.9
2x	T1	11	3.0	0.146	13.7	LOS B	0.6	16.5	0.81	0.81	29.8
12x	R2	11	3.0	0.146	13.7	LOS B	0.6	16.5	0.81	0.81	29.1
Approach		47	3.0	0.146	13.7	LOS B	0.6	16.5	0.81	0.81	29.7
All Vehicles		2863	1.3	0.690	11.1	LOS B	7.9	199.3	0.68	0.52	31.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Thursday, June 9, 2016 1:49:59 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 Baseline\58) Henderson Ave at Old Hwy 99.sip6

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Traffic Vol, veh/h	1	1	10	30	0	125	130	1450	0	1	645	20
Future Vol, veh/h	1	1	10	30	0	125	130	1450	0	1	645	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	300	250	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	11	32	0	132	137	1526	0	1	679	21

Major/Minor	Minor1			Minor2			Major1			Major2		
Conflicting Flow All	2142	2502	763	1729	2492	350	700	0	0	1526	0	0
Stage 1	1800	1800	-	692	692	-	-	-	-	-	-	-
Stage 2	342	702	-	1037	1800	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.52	6.52	6.92	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.51	4.01	3.31	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	28	28	347	57	29	649	899	-	-	438	-	-
Stage 1	83	130	-	403	446	-	-	-	-	-	-	-
Stage 2	646	439	-	249	132	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	20	24	347	47	24	649	899	-	-	438	-	-
Mov Cap-2 Maneuver	20	24	-	47	24	-	-	-	-	-	-	-
Stage 1	70	110	-	342	444	-	-	-	-	-	-	-
Stage 2	513	437	-	203	112	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	46.1	43.9	0.8	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	WBLn2	SEL	SET	SER
Capacity (veh/h)	438	-	-	100	47	649	899	-	-
HCM Lane V/C Ratio	0.002	-	-	0.126	0.672	0.203	0.152	-	-
HCM Control Delay (s)	13.2	0	-	46.1	176.9	12	9.7	-	-
HCM Lane LOS	B	A	-	E	F	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	2.6	0.8	0.5	-	-

HCM 2010 TWSC
60: Kimmie St & 83rd Ave

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	2.1					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	55	15	65	15	5	210
Future Vol, veh/h	55	15	65	15	5	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	3	3	9	9	3	3
Mvmt Flow	58	16	68	16	5	221

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	308	76	0	0	84	0
Stage 1	76	-	-	-	-	-
Stage 2	232	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	682	982	-	-	1506	-
Stage 1	944	-	-	-	-	-
Stage 2	804	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	679	982	-	-	1506	-
Mov Cap-2 Maneuver	679	-	-	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	0.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	727	1506	-
HCM Lane V/C Ratio	-	-	0.101	0.003	-
HCM Control Delay (s)	-	-	10.5	7.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
61: 83rd Ave & Center St

Projected 2040 No Build
PM Peak Hour

Intersection						
Int Delay, s/veh	9.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	70	15	10	140	275	80
Future Vol, veh/h	70	15	10	140	275	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	3	3	1	1
Mvmt Flow	74	16	11	147	289	84

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	158	0	-	0	247	84
Stage 1	-	-	-	-	84	-
Stage 2	-	-	-	-	163	-
Critical Hdwy	4.11	-	-	-	7.11	6.21
Critical Hdwy Stg 1	-	-	-	-	6.11	-
Critical Hdwy Stg 2	-	-	-	-	6.11	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1428	-	-	-	709	978
Stage 1	-	-	-	-	927	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1428	-	-	-	681	978
Mov Cap-2 Maneuver	-	-	-	-	681	-
Stage 1	-	-	-	-	879	-
Stage 2	-	-	-	-	797	-

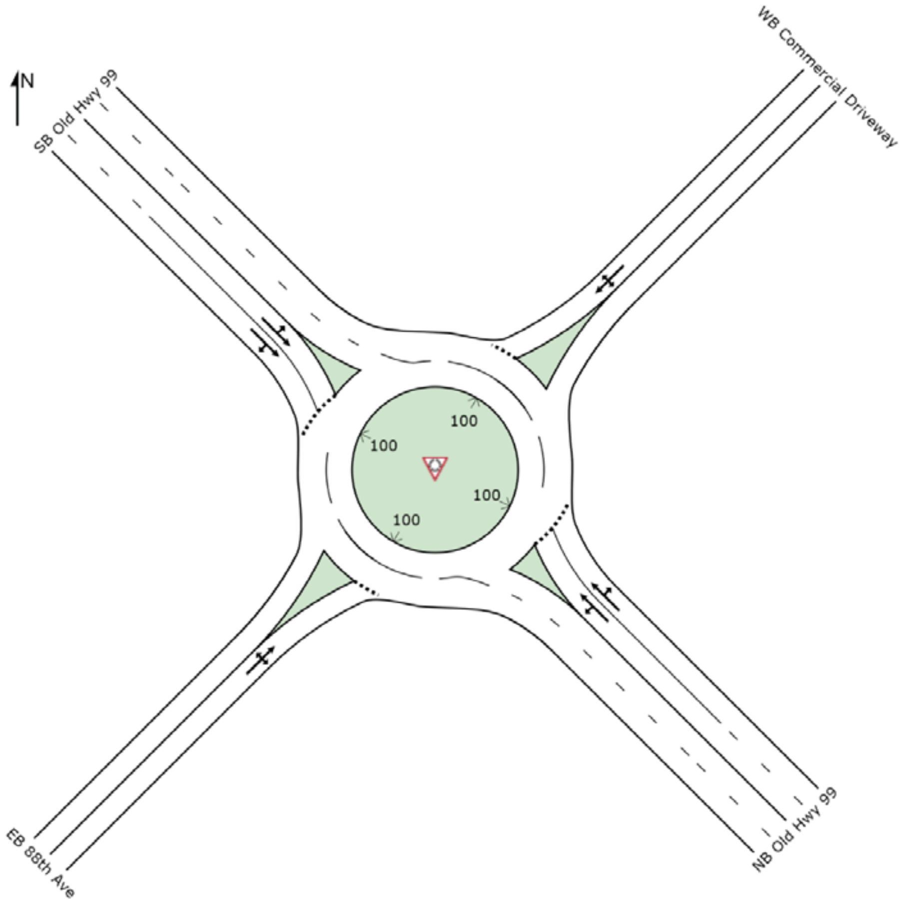
Approach	EB	WB	SB
HCM Control Delay, s	6.3	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1428	-	-	-	731
HCM Lane V/C Ratio	0.052	-	-	-	0.511
HCM Control Delay (s)	7.7	0	-	-	15
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	2.9

SITE LAYOUT

Site: 62) 88th Ave at Old Hwy 99

Projected 2040 Baseline
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 62) 88th Ave at Old Hwy 99

Projected 2040 Baseline
PM Peak Hour
Roundabout

Movement Performance - Vehicles

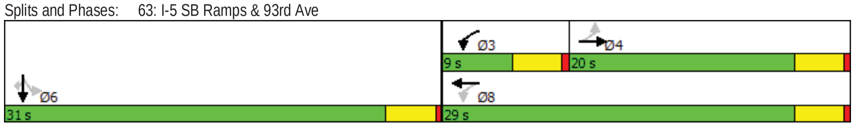
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NB Old Hwy 99											
3x	L2	5	1.0	0.189	5.1	LOS A	1.2	29.3	0.50	0.34	35.2
8x	T1	421	1.0	0.189	4.9	LOS A	1.2	30.2	0.50	0.33	35.3
18x	R2	1	1.0	0.189	4.7	LOS A	1.2	30.2	0.49	0.32	34.3
Approach		427	1.0	0.189	4.9	LOS A	1.2	30.2	0.50	0.33	35.3
NorthEast: WB Commercial Driveway											
1x	L2	5	2.0	0.016	5.2	LOS A	0.1	1.6	0.53	0.39	33.9
6x	T1	5	2.0	0.016	5.2	LOS A	0.1	1.6	0.53	0.39	33.8
16x	R2	1	2.0	0.016	5.2	LOS A	0.1	1.6	0.53	0.39	32.9
Approach		12	2.0	0.016	5.2	LOS A	0.1	1.6	0.53	0.39	33.8
NorthWest: SB Old Hwy 99											
7x	L2	1	1.0	0.525	8.0	LOS A	4.9	123.9	0.16	0.04	33.8
4x	T1	979	1.0	0.525	7.9	LOS A	4.9	123.9	0.16	0.04	33.7
14x	R2	537	1.0	0.525	7.7	LOS A	4.9	123.8	0.15	0.04	32.6
Approach		1517	1.0	0.525	7.8	LOS A	4.9	123.9	0.16	0.04	33.3
SouthWest: EB 88th Ave											
5x	L2	253	3.0	0.462	13.1	LOS B	2.5	64.5	0.73	0.79	29.5
2x	T1	5	3.0	0.462	13.1	LOS B	2.5	64.5	0.73	0.79	29.4
12x	R2	26	3.0	0.462	13.1	LOS B	2.5	64.5	0.73	0.79	28.7
Approach		284	3.0	0.462	13.1	LOS B	2.5	64.5	0.73	0.79	29.4
All Vehicles		2240	1.3	0.525	7.9	LOS A	4.9	123.9	0.30	0.19	33.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	415	95	85	305	0	0	0	0	475	0	425
Future Volume (vph)	0	415	95	85	305	0	0	0	0	475	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		300
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			40			30			30	
Link Distance (ft)		1124			936			1099			1644	
Travel Time (s)		25.5			16.0			25.0			37.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases	4			8						6		6
Detector Phase	4	4		3	8					6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		8.0	20.0					20.0	20.0	20.0
Total Split (s)	20.0	20.0		9.0	29.0					31.0	31.0	31.0
Total Split (%)	33.3%	33.3%		15.0%	48.3%					51.7%	51.7%	51.7%
Yellow Time (s)	3.5	3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	0.0
Total Lost Time (s)		4.0		4.0	4.0						4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None					Max	Max	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 58.2	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 63: I-5 SB Ramps & 93rd Ave



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	415	95	85	305	0	0	0	0	475	0	425
Future Volume (veh/h)	0	415	95	85	305	0	0	0	0	475	0	425
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1743	1743	0				1900	1827	1827
Adj Flow Rate, veh/h	0	437	100	89	321	0				500	0	268
Adj No. of Lanes	0	1	0	1	1	0				0	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	9	9	0				4	4	4
Cap, veh/h	0	408	93	213	694	0				808	0	721
Arrive On Green	0.00	0.28	0.28	0.05	0.40	0.00				0.46	0.00	0.46
Sat Flow, veh/h	0	1482	339	1660	1743	0				1740	0	1553
Grp Volume(v), veh/h	0	0	537	89	321	0				500	0	268
Grp Sat Flow(s),veh/h/ln	0	0	1821	1660	1743	0				1740	0	1553
Q Serve(g_s), s	0.0	0.0	16.0	2.1	7.9	0.0				12.6	0.0	6.5
Cycle Q Clear(g_c), s	0.0	0.0	16.0	2.1	7.9	0.0				12.6	0.0	6.5
Prop In Lane	0.00		0.19	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	0	501	213	694	0				808	0	721
V/C Ratio(X)	0.00	0.00	1.07	0.42	0.46	0.00				0.62	0.00	0.37
Avail Cap(c_a), veh/h	0	0	501	267	750	0				808	0	721
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	21.1	15.2	12.9	0.0				11.7	0.0	10.1
Incr Delay (d2), s/veh	0.0	0.0	60.6	1.3	0.5	0.0				3.5	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	16.4	1.0	3.8	0.0				6.8	0.0	3.0
LnGrp Delay(d),s/veh	0.0	0.0	81.7	16.5	13.4	0.0				15.2	0.0	11.5
LnGrp LOS			F	B	B					B		B
Approach Vol, veh/h		537			410						768	
Approach Delay, s/veh		81.7			14.1						14.0	
Approach LOS		F			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			7.1	20.0		31.0		27.1
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			5.0	16.0		27.0		25.0
Max Q Clear Time (g_c+I1), s			4.1	18.0		14.6		9.9
Green Ext Time (p_c), s			0.0	0.0		3.5		4.9

Intersection Summary		
HCM 2010 Ctrl Delay		35.2
HCM 2010 LOS		D

Item 8.

Intersection												
Int Delay, s/veh	18.6											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Traffic Vol, veh/h	290	555	0	0	290	425	130	0	155	0	0	0
Future Vol, veh/h	290	555	0	0	290	425	130	0	155	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	Yield	-	-	None
Storage Length	125	-	-	-	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	3	3	3	8	8	8	14	14	14	0	0	0
Mvmt Flow	305	584	0	0	305	447	137	0	163	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	305	0	-	-	-	0	1500	1500	584
Stage 1	-	-	-	-	-	-	1195	1195	-
Stage 2	-	-	-	-	-	-	305	305	-
Critical Hdwy	4.13	-	-	-	-	-	6.54	6.64	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	5.54	5.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.54	5.64	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.626	4.126	3.426
Pot Cap-1 Maneuver	1250	-	0	0	-	-	~ 126	115	490
Stage 1	-	-	0	0	-	-	271	246	-
Stage 2	-	-	0	0	-	-	721	641	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1250	-	-	-	-	-	~ 95	0	490
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 95	0	-
Stage 1	-	-	-	-	-	-	205	0	-
Stage 2	-	-	-	-	-	-	721	0	-

Approach	EB	WB	NB
HCM Control Delay, s	3	0	111.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	282	1250	-	-	-
HCM Lane V/C Ratio	1.064	0.244	-	-	-
HCM Control Delay (s)	111.6	8.8	-	-	-
HCM Lane LOS	F	A	-	-	-
HCM 95th %tile Q(veh)	11.8	1	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection												
Int Delay, s/veh	4.6											
Movement	**EBL**	**EBT**	**EBR**	**WBL**	**WBT**	**WBR**	**NBL**	**NBT**	**NBR**	**SBL**	**SBT**	**SBR**
Traffic Vol, veh/h	55	535	5	5	475	15	15	1	10	30	15	110
Future Vol, veh/h	55	535	5	5	475	15	15	1	10	30	15	110
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	4	4	4	1	1	1	0	0	0	5	5	5
Mvmt Flow	58	563	5	5	500	16	16	1	11	32	16	116

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	516	0	0	568	0	0	1266	1208	566	1205	1202	508
Stage 1	-	-	-	-	-	-	682	682	-	518	518	-
Stage 2	-	-	-	-	-	-	584	526	-	687	684	-
Critical Hdwy	4.14	-	-	4.11	-	-	7.1	6.5	6.2	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Follow-up Hdwy	2.236	-	-	2.209	-	-	3.5	4	3.3	3.545	4.045	3.345
Pot Cap-1 Maneuver	1040	-	-	1009	-	-	147	185	528	158	182	559
Stage 1	-	-	-	-	-	-	443	453	-	535	528	-
Stage 2	-	-	-	-	-	-	501	532	-	432	444	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1040	-	-	1009	-	-	101	169	528	144	166	559
Mov Cap-2 Maneuver	-	-	-	-	-	-	101	169	-	144	166	-
Stage 1	-	-	-	-	-	-	407	416	-	491	524	-
Stage 2	-	-	-	-	-	-	383	528	-	388	408	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.8	0.1	34.3	28.4
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	150	1040	-	-	1009	-	-	313
HCM Lane V/C Ratio	0.182	0.056	-	-	0.005	-	-	0.521
HCM Control Delay (s)	34.3	8.7	0	-	8.6	0	-	28.4
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.6	0.2	-	-	0	-	-	2.8

Intersection	
Intersection Delay, s/veh	53.3
Intersection LOS	F

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NEU	NEL	NET	NER
Traffic Vol, veh/h	0	2	435	140	0	240	360	65	0	85	35	50
Future Vol, veh/h	0	2	435	140	0	240	360	65	0	85	35	50
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	3	3	3	2	2	2	2	2	0	0	0
Mvmt Flow	0	2	458	147	0	253	379	68	0	89	37	53
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	NE
Opposing Approach	WB	EB	SW
Opposing Lanes	2	1	1
Conflicting Approach Left	SW	NE	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NE	SW	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	65.8	62.9	16.9
HCM LOS	F	F	C

Lane	NELn1	EBLn1	WBLn1	WBLn2	SWLn1
Vol Left, %	50%	0%	40%	0%	63%
Vol Thru, %	21%	75%	60%	0%	36%
Vol Right, %	29%	24%	0%	100%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	170	577	600	65	221
LT Vol	85	2	240	0	140
Through Vol	35	435	360	0	80
RT Vol	50	140	0	65	1
Lane Flow Rate	179	607	632	68	233
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.408	1	1	0.127	0.526
Departure Headway (Hd)	8.218	6.931	7.562	6.66	8.139
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	437	528	486	542	442
Service Time	6.286	4.931	5.262	4.36	6.196
HCM Lane V/C Ratio	0.41	1.15	1.3	0.125	0.527
HCM Control Delay	16.9	65.8	68.6	10.3	19.9
HCM Lane LOS	C	F	F	B	C
HCM 95th-tile Q	1.9	14	13.4	0.4	3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SWU	SWL	SWT	SWR
Traffic Vol, veh/h	0	140	80	1
Future Vol, veh/h	0	140	80	1
Peak Hour Factor	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	147	84	1
Number of Lanes	0	0	1	0

Approach	SW
Opposing Approach	NE
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	19.9
HCM LOS	C

Lane

HCM 2010 AWSC
67: Tilley Rd (South) & 93rd Ave

Projected 2040 No Build
PM Peak Hour

Intersection	
Intersection Delay, s/veh	53.5
Intersection LOS	F

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Traffic Vol, veh/h	0	385	235	0	265	485	0	170	85
Future Vol, veh/h	0	385	235	0	265	485	0	170	85
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles, %	2	3	3	2	2	2	2	1	1
Mvmt Flow	0	405	247	0	279	511	0	179	89
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	59.4	61	17.2
HCM LOS	F	F	C

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	67%	0%	35%
Vol Thru, %	0%	62%	65%
Vol Right, %	33%	38%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	255	620	750
LT Vol	170	0	265
Through Vol	0	385	485
RT Vol	85	235	0
Lane Flow Rate	268	653	789
Geometry Grp	1	1	1
Degree of Util (X)	0.518	1	1
Departure Headway (Hd)	6.947	5.692	5.973
Convergence, Y/N	Yes	Yes	Yes
Cap	523	640	616
Service Time	4.947	3.717	3.998
HCM Lane V/C Ratio	0.512	1.02	1.281
HCM Control Delay	17.2	59.4	61
HCM Lane LOS	C	F	F
HCM 95th-tile Q	2.9	15.4	15

HCM 2010 TWSC
68: 93rd Ave & Tilley Rd (North)

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	115	360	340	65	170	410
Future Vol, veh/h	115	360	340	65	170	410
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	250	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	3	3	1	1
Mvmt Flow	121	379	358	68	179	432

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	426	0	-	0	1013	392
Stage 1	-	-	-	-	392	-
Stage 2	-	-	-	-	621	-
Critical Hdwy	4.12	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.218	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1133	-	-	-	266	659
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1133	-	-	-	230	659
Mov Cap-2 Maneuver	-	-	-	-	230	-
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	465	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	31.9
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1133	-	-	-	230	659
HCM Lane V/C Ratio	0.107	-	-	-	0.778	0.655
HCM Control Delay (s)	8.6	0	-	-	60	20.2
HCM Lane LOS	A	A	-	-	F	C
HCM 95th %tile Q(veh)	0.4	-	-	-	5.6	4.9

HCM 2010 TWSC
69: 93rd Ave & Old Hwy 99

Projected 2040 No Build
PM Peak Hour

Intersection	
Int Delay, s/veh	6

Movement	EBT	EBR	WBL	WBT	NEL	NER
Traffic Vol, veh/h	890	30	190	340	15	205
Future Vol, veh/h	890	30	190	340	15	205
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	450	300	-	300	0
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	937	32	200	358	16	216

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	937	0	1695	937
Stage 1	-	-	-	-	937	-
Stage 2	-	-	-	-	758	-
Critical Hdwy	-	-	4.12	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.218	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	731	-	103	322
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	465	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	731	-	75	322
Mov Cap-2 Maneuver	-	-	-	-	250	-
Stage 1	-	-	-	-	383	-
Stage 2	-	-	-	-	338	-

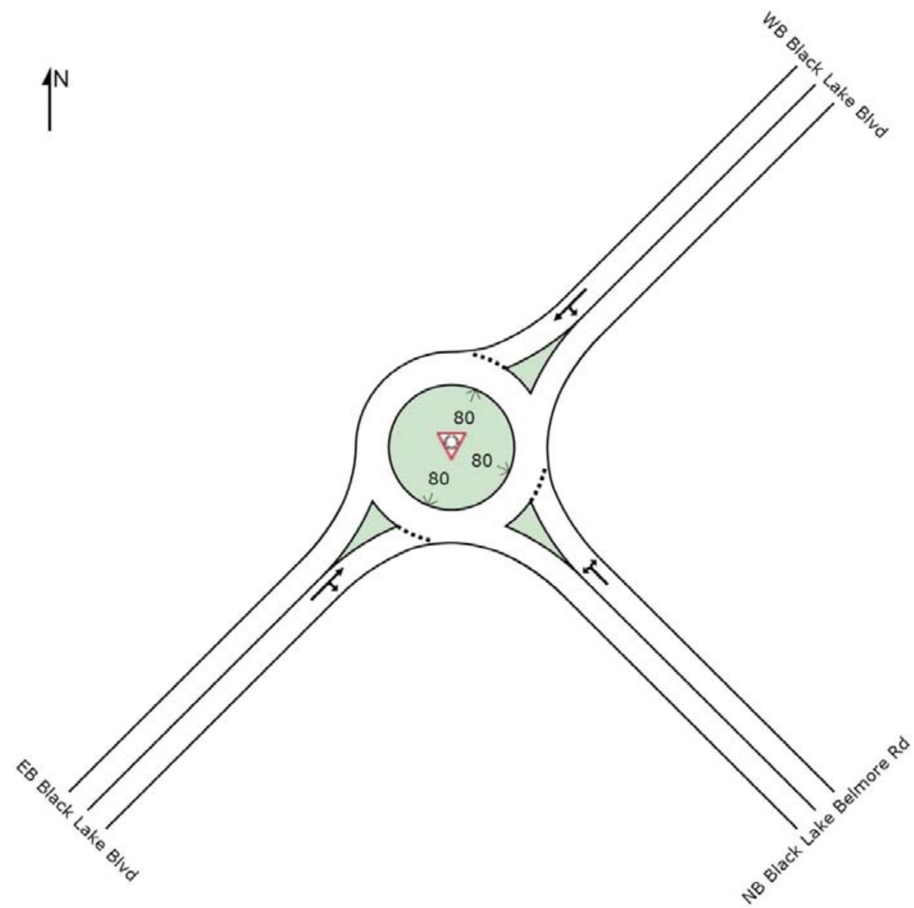
Approach	EB	WB	NE
HCM Control Delay, s	0	4.2	35.1
HCM LOS			E

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	250	322	-	-	731	-
HCM Lane V/C Ratio	0.063	0.67	-	-	0.274	-
HCM Control Delay (s)	20.4	36.2	-	-	11.8	-
HCM Lane LOS	C	E	-	-	B	-
HCM 95th %tile Q(veh)	0.2	4.5	-	-	1.1	-

SITE LAYOUT

Site: 6) Black Lake Belmore Rd at Black Lake Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout



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MOVEMENT SUMMARY

Site: 6) Black Lake Belmore Rd at Black Lake Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NB Black Lake Belmore Rd											
3x	L2	221	1.0	0.457	8.8	LOS A	3.4	86.2	0.57	0.40	31.7
18x	R2	242	1.0	0.457	8.8	LOS A	3.4	86.2	0.57	0.40	30.9
Approach		463	1.0	0.457	8.8	LOS A	3.4	86.2	0.57	0.40	31.3
NorthEast: WB Black Lake Blvd											
1x	L2	263	0.0	0.674	13.8	LOS B	7.3	182.6	0.75	0.58	29.9
6x	T1	432	0.0	0.674	13.8	LOS B	7.3	182.6	0.75	0.58	29.9
Approach		695	0.0	0.674	13.8	LOS B	7.3	182.6	0.75	0.58	29.9
SouthWest: EB Black Lake Blvd											
2x	T1	200	3.0	0.313	7.2	LOS A	2.1	52.5	0.57	0.42	33.5
12x	R2	89	3.0	0.313	7.2	LOS A	2.1	52.5	0.57	0.42	32.7
Approach		289	3.0	0.313	7.2	LOS A	2.1	52.5	0.57	0.42	33.2
All Vehicles		1447	0.9	0.674	10.9	LOS B	7.3	182.6	0.66	0.49	30.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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13: 2nd Ave/US 101/I-5 Off-Ramps Performance by movement

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	1.3	1.8	0.9
Total Del/Veh (s)	0.7	0.9	0.8	49.8	43.1	33.1

Lanes, Volumes, Timings
14: 2nd Ave & Custer Way

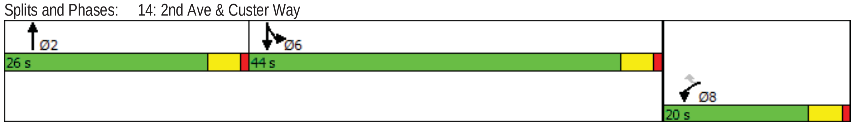
Projected 2040 with Imp
PM Peak Hour

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	235	260	15	320	915	310
Future Volume (vph)	235	260	15	320	915	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	225		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	662		2035			505
Travel Time (s)	15.0		46.3			11.5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)					34%	
Turn Type	Prot	Perm	NA		Split	NA
Protected Phases	8		2		6	6
Permitted Phases		8				
Detector Phase	8	8	2		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	10.0	10.0	24.5		20.0	20.0
Total Split (s)	20.0	20.0	26.0		44.0	44.0
Total Split (%)	22.2%	22.2%	28.9%		48.9%	48.9%
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 74.5
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 14: 2nd Ave & Custer Way



HCM 2010 Signalized Intersection Summary
14: 2nd Ave & Custer Way

Projected 2040 with Imp
PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	235	260	15	320	915	310
Future Volume (veh/h)	235	260	15	320	915	310
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900
Adj Flow Rate, veh/h	247	121	16	184	644	772
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	0	0
Cap, veh/h	291	260	20	224	926	972
Arrive On Green	0.16	0.16	0.15	0.15	0.51	0.51
Sat Flow, veh/h	1792	1599	129	1489	1810	1900
Grp Volume(v), veh/h	247	121	0	200	644	772
Grp Sat Flow(s),veh/h/ln	1792	1599	0	1618	1810	1900
Q Serve(g_s), s	10.3	5.3	0.0	9.2	20.8	25.8
Cycle Q Clear(g_c), s	10.3	5.3	0.0	9.2	20.8	25.8
Prop In Lane	1.00	1.00		0.92	1.00	
Lane Grp Cap(c), veh/h	291	260	0	244	926	972
V/C Ratio(X)	0.85	0.47	0.00	0.82	0.70	0.79
Avail Cap(c_a), veh/h	360	321	0	451	926	972
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	29.3	0.0	31.8	14.3	15.5
Incr Delay (d2), s/veh	12.3	0.5	0.0	2.6	4.3	6.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	2.4	0.0	4.3	11.3	15.1
LnGrp Delay(d),s/veh	43.7	29.8	0.0	34.4	18.6	22.1
LnGrp LOS	D	C		C	B	C
Approach Vol, veh/h	368		200			1416
Approach Delay, s/veh	39.1		34.4			20.5
Approach LOS	D		C			C

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		16.1				44.0		17.1
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		21.5				39.5		15.5
Max Q Clear Time (g_c+I1), s		11.2				27.8		12.3
Green Ext Time (p_c), s		0.5				6.1		0.2

Intersection Summary

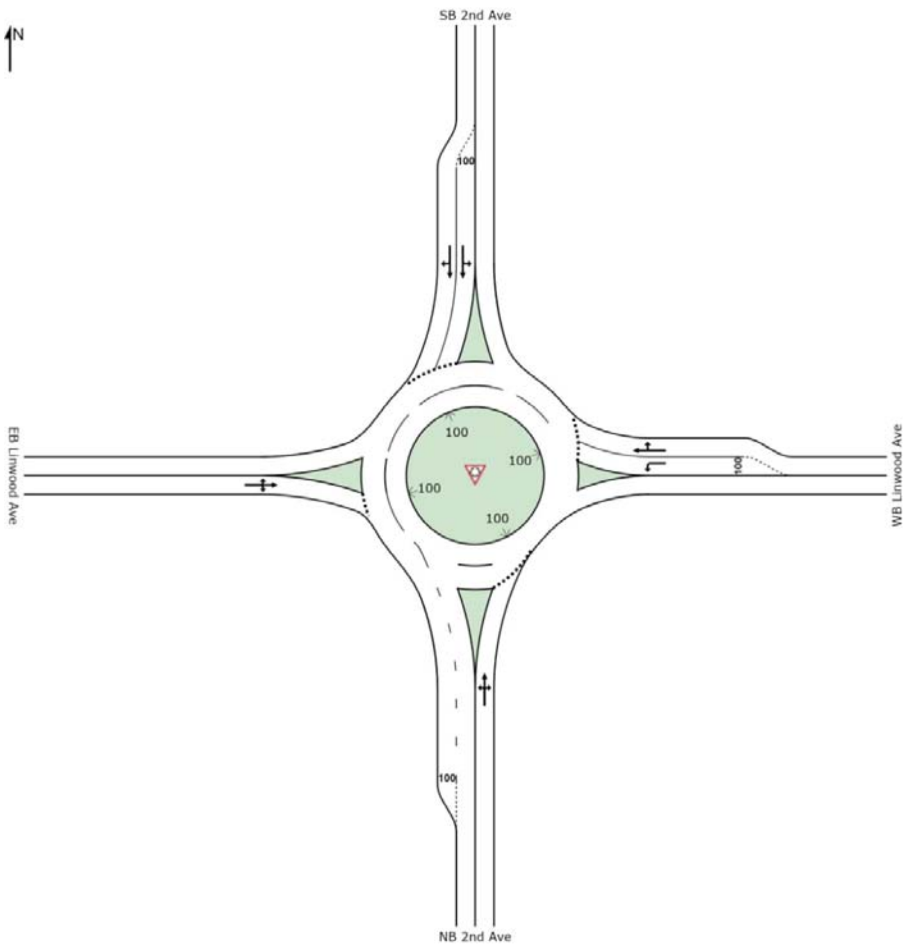
HCM 2010 Ctrl Delay 25.4
HCM 2010 LOS C

Notes

SITE LAYOUT

Site: 25) Linwood Ave at 2nd Ave

Projected 2040 with Improvements
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 25) Linwood Ave at 2nd Ave

Projected 2040 with Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

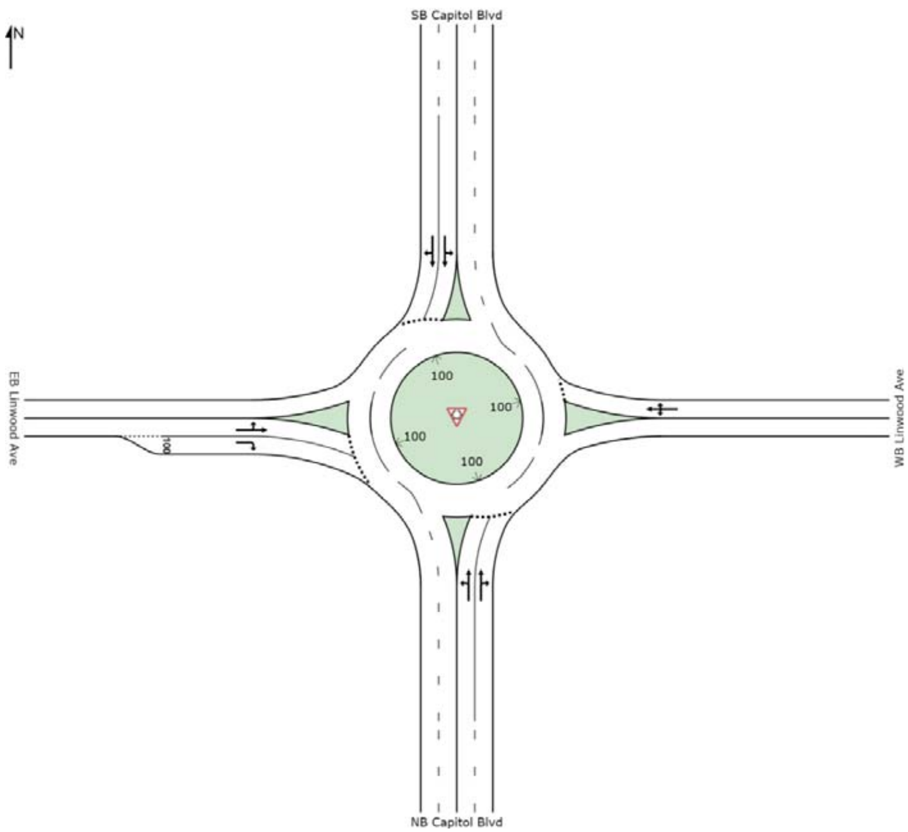
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB 2nd Ave											
3	L2	189	2.0	0.780	23.6	LOS C	9.4	239.8	0.93	1.07	26.9
8	T1	321	2.0	0.780	23.6	LOS C	9.4	239.8	0.93	1.07	26.8
18	R2	68	2.0	0.780	23.6	LOS C	9.4	239.8	0.93	1.07	26.2
Approach		579	2.0	0.780	23.6	LOS C	9.4	239.8	0.93	1.07	26.8
East: WB Linwood Ave											
1	L2	263	2.0	0.401	11.1	LOS B	2.8	72.4	0.84	0.79	30.1
6	T1	321	2.0	0.479	10.8	LOS B	4.1	103.6	0.88	0.82	32.3
16	R2	68	2.0	0.479	10.8	LOS B	4.1	103.6	0.88	0.82	31.3
Approach		653	2.0	0.479	10.9	LOS B	4.1	103.6	0.87	0.81	31.2
North: SB 2nd Ave											
7	L2	189	2.0	0.679	17.0	LOS B	5.5	140.7	0.84	0.94	29.2
4	T1	347	2.0	0.679	17.0	LOS B	5.5	140.7	0.84	0.94	29.1
14	R2	189	2.0	0.359	12.4	LOS B	1.7	43.8	0.71	0.72	30.6
Approach		726	2.0	0.679	15.8	LOS B	5.5	140.7	0.81	0.88	29.5
West: EB Linwood Ave											
5	L2	137	2.0	0.803	33.0	LOS C	9.7	246.5	1.00	1.27	24.2
2	T1	153	2.0	0.803	33.0	LOS C	9.7	246.5	1.00	1.27	24.2
12	R2	137	2.0	0.803	33.0	LOS C	9.7	246.5	1.00	1.27	23.7
Approach		426	2.0	0.803	33.0	LOS C	9.7	246.5	1.00	1.27	24.0
All Vehicles		2384	2.0	0.803	19.4	LOS B	9.7	246.5	0.89	0.98	28.1

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 26) Linwood Ave at Capitol Blvd

Projected 2040 With Improvements
PM Peak Hour
Roundabout



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MOVEMENT SUMMARY

Site: 26) Linwood Ave at Capitol Blvd

Projected 2040 With Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Capitol Blvd											
3	L2	226	2.0	0.556	9.5	LOS A	5.3	133.8	0.56	0.34	32.2
8	T1	1147	2.0	0.556	9.1	LOS A	5.4	136.3	0.55	0.33	32.8
18	R2	16	2.0	0.556	8.9	LOS A	5.4	136.3	0.54	0.32	32.2
Approach		1389	2.0	0.556	9.2	LOS A	5.4	136.3	0.55	0.33	32.7
East: WB Linwood Ave											
1	L2	16	2.0	0.071	9.1	LOS A	0.3	7.4	0.72	0.72	32.0
6	T1	5	2.0	0.071	9.1	LOS A	0.3	7.4	0.72	0.72	31.8
16	R2	11	2.0	0.071	9.1	LOS A	0.3	7.4	0.72	0.72	31.1
Approach		32	2.0	0.071	9.1	LOS A	0.3	7.4	0.72	0.72	31.6
North: SB Capitol Blvd											
7	L2	11	2.0	0.843	22.3	LOS C	15.5	393.4	0.98	0.88	27.8
4	T1	1500	2.0	0.843	21.7	LOS C	15.5	393.4	0.97	0.86	28.0
14	R2	421	2.0	0.843	20.7	LOS C	15.5	393.2	0.96	0.82	27.5
Approach		1932	2.0	0.843	21.5	LOS C	15.5	393.4	0.97	0.85	27.9
West: EB Linwood Ave											
5	L2	121	2.0	0.427	23.1	LOS C	2.2	57.1	0.87	0.91	26.1
2	T1	5	2.0	0.427	23.1	LOS C	2.2	57.1	0.87	0.91	26.0
12	R2	268	2.0	0.648	26.5	LOS C	4.5	115.5	0.95	1.05	25.6
Approach		395	2.0	0.648	25.4	LOS C	4.5	115.5	0.92	1.00	25.8
All Vehicles		3747	2.0	0.843	17.2	LOS B	15.5	393.4	0.81	0.67	29.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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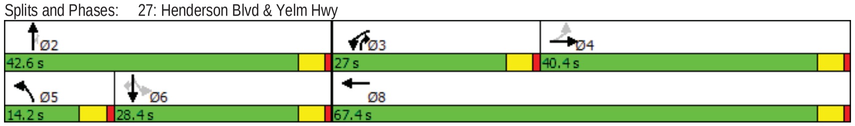
Lanes, Volumes, Timings
27: Henderson Blvd & Yelm Hwy

Projected 2040 with Imp
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	955	195	510	780	85	140	200	700	230	335	30
Future Volume (vph)	10	955	195	510	780	85	140	200	700	230	335	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	450		0	200		100	0		150
Storage Lanes	1		0	2		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1947			1645			444			1606	
Travel Time (s)		44.3			37.4			10.1			36.5	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Prot	NA		Prot	NA	pm+ov	Perm	NA	Perm
Protected Phases		4		3	8		5	2	3		6	
Permitted Phases	4								2	6		6
Detector Phase	4	4		3	8		5	2	3	6	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		5.0	6.0		5.0	6.0	5.0	6.0	6.0	6.0
Minimum Split (s)	24.5	24.5		9.5	24.5		9.5	24.5	9.5	24.5	24.5	24.5
Total Split (s)	40.4	40.4		27.0	67.4		14.2	42.6	27.0	28.4	28.4	28.4
Total Split (%)	36.7%	36.7%		24.5%	61.3%		12.9%	38.7%	24.5%	25.8%	25.8%	25.8%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead			Lead		Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes		Yes	Yes	Yes	Yes
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 110	
Actuated Cycle Length: 109.3	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 27: Henderson Blvd & Yelm Hwy



HCM 2010 Signalized Intersection Summary
27: Henderson Blvd & Yelm Hwy

Projected 2040 with Imp
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	955	195	510	780	85	140	200	700	230	335	30
Future Volume (veh/h)	10	955	195	510	780	85	140	200	700	230	335	30
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	10	974	184	520	796	82	143	204	0	235	342	5
Adj No. of Lanes	1	2	0	2	2	0	1	1	1	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	274	983	185	515	1876	193	158	648	879	320	405	344
Arrive On Green	0.33	0.33	0.33	0.21	0.57	0.57	0.09	0.34	0.00	0.22	0.22	0.22
Sat Flow, veh/h	635	3002	566	2508	3272	337	1792	1881	1599	1185	1881	1599
Grp Volume(v), veh/h	10	579	579	520	435	443	143	204	0	235	342	5
Grp Sat Flow(s),veh/h/ln	635	1787	1781	1254	1787	1822	1792	1881	1599	1185	1881	1599
Q Serve(g_s), s	1.2	35.4	35.5	22.5	15.0	15.0	8.7	8.7	0.0	21.3	19.1	0.3
Cycle Q Clear(g_c), s	1.2	35.4	35.5	22.5	15.0	15.0	8.7	8.7	0.0	21.3	19.1	0.3
Prop In Lane	1.00		0.32	1.00		0.18	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	274	585	583	515	1025	1045	158	648	879	320	405	344
V/C Ratio(X)	0.04	0.99	0.99	1.01	0.42	0.42	0.90	0.31	0.00	0.73	0.85	0.01
Avail Cap(c_a), veh/h	274	585	583	515	1025	1045	158	653	883	324	410	348
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.2	36.7	36.8	43.6	13.2	13.2	49.5	26.4	0.0	42.2	41.3	33.9
Incr Delay (d2), s/veh	0.2	35.0	35.5	42.4	1.3	1.3	44.3	0.3	0.0	8.2	14.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	23.1	23.1	10.7	7.7	7.9	6.2	4.6	0.0	7.7	11.6	0.1
LnGrp Delay(d),s/veh	25.5	71.7	72.2	86.0	14.5	14.5	93.9	26.7	0.0	50.4	56.1	33.9
LnGrp LOS	C	E	E	F	B	B	F	C		D	E	C
Approach Vol, veh/h		1168			1398			347			582	
Approach Delay, s/veh		71.6			41.1			54.4			53.6	
Approach LOS		E			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6		8
Phs Duration (G+Y+Rc), s		42.3	27.0	40.4	14.2	28.1		67.4
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		38.1	22.5	35.9	9.7	23.9		62.9
Max Q Clear Time (g_c+I1), s		10.7	24.5	37.5	10.7	23.3		17.0
Green Ext Time (p_c), s		4.5	0.0	0.0	0.0	0.3		22.4

Intersection Summary	
HCM 2010 Ctrl Delay	54.7
HCM 2010 LOS	D

Item 8.

HCM 2010 TWSC
28: Trosper Rd & Rural Rd

Projected 2040 with Imp
PM Peak Hour

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	110	265	425	135	150	165
Future Vol, veh/h	110	265	425	135	150	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	2	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	116	279	447	142	158	174

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	589	0	-	0	1029	518
Stage 1	-	-	-	-	518	-
Stage 2	-	-	-	-	511	-
Critical Hdwy	4.1	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	996	-	-	-	259	558
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	602	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	996	-	-	-	229	558
Mov Cap-2 Maneuver	-	-	-	-	427	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	532	-

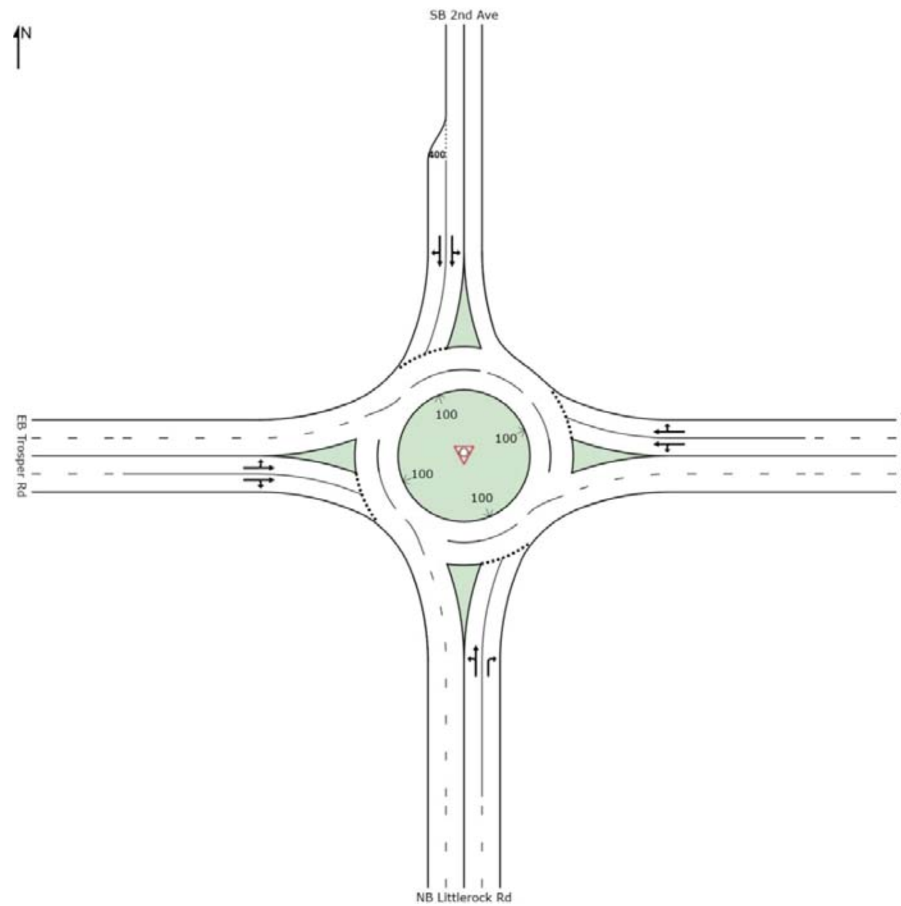
Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	996	-	-	-	427	558
HCM Lane V/C Ratio	0.116	-	-	-	0.37	0.311
HCM Control Delay (s)	9.1	-	-	-	18.3	14.3
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.4	-	-	-	1.7	1.3

SITE LAYOUT

Site: 30) Trosper Rd at 2nd Ave/Littlerock Rd

Projected 2040 with imp
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 30) Trosper Rd at 2nd Ave/Littlerock Rd

Projected 2040 with imp
PM Peak Hour
Roundabout

Movement Performance - Vehicles

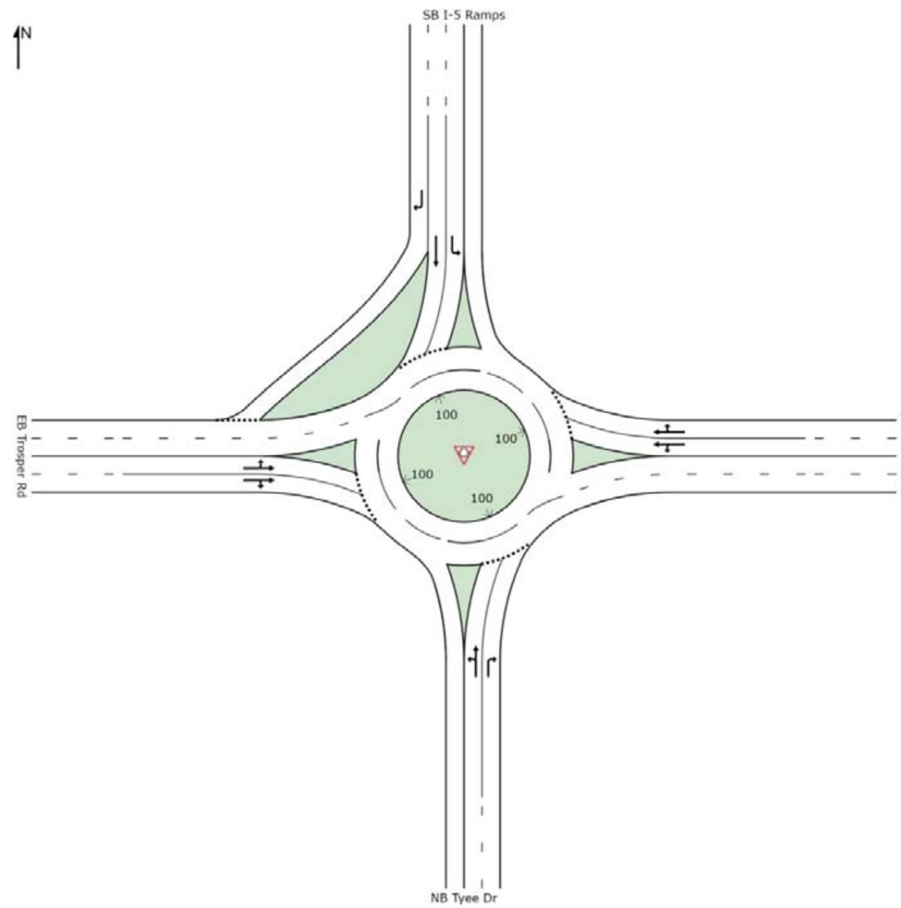
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Littlerock Rd											
3	L2	342	2.0	0.961	45.2	LOS D	18.5	469.2	1.00	1.50	21.4
8	T1	437	2.0	0.961	45.2	LOS D	18.5	469.2	1.00	1.50	21.4
18	R2	500	2.0	0.738	22.5	LOS C	6.5	164.8	0.88	1.01	26.9
Approach		1279	2.0	0.961	36.3	LOS D	18.5	469.2	0.95	1.31	23.2
East: WB Trosper Rd											
1	L2	453	2.0	0.853	38.8	LOS D	12.5	317.3	1.00	1.33	22.2
6	T1	384	2.0	0.853	42.1	LOS D	12.5	317.3	1.00	1.32	22.4
16	R2	21	2.0	0.853	42.1	LOS D	11.6	294.9	1.00	1.32	22.0
Approach		858	2.0	0.853	40.4	LOS D	12.5	317.3	1.00	1.32	22.3
North: SB 2nd Ave											
7	L2	174	2.0	0.751	30.1	LOS C	6.0	152.6	0.93	1.09	24.9
4	T1	516	2.0	0.751	27.7	LOS C	6.5	165.1	0.93	1.10	25.8
14	R2	116	2.0	0.751	26.2	LOS C	6.5	165.1	0.94	1.10	25.9
Approach		805	2.0	0.751	28.0	LOS C	6.5	165.1	0.93	1.10	25.6
West: EB Trosper Rd											
5	L2	89	2.0	0.636	21.2	LOS C	4.5	114.2	0.88	0.99	27.9
2	T1	458	2.0	0.636	20.0	LOS B	4.8	122.3	0.88	0.99	28.4
12	R2	184	2.0	0.636	18.5	LOS B	4.8	122.3	0.89	1.00	28.3
Approach		732	2.0	0.636	19.7	LOS B	4.8	122.3	0.88	0.99	28.3
All Vehicles		3674	2.0	0.961	32.1	LOS C	18.5	469.2	0.94	1.20	24.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 31) Tropser Rd at Tyee Dr/SB I-5 Ramps

Projected 2040 With Imp
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 31) Tropser Rd at Tyee Dr/SB I-5 Ramps

Projected 2040 With Imp
PM Peak Hour
Roundabout

Movement Performance - Vehicles

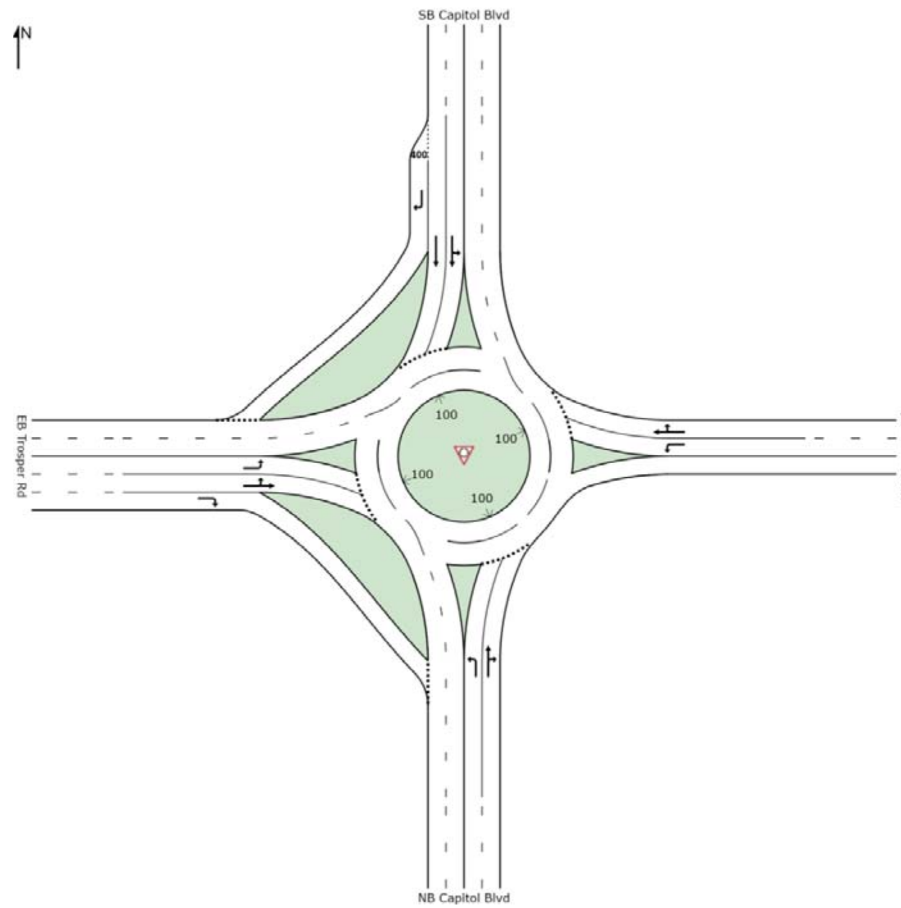
Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Tyee Dr											
3	L2	37	2.0	0.571	25.9	LOS C	3.3	83.3	0.87	0.96	26.5
8	T1	163	2.0	0.571	25.9	LOS C	3.3	83.3	0.87	0.96	26.4
18	R2	458	2.0	0.918	50.9	LOS D	11.0	279.7	1.00	1.40	20.0
Approach		658	2.0	0.918	43.3	LOS D	11.0	279.7	0.96	1.26	21.6
East: WB Trosper Rd											
1	L2	289	2.0	0.564	11.6	LOS B	4.5	113.3	0.72	0.66	30.8
6	T1	358	2.0	0.564	11.5	LOS B	4.5	114.2	0.71	0.66	31.2
16	R2	421	2.0	0.564	11.2	LOS B	4.5	114.2	0.71	0.65	31.1
Approach		1068	2.0	0.564	11.4	LOS B	4.5	114.2	0.71	0.65	31.1
North: SB I-5 Ramps											
7	L2	405	2.0	0.472	10.2	LOS B	3.0	77.1	0.73	0.74	30.4
4	T1	453	2.0	0.426	8.0	LOS A	2.7	68.2	0.70	0.64	33.7
14	R2	500	2.0	0.399	6.8	LOS A	2.3	59.2	0.54	0.43	33.2
Approach		1358	2.0	0.472	8.2	LOS A	3.0	77.1	0.65	0.59	32.5
West: EB Trosper Rd											
5	L2	216	2.0	0.898	44.3	LOS D	10.4	264.7	0.96	1.33	21.6
2	T1	842	2.0	0.898	41.1	LOS D	11.3	288.1	0.97	1.34	22.5
12	R2	26	2.0	0.898	39.5	LOS D	11.3	288.1	0.98	1.35	22.5
Approach		1084	2.0	0.898	41.7	LOS D	11.3	288.1	0.97	1.34	22.3
All Vehicles		4168	2.0	0.918	23.3	LOS C	11.3	288.1	0.80	0.91	26.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 33) Trosper Rd at Capitol Blvd

Projected 2040 With Improvements
PM Peak Hour
Roundabout



Item 8.

MOVEMENT SUMMARY

Site: 33) Trosper Rd at Capitol Blvd

Projected 2040 With Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Capitol Blvd											
3	L2	697	2.0	0.933	41.9	LOS D	15.0	380.4	1.00	1.44	18.9
8	T1	778	2.0	0.944	41.0	LOS D	16.7	424.4	1.00	1.47	21.4
18	R2	10	2.0	0.944	41.0	LOS D	16.7	424.4	1.00	1.47	19.0
Approach		1485	2.0	0.944	41.4	LOS D	16.7	424.4	1.00	1.46	20.1
East: WB Trosper Rd											
1	L2	51	2.0	0.208	19.7	LOS B	1.0	24.1	0.87	0.87	22.7
6	T1	253	2.0	0.805	43.2	LOS D	7.0	176.9	0.98	1.36	17.4
16	R2	51	2.0	0.805	43.2	LOS D	7.0	176.9	0.98	1.36	18.7
Approach		354	2.0	0.805	39.8	LOS D	7.0	176.9	0.96	1.29	18.2
North: SB Capitol Blvd											
7	L2	35	2.0	0.695	21.1	LOS C	5.9	149.7	0.93	1.06	23.8
4	T1	995	2.0	0.695	18.5	LOS B	6.7	170.6	0.94	1.07	27.0
14	R2	657	2.0	0.782	21.7	LOS C	8.7	221.1	0.99	1.17	22.4
Approach		1687	2.0	0.782	19.8	LOS B	8.7	221.1	0.96	1.11	25.0
West: EB Trosper Rd											
5	L2	601	2.0	0.516	11.1	LOS B	3.6	91.4	0.82	0.87	24.9
2	T1	66	2.0	0.516	11.2	LOS B	3.6	91.4	0.84	0.90	22.3
12	R2	465	2.0	0.533	11.4	LOS B	3.8	96.6	0.84	0.91	25.0
Approach		1131	2.0	0.533	11.2	LOS B	3.8	96.6	0.83	0.89	24.8
All Vehicles		4657	2.0	0.944	26.1	LOS C	16.7	424.4	0.94	1.18	22.5

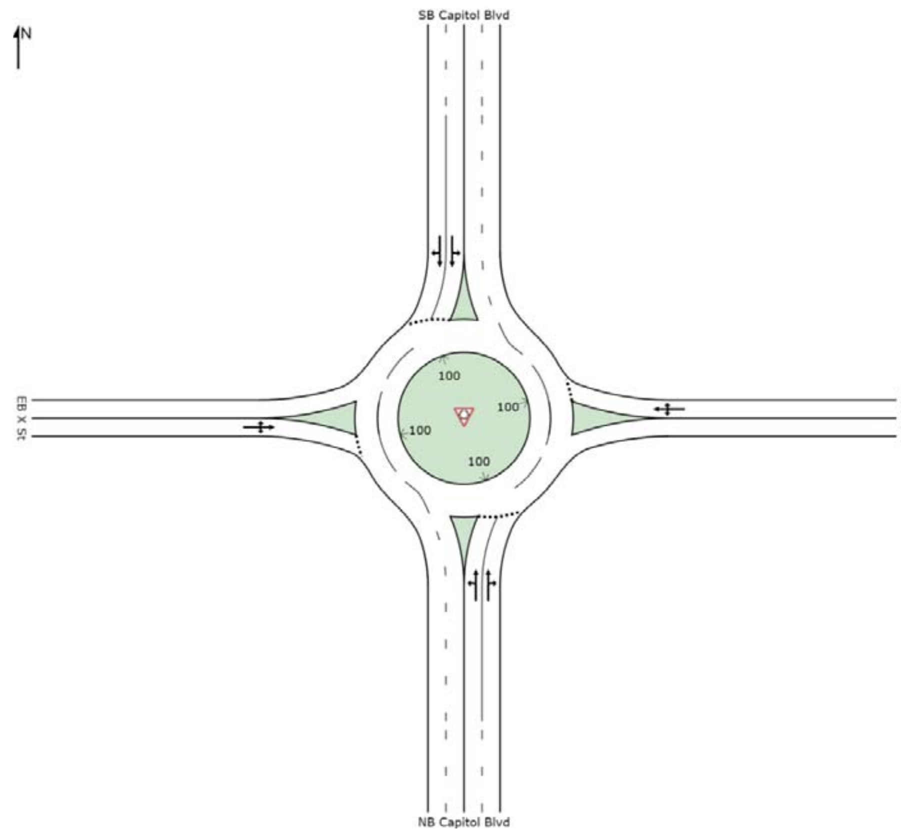
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Tuesday, February 16, 2016 5:51:12 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\33) Trosper Rd at Capitol Blvd.sip6

SITE LAYOUT

Site: 38) X St at Capitol Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout



Organisation: SCJ ALLIANCE | Created: Wednesday, February 10, 2016 10:55:35 AM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\38) X St at Capitol Blvd.sip6

MOVEMENT SUMMARY

Site: 38) X St at Capitol Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Capitol Blvd											
3	L2	26	2.0	0.481	7.7	LOS A	3.9	99.9	0.35	0.17	33.8
8	T1	1253	2.0	0.481	7.5	LOS A	4.0	100.5	0.34	0.16	33.9
18	R2	21	2.0	0.481	7.3	LOS A	4.0	100.5	0.33	0.16	32.9
Approach		1300	2.0	0.481	7.5	LOS A	4.0	100.5	0.34	0.16	33.9
East: WB X St											
1	L2	37	2.0	0.118	8.2	LOS A	0.5	11.5	0.66	0.66	32.2
6	T1	5	2.0	0.118	8.2	LOS A	0.5	11.5	0.66	0.66	32.0
16	R2	21	2.0	0.118	8.2	LOS A	0.5	11.5	0.66	0.66	31.2
Approach		63	2.0	0.118	8.2	LOS A	0.5	11.5	0.66	0.66	31.8
North: SB Capitol Blvd											
7	L2	37	2.0	0.495	7.9	LOS A	4.2	107.4	0.35	0.16	33.6
4	T1	1253	2.0	0.495	7.7	LOS A	4.3	108.1	0.34	0.16	33.8
14	R2	53	2.0	0.495	7.5	LOS A	4.3	108.1	0.33	0.15	32.8
Approach		1342	2.0	0.495	7.7	LOS A	4.3	108.1	0.34	0.16	33.7
West: EB X St											
5	L2	32	2.0	0.110	8.2	LOS A	0.4	10.8	0.66	0.66	32.3
2	T1	5	2.0	0.110	8.2	LOS A	0.4	10.8	0.66	0.66	32.1
12	R2	21	2.0	0.110	8.2	LOS A	0.4	10.8	0.66	0.66	31.3
Approach		58	2.0	0.110	8.2	LOS A	0.4	10.8	0.66	0.66	31.9
All Vehicles		2763	2.0	0.495	7.6	LOS A	4.3	108.1	0.35	0.18	33.7

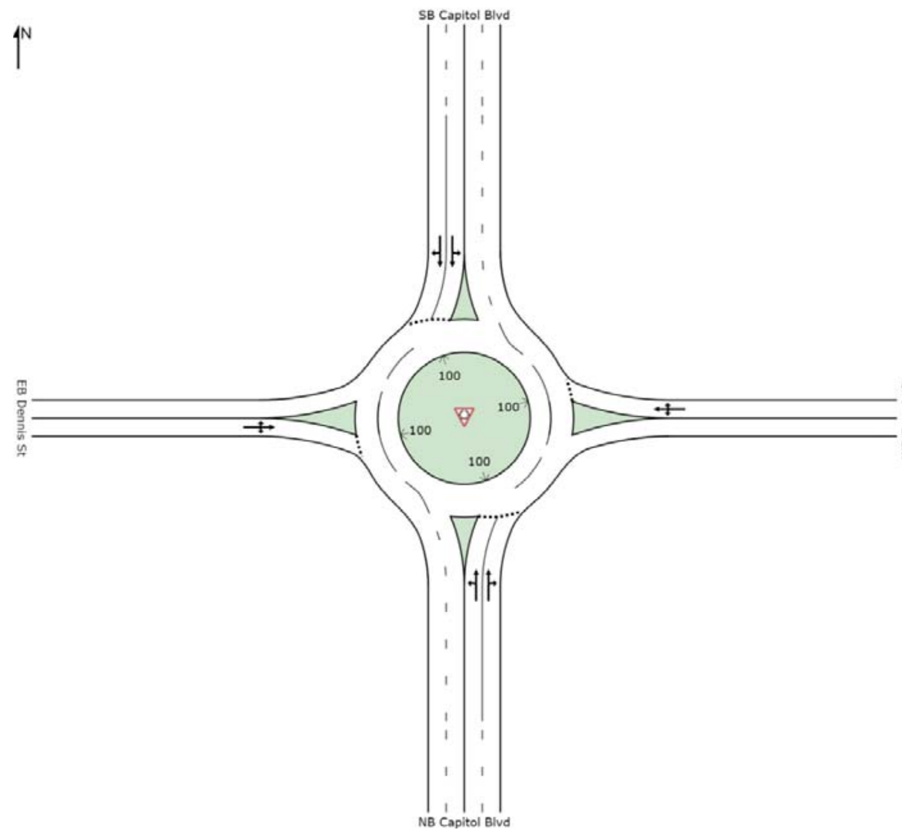
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 3:11:20 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\38) X St at Capitol Blvd.sip6

SITE LAYOUT

Site: 40) Dennis St at Capitol Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout



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Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\40) Dennis St at Capitol Blvd.sip6

MOVEMENT SUMMARY

Site: 40) Dennis St at Capitol Blvd

Projected 2040 with Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Capitol Blvd											
3	L2	21	2.0	0.467	9.1	LOS A	3.5	89.4	0.68	0.54	33.1
8	T1	921	2.0	0.467	8.7	LOS A	3.6	92.6	0.67	0.52	33.3
18	R2	42	2.0	0.467	8.4	LOS A	3.6	92.6	0.67	0.51	32.4
Approach		984	2.0	0.467	8.7	LOS A	3.6	92.6	0.67	0.52	33.2
East: WB Dennis St											
1	L2	42	2.0	0.293	11.5	LOS B	1.3	33.6	0.74	0.74	31.4
6	T1	26	2.0	0.293	11.5	LOS B	1.3	33.6	0.74	0.74	31.3
16	R2	79	2.0	0.293	11.5	LOS B	1.3	33.6	0.74	0.74	30.5
Approach		147	2.0	0.293	11.5	LOS B	1.3	33.6	0.74	0.74	30.9
North: SB Capitol Blvd											
7	L2	47	2.0	0.466	7.6	LOS A	3.9	98.8	0.39	0.20	33.7
4	T1	1053	2.0	0.466	7.4	LOS A	3.9	99.9	0.39	0.20	33.9
14	R2	132	2.0	0.466	7.2	LOS A	3.9	99.9	0.38	0.19	32.9
Approach		1232	2.0	0.466	7.4	LOS A	3.9	99.9	0.39	0.20	33.8
West: EB Dennis St											
5	L2	237	2.0	0.562	17.1	LOS B	3.2	81.9	0.78	0.86	28.3
2	T1	42	2.0	0.562	17.1	LOS B	3.2	81.9	0.78	0.86	28.2
12	R2	37	2.0	0.562	17.1	LOS B	3.2	81.9	0.78	0.86	27.6
Approach		316	2.0	0.562	17.1	LOS B	3.2	81.9	0.78	0.86	28.2
All Vehicles		2679	2.0	0.562	9.3	LOS A	3.9	99.9	0.56	0.42	32.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

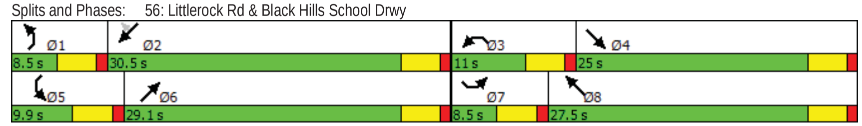
Organisation: SCJ ALLIANCE | Processed: Tuesday, February 9, 2016 6:05:09 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\40) Dennis St at Capitol Blvd.sip6

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	25	10	100	50	25	15	275	50	25	535	70
Future Volume (vph)	5	25	10	100	50	25	15	275	50	25	535	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	175		0	100		350
Storage Lanes	1		0	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1065			515			1067			3970	
Travel Time (s)		24.2			11.7			24.3			90.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	2%	0%	2%	2%	2%	1%	1%	2%	2%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												2
Detector Phase	7	4		3	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	4.0	7.0		4.0	7.0		4.0	7.0		4.0	7.0	7.0
Minimum Split (s)	8.5	24.5		8.5	27.5		8.5	24.5		8.5	27.5	27.5
Total Split (s)	8.5	25.0		11.0	27.5		8.5	29.1		9.9	30.5	30.5
Total Split (%)	11.3%	33.3%		14.7%	36.7%		11.3%	38.8%		13.2%	40.7%	40.7%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	Max		None	None		None	Max		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 67.1
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 56: Littlerock Rd & Black Hills School Drwy



Item 8.

HCM 2010 Signalized Intersection Summary
56: Littlerock Rd & Black Hills School Drwy

Projected 2040 with Imp
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	25	10	100	50	25	15	275	50	25	535	70
Future Volume (veh/h)	5	25	10	100	50	25	15	275	50	25	535	70
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1874	1900	1863	1863	1900	1881	1878	1900	1863	1881	1881
Adj Flow Rate, veh/h	5	26	11	105	53	26	16	289	53	26	563	74
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	2	2	2	2	2	1	1	1	2	1	1
Cap, veh/h	97	366	155	134	372	182	27	543	100	40	675	574
Arrive On Green	0.05	0.29	0.29	0.08	0.31	0.31	0.02	0.35	0.35	0.02	0.36	0.36
Sat Flow, veh/h	1810	1251	529	1774	1181	579	1792	1545	283	1774	1881	1599
Grp Volume(v), veh/h	5	0	37	105	0	79	16	0	342	26	563	74
Grp Sat Flow(s),veh/h/ln	1810	0	1780	1774	0	1760	1792	0	1828	1774	1881	1599
Q Serve(g_s), s	0.2	0.0	1.1	4.1	0.0	2.3	0.6	0.0	10.4	1.0	19.2	2.2
Cycle Q Clear(g_c), s	0.2	0.0	1.1	4.1	0.0	2.3	0.6	0.0	10.4	1.0	19.2	2.2
Prop In Lane	1.00		0.30	1.00		0.33	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	97	0	522	134	0	554	27	0	643	40	675	574
V/C Ratio(X)	0.05	0.00	0.07	0.78	0.00	0.14	0.58	0.00	0.53	0.65	0.83	0.13
Avail Cap(c_a), veh/h	103	0	522	165	0	579	102	0	643	137	699	594
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	0.0	17.9	31.8	0.0	17.2	34.2	0.0	18.1	33.9	20.5	15.1
Incr Delay (d2), s/veh	0.2	0.0	0.3	17.7	0.0	0.1	7.1	0.0	3.1	16.0	8.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.6	2.6	0.0	1.1	0.4	0.0	5.8	0.7	11.5	1.0
LnGrp Delay(d),s/veh	31.6	0.0	18.1	49.5	0.0	17.3	41.4	0.0	21.2	50.0	29.1	15.2
LnGrp LOS	C		B	D		B	D		C	D	C	B
Approach Vol, veh/h		42			184			358			663	
Approach Delay, s/veh		19.7			35.7			22.1			28.3	
Approach LOS		B			D			C			C	

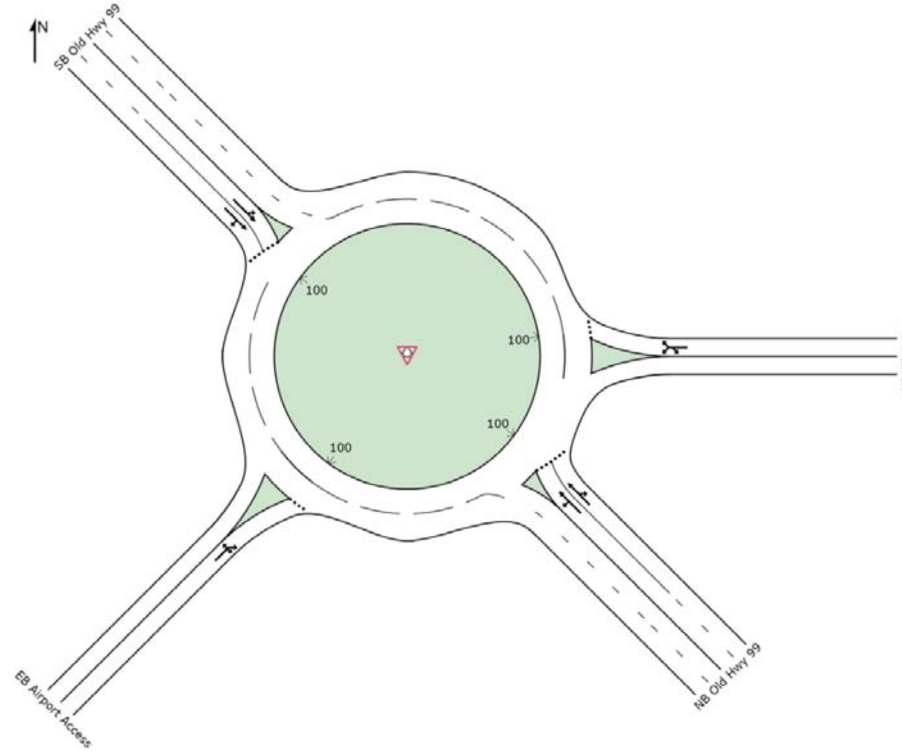
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.6	29.6	9.8	25.0	6.1	29.1	8.3	26.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	4.0	26.0	6.5	20.5	5.4	24.6	4.0	23.0
Max Q Clear Time (g_c+I1), s	2.6	21.2	6.1	3.1	3.0	12.4	2.2	4.3
Green Ext Time (p_c), s	0.0	2.8	0.0	0.6	0.0	5.6	0.0	0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

SITE LAYOUT

Site: 59) 79th Ave at Old Hwy 99

Projected 2040 with Improvements
PM Peak Hour
Roundabout



Organisation: SCJ ALLIANCE | Created: Wednesday, February 17, 2016 3:14:27 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\59) 79th Ave at Old Hwy 99.sip6

MOVEMENT SUMMARY

Site: 59) 79th Ave at Old Hwy 99

Projected 2040 with Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NB Old Hwy 99											
3x	L2	1	1.0	0.272	5.4	LOS A	1.7	41.8	0.36	0.21	35.2
8x	T1	679	1.0	0.272	5.2	LOS A	1.7	42.3	0.36	0.20	35.2
18bx	R3	21	1.0	0.272	5.0	LOS A	1.7	42.3	0.35	0.19	33.7
Approach		701	1.0	0.272	5.2	LOS A	1.7	42.3	0.36	0.20	35.1
East: WB 79th Ave											
1b	L3	32	1.0	0.224	7.5	LOS A	0.9	23.0	0.57	0.56	34.0
1a	L1	1	1.0	0.224	7.5	LOS A	0.9	23.0	0.57	0.56	33.1
16a	R1	132	1.0	0.224	7.5	LOS A	0.9	23.0	0.57	0.56	33.2
Approach		164	1.0	0.224	7.5	LOS A	0.9	23.0	0.57	0.56	33.3
NorthWest: SB Old Hwy 99											
7ax	L1	137	1.0	0.588	9.3	LOS A	6.4	160.8	0.29	0.10	32.4
4x	T1	1526	1.0	0.588	9.0	LOS A	6.4	161.3	0.28	0.10	33.0
14x	R2	1	1.0	0.588	8.9	LOS A	6.4	161.3	0.28	0.10	32.2
Approach		1664	1.0	0.588	9.1	LOS A	6.4	161.3	0.28	0.10	33.0
SouthWest: EB Airport Access											
5x	L2	1	2.0	0.027	8.1	LOS A	0.1	2.6	0.69	0.65	33.5
12ax	R1	1	2.0	0.027	8.1	LOS A	0.1	2.6	0.69	0.65	33.0
12x	R2	11	2.0	0.027	8.1	LOS A	0.1	2.6	0.69	0.65	32.5
Approach		13	2.0	0.027	8.1	LOS A	0.1	2.6	0.69	0.65	32.6
All Vehicles		2542	1.0	0.588	7.9	LOS A	6.4	161.3	0.32	0.16	33.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 3:14:11 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\59) 79th Ave at Old Hwy 99.sip6

Lanes, Volumes, Timings
63: I-5 SB Ramps & 93rd Ave

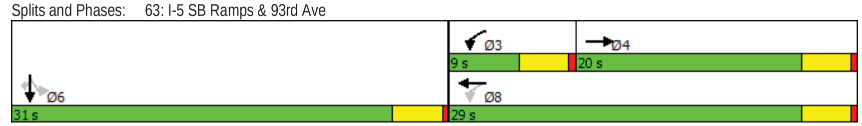
Projected 2040 with Imp
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	415	95	85	305	0	0	0	0	475	0	425
Future Volume (vph)	0	415	95	85	305	0	0	0	0	475	0	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		300
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			40			30			30	
Link Distance (ft)		732			936			1099			1644	
Travel Time (s)		16.6			16.0			25.0			37.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases				8						6		6
Detector Phase		4		3	8					6	6	6
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)		20.0		8.0	20.0					20.0	20.0	20.0
Total Split (s)		20.0		9.0	29.0					31.0	31.0	31.0
Total Split (%)		33.3%		15.0%	48.3%					51.7%	51.7%	51.7%
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)		0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	0.0
Total Lost Time (s)		4.0		4.0	4.0						4.0	4.0
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Recall Mode		None		None	None					Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 55.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 63: I-5 SB Ramps & 93rd Ave



HCM 2010 Signalized Intersection Summary
63: I-5 SB Ramps & 93rd Ave

Projected 2040 with Imp
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	415	95	85	305	0	0	0	0	475	0	425
Future Volume (veh/h)	0	415	95	85	305	0	0	0	0	475	0	425
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900	1743	1743	0				1900	1827	1827
Adj Flow Rate, veh/h	0	437	100	89	321	0				500	0	268
Adj No. of Lanes	0	2	0	1	2	0				0	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95
Percent Heavy Veh, %	0	1	1	9	9	0				4	4	4
Cap, veh/h	0	657	149	296	1180	0				864	0	771
Arrive On Green	0.00	0.23	0.23	0.06	0.36	0.00				0.50	0.00	0.50
Sat Flow, veh/h	0	2989	657	1660	3399	0				1740	0	1553
Grp Volume(v), veh/h	0	268	269	89	321	0				500	0	268
Grp Sat Flow(s),veh/h/ln	0	1787	1765	1660	1656	0				1740	0	1553
Q Serve(g_s), s	0.0	7.4	7.5	2.1	3.8	0.0				11.0	0.0	5.7
Cycle Q Clear(g_c), s	0.0	7.4	7.5	2.1	3.8	0.0				11.0	0.0	5.7
Prop In Lane	0.00		0.37	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	405	400	296	1180	0				864	0	771
V/C Ratio(X)	0.00	0.66	0.67	0.30	0.27	0.00				0.58	0.00	0.35
Avail Cap(c_a), veh/h	0	526	519	356	1523	0				864	0	771
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	19.1	19.2	14.2	12.5	0.0				9.7	0.0	8.3
Incr Delay (d2), s/veh	0.0	2.0	2.2	0.6	0.1	0.0				2.8	0.0	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.9	3.9	1.0	1.7	0.0				6.0	0.0	2.6
LnGrp Delay(d),s/veh	0.0	21.1	21.4	14.8	12.6	0.0				12.5	0.0	9.6
LnGrp LOS		C	C	B	B					B		A
Approach Vol, veh/h		537			410						768	
Approach Delay, s/veh		21.2			13.1						11.5	
Approach LOS		C			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			7.0	16.3		31.0		23.4
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			5.0	16.0		27.0		25.0
Max Q Clear Time (g_c+I1), s			4.1	9.5		13.0		5.8
Green Ext Time (p_c), s			0.0	2.8		3.7		5.2

Intersection Summary	
HCM 2010 Ctrl Delay	14.9
HCM 2010 LOS	B

Lanes, Volumes, Timings
64: I-5 NB Ramps & 93rd Ave

Projected 2040 with Imp
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	555	0	0	290	425	130	0	155	0	0	0
Future Volume (vph)	290	555	0	0	290	425	130	0	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		0	0		300	0		200	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		936			1635			1212			341	
Travel Time (s)		16.0			27.9			27.5			7.8	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	3%	3%	3%	8%	8%	8%	14%	14%	14%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	Prot	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases						8	2		2			
Detector Phase	7	4			8	8	2	2	2			
Switch Phase												
Minimum Initial (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Minimum Split (s)	8.0	20.0			20.0	20.0	20.0	20.0	20.0			
Total Split (s)	19.0	39.0			20.0	20.0	21.0	21.0	21.0			
Total Split (%)	31.7%	65.0%			33.3%	33.3%	35.0%	35.0%	35.0%			
Yellow Time (s)	3.5	3.5			3.5	3.5	3.5	3.5	3.5			
All-Red Time (s)	0.5	0.5			0.5	0.5	0.5	0.5	0.5			
Lost Time Adjust (s)	0.0	0.0			0.0	0.0		0.0	0.0			
Total Lost Time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Recall Mode	None	None			None	None	Min	Min	Min			

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 45.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 64: I-5 NB Ramps & 93rd Ave

HCM 2010 Signalized Intersection Summary
64: I-5 NB Ramps & 93rd Ave

Projected 2040 with Imp
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	555	0	0	290	425	130	0	155	0	0	0
Future Volume (veh/h)	290	555	0	0	290	425	130	0	155	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1845	1845	0	0	1759	1759	1900	1667	1667			
Adj Flow Rate, veh/h	305	584	0	0	305	0	137	0	0			
Adj No. of Lanes	1	2	0	0	2	1	0	1	1			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95			
Percent Heavy Veh, %	3	3	0	0	8	8	14	14	14			
Cap, veh/h	395	2124	0	0	875	391	246	0	219			
Arrive On Green	0.22	0.61	0.00	0.00	0.26	0.00	0.15	0.00	0.00			
Sat Flow, veh/h	1757	3597	0	0	3431	1495	1587	0	1417			
Grp Volume(v), veh/h	305	584	0	0	305	0	137	0	0			
Grp Sat Flow(s),veh/h/ln	1757	1752	0	0	1671	1495	1587	0	1417			
Q Serve(g_s), s	5.5	2.6	0.0	0.0	2.5	0.0	2.7	0.0	0.0			
Cycle Q Clear(g_c), s	5.5	2.6	0.0	0.0	2.5	0.0	2.7	0.0	0.0			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	395	2124	0	0	875	391	246	0	219			
V/C Ratio(X)	0.77	0.27	0.00	0.00	0.35	0.00	0.56	0.00	0.00			
Avail Cap(c_a), veh/h	787	3665	0	0	1598	715	806	0	719			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00			
Uniform Delay (d), s/veh	12.2	3.1	0.0	0.0	10.0	0.0	13.1	0.0	0.0			
Incr Delay (d2), s/veh	3.2	0.1	0.0	0.0	0.2	0.0	2.0	0.0	0.0			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	3.0	1.2	0.0	0.0	1.2	0.0	1.3	0.0	0.0			
LnGrp Delay(d),s/veh	15.4	3.2	0.0	0.0	10.3	0.0	15.1	0.0	0.0			
LnGrp LOS	B	A			B		B					
Approach Vol, veh/h		889			305			137				
Approach Delay, s/veh		7.4			10.3			15.1				
Approach LOS		A			B			B				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		9.2		24.3			11.5	12.8
Change Period (Y+Rc), s		4.0		4.0			4.0	4.0
Max Green Setting (Gmax), s		17.0		35.0			15.0	16.0
Max Q Clear Time (g_c+I1), s		4.7		4.6			7.5	4.5
Green Ext Time (p_c), s		0.5		6.3			0.5	4.3

Intersection Summary			
HCM 2010 Ctrl Delay			8.8
HCM 2010 LOS			A

Lanes, Volumes, Timings
65: Kimmie St & 93rd Ave

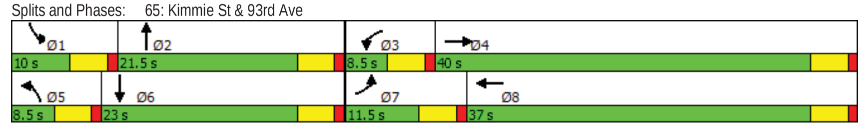
Projected 2040 with Imp
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	535	5	5	475	15	15	1	10	30	15	110
Future Volume (vph)	55	535	5	5	475	15	15	1	10	30	15	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	100		250	100		0	100		0
Storage Lanes	1		0	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1635			3676			860			5320	
Travel Time (s)		27.9			62.7			19.5			120.9	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.5	20.5		8.5	20.5		8.5	20.5		8.5	20.5	
Total Split (s)	11.5	40.0		8.5	37.0		8.5	21.5		10.0	23.0	
Total Split (%)	14.4%	50.0%		10.6%	46.3%		10.6%	26.9%		12.5%	28.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 40.5
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

Splits and Phases: 65: Kimmie St & 93rd Ave



HCM 2010 Signalized Intersection Summary
65: Kimmie St & 93rd Ave

Projected 2040 with Imp
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	535	5	5	475	15	15	1	10	30	15	110
Future Volume (veh/h)	55	535	5	5	475	15	15	1	10	30	15	110
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1827	1900	1881	1881	1900	1900	1900	1900	1810	1810	1900
Adj Flow Rate, veh/h	58	563	5	5	500	16	16	1	11	32	16	116
Adj No. of Lanes	1	1	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	1	1	1	0	0	0	5	5	5
Cap, veh/h	80	803	7	10	1428	46	29	17	185	50	26	188
Arrive On Green	0.05	0.44	0.44	0.01	0.40	0.40	0.02	0.12	0.12	0.03	0.14	0.14
Sat Flow, veh/h	1740	1808	16	1792	3535	113	1810	136	1499	1723	190	1377
Grp Volume(v), veh/h	58	0	568	5	252	264	16	0	12	32	0	132
Grp Sat Flow(s),veh/h/ln	1740	0	1824	1792	1787	1861	1810	0	1635	1723	0	1567
Q Serve(g_s), s	1.5	0.0	11.4	0.1	4.4	4.5	0.4	0.0	0.3	0.8	0.0	3.6
Cycle Q Clear(g_c), s	1.5	0.0	11.4	0.1	4.4	4.5	0.4	0.0	0.3	0.8	0.0	3.6
Prop In Lane	1.00		0.01	1.00		0.06	1.00		0.92	1.00		0.88
Lane Grp Cap(c), veh/h	80	0	810	10	722	752	29	0	202	50	0	214
V/C Ratio(X)	0.73	0.00	0.70	0.52	0.35	0.35	0.55	0.00	0.06	0.63	0.00	0.62
Avail Cap(c_a), veh/h	269	0	1430	158	1283	1336	160	0	614	209	0	640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.3	0.0	10.2	22.5	9.4	9.4	22.1	0.0	17.5	21.7	0.0	18.4
Incr Delay (d2), s/veh	11.9	0.0	1.1	37.0	0.3	0.3	15.1	0.0	0.1	12.4	0.0	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	5.9	0.2	2.2	2.3	0.3	0.0	0.1	0.6	0.0	1.7
LnGrp Delay(d),s/veh	33.3	0.0	11.3	59.5	9.7	9.7	37.2	0.0	17.6	34.2	0.0	21.3
LnGrp LOS	C		B	E	A	A	D		B	C		C
Approach Vol, veh/h		626			521			28			164	
Approach Delay, s/veh		13.3			10.1			28.8			23.8	
Approach LOS		B			B			C			C	

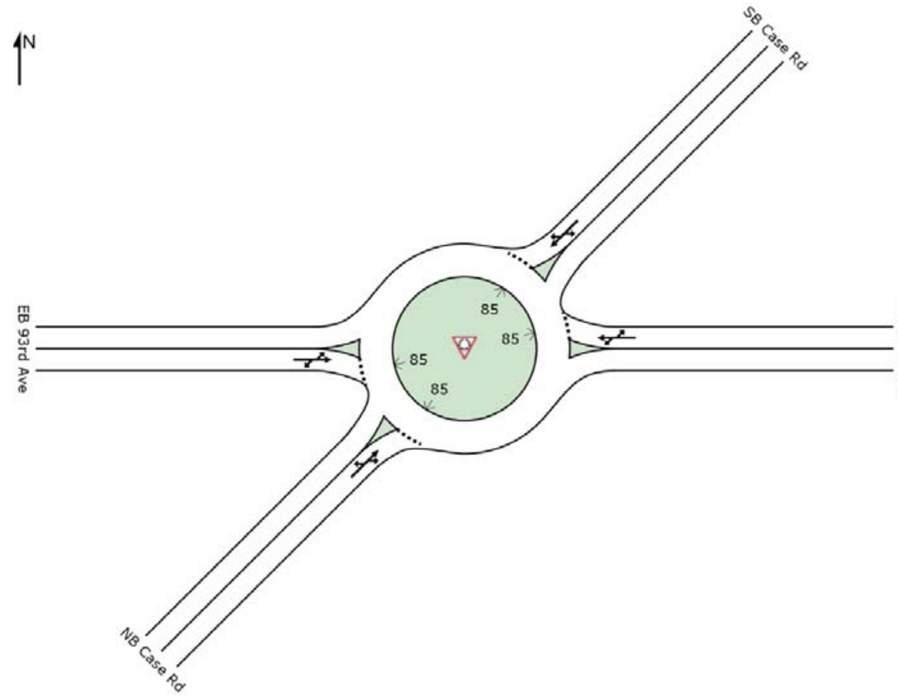
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	10.1	4.7	24.6	5.2	10.7	6.6	22.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	17.0	4.0	35.5	4.0	18.5	7.0	32.5
Max Q Clear Time (g_c+I1), s	2.8	2.3	2.1	13.4	2.4	5.6	3.5	6.5
Green Ext Time (p_c), s	0.0	0.6	0.0	6.7	0.0	0.6	0.0	7.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.7
HCM 2010 LOS	B

SITE LAYOUT

Site: 66) Case Rd at 93rd Ave

Projected 2040 With Improvements
PM Peak Hour
Roundabout



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Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\66) 93rd Ave at Case Rd.sip6

MOVEMENT SUMMARY

Site: 66) Case Rd at 93rd Ave

Projected 2040 With Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB 93rd Ave											
1a	L1	253	2.0	0.659	13.0	LOS B	7.1	179.9	0.66	0.42	30.1
6	T1	379	2.0	0.659	13.0	LOS B	7.1	179.9	0.66	0.42	30.4
16b	R3	68	2.0	0.659	13.0	LOS B	7.1	179.9	0.66	0.42	29.4
Approach		700	2.0	0.659	13.0	LOS B	7.1	179.9	0.66	0.42	30.2
NorthEast: SB Case Rd											
1bx	L3	147	2.0	0.407	12.4	LOS B	2.9	72.4	0.85	0.85	30.0
6x	T1	84	2.0	0.407	12.4	LOS B	2.9	72.4	0.85	0.85	29.8
16ax	R1	5	2.0	0.407	12.4	LOS B	2.9	72.4	0.85	0.85	29.6
Approach		237	2.0	0.407	12.4	LOS B	2.9	72.4	0.85	0.85	29.9
West: EB 93rd Ave											
5a	L1	5	2.0	0.789	23.7	LOS C	11.1	282.6	0.98	1.14	26.7
2	T1	458	2.0	0.789	23.7	LOS C	11.1	282.6	0.98	1.14	27.0
12b	R3	147	2.0	0.789	23.7	LOS C	11.1	282.6	0.98	1.14	26.2
Approach		611	2.0	0.789	23.7	LOS C	11.1	282.6	0.98	1.14	26.8
SouthWest: NB Case Rd											
5bx	L3	89	2.0	0.280	9.2	LOS A	1.8	45.8	0.78	0.71	31.6
2x	T1	37	2.0	0.280	9.2	LOS A	1.8	45.8	0.78	0.71	31.4
12ax	R1	53	2.0	0.280	9.2	LOS A	1.8	45.8	0.78	0.71	31.2
Approach		179	2.0	0.280	9.2	LOS A	1.8	45.8	0.78	0.71	31.4
All Vehicles		1726	2.0	0.789	16.3	LOS B	11.1	282.6	0.81	0.76	29.0

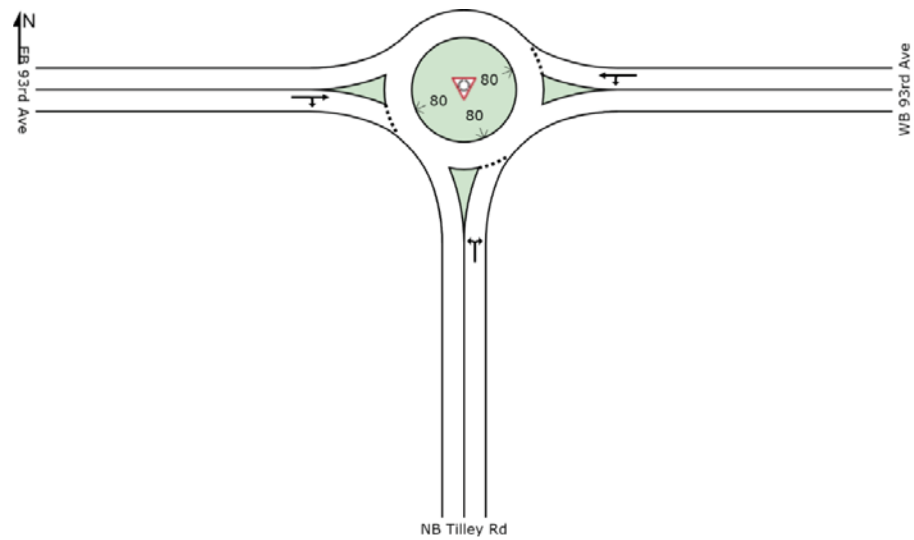
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 3:18:52 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\66) 93rd Ave at Case Rd.sip6

SITE LAYOUT

Site: 67) 93rd Ave at Tilley Rd (South)

Projected 2040 with Improvements
Roundabout



Organisation: SCJ ALLIANCE | Created: Wednesday, February 17, 2016 3:20:02 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\67) 93rd Ave at Tilley Rd (South).sip6

MOVEMENT SUMMARY

Site: 67) 93rd Ave at Tilley Rd (South)

Projected 2040 with Improvements
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Tilley Rd											
3	L2	179	2.0	0.345	8.8	LOS A	2.3	58.9	0.71	0.60	31.2
18	R2	89	2.0	0.345	8.8	LOS A	2.3	58.9	0.71	0.60	30.5
Approach		268	2.0	0.345	8.8	LOS A	2.3	58.9	0.71	0.60	31.0
East: WB 93rd Ave											
1	L2	279	2.0	0.788	19.4	LOS B	12.0	305.6	0.89	0.70	27.8
6	T1	511	2.0	0.788	19.4	LOS B	12.0	305.6	0.89	0.70	27.8
Approach		789	2.0	0.788	19.4	LOS B	12.0	305.6	0.89	0.70	27.8
West: EB 93rd Ave											
2	T1	405	2.0	0.732	17.9	LOS B	9.5	241.7	0.90	0.82	28.9
12	R2	247	2.0	0.732	17.9	LOS B	9.5	241.7	0.90	0.82	28.3
Approach		653	2.0	0.732	17.9	LOS B	9.5	241.7	0.90	0.82	28.7
All Vehicles		1711	2.0	0.788	17.2	LOS B	12.0	305.6	0.86	0.73	28.6

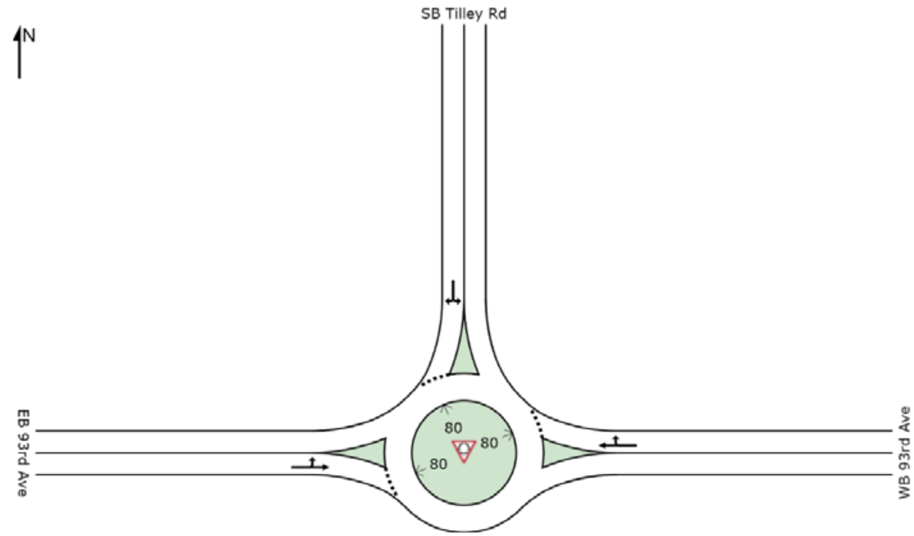
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, February 17, 2016 3:20:01 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\67) 93rd Ave at Tilley Rd (South).sip6

SITE LAYOUT

Site: 68) 93rd Ave at Tilley Rd (Notth)

Projected 2040 with Improvements
Roundabout



Organisation: SCJ ALLIANCE | Created: Thursday, February 25, 2016 12:42:04 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\68) 93rd Ave at Tilley Rd (North).sip6

MOVEMENT SUMMARY

Site: 68) 93rd Ave at Tilley Rd (Notth)

Projected 2040 with Improvements
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB 93rd Ave											
6	T1	358	2.0	0.398	7.6	LOS A	2.9	74.5	0.44	0.26	33.4
16	R2	68	2.0	0.398	7.6	LOS A	2.9	74.5	0.44	0.26	32.5
Approach		426	2.0	0.398	7.6	LOS A	2.9	74.5	0.44	0.26	33.2
North: SB Tilley Rd											
7	L2	179	2.0	0.712	17.4	LOS B	8.5	215.1	0.87	0.87	28.4
14	R2	432	2.0	0.712	17.4	LOS B	8.5	215.1	0.87	0.87	27.9
Approach		611	2.0	0.712	17.4	LOS B	8.5	215.1	0.87	0.87	28.0
West: EB 93rd Ave											
5	L2	121	2.0	0.503	9.7	LOS A	4.2	106.7	0.61	0.42	31.7
2	T1	379	2.0	0.503	9.7	LOS A	4.2	106.7	0.61	0.42	31.8
Approach		500	2.0	0.503	9.7	LOS A	4.2	106.7	0.61	0.42	31.8
All Vehicles		1537	2.0	0.712	12.2	LOS B	8.5	215.1	0.67	0.55	30.5

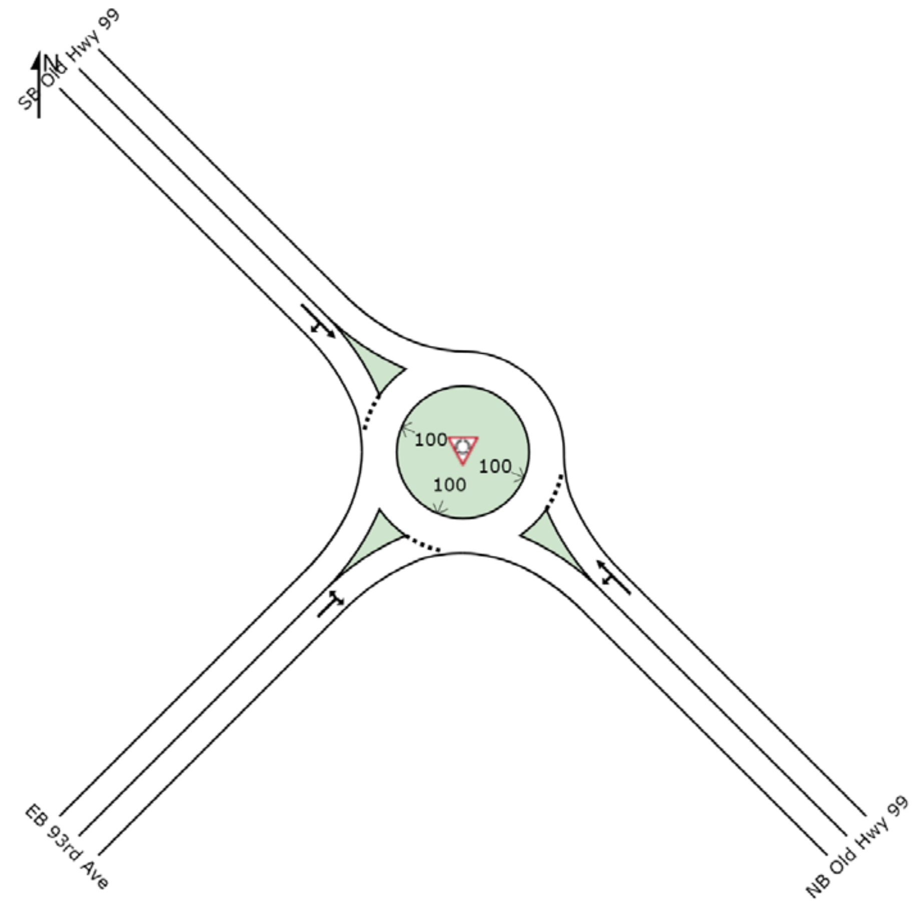
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Thursday, February 25, 2016 12:42:02 PM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\68) 93rd Ave at Tilley Rd (North).sip6

SITE LAYOUT

Site: 69) 93rd Ave at Old Hwy 99

Projected 2040 With Improvements
PM Peak Hour
Roundabout



Organisation: SCJ ALLIANCE | Created: Thursday, February 25, 2016 11:31:20 AM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\69) 93rd Ave at Old Hwy 99.sip6

Item 8.

MOVEMENT SUMMARY

Site: 69) 93rd Ave at Old Hwy 99

Projected 2040 With Improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: NB Old Hwy 99											
3x	L2	200	2.0	0.447	7.4	LOS A	4.3	109.6	0.18	0.05	33.1
8x	T1	358	2.0	0.447	7.4	LOS A	4.3	109.6	0.18	0.05	33.0
Approach		558	2.0	0.447	7.4	LOS A	4.3	109.6	0.18	0.05	33.0
NorthWest: SB Old Hwy 99											
4x	T1	937	2.0	0.922	32.1	LOS C	24.0	608.9	1.00	0.96	24.8
14x	R2	32	2.0	0.922	32.1	LOS C	24.0	608.9	1.00	0.96	24.3
Approach		968	2.0	0.922	32.1	LOS C	24.0	608.9	1.00	0.96	24.8
SouthWest: EB 93rd Ave											
5x	L2	16	2.0	0.623	27.5	LOS C	5.9	150.0	1.00	1.13	25.8
12x	R2	216	2.0	0.623	27.5	LOS C	5.9	150.0	1.00	1.13	25.2
Approach		232	2.0	0.623	27.5	LOS C	5.9	150.0	1.00	1.13	25.3
All Vehicles		1758	2.0	0.922	23.7	LOS C	24.0	608.9	0.74	0.69	27.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Thursday, February 25, 2016 11:31:22 AM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2040 With Imp\69) 93rd Ave at Old Hwy 99.sip6

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	45	85	5	0	120	45	85	0	5	175	135
Future Vol, veh/h	0	45	85	5	0	120	45	85	0	5	175	135
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	6	6	6	2	9	9	9	2	4	4	4
Mvmt Flow	0	49	92	5	0	130	49	92	0	5	190	147
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	10.8	11.4	15.4
HCM LOS	B	B	C

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	56%	0%	94%	0%	35%	0%	85%
Vol Right, %	0%	44%	0%	6%	0%	65%	0%	15%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	5	310	45	90	120	130	45	130
LT Vol	5	0	45	0	120	0	45	0
Through Vol	0	175	0	85	0	45	0	110
RT Vol	0	135	0	5	0	85	0	20
Lane Flow Rate	5	337	49	98	130	141	49	141
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.01	0.548	0.098	0.18	0.254	0.237	0.094	0.246
Departure Headway (Hd)	6.676	5.86	7.177	6.629	7.009	6.036	6.884	6.267
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	535	613	498	539	511	593	519	571
Service Time	4.43	3.614	4.943	4.394	4.766	3.794	4.647	4.029
HCM Lane V/C Ratio	0.009	0.55	0.098	0.182	0.254	0.238	0.094	0.247
HCM Control Delay	9.5	15.5	10.7	10.9	12.2	10.7	10.4	11.1
HCM Lane LOS	A	C	B	B	B	B	B	B
HCM 95th-tile Q	0	3.3	0.3	0.7	1	0.9	0.3	1

HCM 2010 AWSC
1: RW Johnson Rd & Mottman Rd

Intersection				
Intersection Delay, s/veh				
Intersection LOS				

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	45	110	20
Future Vol, veh/h	0	45	110	20
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	3	3
Mvmt Flow	0	49	120	22
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	10.9
HCM LOS	B

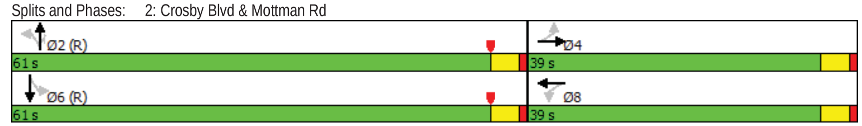
Lane

Lanes, Volumes, Timings
2: Crosby Blvd & Mottman Rd

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	250	25	5	30	85	45	425	155	135	690	455
Future Volume (vph)	180	250	25	5	30	85	45	425	155	135	690	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	0		0	200		0	100		0
Storage Lanes	1		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		940			1116			645			417	
Travel Time (s)		21.4			25.4			14.7			9.5	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	20.5	20.5		20.5	20.5		20.5	20.5	20.5	20.5	20.5	
Total Split (s)	39.0	39.0		39.0	39.0		61.0	61.0	61.0	61.0	61.0	
Total Split (%)	39.0%	39.0%		39.0%	39.0%		61.0%	61.0%	61.0%	61.0%	61.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5	4.5	4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max	C-Max	C-Max	C-Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	
Actuated Cycle Length: 100	
Offset: 82 (82%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	

Splits and Phases: 2: Crosby Blvd & Mottman Rd



HCM 2010 Signalized Intersection Summary
2: Crosby Blvd & Mottman Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	250	25	5	30	85	45	425	155	135	690	455
Future Volume (veh/h)	180	250	25	5	30	85	45	425	155	135	690	455
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1900	1900	1900	1900	1881	1881	1881	1845	1845	1900
Adj Flow Rate, veh/h	202	281	28	6	34	96	51	478	174	152	775	0
Adj No. of Lanes	1	1	0	0	1	0	1	1	1	1	2	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	3	3	3	0	0	0	1	1	1	3	3	3
Cap, veh/h	262	389	39	42	106	267	488	1269	1078	516	2364	0
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.67	0.67	0.67	0.67	0.67	0.00
Sat Flow, veh/h	1243	1651	165	21	452	1135	700	1881	1599	769	3597	0
Grp Volume(v), veh/h	202	0	309	136	0	0	51	478	174	152	775	0
Grp Sat Flow(s),veh/h/ln	1243	0	1816	1608	0	0	700	1881	1599	769	1752	0
Q Serve(g_s), s	9.6	0.0	15.7	0.1	0.0	0.0	3.2	11.1	4.0	10.4	9.2	0.0
Cycle Q Clear(g_c), s	23.6	0.0	15.7	16.9	0.0	0.0	11.2	11.1	4.0	20.2	9.2	0.0
Prop In Lane	1.00		0.09	0.04		0.71	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	262	0	428	416	0	0	488	1269	1078	516	2364	0
V/C Ratio(X)	0.77	0.00	0.72	0.33	0.00	0.00	0.10	0.38	0.16	0.29	0.33	0.00
Avail Cap(c_a), veh/h	398	0	626	596	0	0	488	1269	1078	516	2364	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	0.93	0.93	0.93	1.00	1.00	0.00
Uniform Delay (d), s/veh	41.3	0.0	35.2	31.8	0.0	0.0	8.9	7.1	5.9	11.2	6.8	0.0
Incr Delay (d2), s/veh	5.0	0.0	2.3	0.5	0.0	0.0	0.4	0.8	0.3	1.5	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	0.0	8.1	3.2	0.0	0.0	0.7	6.0	1.8	2.4	4.5	0.0
LnGrp Delay(d),s/veh	46.3	0.0	37.5	32.2	0.0	0.0	9.3	7.9	6.2	12.6	7.2	0.0
LnGrp LOS	D		D	C			A	A	A	B	A	
Approach Vol, veh/h		511			136			703			927	
Approach Delay, s/veh		41.0			32.2			7.6			8.1	
Approach LOS		D			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		69.8		30.2		69.8		30.2
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		56.5		34.5		56.5		34.5
Max Q Clear Time (g_c+I1), s		13.2		25.6		22.2		18.9
Green Ext Time (p_c), s		15.4		2.4		14.2		3.1

Intersection Summary	
HCM 2010 Ctrl Delay	16.8
HCM 2010 LOS	B

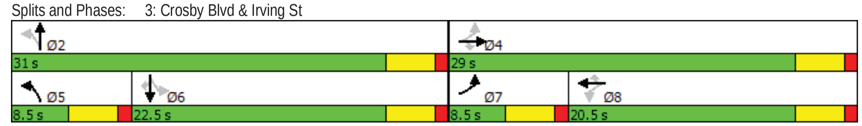
Lanes, Volumes, Timings
3: Crosby Blvd & Irving St

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	25	25	30	40	185	25	340	25	160	485	100
Future Volume (vph)	75	25	25	30	40	185	25	340	25	160	485	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		200	0		150	200		0	0		250
Storage Lanes	0		1	0		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			2725			1710			645	
Travel Time (s)		10.6			61.9			38.9			14.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	8%	8%	8%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm
Protected Phases	7	4			8		5	2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	5	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.5	20.5	20.5	20.5	20.5	20.5	8.5	20.5		20.5	20.5	20.5
Total Split (s)	8.5	29.0	29.0	20.5	20.5	20.5	8.5	31.0		22.5	22.5	22.5
Total Split (%)	14.2%	48.3%	48.3%	34.2%	34.2%	34.2%	14.2%	51.7%		37.5%	37.5%	37.5%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lead/Lag	Lead			Lag	Lag	Lag	Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes			Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	Max		Max	Max	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 47.6	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: Crosby Blvd & Irving St



HCM 2010 Signalized Intersection Summary
3: Crosby Blvd & Irving St

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	25	25	30	40	185	25	340	25	160	485	100
Future Volume (veh/h)	75	25	25	30	40	185	25	340	25	160	485	100
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1759	1759	1900	1881	1881	1881	1881	1900	1863	1863	1863
Adj Flow Rate, veh/h	84	28	28	34	45	208	28	382	28	180	545	0
Adj No. of Lanes	0	1	1	0	1	1	1	1	0	1	1	1
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	8	8	8	1	1	1	1	1	1	2	2	2
Cap, veh/h	146	28	291	193	204	311	431	1041	76	623	880	748
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.03	0.60	0.60	0.47	0.47	0.00
Sat Flow, veh/h	15	142	1495	392	1047	1599	1792	1732	127	972	1863	1583
Grp Volume(v), veh/h	112	0	28	79	0	208	28	0	410	180	545	0
Grp Sat Flow(s),veh/h/ln	156	0	1495	1439	0	1599	1792	0	1859	972	1863	1583
Q Serve(g_s), s	3.7	0.0	0.7	0.1	0.0	5.3	0.3	0.0	5.0	5.3	9.6	0.0
Cycle Q Clear(g_c), s	3.7	0.0	0.7	3.8	0.0	5.3	0.3	0.0	5.0	5.3	9.6	0.0
Prop In Lane	0.75		1.00	0.43		1.00	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	0	0	291	397	0	311	431	0	1117	623	880	748
V/C Ratio(X)	0.00	0.00	0.10	0.20	0.00	0.67	0.06	0.00	0.37	0.29	0.62	0.00
Avail Cap(c_a), veh/h	0	0	831	668	0	580	546	0	1117	623	880	748
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	14.6	14.9	0.0	16.4	6.2	0.0	4.5	7.5	8.7	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.2	0.0	2.5	0.1	0.0	0.9	1.2	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	0.8	0.0	2.5	0.2	0.0	2.8	1.6	5.6	0.0
LnGrp Delay(d),s/veh	0.0	0.0	14.7	15.2	0.0	18.9	6.3	0.0	5.4	8.7	11.9	0.0
LnGrp LOS			B	B		B	A		A	A	B	
Approach Vol, veh/h		140			287			438			725	
Approach Delay, s/veh		2.9			17.9			5.5			11.1	
Approach LOS		A			B			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		8
Phs Duration (G+Y+Rc), s		31.0		13.1	5.7	25.3		13.1
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		26.5		24.5	4.0	18.0		16.0
Max Q Clear Time (g_c+I1), s		7.0		5.7	2.3	11.6		7.3
Green Ext Time (p_c), s		7.3		1.9	0.0	3.6		1.3

Intersection Summary	
HCM 2010 Ctrl Delay	10.1
HCM 2010 LOS	B

HCM 2010 AWSC
4: Irving St & 7th Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	5	15	175	0	1	20	1	0	185	5	1
Future Vol, veh/h	0	5	15	175	0	1	20	1	0	185	5	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1	2	0	0	0	2	1	1	1
Mvmt Flow	0	5	16	190	0	1	22	1	0	201	5	1
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.1	7.8	9.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	97%	3%	5%	0%
Vol Thru, %	3%	8%	91%	50%
Vol Right, %	1%	90%	5%	50%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	191	195	22	10
LT Vol	185	5	1	0
Through Vol	5	15	20	5
RT Vol	1	175	1	5
Lane Flow Rate	208	212	24	11
Geometry Grp	1	1	1	1
Degree of Util (X)	0.261	0.232	0.031	0.013
Departure Headway (Hd)	4.631	3.943	4.629	4.335
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	781	916	776	826
Service Time	2.631	1.945	2.638	2.357
HCM Lane V/C Ratio	0.266	0.231	0.031	0.013
HCM Control Delay	9.3	8.1	7.8	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.9	0.1	0

HCM 2010 AWSC
4: Irving St & 7th Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	0	5	5
Future Vol, veh/h	0	0	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0
Mvmt Flow	0	0	5	5
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.4
HCM LOS	A

Lane

HCM 2010 TWSC
5: Crosby Blvd & Barnes Rd

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	6.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	10	1	0	10	5	215	1	110	5	265	155	20
Future Vol, veh/h	10	1	0	10	5	215	1	110	5	265	155	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	175	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	10	10	10	2	2	2	4	4	4	2	2	2
Mvmt Flow	11	1	0	11	5	236	1	121	5	291	170	22

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	893	893	181	890	901	124	192	0	0	126	0	0
Stage 1	764	764	-	126	126	-	-	-	-	-	-	-
Stage 2	129	129	-	764	775	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.12	6.52	6.22	4.14	-	-	4.12	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.518	4.018	3.318	2.236	-	-	2.218	-	-
Pot Cap-1 Maneuver	254	273	841	264	278	927	1370	-	-	1460	-	-
Stage 1	384	401	-	878	792	-	-	-	-	-	-	-
Stage 2	856	774	-	396	408	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	157	218	841	223	222	927	1370	-	-	1460	-	-
Mov Cap-2 Maneuver	157	218	-	223	222	-	-	-	-	-	-	-
Stage 1	384	321	-	877	791	-	-	-	-	-	-	-
Stage 2	633	773	-	316	327	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	29.2	11	0.1	4.9
HCM LOS	D	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1370	-	-	161	223	927	1460	-	-
HCM Lane V/C Ratio	0.001	-	-	0.075	0.074	0.255	0.199	-	-
HCM Control Delay (s)	7.6	0	-	29.2	22.4	10.2	8.1	-	-
HCM Lane LOS	A	A	-	D	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.2	1	0.7	-	-

6: Black Lake Belmore Rd & Black Lake Blvd

Intersection	
Int Delay, s/veh	23

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Traffic Vol, veh/h	175	75	165	330	190	135
Future Vol, veh/h	175	75	165	330	190	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	3	3	0	0	1	1
Mvmt Flow	186	80	176	351	202	144

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	266	0	928	226
Stage 1	-	-	-	-	226	-
Stage 2	-	-	-	-	702	-
Critical Hdwy	-	-	4.1	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.2	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1310	-	299	816
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	493	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1310	-	259	816
Mov Cap-2 Maneuver	-	-	-	-	259	-
Stage 1	-	-	-	-	814	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	71.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	361	-	-	1310	-
HCM Lane V/C Ratio	0.958	-	-	0.134	-
HCM Control Delay (s)	71.7	-	-	8.2	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	10.5	-	-	0.5	-

7: RW Johnson Rd & Sapp Rd

Intersection	
Int Delay, s/veh	5.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	15	30	2	10	45	80	1	10	10	95	15	35
Future Vol, veh/h	15	30	2	10	45	80	1	10	10	95	15	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	3	3	3
Mvmt Flow	18	35	2	12	53	94	1	12	12	112	18	41

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	147	0	0	38	0	0	225	243	36	208	197	100
Stage 1	-	-	-	-	-	-	72	72	-	124	124	-
Stage 2	-	-	-	-	-	-	153	171	-	84	73	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.527	4.027	3.327
Pot Cap-1 Maneuver	1429	-	-	1579	-	-	735	662	1042	747	697	953
Stage 1	-	-	-	-	-	-	943	839	-	878	791	-
Stage 2	-	-	-	-	-	-	854	761	-	922	832	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1429	-	-	1579	-	-	678	648	1042	717	682	953
Mov Cap-2 Maneuver	-	-	-	-	-	-	678	648	-	717	682	-
Stage 1	-	-	-	-	-	-	931	828	-	867	785	-
Stage 2	-	-	-	-	-	-	792	755	-	887	821	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	0.5	9.7	11.1
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	792	1429	-	-	1579	-	-	758
HCM Lane V/C Ratio	0.031	0.012	-	-	0.007	-	-	0.225
HCM Control Delay (s)	9.7	7.6	0	-	7.3	0	-	11.1
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.9

8: Sapp Rd & Crosby Blvd

Intersection	
Int Delay, s/veh	6.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	100	15	155	100	15	130
Future Vol, veh/h	100	15	155	100	15	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	-	-	0	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	110	16	170	110	16	143

Major/Minor	Minor1		Major1		Minor2	
Conflicting Flow All	296	225	0	0	225	280
Stage 1	225	-	-	-	0	0
Stage 2	71	-	-	-	225	280
Critical Hdwy	7.11	6.21	-	-	7.1	6.5
Critical Hdwy Stg 1	6.11	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	6.1	5.5
Follow-up Hdwy	3.509	3.309	-	-	3.5	4
Pot Cap-1 Maneuver	658	817	-	-	735	632
Stage 1	780	-	-	-	-	-
Stage 2	-	-	-	-	782	683
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	543	817	-	-	720	632
Mov Cap-2 Maneuver	543	-	-	-	720	632
Stage 1	780	-	-	-	-	-
Stage 2	-	-	-	-	766	683

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	12.2
HCM LOS	B		B

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBLn1	SBLn2
Capacity (veh/h)	-	-	543	817	720	632
HCM Lane V/C Ratio	-	-	0.202	0.02	0.023	0.226
HCM Control Delay (s)	-	-	13.3	9.5	10.1	12.4
HCM Lane LOS	-	-	B	A	B	B
HCM 95th %tile Q(veh)	-	-	0.8	0.1	0.1	0.9

9: Black Lake Belmore Rd & 49th Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2
Total Del/Veh (s)	5.7	7.1	3.3	7.6	8.3	4.7	7.8	8.5	5.6	0.8	1.1	0.7

9: Black Lake Belmore Rd & 49th Ave Performance by movement

Movement	All
Denied Del/Veh (s)	0.2
Total Del/Veh (s)	4.6

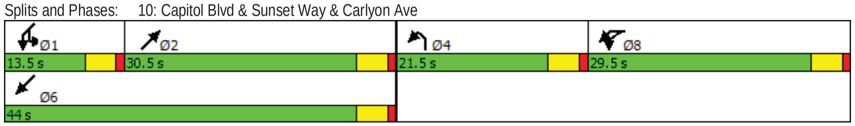
Lanes, Volumes, Timings
10: Capitol Blvd & Sunset Way & Carlyon Ave

Projected 2022 without improvements
PM Peak Hour

Lane Group	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	5	55	40	35	15	2	565	90	15	50	10	995
Future Volume (vph)	5	55	40	35	15	2	565	90	15	50	10	995
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	0	0	0			0			150	
Storage Lanes		1	0	1	0			0			1	
Taper Length (ft)		25		25							25	
Right Turn on Red			Yes			Yes			Yes			
Link Speed (mph)		30		30			30					30
Link Distance (ft)		840		629			731					791
Travel Time (s)		19.1		14.3			16.6					18.0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	Prot		Prot			NA			Prot	Prot	NA
Protected Phases	8	8		4			2			1	1	6
Permitted Phases												
Detector Phase	8	8		4			2			1	1	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0			10.0			6.0	6.0	10.0
Minimum Split (s)	29.5	29.5		21.5			29.5			10.5	10.5	20.0
Total Split (s)	29.5	29.5		21.5			30.5			13.5	13.5	44.0
Total Split (%)	31.1%	31.1%		22.6%			32.1%			14.2%	14.2%	46.3%
Yellow Time (s)	3.5	3.5		3.5			3.5			3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0			1.0			1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0			0.0				0.0	0.0
Total Lost Time (s)		4.5		4.5			4.5				4.5	4.5
Lead/Lag							Lag			Lead	Lead	
Lead-Lag Optimize?							Yes			Yes	Yes	
Recall Mode	None	None		None			Max			None	None	Max

Intersection Summary	
Area Type:	Other
Cycle Length: 95	
Actuated Cycle Length: 62.4	
Natural Cycle: 95	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 10: Capitol Blvd & Sunset Way & Carlyon Ave



HCM Signalized Intersection Capacity Analysis
10: Capitol Blvd & Sunset Way & Carlyon Ave

Projected 2022 without improvements
PM Peak Hour

Movement	WBL2	WBL	WBR	NBL	NBR	NBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	5	55	40	35	15	2	565	90	15	50	10	995
Future Volume (vph)	5	55	40	35	15	2	565	90	15	50	10	995
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.5			4.5				4.5	4.5
Lane Util. Factor		1.00		1.00			0.95				1.00	0.95
Frt		0.95		0.96			0.98				1.00	1.00
Flt Protected		0.97		0.97			1.00				0.95	1.00
Satd. Flow (prot)		1745		1757			3456				1787	3574
Flt Permitted		0.97		0.97			1.00				0.95	1.00
Satd. Flow (perm)		1745		1757			3456				1787	3574
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	6	65	47	41	18	2	665	106	18	59	12	1171
RTOR Reduction (vph)	0	108	0	58	0	0	1	0	0	0	0	0
Lane Group Flow (vph)	0	10	0	3	0	0	788	0	0	0	71	1171
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	1%	1%	1%
Turn Type	Prot	Prot		Prot			NA			Prot	Prot	NA
Protected Phases	8	8		4			2			1	1	6
Permitted Phases												
Actuated Green, G (s)		5.4		3.4			32.9				6.5	43.9
Effective Green, g (s)		5.4		3.4			32.9				6.5	43.9
Actuated g/C Ratio		0.08		0.05			0.50				0.10	0.66
Clearance Time (s)		4.5		4.5			4.5				4.5	4.5
Vehicle Extension (s)		3.0		3.0			3.0				3.0	3.0
Lane Grp Cap (vph)		142		90			1717				175	2370
v/s Ratio Prot		c0.01		c0.00			0.23				0.04	c0.33
v/s Ratio Perm												
v/c Ratio		0.07		0.03			0.46				0.41	0.49
Uniform Delay, d1		28.1		29.8			10.8				28.0	5.6
Progression Factor		1.00		1.00			1.00				1.00	1.00
Incremental Delay, d2		0.2		0.2			0.9				1.5	0.7
Delay (s)		28.3		30.0			11.7				29.6	6.3
Level of Service		C		C			B				C	A
Approach Delay (s)		28.3		30.0			11.7					7.7
Approach LOS		C		C			B					A

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Item 8.

11: Deschutes Way & I-5 NB On-Ramp

Intersection	
Int Delay, s/veh	1.7

Movement	SEL	SET	NWT	NWR	SWL	SWR
Traffic Vol, veh/h	160	325	245	140	0	0
Future Vol, veh/h	160	325	245	140	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	203	411	310	177	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	487	0	-	0	1215	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	816	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1086	-	-	-	202	655
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	438	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1086	-	-	-	153	655
Mov Cap-2 Maneuver	-	-	-	-	153	-
Stage 1	-	-	-	-	682	-
Stage 2	-	-	-	-	332	-

Approach	SE	NW	SW
HCM Control Delay, s	3	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1086	-	-
HCM Lane V/C Ratio	-	-	0.186	-	-
HCM Control Delay (s)	-	-	9.1	0	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.7	-	-

12: Deschutes Way & US 101 WB On-Ramp

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Traffic Vol, veh/h	0	0	450	400	285	20
Future Vol, veh/h	0	0	450	400	285	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	1	0	0
Mvmt Flow	0	0	489	435	310	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1734	-	332	0	-	0
Stage 1	321	-	-	-	-	-
Stage 2	1413	-	-	-	-	-
Critical Hdwy	6.4	-	4.11	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	-	2.209	-	-	-
Pot Cap-1 Maneuver	98	0	1233	-	-	-
Stage 1	740	0	-	-	-	-
Stage 2	227	0	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	59	-	1233	-	-	-
Mov Cap-2 Maneuver	59	-	-	-	-	-
Stage 1	740	-	-	-	-	-
Stage 2	137	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	5.2	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1233	-	-	-	-
HCM Lane V/C Ratio	0.397	-	-	-	-
HCM Control Delay (s)	9.8	-	0	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	1.9	-	-	-	-

13: 2nd Ave/US 101/I-5 Off-Ramps Performance by movement

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.0	0.0	0.4	0.4	0.3
Total Del/Veh (s)	0.7	1.0	1.0	24.0	10.0	16.7

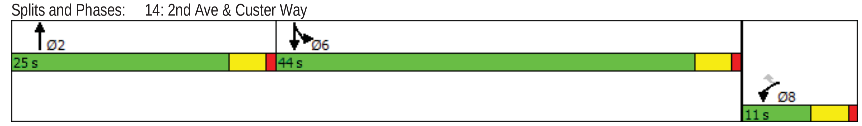
14: 2nd Ave & Custer Way

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	175	180	20	210	840	255
Future Volume (vph)	175	180	20	210	840	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	225		0	0	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	30		30			30
Link Distance (ft)	662		2035			505
Travel Time (s)	15.0		46.3			11.5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	NA		Split	NA
Protected Phases	8		2		6	6
Permitted Phases		8				
Detector Phase	8	8	2		6	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	10.0	10.0	24.5		20.0	20.0
Total Split (s)	11.0	11.0	25.0		44.0	44.0
Total Split (%)	13.8%	13.8%	31.3%		55.0%	55.0%
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None		Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 66.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 14: 2nd Ave & Custer Way



HCM 2010 Signalized Intersection Summary
14: 2nd Ave & Custer Way

Projected 2022 without improvements
PM Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	175	180	20	210	840	255
Future Volume (veh/h)	175	180	20	210	840	255
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900
Adj Flow Rate, veh/h	199	40	23	74	955	290
Adj No. of Lanes	1	1	1	0	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	0	0
Cap, veh/h	181	161	30	96	1110	1165
Arrive On Green	0.10	0.10	0.08	0.08	0.61	0.61
Sat Flow, veh/h	1792	1599	393	1265	1810	1900
Grp Volume(v), veh/h	199	40	0	97	955	290
Grp Sat Flow(s),veh/h/ln	1792	1599	0	1658	1810	1900
Q Serve(g_s), s	6.5	1.5	0.0	3.7	27.8	4.5
Cycle Q Clear(g_c), s	6.5	1.5	0.0	3.7	27.8	4.5
Prop In Lane	1.00	1.00		0.76	1.00	
Lane Grp Cap(c), veh/h	181	161	0	126	1110	1165
V/C Ratio(X)	1.10	0.25	0.00	0.77	0.86	0.25
Avail Cap(c_a), veh/h	181	161	0	528	1110	1165
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.9	26.7	0.0	29.2	10.2	5.7
Incr Delay (d2), s/veh	96.4	0.3	0.0	3.7	8.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	0.7	0.0	1.8	16.2	2.5
LnGrp Delay(d),s/veh	125.3	27.0	0.0	32.9	19.0	6.2
LnGrp LOS	F	C		C	B	A
Approach Vol, veh/h	239		97			1245
Approach Delay, s/veh	108.9		32.9			16.0
Approach LOS	F		C			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		9.4				44.0		11.0
Change Period (Y+Rc), s		4.5				4.5		4.5
Max Green Setting (Gmax), s		20.5				39.5		6.5
Max Q Clear Time (g_c+I1), s		5.7				29.8		8.5
Green Ext Time (p_c), s		0.3				4.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	31.1
HCM 2010 LOS	C

HCM 2010 TWSC
15: Boston St & Custer Way

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	0	785	175	380	335	5	0	1	165	0	1	5
Future Vol, veh/h	0	785	175	380	335	5	0	1	165	0	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	425	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	826	184	400	353	5	0	1	174	0	1	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	358	0	0	1011	0	0	-	2076	505	1569	2166	355
Stage 1	-	-	-	-	-	-	-	918	-	1155	1155	-
Stage 2	-	-	-	-	-	-	-	1158	-	414	1011	-
Critical Hdwy	4.115	-	-	4.115	-	-	-	6.5	6.9	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	-	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1205	-	-	689	-	-	0	54	518	83	48	693
Stage 1	-	-	-	-	-	-	0	353	-	242	274	-
Stage 2	-	-	-	-	-	-	0	273	-	592	320	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1205	-	-	689	-	-	-	23	518	29	20	693
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	23	-	29	20	-
Stage 1	-	-	-	-	-	-	-	353	-	242	115	-
Stage 2	-	-	-	-	-	-	-	115	-	392	320	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	9.1	17.6	41.5
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	459	1205	-	-	689	-	-	105
HCM Lane V/C Ratio	0.381	-	-	-	0.581	-	-	0.06
HCM Control Delay (s)	17.6	0	-	-	17.2	-	-	41.5
HCM Lane LOS	C	A	-	-	C	-	-	E
HCM 95th %tile Q(veh)	1.8	0	-	-	3.8	-	-	0.2

Item 8.

HCM 2010 AWSC
16: Deschutes Way & Boston St

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	41.2
Intersection LOS	E

Movement	WBU	WBL	WBR	NBU	NBT	NBR	SBU	SBL	SBT
Traffic Vol, veh/h	0	115	410	0	400	75	0	110	200
Future Vol, veh/h	0	115	410	0	400	75	0	110	200
Peak Hour Factor	0.92	0.93	0.93	0.92	0.93	0.93	0.92	0.93	0.93
Heavy Vehicles, %	2	1	1	2	0	0	2	0	0
Mvmt Flow	0	124	441	0	430	81	0	118	215
Number of Lanes	0	1	0	0	1	0	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	NB		WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right	SB	WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay	50	44.2	21.5
HCM LOS	E	E	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	22%	35%
Vol Thru, %	84%	0%	65%
Vol Right, %	16%	78%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	475	525	310
LT Vol	0	115	110
Through Vol	400	0	200
RT Vol	75	410	0
Lane Flow Rate	511	565	333
Geometry Grp	1	1	1
Degree of Util (X)	0.908	0.949	0.639
Departure Headway (Hd)	6.401	6.054	6.896
Convergence, Y/N	Yes	Yes	Yes
Cap	567	598	520
Service Time	4.465	4.107	4.969
HCM Lane V/C Ratio	0.901	0.945	0.64
HCM Control Delay	44.2	50	21.5
HCM Lane LOS	E	E	C
HCM 95th-tile Q	10.9	12.7	4.5

HCM 2010 TWSC
17: Capitol Blvd & Cleveland Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	4.1

Movement	NBL	NBR	NET	NER	SWL	SWT
Traffic Vol, veh/h	0	245	460	20	395	720
Future Vol, veh/h	0	245	460	20	395	720
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	0	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	1	1
Mvmt Flow	0	278	523	23	449	818

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	261	0	0	523	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.98	-	-	4.12	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.34	-	-	2.21	-
Pot Cap-1 Maneuver	0	732	-	-	1047	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	732	-	-	1047	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	12.9	0	3.9
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	732	1047	-
HCM Lane V/C Ratio	-	-	0.38	0.429	-
HCM Control Delay (s)	-	-	12.9	11	-
HCM Lane LOS	-	-	B	B	-
HCM 95th %tile Q(veh)	-	-	1.8	2.2	-

Lanes, Volumes, Timings
18: Capitol Blvd & Custer Way

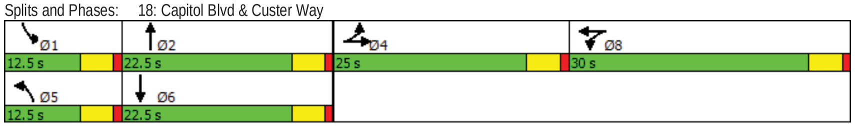
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	705	75	395	495	10	20	415	485	25	530	165
Future Volume (vph)	180	705	75	395	495	10	20	415	485	25	530	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			631			2019			1179	
Travel Time (s)		15.5			14.3			45.9			26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%
Shared Lane Traffic (%)	10%			10%								
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	22.0	22.0		22.0	22.0		12.5	22.0		12.5	22.0	
Total Split (s)	25.0	25.0		30.0	30.0		12.5	22.5		12.5	22.5	
Total Split (%)	27.8%	27.8%		33.3%	33.3%		13.9%	25.0%		13.9%	25.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 82.5
Natural Cycle: 140
Control Type: Actuated-Uncoordinated

Splits and Phases: 18: Capitol Blvd & Custer Way



HCM 2010 Signalized Intersection Summary
18: Capitol Blvd & Custer Way

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	705	75	395	495	10	20	415	485	25	530	165
Future Volume (veh/h)	180	705	75	395	495	10	20	415	485	25	530	165
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1900	1900	1900
Adj Flow Rate, veh/h	200	783	0	439	550	11	22	461	256	28	589	183
Adj No. of Lanes	1	2	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	0	0	0
Cap, veh/h	419	880	0	535	549	11	68	469	259	82	593	184
Arrive On Green	0.23	0.23	0.00	0.30	0.30	0.30	0.04	0.21	0.21	0.05	0.22	0.22
Sat Flow, veh/h	1792	3762	0	1792	1838	37	1792	2224	1227	1810	2715	842
Grp Volume(v), veh/h	200	783	0	439	0	561	22	370	347	28	391	381
Grp Sat Flow(s),veh/h/ln	1792	1881	0	1792	0	1875	1792	1787	1665	1810	1805	1751
Q Serve(g_s), s	8.2	17.2	0.0	19.4	0.0	25.5	1.0	17.6	17.7	1.3	18.5	18.5
Cycle Q Clear(g_c), s	8.2	17.2	0.0	19.4	0.0	25.5	1.0	17.6	17.7	1.3	18.5	18.5
Prop In Lane	1.00		0.00	1.00		0.02	1.00		0.74	1.00		0.48
Lane Grp Cap(c), veh/h	419	880	0	535	0	560	68	377	351	82	394	382
V/C Ratio(X)	0.48	0.89	0.00	0.82	0.00	1.00	0.32	0.98	0.99	0.34	0.99	1.00
Avail Cap(c_a), veh/h	430	904	0	535	0	560	168	377	351	170	394	382
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.2	31.6	0.0	27.8	0.0	29.9	40.0	33.5	33.6	39.5	33.3	33.3
Incr Delay (d2), s/veh	0.8	10.7	0.0	9.8	0.0	38.4	2.7	41.9	45.4	2.4	43.6	45.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	10.2	0.0	11.1	0.0	19.0	0.6	13.0	12.5	0.7	13.9	13.7
LnGrp Delay(d),s/veh	29.0	42.3	0.0	37.6	0.0	68.3	42.7	75.4	78.9	41.9	76.9	78.4
LnGrp LOS	C	D		D		F	D	E	E	D	E	E
Approach Vol, veh/h		983			1000			739			800	
Approach Delay, s/veh		39.6			54.8			76.1			76.4	
Approach LOS		D			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.4	22.5		24.5	7.8	23.1		30.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	8.0	18.0		20.5	8.0	18.0		25.5
Max Q Clear Time (g_c+I1), s	3.3	19.7		19.2	3.0	20.5		27.5
Green Ext Time (p_c), s	0.0	0.0		0.8	0.0	0.0		0.0

Intersection Summary

HCM 2010 Ctrl Delay	59.9
HCM 2010 LOS	E

Notes

Lanes, Volumes, Timings
19: Cleveland Ave & Custer Way/North St

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	385	700	15	300	70	530	155	15	110	310	115
Future Volume (vph)	55	385	700	15	300	70	530	155	15	110	310	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	200		0	300		0	150		150
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		631			2207			2922			341	
Travel Time (s)		14.3			50.2			66.4			7.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)							50%					
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	Perm
Protected Phases	2	2	8	6	6		8	8		4	4	
Permitted Phases			2									4
Detector Phase	2	2	8	6	6		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	6.0	8.0	6.0	6.0		8.0	8.0		6.0	6.0	6.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0		22.0	22.0		22.0	22.0	22.0
Total Split (s)	24.0	24.0	22.0	22.0	22.0		22.0	22.0		22.0	22.0	22.0
Total Split (%)	26.7%	26.7%	24.4%	24.4%	24.4%		24.4%	24.4%		24.4%	24.4%	24.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	None		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 19: Cleveland Ave & Custer Way/North St

Ø2	Ø6	Ø4	Ø8
24 s	22 s	22 s	22 s

HCM 2010 Signalized Intersection Summary
19: Cleveland Ave & Custer Way/North St

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	385	700	15	300	70	530	155	15	110	310	115
Future Volume (veh/h)	55	385	700	15	300	70	530	155	15	110	310	115
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900	1881	1881	1900	1863	1863	1863
Adj Flow Rate, veh/h	59	414	645	16	323	75	570	167	16	118	333	33
Adj No. of Lanes	1	1	1	1	1	0	2	1	0	1	1	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	2	2	2
Cap, veh/h	381	400	632	341	281	65	653	308	30	338	355	302
Arrive On Green	0.21	0.21	0.21	0.19	0.19	0.19	0.18	0.18	0.18	0.19	0.19	0.19
Sat Flow, veh/h	1792	1881	1599	1792	1478	343	3583	1691	162	1774	1863	1583
Grp Volume(v), veh/h	59	414	645	16	0	398	570	0	183	118	333	33
Grp Sat Flow(s),veh/h/ln	1792	1881	1599	1792	0	1821	1792	0	1853	1774	1863	1583
Q Serve(g_s), s	2.4	19.0	19.0	0.7	0.0	17.0	13.8	0.0	8.0	5.1	15.7	1.5
Cycle Q Clear(g_c), s	2.4	19.0	19.0	0.7	0.0	17.0	13.8	0.0	8.0	5.1	15.7	1.5
Prop In Lane	1.00		1.00	1.00		0.19	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	381	400	632	341	0	347	653	0	338	338	355	302
V/C Ratio(X)	0.15	1.03	1.02	0.05	0.00	1.15	0.87	0.00	0.54	0.35	0.94	0.11
Avail Cap(c_a), veh/h	381	400	632	341	0	347	682	0	353	338	355	302
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.6	35.1	22.1	29.5	0.0	36.1	35.5	0.0	33.1	31.3	35.6	29.9
Incr Delay (d2), s/veh	0.2	54.0	41.2	0.1	0.0	94.9	11.6	0.0	1.5	0.5	32.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	15.8	22.7	0.3	0.0	17.6	7.9	0.0	4.2	2.6	11.2	0.7
LnGrp Delay(d),s/veh	28.8	89.2	63.3	29.6	0.0	131.0	47.1	0.0	34.7	31.8	67.8	30.0
LnGrp LOS	C	F	F	C		F	D		C	C	E	C
Approach Vol, veh/h		1118			414			753			484	
Approach Delay, s/veh		71.0			127.1			44.1			56.5	
Approach LOS		E			F			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		24.0		22.0		22.0		21.3
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0
Max Green Setting (Gmax), s		19.0		17.0		17.0		17.0
Max Q Clear Time (g_c+I1), s		21.0		17.7		19.0		15.8
Green Ext Time (p_c), s		0.0		0.0		0.0		0.5

Intersection Summary

HCM 2010 Ctrl Delay	69.5
HCM 2010 LOS	E

Notes

Item 8.

20: Hoadly St & North St

Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	45	330	0	10	455	50	0	2	10	25	1	15
Future Vol, veh/h	45	330	0	10	455	50	0	2	10	25	1	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	52	379	0	11	523	57	0	2	11	29	1	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	580	0	0	379	0	0	1067	1086	379	1065	1058	552
Stage 1	-	-	-	-	-	-	483	483	-	575	575	-
Stage 2	-	-	-	-	-	-	584	603	-	490	483	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	999	-	-	1185	-	-	202	218	672	202	227	537
Stage 1	-	-	-	-	-	-	569	556	-	507	506	-
Stage 2	-	-	-	-	-	-	501	492	-	564	556	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	999	-	-	1185	-	-	183	201	672	185	209	537
Mov Cap-2 Maneuver	-	-	-	-	-	-	183	201	-	185	209	-
Stage 1	-	-	-	-	-	-	531	519	-	474	499	-
Stage 2	-	-	-	-	-	-	477	485	-	515	519	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0.2	12.7	23.3
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	483	999	-	-	1185	-	-	244
HCM Lane V/C Ratio	0.029	0.052	-	-	0.01	-	-	0.193
HCM Control Delay (s)	12.7	8.8	0	-	8.1	0	-	23.3
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	0.7

21: I-5 NB Off-Ramp/Deschutes Way & E St Performance by movement

Movement	WBT	WBR	NBT	NBR	SBL	All
Denied Del/Veh (s)	0.0	0.0	0.2	0.2	0.3	0.1
Total Del/Veh (s)	1.4	2.3	25.6	6.2	1.6	4.6

Lanes, Volumes, Timings
22: E St & Capitol Blvd

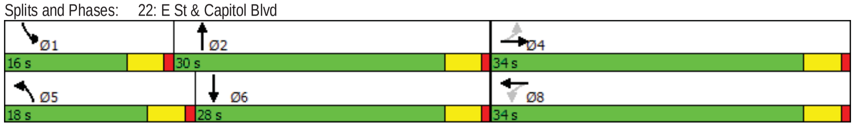
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	95	280	135	100	140	235	550	145	205	760	85
Future Volume (vph)	120	95	280	135	100	140	235	550	145	205	760	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	175		0	150		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		282			479			1902			2019	
Travel Time (s)		6.4			10.9			43.2			45.9	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	8.0		5.0	8.0	
Minimum Split (s)	29.5	29.5		29.5	29.5		9.5	26.5		9.5	26.5	
Total Split (s)	34.0	34.0		34.0	34.0		18.0	30.0		16.0	28.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		22.5%	37.5%		20.0%	35.0%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

Splits and Phases: 22: E St & Capitol Blvd



HCM 2010 Signalized Intersection Summary
22: E St & Capitol Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	120	95	280	135	100	140	235	550	145	205	760	85
Future Volume (veh/h)	120	95	280	135	100	140	235	550	145	205	760	85
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	140	110	0	157	116	163	273	640	169	238	884	99
Adj No. of Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	265	189	0	233	153	191	314	934	246	278	1016	114
Arrive On Green	0.33	0.33	0.00	0.33	0.33	0.33	0.18	0.33	0.33	0.16	0.31	0.31
Sat Flow, veh/h	577	576	0	507	468	582	1792	2800	738	1792	3241	363
Grp Volume(v), veh/h	250	0	0	436	0	0	273	408	401	238	487	496
Grp Sat Flow(s),veh/h/ln	1154	0	0	1557	0	0	1792	1787	1751	1792	1787	1817
Q Serve(g_s), s	0.0	0.0	0.0	5.1	0.0	0.0	10.9	14.5	14.6	9.5	19.0	19.0
Cycle Q Clear(g_c), s	14.1	0.0	0.0	19.2	0.0	0.0	10.9	14.5	14.6	9.5	19.0	19.0
Prop In Lane	0.56		0.00	0.36		0.37	1.00		0.42	1.00		0.20
Lane Grp Cap(c), veh/h	454	0	0	577	0	0	314	596	584	278	560	570
V/C Ratio(X)	0.55	0.00	0.00	0.76	0.00	0.00	0.87	0.68	0.69	0.86	0.87	0.87
Avail Cap(c_a), veh/h	553	0	0	689	0	0	328	619	606	280	570	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.9	0.0	0.0	23.0	0.0	0.0	29.5	21.2	21.2	30.3	23.9	23.9
Incr Delay (d2), s/veh	1.0	0.0	0.0	4.0	0.0	0.0	20.6	3.0	3.1	21.9	13.5	13.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	0.0	0.0	8.9	0.0	0.0	7.2	7.6	7.5	6.4	11.4	11.6
LnGrp Delay(d),s/veh	22.0	0.0	0.0	26.9	0.0	0.0	50.1	24.2	24.3	52.2	37.3	37.2
LnGrp LOS	C			C			D	C	C	D	D	D
Approach Vol, veh/h		250			436			1082			1221	
Approach Delay, s/veh		22.0			26.9			30.8			40.2	
Approach LOS		C			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.9	29.1		28.6	17.4	27.6		28.6
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	11.5	25.5		29.5	13.5	23.5		29.5
Max Q Clear Time (g_c+I1), s	11.5	16.6		16.1	12.9	21.0		21.2
Green Ext Time (p_c), s	0.0	6.6		3.9	0.1	2.1		2.9

Intersection Summary			
HCM 2010 Ctrl Delay			33.3
HCM 2010 LOS			C

Item 8.

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	5	15	630	10	20	930
Future Vol, veh/h	5	15	630	10	20	930
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	6	17	716	11	23	1057

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1296	364	0	0	727	0
Stage 1	722	-	-	-	-	-
Stage 2	574	-	-	-	-	-
Critical Hdwy	6.8	6.9	-	-	4.12	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.21	-
Pot Cap-1 Maneuver	156	639	-	-	879	-
Stage 1	447	-	-	-	-	-
Stage 2	532	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	146	639	-	-	879	-
Mov Cap-2 Maneuver	146	-	-	-	-	-
Stage 1	447	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.1	0	0.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	346	879	-
HCM Lane V/C Ratio	-	-	0.066	0.026	-
HCM Control Delay (s)	-	-	16.1	9.2	0.3
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	20	140	0	1	285	210	0	0	1	145	0	20
Future Vol, veh/h	20	140	0	1	285	210	0	0	1	145	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	1	1	1	0	0	0	1	1	1
Mvmt Flow	22	151	0	1	306	226	0	0	1	156	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	532	0	0	151	0	0	626	728	151	616	616	419
Stage 1	-	-	-	-	-	-	194	194	-	422	422	-
Stage 2	-	-	-	-	-	-	432	534	-	194	194	-
Critical Hdwy	4.13	-	-	4.11	-	-	7.1	6.5	6.2	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.11	5.51	-
Follow-up Hdwy	2.227	-	-	2.209	-	-	3.5	4	3.3	3.509	4.009	3.309
Pot Cap-1 Maneuver	1030	-	-	1436	-	-	400	353	901	404	407	636
Stage 1	-	-	-	-	-	-	812	744	-	611	590	-
Stage 2	-	-	-	-	-	-	606	528	-	810	742	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1030	-	-	1436	-	-	379	345	901	396	397	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	379	345	-	396	397	-
Stage 1	-	-	-	-	-	-	793	727	-	597	589	-
Stage 2	-	-	-	-	-	-	585	527	-	790	725	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	9	20
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	901	1030	-	-	1436	-	-	415
HCM Lane V/C Ratio	0.001	0.021	-	-	0.001	-	-	0.428
HCM Control Delay (s)	9	8.6	0	-	7.5	0	-	20
HCM Lane LOS	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	2.1

HCM 2010 AWSC
25: Linwood Ave & 2nd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	38.2
Intersection LOS	E

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Traffic Vol, veh/h	0	50	155	110	0	135	265	60	0	120	155	90
Future Vol, veh/h	0	50	155	110	0	135	265	60	0	120	155	90
Peak Hour Factor	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	1	1	1	2	1	1	1	2	0	0	0
Mvmt Flow	0	56	174	124	0	152	298	67	0	135	174	101
Number of Lanes	0	1	1	0	0	1	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	2	2	2
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	2	2	2
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	2	2	2
HCM Control Delay	31.3	43.2	25.8
HCM LOS	D	E	D

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	100%	0%	100%	0%
Vol Thru, %	0%	63%	0%	58%	0%	82%	0%	57%
Vol Right, %	0%	37%	0%	42%	0%	18%	0%	43%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	120	245	50	265	135	325	95	340
LT Vol	120	0	50	0	135	0	95	0
Through Vol	0	155	0	155	0	265	0	195
RT Vol	0	90	0	110	0	60	0	145
Lane Flow Rate	135	275	56	298	152	365	107	382
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.367	0.688	0.154	0.749	0.402	0.9	0.283	0.925
Departure Headway (Hd)	9.791	8.999	9.886	9.058	9.531	8.874	9.55	8.717
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	367	402	362	399	378	409	376	416
Service Time	7.568	6.775	7.662	6.833	7.305	6.648	7.321	6.487
HCM Lane V/C Ratio	0.368	0.684	0.155	0.747	0.402	0.892	0.285	0.918
HCM Control Delay	18.2	29.5	14.5	34.5	18.6	53.4	16.1	57.4
HCM Lane LOS	C	D	B	D	C	F	C	F
HCM 95th-tile Q	1.6	5	0.5	6	1.9	9.4	1.1	10.2

HCM 2010 AWSC
25: Linwood Ave & 2nd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Traffic Vol, veh/h	0	95	195	145
Future Vol, veh/h	0	95	195	145
Peak Hour Factor	0.92	0.89	0.89	0.89
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	107	219	163
Number of Lanes	0	1	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	2
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	2
HCM Control Delay	48.4
HCM LOS	E

Lane

Lanes, Volumes, Timings
26: Capitol Blvd & Linwood Ave

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑↑	↑↱	
Traffic Volume (vph)	155	175	165	770	880	280
Future Volume (vph)	155	175	165	770	880	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	489			2664	1902	
Travel Time (s)	11.1			60.5	43.2	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	15.0	15.0	15.0	15.0	
Minimum Split (s)	22.5	19.5	19.5	20.0	21.5	
Total Split (s)	22.6	19.6	19.6	47.4	27.8	
Total Split (%)	32.3%	28.0%	28.0%	67.7%	39.7%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?		Yes	Yes		Yes	
Recall Mode	None	None	None	Max	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 62.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 26: Capitol Blvd & Linwood Ave

HCM 2010 Signalized Intersection Summary
26: Capitol Blvd & Linwood Ave

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑↑	↑↱	
Traffic Volume (veh/h)	155	175	165	770	880	280
Future Volume (veh/h)	155	175	165	770	880	280
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	185	208	196	917	1048	333
Adj No. of Lanes	1	1	1	2	2	0
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	251	607	549	2540	1063	334
Arrive On Green	0.14	0.14	0.24	0.71	0.40	0.40
Sat Flow, veh/h	1792	1599	1792	3668	2771	843
Grp Volume(v), veh/h	185	208	196	917	696	685
Grp Sat Flow(s),veh/h/ln	1792	1599	1792	1787	1787	1732
Q Serve(g_s), s	6.0	5.6	2.5	6.0	23.2	23.8
Cycle Q Clear(g_c), s	6.0	5.6	2.5	6.0	23.2	23.8
Prop In Lane	1.00	1.00	1.00			0.49
Lane Grp Cap(c), veh/h	251	607	549	2540	709	688
V/C Ratio(X)	0.74	0.34	0.36	0.36	0.98	1.00
Avail Cap(c_a), veh/h	537	862	569	2540	709	688
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	13.4	9.3	3.4	18.0	18.1
Incr Delay (d2), s/veh	1.6	0.1	0.1	0.4	29.6	33.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	5.7	1.4	3.1	17.2	17.6
LnGrp Delay(d),s/veh	26.5	13.5	9.4	3.8	47.6	51.4
LnGrp LOS	C	B	A	A	D	D
Approach Vol, veh/h	393			1113	1381	
Approach Delay, s/veh	19.6			4.8	49.5	
Approach LOS	B			A	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		47.4		13.0	18.9	28.5		
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5		
Max Green Setting (Gmax), s		42.9		18.1	15.1	23.3		
Max Q Clear Time (g_c+I1), s		8.0		8.0	4.5	25.8		
Green Ext Time (p_c), s		20.1		0.5	0.2	0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	28.2
HCM 2010 LOS	C

Item 8.

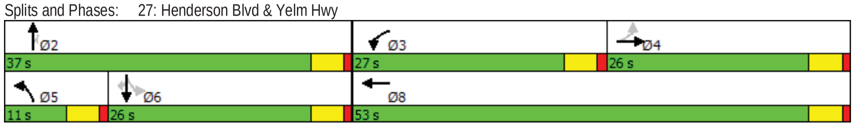
Lanes, Volumes, Timings
27: Henderson Blvd & Yelm Hwy

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	740	170	460	550	80	120	175	665	180	235	25
Future Volume (vph)	10	740	170	460	550	80	120	175	665	180	235	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	450		0	200		100	0		150
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1947			1645			3441			1606	
Travel Time (s)		44.3			37.4			78.2			36.5	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Prot	NA		Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4								2	6		6
Detector Phase	4	4		3	8		5	2	2	6	6	6
Switch Phase												
Minimum Initial (s)	6.0	6.0		5.0	6.0		5.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	24.5	24.5		9.5	24.5		9.5	24.5	24.5	24.5	24.5	24.5
Total Split (s)	26.0	26.0		27.0	53.0		11.0	37.0	37.0	26.0	26.0	26.0
Total Split (%)	28.9%	28.9%		30.0%	58.9%		12.2%	41.1%	41.1%	28.9%	28.9%	28.9%
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes			Yes			Yes	Yes	Yes
Recall Mode	Max	Max		None	Max		None	None	None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 86.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 27: Henderson Blvd & Yelm Hwy



HCM 2010 Signalized Intersection Summary
27: Henderson Blvd & Yelm Hwy

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	740	170	460	550	80	120	175	665	180	235	25
Future Volume (veh/h)	10	740	170	460	550	80	120	175	665	180	235	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	11	813	187	505	604	88	132	192	0	198	258	27
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	273	723	166	469	1769	257	136	622	529	326	381	324
Arrive On Green	0.25	0.25	0.25	0.26	0.56	0.56	0.08	0.33	0.00	0.20	0.20	0.20
Sat Flow, veh/h	756	2887	664	1792	3132	455	1792	1881	1599	1198	1881	1599
Grp Volume(v), veh/h	11	503	497	505	344	348	132	192	0	198	258	27
Grp Sat Flow(s),veh/h/ln	756	1787	1764	1792	1787	1801	1792	1881	1599	1198	1881	1599
Q Serve(g_s), s	1.0	21.5	21.5	22.5	8.9	9.0	6.3	6.5	0.0	13.6	10.9	1.2
Cycle Q Clear(g_c), s	1.0	21.5	21.5	22.5	8.9	9.0	6.3	6.5	0.0	13.6	10.9	1.2
Prop In Lane	1.00		0.38	1.00		0.25	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	273	447	442	469	1009	1017	136	622	529	326	381	324
V/C Ratio(X)	0.04	1.13	1.13	1.08	0.34	0.34	0.97	0.31	0.00	0.61	0.68	0.08
Avail Cap(c_a), veh/h	273	447	442	469	1009	1017	136	712	605	384	471	400
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.5	32.2	32.2	31.7	10.1	10.1	39.6	21.4	0.0	32.7	31.7	27.8
Incr Delay (d2), s/veh	0.3	81.3	81.6	63.5	0.9	0.9	69.0	0.3	0.0	2.0	2.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	20.5	20.3	19.2	4.7	4.7	5.7	3.4	0.0	4.6	6.0	0.5
LnGrp Delay(d),s/veh	24.8	113.5	113.8	95.2	11.0	11.0	108.6	21.7	0.0	34.7	34.5	27.9
LnGrp LOS	C	F	F	F	B	B	F	C		C	C	C
Approach Vol, veh/h		1011			1197			324			483	
Approach Delay, s/veh		112.7			46.5			57.1			34.2	
Approach LOS		F			D			E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6		8
Phs Duration (G+Y+Rc), s		32.9	27.0	26.0	11.0	21.9		53.0
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		32.5	22.5	21.5	6.5	21.5		48.5
Max Q Clear Time (g_c+I1), s		8.5	24.5	23.5	8.3	15.6		11.0
Green Ext Time (p_c), s		3.6	0.0	0.0	0.0	1.8		15.6

Intersection Summary	
HCM 2010 Ctrl Delay	67.9
HCM 2010 LOS	E

HCM 2010 TWSC
28: Trosper Rd & Rural Rd

Projected 2022 without improvements
PM Peak Hour

Intersection						
Int Delay, s/veh	3.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	55	205	330	110	95	100
Future Vol, veh/h	55	205	330	110	95	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	1	1	2	2
Mvmt Flow	60	223	359	120	103	109

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	478	0	-	0	760	418
Stage 1	-	-	-	-	418	-
Stage 2	-	-	-	-	342	-
Critical Hdwy	4.1	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.2	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1095	-	-	-	374	635
Stage 1	-	-	-	-	664	-
Stage 2	-	-	-	-	719	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1095	-	-	-	350	635
Mov Cap-2 Maneuver	-	-	-	-	350	-
Stage 1	-	-	-	-	664	-
Stage 2	-	-	-	-	674	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	15.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1095	-	-	-	350	635
HCM Lane V/C Ratio	0.055	-	-	-	0.295	0.171
HCM Control Delay (s)	8.5	0	-	-	19.5	11.8
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	1.2	0.6

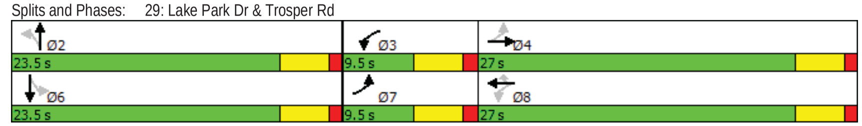
Lanes, Volumes, Timings
29: Lake Park Dr & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	290	45	55	415	75	65	25	60	70	20	15
Future Volume (vph)	10	290	45	55	415	75	65	25	60	70	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	125		150	225		0	100		0	125		0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2012			652			269			583	
Travel Time (s)		45.7			14.8			6.1			13.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phase	7	4		3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	26.5		9.5	26.5	26.5	21.5	21.5		21.5	21.5	
Total Split (s)	9.5	27.0		9.5	27.0	27.0	23.5	23.5		23.5	23.5	
Total Split (%)	15.8%	45.0%		15.8%	45.0%	45.0%	39.2%	39.2%		39.2%	39.2%	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 46	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 29: Lake Park Dr & Trosper Rd



Item 8.

HCM 2010 Signalized Intersection Summary — Projected 2022 without improvements
29: Lake Park Dr & Trosper Rd — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	290	45	55	415	75	65	25	60	70	20	15
Future Volume (veh/h)	10	290	45	55	415	75	65	25	60	70	20	15
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1881	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	11	305	47	58	437	79	68	26	63	74	21	16
Adj No. of Lanes	1	2	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	277	875	133	456	607	516	668	191	463	617	388	296
Arrive On Green	0.01	0.28	0.28	0.06	0.32	0.32	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	1792	3110	474	1792	1881	1599	1393	493	1196	1329	1002	763
Grp Volume(v), veh/h	11	174	178	58	437	79	68	0	89	74	0	37
Grp Sat Flow(s),veh/h/ln	1792	1787	1797	1792	1881	1599	1393	0	1689	1329	0	1765
Q Serve(g_s), s	0.2	3.8	3.9	1.1	10.0	1.7	1.6	0.0	1.7	1.9	0.0	0.6
Cycle Q Clear(g_c), s	0.2	3.8	3.9	1.1	10.0	1.7	2.2	0.0	1.7	3.5	0.0	0.6
Prop In Lane	1.00		0.26	1.00		1.00	1.00		0.71	1.00		0.43
Lane Grp Cap(c), veh/h	277	503	506	456	607	516	668	0	655	617	0	684
V/C Ratio(X)	0.04	0.35	0.35	0.13	0.72	0.15	0.10	0.00	0.14	0.12	0.00	0.05
Avail Cap(c_a), veh/h	435	820	825	539	863	734	668	0	655	617	0	684
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	12.9	14.0	14.1	11.3	14.6	11.8	10.1	0.0	9.7	10.9	0.0	9.4
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.1	1.7	0.1	0.3	0.0	0.4	0.4	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.9	2.0	0.5	5.4	0.8	0.7	0.0	0.8	0.7	0.0	0.3
LnGrp Delay(d),s/veh	13.0	14.4	14.5	11.4	16.3	12.0	10.4	0.0	10.1	11.2	0.0	9.5
LnGrp LOS	B	B	B	B	B	B	B		B	B		A
Approach Vol, veh/h		363			574			157			111	
Approach Delay, s/veh		14.4			15.2			10.2			10.7	
Approach LOS		B			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.5	7.2	18.3		23.5	5.2	20.3
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.0	5.0	22.5		19.0	5.0	22.5
Max Q Clear Time (g_c+I1), s		4.2	3.1	5.9		5.5	2.2	12.0
Green Ext Time (p_c), s		0.9	0.0	4.8		0.9	0.0	3.8

Intersection Summary	
HCM 2010 Ctrl Delay	13.9
HCM 2010 LOS	B

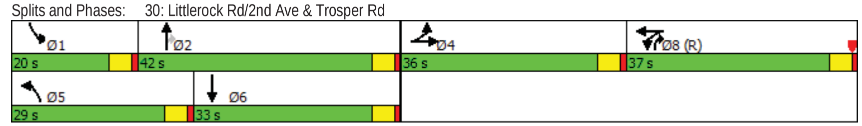
Lanes, Volumes, Timings — Projected 2022 without improvements
30: Littlerock Rd/2nd Ave & Trosper Rd — PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	315	120	395	325	35	215	265	440	115	300	60
Future Volume (vph)	50	315	120	395	325	35	215	265	440	115	300	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		652			520			896			1861	
Travel Time (s)		14.8			11.8			20.4			42.3	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)				37%								
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	36.0	36.0		37.0	37.0		29.0	42.0	37.0	20.0	33.0	
Total Split (%)	26.7%	26.7%		27.4%	27.4%		21.5%	31.1%	27.4%	14.8%	24.4%	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max		C-Max	C-Max		Max	Max	C-Max	None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 46 (34%), Referenced to phase 8:WBTL, Start of Red
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 30: Littlerock Rd/2nd Ave & Trosper Rd



HCM 2010 Signalized Intersection Summary
30: Littlerock Rd/2nd Ave & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	315	120	395	325	35	215	265	440	115	300	60
Future Volume (veh/h)	50	315	120	395	325	35	215	265	440	115	300	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	51	321	61	257	536	36	219	270	332	117	306	61
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	417	699	131	430	837	56	324	587	883	141	627	123
Arrive On Green	0.23	0.23	0.23	0.40	0.40	0.40	0.18	0.31	0.31	0.08	0.21	0.21
Sat Flow, veh/h	1792	3004	564	1792	3487	234	1792	1881	1599	1792	2979	586
Grp Volume(v), veh/h	51	189	193	257	289	283	219	270	332	117	182	185
Grp Sat Flow(s),veh/h/ln	1792	1787	1782	1792	1881	1840	1792	1881	1599	1792	1787	1778
Q Serve(g_s), s	3.0	12.3	12.6	15.3	16.7	16.8	15.4	15.6	15.8	8.7	12.1	12.4
Cycle Q Clear(g_c), s	3.0	12.3	12.6	15.3	16.7	16.8	15.4	15.6	15.8	8.7	12.1	12.4
Prop In Lane	1.00		0.32	1.00		0.13	1.00		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	417	416	414	430	451	442	324	587	883	141	376	374
V/C Ratio(X)	0.12	0.46	0.46	0.60	0.64	0.64	0.68	0.46	0.38	0.83	0.48	0.49
Avail Cap(c_a), veh/h	417	416	414	430	451	442	324	587	883	204	376	374
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	0.97	0.83	0.83	0.83	0.87	0.87	0.87	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.9	44.5	44.6	35.3	35.7	35.8	51.6	37.3	17.1	61.3	46.9	47.0
Incr Delay (d2), s/veh	0.6	3.5	3.6	5.0	5.6	5.8	9.5	2.2	1.1	16.6	4.4	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	6.4	6.6	8.1	9.3	9.2	8.5	8.5	11.0	5.0	6.4	6.5
LnGrp Delay(d),s/veh	41.5	47.9	48.2	40.3	41.4	41.6	61.1	39.5	18.1	77.8	51.3	51.6
LnGrp LOS	D	D	D	D	D	D	E	D	B	E	D	D
Approach Vol, veh/h		433			829			821			484	
Approach Delay, s/veh		47.3			41.1			36.6			57.8	
Approach LOS		D			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.3	46.7		36.0	29.0	33.0		37.0
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6
Max Green Setting (Gmax), s	15.4	37.4		31.4	24.4	28.4		32.4
Max Q Clear Time (g_c+I1), s	10.7	17.8		14.6	17.4	14.4		18.8
Green Ext Time (p_c), s	0.1	4.0		1.8	0.3	3.6		3.7

Intersection Summary		
HCM 2010 Ctrl Delay		43.9
HCM 2010 LOS		D

Notes

Lanes, Volumes, Timings
31: Tyee Dr/I-5 SB Ramps & Trosper Rd

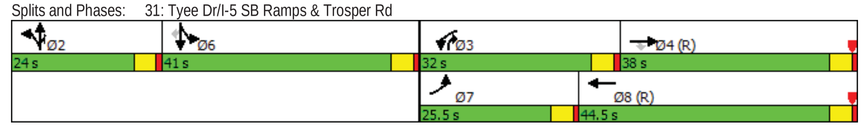
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	640	20	265	340	240	25	190	345	430	330	415
Future Volume (vph)	170	640	20	265	340	240	25	190	345	430	330	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		100	275		0	75		125	400		400
Storage Lanes	1		1	1		0	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		520			883			832			952	
Travel Time (s)		11.8			20.1			18.9			21.6	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	10.0	10.0	4.0	10.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.6	33.6	33.6	8.6	29.6		20.5	20.5		36.6	36.6	36.6
Total Split (s)	25.5	38.0	38.0	32.0	44.5		24.0	24.0		41.0	41.0	41.0
Total Split (%)	18.9%	28.1%	28.1%	23.7%	33.0%		17.8%	17.8%		30.4%	30.4%	30.4%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	4.6
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 46 (34%), Referenced to phase 4:EBT and 8:WBT, Start of Red
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 31: Tyee Dr/I-5 SB Ramps & Trosper Rd



HCM 2010 Signalized Intersection Summary
31: Tyee Dr/I-5 SB Ramps & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	640	20	265	340	240	25	190	345	430	330	415
Future Volume (veh/h)	170	640	20	265	340	240	25	190	345	430	330	415
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1881	1881	1900	1863	1863	1863	1881	1881	1881
Adj Flow Rate, veh/h	179	674	21	279	358	0	26	200	310	453	347	121
Adj No. of Lanes	1	2	1	1	2	0	1	1	1	2	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	2	2	2	1	1	1
Cap, veh/h	202	1006	450	303	1206	0	255	268	495	628	507	431
Arrive On Green	0.23	0.56	0.56	0.28	0.56	0.00	0.14	0.14	0.14	0.27	0.27	0.27
Sat Flow, veh/h	1792	3574	1599	1792	3668	0	1774	1863	1583	2329	1881	1599
Grp Volume(v), veh/h	179	674	21	279	358	0	26	200	310	453	347	121
Grp Sat Flow(s),veh/h/ln	1792	1787	1599	1792	1787	0	1774	1863	1583	1165	1881	1599
Q Serve(g_s), s	13.0	17.9	0.8	20.4	7.1	0.0	1.7	13.9	19.4	23.8	22.3	8.1
Cycle Q Clear(g_c), s	13.0	17.9	0.8	20.4	7.1	0.0	1.7	13.9	19.4	23.8	22.3	8.1
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	202	1006	450	303	1206	0	255	268	495	628	507	431
V/C Ratio(X)	0.88	0.67	0.05	0.92	0.30	0.00	0.10	0.75	0.63	0.72	0.68	0.28
Avail Cap(c_a), veh/h	277	1006	450	364	1206	0	255	268	495	628	507	431
HCM Platoon Ratio	2.00	2.00	2.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.84	0.84	0.84	0.82	0.82	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.4	25.1	21.4	47.6	21.1	0.0	50.2	55.4	39.7	44.7	44.2	39.0
Incr Delay (d2), s/veh	18.6	3.0	0.2	22.5	0.5	0.0	0.8	17.3	5.9	7.0	7.3	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	9.1	0.4	12.0	3.6	0.0	0.9	8.4	10.7	8.3	12.6	3.7
LnGrp Delay(d),s/veh	70.0	28.1	21.5	70.1	21.6	0.0	51.0	72.7	45.5	51.7	51.5	40.6
LnGrp LOS	E	C	C	E	C		D	E	D	D	D	D
Approach Vol, veh/h		874			637			536			921	
Approach Delay, s/veh		36.5			42.9			55.9			50.2	
Approach LOS		D			D			E			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		24.0	27.4	42.6		41.0	19.9	50.1
Change Period (Y+Rc), s		4.6	4.6	4.6		4.6	4.6	4.6
Max Green Setting (Gmax), s		19.4	27.4	33.4		36.4	20.9	39.9
Max Q Clear Time (g_c+I1), s		21.4	22.4	19.9		25.8	15.0	9.1
Green Ext Time (p_c), s		0.0	0.4	5.6		3.9	0.2	7.8

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Lanes, Volumes, Timings
32: I-5 NB Ramps & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (vph)	0	905	545	0	660	615	190	0	85	0	0
Future Volume (vph)	0	905	545	0	660	615	190	0	85	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	0		0		0	200	0	0
Storage Lanes	1		0	0		0		1	1	0	0
Taper Length (ft)	25			25				25		25	
Right Turn on Red			Yes			Yes			Yes		
Link Speed (mph)		30			30			30		30	
Link Distance (ft)		883			397			785		593	
Travel Time (s)		20.1			9.0			17.8		13.5	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%
Shared Lane Traffic (%)											
Turn Type		NA			NA		Prot		Prot		
Protected Phases		4			8		5		5		
Permitted Phases											
Detector Phase		4			8		5		5		
Switch Phase											
Minimum Initial (s)		10.0			10.0		6.0		6.0		
Minimum Split (s)		21.5			21.5		10.6		10.6		
Total Split (s)		96.0			96.0		39.0		39.0		
Total Split (%)		71.1%			71.1%		28.9%		28.9%		
Yellow Time (s)		3.6			3.6		3.6		3.6		
All-Red Time (s)		1.0			1.0		1.0		1.0		
Lost Time Adjust (s)		0.0			0.0		0.0		0.0		
Total Lost Time (s)		4.6			4.6		4.6		4.6		
Lead/Lag											
Lead-Lag Optimize?											
Recall Mode		C-Max			C-Max		None		None		

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 103 (76%), Referenced to phase 4:EBT and 8:WBT, Start of Red
Natural Cycle: 40
Control Type: Actuated-Coordinated

Splits and Phases: 32: I-5 NB Ramps & Trosper Rd

Item 8.

HCM 2010 Signalized Intersection Summary
32: I-5 NB Ramps & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBR	SEL	SER
Lane Configurations											
Traffic Volume (veh/h)	0	905	545	0	660	615	190	0	85	0	0
Future Volume (veh/h)	0	905	545	0	660	615	190	0	85	0	0
Number	7	4	14	3	8	18	5	5	12		
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	0	1881	1900	0	1881	1900	1881	1881	1881		
Adj Flow Rate, veh/h	0	973	0	0	710	0	204	204	0		
Adj No. of Lanes	0	3	0	0	2	0	1	1	1		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93		
Percent Heavy Veh, %	0	1	1	0	1	1	1	1	1		
Cap, veh/h	0	4125	0	0	2871	0	230	230	206		
Arrive On Green	0.00	1.00	0.00	0.00	1.00	0.00	0.13	0.13	0.00		
Sat Flow, veh/h	0	5474	0	0	3762	0	1792	1792	1599		
Grp Volume(v), veh/h	0	973	0	0	710	0	204	204	0		
Grp Sat Flow(s),veh/h/ln	0	1712	0	0	1787	0	1792	1792	1599		
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	15.1	15.1	0.0		
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	15.1	15.1	0.0		
Prop In Lane	0.00		0.00	0.00		0.00	1.00	1.00	1.00		
Lane Grp Cap(c), veh/h	0	4125	0	0	2871	0	230	230	206		
V/C Ratio(X)	0.00	0.24	0.00	0.00	0.25	0.00	0.89	0.89	0.00		
Avail Cap(c_a), veh/h	0	4125	0	0	2871	0	457	457	407		
HCM Platoon Ratio	1.00	2.00	2.00	1.00	2.00	2.00	1.00	1.00	1.00		
Upstream Filter(I)	0.00	0.66	0.00	0.00	0.49	0.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	57.8	57.8	0.0		
Incr Delay (d2), s/veh	0.0	0.1	0.0	0.0	0.1	0.0	4.5	4.5	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	7.8	7.8	0.0		
LnGrp Delay(d),s/veh	0.0	0.1	0.0	0.0	0.1	0.0	62.3	62.3	0.0		
LnGrp LOS		A			A		E	E			
Approach Vol, veh/h		973			710		204	204			
Approach Delay, s/veh		0.1			0.1		62.3	62.3			
Approach LOS		A			A		E	E			

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		22.0		113.0				113.0
Change Period (Y+Rc), s		4.6		4.6				4.6
Max Green Setting (Gmax), s		34.4		91.4				91.4
Max Q Clear Time (g_c+I1), s		17.1		2.0				2.0
Green Ext Time (p_c), s		0.3		15.7				15.7

Intersection Summary		
HCM 2010 Ctrl Delay		6.8
HCM 2010 LOS		A

Lanes, Volumes, Timings
33: Capitol Blvd & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	325	50	600	30	75	35	795	675	10	15	615	395
Future Volume (vph)	325	50	600	30	75	35	795	675	10	15	615	395
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	50		0	250		0	100		200
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		397			338			735			2664	
Travel Time (s)		9.0			7.7			16.7			60.5	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)	43%						39%					
Turn Type	Split	NA	pm+ov	Split	NA		Split	NA		Split	NA	Perm
Protected Phases	4	4	2	8	8		2	2		6	6	
Permitted Phases			4									6
Detector Phase	4	4	2	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	20.6	20.6	29.6	28.6	28.6		29.6	29.6		34.6	34.6	34.6
Total Split (s)	20.6	20.6	51.2	28.6	28.6		51.2	51.2		34.6	34.6	34.6
Total Split (%)	15.3%	15.3%	37.9%	21.2%	21.2%		37.9%	37.9%		25.6%	25.6%	25.6%
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6		3.6	3.6		3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	4.6
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None	C-Min	None	None		C-Min	C-Min		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 6 (4%), Referenced to phase 2:NBTL, Start of Red
Natural Cycle: 145
Control Type: Actuated-Coordinated

Splits and Phases: 33: Capitol Blvd & Trosper Rd

Item 8.

HCM 2010 Signalized Intersection Summary
33: Capitol Blvd & Trosper Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	50	600	30	75	35	795	675	10	15	615	395
Future Volume (veh/h)	325	50	600	30	75	35	795	675	10	15	615	395
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1900	1900	1900	1881	1881	1900	1881	1881	1881
Adj Flow Rate, veh/h	364	0	379	30	76	35	498	1109	10	15	621	0
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	1	1	1
Cap, veh/h	425	0	947	139	95	44	849	1764	16	349	696	311
Arrive On Green	0.04	0.00	0.04	0.08	0.08	0.08	0.79	0.79	0.79	0.19	0.19	0.00
Sat Flow, veh/h	3583	0	1599	1810	1232	568	1792	3723	34	1792	3574	1599
Grp Volume(v), veh/h	364	0	379	30	0	111	498	560	559	15	621	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599	1810	0	1800	1792	1881	1875	1792	1787	1599
Q Serve(g_s), s	13.6	0.0	15.4	2.1	0.0	8.2	14.6	16.7	16.7	0.9	22.9	0.0
Cycle Q Clear(g_c), s	13.6	0.0	15.4	2.1	0.0	8.2	14.6	16.7	16.7	0.9	22.9	0.0
Prop In Lane	1.00		1.00	1.00		0.32	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	425	0	947	139	0	138	849	891	888	349	696	311
V/C Ratio(X)	0.86	0.00	0.40	0.22	0.00	0.80	0.59	0.63	0.63	0.04	0.89	0.00
Avail Cap(c_a), veh/h	425	0	947	322	0	320	849	891	888	398	794	355
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.00	0.92	1.00	0.00	1.00	0.80	0.80	0.80	0.23	0.23	0.00
Uniform Delay (d), s/veh	63.7	0.0	15.7	58.5	0.0	61.3	9.0	9.2	9.2	44.2	53.0	0.0
Incr Delay (d2), s/veh	14.2	0.0	0.1	0.3	0.0	4.0	2.4	2.7	2.7	0.0	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	0.0	14.2	1.1	0.0	4.2	7.4	8.9	8.9	0.5	11.6	0.0
LnGrp Delay(d),s/veh	77.9	0.0	15.8	58.8	0.0	65.3	11.3	11.9	11.9	44.2	55.8	0.0
LnGrp LOS	E		B	E		E	B	B	B	D	E	
Approach Vol, veh/h		743			141			1617			636	
Approach Delay, s/veh		46.2			63.9			11.7			55.5	
Approach LOS		D			E			B			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		68.5		20.6		30.9		15.0
Change Period (Y+Rc), s		4.6		4.6		4.6		4.6
Max Green Setting (Gmax), s		46.6		16.0		30.0		24.0
Max Q Clear Time (g_c+I1), s		18.7		17.4		24.9		10.2
Green Ext Time (p_c), s		6.4		0.0		1.4		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	31.1
HCM 2010 LOS	C

Notes

Lanes, Volumes, Timings
34: Capitol Blvd & Lee St

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	5	45	15	10	80	25	1110	25	55	940	185
Future Volume (vph)	300	5	45	15	10	80	25	1110	25	55	940	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	250		0	200		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		718			814			621			735	
Travel Time (s)		16.3			18.5			14.1			16.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	12.0		6.0	12.0	
Minimum Split (s)	29.0	29.0	29.0	30.0	30.0	30.0	11.0	25.0		11.0	25.0	
Total Split (s)	53.0	53.0	53.0	53.0	53.0	53.0	12.0	67.0		15.0	70.0	
Total Split (%)	39.3%	39.3%	39.3%	39.3%	39.3%	39.3%	8.9%	49.6%		11.1%	51.9%	
Yellow Time (s)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6		3.6	3.6	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	C-Max		None	C-Max	

Intersection Summary

Area Type: Other
Cycle Length: 135
Actuated Cycle Length: 135
Offset: 130 (96%), Referenced to phase 2:NBT and 6:SBT, Start of Red
Natural Cycle: 70
Control Type: Actuated-Coordinated

Splits and Phases: 34: Capitol Blvd & Lee St

Item 8.

HCM Signalized Intersection Capacity Analysis
34: Capitol Blvd & Lee St

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	5	45	15	10	80	25	1110	25	55	940	185
Future Volume (vph)	300	5	45	15	10	80	25	1110	25	55	940	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.95	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1599		1845	1615	1787	3562		1787	3486	
Flt Permitted		0.71	1.00		0.77	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1335	1599		1458	1615	1787	3562		1787	3486	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	323	5	48	16	11	86	27	1194	27	59	1011	199
RTOR Reduction (vph)	0	0	35	0	0	62	0	1	0	0	10	0
Lane Group Flow (vph)	0	328	13	0	27	24	27	1220	0	59	1200	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		37.8	37.8		37.8	37.8	4.1	76.2		7.2	79.3	
Effective Green, g (s)		37.8	37.8		37.8	37.8	4.1	76.2		7.2	79.3	
Actuated g/C Ratio		0.28	0.28		0.28	0.28	0.03	0.56		0.05	0.59	
Clearance Time (s)		4.6	4.6		4.6	4.6	4.6	4.6		4.6	4.6	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	1.5	3.0		1.6	3.0	
Lane Grp Cap (vph)		373	447		408	452	54	2010		95	2047	
v/s Ratio Prot							0.02	c0.34		c0.03	c0.34	
v/s Ratio Perm		c0.25	0.01		0.02	0.01						
v/c Ratio		0.88	0.03		0.07	0.05	0.50	0.61		0.62	0.59	
Uniform Delay, d1		46.4	35.3		35.7	35.5	64.4	19.5		62.6	17.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		0.79	0.96	
Incremental Delay, d2		19.8	0.0		0.0	0.0	2.6	1.4		6.7	0.9	
Delay (s)		66.2	35.3		35.7	35.5	67.1	20.9		56.4	17.7	
Level of Service		E	D		D	D	E	C		E	B	
Approach Delay (s)		62.2			35.6			21.9			19.5	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

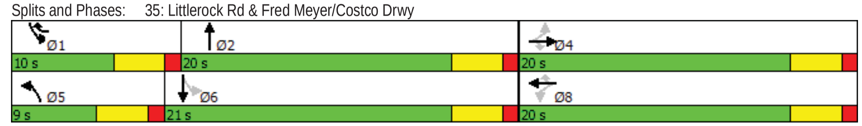
Lanes, Volumes, Timings
35: Littlerock Rd & Fred Meyer/Costco Drwy

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	130	5	115	0	770	100	105	680	0
Future Volume (vph)	0	0	0	130	5	115	0	770	100	105	680	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	175		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		390			426			713			896	
Travel Time (s)		8.9			9.7			16.2			20.4	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type			Perm	Perm	NA	pm+ov	Prot	NA		pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8				6		
Detector Phase	4	4	4	8	8	1	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	9.0	9.0	20.0		9.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	10.0	9.0	20.0		10.0	21.0	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	20.0%	18.0%	40.0%		20.0%	42.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag						Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary	
Area Type:	Other
Cycle Length: 50	
Actuated Cycle Length: 42.1	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 35: Littlerock Rd & Fred Meyer/Costco Drwy



HCM 2010 Signalized Intersection Summary
35: Littlerock Rd & Fred Meyer/Costco Drwy

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	130	5	115	0	770	100	105	680	0
Future Volume (veh/h)	0	0	0	130	5	115	0	770	100	105	680	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1881	1881	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	0	0	137	5	121	0	811	105	111	716	0
Adj No. of Lanes	0	1	1	0	1	1	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	0	285	243	400	8	387	5	1378	178	506	2263	0
Arrive On Green	0.00	0.00	0.00	0.15	0.15	0.15	0.00	0.43	0.43	0.09	0.63	0.00
Sat Flow, veh/h	0	1900	1615	1387	51	1599	1792	3183	412	1792	3668	0
Grp Volume(v), veh/h	0	0	0	142	0	121	0	455	461	111	716	0
Grp Sat Flow(s),veh/h/ln	0	1900	1615	1438	0	1599	1792	1787	1808	1792	1787	0
Q Serve(g_s), s	0.0	0.0	0.0	3.4	0.0	2.3	0.0	7.2	7.2	1.0	3.4	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.4	0.0	2.3	0.0	7.2	7.2	1.0	3.4	0.0
Prop In Lane	0.00		1.00	0.96		1.00	1.00		0.23	1.00		0.00
Lane Grp Cap(c), veh/h	0	285	243	407	0	387	5	774	783	506	2263	0
V/C Ratio(X)	0.00	0.00	0.00	0.35	0.00	0.31	0.00	0.59	0.59	0.22	0.32	0.00
Avail Cap(c_a), veh/h	0	823	699	814	0	840	242	774	783	632	2263	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	14.8	0.0	11.5	0.0	8.0	8.0	4.9	3.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.0	0.2	0.0	3.3	3.2	0.2	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	1.4	0.0	1.0	0.0	4.1	4.2	0.5	1.7	0.0
LnGrp Delay(d),s/veh	0.0	0.0	0.0	15.0	0.0	11.6	0.0	11.2	11.2	5.0	3.5	0.0
LnGrp LOS				B		B		B	B	A	A	
Approach Vol, veh/h		0			263			916			827	
Approach Delay, s/veh		0.0			13.5			11.2			3.7	
Approach LOS					B			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.4	20.0		9.6	0.0	27.4		9.6
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	6.0	16.0		16.0	5.0	17.0		16.0
Max Q Clear Time (g_c+I1), s	3.0	9.2		0.0	0.0	5.4		5.4
Green Ext Time (p_c), s	0.0	4.6		0.0	0.0	6.8		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		8.4
HCM 2010 LOS		A

Lanes, Volumes, Timings
36: Littlerock Rd & Costco Drwy

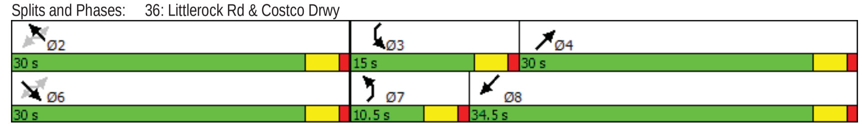
Projected 2022 without improvements
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	80	25	15	130	5	220	50	590	110	220	495	80
Future Volume (vph)	80	25	15	130	5	220	50	590	110	220	495	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		100	150		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		325			608			995			713	
Travel Time (s)		7.4			13.8			22.6			16.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Detector Phase	6	6	6	2	2	2	7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	9.5	30.0		9.5	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	10.5	30.0		15.0	34.5	
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	14.0%	40.0%		20.0%	46.0%	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Max	Max	Max	Max	Max	Max	None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 69.7
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 36: Littlerock Rd & Costco Drwy



HCM Signalized Intersection Capacity Analysis
36: Littlerock Rd & Costco Drwy

Projected 2022 without improvements
PM Peak Hour

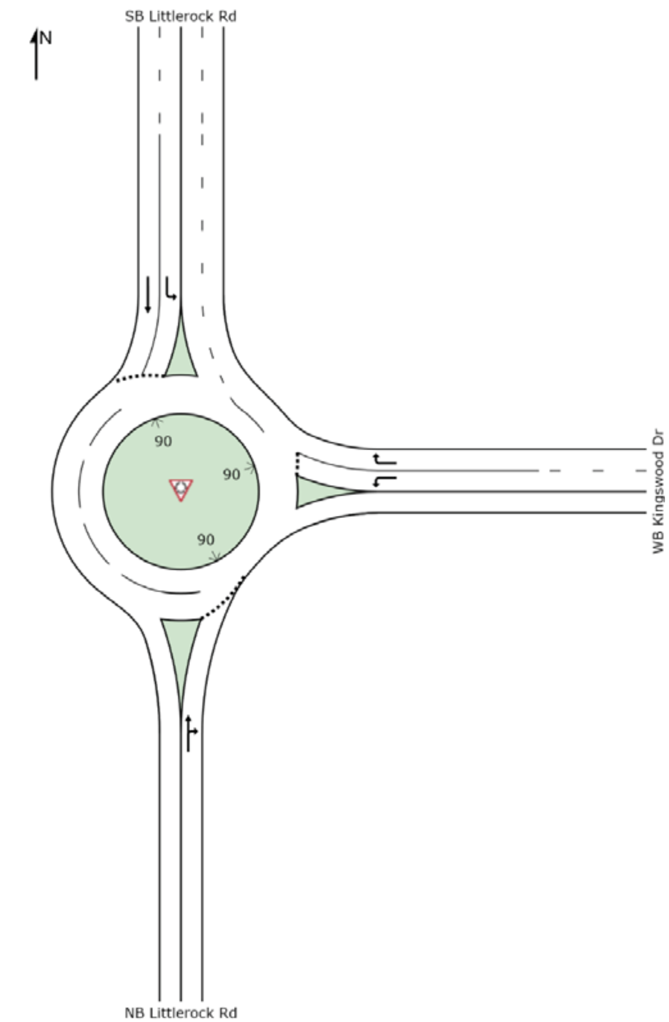
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	80	25	15	130	5	220	50	590	110	220	495	80
Future Volume (vph)	80	25	15	130	5	220	50	590	110	220	495	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1830	1615		1813	1615	1787	3490		1787	3500	
Flt Permitted		0.73	1.00		0.67	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1395	1615		1275	1615	1787	3490		1787	3500	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	26	16	137	5	232	53	621	116	232	521	84
RTOR Reduction (vph)	0	0	10	0	0	147	0	21	0	0	17	0
Lane Group Flow (vph)	0	110	6	0	142	85	53	716	0	232	588	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		6			2		7	4		3	8	
Permitted Phases	6		6	2		2						
Actuated Green, G (s)		26.1	26.1		26.1	26.1	3.7	22.2		11.0	29.5	
Effective Green, g (s)		26.1	26.1		26.1	26.1	3.7	22.2		11.0	29.5	
Actuated g/C Ratio		0.37	0.37		0.37	0.37	0.05	0.31		0.15	0.41	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		510	591		466	591	92	1086		275	1448	
v/s Ratio Prot							0.03	c0.21		c0.13	0.17	
v/s Ratio Perm		0.08	0.00		c0.11	0.05						
v/c Ratio		0.22	0.01		0.30	0.14	0.58	0.66		0.84	0.41	
Uniform Delay, d1		15.6	14.4		16.1	15.1	33.0	21.3		29.3	14.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.0	0.0		1.7	0.5	8.5	1.5		20.4	0.2	
Delay (s)		16.5	14.4		17.8	15.6	41.5	22.7		49.7	14.9	
Level of Service		B	B		B	B	D	C		D	B	
Approach Delay (s)		16.3			16.5			24.0			24.6	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	71.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

SITE LAYOUT

Site: 37) Littlerock Rd at Kingswood Dr

Projected 2022 without improvements
PM Peak Hour
Roundabout



Item 8.

MOVEMENT SUMMARY

Site: 37) Littlerock Rd at Kingswood Dr

Projected 2022 without improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB Littlerock Rd											
8	T1	656	1.0	0.747	5.2	LOS A	9.0	226.0	0.54	0.47	36.0
18	R2	151	1.0	0.747	5.1	LOS A	9.0	226.0	0.54	0.47	35.0
Approach		806	1.0	0.747	5.2	LOS A	9.0	226.0	0.54	0.47	35.8
East: WB Kingswood Dr											
1	L2	215	1.0	0.254	13.3	LOS B	1.7	43.9	0.76	0.81	33.0
16	R2	91	1.0	0.055	4.2	LOS A	0.0	0.0	0.00	0.49	36.5
Approach		306	1.0	0.254	10.6	LOS B	1.7	43.9	0.53	0.71	33.9
North: SB Littlerock Rd											
7	L2	70	1.0	0.092	11.5	LOS B	0.5	12.2	0.47	0.66	33.8
4	T1	667	1.0	0.547	5.5	LOS A	4.9	123.5	0.63	0.55	35.7
Approach		737	1.0	0.547	6.1	LOS A	4.9	123.5	0.61	0.56	35.5
All Vehicles		1849	1.0	0.747	6.4	LOS A	9.0	226.0	0.57	0.55	35.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, June 8, 2016 9:37:03 AM
Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2022 Baseline\Existing 2022 PM.sip6

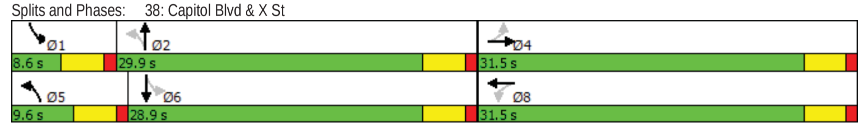
Lanes, Volumes, Timings
38: Capitol Blvd & X St

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	1	15	15	1	20	20	975	15	35	840	40
Future Volume (vph)	25	1	15	15	1	20	20	975	15	35	840	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	150		0	250		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		642			1326			1300			1368	
Travel Time (s)		14.6			30.1			29.5			31.1	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Minimum Split (s)	31.5	31.5		31.5	31.5		9.5	25.5		8.5	26.5	
Total Split (s)	31.5	31.5		31.5	31.5		9.6	29.9		8.6	28.9	
Total Split (%)	45.0%	45.0%		45.0%	45.0%		13.7%	42.7%		12.3%	41.3%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary
Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 46.3
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 38: Capitol Blvd & X St



Item 8.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	1	15	15	1	20	20	975	15	35	840	40
Future Volume (veh/h)	25	1	15	15	1	20	20	975	15	35	840	40
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	28	1	17	17	1	22	22	1096	17	39	944	45
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	269	8	136	273	6	137	448	2063	32	421	2035	97
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.02	0.57	0.57	0.03	0.59	0.59
Sat Flow, veh/h	1410	90	1538	1417	71	1555	1792	3603	56	1792	3474	166
Grp Volume(v), veh/h	28	0	18	17	0	23	22	544	569	39	486	503
Grp Sat Flow(s),veh/h/ln	1410	0	1629	1417	0	1626	1792	1787	1871	1792	1787	1852
Q Serve(g_s), s	0.8	0.0	0.5	0.5	0.0	0.6	0.2	8.3	8.3	0.4	6.9	6.9
Cycle Q Clear(g_c), s	1.4	0.0	0.5	0.9	0.0	0.6	0.2	8.3	8.3	0.4	6.9	6.9
Prop In Lane	1.00		0.94	1.00		0.96	1.00		0.03	1.00		0.09
Lane Grp Cap(c), veh/h	269	0	144	273	0	144	448	1024	1072	421	1047	1085
V/C Ratio(X)	0.10	0.00	0.13	0.06	0.00	0.16	0.05	0.53	0.53	0.09	0.46	0.46
Avail Cap(c_a), veh/h	1003	0	992	1011	0	990	615	1024	1072	525	1047	1085
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.3	0.0	18.6	19.1	0.0	18.7	4.2	5.8	5.8	4.3	5.2	5.2
Incr Delay (d2), s/veh	0.2	0.0	0.4	0.1	0.0	0.5	0.0	2.0	1.9	0.1	1.5	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.2	0.2	0.0	0.3	0.1	4.5	4.7	0.2	3.7	3.8
LnGrp Delay(d),s/veh	19.5	0.0	19.0	19.2	0.0	19.2	4.2	7.8	7.7	4.4	6.7	6.7
LnGrp LOS	B		B	B		B	A	A	A	A	A	A
Approach Vol, veh/h		46			40			1135			1028	
Approach Delay, s/veh		19.3			19.2			7.7			6.6	
Approach LOS		B			B			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	29.9		8.4	5.4	30.5		8.4				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	4.1	25.4		27.0	5.1	24.4		27.0				
Max Q Clear Time (g_c+I1), s	2.4	10.3		3.4	2.2	8.9		2.9				
Green Ext Time (p_c), s	0.0	11.2		0.3	0.0	11.5		0.3				
Intersection Summary												
HCM 2010 Ctrl Delay			7.6									
HCM 2010 LOS			A									

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	10	10	5	5	2	2	65	5	0	45	5
Future Vol, veh/h	5	10	10	5	5	2	2	65	5	0	45	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	2	2	2
Mvmt Flow	7	14	14	7	7	3	3	88	7	0	61	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	165	164	64	175	165	91	68	0	0	95	0	0
Stage 1	64	64	-	97	97	-	-	-	-	-	-	-
Stage 2	101	100	-	78	68	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	804	732	1006	792	731	972	1546	-	-	1499	-	-
Stage 1	952	846	-	914	819	-	-	-	-	-	-	-
Stage 2	910	816	-	936	842	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	795	731	1006	769	730	972	1546	-	-	1499	-	-
Mov Cap-2 Maneuver	795	731	-	769	730	-	-	-	-	-	-	-
Stage 1	950	846	-	912	817	-	-	-	-	-	-	-
Stage 2	898	814	-	909	842	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.5	9.7	0.2	0
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1546	-	-	836	779	1499	-	-
HCM Lane V/C Ratio	0.002	-	-	0.04	0.021	-	-	-
HCM Control Delay (s)	7.3	0	-	9.5	9.7	0	-	-
HCM Lane LOS	A	A	-	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.1	0	-	-

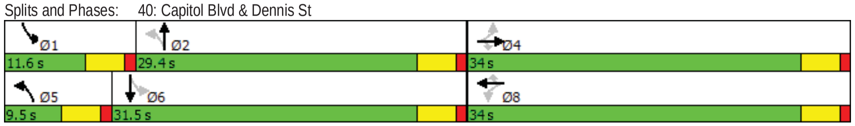
Lanes, Volumes, Timings — Projected 2022 without improvements
40: Capitol Blvd & Dennis St — PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	40	35	30	20	75	15	740	25	50	695	90
Future Volume (vph)	170	40	35	30	20	75	15	740	25	50	695	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		125	0		100	175		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		834			700			1337			1300	
Travel Time (s)		19.0			15.9			30.4			29.5	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	4	4	4	8	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	8.0		7.0	8.0	
Minimum Split (s)	33.5	33.5	33.5	33.5	33.5	33.5	9.5	27.5		11.5	27.5	
Total Split (s)	34.0	34.0	34.0	34.0	34.0	34.0	9.5	29.4		11.6	31.5	
Total Split (%)	45.3%	45.3%	45.3%	45.3%	45.3%	45.3%	12.7%	39.2%		15.5%	42.0%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None	None	None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 59.3
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 40: Capitol Blvd & Dennis St



HCM Signalized Intersection Capacity Analysis — Projected 2022 without improvements
40: Capitol Blvd & Dennis St — PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	40	35	30	20	75	15	740	25	50	695	90
Future Volume (vph)	170	40	35	30	20	75	15	740	25	50	695	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.96	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1808	1599		1845	1615	1787	3557		1787	3513	
Flt Permitted		0.73	1.00		0.76	1.00	0.30	1.00		0.24	1.00	
Satd. Flow (perm)		1372	1599		1453	1615	568	3557		461	3513	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	187	44	38	33	22	82	16	813	27	55	764	99
RTOR Reduction (vph)	0	0	29	0	0	62	0	3	0	0	10	0
Lane Group Flow (vph)	0	231	9	0	55	20	16	837	0	55	853	0
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		15.0	15.0		15.0	15.0	31.3	30.4		37.3	33.4	
Effective Green, g (s)		15.0	15.0		15.0	15.0	31.3	30.4		37.3	33.4	
Actuated g/C Ratio		0.24	0.24		0.24	0.24	0.50	0.48		0.59	0.53	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		327	381		347	385	300	1721		356	1868	
v/s Ratio Prot							0.00	0.24		c0.01	c0.24	
v/s Ratio Perm		c0.17	0.01		0.04	0.01	0.03			0.08		
v/c Ratio		0.71	0.02		0.16	0.05	0.05	0.49		0.15	0.46	
Uniform Delay, d1		21.9	18.3		18.9	18.4	8.0	10.9		6.1	9.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		6.8	0.0		0.2	0.1	0.1	1.0		0.2	0.8	
Delay (s)		28.7	18.3		19.1	18.5	8.1	11.9		6.3	9.9	
Level of Service		C	B		B	B	A	B		A	A	
Approach Delay (s)		27.2			18.7			11.8			9.7	
Approach LOS		C			B			B			A	

Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Item 8.

Lanes, Volumes, Timings
41: Israel Rd & Capitol Blvd

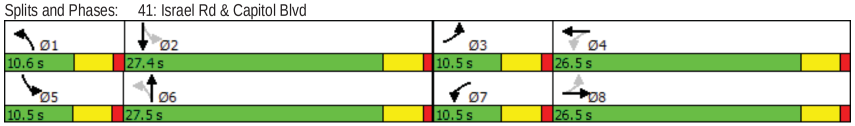
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	160	150	105	215	150	120	335	25	120	575	105
Future Volume (vph)	95	160	150	105	215	150	120	335	25	120	575	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	150		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2751			725			934			1337	
Travel Time (s)		62.5			16.5			21.2			30.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8			4			6			2		
Detector Phase	3	8		7	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	10.5	26.5		10.5	26.5		10.5	26.5		10.5	26.5	
Total Split (s)	10.5	26.5		10.5	26.5		10.6	27.5		10.5	27.4	
Total Split (%)	14.0%	35.3%		14.0%	35.3%		14.1%	36.7%		14.0%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 67.5
Natural Cycle: 75
Control Type: Actuated-Uncoordinated

Splits and Phases: 41: Israel Rd & Capitol Blvd



HCM 2010 Signalized Intersection Summary
41: Israel Rd & Capitol Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	160	150	105	215	150	120	335	25	120	575	105
Future Volume (veh/h)	95	160	150	105	215	150	120	335	25	120	575	105
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1863	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	106	178	100	117	239	167	133	372	28	133	639	117
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	2	2	2	1	1	1	1	1	1
Cap, veh/h	288	313	176	388	281	197	339	1084	81	475	971	177
Arrive On Green	0.07	0.27	0.27	0.08	0.28	0.28	0.08	0.32	0.32	0.08	0.32	0.32
Sat Flow, veh/h	1810	1144	643	1774	1022	714	1792	3371	253	1792	3019	552
Grp Volume(v), veh/h	106	0	278	117	0	406	133	196	204	133	378	378
Grp Sat Flow(s),veh/h/ln	1810	0	1787	1774	0	1737	1792	1787	1837	1792	1787	1784
Q Serve(g_s), s	2.9	0.0	9.6	3.3	0.0	15.8	3.4	6.0	6.0	3.4	13.0	13.1
Cycle Q Clear(g_c), s	2.9	0.0	9.6	3.3	0.0	15.8	3.4	6.0	6.0	3.4	13.0	13.1
Prop In Lane	1.00		0.36	1.00		0.41	1.00		0.14	1.00		0.31
Lane Grp Cap(c), veh/h	288	0	488	388	0	478	339	575	591	475	575	574
V/C Ratio(X)	0.37	0.00	0.57	0.30	0.00	0.85	0.39	0.34	0.34	0.28	0.66	0.66
Avail Cap(c_a), veh/h	306	0	550	402	0	534	353	575	591	486	575	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.1	0.0	22.4	17.0	0.0	24.5	15.4	18.5	18.5	14.2	20.9	20.9
Incr Delay (d2), s/veh	0.9	0.0	1.3	0.5	0.0	11.7	0.9	1.6	1.6	0.4	5.8	5.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	0.0	4.9	1.6	0.0	9.1	1.7	3.2	3.3	1.7	7.3	7.3
LnGrp Delay(d),s/veh	19.1	0.0	23.7	17.5	0.0	36.2	16.3	20.1	20.1	14.6	26.7	26.7
LnGrp LOS	B		C	B		D	B	C	C	B	C	C
Approach Vol, veh/h		384			523			533			889	
Approach Delay, s/veh		22.4			32.0			19.2			24.9	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	27.5	9.8	24.2	10.1	27.5	9.9	24.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	6.1	22.9	6.0	22.0	6.0	23.0	6.0	22.0
Max Q Clear Time (g_c+I1), s	5.4	15.1	4.9	17.8	5.4	8.0	5.3	11.6
Green Ext Time (p_c), s	0.0	4.7	0.0	1.9	0.0	7.4	0.0	3.7

Intersection Summary

HCM 2010 Ctrl Delay	24.8
HCM 2010 LOS	C

Item 8.

42: 66th Ave & Black Lake Belmore Rd

Intersection	
Int Delay, s/veh	4.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	55	85	100	135	85	85
Future Vol, veh/h	55	85	100	135	85	85
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	58	89	105	142	89	89

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	247	0	-	0	381	176
Stage 1	-	-	-	-	176	-
Stage 2	-	-	-	-	205	-
Critical Hdwy	4.11	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.209	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1325	-	-	-	625	872
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	834	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1325	-	-	-	596	872
Mov Cap-2 Maneuver	-	-	-	-	596	-
Stage 1	-	-	-	-	859	-
Stage 2	-	-	-	-	796	-

Approach	EB	WB	SB
HCM Control Delay, s	3.1	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1325	-	-	-	708
HCM Lane V/C Ratio	0.044	-	-	-	0.253
HCM Control Delay (s)	7.8	0	-	-	11.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1

43: Kirsop Rd & 66th Ave

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	25	5	145	5	1	5	240	15	5	5	10	40
Future Vol, veh/h	25	5	145	5	1	5	240	15	5	5	10	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	1	1	1	0	0	0	1	1	1	0	0	0
Mvmt Flow	30	6	173	6	1	6	286	18	6	6	12	48

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	644	643	36	729	663	21	60	0	0	24	0	0
Stage 1	48	48	-	592	592	-	-	-	-	-	-	-
Stage 2	596	595	-	137	71	-	-	-	-	-	-	-
Critical Hdwy	7.11	6.51	6.21	7.1	6.5	6.2	4.11	-	-	4.1	-	-
Critical Hdwy Stg 1	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.11	5.51	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	4.009	3.309	3.5	4	3.3	2.209	-	-	2.2	-	-
Pot Cap-1 Maneuver	387	393	1039	341	384	1062	1550	-	-	1604	-	-
Stage 1	968	857	-	496	497	-	-	-	-	-	-	-
Stage 2	492	494	-	871	840	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	328	318	1039	239	311	1062	1550	-	-	1604	-	-
Mov Cap-2 Maneuver	328	318	-	239	311	-	-	-	-	-	-	-
Stage 1	787	854	-	403	404	-	-	-	-	-	-	-
Stage 2	397	402	-	718	837	-	-	-	-	-	-	-

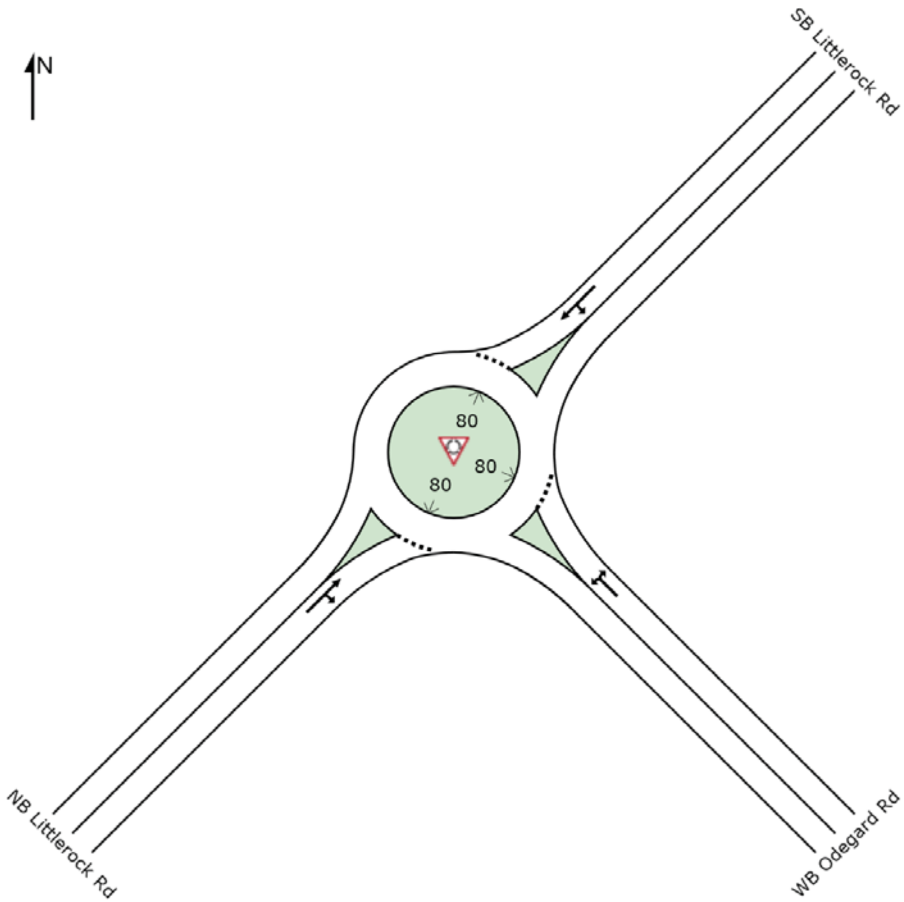
Approach	EB	WB	NB	SB
HCM Control Delay, s	11.6	14.8	7.2	0.7
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1550	-	-	756	381	1604	-	-
HCM Lane V/C Ratio	0.184	-	-	0.276	0.034	0.004	-	-
HCM Control Delay (s)	7.8	0	-	11.6	14.8	7.3	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.7	-	-	1.1	0.1	0	-	-

SITE LAYOUT

Site: 44) Littlerock Rd at Odegard Rd

Projected 2022 without improvements
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 44) Littlerock Rd at Odegard Rd

Projected 2022 without improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: WB Odegard Rd											
3x	L2	16	0.0	0.034	14.9	LOS B	0.2	4.6	0.70	0.73	32.6
18x	R2	5	0.0	0.034	9.5	LOS A	0.2	4.6	0.70	0.73	31.8
Approach		22	0.0	0.034	13.5	LOS B	0.2	4.6	0.70	0.73	32.4
NorthEast: SB Littlerock Rd											
1x	L2	11	1.0	0.677	9.7	LOS A	9.6	242.9	0.26	0.38	36.6
6x	T1	823	1.0	0.677	4.4	LOS A	9.6	242.9	0.26	0.38	36.6
Approach		833	1.0	0.677	4.5	LOS A	9.6	242.9	0.26	0.38	36.6
SouthWest: NB Littlerock Rd											
2x	T1	790	1.0	0.641	4.3	LOS A	7.5	189.4	0.17	0.38	37.0
12x	R2	5	1.0	0.641	4.2	LOS A	7.5	189.4	0.17	0.38	36.0
Approach		796	1.0	0.641	4.3	LOS A	7.5	189.4	0.17	0.38	37.0
All Vehicles		1651	1.0	0.677	4.5	LOS A	9.6	242.9	0.22	0.39	36.7

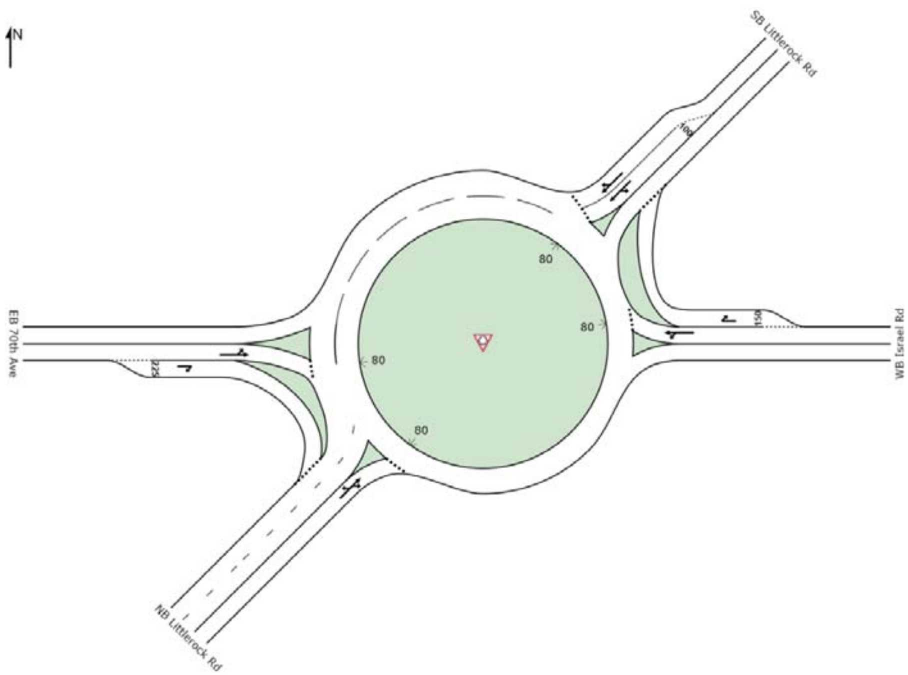
Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Item 8.

SITE LAYOUT

Site: 45) Littlerock Rd at Israel Rd

Projected 2022 without improvements
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 45) Littlerock Rd at Israel Rd

Projected 2022 without improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
East: WB Israel Rd											
1a	L1	137	1.0	0.426	13.0	LOS B	3.3	84.3	0.88	0.87	33.5
6	T1	184	1.0	0.426	8.8	LOS A	3.3	84.3	0.88	0.87	33.8
16b	R3	337	1.0	0.336	6.6	LOS A	2.3	58.8	0.67	0.71	34.8
Approach		658	1.0	0.426	8.5	LOS A	3.3	84.3	0.77	0.79	34.2
NorthEast: SB Littlerock Rd											
1bx	L3	184	1.0	0.493	16.1	LOS B	3.9	98.7	0.82	0.90	33.3
6x	T1	505	1.0	0.493	9.3	LOS A	4.0	101.8	0.82	0.86	34.1
16ax	R1	132	1.0	0.493	8.4	LOS A	4.0	101.8	0.82	0.83	34.5
Approach		821	1.0	0.493	10.7	LOS B	4.0	101.8	0.82	0.87	34.0
West: EB 70th Ave											
5a	L1	116	1.0	0.283	11.2	LOS B	1.4	35.1	0.68	0.80	34.0
2	T1	95	1.0	0.283	7.2	LOS A	1.4	35.1	0.68	0.80	34.4
12b	R3	79	1.0	0.094	6.0	LOS A	0.4	9.9	0.55	0.70	35.1
Approach		289	1.0	0.283	8.5	LOS A	1.4	35.1	0.64	0.77	34.4
SouthWest: NB Littlerock Rd											
5bx	L3	263	1.0	0.757	19.4	LOS B	10.0	253.2	0.92	1.02	31.9
2x	T1	305	1.0	0.757	13.0	LOS B	10.0	253.2	0.92	1.02	31.7
12ax	R1	79	1.0	0.757	12.6	LOS B	10.0	253.2	0.92	1.02	31.5
Approach		647	1.0	0.757	15.5	LOS B	10.0	253.2	0.92	1.02	31.8
All Vehicles		2416	1.0	0.757	11.1	LOS B	10.0	253.2	0.81	0.87	33.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Lanes, Volumes, Timings
46: Linderson Way & Israel Rd

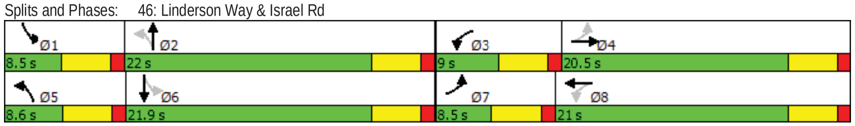
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	210	50	135	305	25	130	105	115	40	90	80
Future Volume (vph)	65	210	50	135	305	25	130	105	115	40	90	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	200		0	150		0	100		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		3505			2751			2073			847	
Travel Time (s)		79.7			62.5			47.1			19.3	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	7	4		3	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	4.0	5.0		4.0	5.0		4.0	6.0		4.0	6.0	
Minimum Split (s)	8.5	20.5		8.5	20.5		8.5	21.5		8.5	21.5	
Total Split (s)	8.5	20.5		9.0	21.0		8.6	22.0		8.5	21.9	
Total Split (%)	14.2%	34.2%		15.0%	35.0%		14.3%	36.7%		14.2%	36.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Max		None	Max	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 53.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 46: Linderson Way & Israel Rd



HCM 2010 Signalized Intersection Summary
46: Linderson Way & Israel Rd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	210	50	135	305	25	130	105	115	40	90	80
Future Volume (veh/h)	65	210	50	135	305	25	130	105	115	40	90	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	68	221	53	142	321	26	137	111	47	42	95	84
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	287	310	74	353	421	34	543	441	187	546	288	254
Arrive On Green	0.05	0.21	0.21	0.08	0.25	0.25	0.07	0.35	0.35	0.03	0.31	0.31
Sat Flow, veh/h	1792	1467	352	1792	1718	139	1792	1256	532	1792	922	815
Grp Volume(v), veh/h	68	0	274	142	0	347	137	0	158	42	0	179
Grp Sat Flow(s),veh/h/ln	1792	0	1819	1792	0	1857	1792	0	1787	1792	0	1737
Q Serve(g_s), s	1.6	0.0	7.8	3.4	0.0	9.7	2.8	0.0	3.5	0.9	0.0	4.4
Cycle Q Clear(g_c), s	1.6	0.0	7.8	3.4	0.0	9.7	2.8	0.0	3.5	0.9	0.0	4.4
Prop In Lane	1.00		0.19	1.00		0.07	1.00		0.30	1.00		0.47
Lane Grp Cap(c), veh/h	287	0	385	353	0	456	543	0	627	546	0	542
V/C Ratio(X)	0.24	0.00	0.71	0.40	0.00	0.76	0.25	0.00	0.25	0.08	0.00	0.33
Avail Cap(c_a), veh/h	332	0	522	353	0	549	543	0	627	613	0	542
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.5	0.0	20.4	15.8	0.0	19.5	11.6	0.0	12.9	12.2	0.0	14.7
Incr Delay (d2), s/veh	0.2	0.0	2.9	0.3	0.0	5.1	0.1	0.0	1.0	0.0	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	4.2	1.7	0.0	5.6	1.4	0.0	1.9	0.4	0.0	2.3
LnGrp Delay(d),s/veh	16.7	0.0	23.3	16.1	0.0	24.6	11.7	0.0	13.9	12.3	0.0	16.4
LnGrp LOS	B		C	B		C	B		B	B		B
Approach Vol, veh/h		342			489			295			221	
Approach Delay, s/veh		22.0			22.2			12.9			15.6	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.4	24.1	9.0	16.3	8.6	21.9	7.1	18.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	4.0	17.5	4.5	16.0	4.1	17.4	4.0	16.5
Max Q Clear Time (g_c+I1), s	2.9	5.5	5.4	9.8	4.8	6.4	3.6	11.7
Green Ext Time (p_c), s	0.0	1.5	0.0	2.0	0.0	1.5	0.0	1.6

Intersection Summary

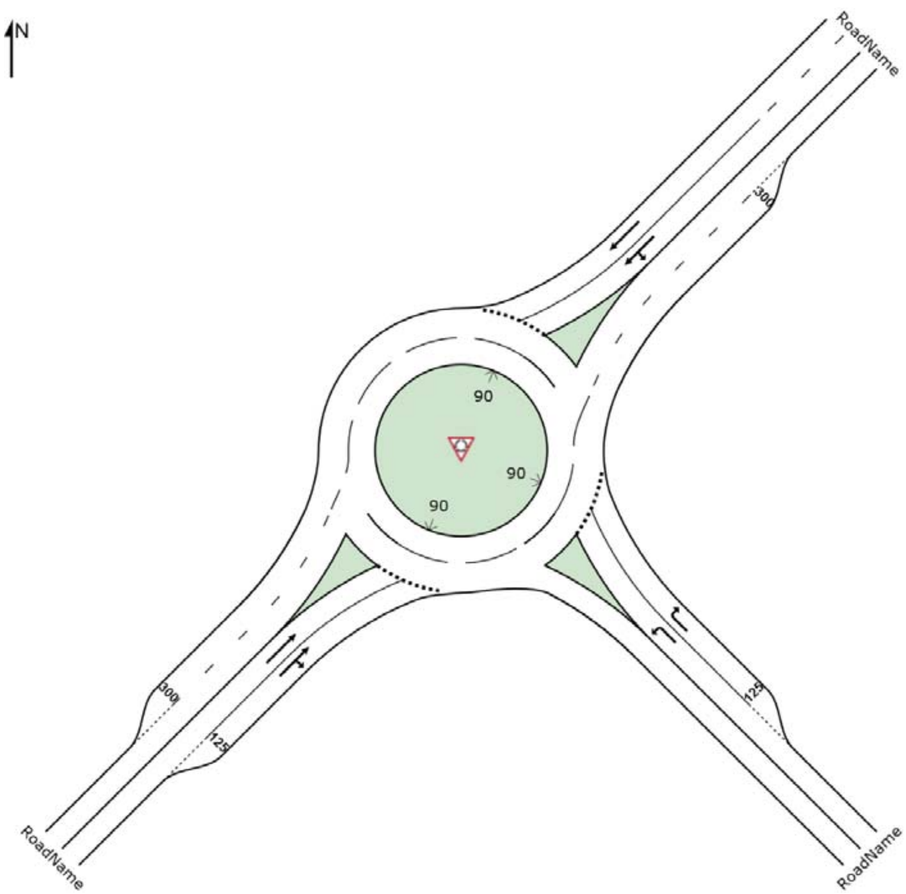
HCM 2010 Ctrl Delay	19.0
HCM 2010 LOS	B

Item 8.

SITE LAYOUT

Site: 47) Littlerock Rd at Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour
Roundabout



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Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2022 Baseline\Existing 2022 PM.sip6

MOVEMENT SUMMARY

Site: 47) Littlerock Rd at Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
SouthEast: RoadName											
3x	L2	314	1.0	0.282	10.7	LOS B	1.5	38.9	0.40	0.66	34.0
18x	R2	340	1.0	0.299	5.1	LOS A	1.7	42.1	0.40	0.55	35.6
Approach		654	1.0	0.299	7.8	LOS A	1.7	42.1	0.40	0.60	34.8
NorthEast: RoadName											
1x	L2	383	1.0	0.491	11.7	LOS B	3.2	80.8	0.58	0.71	34.3
6x	T1	410	1.0	0.491	6.2	LOS A	3.2	80.8	0.54	0.63	35.4
Approach		793	1.0	0.491	8.9	LOS A	3.2	80.8	0.56	0.67	34.8
SouthWest: RoadName											
2x	T1	197	0.0	0.198	5.9	LOS A	1.1	26.5	0.52	0.55	36.0
12x	R2	181	0.0	0.190	6.0	LOS A	1.0	24.9	0.52	0.63	35.3
Approach		378	0.0	0.198	5.9	LOS A	1.1	26.5	0.52	0.59	35.7
All Vehicles		1824	0.8	0.491	7.9	LOS A	3.2	80.8	0.50	0.63	35.0

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: N:\Projects\0625 City of Tumwater\0625.17 Tumwater Transportation Master Plan\Traffic\Operations\sidra\2022 Baseline\Existing 2022 PM.sip6

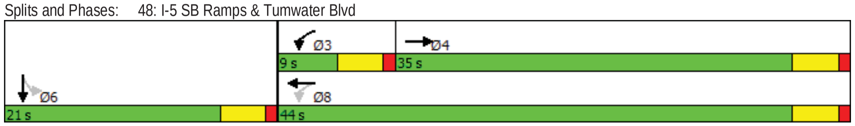
Lanes, Volumes, Timings
48: I-5 SB Ramps & Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	425	105	365	310	0	0	0	0	400	30	310
Future Volume (vph)	0	425	105	365	310	0	0	0	0	400	30	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	350		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1843			807			1457			1571	
Travel Time (s)		41.9			18.3			33.1			35.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)										10%		
Turn Type		NA		pm+pt	NA					Perm	NA	
Protected Phases		4		3	8						6	
Permitted Phases				8						6		
Detector Phase		4		3	8					6	6	
Switch Phase												
Minimum Initial (s)		4.0		4.0	4.0					4.0	4.0	
Minimum Split (s)		20.5		8.5	20.5					20.5	20.5	
Total Split (s)		35.0		9.0	44.0					21.0	21.0	
Total Split (%)		53.8%		13.8%	67.7%					32.3%	32.3%	
Yellow Time (s)		3.5		3.5	3.5					3.5	3.5	
All-Red Time (s)		1.0		1.0	1.0					1.0	1.0	
Lost Time Adjust (s)		0.0			0.0					0.0	0.0	
Total Lost Time (s)		4.5			4.5					4.5	4.5	
Lead/Lag		Lag		Lead								
Lead-Lag Optimize?		Yes		Yes								
Recall Mode		None		None	Max					None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 65	
Actuated Cycle Length: 64.9	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 48: I-5 SB Ramps & Tumwater Blvd



HCM 2010 Signalized Intersection Summary
48: I-5 SB Ramps & Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	425	105	365	310	0	0	0	0	400	30	310
Future Volume (veh/h)	0	425	105	365	310	0	0	0	0	400	30	310
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1881	1900	1900	1881	0				1827	1827	1900
Adj Flow Rate, veh/h	0	452	112	388	330	0				306	200	154
Adj No. of Lanes	0	2	0	0	1	0				1	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94				0.94	0.94	0.94
Percent Heavy Veh, %	0	1	1	1	1	0				4	4	4
Cap, veh/h	0	1759	433	88	7	0				419	231	178
Arrive On Green	0.00	0.62	0.62	0.62	0.62	0.00				0.24	0.24	0.24
Sat Flow, veh/h	0	2939	700	3	11	0				1740	959	738
Grp Volume(v), veh/h	0	283	281	718	0	0				306	0	354
Grp Sat Flow(s),veh/h/ln	0	1787	1758	13	0	0				1740	0	1697
Q Serve(g_s), s	0.0	4.6	4.6	28.2	0.0	0.0				10.3	0.0	12.8
Cycle Q Clear(g_c), s	0.0	4.6	4.6	28.2	0.0	0.0				10.3	0.0	12.8
Prop In Lane	0.00		0.40	0.54		0.00				1.00		0.44
Lane Grp Cap(c), veh/h	0	1105	1086	0	0	0				419	0	409
V/C Ratio(X)	0.00	0.26	0.26	0.00	0.00	0.00				0.73	0.00	0.87
Avail Cap(c_a), veh/h	0	1105	1086	0	0	0				449	0	438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	0.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	5.5	5.5	0.0	0.0	0.0				22.3	0.0	23.3
Incr Delay (d2), s/veh	0.0	0.1	0.1	0.0	0.0	0.0				5.5	0.0	15.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.2	2.2	0.0	0.0	0.0				5.6	0.0	7.8
LnGrp Delay(d),s/veh	0.0	5.7	5.7	0.0	0.0	0.0				27.9	0.0	39.0
LnGrp LOS		A	A							C		D
Approach Vol, veh/h		564			718						660	
Approach Delay, s/veh		5.7			0.0						33.8	
Approach LOS		A			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				44.0		19.9		44.0
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				30.5		16.5		39.5
Max Q Clear Time (g_c+I1), s				6.6		14.8		30.2
Green Ext Time (p_c), s				11.5		0.6		6.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Notes

HCM 2010 TWSC
49: I-5 NB Ramps & Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour

Intersection												
Int Delay, s/veh	19.8											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	195	630	0	0	610	1205	65	5	150	0	0	0
Future Vol, veh/h	195	630	0	0	610	1205	65	5	150	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	150	-	-	-	-	0	-	-	150	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	3	3	3	1	1	1	3	3	3	0	0	0
Mvmt Flow	222	716	0	0	693	1369	74	6	170	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	693	0	-	-	-	0	1852	1852	358
Stage 1	-	-	-	-	-	-	1159	1159	-
Stage 2	-	-	-	-	-	-	693	693	-
Critical Hdwy	4.145	-	-	-	-	-	6.645	6.545	6.945
Critical Hdwy Stg 1	-	-	-	-	-	-	5.845	5.545	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.445	5.545	-
Follow-up Hdwy	2.2285	-	-	-	-	-	3.5285	4.0285	3.3285
Pot Cap-1 Maneuver	895	-	0	0	-	0	~ 72	73	637
Stage 1	-	-	0	0	-	0	260	268	-
Stage 2	-	-	0	0	-	0	493	442	-
Platoon blocked, %		-			-				
Mov Cap-1 Maneuver	895	-	-	-	-	-	~ 54	0	637
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 54	0	-
Stage 1	-	-	-	-	-	-	196	0	-
Stage 2	-	-	-	-	-	-	493	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.4	0	140.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT
Capacity (veh/h)	54	637	895	-	-
HCM Lane V/C Ratio	1.473	0.268	0.248	-	-
HCM Control Delay (s)	$ 413.7	12.7	10.3	-	-
HCM Lane LOS	F	B	B	-	-
HCM 95th %tile Q(veh)	7.3	1.1	1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
50: Center St/Linderson Way & Tumwater Blvd

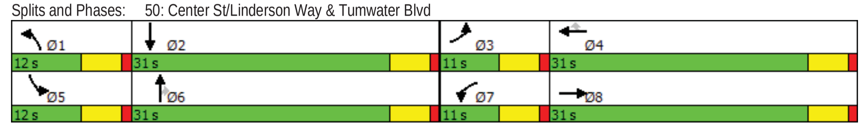
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	595	150	105	755	30	170	105	55	185	185	875
Future Volume (vph)	130	595	150	105	755	30	170	105	55	185	185	875
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	300		0	350		250	250		150	300		700
Storage Lanes	2		0	1		1	1		1	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			1275			1023			2073	
Travel Time (s)		20.3			29.0			23.3			47.1	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Free
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			6			Free
Detector Phase	3	8		7	4	4	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	31.0		11.0	31.0	31.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	11.0	31.0		11.0	31.0	31.0	12.0	31.0	31.0	12.0	31.0	
Total Split (%)	12.9%	36.5%		12.9%	36.5%	36.5%	14.1%	36.5%	36.5%	14.1%	36.5%	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max		None	Max	Max	None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 85
Actuated Cycle Length: 71.8
Natural Cycle: 85
Control Type: Actuated-Uncoordinated

Splits and Phases: 50: Center St/Linderson Way & Tumwater Blvd



HCM 2010 Signalized Intersection Summary
50: Center St/Linderson Way & Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	130	595	150	105	755	30	170	105	55	185	185	875
Future Volume (veh/h)	130	595	150	105	755	30	170	105	55	185	185	875
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1881	1881	1881	1881	1881	1881	1881
Adj Flow Rate, veh/h	138	633	160	112	803	32	181	112	59	197	197	0
Adj No. of Lanes	2	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	1	1	1
Cap, veh/h	277	1055	266	143	1343	601	181	289	245	181	289	245
Arrive On Green	0.08	0.38	0.38	0.08	0.38	0.38	0.10	0.15	0.15	0.10	0.15	0.00
Sat Flow, veh/h	3442	2801	707	1792	3574	1599	1792	1881	1599	1792	1881	1599
Grp Volume(v), veh/h	138	400	393	112	803	32	181	112	59	197	197	0
Grp Sat Flow(s),veh/h/ln	1721	1770	1738	1792	1787	1599	1792	1881	1599	1792	1881	1599
Q Serve(g_s), s	2.7	12.6	12.6	4.2	12.5	0.9	7.0	3.7	2.2	7.0	6.9	0.0
Cycle Q Clear(g_c), s	2.7	12.6	12.6	4.2	12.5	0.9	7.0	3.7	2.2	7.0	6.9	0.0
Prop In Lane	1.00		0.41	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	277	666	654	143	1343	601	181	289	245	181	289	245
V/C Ratio(X)	0.50	0.60	0.60	0.78	0.60	0.05	1.00	0.39	0.24	1.09	0.68	0.00
Avail Cap(c_a), veh/h	298	666	654	155	1343	601	181	707	601	181	707	601
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	30.5	17.4	17.4	31.3	17.4	13.8	31.1	26.4	25.7	31.1	27.7	0.0
Incr Delay (d2), s/veh	1.4	4.0	4.1	21.1	2.0	0.2	66.5	0.9	0.5	92.0	2.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	6.8	6.7	2.9	6.5	0.4	6.8	2.0	1.0	8.1	3.8	0.0
LnGrp Delay(d),s/veh	31.8	21.3	21.4	52.3	19.4	13.9	97.6	27.2	26.2	123.1	30.5	0.0
LnGrp LOS	C	C	C	D	B	B	F	C	C	F	C	
Approach Vol, veh/h		931			947			352			394	
Approach Delay, s/veh		22.9			23.1			63.2			76.8	
Approach LOS		C			C			E			E	

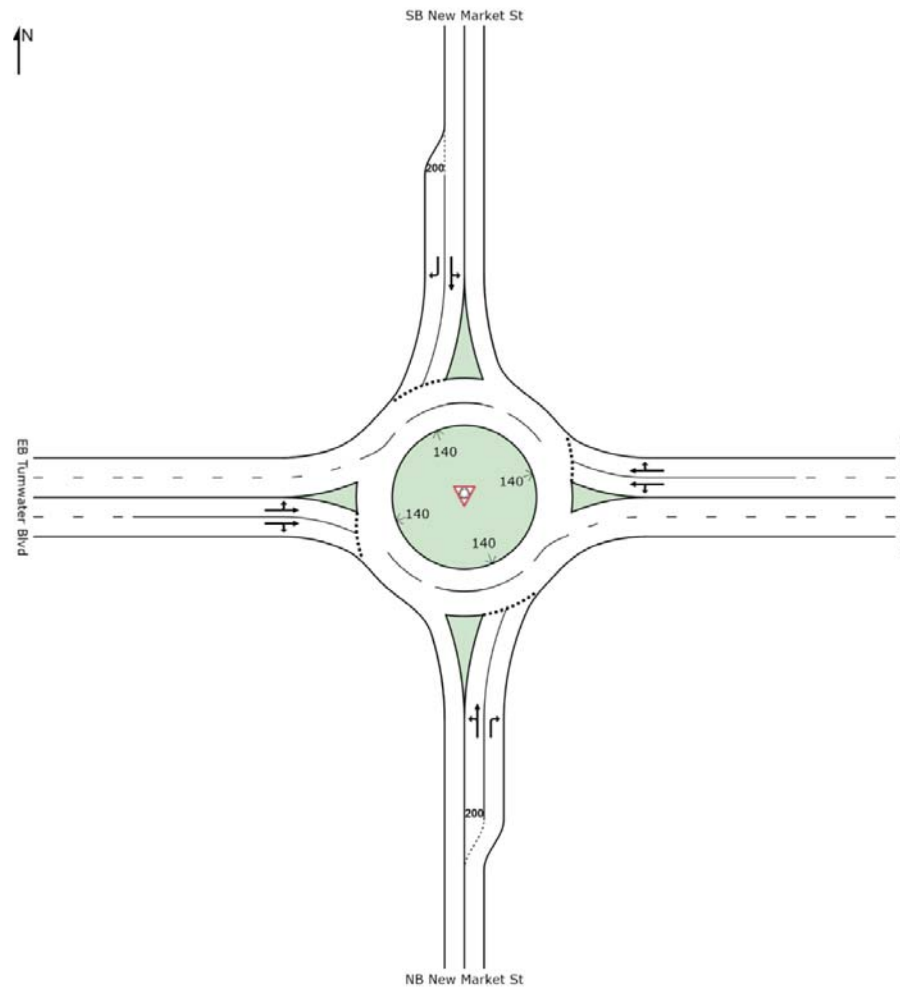
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.0	15.6	10.6	31.0	12.0	15.6	10.5	31.1
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	26.0	6.0	26.0	7.0	26.0	6.0	26.0
Max Q Clear Time (g_c+I1), s	9.0	8.9	4.7	14.5	9.0	5.7	6.2	14.6
Green Ext Time (p_c), s	0.0	1.8	0.0	7.6	0.0	1.9	0.0	7.5

Intersection Summary		
HCM 2010 Ctrl Delay		36.5
HCM 2010 LOS		D

SITE LAYOUT

Site: 51) New Market Rd at Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour
Roundabout



MOVEMENT SUMMARY

Site: 51) New Market Rd at Tumwater Blvd

Projected 2022 without improvements
PM Peak Hour
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB New Market St											
3	L2	22	0.0	0.043	13.5	LOS B	0.2	4.1	0.60	0.78	34.8
8	T1	5	0.0	0.043	6.4	LOS A	0.2	4.1	0.60	0.78	34.3
18	R2	65	0.0	0.073	5.8	LOS A	0.3	7.6	0.58	0.67	35.9
Approach		92	0.0	0.073	7.6	LOS A	0.3	7.6	0.59	0.71	35.5
East: WB Tumwater Blvd											
1	L2	65	2.0	0.316	10.7	LOS B	2.1	52.3	0.28	0.41	38.1
6	T1	815	2.0	0.316	3.5	LOS A	2.1	52.9	0.27	0.37	38.0
16	R2	27	2.0	0.316	3.9	LOS A	2.1	52.9	0.26	0.35	36.7
Approach		908	2.0	0.316	4.1	LOS A	2.1	52.9	0.27	0.38	38.0
North: SB New Market St											
7	L2	60	4.0	0.118	13.4	LOS B	0.4	11.4	0.58	0.80	34.9
4	T1	22	4.0	0.118	6.3	LOS A	0.4	11.4	0.58	0.80	34.6
14	R2	147	4.0	0.163	5.9	LOS A	0.7	17.0	0.57	0.69	35.8
Approach		228	4.0	0.163	7.9	LOS A	0.7	17.0	0.57	0.73	35.5
West: EB Tumwater Blvd											
5	L2	49	4.0	0.360	11.2	LOS B	2.4	62.6	0.41	0.44	37.7
2	T1	875	4.0	0.360	4.0	LOS A	2.5	63.9	0.40	0.41	37.5
12	R2	27	4.0	0.360	4.4	LOS A	2.5	63.9	0.39	0.39	36.1
Approach		951	4.0	0.360	4.4	LOS A	2.5	63.9	0.40	0.41	37.5
All Vehicles		2179	3.0	0.360	4.7	LOS A	2.5	63.9	0.37	0.44	37.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: SCJ ALLIANCE | Processed: Wednesday, June 8, 2016 9:37:07 AM
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Lanes, Volumes, Timings
52: Tumwater Blvd & Capitol Blvd

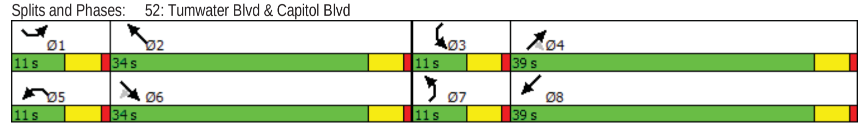
Projected 2022 without improvements
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	120	475	175	200	305	20	90	325	245	85	340	15
Future Volume (vph)	120	475	175	200	305	20	90	325	245	85	340	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	200		0	275		0	200		0
Storage Lanes	1		1	2		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		934			3620			2404			1729	
Travel Time (s)		12.7			49.4			54.6			39.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases			6						4			
Detector Phase	1	6	6	5	2		7	4	4	3	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (s)	11.0	34.0	34.0	11.0	34.0		11.0	39.0	39.0	11.0	39.0	
Total Split (%)	11.6%	35.8%	35.8%	11.6%	35.8%		11.6%	41.1%	41.1%	11.6%	41.1%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Recall Mode	None	Max	Max	None	Max		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 95
Actuated Cycle Length: 83.7
Natural Cycle: 95
Control Type: Actuated-Uncoordinated

Splits and Phases: 52: Tumwater Blvd & Capitol Blvd



Item 8.

HCM 2010 Signalized Intersection Summary
52: Tumwater Blvd & Capitol Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	120	475	175	200	305	20	90	325	245	85	340	15
Future Volume (veh/h)	120	475	175	200	305	20	90	325	245	85	340	15
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1881	1881	1900	1881	1881	1881	1881	1881	1900
Adj Flow Rate, veh/h	133	528	116	222	339	22	100	361	33	94	378	17
Adj No. of Lanes	1	1	1	2	2	0	1	1	1	1	2	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	1	1	1
Cap, veh/h	130	658	559	257	1216	79	128	482	410	120	879	39
Arrive On Green	0.07	0.36	0.36	0.07	0.36	0.36	0.07	0.26	0.26	0.07	0.25	0.25
Sat Flow, veh/h	1757	1845	1568	3476	3409	220	1792	1881	1599	1792	3484	156
Grp Volume(v), veh/h	133	528	116	222	177	184	100	361	33	94	193	202
Grp Sat Flow(s),veh/h/ln	1757	1845	1568	1738	1787	1842	1792	1881	1599	1792	1787	1854
Q Serve(g_s), s	6.0	21.0	4.2	5.1	5.7	5.8	4.5	14.4	1.3	4.2	7.4	7.4
Cycle Q Clear(g_c), s	6.0	21.0	4.2	5.1	5.7	5.8	4.5	14.4	1.3	4.2	7.4	7.4
Prop In Lane	1.00		1.00	1.00		0.12	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	130	658	559	257	638	657	128	482	410	120	451	467
V/C Ratio(X)	1.03	0.80	0.21	0.87	0.28	0.28	0.78	0.75	0.08	0.78	0.43	0.43
Avail Cap(c_a), veh/h	130	658	559	257	638	657	132	787	669	132	748	775
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.6	23.6	18.2	37.2	18.7	18.7	37.1	27.8	23.0	37.3	25.5	25.5
Incr Delay (d2), s/veh	86.0	10.0	0.8	25.1	1.1	1.1	22.9	2.4	0.1	20.7	0.6	0.6
Initial Q Delay(d3),s/veh	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.0	12.4	1.9	3.4	3.0	3.1	3.0	7.7	0.6	2.8	3.7	3.9
LnGrp Delay(d),s/veh	124.0	33.5	19.0	62.4	19.7	19.7	60.0	30.2	23.0	58.0	26.1	26.1
LnGrp LOS	F	C	B	E	B	B	E	C	C	E	C	C
Approach Vol, veh/h		777			583			494			489	
Approach Delay, s/veh		46.8			36.0			35.7			32.3	
Approach LOS		D			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	34.0	10.5	25.8	11.0	34.0	10.8	25.5
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	6.0	29.0	6.0	34.0	6.0	29.0	6.0	34.0
Max Q Clear Time (g_c+I1), s	8.0	7.8	6.2	16.4	7.1	23.0	6.5	9.4
Green Ext Time (p_c), s	0.0	6.5	0.0	4.5	0.0	3.1	0.0	5.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.8
HCM 2010 LOS	D

Lanes, Volumes, Timings
53: 65th Ave & Henderson Blvd

Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	870	70	80	565	5	35	0	55	5	0	2
Future Volume (vph)	5	870	70	80	565	5	35	0	55	5	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		2111			1760			704			354	
Travel Time (s)		48.0			40.0			16.0			8.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	27.5	27.5		27.5	27.5		12.5	12.5		27.5	27.5	
Total Split (s)	52.5	52.5		52.5	52.5		27.5	27.5		27.5	27.5	
Total Split (%)	65.6%	65.6%		65.6%	65.6%		34.4%	34.4%		34.4%	34.4%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0			0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max		Max	Max		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 71.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 53: 65th Ave & Henderson Blvd

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	870	70	80	565	5	35	0	55	5	0	2
Future Volume (veh/h)	5	870	70	80	565	5	35	0	55	5	0	2
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1881	1881	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	5	956	77	88	621	5	38	0	60	5	0	2
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	619	1294	104	356	1403	11	128	15	102	205	16	50
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.11	0.00	0.11	0.11	0.00	0.11
Sat Flow, veh/h	804	1718	138	549	1864	15	469	143	966	1026	151	471
Grp Volume(v), veh/h	5	0	1033	88	0	626	98	0	0	7	0	0
Grp Sat Flow(s),veh/h/ln	804	0	1857	549	0	1879	1579	0	0	1647	0	0
Q Serve(g_s), s	0.1	0.0	19.8	6.8	0.0	7.9	2.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.0	0.0	19.8	26.5	0.0	7.9	3.7	0.0	0.0	0.2	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.01	0.39		0.61	0.71		0.29
Lane Grp Cap(c), veh/h	619	0	1398	356	0	1414	246	0	0	271	0	0
V/C Ratio(X)	0.01	0.00	0.74	0.25	0.00	0.44	0.40	0.00	0.00	0.03	0.00	0.00
Avail Cap(c_a), veh/h	619	0	1398	356	0	1414	638	0	0	635	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.4	0.0	4.4	11.8	0.0	2.9	27.1	0.0	0.0	25.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.5	1.6	0.0	1.0	1.3	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	11.1	1.2	0.0	4.4	1.7	0.0	0.0	0.1	0.0	0.0
LnGrp Delay(d),s/veh	4.4	0.0	7.9	13.4	0.0	3.9	28.4	0.0	0.0	25.6	0.0	0.0
LnGrp LOS	A		A	B		A	C			C		
Approach Vol, veh/h		1038			714			98			7	
Approach Delay, s/veh		7.9			5.1			28.4			25.6	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.5		11.3		52.5		11.3
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5
Max Green Setting (Gmax), s		48.0		23.0		48.0		23.0
Max Q Clear Time (g_c+I1), s		21.8		2.2		28.5		5.7
Green Ext Time (p_c), s		18.7		0.6		14.8		0.5

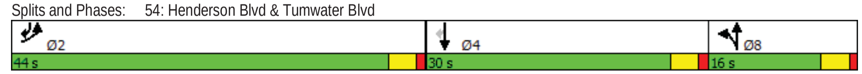
Intersection Summary		
HCM 2010 Ctrl Delay		8.0
HCM 2010 LOS		A

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	685	30	25	170	215	355
Future Volume (vph)	685	30	25	170	215	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0			100
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	35	
Link Distance (ft)	3122			2394	2111	
Travel Time (s)	60.8			46.6	41.1	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot		Split	NA	NA	pm+ov
Protected Phases	2		8	8	4	2
Permitted Phases						4
Detector Phase	2		8	8	4	2
Switch Phase						
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0
Minimum Split (s)	20.5		10.5	10.5	30.0	20.5
Total Split (s)	44.0		16.0	16.0	30.0	44.0
Total Split (%)	48.9%		17.8%	17.8%	33.3%	48.9%
Yellow Time (s)	3.0		3.0	3.0	3.0	3.0
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.0			4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	Max		None	None	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 54: Henderson Blvd & Tumwater Blvd



54: Henderson Blvd & Tumwater Blvd

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	685	30	25	170	215	355
Future Volume (veh/h)	685	30	25	170	215	355
Number	5	12	3	8	4	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1900	1900	1881	1881	1881
Adj Flow Rate, veh/h	753	33	27	187	236	269
Adj No. of Lanes	0	0	0	1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	758	33	31	218	543	1173
Arrive On Green	0.44	0.44	0.13	0.13	0.29	0.29
Sat Flow, veh/h	1706	75	236	1634	1881	1599
Grp Volume(v), veh/h	787	0	214	0	236	269
Grp Sat Flow(s),veh/h/ln	1783	0	1869	0	1881	1599
Q Serve(g_s), s	39.5	0.0	10.1	0.0	9.2	4.9
Cycle Q Clear(g_c), s	39.5	0.0	10.1	0.0	9.2	4.9
Prop In Lane	0.96	0.04	0.13			1.00
Lane Grp Cap(c), veh/h	792	0	249	0	543	1173
V/C Ratio(X)	0.99	0.00	0.86	0.00	0.43	0.23
Avail Cap(c_a), veh/h	792	0	249	0	543	1173
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	24.9	0.0	38.2	0.0	26.0	3.8
Incr Delay (d2), s/veh	30.4	0.0	24.9	0.0	2.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	25.9	0.0	6.9	0.0	5.2	5.8
LnGrp Delay(d),s/veh	55.3	0.0	63.1	0.0	28.5	4.3
LnGrp LOS	E		E		C	A
Approach Vol, veh/h	787			214	505	
Approach Delay, s/veh	55.3			63.1	15.6	
Approach LOS	E			E	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4				8
Phs Duration (G+Y+Rc), s		44.0		30.0				16.0
Change Period (Y+Rc), s		4.0		4.0				4.0
Max Green Setting (Gmax), s		40.0		26.0				12.0
Max Q Clear Time (g_c+I1), s		41.5		11.2				12.1
Green Ext Time (p_c), s		0.0		2.4				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.1
HCM 2010 LOS	D

Notes

55: Henderson Blvd & Trails End Dr

Intersection	
Int Delay, s/veh	4.3

Movement	NWL	NWR	NET	NER	SWL	SWT
Traffic Vol, veh/h	60	55	160	95	125	145
Future Vol, veh/h	60	55	160	95	125	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	1	1	1
Mvmt Flow	69	63	184	109	144	167

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	693	239	0	0	293	0
Stage 1	239	-	-	-	-	-
Stage 2	454	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.11	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.209	-
Pot Cap-1 Maneuver	412	805	-	-	1274	-
Stage 1	805	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	361	805	-	-	1274	-
Mov Cap-2 Maneuver	361	-	-	-	-	-
Stage 1	805	-	-	-	-	-
Stage 2	564	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	15	0	3.8
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	490	1274	-
HCM Lane V/C Ratio	-	-	0.27	0.113	-
HCM Control Delay (s)	-	-	15	8.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.1	0.4	-

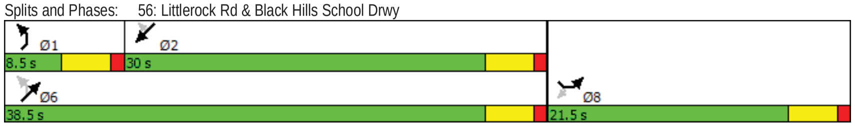
Lanes, Volumes, Timings
56: Littlerock Rd & Black Hills School Drwy

Projected 2022 without improvements
PM Peak Hour

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	5	10	10	205	450	55
Future Volume (vph)	5	10	10	205	450	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200	0	175			350
Storage Lanes	1	1	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			30	30	
Link Distance (ft)	1065			1067	3970	
Travel Time (s)	24.2			24.3	90.2	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	pm+pt	NA	NA	Perm
Protected Phases	8		1	6	2	
Permitted Phases		8	6			2
Detector Phase	8	8	1	6	2	2
Switch Phase						
Minimum Initial (s)	7.0	7.0	4.0	7.0	7.0	7.0
Minimum Split (s)	21.5	21.5	8.5	24.5	27.5	27.5
Total Split (s)	21.5	21.5	8.5	38.5	30.0	30.0
Total Split (%)	35.8%	35.8%	14.2%	64.2%	50.0%	50.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Recall Mode	None	None	None	Max	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 53.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 56: Littlerock Rd & Black Hills School Drwy



HCM 2010 Signalized Intersection Summary
56: Littlerock Rd & Black Hills School Drwy

Projected 2022 without improvements
PM Peak Hour

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (veh/h)	5	10	10	205	450	55
Future Volume (veh/h)	5	10	10	205	450	55
Number	3	18	1	6	2	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1881	1881	1881	1881
Adj Flow Rate, veh/h	5	11	11	216	474	58
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	51	46	656	1445	1233	1048
Arrive On Green	0.03	0.03	0.01	0.77	0.66	0.66
Sat Flow, veh/h	1810	1615	1792	1881	1881	1599
Grp Volume(v), veh/h	5	11	11	216	474	58
Grp Sat Flow(s),veh/h/ln	1810	1615	1792	1881	1881	1599
Q Serve(g_s), s	0.1	0.3	0.1	1.3	5.1	0.6
Cycle Q Clear(g_c), s	0.1	0.3	0.1	1.3	5.1	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	51	46	656	1445	1233	1048
V/C Ratio(X)	0.10	0.24	0.02	0.15	0.38	0.06
Avail Cap(c_a), veh/h	695	620	797	1445	1233	1048
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.0	21.0	2.4	1.3	3.5	2.7
Incr Delay (d2), s/veh	0.8	2.7	0.0	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.2	0.0	0.7	2.7	0.2
LnGrp Delay(d),s/veh	21.8	23.7	2.4	1.6	3.8	2.8
LnGrp LOS	C	C	A	A	A	A
Approach Vol, veh/h	16			227	532	
Approach Delay, s/veh	23.1			1.6	3.6	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	5.0	33.5				38.5		5.7
Change Period (Y+Rc), s	4.5	4.5				4.5		4.5
Max Green Setting (Gmax), s	4.0	25.5				34.0		17.0
Max Q Clear Time (g_c+I1), s	2.1	7.1				3.3		2.3
Green Ext Time (p_c), s	0.0	5.2				6.1		0.0

Intersection Summary			
HCM 2010 Ctrl Delay			3.4
HCM 2010 LOS			A

Item 8.

HCM 2010 TWSC
57: Center St & 76th Ave

Projected 2022 without improvements
PM Peak Hour

Intersection												
Int Delay, s/veh	2.6											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	60	10	1	10	10	20	1	265	0	10	335	85
Future Vol, veh/h	60	10	1	10	10	20	1	265	0	10	335	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	11	11	11	1	1	1	3	3	3
Mvmt Flow	65	11	1	11	11	22	1	288	0	11	364	92

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	739	722	410	728	768	288	457	0	0	288	0	0
Stage 1	432	432	-	290	290	-	-	-	-	-	-	-
Stage 2	307	290	-	438	478	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.21	6.61	6.31	4.11	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.599	4.099	3.399	2.209	-	-	2.227	-	-
Pot Cap-1 Maneuver	332	352	639	328	322	730	1109	-	-	1268	-	-
Stage 1	600	581	-	699	656	-	-	-	-	-	-	-
Stage 2	701	670	-	580	541	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	311	347	639	316	318	730	1109	-	-	1268	-	-
Mov Cap-2 Maneuver	311	347	-	316	318	-	-	-	-	-	-	-
Stage 1	599	574	-	698	655	-	-	-	-	-	-	-
Stage 2	668	669	-	561	535	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	19.9	14	0	0.2
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	318	442	1268	-	-
HCM Lane V/C Ratio	0.001	-	-	0.243	0.098	0.009	-	-
HCM Control Delay (s)	8.2	0	-	19.9	14	7.9	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	0.3	0	-	-

Lanes, Volumes, Timings
58: Old Hwy 99 & Henderson Blvd

Projected 2022 without improvements
PM Peak Hour

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	110	865	10	2	540	115	15	5	5	150	5	60
Future Volume (vph)	110	865	10	2	540	115	15	5	5	150	5	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		50	50		0	0		0	150		0
Storage Lanes	1		1	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		3620			1652			415			2274	
Travel Time (s)		49.4			22.5			9.4			51.7	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	3%	3%	3%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	1	6			2			4			8	
Permitted Phases	6		6	2			4			8		
Detector Phase	1	6	6	2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.5	25.5	25.5	26.5	26.5		33.5	33.5		33.5	33.5	
Total Split (s)	11.0	56.5	56.5	45.5	45.5		33.5	33.5		33.5	33.5	
Total Split (%)	12.2%	62.8%	62.8%	50.6%	50.6%		37.2%	37.2%		37.2%	37.2%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5		1.5	1.5		1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5			5.5		5.5	5.5	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	Max	Max	Max	Max		None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 76.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 58: Old Hwy 99 & Henderson Blvd

HCM 2010 Signalized Intersection Summary
58: Old Hwy 99 & Henderson Blvd

Projected 2022 without improvements
PM Peak Hour

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	110	865	10	2	540	115	15	5	5	150	5	60
Future Volume (veh/h)	110	865	10	2	540	115	15	5	5	150	5	60
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1881	1863	1863	1900	1900	1845	1900	1881	1881	1900
Adj Flow Rate, veh/h	126	994	11	2	621	132	17	6	6	172	6	69
Adj No. of Lanes	1	1	1	1	1	0	0	1	0	1	1	0
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	1	1	1	2	2	2	3	3	3	1	1	1
Cap, veh/h	399	1332	1132	313	846	180	162	56	36	312	18	207
Arrive On Green	0.06	0.71	0.71	0.57	0.57	0.57	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	1792	1881	1599	558	1490	317	592	405	260	1410	129	1489
Grp Volume(v), veh/h	126	994	11	2	0	753	29	0	0	172	0	75
Grp Sat Flow(s),veh/h/ln	1792	1881	1599	558	0	1807	1257	0	0	1410	0	1618
Q Serve(g_s), s	1.9	23.6	0.1	0.2	0.0	22.2	0.0	0.0	0.0	4.6	0.0	3.0
Cycle Q Clear(g_c), s	1.9	23.6	0.1	13.6	0.0	22.2	3.0	0.0	0.0	7.7	0.0	3.0
Prop In Lane	1.00		1.00	1.00		0.18	0.59		0.21	1.00		0.92
Lane Grp Cap(c), veh/h	399	1332	1132	313	0	1026	254	0	0	312	0	225
V/C Ratio(X)	0.32	0.75	0.01	0.01	0.00	0.73	0.11	0.00	0.00	0.55	0.00	0.33
Avail Cap(c_a), veh/h	422	1332	1132	313	0	1026	614	0	0	664	0	629
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	9.4	6.5	3.1	13.8	0.0	11.5	27.1	0.0	0.0	29.8	0.0	28.0
Incr Delay (d2), s/veh	0.2	3.8	0.0	0.0	0.0	4.7	0.1	0.0	0.0	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	13.3	0.1	0.0	0.0	12.2	0.5	0.0	0.0	3.3	0.0	1.4
LnGrp Delay(d),s/veh	9.6	10.3	3.1	13.9	0.0	16.2	27.2	0.0	0.0	30.3	0.0	28.3
LnGrp LOS	A	B	A	B		B	C			C		C
Approach Vol, veh/h		1131			755			29			247	
Approach Delay, s/veh		10.2			16.2			27.2			29.7	
Approach LOS		B			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	10.1	46.4		15.5		56.5		15.5				
Change Period (Y+Rc), s	5.5	5.5		5.5		5.5		5.5				
Max Green Setting (Gmax), s	5.5	40.0		28.0		51.0		28.0				
Max Q Clear Time (g_c+I1), s	3.9	24.2		5.0		25.6		9.7				
Green Ext Time (p_c), s	0.0	10.2		0.4		13.9		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay			14.7									
HCM 2010 LOS			B									

Tumwater Transportation Master Plan
SCJ Alliance

Synchro 9 Report
6/10/2016

HCM 2010 TWSC
59: Old Hwy 99 & 79th Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Traffic Vol, veh/h	1	1	10	15	0	115	115	915	0	1	460	15
Future Vol, veh/h	1	1	10	15	0	115	115	915	0	1	460	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	300	250	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	1	1	1	1	1	1	1	1	1
Mvmt Flow	1	1	11	16	0	121	121	963	0	1	484	16

Major/Minor	Minor1			Minor2			Major1			Major2		
Conflicting Flow All	1699	1707	963	1705	1699	492	500	0	0	963	0	0
Stage 1	1205	1205	-	494	494	-	-	-	-	-	-	-
Stage 2	494	502	-	1211	1205	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.11	6.51	6.21	4.11	-	-	4.11	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.509	4.009	3.309	2.209	-	-	2.209	-	-
Pot Cap-1 Maneuver	73	91	310	73	93	579	1069	-	-	719	-	-
Stage 1	225	257	-	559	548	-	-	-	-	-	-	-
Stage 2	557	542	-	224	258	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	53	81	310	64	82	579	1069	-	-	719	-	-
Mov Cap-2 Maneuver	53	81	-	64	82	-	-	-	-	-	-	-
Stage 1	200	228	-	496	547	-	-	-	-	-	-	-
Stage 2	440	541	-	191	229	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s	25.4	20.5	1	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NWL	NWT	NWR	EBLn1	WBLn1	WBLn2	SEL	SET	SER
Capacity (veh/h)	719	-	-	189	64	579	1069	-	-
HCM Lane V/C Ratio	0.001	-	-	0.067	0.247	0.209	0.113	-	-
HCM Control Delay (s)	10	0	-	25.4	78.8	12.9	8.8	-	-
HCM Lane LOS	B	A	-	D	F	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.9	0.8	0.4	-	-

Tumwater Transportation Master Plan
SCJ Alliance

Synchro 9 Report
6/10/2016

HCM 2010 TWSC
60: Kimmie St & 83rd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Traffic Vol, veh/h	45	15	40	15	5	115
Future Vol, veh/h	45	15	40	15	5	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	3	3	9	9	3	3
Mvmt Flow	55	18	49	18	6	140

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	210	58	0	0	67	0
Stage 1	58	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	776	1005	-	-	1528	-
Stage 1	962	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	773	1005	-	-	1528	-
Mov Cap-2 Maneuver	773	-	-	-	-	-
Stage 1	962	-	-	-	-	-
Stage 2	871	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	820	1528	-
HCM Lane V/C Ratio	-	-	0.089	0.004	-
HCM Control Delay (s)	-	-	9.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

HCM 2010 TWSC
61: 83rd Ave & Center St

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	8.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	70	20	10	110	200	75
Future Vol, veh/h	70	20	10	110	200	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	1	1	3	3	1	1
Mvmt Flow	80	23	11	125	227	85

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	136	0	-	0	256	74
Stage 1	-	-	-	-	74	-
Stage 2	-	-	-	-	182	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1454	-	-	-	735	990
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	852	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1454	-	-	-	694	990
Mov Cap-2 Maneuver	-	-	-	-	694	-
Stage 1	-	-	-	-	951	-
Stage 2	-	-	-	-	804	-

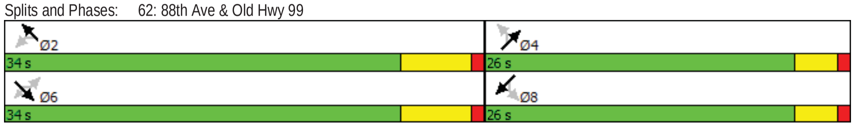
Approach	EB	WB	SB
HCM Control Delay, s	5.9	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1454	-	-	-	756
HCM Lane V/C Ratio	0.055	-	-	-	0.413
HCM Control Delay (s)	7.6	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	-	2

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	785	220	10	310	0	205	10	25	2	5	1
Future Volume (vph)	0	785	220	10	310	0	205	10	25	2	5	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		150	150		0	150		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		50			50			30			30	
Link Distance (ft)		3849			1410			1160			265	
Travel Time (s)		52.5			19.2			26.4			6.0	
Peak Hour Factor	0.92	0.90	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.92	0.92	0.92
Heavy Vehicles (%)	2%	1%	1%	1%	1%	2%	3%	2%	3%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6		6	2			4			8		
Detector Phase	6	6	6	2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	26.0	26.0	26.0	26.0	26.0		24.0	24.0		26.0	26.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		26.0	26.0		26.0	26.0	
Total Split (%)	56.7%	56.7%	56.7%	56.7%	56.7%		43.3%	43.3%		43.3%	43.3%	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Max	Max	Max	Max	Max		None	None		None	None	

Intersection Summary
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 56.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

Splits and Phases: 62: 88th Ave & Old Hwy 99



Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	785	220	10	310	0	205	10	25	2	5	1
Future Volume (veh/h)	0	785	220	10	310	0	205	10	25	2	5	1
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1881	1881	1881	1881	1900	1845	1850	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	872	244	11	344	0	228	11	28	2	5	1
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.92	0.90	0.90	0.90	0.90	0.92	0.90	0.92	0.90	0.92	0.92	0.92
Percent Heavy Veh, %	2	1	1	1	1	1	3	2	2	2	2	2
Cap, veh/h	150	1100	935	265	1100	0	438	95	243	140	268	45
Arrive On Green	0.00	0.58	0.58	0.58	0.58	0.00	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1032	1881	1599	508	1881	0	1391	463	1179	225	1299	218
Grp Volume(v), veh/h	0	872	244	11	344	0	228	0	39	8	0	0
Grp Sat Flow(s),veh/h/ln	1032	1881	1599	508	1881	0	1391	0	1642	1742	0	0
Q Serve(g_s), s	0.0	17.2	3.6	0.8	4.4	0.0	7.2	0.0	0.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	17.2	3.6	18.0	4.4	0.0	7.4	0.0	0.9	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.72	0.25		0.12
Lane Grp Cap(c), veh/h	150	1100	935	265	1100	0	438	0	339	453	0	0
V/C Ratio(X)	0.00	0.79	0.26	0.04	0.31	0.00	0.52	0.00	0.12	0.02	0.00	0.00
Avail Cap(c_a), veh/h	150	1100	935	265	1100	0	791	0	754	877	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	7.7	4.9	14.7	5.0	0.0	18.0	0.0	15.4	15.1	0.0	0.0
Incr Delay (d2), s/veh	0.0	5.9	0.7	0.3	0.7	0.0	1.0	0.0	0.1	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.5	1.7	0.1	2.5	0.0	3.0	0.0	0.4	0.1	0.0	0.0
LnGrp Delay(d),s/veh	0.0	13.6	5.5	14.9	5.8	0.0	19.0	0.0	15.6	15.2	0.0	0.0
LnGrp LOS		B	A	B	A		B		B	B		
Approach Vol, veh/h		1116			355			267			8	
Approach Delay, s/veh		11.8			6.1			18.5			15.2	
Approach LOS		B			A			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		34.0		13.9		34.0		13.9
Change Period (Y+Rc), s		6.0		4.0		6.0		4.0
Max Green Setting (Gmax), s		28.0		22.0		28.0		22.0
Max Q Clear Time (g_c+I1), s		20.0		9.4		19.2		2.2
Green Ext Time (p_c), s		4.9		0.7		5.3		0.9

Intersection Summary
HCM 2010 Ctrl Delay 11.7
HCM 2010 LOS B

Item 8.

Lanes, Volumes, Timings
63: I-5 SB Ramps & 93rd Ave

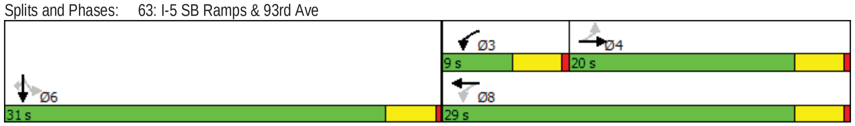
Projected 2022 without improvements
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	325	45	130	180	0	0	0	0	520	0	315
Future Volume (vph)	0	325	45	130	180	0	0	0	0	520	0	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		300
Storage Lanes	0		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			40			30			30	
Link Distance (ft)		1124			936			1099			1644	
Travel Time (s)		25.5			16.0			25.0			37.4	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	9%	9%	9%	0%	0%	0%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		4		3	8						6	
Permitted Phases	4			8						6		6
Detector Phase	4	4		3	8					6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0					4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		8.0	20.0					20.0	20.0	20.0
Total Split (s)	20.0	20.0		9.0	29.0					31.0	31.0	31.0
Total Split (%)	33.3%	33.3%		15.0%	48.3%					51.7%	51.7%	51.7%
Yellow Time (s)	3.5	3.5		3.5	3.5					3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5					0.5	0.5	0.5
Lost Time Adjust (s)		0.0		0.0	0.0						0.0	0.0
Total Lost Time (s)		4.0		4.0	4.0						4.0	4.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Recall Mode	None	None		None	None					Max	Max	Max

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 57.3
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 63: I-5 SB Ramps & 93rd Ave



HCM 2010 Signalized Intersection Summary
63: I-5 SB Ramps & 93rd Ave

Projected 2022 without improvements
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	325	45	130	180	0	0	0	0	520	0	315
Future Volume (veh/h)	0	325	45	130	180	0	0	0	0	520	0	315
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1881	1900	1743	1743	0				1900	1827	1827
Adj Flow Rate, veh/h	0	369	51	148	205	0				591	0	165
Adj No. of Lanes	0	1	0	1	1	0				0	1	1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	9	9	0				4	4	4
Cap, veh/h	0	420	58	297	716	0				791	0	706
Arrive On Green	0.00	0.26	0.26	0.08	0.41	0.00				0.45	0.00	0.45
Sat Flow, veh/h	0	1618	224	1660	1743	0				1740	0	1553
Grp Volume(v), veh/h	0	0	420	148	205	0				591	0	165
Grp Sat Flow(s),veh/h/ln	0	0	1842	1660	1743	0				1740	0	1553
Q Serve(g_s), s	0.0	0.0	13.0	3.6	4.7	0.0				16.7	0.0	3.9
Cycle Q Clear(g_c), s	0.0	0.0	13.0	3.6	4.7	0.0				16.7	0.0	3.9
Prop In Lane	0.00		0.12	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	0	478	297	716	0				791	0	706
V/C Ratio(X)	0.00	0.00	0.88	0.50	0.29	0.00				0.75	0.00	0.23
Avail Cap(c_a), veh/h	0	0	496	297	734	0				791	0	706
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	21.1	14.9	11.7	0.0				13.4	0.0	9.9
Incr Delay (d2), s/veh	0.0	0.0	16.1	1.3	0.2	0.0				6.4	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	8.7	1.8	2.3	0.0				9.3	0.0	1.8
LnGrp Delay(d),s/veh	0.0	0.0	37.2	16.2	11.9	0.0				19.8	0.0	10.7
LnGrp LOS			D	B	B					B		B
Approach Vol, veh/h		420			353						756	
Approach Delay, s/veh		37.2			13.7						17.8	
Approach LOS		D			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			9.0	19.4		31.0		28.4
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			5.0	16.0		27.0		25.0
Max Q Clear Time (g_c+I1), s			5.6	15.0		18.7		6.7
Green Ext Time (p_c), s			0.0	0.4		3.0		3.6

Intersection Summary

HCM 2010 Ctrl Delay			22.2
HCM 2010 LOS			C

HCM 2010 TWSC
64: I-5 NB Ramps & 93rd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection												
Int Delay, s/veh	3.1											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	260	540	0	0	270	370	70	0	125	0	0	0
Future Vol, veh/h	260	540	0	0	270	370	70	0	125	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	Yield	-	-	None
Storage Length	125	-	-	-	-	300	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	3	3	3	8	8	8	14	14	14	0	0	0
Mvmt Flow	277	574	0	0	287	394	74	0	133	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	287	0	-	-	-	0	1415	1415	574
Stage 1	-	-	-	-	-	-	1128	1128	-
Stage 2	-	-	-	-	-	-	287	287	-
Critical Hdwy	4.13	-	-	-	-	-	6.54	6.64	6.34
Critical Hdwy Stg 1	-	-	-	-	-	-	5.54	5.64	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.54	5.64	-
Follow-up Hdwy	2.227	-	-	-	-	-	3.626	4.126	3.426
Pot Cap-1 Maneuver	1269	-	0	0	-	-	142	130	496
Stage 1	-	-	0	0	-	-	293	266	-
Stage 2	-	-	0	0	-	-	735	653	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	1269	-	-	-	-	-	111	0	496
Mov Cap-2 Maneuver	-	-	-	-	-	-	111	0	-
Stage 1	-	-	-	-	-	-	229	0	-
Stage 2	-	-	-	-	-	-	735	0	-

Approach	EB	WB	NB
HCM Control Delay, s	2.8	0	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBT	WBR
Capacity (veh/h)	590	1269	-	-	-
HCM Lane V/C Ratio	0.352	0.218	-	-	-
HCM Control Delay (s)	14.4	8.6	-	-	-
HCM Lane LOS	B	A	-	-	-
HCM 95th %tile Q(veh)	1.6	0.8	-	-	-

HCM 2010 TWSC
65: Kimmie St & 93rd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection												
Int Delay, s/veh	2.4											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	35	500	15	5	435	10	15	2	10	20	5	70
Future Vol, veh/h	35	500	15	5	435	10	15	2	10	20	5	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	4	4	1	1	1	0	0	0	5	5	5
Mvmt Flow	37	532	16	5	463	11	16	2	11	21	5	74

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	473	0	0	548	0	0	1133	1098	540	1100	1101	468
Stage 1	-	-	-	-	-	-	614	614	-	479	479	-
Stage 2	-	-	-	-	-	-	519	484	-	621	622	-
Critical Hdwy	4.14	-	-	4.11	-	-	7.1	6.5	6.2	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.15	5.55	-
Follow-up Hdwy	2.236	-	-	2.209	-	-	3.5	4	3.3	3.545	4.045	3.345
Pot Cap-1 Maneuver	1079	-	-	1027	-	-	182	215	546	187	209	589
Stage 1	-	-	-	-	-	-	483	486	-	562	550	-
Stage 2	-	-	-	-	-	-	544	555	-	470	474	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1079	-	-	1027	-	-	149	203	546	174	197	589
Mov Cap-2 Maneuver	-	-	-	-	-	-	149	203	-	174	197	-
Stage 1	-	-	-	-	-	-	459	462	-	534	546	-
Stage 2	-	-	-	-	-	-	467	551	-	436	451	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.1	24.8	18.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	210	1079	-	-	1027	-	-	367
HCM Lane V/C Ratio	0.137	0.035	-	-	0.005	-	-	0.275
HCM Control Delay (s)	24.8	8.5	0	-	8.5	0	-	18.5
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-	-	1.1

Intersection												
Intersection Delay, s/veh	42.9											
Intersection LOS	E											

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NEU	NEL	NET	NER
Traffic Vol, veh/h	0	2	370	165	0	105	320	45	0	85	20	35
Future Vol, veh/h	0	2	370	165	0	105	320	45	0	85	20	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	3	3	3	2	2	2	2	2	0	0	0
Mvmt Flow	0	2	402	179	0	114	348	49	0	92	22	38
Number of Lanes	0	0	1	0	0	0	1	1	0	0	1	0

Approach	EB	WB	NE
Opposing Approach	WB	EB	SW
Opposing Lanes	2	1	1
Conflicting Approach Left	SW	NE	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NE	SW	WB
Conflicting Lanes Right	1	1	2
HCM Control Delay	61	39.1	14.7
HCM LOS	F	E	B

Lane	NELn1	EBLn1	WBLn1	WBLn2	SWLn1
Vol Left, %	61%	0%	25%	0%	65%
Vol Thru, %	14%	69%	75%	0%	34%
Vol Right, %	25%	31%	0%	100%	1%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	537	425	45	146
LT Vol	85	2	105	0	95
Through Vol	20	370	320	0	50
RT Vol	35	165	0	45	1
Lane Flow Rate	152	584	462	49	159
Geometry Grp	2	5	7	7	2
Degree of Util (X)	0.331	0.995	0.883	0.082	0.351
Departure Headway (Hd)	7.824	6.139	6.98	6.137	7.952
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	461	584	522	587	454
Service Time	5.837	4.237	4.68	3.837	5.964
HCM Lane V/C Ratio	0.33	1	0.885	0.083	0.35
HCM Control Delay	14.7	61	42.2	9.4	15.2
HCM Lane LOS	B	F	E	A	C
HCM 95th-tile Q	1.4	14.5	9.8	0.3	1.6

HCM 2010 AWSC
66: Case Rd & 93rd Ave
Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SWU	SWL	SWT	SWR
Traffic Vol, veh/h	0	95	50	1
Future Vol, veh/h	0	95	50	1
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	1	1	1
Mvmt Flow	0	103	54	1
Number of Lanes	0	0	1	0

Approach	SW
Opposing Approach	NE
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	2
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	15.2
HCM LOS	C

Lane

Tumwater Transportation Master Plan
SCJ Alliance
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6/10/2016

HCM 2010 AWSC
67: Tilley Rd (South) & 93rd Ave

Projected 2022 without improvements
PM Peak Hour

Intersection	
Intersection Delay, s/veh	24.6
Intersection LOS	C

Movement	EBU	EBT	EBR	WBU	WBL	WBT	NBU	NBL	NBR
Traffic Vol, veh/h	0	305	190	0	100	315	0	145	70
Future Vol, veh/h	0	305	190	0	100	315	0	145	70
Peak Hour Factor	0.92	0.87	0.87	0.92	0.87	0.87	0.92	0.87	0.87
Heavy Vehicles, %	2	3	3	2	2	2	2	1	1
Mvmt Flow	0	351	218	0	115	362	0	167	80
Number of Lanes	0	1	0	0	0	1	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	29.6	23.7	14.6
HCM LOS	D	C	B

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	67%	0%	24%
Vol Thru, %	0%	62%	76%
Vol Right, %	33%	38%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	215	495	415
LT Vol	145	0	100
Through Vol	0	305	315
RT Vol	70	190	0
Lane Flow Rate	247	569	477
Geometry Grp	1	1	1
Degree of Util (X)	0.442	0.836	0.748
Departure Headway (Hd)	6.442	5.289	5.642
Convergence, Y/N	Yes	Yes	Yes
Cap	556	683	639
Service Time	4.522	3.353	3.709
HCM Lane V/C Ratio	0.444	0.833	0.746
HCM Control Delay	14.6	29.6	23.7
HCM Lane LOS	B	D	C
HCM 95th-tile Q	2.2	9.2	6.7

HCM 2010 TWSC
68: 93rd Ave & Tilley Rd (North)

Projected 2022 without improvements
PM Peak Hour

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Traffic Vol, veh/h	110	260	175	20	35	240
Future Vol, veh/h	110	260	175	20	35	240
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	250	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	2	2	3	3	1	1
Mvmt Flow	128	302	203	23	41	279

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	227	0	-	0	773	215
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	558	-
Critical Hdwy	4.12	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.218	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1341	-	-	-	369	827
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	575	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1341	-	-	-	327	827
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	509	-

Approach	EB	WB	SB
HCM Control Delay, s	2.4	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1341	-	-	-	327	827
HCM Lane V/C Ratio	0.095	-	-	-	0.124	0.337
HCM Control Delay (s)	8	0	-	-	17.6	11.6
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.4	1.5

Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NEL	NER
Traffic Vol, veh/h	675	30	115	230	15	175
Future Vol, veh/h	675	30	115	230	15	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	450	300	-	300	0
Veh in Median Storage, #	0	-	-	0	2	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	2	2	1	1
Mvmt Flow	734	33	125	250	16	190

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	734	0	1234	734
Stage 1	-	-	-	-	734	-
Stage 2	-	-	-	-	500	-
Critical Hdwy	-	-	4.12	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.218	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	871	-	196	422
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	611	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	871	-	168	422
Mov Cap-2 Maneuver	-	-	-	-	368	-
Stage 1	-	-	-	-	477	-
Stage 2	-	-	-	-	523	-

Approach	EB	WB	NE
HCM Control Delay, s	0	3.3	19.9
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NELn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	422	-	-	871	-
HCM Lane V/C Ratio	0.044	0.451	-	-	0.144	-
HCM Control Delay (s)	15.2	20.3	-	-	9.8	-
HCM Lane LOS	C	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	2.3	-	-	0.5	-

B. Analysis of Non-Motorized Network

This was prepared as background for the non-motorized network

Tumwater Non-Motorized LOS Framework

The purpose of this white paper is to describe the draft Non-Motorized LOS Framework for the City of Tumwater as part of the Transportation Master Plan. This framework is intended to provide the structure, policies, and goals that would be associated with the Non-Motorized LOS standards. Specific details regarding non-motorized facility design standards are not the focus of this framework as those details should be identified in the City's street design standards or as part of a separate Non-Motorized Plan. However, examples of specific facility designs may be discussed to explain concepts. It is anticipated that text and concepts described in this white paper may be used in some manner in the Transportation Master Plan.

First the framework concepts and structure will be discussed, which define the terms being used in the Non-Motorized LOS Framework and highlight how different pieces of the policy fit together. Next the resulting framework for Non-Motorized LOS Standards is presented. Finally, a needs based assessment was conducted using the framework.

1. Concept and Structure for LOS Framework

The first important concepts are "Quality of Service" and "Level of Service" as defined below:

- **Quality of Service** (QOS) describes how well a facility operates from the traveler's perspective.
- **Level of Service** (LOS) is a quantitative stratification of one or more performance measures that represent quality of service.

For example, let us consider the traditional auto-based LOS framework. Drivers expect that a good transportation network means that they can *conveniently* get where they want to go. The QOS goal relates "convenience" to "congestion". A more technical performance metric for "congestion" is "vehicle delay". The traditional auto-based LOS system is stratified into six categories of "vehicle delay" ranging from A to F. Communities set LOS standards (A to F) according to what they consider an acceptable level of "congestion" (in other works, the LOS standard is meant to meet a QOS goal). If portions of the transportation network fall below acceptable LOS standards, then local agencies (and developers) build improvement projects to return the system to an acceptable level of "congestion" goal.

For non-motorized transportation systems, the QOS goals are broadened to capture different traveler expectations. Walkers and bicyclists expect that a good transportation network means that they can *comfortably* and *conveniently* get where they want to go. For vehicles the QOS goal relates to congestion, but for non-motorized transportation systems the QOS goal relates to the following:

- **Comfort**. Sense of safety, street conditions, or wayfinding
- **Completeness**. Continuity, extent, or duration
- **Connectivity**. Land use, route choice, or linkages
- **Convenience**. Distance, destinations, or choices

Transportation Master Plan Network

The City of Tumwater Transportation Master Plan (or similar document) identifies the ultimate network of pedestrian and bicycle facilities throughout the City. A hierarchy of pedestrian routes and bicycle routes are developed based on route continuity, connectivity to community destinations, and convenient locations. Table 1 defines the hierarchy of the Master Plan, which includes Primary Routes and Secondary Routes. This hierarchy and Master Plan network addresses the QOS goals related to completeness, connectivity, and convenience.

Table 1: Framework for the Transportation Master Plan Hierarchy of Pedestrian and Bicycle Routes

Hierarchy Level	Description	Relationship to Street Functional Classification
Primary Route	Primary routes provide the backbone of the non-motorized system. They provide network continuity throughout the city and link to major community destinations. On these routes, the pedestrian and bicycle modes are considered <u>equal or higher priority</u> than vehicle travel modes. Multi-use pathways are typically primary routes.	Primary routes are typically along city arterials and collector streets because the street corridors provide the continuity and connectivity. However, primary routes may be on parallel streets or pathways if the available, especially if the arterial street is prioritized for auto travel.
Secondary Route	Secondary routes support the primary route network, but are not considered as critical. On these routes, the pedestrian and bicycle modes are considered <u>equal or lower priority</u> than vehicle travel modes.	Secondary routes are typically along city arterials and collector streets because the street corridors provide the continuity and connectivity. These are routes where non-motorized activity is expected but the street is prioritized for auto traffic modes or where primary route facilities are not needed and/or feasible.
Other Streets or Paths	These are anything not classified primary or secondary routes. These are other routes not considered critical for citywide plans and projects. Non-motorized facilities would be provided based on the City's design standards.	These are typically on local streets but may also be on arterials and collectors where non-motorized travel is not expected or desired.

The Transportation Master Plan identifies the <u>low-stress</u> pedestrian and bicycle facilities for the streets and pathways in the non-motorized system. For transportation professionals, "low-stress" or "traveler stress" is the more technical performance metric for "comfortable". Traveler stress takes into account the facility design, vehicle volumes and speeds on adjacent streets, and topography. In addition, special areas or districts may be identified for geographic areas to indicate where different levels of stress are acceptable.

The Non-Motorized LOS framework relies on a Transportation Master Plan that identifies the network, the facilities, and the areas to address the QOS goals.

Project-Focused Outcomes

In practice, LOS standards are used by local governments to understand where transportation projects are needed. LOS standards reflect community QOS goals, and when the standards are not met, the community expects that improvement be made over time to bring the facility within standards. Table 2 illustrates how QOS, traveler expectations, and project identification relate.

As shown in Table 2, projects are expected in areas where the QOS is considered “POOR” because people cannot get to desirable destinations in a safe or convenient manner. “POOR” facilities would be the highest priority for project improvements and “ACCEPTABLE” facilities would be lower priority. “GOOD” facilities match the Master Plan expectations for the area.

Table 2: Framework for Non-Motorized Quality of Service

Quality of Service	Traveler Expectations	Project Identification
“GOOD”	People can safely, comfortably, and conveniently get where they want to go	“GOOD” a realistic goal for every primary non-motorized facility. No project is needed if traveler stress is low.
“ACCEPTABLE”	People can safely get where they want to go, but may not be comfortable or convenient.	“ACCEPTABLE” are facilities that are transitioning from “POOR” to “GOOD” and are lower priority areas for new project, in general.
“POOR”	People cannot safely or conveniently get where they want to go.	“POOR” represent major gaps in the primary routes and highlight the highest priorities for non-motorized projects, in general.

2. Framework for LOS Standard

The framework for the LOS standards needs both a table of LOS definitions, and the LOS standards that would be applied. Table 3 shows the LOS definitions, the quantitative stratification of the non-motorized performance metric “traveler stress”. The stratification of LOS can take a form of a letter grade (from A to F) but for Non-Motorized LOS it is can be simplified to Green, Yellow, or Red scale.

Table 3: Level of Service Definitions

Level of Service	Traveler Stress	Description
“GREEN”	Low	LOS GREEN reflects where traveler stress is low and meets community expectations for that area (complies with the Transportation Master Plan). Areas with higher traffic volumes and speeds typically require greater protection for the non-motorized modes.
“YELLOW”	Moderate	LOS YELLOW reflects where traveler stress is moderate and may or may not meet community expectations for that area. There are non-motorized facilities provided, but not enough to reach low-stress levels.
“RED”	High	LOS RED reflects where traveler stress is high and does not meet community expectations for that area. These are areas where non-motorized modes are not separated from higher volume and speed traffic.

The defined LOS Standards for the City of Tumwater would be segmented by geographic areas. The “Urban Corridor District” would have more rigid design standards, whereas the “Practical Design District” would have more flexible design standards.

The LOS Standards are set at:

- LOS GREEN for primary and secondary routes in the Urban Corridor District.
- LOS GREEN for primary routes in the Practical Design District
- LOS YELLOW for secondary routes in the Practical Design District

For facilities not classified as primary or secondary routes, there would be no set LOS Standard.

Implementation and Development Review

Implementation of this framework would require further specific details surrounding stress levels: What are the traffic volume thresholds? What are the traffic speed thresholds? How much does the city want to account for topology? What type and design of facilities does the City want? We have provided a draft set of recommendations in Section 3 that could be incorporated into the Transportation Master Plan.

For Development Reviews the Non-Motorized LOS standard would apply to site frontages. For SEPA analysis, the most direct route between the development site to the nearest transit stop, school, and community center (within a certain distance) would be disclosed. These points would be identified by the City on an official map. If the route includes sections that fail the City’s LOS standard, the developer may be required to mitigate at the City’s discretion according to SEPA guidelines.

City-Wide Monitoring and Concurrency

Concurrency may be monitored in a similar manner. Most communities use two types of concurrency programs. One is a planning-based program to understand if communities are progressing toward their goals and being concurrent with the associated growth. The other is a regulatory-based program that can limit future development if LOS standards along specific corridors are not being achieved. This framework follows a planning-based program approach that monitors completion of the non-motorized system citywide.

Regular monitoring of the Non-Motorized System on a City-wide basis would track metrics associated with percent complete as shown in Table 4. This could be tracked separately for pedestrian and bicycle systems, or combined. The "Existing Year" documents the current state of the network. The "Future Goal" is the Transportation Master Plan conditions that are constrained by the projects that are possible in the next 20 years. The "Study Year" would be the future year that would be evaluated to see if the Percent Complete results are on target to reach the "Future Goal."

Table 4: Monitoring the Non-Motorized System

Mode	Hierarchy Level	Percent Complete (Centerline Miles at LOS GREEN and YELLOW)		
		Existing Year	Study Year[1]	Future Goal[2]
Pedestrian	Primary Route	33%	TBD	TBD
	Secondary Route	36%	TBD	TBD
Bicycle	Primary Route	45%	TBD	TBD
	Secondary Route	27%	TBD	TBD

[1] Study Year percentages to completed with final Transportation Element project list.

[2] Future Goal to be set evaluated and set at a later date.

3. Needs Analysis

This section highlights how the Non-Motorized LOS Framework was applied to existing conditions. Because the framework would benefit from information contained in a Non-Motorized Master Plan, some specific details about the City non-motorized system have been developed that are for discussion purposes only or may be refined into formalized definitions at a later date. The pedestrian and bicycle facilities that are present in Tumwater are first described, followed by an analysis of existing and future non-motorized needs.

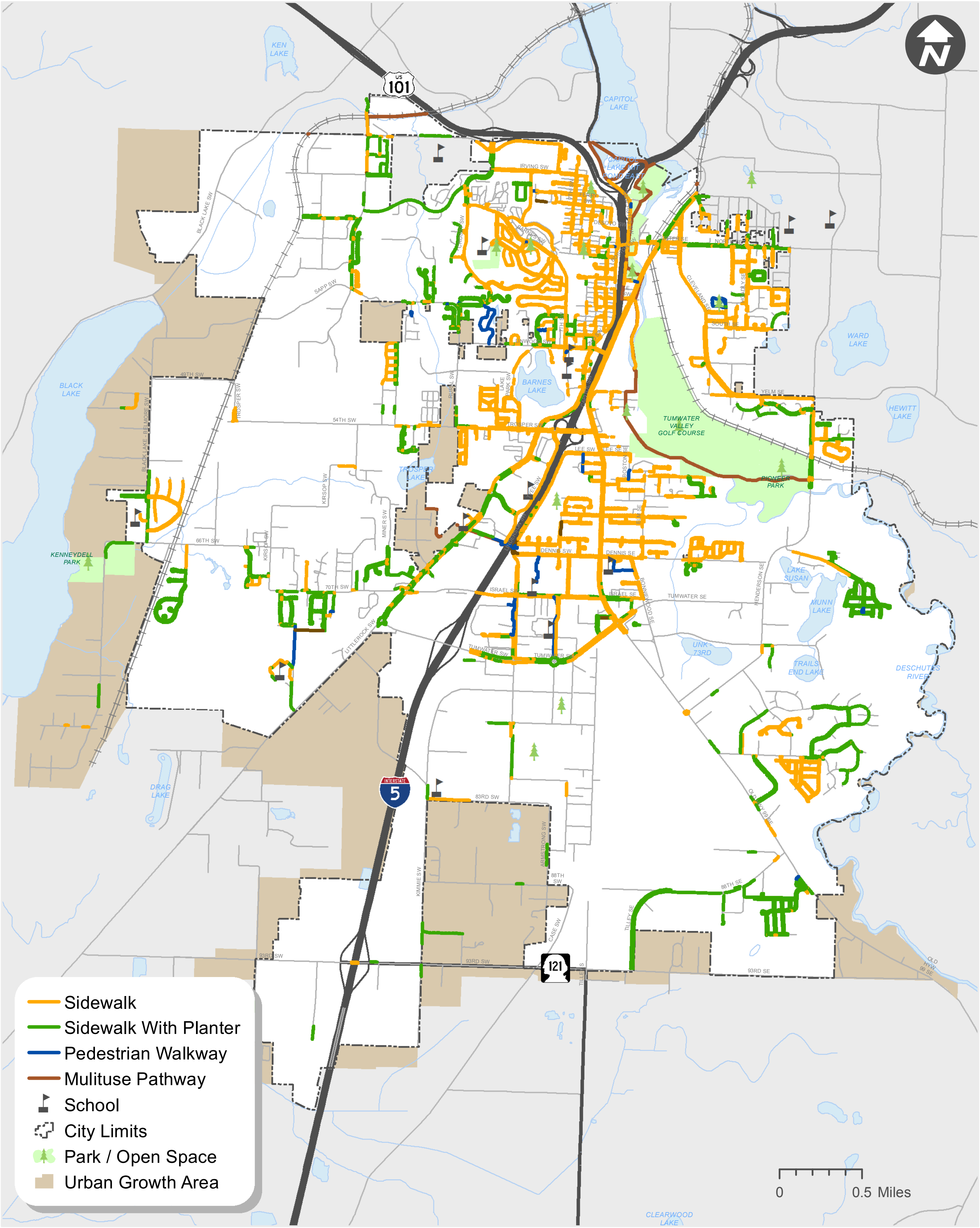
Pedestrian Facilities

Every trip begins or ends with walking. Walking promotes physical activity among residents and provides connections among destinations that include shopping areas, parking lots, and recreational trips within parks and open space. A combination of walkways, sidewalks, and off-street pathways provides the core network for pedestrians.

The following types of pedestrian facilities are present in the City of Tumwater:

- **Attached Sidewalks** are the primary pedestrian facility within downtowns and developed areas. Sidewalks are directly adjacent to the curb or roadway edge and vary in width and quality. They are generally 5 feet wide. There are currently over 65 miles of attached sidewalks in the City of Tumwater.
- **Buffered Sidewalks** (Sidewalks with Planters) include a landscaped area or buffer between the roadway and sidewalk. This buffer area may also include hardscape elements where landscape planters may not be feasible or desirable. These facilities provide additional separation from traveling or parked vehicles and are generally more comfortable for pedestrians. The sidewalks are generally 5 feet wide, with a buffer distance of 4 feet. There are approximately 37 miles of sidewalks with planters in the City limits.
- **Pedestrian Pathways** traverse open areas and are typically paved. Pedestrian walkways are short segments that are used to provide more direct connections between land uses and other types of pedestrian facilities. They are generally an 8-foot wide public space with 5-foot wide paved area. They are typically not designed for bicycle use. There are approximately 2.6 miles of pedestrian walkways in the City of Tumwater.
- **Multiuse Pathways** are longer connections that include paved and unpaved trails that are designed for both pedestrians and bicyclists. These facilities are generally used for recreational purposes, but may also serve commuter and utility travel between neighborhoods and to surrounding areas.

The existing pedestrian facilities in Tumwater are shown in Figure 1. Some cities consider wide shoulders to be pedestrian facilities as well.



Existing Pedestrian Facilities Map

City of Tumwater Transportation Element

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FIGURE

1

transpogroup

Bicycle Facilities

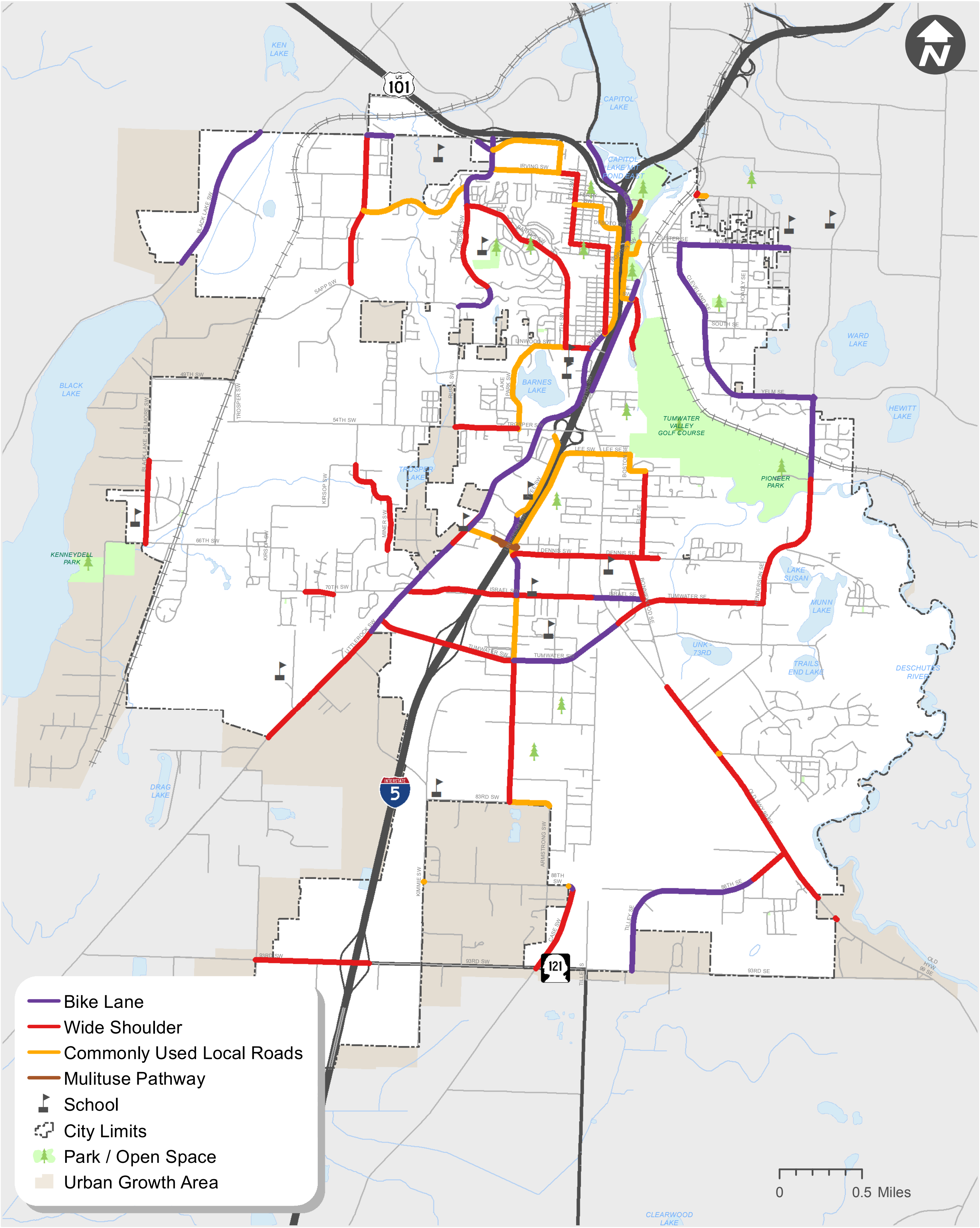
Bicycling is an important and growing mode of travel for people in cities across the country. When appropriately planned, bicycle facilities have a role in reducing congestion, improving air quality, providing travel choices, encouraging exercise and recreation, and providing greater mobility for those without access to a vehicle.

A combination of bicycle lanes, wide shoulders, quiet streets, and off-street pathways provide the core network for bicyclists to travel. The following types of bicycle facilities are present in the City of Tumwater:

- **Bicycle Lanes** are dedicated striped roadway space for cyclists that are typically in both directions on the edge of the traveled way. They are marked with a wide white stripe and range from 4 to 6 feet in width (widths are typically measured from the lane stripe to face of curb). The City has approximately 11 miles of bicycle lanes.
- **Wide Shoulders** are on the edge of the traveled way where there is a reasonable distance available for pedestrians and cyclists to travel with minor impact to motor vehicles. Wide shoulders mean striped shoulders with more than 4 feet width. Narrower shoulders often result in non-motorized users being forced into the vehicle travel lanes. Widths are typically measured from the lane stripe to face of curb, or if no curb to edge of pavement. There are approximately 15 miles of roadways with wide shoulders in the City limits.
- **Multiuse Pathways** are longer connections that include paved and unpaved trails that are designed for both pedestrians and bicyclists. These facilities are generally used for recreational purposes, but may also serve commuter and utility travel between neighborhoods and to surrounding areas.
- **Bike Routes** are low volume, low speed routes that may include shared lane markings or wayfinding signs for bicyclists, but are typically unmarked. These quiet streets that are commonly used by bicyclists comprise approximately 7 miles of the existing bicycle network.

The existing bicycle facilities in Tumwater are shown in Figure 2. Some cities are considering or have built the following bicycle facilities: bike boulevards (like bike routes, but with traffic calming elements); protected bike lanes (like bike lanes but physically separated from vehicle traffic); and specialized bicycle facilities at major intersections.

Item 8.



Existing Bicycle Facilities Map

City of Tumwater Transportation Element

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transpogroup

FIGURE
2

:\Projects\15\15073.01 - Tumwater Transportation Element Update\GIS\Maps\MXD\Figures\Report Figures\Fig02 Existing Bicycle Facilities.mxd

Non-Motorized Network Hierarchy

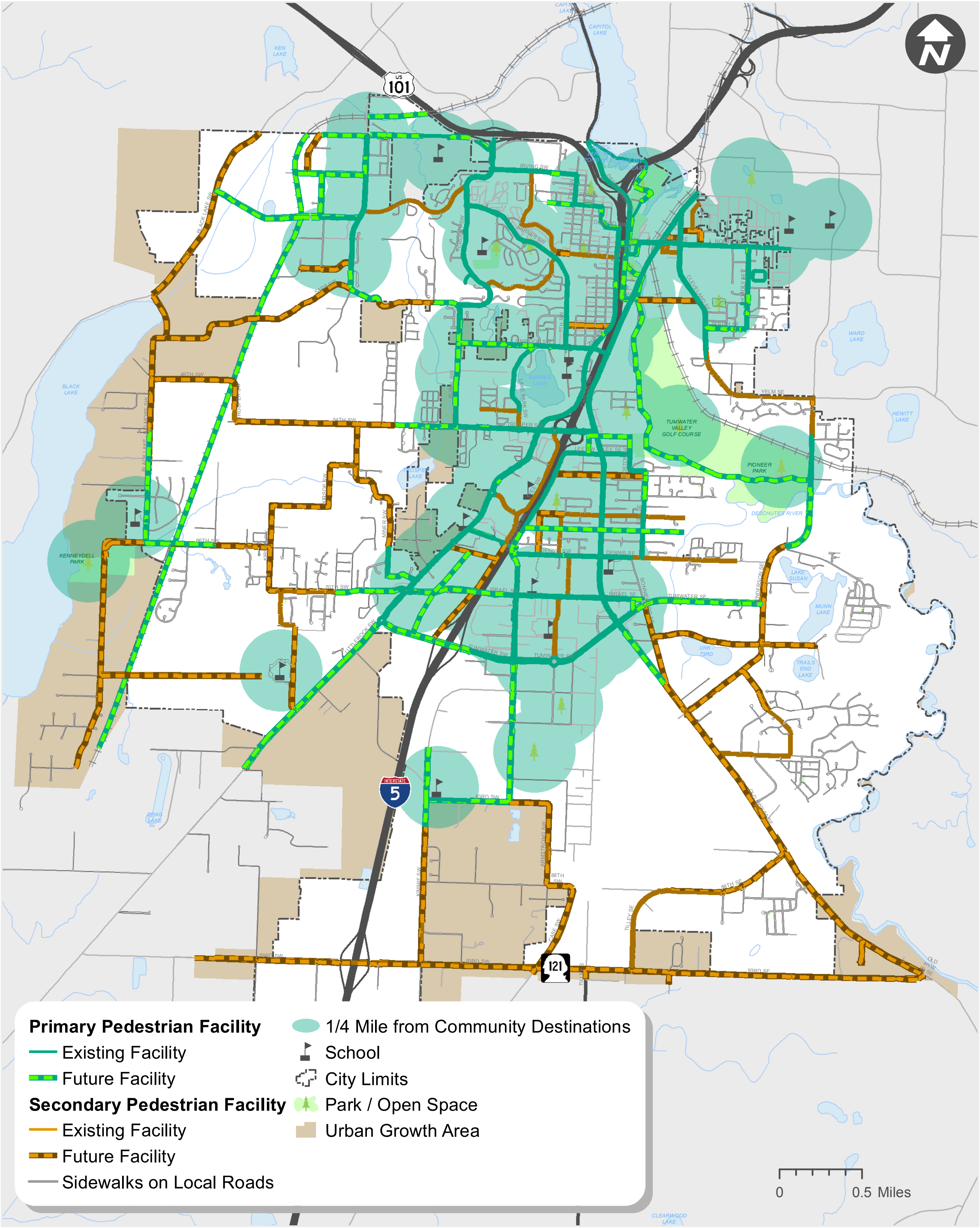
For the purposes of this sample existing analysis the primary and secondary routes were defined for the City of Tumwater network. They are defined separately for pedestrian and bicycle routes.

Pedestrian System

Proximity to schools, transit stops, parks, and other destinations were used to identify priority areas for the pedestrian network. Primary and Secondary pedestrian routes were determined based on the following criteria:

- **Primary pedestrian routes** are sections of arterial and collector roadways that are within ¼ mile of community destinations (schools, parks, and transit stops) that are expected to serve a higher volume of pedestrians. Multiuse pathways are also primary pedestrian routes due to their importance for all non-motorized travelers. Other streets may be included to complete logical gaps in the system.
- **Secondary pedestrian routes** are sections of arterial and collector roadways that are within ¼ mile of community destinations (schools, parks, and transit stops) that are expected to serve a lower volume of pedestrians. Other streets may be included to complete logical gaps in the system.

Pedestrian facilities on Primary routes anticipate higher levels of pedestrian activity due to their proximity to community destinations that generate walking trips. Secondary routes do not have as much pedestrian activity but complete important gaps in the pedestrian network. The City of Tumwater pedestrian network map is shown in Figure 3.



Pedestrian Network Map

City of Tumwater Transportation Element

DRAFT

FIGURE 3

transpogroup

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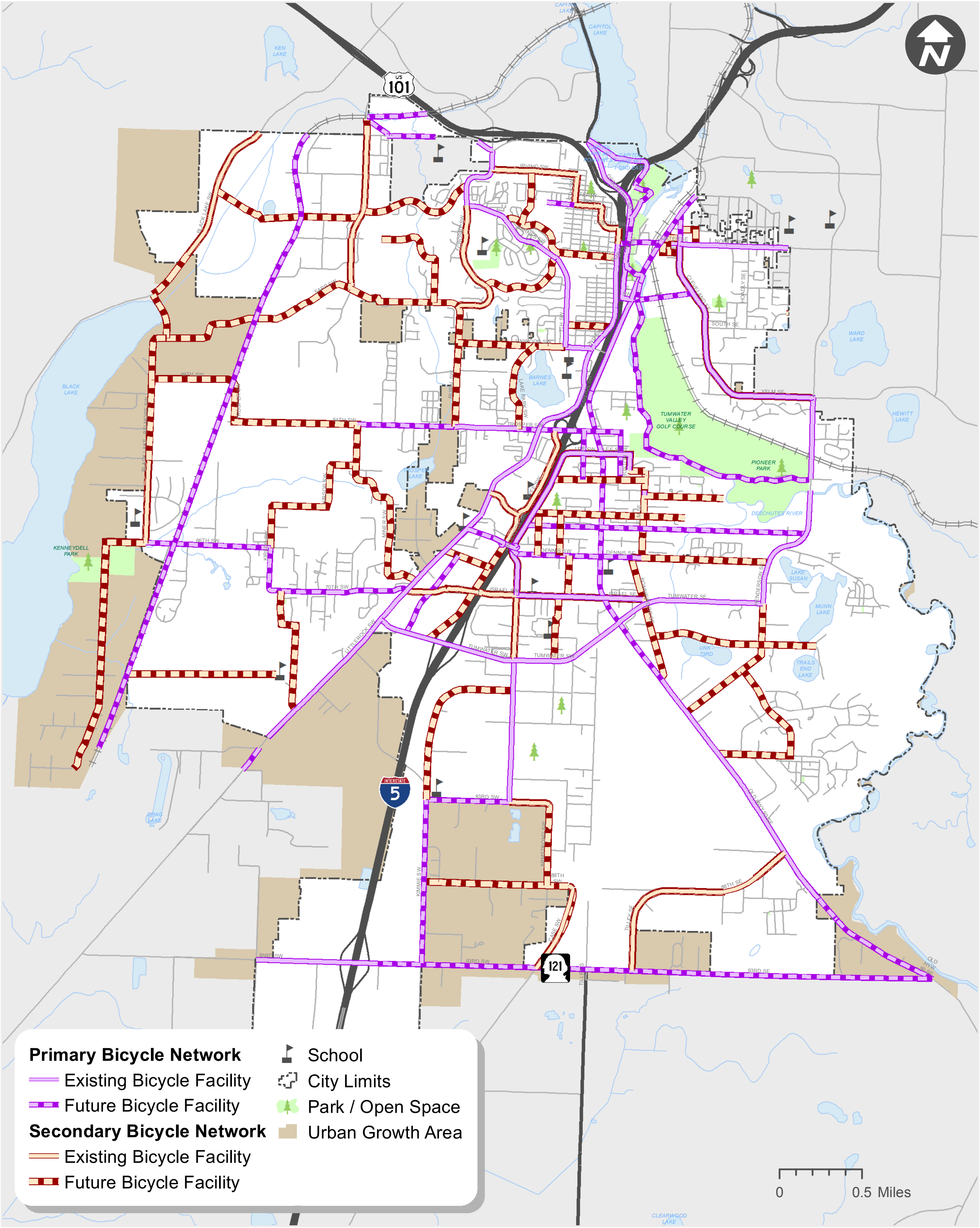
Bicycle System

Bicycles are a network of primary and secondary bicycle streets that form a complete network, linking major bike destinations. The bicycle LOS includes look at the complete bike network considering both the bicycle corridors and the conflicts at major intersections and freeway interchanges.

- **Primary bicycle routes** connect community destinations through a backbone network of arterials, collector roadways, and local streets identified as bike routes. Multiuse pathways are also primary bicycle routes due to their importance for all non-motorized travelers.
- **Secondary bicycle routes** include other arterials, collector roadways, and local streets identified as bike routes that serve as connections between primary bicycle routes.

Primary and Secondary bicycle routes anticipate higher volumes and levels of bicycle activity. The City of Tumwater bicycle network map is shown in Figure 4.



Bicycle Network Map

City of Tumwater Transportation Element

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FIGURE
4

transpogroup

:\Projects\15\15073.01 - Tumwater Transportation Element Update\GIS\Maps\MXD\Figures\Report Figures\Fig04 Bicycle Network.mxd

C. Capitol Boulevard Corridor Plan – Transportation Summary

Following are excerpts from the Capitol Boulevard Corridor Plan with particular relevance to this Transportation Master Plan. The complete plan and its implementing regulations can be found at

<u>Transportation-related Goals and Objectives from the Capitol Boulevard Plan</u>

Improve mobility for pedestrian, bicycle, bus, and automobile transportation.

- Incorporate a multi-modal strategy to make transportation safe and enjoyable for a range of users.
- Develop a multi-modal street network and supporting land uses that diffuse the dependency on Capitol Boulevard to meet the needs of all users at all times.
- Balance regional transportation needs, business access, and non-motorized circulation.
- Address safety of all users.
- Refine multi-modal street design standards to guide new street development that supports walkable communities.
- Consider a variety of measures to reduce excessive traffic speed on existing streets.

Improve pedestrian and bicycle environments.

- Create safe, universally accessible and comfortable walking and bicycling routes throughout the community, especially to schools.
- Improve the safety of existing crosswalks and intersections.
- Utilize urban design, landscaping, sidewalk art, and creative streetscape treatments to encourage walking.
- Connect residential areas to the Boulevard.

Enhance transit experience and efficiency.

- Enhance the transit experience by improving bus stops and the connections to them.
- Increase transit ridership in the central zone.

Transportation Directives and Planning Principles

Directives:

- Reduce congestion growth
- Provide for pedestrian and bicycle connectivity
- Improve neighborhoods
- Beautify corridor
- Mitigate new development impacts

Principles:

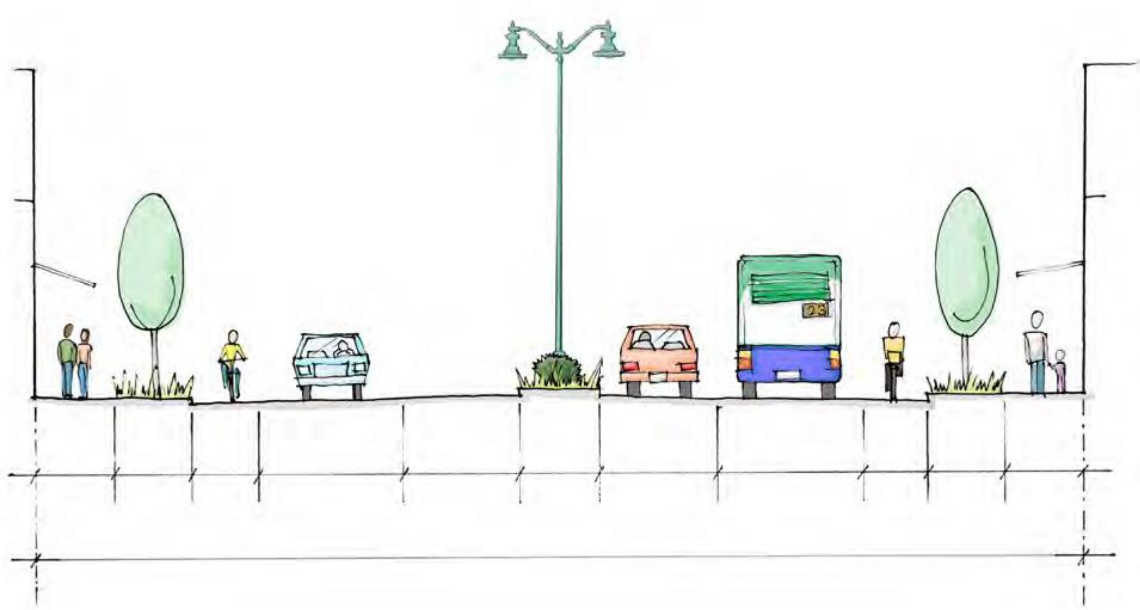
- Added travel lanes to quell congestion is neither feasible or desired
- A parallel street system should be pursued
- Ensure traffic operations help prioritize premium transit
- Enhance streetscape at major intersections and crossings
- Integrate and enhance bus stop facilities
- Establish parallel and intersecting bike network
- Establish parallel and intersecting walking routes

Transportation System Recommendations:

By repurposing existing right-of-way Tumwater will add bike lanes to Capitol Boulevard without having to reconstruct the entire street, which would be cost prohibitive.

(T-7) Initiate Capitol Boulevard improvements, including:

- Rechannelize the street to remove the continuous center, left-turn lane and replace with a 4-6 foot raised median, re-designate travel lanes, and designate new bicycle lanes between T Street and Dennis Street.
- Remove U Street pedestrian crossing due to its proximity to the new T Street crossing; and
- Construct new roundabouts at T, X, and Dennis Streets.



(T-8) Examine the design needs for vision- and mobility-impaired pedestrians, including the need for accessible and audible pedestrian signals, and install new pedestrian crosswalks and hybrid pedestrian beacons at or near:

- New roundabouts
- Gerth Street
  - BPA transmission line corridor
- Existing pedestrian crossing between Dennis Street and Israel Road

(T-9) Use the VE study findings to help determine whether similar median treatment, bike lane and roundabout installations are also suitable on Capitol Boulevard north through Lee Street and south to Israel Road, or whether existing signalized intersections (Lee and Israel) may require minor widening to accommodate greater u-turn traffic demand.

(T-10) Coordinate with property owners and purchase additional rights-of-way to construct a wider sidewalk corridor zone as feasible.

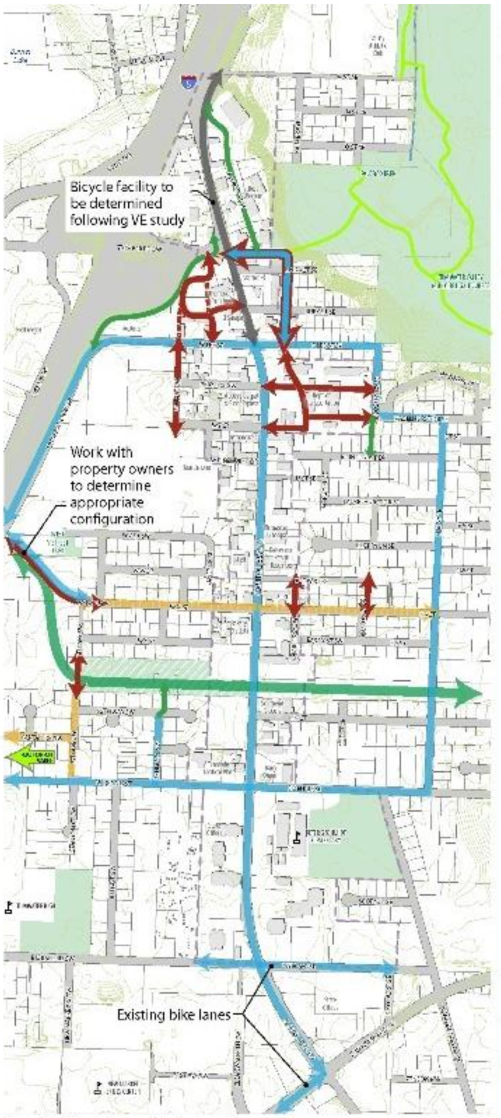
Connectivity Recommendations:

(T-3) Consider findings of Capitol Boulevard / Trosper Road Value-Engineering (VE) study and complete center median curbing along Capitol Boulevard from Trosper Road to Lee Street, in coordination with:

- New North-South Street – a low-speed local access street connection linking Ruby, Linda and Lee Streets with Trosper Road at the Capitol Boulevard intersection. *[Illustration to the right is a schematic of the proposed cross section for this new neighborhood connection.]*
- Westside Internal Connectors

(T-6) Construct local connectors facilitating circulation and access to businesses between Trosper Road and W Lee Street west of Capitol Boulevard

The mobility strategy for Capitol Boulevard includes roundabouts and medians and the addition of bike lanes and improved pedestrian facilities to help transform the old highway character of this street into a more urban, people-oriented place.



(T-13) Construct a narrow two-lane access street between W Lee Street and W T Street along the 6th Avenue SW right-of-way. *[This small roadway would allow residents on Gerth Street to access Capitol Boulevard at a signal or roundabout and would greatly facilitate local circulation.]*

(T-14) Extend X Street westward to Linderson Way SW. *[A connection here provides a much needed east-west route for emergency vehicles and local traffic. Implementation and alignment of this street connection depends on development of property near Linderson. Traffic calming will ensure that X Street provides local access but does not become a shortcut.]*

(T-16) Extend 7th Avenue SW to connect West Y Street with 65th Way SW.

(T-17) Extend Charles Street and Boston Street to connect East W Street and East X Street. *[Boston Street connection will be a narrow*
alley and Charles Street extension will require ROW so these improvements are lower priority than some others.]

(T-18) Establish a loop of bicycle lanes along Linderson Way, West and East Lee Streets, Boston Street, Hazelhurst Drive, Elm Street, and West and East Dennis Streets.

(T-19) Designate X Street, Dennis Place, and 7th Avenue as shared-lane bicycle routes, with signs and pavement markings for “sharrows.”

(T-21) Secure rights-of-way and construct a new shared-use pathway (a) along the BPA/Bonneville transmission lines between Elm Street and 6th Avenue, (b) from the transmission lines to the X Street extension, (c) from Lee Street to Trosper Road, (d) from the new North-South Street to Capitol Boulevard along Market Street, (e) along the 7th Street extension, (f) on the Boston Street easement between Pinehurst and Hazelhurst, and (g) two connections to the Deschutes Valley Trail.

(NL-15) Construct the Deschutes Valley Trail and associated trail spurs according to the Parks plan

Development-driven Transportation Policies:

(T-2) Install driveway modifications at Starbucks drive to prevent left turns. *[This will resolve current operational issues and safety concerns.]*

(T-5) Coordinate with local property owners to plan local street connectors providing local access alternatives to and from Capitol Boulevard via Lee Street.

(T-11) As properties redevelop, require (a) additional rights-of-way and construct a wider sidewalk corridor zone, and (b) parallel to Capitol Boulevard, external site vehicular connectivity.

(T-15) Construct internal streets within any WSDOT site redevelopment. *[These streets are needed for access but will also reduce congestion in this vicinity and enhance site's role as a community focus.*

(T-20) Coordinate with local property owners and/or developers to construct sidewalks and bicycle facilities as part of new street construction, especially those new street connections identified in recommendations T-13 to T-17.

(T-22) As redevelopment occurs, require internal pedestrian connectivity linking neighborhoods behind the commercial strip to Capitol Boulevard.

Transit Policy:

(T-23) As part of the Capitol Boulevard street improvements the City should coordinate with Intercity Transit to revise the current bus stop location and design, conforming with the following:

- Far-side (of intersection) bus stop location guidelines;
- Removal of bus pull-out bays; and
- Placement of stops and added arterial crossing to coincide with recommended corridor improvements.

Traffic Calming Policies:

(NL-2) Construct traffic calming devices – bulb-outs, traffic circles, or chicanes – along X Street (at 7th Avenue and at the commercial/residential zone boundary), Elm Street (at Dennis Street, BPA/Bonneville corridor, and X Street), and along the bike route loop (Lee Street, Boston Street, Hazelhurst Drive, Dennis Street, and Linderson Way) as appropriate to moderate traffic speed. Undertake measures necessary to prevent parking impacts on safety and residential quality.

(NL-3) Ensure that the new access streets near Trosper Road include traffic calming devices.

D. Brewery District Plan – Summary of Recommendations

Transportation-related Goals and Objectives from the Brewery District Plan

Brewery District Vision:

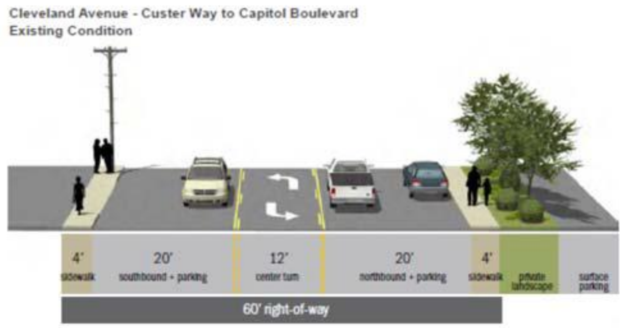
> *The Tumwater Brewery District is a vibrant, neighborly mixed-use urban community with abundant shopping and business services, safe and accessible transportation options and outstanding recreational amenities. At the heart of Washington State's "original city," the Brewery District continues to serve as an historic destination, even as it evolves to provide new homes and economic opportunity for a growing regional population. The District infuses the best of past and present urban development through the preservation of critical heritage sites, incorporation of modern urban design practices and emphasis on creating a unique sense of place.*

Create a strong sense of place by facilitating pedestrian access, establishing gathering places for residents and fostering a District identity.

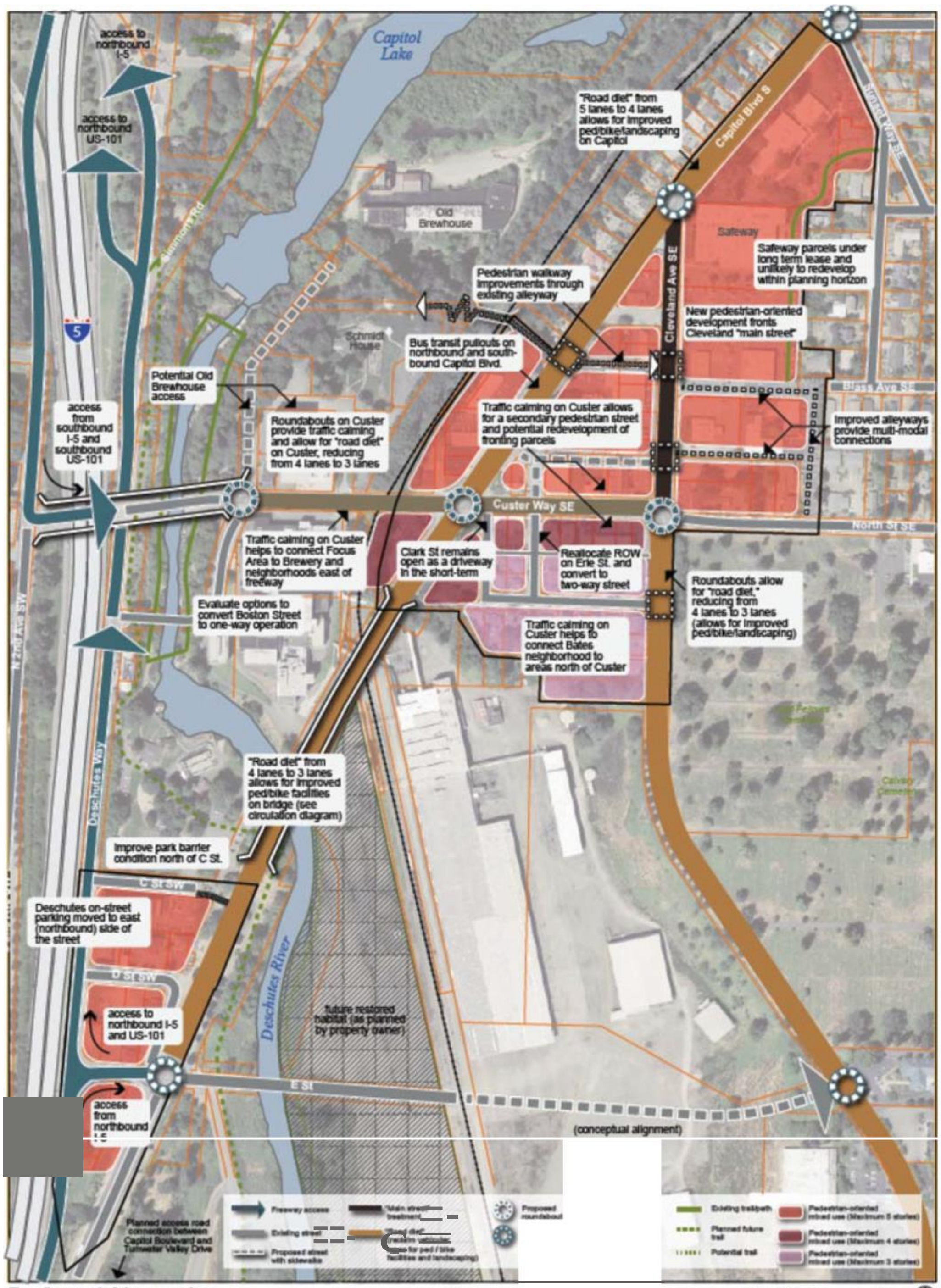
a. Evaluate opportunities for a pedestrian-oriented "Main Street"
b. Consider opportunities for reducing/redistributing wide rights-of-way where appropriate
c. Facilitate opportunities for pedestrian-oriented, mixed-use and commercial development.

Improve transportation options, safety, and access within and across the District.

a. Reduce pressure on over-burdened intersections
b. Improve transit, bicycle and pedestrian access into the District
c. Prioritize and implement safety and comfort enhancements for non-motorized users
d. Update current parking and access management framework



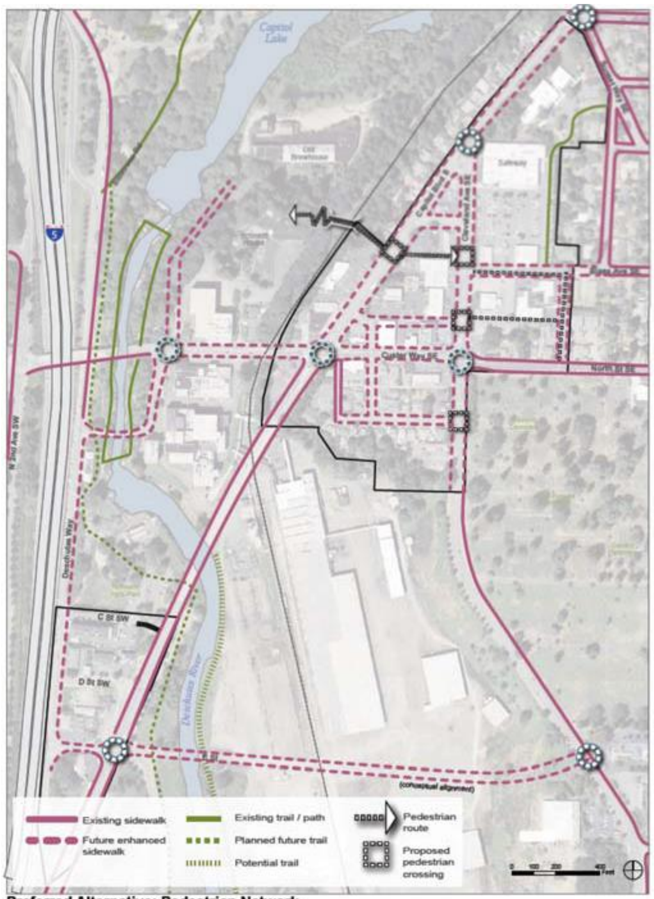
The illustrations demonstrate how repurposing existing right-of-way can be used to create or enhance non-motorized facilities and contribute to the overall livability of a place. Cleveland Avenue, top, and Custer Way, bottom, will be reconfigured so that there is better balance between motorized and non-motorized uses in this area



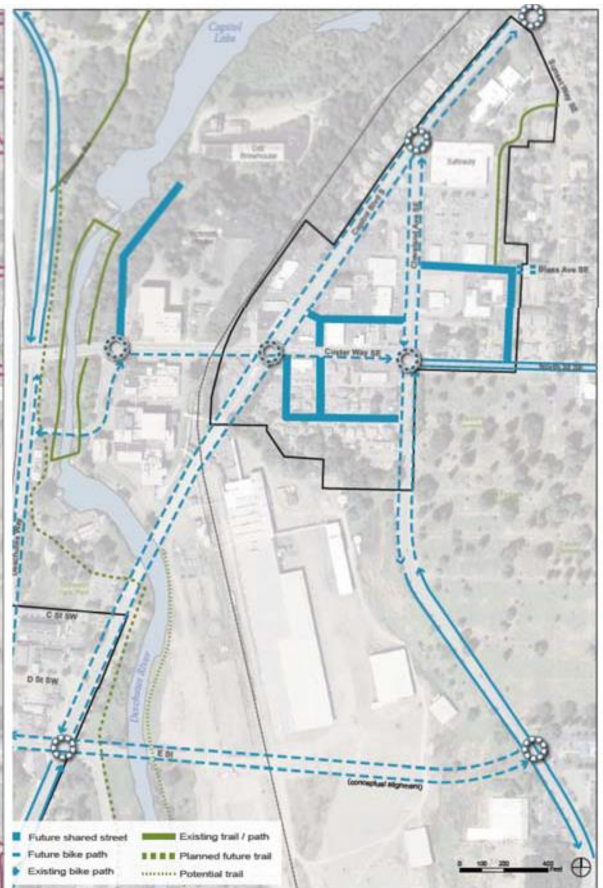
Preferred Alternative
TUMWATER BREWERY DISTRICT PLAN

City of Tumwater • Thurston Regional Planning Council • SERA Architects • J Robertson and Company • SCJ Alliance • ECONorthwest

The land use and transportation strategies for the Brewery District are completely integrated, each relying on the other to be most effective



Preferred Alternative: Pedestrian Network



d Alternative: Bicycle Network

Clearly defined strategies for addressing bike and pedestrian mobility will help ensure the successful transition of the Brewery District into a vibrant, people-oriented place.

Figure 3.4: A road diet on Cleveland Avenue will include adding bicycle facilities, widening sidewalks, and installing street trees and stormwater facilities. The calmed streetscape allows easier pedestrian crossings and creates a more welcoming environment for mixed-use (re)development along the "main street".

Another example of how repurposing valuable right-of-way can be used to transform the character of a place. This planned treatment of Cleveland Avenue will take advantage of a vast space that is greatly under-utilized today.

TO: Planning Commission

FROM: Erika Smith-Erickson, Land Use and Housing Planner, and Brad Medrud, Planning Manager

DATE: January 9, 2024

SUBJECT: Ordinance No. O2023-017, TMC 18.38 FP Floodplain Overlay

---

1) Recommended Action:

Conduct a briefing on Ordinance No. O2023-017, TMC 18.38 FP Floodplain Overlay.

---

2) Background:

Close to three hundred towns, cities, counties, and tribes within the State of Washington participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP). Continued enforcement of the City's floodplain management regulations (TMC 18.38 FP Floodplain Overlay) allows FEMA to make federally backed flood insurance available to property owners within the City of Tumwater.

As a condition of participation in the NFIP, communities are required to adopt and enforce flood hazard reduction regulations that meet the minimum requirements of the NFIP.

In May 2023, City staff completed a FEMA floodplain community assistance visit (CAV) with State Department of Ecology staff to review the City's participation in the National Flood Insurance Program. It was determined that TMC 18.38 *FP Floodplain Overlay* should be updated to reflect current FEMA standards.

On November 8, 2023, FEMA notified the City of the final flood determinations for Thurston County, Washington, and Incorporated Areas, which includes the City of Tumwater. The FEMA flood hazard determinations for the City are considered final. The Flood Insurance Study (FIS) report and Flood Insurance Rate Maps (FIRM) covering the City will be effective May 8, 2024.

Prior to the May 8, 2024, effective date of the FIS and FIRM, the City must amend its existing floodplain regulations to be more consistent with the Model Ordinance for Floodplain Management under the NFIP, the Endangered Species Act, and to maintain its eligibility in the NFIP.

---

3) Alternatives:

- ❑ None

---

4) Attachments:

A. Staff Report
B. Ordinance No. O2023-017
C. Presentation

STAFF REPORT

Date: January 9, 2024

To: Planning Commission

From: Erika Smith-Erickson, Land Use and Housing Planner, and Brad Medrud, Planning Manager

Ordinance No. O2023-017 – TMC 18.38 *FP – Floodplain Overlay*

On November 8, 2023, the Federal Emergency Management Agency (FEMA) notified staff of the final flood determinations for Thurston County, Washington, and Incorporated Areas, which includes the City of Tumwater. The FEMA flood hazard determinations for the City are considered final. The Flood Insurance Study (FIS) report and Flood Insurance Rate Maps (FIRM) will be effective May 8, 2024.

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Summary

The proposed amendments are intended to make alterations to the City's floodplain ordinance to bring it into compliance with NFIP and Washington state standards.

Background

Close to three hundred towns, cities, counties, and tribes within the State of Washington participate in the NFIP. Continued enforcement of the floodplain management ordinance allows FEMA to make federally backed flood insurance available to property owners within the City of Tumwater.

As a condition of participation in the NFIP, communities are required to adopt and enforce a flood hazard reduction ordinance that meets the minimum requirements of the NFIP.

The purpose of *TMC 18.38 FP Floodplain Overlay* is to:

> *"…promote the public health, safety, and general welfare by managing development in order to:*
>
> *A. Protect human life, health and property from the dangers of flooding;*
>
> *B. Minimize the need for publicly funded and hazardous rescue efforts to save those who are isolated by flood waters;*
>
> *C. Minimize expenditure of public money for costly flood damage repair and flood control projects;*

D. Minimize disruption of commerce and governmental services;

E. Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in the floodplain;

F. Maintain a stable tax base by providing for the sound use of floodprone areas so as to minimize future flood blight areas;

G. Encourage those who occupy areas subject to flooding and channel migration to assume responsibility for their actions;

H. Qualify the city of Tumwater for participation in the National Flood Insurance Program, thereby giving citizens and businesses the opportunity to purchase flood insurance;

I. Maintain the quality of water in rivers, streams, lakes, estuaries, and marine areas and their floodplains so as to protect public water supplies, areas of the public trust, and wildlife habitat protected by the Endangered Species Act;

J. Retain the natural channel, shoreline, and floodplain creation processes and other natural floodplain functions that protect, create, and maintain habitat for threatened and endangered species;

K. Prevent or minimize loss of hydraulic, geomorphic, and ecological functions of floodplains and stream channels."[1]

In May 2023, City staff completed a FEMA floodplain community assistance visit (CAV) with State Department of Ecology staff to review the City's participation in the National Flood Insurance Program. It was determined that TMC 18.38 *FP Floodplain Overlay* should be updated to reflect current standards.

To maintain eligibility in the NFIP, the City must update its ordinance to meet minimum Federal and State Standards by the time the updated FIS and FIRM become effective on May 8, 2024.

The amendments are a part of the approved 2023 Long Range Planning work program.

Floodplain Overlay Amendments

The following is a summary of the proposed amendments that make up the floodplain overlay code.

1. Definitions

Clarify and add definitions as needed for enhanced interpretation of floodplain regulations.

Code Section to be amended:

[1] TMC 18.38.010 *Purpose*.

- TMC 18.38.070 – Definitions.

Proposed amendment language:

18.38.070 Definitions.

[…]

“Alteration of watercourse” means any action that will change the location of the channel occupied by water within the banks of any portion of a riverine waterbody.

[...]

“Area of special flood hazard” means the land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. It is shown on the flood insurance rate map (FIRM) as zone A, AO, AH, A1-30, AE, A99, AR (V, VO, V1-30, VE). “Special flood hazard area” is synonymous in meaning with the phrase “area of special flood hazard”.

[...]

“Development” means any manmade change to improved or unimproved real estate in the special flood hazard area (SFHA), including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, storage of equipment or materials, subdivision of land, removal of more than five percent of the native vegetation on the property, ~~or~~ alteration of natural site characteristics, or storage of equipment or materials.

[…]

“Flood” or “flooding” means a general and temporary condition of partial or complete inundation of normally dry land areas from:

A. The overflow of inland or tidal waters; and/or

B. The unusual and rapid accumulation of runoff of surface waters from any source.

C. The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (A) of this definition.

“Flood elevation study (FES)” means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards. Also known as a flood insurance study (FIS).

“Flood insurance rate map (FIRM)” means the official map on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the city of Tumwater.

"Flood insurance study (FIS)" means the official report provided by the Federal Emergency Management Agency that includes flood profiles, the flood insurance rate map (FIRM), and the water surface elevation of the base flood.

[…]

"Floodplain administrator" means the community official designated by title to administer and enforce the floodplain management regulations.

"Flood proofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate risk of flood damage to real estate or improved real property, water and sanitary facilities, structures, and their contents. Flood proofed structures are those that have the structural integrity and design to be impervious to floodwater below the base flood elevation.

"Floodway" means the channel of a stream or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot at any point. Also referred to as "regulatory floodway".

"Functionally dependent use" means a use that must be located or carried out close to water, e.g., docking or port facilities necessary for the unloading of cargo or passengers or shipbuilding and ship repair, and does not include long term storage or related manufacturing facilities.

"Highest adjacent grade" means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

[…]

"Mean sea level" means for the purposes of the National Flood Insurance Program, the vertical datum to which base flood elevations shown on a community's flood insurance rate map are referenced.

[…]

"New construction" means structures for which the "start of construction" commenced on or after the effective date of this chapter and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

[…]

"Special flood hazard area (SFHA)" means the land subject to inundation by the base flood. Special flood hazard areas are designated on flood insurance rate maps (FIRMs) with the letters "A" or "V" including AE, AO, AH, A1-99 and VE. The special flood hazard area is also referred to as the area of special flood hazard or SFHA.

[…}

“Structure” means a walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

[…]

“Substantial improvement” means any repair, reconstruction, rehabilitation, addition, replacement, or other improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure before the “start of construction” of the improvement. This term includes structures which have incurred “substantial damage,” regardless of the actual repair work performed. The term does not include any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, any alteration of a “historic structure”, provided that the alteration will not preclude the structure's continued designation as a “historic structure.”

[…]

“Zone” means one or more areas delineated on the FIRM. The following zones may be used on the adopted FIRM. The special flood hazard area (SFHA) is comprised of the A and V zones.

“A” means SFHA where no base flood elevation (BFE) is provided.

“A#” means numbered A zones (e.g., A7 or A14), SFHA with a ~~base flood~~ elevation BFE.

“AE” means SFHA with a ~~base flood~~ elevation BFE.

“AO” means SFHA subject to inundation by shallow flooding usually resulting from sheet flow on sloping terrain, with average depths between one and three feet. Average flood depths are shown.

“AH” means SFHA subject to inundation by shallow flooding (usually areas of ponding) with average depths between one and three feet. ~~Base flood elevations~~ BFEs are shown.

“B” means the area between the SFHA and the five-hundred-year flood of the primary source of flooding. It may also be an area with a local, shallow flooding problem or an area protected by a levee.

“C” means an area of minimal flood hazard, as above the five-hundred-year flood level of the primary source of flooding. B and C zones may have flooding that does not meet the criteria to be mapped as a special flood hazard area, especially ponding and local drainage problems.

“D” means area of undetermined but possible flood hazard.

“V” means the SFHA subject to coastal high hazard flooding including waves of three feet or greater in height. There are three types of V zones: V, V#, and VE, and they correspond to the A zone designations.

“X” means the area outside the mapped SFHA.

“Shaded X” means the same as a zone B, above.

2. Special Flood Hazard Areas

The intent of this amendment is to update the FIS areas and FIRM identified by FEMA to the most current versions effective May 8, 2024.

Code Section to be amended:

- 18.38.090 – Special flood hazard areas.

Proposed amendment language:

18.38.090 Special flood hazard area.

A. The special flood hazard area (SFHA) is the area subject to flooding by the base flood and subject to the provisions of this chapter. It is identified by the Federal Emergency Management Agency in a scientific and engineering report entitled, "Flood Insurance Study for Thurston County, Washington and Incorporated Areas," dated ~~October 16, 2012~~ May 8, 2024 and any revisions thereto, with an accompanying Flood Insurance Rate Map (FIRM) for Thurston County, Washington and Incorporated Areas, dated ~~October 16, 2012~~ May 8, 2024, and any revisions thereto, which are hereby adopted by reference and declared to be a part of this chapter. The flood insurance study and the FIRM are on file at Tumwater City Hall, 555 Israel Road SW, Tumwater, Washington 98501.

B. Upon receipt of a floodplain development permit application, the floodplain administrator shall compare the elevation of the site to the base flood elevation. A development project is not subject to the requirements of this chapter if it is located on land that can be shown to be:

1. Outside the protected area; and

2. Higher than the ~~base flood elevation~~ BFE as demonstrated by an elevation certificate.

The floodplain administrator shall inform the applicant that the project will still be subject to the flood insurance purchase requirements unless the owner receives a letter of map amendment from FEMA.

C. The floodplain administrator shall make interpretations where needed, as to the exact location of the boundaries of the SFHA and the protected area (e.g., where there appears to be a conflict between the mapped SFHA boundary and actual field conditions as determined by the ~~base flood elevation~~ BFE and ground elevations). The applicant may appeal the floodplain administrator's interpretation of the location of the boundary to the hearing examiner.

3. Flood Hazard Data

This code section amendment is intended to clarify the source of the most current flood data and maps.

Code Sections to be amended:

- TMC 18.38.100 – Flood hazard data.

Proposed amendment language:

18.38.100 Flood hazard data.

A. The base flood elevation (BFE) for the SFHAs of the city of Tumwater shall be as delineated on the one-hundred-year flood profiles in the Flood Insurance Study for Thurston County, Washington and Incorporated Areas.

B. The ~~base flood elevation~~ BFE for each SFHA delineated as a "zone AH" or "zone AO" shall be that elevation (or depth) delineated on the flood insurance rate map (FIRM). Where base flood depths are not available in zone AO, the base flood elevation shall be considered to be two feet above the highest grade adjacent to the structure.

C. The ~~base flood elevation~~ BFE for all other SFHAs shall be as defined in subsection F of this section and 18.38.120(C).

D. The flood protection elevation (FPE) shall be the base flood elevation plus one foot.

E. The floodway shall be as delineated on the ~~flood insurance rate map~~ FIRM or in accordance with subsection F of this section and TMC 18.38.120(D).

F. Where ~~base flood elevation~~ BFE and floodway data have not been provided in special flood hazard areas in accordance with 18.38.090, the floodplain administrator shall obtain, review, and reasonably utilize any ~~base flood elevation~~ BFE and floodway data available from a federal, state, or other source.

4. Floodplain Development Permit Required

This code section amendment is intended to clarify when and where a floodplain development permit is required.

Code Sections to be amended:

- TMC 18.38.130 – Floodplain development permit required.

Proposed amendment language:

18.38.130 ~~Establishment of f~~Floodplain development permit required.

A floodplain development permit ~~shall be obtained~~ is required before construction or development begins within the special flood hazard area (SFHA) established in TMC 18.38.090. The permit shall be for all development as set forth in TMC 18.38.070, Definitions.

5. Floodplain Development Permit

This code section amendment is intended to add new permit application requirements such as elevation certificate information requirements, elevations related to mean sea level, and engineering analysis requirements.

Code Sections to be amended:

- TMC 18.38.140 – Floodplain development permit application.

Proposed amendment language:

18.38.140 Floodplain development permit application.
Application for a floodplain development permit shall be made on forms furnished by the floodplain administrator and shall include, but are not limited to:

[...]

C. If the proposed project includes a new structure, substantial improvement, or repairs to a substantially damaged structure that will be elevated, the application shall include the flood protection elevation (FPE) for the building site and the proposed elevations of the following:

1. *The top of bottom floor (including basement, crawlspace, or enclosure floor).*
2. *The top of the next higher floor.*
3. *The bottom of the lowest horizontal structural member (in V zones only).*
4. *The top of the slab of an attached garage.*
5. *The lowest elevation of machinery or equipment servicing the structure.*
6. *The lowest adjacent (finished) grade next to structure.*
7. *The highest adjacent (finished) grade next to structure.*
8. *The lowest adjacent grade at the lowest elevation of a deck or stairs, including structural support.*

[…]

E. If a project will alter the base flood elevation data (BFE) or boundaries of the SFHA, the project applicant shall provide the floodplain administrator with engineering documentation *and analysis regarding the proposed change. If the change to the BFE or boundaries of the SFHA would normally require a Letter of Map Change, the project approval shall be conditioned accordingly.*

F~~E~~. The proposed project must be designed and located so that new structural flood protection is not needed.

G~~F~~. The application shall include a description of the extent to which a stream, lake, or other water body, including its shoreline, will be altered or relocated as a result of the proposed development.

1. *Bank stabilization measures along salmonid-bearing streams, channel migration zones, and along estuarine and marine shorelines must be minimized to the maximum extent possible. If bank stabilization measures are necessary, bioengineered armoring of streambanks and shorelines must be used.*
2. *Channel Migration. No activity is allowed that limits the natural meandering pattern of the channel migration zone; however, natural channel migration patterns may be enhanced or restored.*

H~~G~~. The application shall include documentation that the applicant will apply for all necessary permits required by federal, state, or local law. The application shall include written acknowledgment that the applicant understands that the final certification of use or certificate of occupancy will be issued only if the applicant provides copies of the required federal, state, and local permits or letters stating that a permit is not required. The floodplain permit is not valid if those other permits and approvals are not obtained prior to any ground disturbing work or structural improvements.

I~~H~~. The application shall include acknowledgment by the applicant that representatives of any federal, state or local unit of government with regulatory authority over the project are authorized to enter upon the property to inspect the development.

J. The application shall include the elevation in relation to mean sea level, of the lowest floor (including basement) of all structures recorded on a current elevation certificate with section B completed by the floodplain administrator.

K. The application shall include the elevation relation to mean sea level to which any structure has been flood proofed.

L. The application shall include, where development is proposed in a floodway, an engineering analysis indicating no rise of the base flood elevation (BFE).

M. The application shall include any other such information that may be reasonably required by the floodplain administrator in order to review the application.

6. Duties of the Floodplain Administrator

This code section amendment is intended to update language from protected area to floodway and add an additional role to the duties of the floodplain administrator.

Code Sections to be amended:

- TMC 18.38.170 – Duties of the floodplain administrator.

Proposed amendment language:

18.38.170 Duties of the floodplain administrator.
Duties of the floodplain administrator shall include, but not be limited to:

[...]

C. Review all floodplain development permits to determine if the proposed development is located in the ~~protected area~~ floodway. If located in the ~~protected area~~ floodway, ensure that the provisions of TMC 18.38.320 through 18.38.400 are met.

D. Ensure that all development activities within the special flood hazard area (SFHA) of the jurisdiction of the city of Tumwater meet the requirements of this chapter.

[...]

G. Submit reports to include the projects for which they issue floodplain development permits, including effects to flood storage, fish habitat, and all indirect effects of development and mitigation provided to FEMA as required for the National Flood Insurance Program (NFIP).

[...]

J. Interpretations as to exact location of the boundaries of the areas of special flood hazards where needed (e.g., where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation. Such appeals shall be granted consistent with the standards of 44 CFR 60.6 of the Rules and Regulations of the NFIP.

7. Records

This code section amendment is intended clarify what information is to be retained and what specific elevations are required for records.

Code Sections to be amended:

- TMC 18.38.180 – Records.

Proposed amendment language:

18.38.180 Records.

A. Where base flood elevation data (BFE) have been obtained pursuant to TMC 18.38.100 and 18.38.120, the floodplain administrator shall obtain, record, and maintain the actual "finished construction" elevations (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, for the locations listed in TMC 18.38.140(C), and whether or not the structure contains a basement. This information shall be recorded on a current FEMA Elevation Certificate ~~(FEMA Form 81-31)~~, signed and sealed by a professional land surveyor, currently licensed in the state of Washington.

B. For all new or substantially improved dry floodproofed nonresidential structures, where ~~base flood elevation~~ BFE data has been obtained pursuant to TMC 18.38.100 and 18.38.120, the floodplain administrator shall: ~~obtain~~

1. Obtain, record and maintain the elevation (in relation to ~~the datum of the effective FIRM~~ mean sea level) to which the structure was floodproofed.

2. This information shall be recorded on a current FEMA floodproofing certificate ~~(FEMA FORM 81 65)~~ by a professional engineer currently licensed in the state of Washington.

C. Where elevation data is not available, either through the FIS, FIRM, or from another authoritative source (as required by TMC 18.38.100(F)), the floodplain administrator shall review applications for floodplain development to assure that proposed construction will be reasonably safe from flooding based on the use of historical data, high water marks, photographs of past flooding, etc., where available.

Failure to elevate habitable buildings at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.

D. The floodplain administrator shall obtain, record, and maintain the records for public inspection of the following:

1. Certification required by TMC 18.38.360(1).

2. Records of all variance actions, including justification for their issuance.

3. Improvement and damage calculations.

4. All records pertaining to the provisions of this ordinance.

8. Development and Subdivisions

The proposed amendments clarify which types of land division proposals are subject to the requirements of this section and add requirements for projects over a certain size.

Code Section to be amended:

- TMC 18.38.210 – Development and subdivisions.

Proposed amendment language:

18.38.210 Development and ~~S~~ subdivisions.

This section applies to all development and subdivision proposals~~,~~. Subdivision proposals include short subdivisions, short plats, binding site plans, planned developments, and new and expansions to manufactured housing parks.

A. All proposals shall be consistent with the need to minimize flood damage.

B. ~~The~~ A proposed subdivision must have one or more new lots in the special flood hazard area (SFHA) set aside for open space use through deed restriction, easement, subdivision covenant, or donation to a public agency.

1. In the ~~special flood hazard area~~ (SFHA) outside the protected area, zoning must maintain a low density of floodplain development.

2. In the ~~special flood hazard area~~ (SFHA) outside the protected area in which the current zoning is less than five acres must maintain the current zoning.

3. The density of the development in the portion of the development outside the ~~special flood hazard area~~ (SFHA) may be increased to compensate for the amount of land in the ~~special flood hazard area~~ (SFHA) preserved as open space in accordance with TMC Title 18.

C. If a parcel has a buildable site outside the special flood hazard area, it shall not be subdivided to create a new lot, tract, or parcel within a binding site plan that does not have a buildable site outside the special flood hazard area. This provision does not apply to lots set aside from development and preserved as open space.

D. All proposals shall have utilities and facilities, such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.

E. All subdivision proposals shall ensure that ~~all subdivisions have~~ there is at least one access road connected to land outside the ~~special flood hazard area~~ (SFHA) with the surface of the road at or above the FPE wherever possible.

F. All proposals shall have adequate drainage provided to avoid exposure to water damage.

G. ~~The~~ A final recorded subdivision ~~plat~~ shall include a notice that part of the property is in the SFHA, riparian habitat zone and/or channel migration area, as appropriate.

H. Where subdivision proposals and other proposed developments contain greater than fifty lots or five acres (whichever is the lesser) base flood elevation data (BFE) shall be included as part of the application.

9. Flood Protection Standards

An amendment to clarify standards for construction within specific flood zones.

Code Section to be amended:

- TMC 18.38.184 – Flood protection standards.

Proposed amendment language:

18.38.260 Flood protection standards.

A. In AE and A1-30 zones or other A zoned areas where the base flood elevation data (BFE) has been determined or can be reasonably obtained, ~~A~~ all new structures and substantial improvements of any structure shall have the lowest floor, including basement, elevated at least one foot above the ~~FPE~~ BFE.

B. The structure shall be aligned parallel with the direction of flood flows where practicable.

C. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

D. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

E. ~~The structure~~ All new construction and substantial improvements, including those related to manufactured homes, shall be anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads including the effects of buoyancy.

F~~D~~. All materials below the FPE shall be resistant to flood damage and firmly anchored to prevent flotation. Materials harmful to aquatic wildlife, such as creosote, are prohibited below the FPE.

G~~E~~. Electrical, heating, ventilation, duct work, plumbing, and air-conditioning equipment and other service facilities shall be elevated above the FPE. Water, sewage, electrical, and other utility lines below the FPE shall be constructed so as to prevent water from entering or accumulating within them during conditions of flooding.

H~~F~~. Fully enclosed areas below the lowest floor that are subject to flooding shall be used only for parking, storage, or building access and shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or licensed architect and/or meet or exceed the following minimum criteria:

1. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.

2. The bottom of all openings shall be no higher than one foot above grade.

3. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

I~~G~~. In zones V, V1-30 and VE, new structures and substantial improvements shall be elevated on pilings or columns so that:

1. The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated above the FPE.

2. The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Wind and water loading values shall each have a one percent chance of being equaled or exceeded in any given year (one-hundred-year mean recurrence interval).

3. The areas below the lowest floor that are subject to flooding shall be free of obstruction.

4. The structure or improvement shall be located landward of the reach of mean high tide.

5. The use of fill for structural support of a structure or addition is prohibited.

6. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting these provisions.

J. New construction and substantial improvement of any residential structure in an Unnumbered A zone for which a BFE is not available and cannot be reasonably obtained shall be reasonably safe from flooding, but in all cases the lowest floor shall be at least two feet above the highest adjacent grade.

K. A garage attached to a residential structure, constructed with the garage floor slab below the BFE, must be designed to allow for the automatic entry and exit of floodwaters.

10. Nonresidential construction

The amendment to this section is to make clear the nonresidential development and standards within certain flood zones.

Code Section to be amended:

- TMC 18.38.270- Nonresidential construction.

Proposed amendment language:

18.38.270 Nonresidential construction.

~~*New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall be elevated in accordance with TMC 18.38.260. As an alternative to elevation, a new or substantial improvement to a nonresidential structure and its attendant utility and sanitary facilities may be dry floodproofed in A zones. The project must meet the following:*~~

~~*A. The structure is not located in zones V, V1-30, or VE; and*~~

~~*B. Below the FPE the structure is watertight with walls substantially impermeable to the passage of water; and*~~

~~*C. The structural components are capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and*~~

~~*D. The plans are certified by a registered professional engineer or licensed architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the floodplain administrator as set forth in TMC 18.38.180(B) and 18.38.190(A)(1).*~~

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet the requirements of TMC 18.38.270(A) or (B), below.

A. New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet all of the following requirements:

1. In AE and A1-30 zones or other A zoned areas where the base flood elevation data (BFE) has been determined or can be reasonably obtained:

New construction and substantial improvement of any commercial, industrial, or other nonresidential structure shall have the lowest floor, including basement, elevated one foot or more above the BFE, or elevated as required by ASCE 24, whichever is greater. Mechanical equipment and utilities shall be waterproofed or elevated at least one foot above the BFE, or as required by ASCE 24, whichever is greater.

2. If located in an unnumbered A zone for which a BFE is not available and cannot be reasonably obtained, the lowest floor shall be at least two feet above the highest adjacent grade.

3. Fully enclosed areas below the lowest floor that are subject to flooding are prohibited or shall meet the requirements of TMC 18.38.210.

B. If the requirements of TMC 18.38.272(A) are not met, new construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet all of the following requirements:

1. Be dry flood proofed so that below one foot or more above the base flood level the structure is watertight with walls substantially impermeable to the passage of water or dry flood proofed to the elevation required by ASCE 24, whichever is greater;

2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

3. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in TMC 18.38.180.

11. Manufactured Homes

The amendments proposed specify methods and practices to minimize flood damage.

Code Section to be amended:

- TMC 18.38.280- Manufactured homes.

Proposed amendment language:

18.38.280 Manufactured homes.
All manufactured homes to be placed or substantially improved on sites shall be:

A. Elevated on a permanent foundation in accordance with TMC 18.38.260; and

B. Securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors, and shall be installed using methods and practices that minimize flood damage. This requirement is in addition to other applicable anchoring requirements for resisting wind forces.

12. Detached Accessory Structures

A new section specific to detached accessory structures and standards for developing in the floodway.

Code Section to be added:

- TMC 18.38.285- Detached accessory structures.

Proposed amendment language:

18.38.285 Detached accessory structures.

A. Detached accessory structures used solely for parking of vehicles or limited storage may be constructed such that the floor is below the base flood elevation data (BFE), provided the structure is designed and constructed in accordance with the following requirements:

1. In special flood hazard areas other than coastal high hazard areas (Zones A, AE, AH, AO, and A1-30), the structure is not larger than a one-story two-car garage;

2. In coastal high hazard areas (Zones V, VE, V1 30, and VO), the structure is not larger than 100 sq. ft. in area;

3. The portions of the structure located below the BFE must be built using flood resistant materials;

4. The structure must be adequately anchored to prevent flotation, collapse, and lateral movement;

5. Any machinery or equipment servicing the structure must be elevated or floodproofed to or above the BFE;

6. The structure must comply with floodway encroachment provisions in TMC 18.38.360(1);

7. The structure must be designed to allow for the automatic entry and exit of flood waters in accordance with TMC 18.38.240(F);

8. The structure shall have low damage potential;

9. If the structure is converted to another use, it must be brought into full compliance with the standards governing such use; and

10. The structure shall not be used for human habitation.

13. Storage of Materials and Equipment

A new section proposed for the storage of certain materials in the floodway.

Code Section to be added:

- TMC 18.38.325- Storage of materials and equipment.

Proposed amendment language:

18.38.325 Storage of materials and equipment.
A. The storage or processing of materials that could be injurious to human, animal, or plant life if released due to damage from flooding is prohibited in special flood hazard areas.

B. Storage of other material or equipment may be allowed if not subject to damage by floods and if firmly anchored to prevent flotation, or if readily removable from the area within the time available after flood warning.

14. Floodway Standards

An amendment to clarify standards for projects within the floodway and state all construction shall comply with all flood hazard reduction provisions of TMC 18.38.

Code Section to be amended:

- TMC 18.38.360 – Floodway standards.

Proposed amendment language:

18.38.360 Floodway standards.

A. In addition to the other requirements of this chapter, a project to develop in the floodway as delineated pursuant to TMC 18.38.100(E) and (F) or 18.38.120(D) shall meet the following criteria:

1. <u>Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless</u> ~~T~~<u>t</u>he applicant ~~shall~~ provide<u>s</u> ~~s~~ <u>a</u> certification by a registered professional engineer demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed development would not result in any increase in flood levels during the occurrence of the base flood discharge.

2. Construction or reconstruction of residential structures is prohibited within designated floodways, except for ~~the following~~ <u>repairs, reconstruction, or improvements to a residential structure which do not increase the ground floor area</u>. The following exceptions must still meet all other requirements in the chapter, including subsection (A)(1) of this section:

a. Repairs, reconstruction, or improvements to a residential structure that do not increase the ground floor area, providing the cost of which does not exceed fifty percent of the market value of the structure either:

i. Before the repair, or reconstruction is started; or

ii. If the structure has been damaged, and is being restored, before the damage occurred. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications that have been identified by a local code enforcement official, and which are the minimum necessary to assure safe living conditions, or to an historic structure, may be excluded from the fifty percent calculations;

b. Repairs, replacement, reconstruction, or improvements to existing farmhouses located in designated floodways and located on designated agricultural lands that do *not increase the building's total square footage of encroachment and are consistent with all requirements of WAC 173-158-075;*

c. Repairs, replacement, reconstruction, or improvements to substantially damaged residential dwellings other than farmhouses that do not increase the building's total square footage of encroachment and are consistent with all requirements of WAC 173-158-076; or

d. Repairs, reconstruction, or improvements to residential structures identified as historic structures that do not increase the building's dimensions.

B. In riverine special flood hazard areas where a floodway has not been delineated pursuant to TMC 18.38.100(E) and (F) or 18.38.120(D), the applicant for a project to develop in the SFHA shall provide a certification by a registered professional engineer demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed development and all other past or future similar developments would not cumulatively result in an increase of flood levels during the occurrence of the base flood discharge by more than one foot.

C. If TMC 18.38.360(A)(1) is satisfied or construction is allowed pursuant to TMC 18.38.360(A)(2), all new construction and substantial improvements in the floodway shall comply with all applicable flood hazard reduction provisions of this chapter.

15. Penalties

A new section establishing penalties for noncompliance with TMC 18.38. This section establishes a fine for violations.

Code Section to be added

- TMC 18.38.450- Penalties for noncompliance.

Proposed amendment language:

18.38.450 Penalties for noncompliance.
A. No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violations of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions), shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than one thousand dollars ($1,000.00) or imprisoned for not more than ninety (90) days, or both for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the city of Tumwater from taking such other lawful action as is necessary to prevent or remedy any violation.

B. Enforcement under this section is in addition to and does not preclude or limit any other forms of enforcement available to the city including, but not limited to, enforcement under any provision of TMC Chapter 1.10, nuisance actions, actions for injunctions, or any other civil or equitable actions to abate, discontinue, or correct, acts in violation of this code.

Public Approval Process

An Environmental Checklist for a non-project action was prepared on December 13, 2023 under the State Environmental Policy Act (Chapter 43.21C RCW), pursuant to Chapter 197-11 WAC, and a Determination of Non-Significance was issued in December 29, 2023.

The ordinance was sent to the Washington State Department of Commerce on December 14, 2023 for their required 60-day review before the proposed text amendments are adopted, in accordance with RCW 36.70A.106.

The Planning Commission will receive a briefing on proposed code amendments on January 9, 2024 and is expected to hold a work session on January 23, 2024. A Notice of Public Hearing for the Planning Commission is expected to be issued on February 2, 2024, ten days prior to a public hearing. The notice will be posted, published as a press release, distributed to interested individuals and entities that have requested such notices, and published in *The Olympian*.

The Planning Commission is expected to hold a public hearing on the final proposed amendments on February 13, 2024. Following the public hearing and deliberations, the Planning Commission is expected to recommend that the City Council consider the proposed amendments.

The City Council is scheduled to review the final proposed amendments at a work session on March 12, 2024. The City Council is scheduled to consider final proposed amendments on March 19, 2024.

Public Notification

A Notice of Public Hearing for the expected February 13, 2024 Planning Commission public hearing is expected to be issued, posted, mailed to interested parties, and published in *The Olympian* ten days prior to the public hearing on February 2, 2024, after the Planning Commission is expected to set the public hearing date on January 23, 2024.

Staff Conclusions

1. The proposed text amendments will need to be consistent with the goals of the Washington State Growth Management Act.
    a. The ordinance will need to be consistent with Goal 7 of the Growth Management Act which states:

        Permits. Applications for both state and local government permits should be processed in a timely and fair manner to ensure predictability.

The ordinance will establish concise requirements for developments and allowed uses in the floodway. It will establish clear permitting application requirements.

b. This ordinance will need to be consistent with Goal 10 of the Growth Management Act which states:

Protect and enhance the environment and enhance the state's high quality of life, including air and water quality, and the availability of water.

The ordinance will establish concise requirements and protections in the floodway.

c. This ordinance will need to be consistent with Goal 14 of the Growth Management Act which states:

Ensure that comprehensive plans, development regulations, and regional policies, plans, and strategies under RCW 36.70A.210 and chapter 47.80 RCW adapt to and mitigate the effects of a changing climate; support reductions in greenhouse gas emissions and per capita vehicle miles traveled; prepare for climate impact scenarios; foster resiliency to climate impacts and natural hazards; protect and enhance environmental, economic, and human health and safety; and advance environmental justice.

The ordinance will establish concise development regulations to protect development and people from natural flood hazards and protect and enhance the environment.

2. The proposed amendments will need to be consistent with the Conservation Element of the Comprehensive Plan because the proposed amendments address permitting, development regulations, allowable uses, and critical areas.

a. Goal 2 of the Conservation Element states:

Designate and protect critical areas including wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas in accordance with the Growth Management Act to protect the functions and values of these areas as well as to protect against threats to health, safety, and property.

b. Action item C-2.1 of the Conservation Element states:

Include best available science in developing policies and development regulations to protect the functions and values of critical areas and consider conservation or protection measures necessary to preserve or enhance anadromous fisheries, consistent with the Growth Management Act.

3. The proposed amendments will need to be consistent with the Land Use Element by improving and updating the existing regulations for floodways, permitted uses in flood zones, and update the review and approval of applications for development in floodways.

a. Goal LU-2 of the Land Use Element states:

Ensure development takes place in an orderly and cost-efficient manner in order to best utilize available land and public services, conserve natural resources, protect critical areas, preserve open space, and reduce sprawl.

b. Goal LU-8 of the Land Use Element states:

Ensure physical limitations of the land are observed during the development process.

4. Based on the above review and analysis, staff will need to conclude that the proposed text amendments are consistent with the requirements of the Washington State Growth Management Act and the Tumwater Comprehensive Plan.

Staff Recommendation

Staff recommend that the Planning Commission review the proposed amendments and provide comments to staff.

Effects of the Proposed Amendments

The proposed text amendments would necessitate changes to the Tumwater Municipal Code.

Staff Contacts

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ORDINANCE NO. O2023-017

AN ORDINANCE of the City Council of the City of Tumwater, Washington, amending Chapter 18.38, FP Flood Plain Overlay, of the Tumwater Municipal Code to address updates needed to bring the regulations into compliance with National Flood Insurance Program and State of Washington standards.

WHEREAS, the Legislature of the State of Washington has delegated the responsibility to local governmental units to adopt regulations designed to promote the public health, safety, and general welfare; and

WHEREAS, areas of the City are subject to periodic inundation and channel migration which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for protection and relief from flooding and channel migration, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare; and

WHEREAS, when floodplains and watersheds are developed without taking appropriate care and precautions, flood heights, frequencies, and velocities increase, causing a greater threat to humans, damage to property, destruction of natural floodplain functions, and adverse impacts to water quality and habitat; and

WHEREAS, rivers, streams, lakes, estuarine and marine areas, and their floodplains are major elements of healthy aquatic and riparian habitats and conveyance of flood waters. If watersheds, rivers, streams, lakes, estuaries, floodplains and other systems are not viewed holistically as biological and geomorphologic units, it can lead to serious degradation of habitat and increased flood hazards to people and human development; and

WHEREAS, over the years, natural processes have evolved that manage flood waters and channel flows in the most effective and efficient manner. Disruption of these processes through alterations to land cover, stream channels, wetlands, and other water bodies leads to increased flood hazards, loss of life and property, threats to public health, and loss of habitat; and

WHEREAS, State Department of Ecology staff completed a Federal Emergency Management Agency floodplain community assistance visit with City staff in May 2023 to review the City's participation in the National Flood Insurance Program (NFIP); and

WHEREAS, State Department of Ecology staff and City staff reviewed the City's NFIP community profile; and

WHEREAS, State Department of Ecology staff prepared a field report and completed an ordinance review based on 44 CFR 60, the Washington Model Ordinance and the checklist used to review local ordinances for NFIP compliance; and

WHEREAS, it was determined that Tumwater Municipal Code (TMC) 18.38 *FP Floodplain Overlay* should be updated to reflect current standards; and

WHEREAS, the Federal Emergency Management Agency has produced a new digital Flood Insurance Study and Flood Insurance Rate Map for the Deschutes River that will become effective on May 8, 2024; and

WHEREAS, the City is required to adopt the new digital Flood Insurance Study and Flood Insurance Rate Map for the Deschutes River and to regulate development within flood prone areas by the effective date using up to date regulations; and

WHEREAS, it is timely to amend the City's existing floodplain regulations to be more consistent with the Model Ordinance for Floodplain Management under the NFIP and the Endangered Species Act prior to May 8, 2024; and

WHEREAS, this Ordinance meets the goals and requirements of the Growth Management Act; and

WHEREAS, the proposed amendments to the City's existing floodplain regulations are consistent with the City's Comprehensive Plan; and

WHEREAS, the Attorney General *Advisory Memorandum and Recommended Process for Evaluating Proposed Regulatory or Administrative Actions to Avoid Unconstitutional Takings of Private Property* (September 2018) was reviewed and utilized by the City in objectively evaluating the proposed amendments; and

WHEREAS, this Ordinance was sent to the Washington State Department of Commerce on December 14, 2023 at least sixty days before the proposed code amendments were adopted, in accordance with RCW 36.70A.106; and

WHEREAS, on December 14, 2023, the Washington State Department of Commerce notified the City of Tumwater that the requirements for State Agency notification for the proposed amendments had been met, as required by RCW 36.70A.106; and

WHEREAS, an Environmental Checklist for a non-project action was prepared under the State Environmental Policy Act (Chapter 43.21C RCW), pursuant to Chapter 197-11 WAC on December 13, 2023, and a Determination of Non-Significance (DNS) was issued on December 29, 2023; and

WHEREAS, the Planning Commission had a briefing on the code amendments on January 9, 2024, and a work session on the code amendments on January 23, 2024; and

WHEREAS, the Planning Commission held a public hearing on the code amendments on February 13, 2024; and

WHEREAS, following the public hearing and deliberations, the Planning Commission recommended approval of the code amendments by the City Council; and

WHEREAS, the City Council discussed the Planning Commission's recommendation on the code amendments at a work session on March 12, 2024; and

WHEREAS, the City Council considered the proposed code amendments on March 19, 2024; and

WHEREAS, the City Council finds that the provisions of this Ordinance are in the best interest of and protect the health, safety, and welfare of the residents of the City.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUMWATER, STATE OF WASHINGTON, DOES ORDAIN AS FOLLOWS:

Section 1. Section 18.38.070, Definitions, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.070 Definitions.

Unless specifically defined below, terms or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application.

"Adversely affect/adverse effect" means effects that are a direct or indirect result of the proposed action, or its interrelated or interdependent actions, and the effect is not discountable, insignificant or beneficial. Discountable effects are extremely unlikely to occur. Insignificant effects relate to the size of the impact and should never reach the scale where a take occurs. Based on best judgment, a person would not: (A) be able to meaningfully measure, detect, or evaluate insignificant effects; or (B) expect discountable effects to occur. Beneficial effects are contemporaneous positive effects without any adverse effects. In the event that the overall effect of the proposed action is beneficial, but is also likely to cause some adverse effects, then the proposed action is considered to result in an adverse effect.

“Alteration of watercourse” means any action that will change the location of the channel occupied by water within the banks of any portion of a riverine waterbody.

“Appurtenant structure” means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

“Area of special flood hazard” means the land in the floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. It is shown on the flood insurance rate map (FIRM) as zone A, AO, AH, A1-30, AE, A99, AR (V, VO, V1-30, VE). “Special flood hazard area” is synonymous in meaning with the phrase “area of special flood hazard”.

“Base flood” means the flood having a one percent chance of being equaled or exceeded in any given year (also referred to as the “one-hundred-year flood”). The area subject to the base flood is the special flood hazard area (SFHA) designated on flood insurance rate maps (FIRMs) as zones “A” or “V” including AE, AO, AH, A1-99 and VE.

“Base flood elevation (BFE)” means the elevation of the base flood above the datum of the effective FIRM.

“Basement” means any area of the structure having its floor sub-grade (below ground level) on all sides.

“Channel migration zone” means the area within the lateral extent of likely stream channel movement due to stream bank destabilization and erosion, rapid stream incision, aggradation, avulsions, and shifts in location of stream channels.

“Critical facility” means a facility necessary to protect the public health, safety and welfare during a flood. Critical facilities include, but are not limited to, schools, nursing homes, hospitals, police, fire and emergency operations installations, water and wastewater treatment plants, electric power stations, and installations which produce, use, or store hazardous materials or hazardous waste (other than consumer products containing hazardous substances or hazardous waste intended for household use).

“Development” means any manmade change to improved or unimproved real estate in the special flood hazard area (SFHA), including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, storage of equipment or materials, subdivision of land, removal of more than five percent of the native vegetation on the property, ~~or~~ alteration of natural site characteristics, or storage of equipment or materials.

“Dry floodproofing” means any combination of structural and nonstructural measures that prevent flood waters from entering a structure.

“Elevation certificate” means the official form ~~(FEMA Form 81-31)~~ used to provide elevation information necessary to ensure compliance with provisions of this chapter and determine the proper flood insurance premium rate.

"FEMA" means the Federal Emergency Management Agency, the agency responsible for administering the National Flood Insurance Program (NFIP).

"Fish and wildlife habitat conservation area" means lands needed to maintain species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created. These areas are designated by the city of Tumwater pursuant to the Washington State Growth Management Act and implementing regulations.

"Flood" or "flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from:

A. The overflow of inland or tidal waters; and/or

B. The unusual and rapid accumulation of runoff of surface waters from any source.

C. The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (A) of this definition.

"Flood elevation study (FES)" means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards. Also known as a flood insurance study (FIS).

"Flood insurance rate map (FIRM)" means the official map on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the city of Tumwater.

"Flood insurance study (FIS)" means the official report provided by the Federal Emergency Management Agency that includes flood profiles, the flood insurance rate map (FIRM), and the water surface elevation of the base flood.

"Flood protection elevation (FPE)" means the elevation above the datum of the effective FIRM to which new and substantially improved structures must be protected from flood damage.

"Floodplain administrator" means the community official designated by title to administer and enforce the floodplain management regulations.

"Flood proofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate risk of flood damage to real estate or improved real property, water and sanitary facilities, structures, and their contents. Flood proofed structures are those that have the structural integrity and design to be impervious to floodwater below the base flood elevation (BFE).

“Floodway” means the channel of a stream or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot at any point. Also referred to as “regulatory floodway”.

“Functionally dependent use” means a use that must be located or carried out close to water, e.g., docking or port facilities necessary for the unloading of cargo or passengers or shipbuilding and ship repair, and does not include long term storage or related manufacturing facilities.

“Highest adjacent grade” means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

“Historic structure” means a structure that:

A. Is listed on the National Register of Historic Places, the Washington Heritage Register, or the Washington Heritage Barn Register; or

B. Has been certified to contribute to the historical significance of a registered historic district.

“Hyporheic zone” means a saturated layer of rock or sediment beneath and/or adjacent to a stream channel that contains some proportion of channel water or that has been altered by channel water infiltration.

“Impervious surface” means a hard surface area which causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater.

“Lowest floor” means the lowest floor of the lowest enclosed area (including basement or crawlspace). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a structure’s lowest floor; provided, that such enclosure is compliant with TMC 18.38.260(F) (i.e., provided there are adequate openings to allow floodwaters into the area).

“Manufactured home” means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term “manufactured home” does not include a “recreational vehicle.”

“Manufactured home park or subdivision” means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

“Mean sea level” means for the purposes of the National Flood Insurance Program (NFIP), the vertical datum to which base flood elevations (BFEs) shown on a community's flood insurance rate map (FIRM) are referenced.

“Native vegetation” means plant species that are indigenous to the community’s area and that reasonably could be expected to naturally occur on the site.

“Natural floodplain functions” means the contribution that a floodplain makes to support habitat, including, but not limited to, providing flood storage and conveyance, reducing flood velocities, reducing sedimentation, filtering nutrients and impurities from runoff, processing organic wastes, moderating temperature fluctuations, and providing breeding and feeding grounds, shelter, and refugia for aquatic or riparian species.

“New construction” means structures for which the “start of construction” commenced on or after the effective date of this chapter and includes any subsequent improvements to such structures. For floodplain management purposes, “new construction” means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

“Protected area” means the lands that lie within the boundaries of the floodway, the riparian habitat zone, and the channel migration area. Because of the impact that development can have on flood heights and velocities and habitat, special rules apply in the protected area.

“Recreational vehicle” means a vehicle:

A. Built on a single chassis; and

B. Four hundred square feet or less when measured at the largest horizontal projection; and

C. Designed to be self-propelled or permanently towable by an automobile or light duty truck; and

D. Designed primarily for use as temporary living quarters for recreational, camping, travel, or seasonal use, not as a permanent dwelling.

“Riparian” means of, adjacent to, or living on the bank of a river, lake, pond, ocean, sound, or other water body.

“Riparian habitat zone” means the water body and adjacent land areas that are likely to support aquatic and riparian habitat as detailed in TMC 18.38.110(C).

“Special flood hazard area (SFHA)” means the land subject to inundation by the base flood. Special flood hazard areas are designated on flood insurance rate maps (FIRMs) with the letters “A” or “V” including AE, AO, AH, A1-99 and VE. The special flood hazard area is also referred to as the area of special flood hazard or SFHA.

“Start of construction” includes substantial improvement, and means the actual start of construction, repair, reconstruction, rehabilitation, addition, placement or other improvement that occurred before the permit’s expiration date. The actual start is either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory structures not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

"Structure" means a walled and roofed building, including a gas or liquid storage tank that is principally above ground, as well as a manufactured home.

"Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty percent of the market value of the structure before the damage occurred. Substantial damage also means flood-related damage sustained by a structure on two separate occasions during a ten-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds twenty-five percent of the market value of the structure before the damage occurred.

"Substantial improvement" means any repair, reconstruction, rehabilitation, addition, replacement, or other improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not include any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure."

"Variance" means a grant of relief from the requirements of this chapter which permits construction in a manner that would otherwise be prohibited by this chapter.

"Water typing" means a system for classifying water bodies according to their size and fish habitat characteristics. The Washington Department of Natural Resources' Forest Practices Water Typing classification system is hereby adopted by reference. The system defines four water types:

A. Type "S" = shoreline: streams that are designated "shorelines of the state," including marine shorelines.

B. Type “F” = fish: streams that are known to be used by fish or meet the physical criteria to be potentially used by fish.

C. Type “Np” = nonfish perennial streams.

D. Type “Ns” = nonfish seasonal streams.

“Zone” means one or more areas delineated on the FIRM. The following zones may be used on the adopted FIRM. The special flood hazard area (SFHA) is comprised of the A and V zones.

“A” means SFHA where no base flood elevation (BFE) is provided.

“A#” means numbered A zones (e.g., A7 or A14), SFHA with a ~~base flood~~ elevation BFE.

“AE” means SFHA with a ~~base flood~~ elevation BFE.

“AO” means SFHA subject to inundation by shallow flooding usually resulting from sheet flow on sloping terrain, with average depths between one and three feet. Average flood depths are shown.

“AH” means SFHA subject to inundation by shallow flooding (usually areas of ponding) with average depths between one and three feet. ~~Base flood elevations~~ BFEs are shown.

“B” means the area between the SFHA and the five-hundred-year flood of the primary source of flooding. It may also be an area with a local, shallow flooding problem or an area protected by a levee.

“C” means an area of minimal flood hazard, as above the five-hundred-year flood level of the primary source of flooding. B and C zones may have flooding that does not meet the criteria to be mapped as a special flood hazard area, especially ponding and local drainage problems.

“D” means area of undetermined but possible flood hazard.

“V” means the SFHA subject to coastal high hazard flooding including waves of three feet or greater in height. There are three types of V zones: V, V#, and VE, and they correspond to the A zone designations.

“X” means the area outside the mapped SFHA.

“Shaded X” means the same as a zone B, above.

(Ord. O2015-007, Amended, 02/02/2016)

Section 2. Section 18.38.090, Special flood hazard area, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.090 Special flood hazard area.

A. The special flood hazard area (SFHA) is the area subject to flooding by the base flood and subject to the provisions of this chapter. It is identified by the Federal Emergency Management Agency in a scientific and engineering report entitled, "Flood Insurance Study for Thurston County, Washington and Incorporated Areas," dated ~~October 16, 2012~~May 8, 2024 and any revisions thereto, with an accompanying Flood Insurance Rate Map (FIRM) for Thurston County, Washington and Incorporated Areas, dated ~~October 16, 2012~~May 8, 2024, and any revisions thereto, which are hereby adopted by reference and declared to be a part of this chapter. The flood insurance study (FIS) and the FIRM are on file at Tumwater City Hall, 555 Israel Road SW, Tumwater, Washington 98501.

B. Upon receipt of a floodplain development permit application, the floodplain administrator shall compare the elevation of the site to the base flood elevation (BFE). A development project is not subject to the requirements of this chapter if it is located on land that can be shown to be:

1. Outside the protected area; and

2. Higher than the ~~base flood elevation~~ BFE as demonstrated by an elevation certificate.

The floodplain administrator shall inform the applicant that the project will still be subject to the flood insurance purchase requirements unless the owner receives a letter of map amendment from FEMA.

C. The floodplain administrator shall make interpretations where needed, as to the exact location of the boundaries of the SFHA and the protected area (e.g., where there appears to be a conflict between the mapped SFHA boundary and actual field conditions as determined by the ~~base flood elevation~~ BFE and ground elevations). The applicant may appeal the floodplain administrator's interpretation of the location of the boundary to the hearing examiner.

(Ord. O2016-009, Amended, 07/09/2016; Ord. O2015-007, Amended, 02/02/2016)

Section 3. Section 18.38.100, Flood hazard data, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.100 Flood hazard data.

A. The base flood elevation (BFE) for the SFHAs of the city of Tumwater shall be as delineated on the one-hundred-year flood profiles in the Flood Insurance Study for Thurston County, Washington and Incorporated Areas.

B. The ~~base flood elevation~~ BFE for each SFHA delineated as a "zone AH" or "zone AO" shall be that elevation (or depth) delineated on the flood insurance rate map (FIRM). Where base flood depths are not available in zone AO, the base flood elevation shall be considered to be two feet above the highest grade adjacent to the structure.

C. The ~~base flood elevation~~ BFE for all other SFHAs shall be as defined in subsection F of this section and 18.38.120(C).

D. The flood protection elevation (FPE) shall be the base flood elevation plus one foot.

E. The floodway shall be as delineated on the ~~flood insurance rate map~~ FIRM or in accordance with subsection F of this section and TMC 18.38.120(D).

F. Where ~~base flood elevation~~ BFE and floodway data have not been provided in special flood hazard areas in accordance with 18.38.090, the floodplain administrator shall obtain, review, and reasonably utilize any ~~base flood elevation~~ BFE and floodway data available from a federal, state, or other source.

(Ord. O2015-007, Amended, 02/02/2016)

Section 4. Section 18.38.130, Establishment of floodplain development permit, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.130 ~~Establishment of f~~Floodplain development permit required.
A floodplain development permit ~~shall be obtained~~ is required before construction or development begins within the special flood hazard area (SFHA) established in TMC 18.38.090. The permit shall be for all development as set forth in TMC 18.38.070, Definitions.

(Ord. O2015-007, Amended, 02/02/2016)

Section 5. Section 18.38.140, Floodplain development permit application, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.140 Floodplain development permit application.
Application for a floodplain development permit shall be made on forms furnished by the floodplain administrator and shall include, but are not limited to:

A. One or more site plans, drawn to scale, showing:

1. The nature, location, dimensions, and elevations of the property in question;

2. Names and location of all lakes, water bodies, waterways and drainage facilities within three hundred feet of the site;

3. The elevations of the ten-, fifty-, one-hundred-, and five-hundred-year floods, where such data are available;

4. The boundaries of the SFHA, floodway, riparian habitat zone, and channel migration area, delineated in accordance with TMC 18.38.080 through 18.38.120;

5. The proposed drainage system including, but not limited to, storm sewers, overland flow paths, detention facilities and roads;

6. Existing and proposed structures, fill, pavement and other impervious surfaces, and sites for storage of materials;

7. All wetlands;

8. Designated fish and wildlife habitat conservation areas, and habitat areas identified for conservation or protection under state or federal or local laws or regulations (e.g., Endangered Species Act, Magnuson-Stevens Fishery

Conservation and Management Act, Growth Management Act, Shorelines Management Act, Priority Habitat and Species List); and

9. Existing native vegetation and proposed revegetation.

B. If the proposed project involves grading, excavation, or filling, the site plan shall include proposed post-development terrain at one-foot contour intervals.

C. If the proposed project includes a new structure, substantial improvement, or repairs to a substantially damaged structure that will be elevated, the application shall include the flood protection elevation (FPE) for the building site and the proposed elevations of the following:

1. The top of bottom floor (including basement, crawlspace, or enclosure floor).

2. The top of the next higher floor.

3. The bottom of the lowest horizontal structural member (in V zones only).

4. The top of the slab of an attached garage.

5. The lowest elevation of machinery or equipment servicing the structure.

6. The lowest adjacent (finished) grade next to structure.

7. The highest adjacent (finished) grade next to structure.

8. The lowest adjacent grade at the lowest elevation of a deck or stairs, including structural support.

D. If the proposed project includes a new structure, substantial improvement, or repairs to a substantially damaged nonresidential structure that will be dry floodproofed, the application shall include the FPE for the building site, the elevation in relation to the datum of the effective FIRM to which the structure will be dry floodproofed, and a certification by a registered professional engineer or licensed architect that the dry floodproofing methods meet the floodproofing criteria in TMC 18.38.270.

E. If a project will alter the base flood elevation data (BFE) or boundaries of the SFHA, the project applicant shall provide the floodplain administrator with engineering documentation and analysis regarding the proposed change. If the change to the BFE or boundaries of the SFHA would normally require a Letter of Map Change, the project approval shall be conditioned accordingly.

F~~E~~. The proposed project must be designed and located so that new structural flood protection is not needed.

G~~F~~. The application shall include a description of the extent to which a stream, lake, or other water body, including its shoreline, will be altered or relocated as a result of the proposed development.

1. Bank stabilization measures along salmonid-bearing streams, channel migration zones, and along estuarine and marine shorelines must be minimized

to the maximum extent possible. If bank stabilization measures are necessary, bioengineered armoring of streambanks and shorelines must be used.

2. Channel Migration. No activity is allowed that limits the natural meandering pattern of the channel migration zone; however, natural channel migration patterns may be enhanced or restored.

H~~G~~. The application shall include documentation that the applicant will apply for all necessary permits required by federal, state, or local law. The application shall include written acknowledgment that the applicant understands that the final certification of use or certificate of occupancy will be issued only if the applicant provides copies of the required federal, state, and local permits or letters stating that a permit is not required. The floodplain permit is not valid if those other permits and approvals are not obtained prior to any ground disturbing work or structural improvements.

I~~H~~. The application shall include acknowledgment by the applicant that representatives of any federal, state or local unit of government with regulatory authority over the project are authorized to enter upon the property to inspect the development.

J. The application shall include the elevation in relation to mean sea level, of the lowest floor (including basement) of all structures recorded on a current elevation certificate with section B completed by the floodplain administrator.

K. The application shall include the elevation relation to mean sea level to which any structure has been flood proofed.

L. The application shall include, where development is proposed in a floodway, an engineering analysis indicating no rise of the base flood elevation (BFE).

M. The application shall include any other such information that may be reasonably required by the floodplain administrator in order to review the application.

(Ord. O2015-007, Amended, 02/02/2016)

Section 6. Section 18.38.170, Duties of the floodplain administrator, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.170 Duties of the floodplain administrator.

Duties of the floodplain administrator shall include, but not be limited to:

A. Review all floodplain development permits to determine that the permit requirements of this chapter have been satisfied.

B. Review all floodplain development permits to determine that all necessary permits have been obtained from those federal, state, or local governmental agencies from which prior approval is required, including those local, state or federal permits that may be required to assure compliance with the Endangered Species Act and/or other appropriate state or federal laws.

C. Review all floodplain development permits to determine if the proposed development is located in the ~~protected area~~ floodway. If located in the ~~protected area~~ floodway, ensure that the provisions of TMC 18.38.320 through 18.38.400 are met.

D. Ensure that all development activities within the special flood hazard area (SFHA) of the jurisdiction of the city of Tumwater meet the requirements of this chapter.

E. Inspect all development projects before, during and after construction to ensure compliance with all provisions of this chapter, including proper elevation of the structure.

F. Maintain for public inspection all records pertaining to the provisions of this chapter.

G. Submit reports to include the projects for which they issue floodplain development permits, including effects to flood storage, fish habitat, and all indirect effects of development and mitigation provided to FEMA as required for the National Flood Insurance Program (NFIP).

H. Notify FEMA of any proposed amendments to this chapter.

I. Cooperate with state and federal agencies to improve flood and other technical data and notify FEMA of any new data that would revise the FIRM.

J. Interpretations as to exact location of the boundaries of the areas of special flood hazards where needed (e.g., where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation. Such appeals shall be granted consistent with the standards of 44 CFR 60.6 of the Rules and Regulations of the NFIP.

(Ord. O2015-007, Amended, 02/02/2016)

Section 7. Section 18.38.180, Records, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.180 Records.

A. Where base flood elevation data (BFE) have been obtained pursuant to TMC 18.38.100 and 18.38.120, the floodplain administrator shall obtain, record, and maintain the actual "finished construction" elevations (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, for the locations listed in TMC 18.38.140(C), and whether or not the structure contains a basement. This information shall be recorded on a current FEMA Elevation Certificate ~~(FEMA Form 81-31)~~, signed and sealed by a professional land surveyor, currently licensed in the state of Washington.

B. For all new or substantially improved dry floodproofed nonresidential structures, where ~~base flood elevation~~ BFE data has been obtained pursuant to TMC 18.38.100 and 18.38.120, the floodplain administrator shall:~~ obtain~~

1. Obtain, record and maintain the elevation (in relation to ~~the datum of the effective FIRM~~ mean sea level) to which the structure was floodproofed.

2. This information shall be recorded on a current FEMA floodproofing certificate ~~(FEMA FORM 81 65)~~ by a professional engineer currently licensed in the state of Washington.

C. Where elevation data is not available, either through the FIS, FIRM, or from another authoritative source (as required by TMC 18.38.100(F)), the floodplain administrator shall review applications for floodplain development to assure that proposed construction will be reasonably safe from flooding based on the use of historical data, high water marks, photographs of past flooding, etc., where available.

Failure to elevate habitable buildings at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.

D. The floodplain administrator shall obtain, record, and maintain the records for public inspection of the following:

1. Certification required by TMC 18.38.360(1).

2. Records of all variance actions, including justification for their issuance.

3. Improvement and damage calculations.

4. All records pertaining to the provisions of this ordinance.

(Ord. O2015-007, Amended, 02/02/2016)

Section 8. Section 18.38.210, Subdivisions, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.210 Development and ~~S~~ subdivisions.

This section applies to all development and subdivision proposals~~,~~. Subdivision proposals include short subdivisions, short plats, binding site plans, planned developments, and new and expansions to manufactured housing parks.

A. All proposals shall be consistent with the need to minimize flood damage.

B. ~~The~~ A proposed subdivision must have one or more new lots in the special flood hazard area (SFHA) set aside for open space use through deed restriction, easement, subdivision covenant, or donation to a public agency.

1. In the ~~special flood hazard area~~ (SFHA) outside the protected area, zoning must maintain a low density of floodplain development.

2. In the ~~special flood hazard area~~ (SFHA) outside the protected area in which the current zoning is less than five acres must maintain the current zoning.

3. The density of the development in the portion of the development outside the ~~special flood hazard area~~ (SFHA) may be increased to compensate for the amount of land in the ~~special flood hazard area~~ (SFHA) preserved as open space in accordance with TMC Title 18.

C. If a parcel has a buildable site outside the special flood hazard area, it shall not be subdivided to create a new lot, tract, or parcel within a binding site plan that does not have a buildable site outside the special flood hazard area. This provision does not apply to lots set aside from development and preserved as open space.

D. All proposals shall have utilities and facilities, such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage.

E. All subdivision proposals shall ensure that ~~all subdivisions have~~ there is at least one access road connected to land outside the ~~special flood hazard area~~ (SFHA) with the surface of the road at or above the FPE wherever possible.

F. All proposals shall have adequate drainage provided to avoid exposure to water damage.

G. ~~The~~ A final recorded subdivision ~~plat~~ shall include a notice that part of the property is in the SFHA, riparian habitat zone and/or channel migration area, as appropriate.

H. Where subdivision proposals and other proposed developments contain greater than fifty lots or five acres (whichever is the lesser) base flood elevation data (BFE) shall be included as part of the application.

(Ord. O2015-007, Amended, 02/02/2016)

Section 9. Section 18.38.260, Flood protection standards, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.260 Flood protection standards.

A. In AE and A1-30 zones or other A zoned areas where the base flood elevation data (BFE) has been determined or can be reasonably obtained, ~~A~~ all new structures and substantial improvements of any structure shall have the lowest floor, including basement, elevated at least one foot above the ~~FPE~~ BFE.

B. The structure shall be aligned parallel with the direction of flood flows where practicable.

C. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

D. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

E. ~~The structure~~ All new construction and substantial improvements, including those related to manufactured homes, shall be anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads including the effects of buoyancy.

F~~D~~. All materials below the FPE shall be resistant to flood damage and firmly anchored to prevent flotation. Materials harmful to aquatic wildlife, such as creosote, are prohibited below the FPE.

G~~E~~. Electrical, heating, ventilation, duct work, plumbing, and air-conditioning equipment and other service facilities shall be elevated above the FPE. Water, sewage, electrical, and other utility lines below the FPE shall be constructed so as to prevent water from entering or accumulating within them during conditions of flooding.

H~~F~~. Fully enclosed areas below the lowest floor that are subject to flooding shall be used only for parking, storage, or building access and shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a registered professional engineer or licensed architect and/or meet or exceed the following minimum criteria:

1. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
2. The bottom of all openings shall be no higher than one foot above grade.
3. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

I~~G~~. In zones V, V1-30 and VE, new structures and substantial improvements shall be elevated on pilings or columns so that:

1. The bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated above the FPE.
2. The pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Wind and water loading values shall each have a one percent chance of being equaled or exceeded in any given year (one-hundred-year mean recurrence interval).
3. The areas below the lowest floor that are subject to flooding shall be free of obstruction.
4. The structure or improvement shall be located landward of the reach of mean high tide.
5. The use of fill for structural support of a structure or addition is prohibited.
6. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify

that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting these provisions.

J. New construction and substantial improvement of any residential structure in an Unnumbered A zone for which a BFE is not available and cannot be reasonably obtained the lowest floor shall be at least two feet above the highest adjacent grade.

K. A garage attached to a residential structure, constructed with the garage floor slab below the BFE, must be designed to allow for the automatic entry and exit of floodwaters.

(Ord. O2015-007, Amended, 02/02/2016)

Section 10. Section 18.38.270, Nonresidential construction, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.270 Nonresidential construction.

~~New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall be elevated in accordance with TMC 18.38.260. As an alternative to elevation, a new or substantial improvement to a nonresidential structure and its attendant utility and sanitary facilities may be dry floodproofed in A zones. The project must meet the following:~~

~~A. The structure is not located in zones V, V1-30, or VE; and~~

~~B. Below the FPE the structure is watertight with walls substantially impermeable to the passage of water; and~~

~~C. The structural components are capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and~~

~~D. The plans are certified by a registered professional engineer or licensed architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the floodplain administrator as set forth in TMC 18.38.180(B) and 18.38.190(A)(1).~~

New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet the requirements of TMC 18.38.270(A) or (B), below.

A. New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet all of the following requirements:

1. In AE and A1-30 zones or other A zoned areas where the base flood elevation data (BFE) has been determined or can be reasonably obtained:

New construction and substantial improvement of any commercial, industrial, or other nonresidential structure shall have the lowest floor, including basement, elevated one foot or more above the BFE, or elevated as required by ASCE 24, whichever is greater. Mechanical equipment and utilities shall be waterproofed or elevated at least one foot above the BFE, or as required by ASCE 24, whichever is greater.

2. If located in an unnumbered A zone for which a BFE is not available and cannot be reasonably obtained, the lowest floor shall be at least two feet above the highest adjacent grade.

3. Fully enclosed areas below the lowest floor that are subject to flooding are prohibited or shall meet the requirements of TMC 18.38.210.

B. If the requirements of TMC 18.38.272(A) are not met, new construction and substantial improvement of any commercial, industrial or other nonresidential structure shall meet all of the following requirements:

1. Be dry flood proofed so that below one foot or more above the base flood level the structure is watertight with walls substantially impermeable to the passage of water or dry flood proofed to the elevation required by ASCE 24, whichever is greater;

2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and

3. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in TMC 18.38.180.

(Ord. O2015-007, Amended, 02/02/2016)

Section 11. Section 18.38.280, Manufactured homes, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.280 Manufactured homes.

All manufactured homes to be placed or substantially improved on sites shall be:

A. Elevated on a permanent foundation in accordance with TMC 18.38.260; and

B. Securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors, and shall be installed using methods and practices that minimize flood damage. This requirement is in addition to other applicable anchoring requirements for resisting wind forces.

(Ord. O2015-007, Amended, 02/02/2016)

Section 12. A new Section TMC 18.38.285, Detached accessory structures, is hereby added to the Tumwater Municipal Code to read as follows:

18.38.285 Detached accessory structures.

A. Detached accessory structures used solely for parking of vehicles or limited storage may be constructed such that the floor is below the base flood elevation data (BFE), provided the structure is designed and constructed in accordance with the following requirements:

1. In special flood hazard areas other than coastal high hazard areas (Zones A, AE, AH, AO, and A1-30), the structure is not larger than a one-story two-car garage;

2. In coastal high hazard areas (Zones V, VE, V1 30, and VO), the structure is not larger than 100 sq. ft. in area;

3. The portions of the structure located below the BFE must be built using flood resistant materials;

4. The structure must be adequately anchored to prevent flotation, collapse, and lateral movement;

5. Any machinery or equipment servicing the structure must be elevated or floodproofed to or above the BFE;

6. The structure must comply with floodway encroachment provisions in TMC 18.38.360(1);

7. The structure must be designed to allow for the automatic entry and exit of flood waters in accordance with TMC 18.38.240(F);

8. The structure shall have low damage potential;

9. If the structure is converted to another use, it must be brought into full compliance with the standards governing such use; and

10. The structure shall not be used for human habitation.

Section 13. A new Section TMC 18.38.325, Storage of materials and equipment, is hereby added to the Tumwater Municipal Code to read as follows:

18.38.325 Storage of materials and equipment.

A. The storage or processing of materials that could be injurious to human, animal, or plant life if released due to damage from flooding is prohibited in special flood hazard areas.

B. Storage of other material or equipment may be allowed if not subject to damage by floods and if firmly anchored to prevent flotation, or if readily removable from the area within the time available after flood warning.

Section 14. Section 18.38.360, Floodway standards, of the Tumwater Municipal Code is hereby amended to read as follows:

18.38.360 Floodway standards.

A. In addition to the other requirements of this chapter, a project to develop in the floodway as delineated pursuant to TMC 18.38.100(E) and (F) or 18.38.120(D) shall meet the following criteria:

1. Encroachments, including fill, new construction, substantial improvements, and other development is prohibited unless ~~T~~the applicant ~~shall~~ provides a certification by a registered professional engineer demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed development would not result in any increase in flood levels during the occurrence of the base flood discharge.

2. Construction or reconstruction of residential structures is prohibited within designated floodways, except for ~~the following~~ repairs, reconstruction, or improvements to a residential structure which do not increase the ground floor area. The following exceptions must still meet all other requirements in the chapter, including subsection (A)(1) of this section:

a. Repairs, reconstruction, or improvements to a residential structure that do not increase the ground floor area, providing the cost of which does not exceed fifty percent of the market value of the structure either:

i. Before the repair, or reconstruction is started; or

ii. If the structure has been damaged, and is being restored, before the damage occurred. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications that have been identified by a local code enforcement official, and which are the minimum necessary to assure safe living conditions, or to an historic structure, may be excluded from the fifty percent calculations;

b. Repairs, replacement, reconstruction, or improvements to existing farmhouses located in designated floodways and located on designated agricultural lands that do not increase the building’s total square footage of encroachment and are consistent with all requirements of WAC 173-158-075;

c. Repairs, replacement, reconstruction, or improvements to substantially damaged residential dwellings other than farmhouses that do not increase the building’s total square footage of encroachment and are consistent with all requirements of WAC 173-158-076; or

d. Repairs, reconstruction, or improvements to residential structures identified as historic structures that do not increase the building’s dimensions.

B. In riverine special flood hazard areas where a floodway has not been delineated pursuant to TMC 18.38.100(E) and (F) or 18.38.120(D), the applicant for a project to develop in the SFHA shall provide a certification by a registered professional engineer demonstrating through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed development and all other past or future similar developments would not cumulatively result in an increase of flood levels during the occurrence of the base flood discharge by more than one foot.

C. If TMC 18.38.360(A)(1) is satisfied or construction is allowed pursuant to TMC 18.38.360(A)(2), all new construction and substantial improvements in the floodway shall comply with all applicable flood hazard reduction provisions of this chapter.

(Ord. O2015-007, Amended, 02/02/2016)

Section 15. A new Section TMC 18.38.450, Penalties for noncompliance, is hereby added to the Tumwater Municipal Code to read as follows:

18.38.450 Penalties for noncompliance.

A. No structure or land shall hereafter be constructed, located, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violations of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions), shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than one thousand dollars ($1,000.00) or imprisoned for not more than ninety (90) days, or both for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the city of Tumwater from taking such other lawful action as is necessary to prevent or remedy any violation.

B. Enforcement under this section is in addition to and does not preclude or limit any other forms of enforcement available to the city including, but not limited to, enforcement under any provision of TMC Chapter 1.10, nuisance actions, actions for injunctions, or any other civil or equitable actions to abate, discontinue, or correct, acts in violation of this code.

Section 16. Corrections. The City Clerk and codifiers of this ordinance are authorized to make necessary corrections to this ordinance including, but not limited to, the correction of scrivener/clerical errors, references, ordinance numbering, section/subsection numbers and any references thereto.

Section 17. Ratification. Any act consistent with the authority and prior to the effective date of this ordinance is hereby ratified and affirmed.

Section 18. Severability. The provisions of this ordinance are declared separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section, or portion of this ordinance or the invalidity of the application thereof to any person or circumstance, shall not affect the validity of the remainder of the ordinance, or the validity of its application to other persons or circumstances.

Section 19. **Effective Date.** This ordinance shall become effective thirty (30) days after passage, approval and publication as provided by law.

ADOPTED this _________day of _________________, 2024.

CITY OF TUMWATER

____
Debbie Sullivan, Mayor

ATTEST:

____
Melody Valiant, City Clerk

APPROVED AS TO FORM:

____
Karen Kirkpatrick, City Attorney

Published:_______________________

Effective Date:___________________

Attachment C

Ordinance No. O2023-017
Floodplain Overlay Amendments

January 9, 2024

Planning Commission Briefing

CITY OF
WATER

Background

- Close to three hundred towns, cities, counties, and tribes in the state participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP)
- Continued enforcement of the City's floodplain management regulations (TMC 18.38 *FP Floodplain Overlay*) allows FEMA to make federally backed flood insurance available to property owners within the City

CITY OF
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Background

- As a condition of participation in the NFIP, communities are required to adopt and enforce flood hazard reduction regulations that meet the minimum requirements of the NFIP
- In May 2023, City staff completed a FEMA floodplain community assistance visit (CAV) with State Department of Ecology staff to review the City's participation in the National Flood Insurance Program
- The CAV determined that TMC 18.38 *FP Floodplain Overlay* should be updated to reflect FEMA current standards

Background

- On November 8, 2023, FEMA notified the City of the final flood determinations for Thurston County, Washington, and Incorporated Areas, which includes the City
- The FEMA flood hazard determinations for the City are considered final
- The Flood Insurance Study (FIS) report and Flood Insurance Rate Maps (FIRM) covering the City will be effective May 8, 2024

CITY OF
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Requirement

- Prior to the May 8, 2024, effective date of the FIS and FIRM, the City must amend its existing floodplain regulations to be more consistent with the Model Ordinance for Floodplain Management under the NFIP, the Endangered Species Act, and to maintain its eligibility in the NFIP

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Staff Report

The staff report includes:

- Summaries of the fifteen proposed amendments
- The code sections amended or added
- Proposed amendment language

SEPA and Notice of Intent

- Notice of Intent for Ordinance No. O2023-017 was sent to the State Department of Commerce December 14, 2023
- SEPA Checklist for Ordinance No. O2023-017 was completed Dec 13, 2023, and routed to staff for completion of a determination of nonsignificance in 2024

CITY OF
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Suggested Work Session Discussion Topics

1. Review the proposed amendments and new sections within the staff report
2. Are the proposed amendments clear and digestible?
3. Is it easy to determine standards for developing in the floodplain and know what will be required?
4. Provide comments/questions to Staff

CITY OF ...WATER

Next Steps

Planning Commission

- January 23, 2024 – Planning Commission work session
- February 13, 2024 – Planning Commission hearing

City Council

- March 12, 2024 – City Council work session
- March 19, 2024 – City Council consideration

TO: Planning Commission

FROM: Erika Smith-Erickson, Land Use and Housing Planner and Brad Medrud, Planning Manager

DATE: January 9, 2024

SUBJECT: Resolution No. R2024-001, Fourth Edition Hazards Mitigation Plan for the Thurston Region

---

1) Recommended Action:

Read materials, be prepared to discuss as part of a work session on the ordinance, and schedule public hearing for January 23, 2024 Planning Commission meeting.

---

2) Background:

The Thurston Region is susceptible to many natural hazards. In order to receive federal mitigation funding and assistance in the event of a natural disaster, the City must develop a plan to reduce impacts to people, property, and the economy.

The City Council adopted the third edition of the *Hazards Mitigation Plan for the Thurston Region* in 2017. The 2017 Plan was based on a multi-jurisdictional process to develop mitigation strategies to reduce the risks of the most destructive hazards that threaten the region. The City is required to update their plan every five years and have it approved by the Federal Emergency Management Agency (FEMA) to maintain eligibility for federal mitigation grant programs. The City has an annex as part of the Plan that identified initiatives that the City will undertake to address hazards present in the City.

Over twenty local agencies in Thurston County have been working together with the Thurston Regional Planning Council (TRPC) to prepare the fourth edition of the Plan since 2022. The Plan is currently being reviewed by FEMA. The TRPC project website is here 4th Edition Hazards Mitigation Plan for the Thurston Region.

---

3) Alternatives:

❑ None

---

4) Attachments:

A. Resolution
B. Presentation
C. Tumwater Annex to the Fourth Edition of *the Hazards Mitigation Plan for the Thurston Region*

RESOLUTION NO. R2024-001

A RESOLUTION of the City Council of the City of Tumwater, Washington adopting the 2024 update to the Hazards Mitigation Plan for the Thurston Region.

WHEREAS, the City of Tumwater is vulnerable to the human and economic costs of natural disasters; and

WHEREAS, the Tumwater City Council recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community; and

WHEREAS, the City of Tumwater has been an active participant in the countywide process led by the Thurston Regional Planning Council to establish a comprehensive, coordinated planning process to eliminate or decrease these vulnerabilities; and

WHEREAS, the City of Tumwater has identified, justified and prioritized a number of proposed projects and programs needed to mitigate the vulnerabilities of Tumwater to the impacts of future disasters; and

WHEREAS, these proposed projects and programs have been incorporated into the 2024 update edition of the "Hazards Mitigation Plan for the Thurston Region" that has been prepared and issued for consideration and implementation by the communities of Thurston County;

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF TUMWATER AS FOLLOWS:

Section 1. The Tumwater City Council hereby accepts and approves its designated portion of the 2024 update to the "Hazards Mitigation Plan for the Thurston Region" attached as Exhibit “A”.

Section 2. The agency personnel of the City of Tumwater are requested and instructed to pursue available funding opportunities for implementation of the proposals designated therein.

Section 3. The City of Tumwater will, upon receipt of such funding or other necessary resources, seek to implement the proposals contained in its section of the strategy.

<u>Section 4</u>. The City of Tumwater will continue to participate in the updating and expansion of the "Hazards Mitigation Plan for the Thurston Region" in the years ahead.

<u>Section 5</u>. The City of Tumwater will further seek to encourage the businesses, employers, employees, residents, organizations, and community groups operating within and/or for the benefit of the City of Tumwater to also participate in the updating and expansion of the "Hazards Mitigation Plan for the Thurston Region" in the years ahead.

<u>Section 6</u>. **<u>Ratification</u>**. Any act consistent with the authority and prior to the effective date of this Resolution is hereby ratified and affirmed.

<u>Section 7</u>. **<u>Severability</u>**. The provisions of this Resolution are declared separate and severable. The invalidity of any clause, sentence, paragraph, subdivision, section, or portion of this Resolution or the invalidity of the application thereof to any person or circumstance, shall not affect the validity of the remainder of the Resolution, or the validity of its application to other persons or circumstances.

<u>Section 8</u>. **<u>Effective Date</u>**. This Resolution shall become effective immediately upon adoption and signature as provided by law.

RESOLVED this ___ day of _____________, 2024.

CITY OF TUMWATER

____
Debbie Sullivan, Mayor

ATTEST:

____
Melody Valiant, City Clerk

APPROVED AS TO FORM:

____
Karen Kirkpatrick, City Attorney

Attachment B

Hazards Mitigation Plan
City of Tumwater Annex 2024

CITY OF
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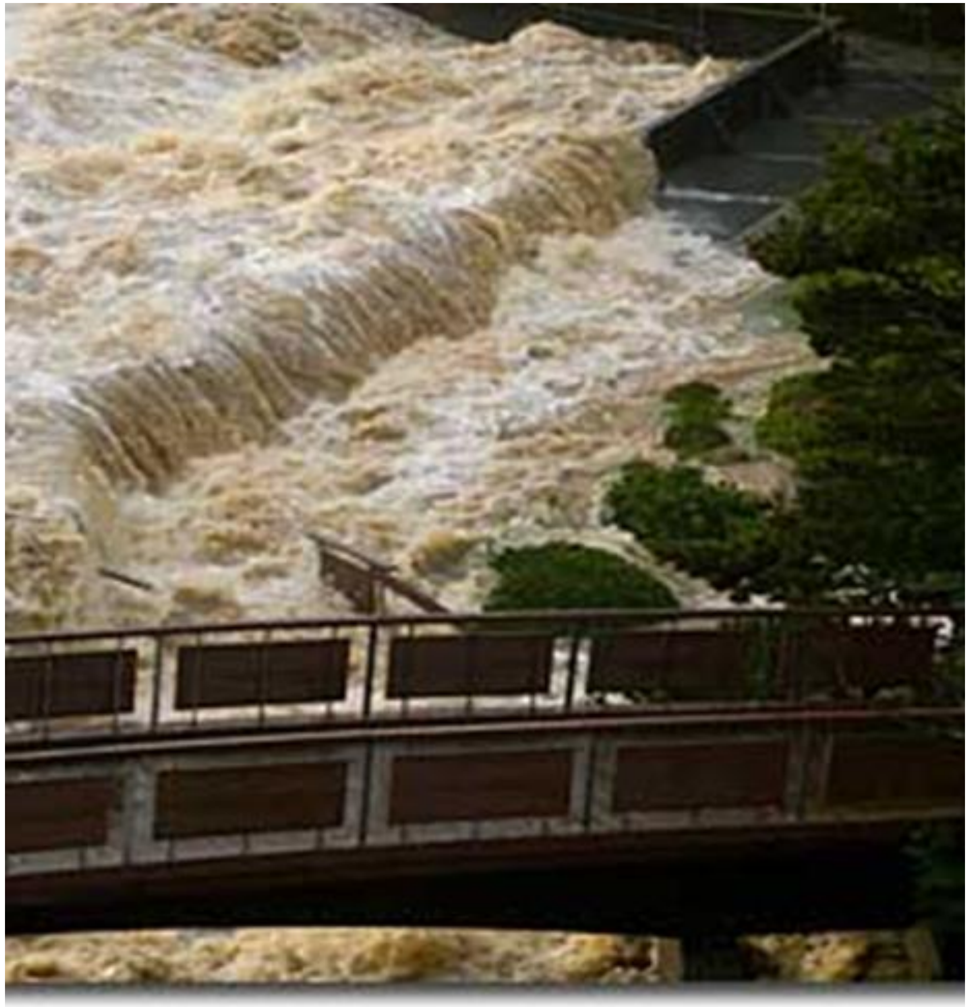
Planning Commission – January 9, 2024

Issue

- Earthquakes, landslides, severe storms, floods, wildland fires, volcanic events, and other hazards cause lengthy disruptions and are costly to communities
- Hazards mitigation planning is intended to identify and implement sustained actions that eliminate long-term risks to life and property



CITY OF
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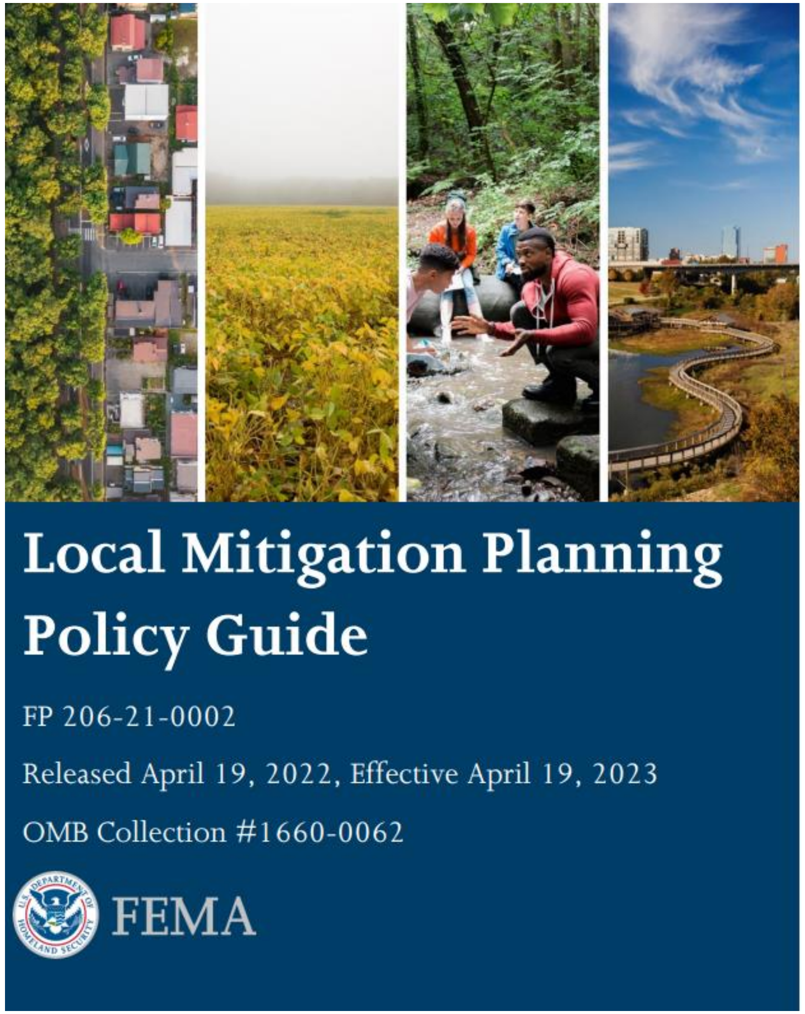
Background

- The Federal Government enacted the Disaster Mitigation Act of 2000
- Jurisdictions must adopt a federally approved Hazards Mitigation Plan to apply for or to receive federal mitigation assistance program grants
- There is a multijurisdictional "Core Plan" for Thurston region and individual jurisdictional plans as part of the "Annex"
- Plans must be updated every 5 years
- The Hazards Mitigation Plan was last updated in 2017



CITY OF TUMWATER

Overview

The City is susceptible to earthquakes, flooding, landslides, severe weather, and wildfires

The City Annex identifies actions that are specific to the vulnerabilities of its community and is responsible for implementing the actions

The City has identified 20 initiatives to help mitigate and reduce impacts of natural hazards

Categorized by initiative type: public outreach and information, plan coordination and implementation, data collecting and mapping, development regulations, hazard preparedness, hazard damage reduction, and critical facilities and replacement retrofit

Sample Mitigation Initiative

Initiative identification, benefit cost review score, and title

New, existing, modified, ongoing, or removed during the plan update process

CW-WH-2: Countywide Multijurisdictional Community Wildfire Protection Plan

Benefit-cost review score. Higher score is a higher priority

Hazard addressed and action category

Benefit-Cost Review Score: 36 **Status:** New
Hazard Addressed: Wildland Fire
Category: Plan Coordination and Implementation

Background and Need description

Background and Need: Thurston County wildfire frequency and size have trended upward over the last 15 years. On September 8, 2020, a 268-acre fire in southwest Thurston County, intensified by sustained high speed winds, destroyed two homes and two outbuildings near Mima and Bordeaux Roads SW. The fire forced area residents to evacuate. The incident resulted in Thurston County receiving immediate federal fire management assistance, an uncommon wildfire declaration for communities in Western Washington lowlands.

The effects of climate change will make summers warmer, drier, and longer. Climate change combined with the region's growing population will increase the likelihood for more frequent, larger, and perhaps more severe wildfires. Planning is necessary to understand the wildfire risks for current and future households and businesses located in wildland urban interface and intermix areas. In addition, wildfire smoke will adversely impact people who suffer from chronic respiratory diseases or people who are exposed and unable to seek indoor refuge.

Building on the momentum of the 2023 Wildfire Ready Neighbors Program partnership and the 2023 Assessing Structural Ignition Potential courses hosted by Thurston County Emergency Management, the region will pursue the development of a multijurisdictional countywide Community Wildfire Protection Plan. The planning process will involve a whole community approach to engage a variety of stakeholders to identify areas of the community, especially underserved communities, that are at greatest risk for wildfire losses and establish a collaborative framework for communities to identify strategies for wildfire response, hazard mitigation, and community education and preparedness.

Relationship to plan goals

Relates to Plan Goal(s) and Objectives: 3C, 5C, 6A, 6B, 7B, 7D, 7E, 9A, 9B

Implementation details

Lead: The Association of Thurston County Fire Chiefs in partnership with the tribes, county, cities, special purpose districts, Wash. Dept. of Natural Resources, the US Forest Service, TRPC, the public, and other stakeholders.
Estimated Cost: Medium, $100,000 to $300,000
Time Period: 2024-2028
Funding Source: Wash. Dept. of Natural Resources Community Wildfire Defense Grant

Source for the initiative

Source and Date: 2023 Natural Hazards Mitigation Plan

Progress toward the initiative's implementation

Initiative and Implementation Status: This is a new initiative. Information about this initiative's status will be reported during the next plan update.

Sample Mitigation Initiative

Integration of City Annex

- Capital Facilities Plan
- Biennial Budget
- 2020 Water System Plan
- Deschutes Flood Reduction Study
- City of Tumwater Comprehensive Plan
- Development Code
- 2023 & 2024 City Work Programs

Plan Structure

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- List of Tables
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- Community Profile
- Summary and Adoption
- City Annex Development process
- City Risk Assessments
- Mitigation Strategy
- Benefit Cost Review Results
- Public Comment Summary
- Appendix A - Community Capability Assessment
- Appendix B - NFIP Assessment

Monitoring & Maintenance

The Planning Team is responsible for monitoring and maintaining the plan

The Planning Team will create a process to track and monitor the initiatives and status

The Annex and Regional Plan is a climate resiliency sub-element in 2025 Comprehensive Plan Update

CITY OF
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Plan Update

- Several Hazards Mitigation plan workgroup meetings were held
- Multiple opportunities for public engagement
- The draft City Annex was submitted for final public comment November 3-17, 2023
- The City received one public comment on the draft City Annex
- The Core Plan, City Annex, and plan review tool were submitted to Washington Emergency Management Division (WAEMD) November 27, 2023

Public Outreach Activities	Date
Thurston Regional Planning Council Community Survey	June 1- July 31, 2022
Article in *The Olympian* regarding the Community Survey	July 11, 2022
City Council Briefing	June 21, 2022
Draft Action Plan Open House and Survey	July 24-August 25, 2023
Planning Commission Briefing	July 25, 2023
Volunteering at Thurston County Fair – Thurston County Emergency Management Booth	July 26, 2023
Planning Commission Briefing	July 25, 2023
General Government Committee Briefing	August 9, 2023
Emergency Preparedness Expo	September 23, 2023
Final Draft Plan Public Comment Period	November 3- November 17, 2023
Final City Annex and Core Regional Plan to Washington Emergency Management Division	November 2023
FEMA Review	November 2023
Planning Commission Work Session	January 9, 2024

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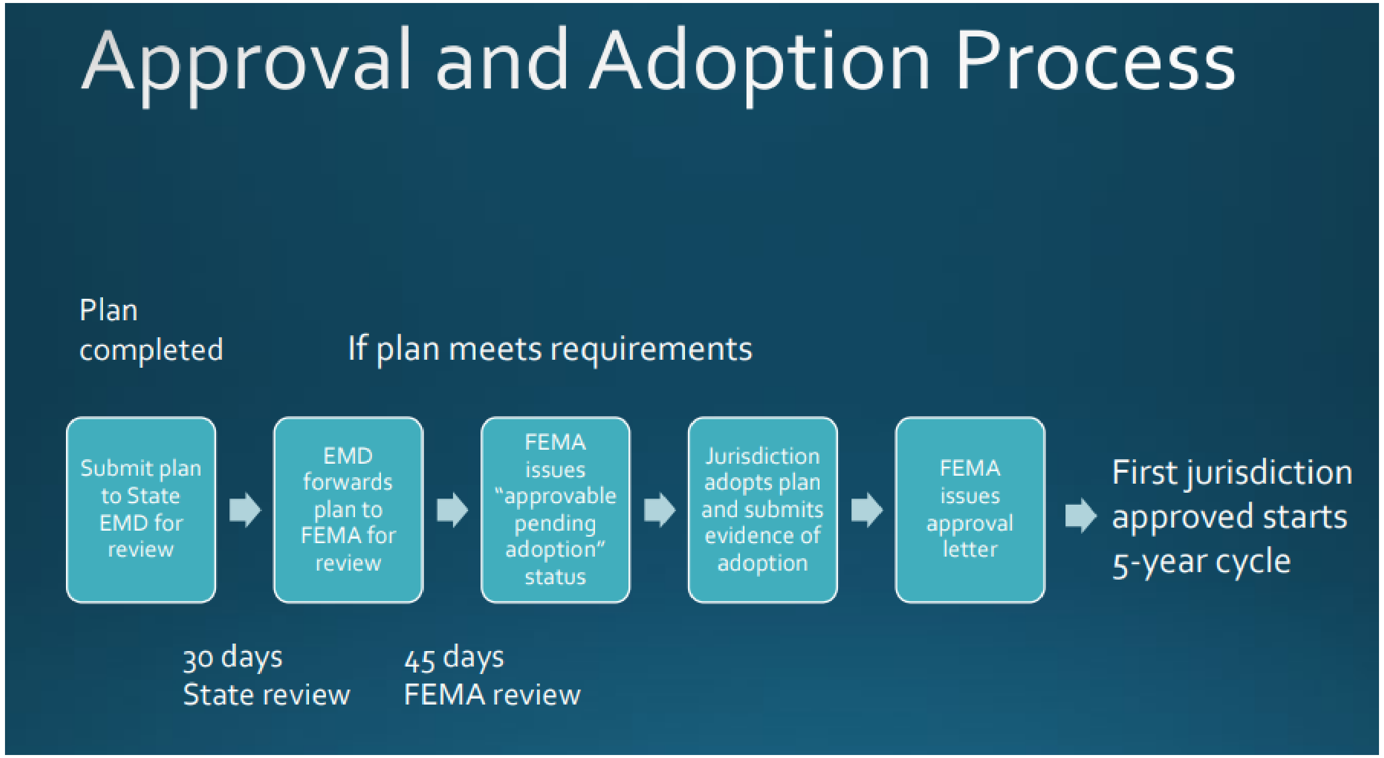
Approval Process

- WAEMD 30-day review period ends December 28, 2023
- After WAEMD approval the plan will be sent to FEMA for their 45-day review period
- WAEMD or FEMA may recommend revisions



Next Steps

Planning Commission Hearing

- January 23, 2024

General Government Committee

- February 14, 2024

Exhibit "A"

The City of Tumwater's Annex to the Natural Hazards Mitigation Plan for the Thurston Region

CITY OF
TUMWATER

November 2023

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Adopting Resolution

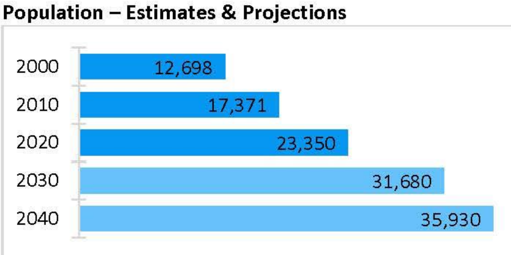
[Will be inserted when adopted]

Community Profile

Tumwater — 2022 Statistical Profile

Demographics

Population – Estimates & Projections



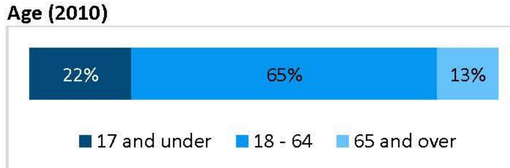
Average Annual Population Growth

2000-2010:	3.2%	per year
2010-2020:	3.0%	per year

Language Spoken at Home (2016-2020)*

English Only	93.8%
Spanish	3.0%
Korean	0.2%
Chinese	0.2%
Vietnamese	0.8%
Tagalog	0.0%
Other Language	1.9%
TOTAL	**100.0%**

Age (2010)



Median Age: 37

Race & Ethnicity (2020)

Race

White	76%
Black & African American	3%
American Indian & Alaska Native	1%
Asian	5%
Native Hawaiian & Other Pacific Islander	1%
Other Race	2%
Two or More Races	12%
TOTAL	**100%**

Ethnicity

Hispanic or Latino	9%
Not Hispanic or Latino	91%
TOTAL	**100%**

Households & Housing

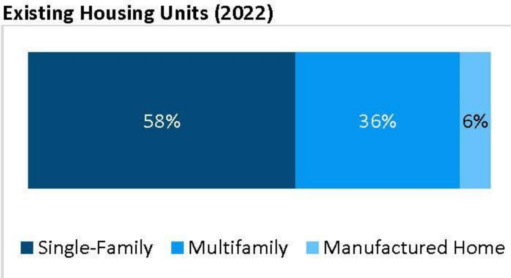
Households (2020)

Total Households: 11,488

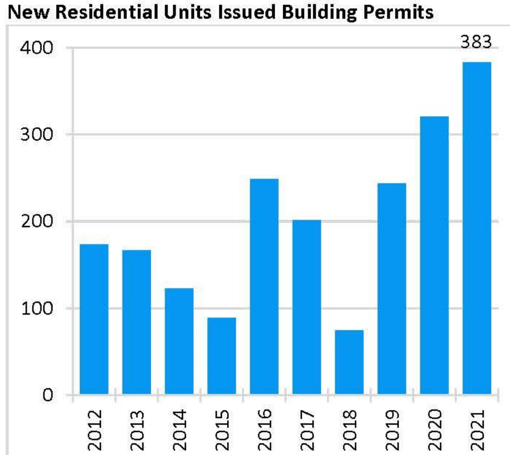
Average Household Size: 2.39

Median Home Sale Price (2021): $460,000

Existing Housing Units (2022)



New Residential Units Issued Building Permits



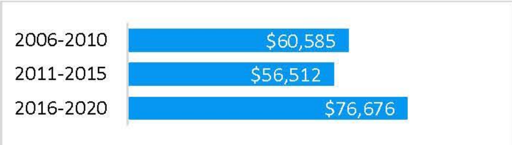
Estimates based on survey data and may have a large margin of error.

Updated Nov. 2022

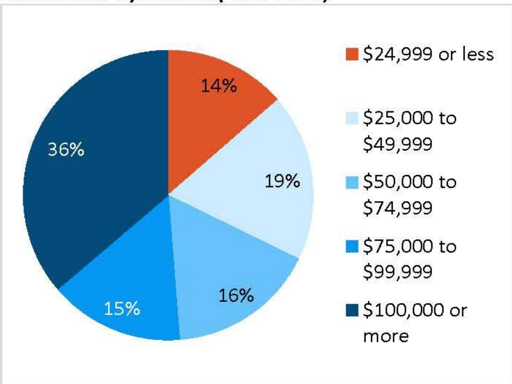
Tumwater — 2022 Statistical Profile

Employment & Income

Median Household Income*



Households by Income (2016-2020)*

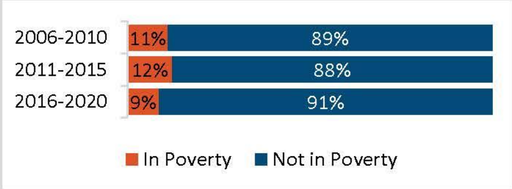


Cost Burdened Households (2016-2020)*

Cost Burdened	2,948
*Severely Cost Burdened***	*1,318*
Not Cost Burdened	6,324
TOTAL Households	**9,272**

***Severely cost burdened households are a subset of cost burdened households.*

Poverty Rate*



Jobs (2017 Estimate)

Resource, Construction, Utilities	1,890
Manufacturing, Wholesale Trade	2,970
Retail, Accommodation, Food	3,660
Transportation, Warehousing	680
Services	5,630
Finance, Insurance, Real Estate	1,250
Government	10,960
Total Jobs**	**27,030**

***Numbers may not add due to rounding.*

Taxable Retail Sales (adjusted for inflation)

LEARN MORE about statistics, trends, analyses and comparisons for Thurston County and its jurisdictions at The Profile: www.trpc.org/theprofile.

thurston regional planning council

Thurston Regional Planning Council
2411 Chandler Ct SW
Olympia, WA 98502
info@trpc.org
Ph: 360-956-7575

**Estimates based on survey data and may have a large margin of error.* *Updated Nov. 2022*

Summary and Adoption

The fourth edition of the Natural Hazards Mitigation Plan for the Thurston Region, referred to here as the Regional Plan, is the result of a multi-jurisdictional process to develop a mitigation strategy to reduce the risks of the most destructive hazards that threaten the region. This plan specifically addresses communities and special districts within Thurston County. This regional cooperative approach, led by the Thurston Regional Planning Council, has provided a comprehensive document at minimal cost to the participating regional partners. Thurston County jurisdictions, including special purpose districts, have the option of developing their own more jurisdiction-specific hazards mitigation plans, referred to as an "Annex." The City has elected to update the City Annex as part of the Regional Plan update process.

The Board of County Commissioners will adopt the Regional Plan and the Thurston County specific Annex. Other jurisdictions will review the document and adopt the Regional Plan and their specific Annex. In adopting the City Annex, the City also adopts the Regional Plan which describes the overarching regional approach to hazards mitigation.

The City Annex describes the City's planning process and expands upon the Regional Plan by identifying unique characteristics of the City, detailing the City's hazard risk rating for all appropriate hazards, cataloging the City's past, current, and proposed mitigation initiatives, and documenting the City's participation in the National Flood Insurance Program. The City Annex identifies potential City specific projects, designed to mitigate the impacts of those hazards that could be undertaken in the future depending on funding, direction, and need. The projects, known as mitigation initiatives, are developed based on input from each City department.

The Community Development Department has reviewed the City Annex to ensure that it does not conflict with the Comprehensive Plan or create potential conflicts with other City initiatives. The public has also been given opportunities to comment on the Regional Plan and the City Annex.

In order to apply for certain types of state and federal grants the City must have current Hazards Mitigation and Comprehensive Emergency Management plans in place.

City Annex Development Process

Hazards Mitigation Planning Team

The following individuals served as the City's hazards mitigation planning team.

City Department and Title	Representative
Community Development, Housing and Land Use Planner	Erika Smith-Erickson
Community Development, Planning Manager	Brad Medrud
Community Development, Director	Mike Matlock

Hazards Mitigation Planning Team Development Activities

The following activities supported the development of the City hazards mitigation planning process.

Actions and Activities	Date
Thurston Regional Planning Council Community Survey	June 1 – July 31, 2022
City Council Briefing	June 21, 2022
Thurston Hazards Mitigation Workgroup	September 26, 2022
Thurston Hazards Mitigation Workgroup	October 24, 2022
Thurston Hazards Mitigation Workgroup	November 28, 2022
Thurston Hazards Mitigation Workgroup	January 23, 2023
Long Range Planning Meeting – Staff introduction	March 3, 2023
Thurston Hazards Mitigation Workgroup	March 8, 2023
Review 2017 initiatives and draft new and revised initiatives	March 10, 2023
Email to City Department Directors for status on 2017 initiatives	March 15, 2023
Review of the of status of initiative responses from the 2017 Hazards Mitigation Plan	March 20, 2023
Started benefit cost review worksheet	April 19, 2023
Thurston Hazards Mitigation Workgroup	March 27, 2023
Collaboration with internal staff reviewing the draft initiatives and cost benefit worksheet	May 12, 2023
Email to internal workgroup to go over new proposed initiatives for 2023	May 23, 2023
Meeting with Planning Manager and Community Development Director to review initiatives	May 26, 2023
Discussion with Planning Manager with draft initiatives, prioritization criteria worksheet, and meeting schedules	June 2, 2023
Email to internal workgroup regarding FEMA requirements and capability assessment	June 5, 2023
Meeting with Thurston Regional Planning Council to review two new policy changes to FEMA requirements: capability assessment and review of hazards and actions required for the City	June 8, 2023

Actions and Activities	Date
Internal City Annex workgroup meeting to review 2023 initiatives, capability assessments, benefit cost review worksheet, and timeline for City Annex and Regional Plan Update	June 29, 2023
Planning Commission Briefing	July 25, 2023
Staffing Thurston County Fair – Thurston County Emergency Management Booth	July 26, 2023
Risk assessment criteria discussion with Thurston Regional Planning Council	August 3, 2023
General Government Committee Briefing	August 9, 2023
Final draft of 2023 initiatives sent to Department leads for comment	August 16, 2023

City Stakeholder Involvement

The City stakeholder group worked together to provide an update on the status of the 2017 initiatives, proposed revisions, and helped implement new initiatives. The stakeholder group helped implement other work plans and plan documents relative to hazards mitigation for the capability assessment.

The hazards mitigation planning team briefed the City Council on June 21, 2023, the Planning Commission on July 25, 2023 and General Government Committee on August 9, 2023. They provided comments and asked questions relating to the City Annex and Regional Plan update.

Organization	Representatives
Mayor	Debbie Sullivan
City Council	Councilmembers Angela Jefferson, Charlie Schneider, Eileen Swarthout, Joan Cathey, Leatta Dahlhoff, Michael Althauser, and Peter Agabi
General Government Committee	Councilmembers Michael Althauser, chair, and Joan Cathey and Leatta Dahlhoff
Public Health and Safety Committee	Councilmembers Leatta Dahlhoff, chair, and Angela Jefferson and Peter Agabi
Planning Commission	Elizabeth Robbins (Chair), Meghan Sullivan (Vice Chair), Anthony Varela, Brian Schumacher, Kelly Von Holtz, Terry Kirkpatrick, Grace Anne Edwards, Michael Tobias
Staff Stakeholder Group	Fire, Water Resources & Sustainability, Parks & Recreation, Executive, Transportation &

Organization	Representatives
	Engineering, and Community Development Departments and the GIS Team

Opportunities for Public Participation in the Plan Development

To engage the public and get feedback on the City Annex and Regional Plan update, the City participated in multiple public meetings, open houses and surveys, volunteer events, and the Emergency Preparedness Expo. During the Planning Commission briefing held on July 25, 2023 the Jolt News organization attended and authored an article.

Public comment on the Jolt News article expressed concern with earthquake hazards. Comments from the Planning Commission and General Government Committee were addressed and noted by staff as part of the update. The City posted the open house and survey on Facebook and put up flyers at local businesses and at City Hall at the Community Development Department counter.

The following public outreach activities supported the development of the City's hazards mitigation planning process.

Public Outreach Activities	Date
Thurston Regional Planning Council Community Survey	June 1- July 31, 2022
Article in *The Olympian* regarding the Community Survey	July 11, 2022
City Council Briefing	June 21, 2022
Draft Action Plan Open House and Survey	July 24-August 25, 2023
Planning Commission Briefing	July 25, 2023
Volunteering at Thurston County Fair – Thurston County Emergency Management Booth	July 26, 2023
Planning Commission Briefing	July 25, 2023
General Government Committee Briefing	August 9, 2023
Emergency Preparedness Expo	September 23, 2023
Final Draft Plan Public Comment Period	November 3- November 17, 2023
Final City Annex and Core Regional Plan to Washington Emergency Management Division	November 2023
FEMA Review	November 2023
Planning Commission Work Session	January 9, 2024

Public Outreach Activities	Date
Planning Commission Hearing	January 23, 2024
GGC Briefing	February 14, 2023
City Council Work Session	February 27, 2024
City Council Consideration	March 5, 2024

Review and Incorporation of Existing Plans, Studies, and Technical Information into the City Annex and Regional Plan Update

Plan	Type
2017 Natural Hazards Mitigation Plan	Initiatives and Historical Events
Thurston County Climate Adaptation and Mitigation Plans	2023 Initiatives
Capital Facilities Plan	2023 Initiatives
2020 Water System Plan	2023 Initiatives
Long Range Planning 2022 and 2023 Work Programs	2023 Initiatives
Comprehensive Plan	City Annex and Regional Plan Update and 2023 Initiatives
Stantec Consulting Ltd. 2023, Deschutes River Flood Reduction **Study: Hydraulic and Erosion Analysis and Alternative Report. Retrieved from Water Resources & Sustainability Department's Deschutes Flood Reduction Study.pdf - City of Tumwater.**	City Annex and Regional Plan Update and 2023 Initiatives

Technical Reports and Citations Bibliography

Report	Type
Julie Baxter and Karen Helbrecht from FEMA and Stacy Franklin Robinson, Sara Reynolds, Adam Reeder, and Hilary Kendro from the Strategic Alliance for Risk Reduction (STARR). ***Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. E-Book, FEMA, 2013.***	2023 Initiatives
Department of Homeland Security. National Risk Index, National Risk Index | FEMA.gov. Accessed 2023.	Hazard Profiles and Risk Ratings

Report	Type
Zuzak, C., E. Goodenough, C. Stanton, M. Mowrer, A. Sheehan, B. Roberts, P. McGuire, and J. Rozelle. 2023. National Risk Index Technical Documentation. Federal Emergency Management Agency, Washington, DC.	Hazard Profiles and Risk Assessments
Mauger, G.S., J.H. Casola H. A. Morgan, R. L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L. Whitely Binder, M. B. Krosby, and A.K. Snover, 2015. *State of Knowledge: Climate Change in Puget Sound*. Report prepared for the Puget Sound Partnership and the National Oceanic and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle. https://doi:10.7915/CIG93777D	Hazard Profiles and Risk Assessments
Climate Mapping for a Resilient Washington. Climate Impacts Group. Climate Mapping for a Resilient Washington, University of Washington, Washington County Climate Projections (uidaho.edu).	Hazard Profiles and Risk Assessments
Halofsky, J. E., Peterson, D. L. & Harvey, B.J. Changing wildfire, changing forests: the effects of climate change on fire regimes and vegetation in the Pacific Northwest, USA. *fire ecol 16, 4* (2020). https://doi.org/10.1186/s42408-019-0062-8	Hazard Profiles and Risk Assessments
Weather closures: rain, flooding - Updated Fri., 1:35 p.m. | The JOLT News Organization (The Jolt News, 2022), A 501(c)(3) Nonprofit Organization	Risk Assessments
Fox 13 Seattle News. (2022, January 6). Retrieved from Fox 13 Seattle: https://www.fox13seattle.com/news/major-flooding-expected-along-south-thurston-county-rivers	Risk Assessments

Integration of City Annex and Regional Plan into other Planning Mechanisms

The City's Capital Facilities Plan and the biennial budget are both used to implement mitigation initiatives specified by the City Annex. After adoption of the City Annex and Regional Plan, the first step is to seek funding for a project or action that supports a mitigation initiative in the biennial budget. The drafting and adoption of the biennial budget is an open public process available to the public. Community members are encouraged to participate in the shaping of the City's biennial budget. Also, getting an action or project into the Capital Facilities Plan is a way to get it in line for funding and a way to plan for when it will be implemented. The Capital Facilities Plan is updated every other year in a process which encourages public participation.

The Land Use Element is being updated and a new Climate Element will be created through the 2025 Comprehensive Plan periodic update process. Both Elements will include integration of the City Annex and Regional Plan into policies and action items. For example, Policy LU-6.5 of the Comprehensive Plan Land Use Element strongly encourages implementation of the City Annex and Regional Plan to reduce or eliminate the human and economic costs of natural disasters for the overall good and welfare of the community. The Climate Element will have a resiliency subelement that will incorporate the City Annex and Regional Plan to meet state requirements.

Plan Monitoring and Maintenance

The Planning Division of the Community Development Department is responsible for monitoring and maintaining the plan. The Planning Division has a Planning Manager and a Land Use and Housing Planner, who are leads for the planning team. The City Council, or appropriate Council committee, will be briefed annually on the status of the plan. Annual briefings will keep the plan in the forefront and place the decision makers in a more ready position to update the plan if needed. The agendas and notices for these meetings are posted on the City's website. These meetings are open to the public so there are additional chances for the public to participate in suggesting ideas for ongoing maintenance and updates to the City Annex.

The City also plans to work with Thurston County and Thurston Regional Planning Council in four years to meet the required five year update to the City Annex. The City has participated in updates in this manner on a regular basis since the plan was first adopted in the early 2000s. The planning team will continue to work with the Thurston Regional Planning Council, Thurston County Emergency Management Division, internal and external stakeholders, and follow state legislature to ensure all documented vulnerabilities are still accurate for the City.

The City Annex has incorporated many City updates into its initiatives. Staff will frequently review and track the status of the initiatives throughout the Capital Facilities Plan update, Tree and Vegetation Code update, 2025 Development Code periodic update, Washington Wildland-Urban Interface Code adoption, the 2025 Comprehensive Plan periodic update, Comprehensive Plan amendments, and more. The City Annex and Regional Plan is a climate resiliency sub-element requirement for the City's Comprehensive Plan that will need to be tracked and monitored.

At a minimum, the planning team and hazards mitigation planning team will meet yearly. The leads identified in the initiatives will be responsible for tracking and providing updates on the initiatives. The planning team has created a spreadsheet to track and monitor past and current initiatives. Additional monitoring and updates will be required through the Comprehensive Plan periodic update.

Continued Public Involvement

The City will continue promoting public participation. The Planning Commission will be briefed on the City Annex and Regional Plan update at a public meeting and hold a public hearing. The City Annex and Regional Plan will also be presented at a public meeting of the General Government Committee, a subcommittee of the City Council. The City Council will hold a public work session and a public meeting on the City Annex and Regional Plan as well. Events like this will be used in the future to allow for ongoing public participation.

Specific examples of continuous public involvement include:

1. Community members, businesses, and organizations will have opportunities to provide feedback on hazards mitigation planning between update cycles through Planning Commission meetings, City Council meetings, and the Comprehensive Plan periodic update.

2. Outreach efforts to engage socially vulnerable populations that are most impacted by hazards will be done through methods outlined in the Comprehensive Plan Update Public Engagement Plan.

3. Methods will include:

   - Presentations on the plan's progress at City Sponsored Meetings.
   - Stakeholder meetings for the Comprehensive Plan periodic update including neighborhood associations, chambers of commerce, School Districts, or other community organizations.
   - Periodic online polls or questionnaires.
   - Hosting a booth at public events like a farmer's market, community event, or music festival when applicable.
   - Creating door flyers.
   - Public meetings.
   - Social media posts.
   - Interactive websites, online open house, GIS story map.

4. Public Involvement will be documented with the initiative status worksheet that is maintained by Community Development Department staff.

City Risk Assessments

Flood Risk Assessment

Area of Impact

Same as described in the Regional Plan. The City is mapped with areas of high groundwater south of Tumwater Boulevard and the 100-year floodplain along the Deschutes River and lakes throughout the City and its Urban Growth Area.

Item 10.

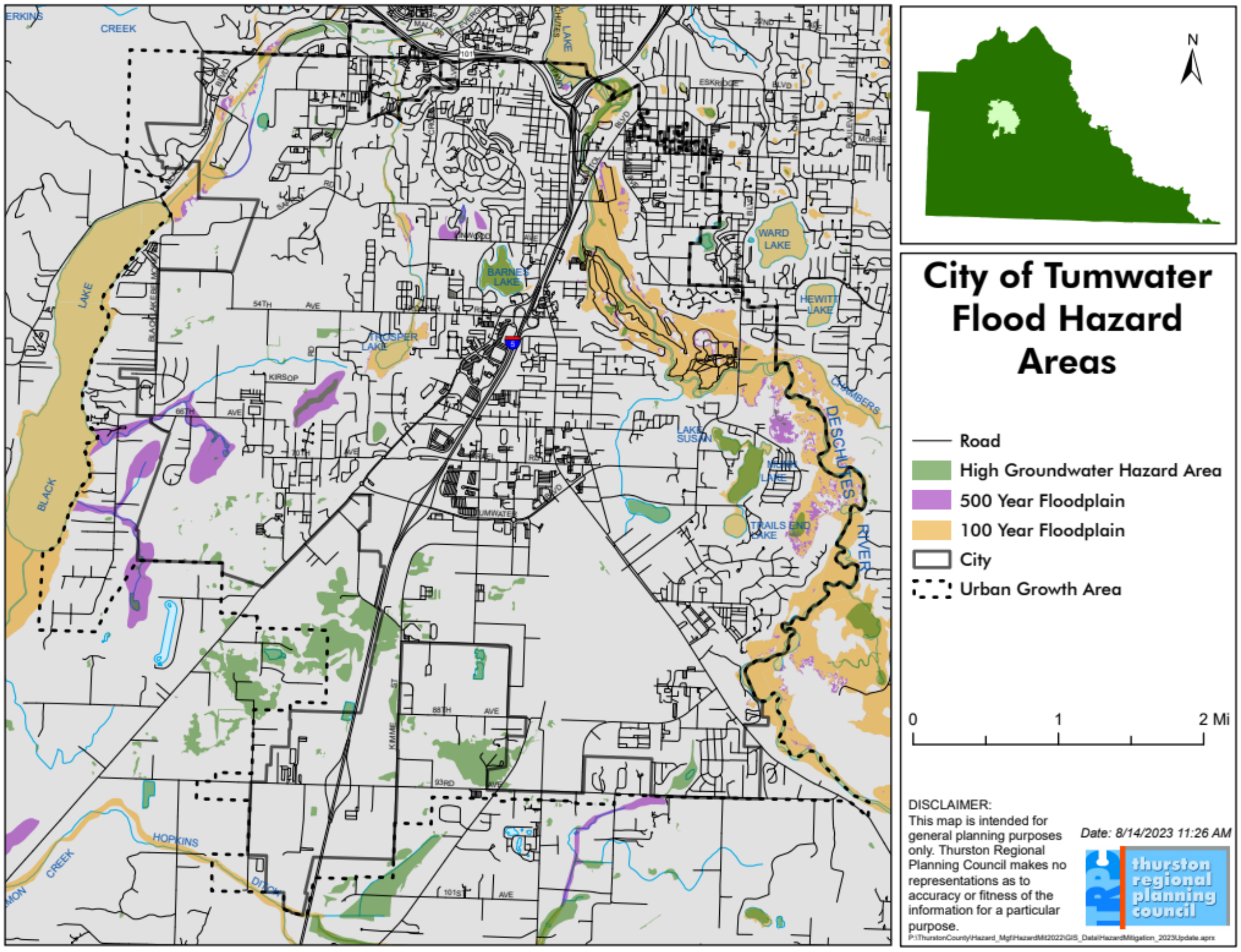


Figure 1. City Flood Hazard Areas.

Extent

The Deschutes River is the fastest rising and falling river in the county, responding quickly to local rainfall and runoff. The river's watershed encompasses a large part of the City. As the Deschutes River enters the urban growth area and the City, the riverbank and surrounding land use becomes more developed, with several residences in the Tumwater Valley around the periphery of the Tumwater Valley Municipal Golf Course. A riprap bank and additional hard banking channels the river through the Tumwater Valley Municipal Golf Course and parts of Tumwater Historical Park before it discharges into Capitol Lake near the Historic Olympia Brewery in the City, just south of Interstate 5. The City has areas of high ground water concern, especially within the Salmon Creek Basin and areas of Kirsop Road.

Previous Incidents

The vast majority of flooding events within the City occur within the Deschutes Valley. According to the National Weather Service records for the Rainier Flood gauge on the Deschutes River, between 1949 and October 2023 there were forty-six events above Flood Stage.

The expansion and development of the former Olympia Brewery properties within the valley led to a significant transformation of the area. Starting in 1953, several acres of riparian floodplain were filled with 133,000 cubic yards of material on which the bottling warehouses were built.[1] The river was partially re-channeled then as well. In 1963 an additional 114,000 cubic yards of material was moved from the adjacent hillside to fill a portion of the valley for a bottling warehouse expansion.[2] Later, in 1968 a much larger project began which moved two million cubic yards of fill material from the hillside on Cleveland Avenue into the valley. This project raised the level of the valley an average of five feet to make development of the Tumwater Valley Municipal Golf Course and Valley Athletic Club possible.[3] A significant watercourse change to the river was also done at this time.

Acres Of Green

In the spring of 1968, our Company launched a $2,000,000 public recreational complex in the Deschutes River Valley directly south of our plant facilities. The new recreational complex, located on 260 acres of brewery-owned property, includes an 18-hole, tournament golf course; pro shop; restaurant; two enclosed, heated swimming pools and four tennis courts. The recreational complex is handled by our Company-owned subsidiary, the Tumwater Valley Development Company.

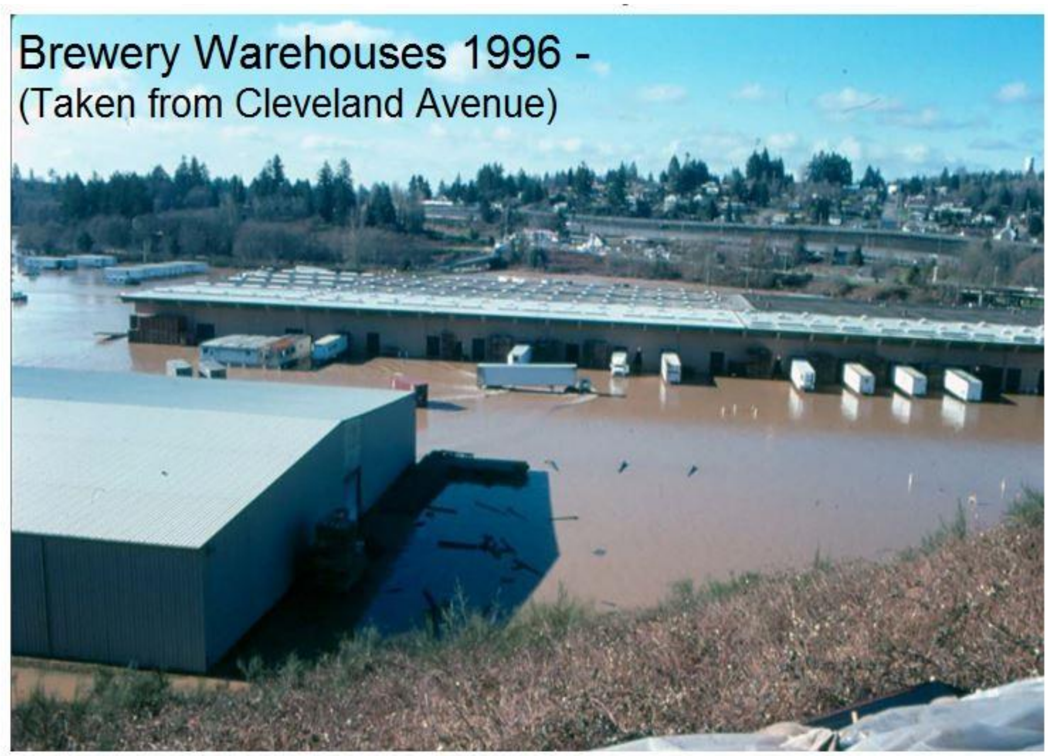
Construction of this golf course involved moving two million cubic yards of sand into the low marshy valley of the Deschutes River, raising the face of the course an average of 5 feet above its original height. All of the course contours were made and gently shaped by man.

25

Figure 2. Source: 75th Anniversary Brewery "It's the water" newsletter. p.25 Circa 1971.

The most obvious and visually dramatic examples of flooding in the City generally occur within the Deschutes Valley. City owned properties and facilities such as Pioneer Park, Tumwater Historical Park, the Tumwater Valley Municipal Golf Course, the Palermo well field and water treatment facility, the "M" Street sewer lift station, and other water and sewer infrastructure are located within this flood prone area. Private properties within this area include the bottling plant for the former Olympia Brewery, a few homes in the Palermo neighborhood off of "M" Street, The Valley athletic club, Tumwater Historical Park, which is a private park open to the public, the fish hatchery and associated fish ladder at Tumwater Falls, and the historic Old Brewhouse across from Tumwater Historical Park.

[1] "It's the Water" Brewery newsletter. "A Hill Becomes A Fill." June-July 1953.
[2] "It's the Water" Brewery newsletter. Aesthetic Excavation Planned. July 1963.
[3] 75th Anniversary Brewery "It's the water" newsletter. p.25, circa 1971.



1996 Tim Walsh, WA DNR

Several residential structures on 58th Avenue across from Pioneer Park were annexed to the City in January 2016. Since 1999, staff have observed and photographed these homes and properties being flooded on a regular basis.

Pioneer Park is one of several areas that are frequently inundated by floodwater. Water typically flows through the entire parking lot area and some of the sports fields.[4] Fortunately, the building, which houses the restrooms, has yet to be flooded.[5] This building is also used as a storage shed for mowers, tractors, and other equipment used for park maintenance.[6] A sewer lift station is located here as well.[7] Access to the building and the sewer lift station has not been possible during floods due to the floodwaters surrounding the site and flowing over the access road.[8]

The generator for this sewer lift station is on a concrete pad behind the restrooms. If the power supply is interrupted this generator is to take over so the sewer lines do not backup and overflow. The generator is not elevated except for the mounting brackets and the concrete pad upon which it sits. Consideration should be given to elevating portions of the infrastructure such as the generator when they are located within floodplains.

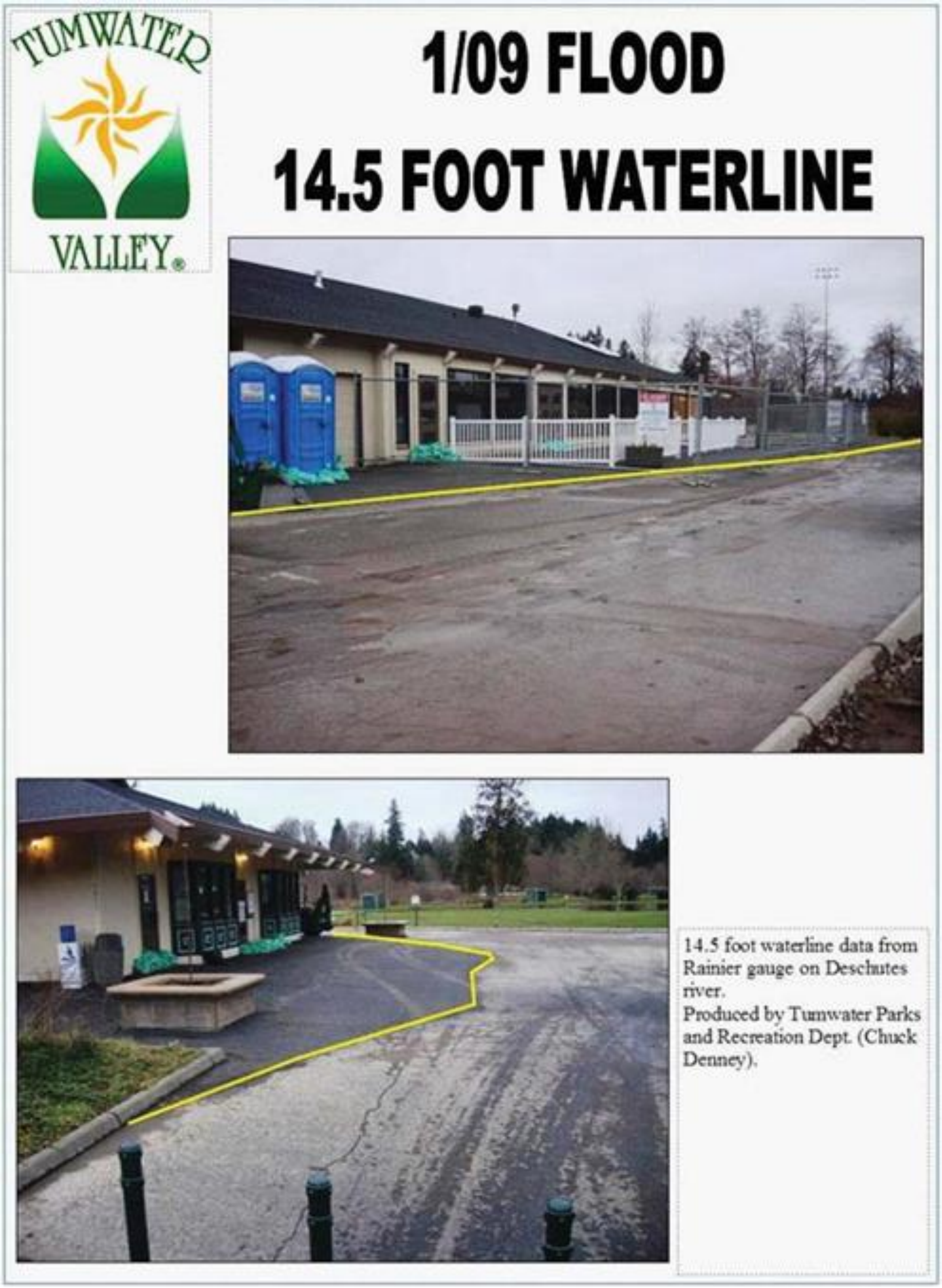
[4] Picture of flooding in parking lot and access road at Pioneer Park, January 8, 2009.
[5] Picture of flooding near restrooms at Pioneer Park, December 4, 2007.
[6] Phone conversation with Jeff Vrabel, Tumwater Facilities Manager, June 10, 2009.
[7] Phone conversation with Steve Craig, Tumwater Public Works Operations Manager, June 15, 2009.
[8] Phone conversation with Steve Craig, Tumwater Public Works Operations Manager, June 15, 2009.

The Palermo neighborhood off "M" Street has several homes within the 1% (100-year) floodplain. The area also contains the Palermo wellfield and water treatment facility and the "M" Street sewer lift station. Floodwaters have not yet flooded the drinking water treatment and wellhead facility but have come close in the past several years.

The sewer lift station at the end of "M" Street is often surrounded by floodwaters but has not been affected by the floodwaters yet. The hatch to the wetwell has already been replaced to limit the inflow of floodwater into the wetwell. In addition, plans to replace manway access to the drywell and increase its height are in process. This would help to avoid the flow of floodwaters into the sewer lift station.[9]

The Tumwater Valley Municipal Golf Course is within the 1% (100-year) floodplain and is flooded almost yearly. Floodwater routinely covers the golf course and gets to within a couple of feet of the door of the clubhouse, which is only inches below the level needed to flood the interior. Chuck Denney, the Parks & Recreation Director, produced a one-page demonstration of the water level at the Tumwater Valley Municipal Golf Course clubhouse in the January 2009 flood. Two photos with yellow lines drawn on them indicate the extent of the water levels near the clubhouse and a citation of the water level at the flood gauge at Rainier on the Deschutes River (14.5 feet).

[9] Phone conversation with Steve Craig, Tumwater Public Works Operations Manager-June 15, 2009.



With most storms that involve precipitation there are localized areas of flooding on streets. The Transportation & Engineering Department operations crew keeps a list of these areas so they can quickly identify and address this issue when it occurs. In most cases, it is tree leaves and other debris blocking storm drains, which causes the water to back up into the streets. In the December 2008 and 2012 snowstorms it became apparent that the snow and ice on Capitol Boulevard was blocking the storm drains and causing localized flooding for most of the length of Capitol Boulevard.[10]

In various areas along both Trosper and Kirsop Roads, localized flooding is a regular occurrence with large storms. The area has little in the way of frontage improvements. There are a series of deep ditches, many disconnected from upstream and downstream conveyance due to impacted or undersized culverts. In a few instances, beaver dams have obstructed conveyance, which is now managed by the City under a permit from the State Department of Fish & Wildlife. In addition, the City's Public Works Department completed a drainage study for the Trosper and Kirsop area in 2011, identifying a number of projects for retrofit to improve both conveyance and water quality. These projects have been added to the City's Capital Facilities Plan, with one project underway in 2015 for Kirsop Road, and others scheduled for 2023.[11]

Heavy rains, snow melting, and warmer temperatures caused flooding of major streets on January 7, 2022. Tyee Drive between Trosper Road and Kingswood Drive SW was closed due to water over the roadways. Tumwater Valley Drive was closed; a flood watch was in effect for the Deschutes River. The Tumwater Valley Municipal Golf Course and parks near the river experienced minor flooding during this event.

High groundwater flooding is an issue in several areas but mostly concentrated in the southwest portion of the City and its urban growth area. In order to deal with future groundwater flooding impacts the City and Thurston County adopted the Salmon Creek Drainage Basin Plan and its implementing regulations in 2005. The regulations control development within areas impacted by high groundwater flooding. Currently, sixteen properties in the City have flood insurance and only two claims have been paid since 1978 for a total of approximately $12,514.40. None of the City owned facilities or buildings, including the

[10] Phone conversation with Steve Craig-Tumwater Public Works Operations Manager-June 15, 2009.
Photos of Capitol Boulevard taken by Senior Planner David Ginther during 2012 snowstorm.
[11] Conversation with Tumwater Public Works Water Resource Division Manager in 2009, December 2015, and review of the June 15, 2009, Request for Statement of Qualifications for drainage studies in the City.

recently remodeled Tumwater Valley Municipal Golf Course clubhouse, which are located in the floodplain, have FEMA flood insurance.

Probability of Occurrence

Same as described in the Regional Risk Assessment. The probability of a flood event in the one hundred year flood plain is high, meaning a flood event is likely in the next 25 years. Flooding in a high groundwater area has a medium probability, an event is likely to occur within one hundred years.

Changes in Development

Development is restricted in the 100-year flood zone, there is no new development in flood hazard areas.

One site that may be redeveloped is the former Olympia Brewery and an “E” street expansion. The Brewery redevelopment and “E” street expansion proposals will require extensive Environmental Impact Studies. The redevelopment areas are in the one hundred year flood plain, shoreline regulatory environment for the Deschutes River which extends to the edge of the one hundred year flood plain.

Review of available studies and regulatory references identify some potential limitations to redevelopment of this area, largely due to the site’s proximity to shoreline, function as a flood plain, and the impact of stormwater. The majority of the site area that is affected by these limitations lies within the Valley and Knoll parcels. The Valley parcel lies within the one hundred-year flood plain of the Deschutes River and within the shoreline buffer areas. Due to periodic flooding and the current Tumwater Municipal Code, grading and construction of new structures will not be allowed. Future uses of the Valley Parcel will need to be tolerant of periodic flooding.

Effects of Climate Change

Both the extent and the frequency of flooding is projected to increase. Heavy rain events are projected to intensify increasing flood risk in all Puget Sound watersheds, including the Deschutes River watershed. Multiple factors combine to drive large increases in flood risk: declining snowpack, intensifying heavy rain events, and rising seas.

Flooding, especially in the Deschutes Valley and areas near the airport have a very high risk index. Flooding will impact existing homes, recreation facilities such as the Valley Athletic Club and parks, and critical infrastructure such as wells and lift stations, and critical facilities such as City Hall, the Headquarters and North End Fire Stations, and the Olympia Regional Airport. Roads and transportation will be impacted as well. Emergency services may not be able to access those in need in cases of extreme water way flooding which is common in the Trosper and Kirsop Road area, and other roads in high ground water areas.

Vulnerability

Impacts to People

If unprepared, people can be caught in fast moving waters and die. Those who have health concerns or do not have transportation are at risk if they are not able to leave in case of an evacuation. Though flooding is rarely related to mortality in Washington State, Flood waters present direct, short-term physical threats to health. In addition, floods can indirectly affect health by conveying biological and chemical agents to drinking, storm, and recreational waters; and by establishing favorable conditions for mold growth. The risk of illness increases as individuals and communities are exposed to pathogens through contact with contaminated waters or mold-filled dwellings.

People living near the Deschutes River by Pioneer Park and residents living near Kirsop and Trosper Road are at risk of flood hazard. There is a high risk of emotional, physical, and psychological stress. Damage to property could be costly and take time, this would impact people's livelihoods. The recovery period is stressful and disruptive for flood victims.

Impacts to Structures

The loss matrix identifies nine buildings exposed to high ground water hazard areas and sixteen buildings in the 100-year flood zone. It is estimated there would be twelve buildings impacted by flood, with a value of $123,879 worth of damage to the structures and contents. The City owns the parcels in the Tumwater Valley, including the Tumwater Valley Gold Course clubhouse. There are warehouses and maintenance facilities in the Deschutes Valley area, flooding could impact City functions and cause damage to structures.

The following critical infrastructures are located within the one hundred year flood zone or near:

- Pump station off Sapp Road
- Palermo Lift Station
- Pioneer Park

Impacts to Systems

Floodwater can damage or destroy buildings, homes, and their contents. Electric, gas, water, and communication utilities are also at risk of damage and disruption. Swift moving floodwaters can cause erosion and damage or destroy infrastructure including electric, gas, water, and communications utilities. Bridges, roads, and railroads are also vulnerable.

Impacts to Natural, Cultural, and Historic Resources

Unique to the historic brewery site along the Deschutes River are several rich layers of culture and history. The site presents challenges for historic preservation, cultural endowment, environmental sensitivity and mitigation, riparian restoration, recreation, and economic development in the event of a flood. Some of the highlights of natural, cultural, and historic resources include:

- Native American historical and cultural site
- Location where settlers from the Columbia River first settled in Washington State
- Southernmost location of Puget Sound
- Brewery History

Risk

Estimated Exposure to Flood

The Regional Plan used a Flood Modeling and GIS exposure analysis to estimate the number of people who live in areas that are prone to flooding. The City's number of population exposed is low as noted in the table below, but that does not negate the risk or danger.

Table 1. Estimated Population Exposure to Flood.

Number or Population Exposed			
50 year	**100 year**	**500 year**	**High Groundwater**
16	28	34	19

Types of Structures Exposed in Flood

The Regional Plan identifies estimates of buildings exposed to flood and the cost of losses and damages using Hazus Modeling. In the event of a flood there will also be tons of debris created from the hazard event. People, businesses, and more would be disrupted for potentially long periods of time. This will have effects on the economy, people, transportation, and more.

Table 2. Estimated Structural Exposure to Flood.

Number of Structures Exposed to Flood			
50 year	**100 year**	**500 year**	**High Groundwater**
5	16	23	9

Hazard Risk Rating

The City's 50-, 100-, and 500-year flood hazard risk ratings are low, medium, and low, respectively. The high groundwater hazard risk rating is low.

Earthquake Risk Assessment

Area of Impact

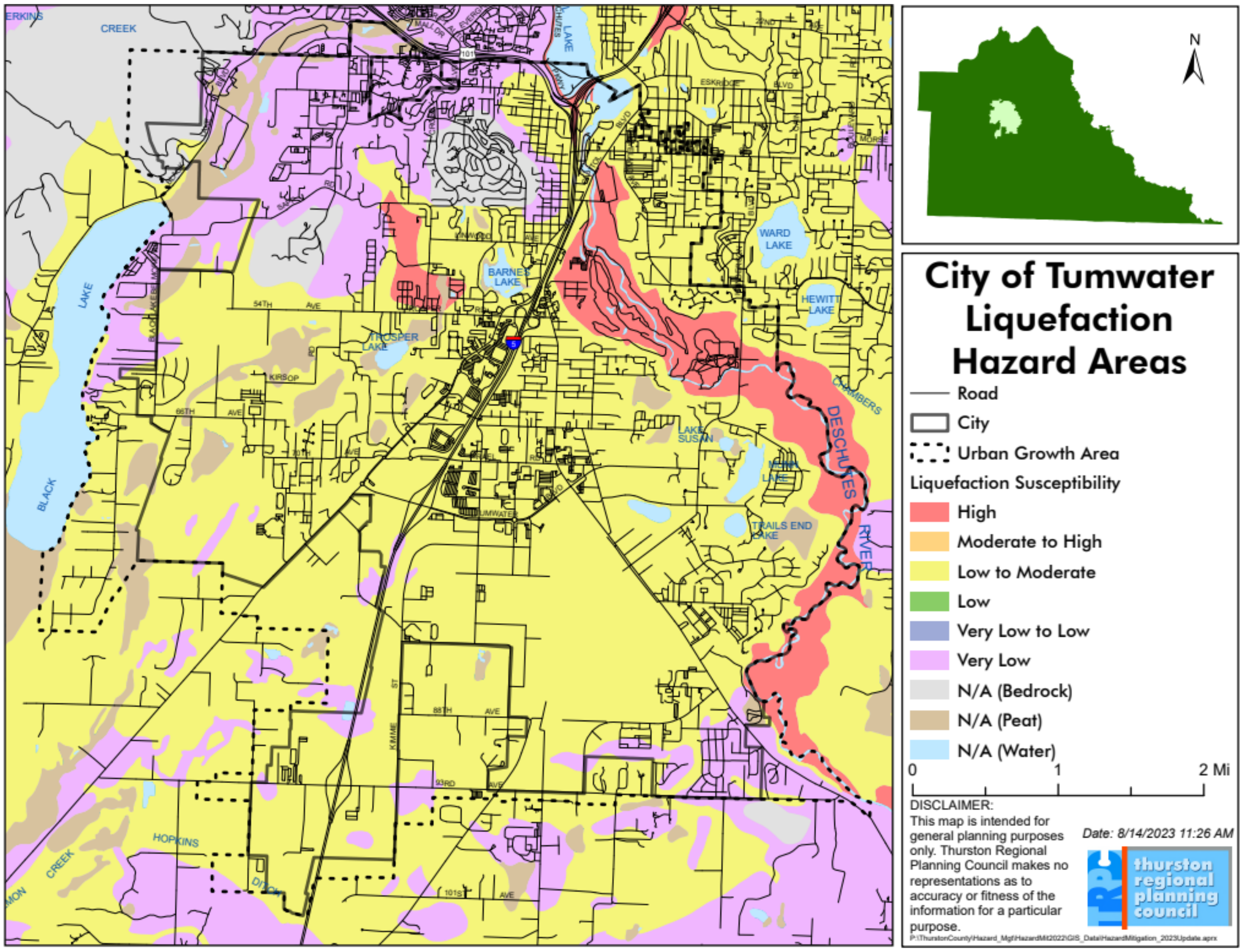


Figure 3. City Liquefaction Hazard Areas.

Generally, the same as described in Chapter 4.2 of Regional Risk Assessment, all areas of the Pacific Northwest are seismically active.

For the risk assessment, three earthquake scenarios were modeled using the natural hazards GIS modeling tool Hazus to assess vulnerabilities, estimate losses, and characterize earthquake hazard risks for Thurston County:

- A Cascadia Subduction Zone Magnitude 9.3 (megathrust earthquake)
- A Nisqually 7.2 (deep intraplate earthquake)
- A Seattle Fault 7.2 (shallow or crustal faulting earthquake)

The entire Deschutes Valley from Henderson Boulevard SE to the former Olympia Brewery has high liquefaction susceptibility. Percival Creek vicinity from Trosper Road SW to Sapp Road SW have areas of moderate to high liquefaction. Liquefaction is a phenomenon that occurs when ground shaking causes loose soil to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and involve the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting a structure liquefies. This can cause structures to tip and topple. Liquefaction typically occurs in artificial fills and in areas of loose sandy soils that are saturated with water, such as low-lying coastal areas, lakeshores, and river valleys.

City critical facilities and infrastructure such as water systems and pump stations are located in Earthquake hazard areas. Disruptions in service could have significant impacts on the community and extend recovery times after an event. Damages to infrastructure would be costly and have significant economic losses and burden to vulnerable communities.

There are many socially vulnerable communities located in areas at high risk for earthquakes and liquefaction near Trosper Road and the Deschutes Valley.

Extent

The Pacific Northwest is one of the most geologically active regions in North America, as described i in Chapter 4.2 of the Regional Risk Assessment. There are three different source zones to categorize Northwest earthquakes: Cascadia Megathrust, Deep Intraplate, and Crustal Faulting zones.

Previous Incidents

Four of the seven large manufactured and mobile home parks within the City are in areas of high liquefaction hazards or on peat.[12] These include Eagles Landing, Tumwater Mobile Estates, and Western Plaza, which are all located on Trosper Road, and Thunderbird Villa on Dennis Street. The latter three sustained damage during the 2001 Nisqually earthquake.[13]

Tumwater Mobile Estates experienced substantial liquefaction during the earthquake. Part of a private street within the mobile home park collapsed into a pond, taking two unoccupied cars into the water. The sidewalk also ended up in the pond. Private water lines and a natural gas line were ruptured prompting the evacuation of fifty residences in the mobile home park.[14] Evidence of liquefaction in the form of sand boils appeared in several areas of the park.[15]

The Western Plaza mobile home park experienced settling due to liquefaction, although it was to a lesser degree than that seen at Tumwater Mobile Estates.[16] Thunderbird Villa on Dennis Street had damage as well. The Fire Department observed at least one home in Thunderbird Villa that had the backyard settle several feet abruptly off the back of the home.[17]

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[12] Map-Tumwater Mobile & Manufactured Home Parks Liquefaction Soil Hazards.
[13] Former Tumwater Fire Chief John Carpenter-phone conversations June 3, 9, and 10, 2009.
[14] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
[15] USGS report on 2001 Nisqually Earthquake: http://pubs.usgs.gov/of/2003/ofr-03-211/NisquallyFinal.html#sunset
Geo-Earthquake Engineering Reconnaissance report on 2001 Nisqually Earthquake:
http://research.eerc.berkeley.edu/projects/GEER/GEER_Post%20EQ%20Reports/Nisqually_2001/liquefaction/lateralspread/index.html#sunset.
[16] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
[17] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
Picture by Fire Department of earthquake damage at Thunderbird Villa mobile home park.

Photo by Tumwater staff

The Olympics West assisted living facility, located on the south side of Trosper Road across from the Tumwater Mobile Estates mobile home park, also experienced settling and minor damage even though it is located within an area designated as low to moderate risk.[18] John Carpenter, the former Fire Chief, was inside the building at the time and witnessed the formation of a 10" step in the middle of a formerly flat hallway.[19] It is of particular concern that these types of facilities and mobile and manufactured home parks, which tend to be populated by some of the more vulnerable residents, including the elderly and disabled as well as low income, are located in areas that are highly susceptible to liquefaction.

Even buildings within areas of low to moderate liquefaction susceptibility sustained damage. The Headquarters Fire Station on Israel Road, which houses the Emergency Operations Center, was structurally damaged during the quake. The apparatus bay shifted away from the main building of the Headquarters Fire Station even though the two were structurally joined together.[20]

Most City buildings had at least some minor damage. Both the Headquarters Fire Station and North End Fire Station, City Hall, the Tumwater Timberland Library, Old Town Center, the historic Crosby House, the

[18] Map-Tumwater Mobile & Manufactured Home Parks Liquefaction Soil Hazards.
Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
[19] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
[20] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.

Henderson House Museum, and portions of the Tumwater Valley Municipal Golf Course all were damaged in the earthquake.[21] There were approximately 173 reports of damage to private property in the City.[22]

Figure 1: The Best Western hotel located on the bluff above the Palermo well field had a portion of the rear parking lot settle and start to slide down the hill. (Former Tumwater Fire Chief John Carpenter-phone conversation 6-3/9/10-2009)

Figure 2: The Extended Stay America facility near the Highway 101/Crosby Boulevard interchange had a large retaining wall give way, which broke a water line (Former Tumwater Fire Chief John Carpenter-phone conversation 6-3/9/10-2009)

[21] Former Fire Chief John Carpenter-phone conversation June 3, 9, and 10, 2009.
Jeff Vrabel, Facilities Manager, phone conversation June 10, 2009.
City Preliminary Damage Assessment Worksheet March 5, 2001.
[22] City-wide damage spreadsheet (Excel) sourced from the Fire Department.

Figure 8-10. Hillside slid away from beneath this four-hundred-foot section of a Union Pacific Railway branch line at Tumwater, near Olympia, Washington, during the Puget Sound Earthquake of 1965. A large landslide during the heavy-rainfall winter of 1996-97 also damaged the rail line. Photo by G.W. Thorsen, Washington Division of Geology and Earth Resources.

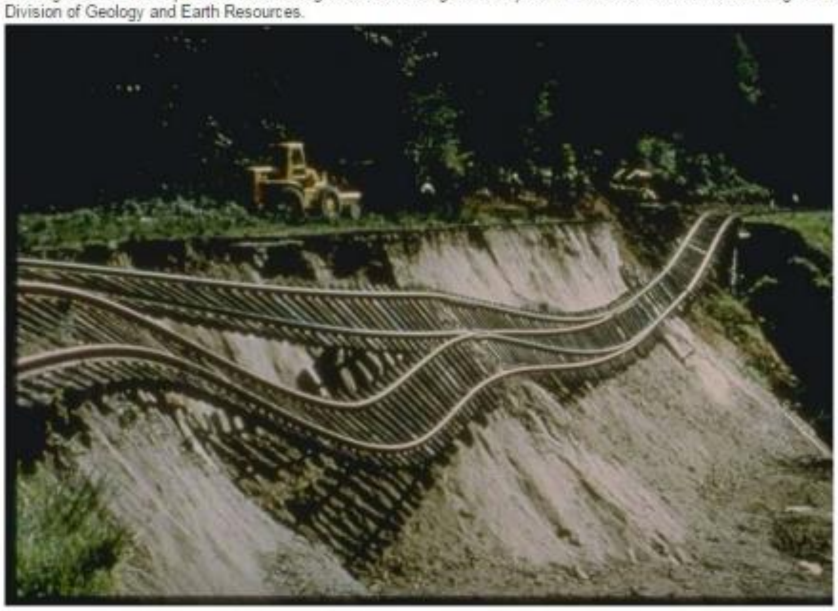


Figure 3: During the 1965 Puget Sound Earthquake, a large portion of the railroad lines north of the old brewhouse were significantly damaged in an earthquake induced landslide.

After the 2001 Nisqually earthquake, the State Department of Natural Resources mapped liquefaction hazard areas in the City. The entire Deschutes Valley southeast of Capitol Boulevard has been identified as an area of high liquefaction hazard. Aerial photos from the 1930s and the early 1950s[23] show that the area where the brewery warehouses are now located was once part of the Deschutes River channel. The river was relocated, 7.5 acres were filled with 130,000 cubic yards of material from the adjacent hillside along Cleveland Avenue, and the warehouses were built on top of the fill.[24]

Probability of Occurrence

An earthquake or liquefaction event for the City is medium, meaning it is likely a hazard event will occur within the next one hundred years. There is a 40 to 80 percent chance of a large earthquake occurring in Washington State in the next 50 years.

Changes in Development

There have been no changes or development in high liquefaction areas. The City is trying to work with the existing manufactured home parks to keep housing costs affordable and to ensure homes are connected to utilities which are to be built to current standards.

[23] Henderson House Museum Collection No. 78 and No. 80

[24] "It's the Water" Brewery newsletter. "A Hill Becomes A Fill." June-July 1953.

Effects of Climate Change

Earthquakes are not influenced by climate change.

Vulnerability

Impacts to People

In the event of an earthquake, everyone within the City would be exposed. There are immediate life safety impacts from collapsing buildings, liquefaction areas, and roads. There are other near-term impacts such as: disruption to utilities, water contamination, risks to people with disabilities, mental health incidents, and shelter demand for displaced individuals. In the event of an M9.3 scenario, 811 households will be displaced, half of those households will need temporary shelter. All buildings and businesses will be exposed to the earthquake, resulting in damage to structures and contents totaling an estimated $996,891,653. The City is at High risk for exposure to earthquakes, and the damages could be substantial. The economy would be impacted, and functionality of critical facilities are services, such as City Departments and infrastructure, would have long recovery times.

As identified in previous incidents above, there are communities that are socially vulnerable located in earthquake hazard areas. The FEMA National Risk Index identifies the City as Relatively Low for Social Vulnerability, but there are historic occurrences of earthquakes impacting emergency service facilities, which could impact the health and safety of people. There are also electric substations, and health and medical facilities that would be impacted. Socially vulnerable people living in long term care and special care facilities would be impacted, especially in the Trosper area, where liquefaction has occurred.

Table 3. Earthquake Displacement and Shelter Needs in the City.

Earthquake Household Displacement & Sheltering Needs			
	Cascadia M9.3	**Nisqually M7.2**	**Seattle M7.2**
Households Displaced	811	68	15
Individuals Needing Shelter	406	35	8

Impacts to Structures

Earthquakes can cause damage to homes and other buildings. Furniture, appliances, electronics, and other items could be moved and damaged in the event. There is a risk of secondary hazards such as fire or water damage.

Critical facilities such as fire departments, hospitals, police, and other providers could sustain damage to the buildings and equipment. Operations would be disrupted and inoperable until buildings, equipment, and power are restored to a functioning status.

In the event of an earthquake, mass amounts of structural debris will be generated. The table below represents structural debris multiplied by one thousand tons within the City.

Table 4. Structural Rubble Created by Earthquake in the City.

	Cascadia M9.3	Nisqually M7.2	Seattle M7.2
Total Debris (tons)	198.35	24.70	6.59

Impacts to Systems

City facilities and infrastructure are susceptible to damage, as identified in the previous incidents section, above. City Hall and surrounding facilities were built in 1987. The Headquarters Fire Station was built in 2000. Routine inspections and maintenance, as well as upgrades to infrastructure outlined in the mitigation initiatives will help reduce damage and keep critical operations working in the event of earthquake. Updates to infrastructure are needed to ensure they can withstand earthquakes and other hazards; the Capital Facilities Plan addresses the specific systems that need to be updated. Upgrades, such as installing solar power in City Hall and backup generators for water systems are needed to reduce the risks of vital utilities being out of commission for long periods of time.

The City has water systems in the Deschutes Valley. This area is mapped with high risk for earthquakes and liquefaction zone. Below is a table outlining the probability of damage and functionality after an event based on LOTT water systems at T Street and a Wastewater Line on Deschutes Valley Drive in the City. These systems are located near the Palermo Well, a critical facility to the City.

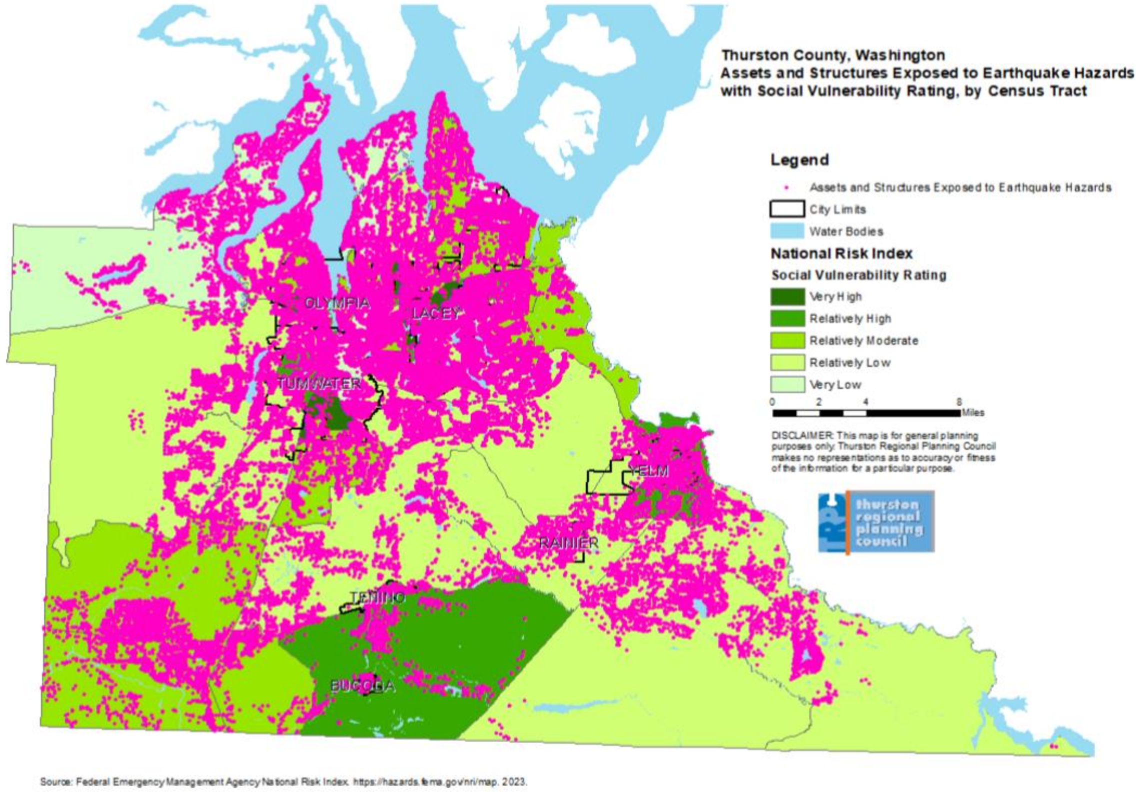
According to the Water Resources & Sustainability Department, more than one third of the City's drinking water comes from the Palermo well field in the Deschutes Valley, which is identified as an area of high liquefaction susceptibility by data provided by the State Department of Natural Resources. Damage to the Palermo wells or related infrastructure could cause a significant disruption in the supply of potable water for the City residents and emergency responses such as firefighting.

Table 5. Damage to Water Systems in the Event of a Cascadia M9.3 Earthquake.

Site	Probability of Complete Damage	Probability of At Least Slight Damage	Probability of at Least Moderate Damage	Functionality (%) at Day1	Functionality (%) at Day 7	Functionality (%) at Day 14
600 T Street-Water reservoir	90.93%	99.98%	98.7%	10.4%	13.5%	16.6%
110 Deschutes Parkway-Wastewater Pipeline	82.04%	99.93%	95.18%	1.3%	6%	8.1%

**Data from CriticalFacilitiesAnalysis_EQ_CascadiaM93.xlsx- Cascadia Fault Earthquake Scenarios*

Risk

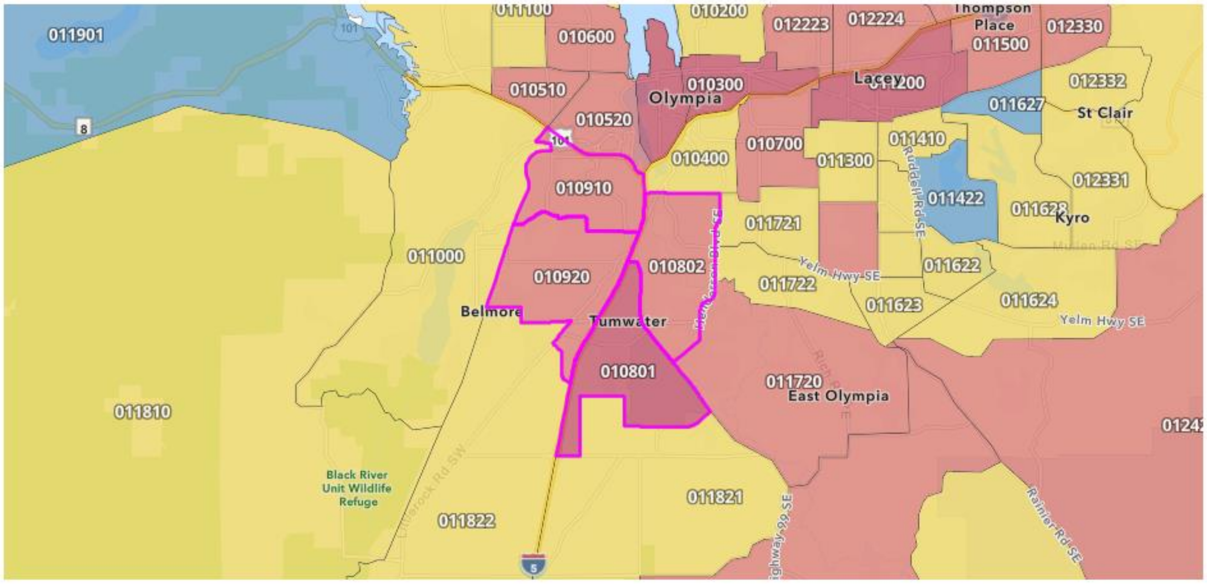


Hazard Risk Rating

Social vulnerability and the hazard risk rating index are summarized in Chapter 4.2 of the Regional Plan. The City's rating for a Cascadia M9.3, Nisqually M7.2, and Seattle M7.2 hazard risk ratings are high, medium, and medium, respectively.

Nationally, the City ranks relatively high/high for risk and social vulnerability in the event of an earthquake.

Risk Index



Risk Index Legend

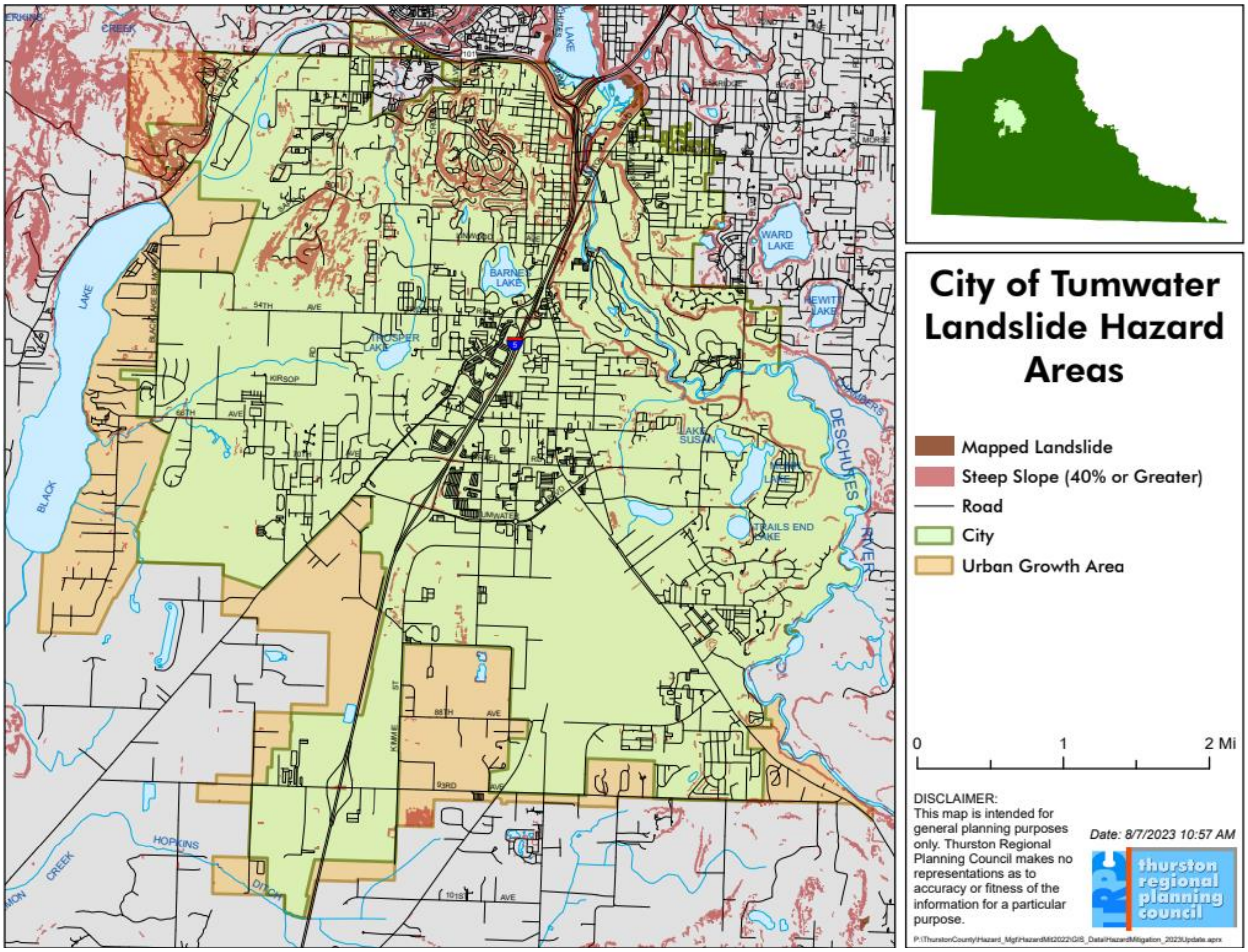
Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

Rank	Community	State	Risk Index Rating	Risk Index Score	National Percentile
1	Census tract 53067010801	WA	Very High	97.5	0 100
2	Census tract 53067010910	WA	Relatively High	95.93	0 100
3	Census tract 53067010920	WA	Relatively High	95.81	0 100
4	Census tract 53067010802	WA	Relatively High	94.88	0 100

Landslide Risk Assessment

Area of Impact



For the purposes of the hazard risk assessment, landslide hazard area is defined as a combination of the following areas:

1. Areas with slopes that are 40 percent or greater (slope was calculated using light detection and ranging or LIDAR using GIS); and
2. State Department of Natural Resources mapped known and historic landslides database

Tumwater Municipal Code 16.20.045(B) defines landslide hazard areas as:

Landslide Hazard Areas. Landslide hazard areas are areas potentially susceptible to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible to landslides because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Examples of these may include, but are not limited to, the following:

1. Areas of historic failures such as:

a. Those areas delineated by the U.S. Department of Agriculture's Natural Resources Conservation Service as having "severe" limitation for building site development.

b. Those areas mapped by the Department of Ecology (Coastal Zone Atlas) or the Department of Natural Resources (slope stability mapping) as unstable ("U" or class 3), unstable old slides ("UOS" or class 4), or unstable recent slides ("URS" or class 5).

c. Areas designated as quaternary slump, earthflows, mudflows, lahars, or landslides on maps published by the U.S. Geological Survey or Department of Natural Resources.

2. Areas with all three of the following characteristics:

a. Slopes steeper than fifteen percent; and

b. Hillsides that have intersecting geologic contact with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and

c. Springs or ground water seepage.

3. Areas that have shown movement during the Holocene epoch (from ten thousand years ago to present) or that are underlain or covered by mass wastage debris of that epoch.

4. Slopes that are parallel or sub parallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials.

5. Slopes having gradients steeper than eighty percent are subject to rock fall during seismic shaking.

6. Areas potentially unstable because of rapid stream incision, stream bank erosion, and undercutting by wave action.

7. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.

8. Any area with a slope of forty percent or steeper and with a vertical relief of ten or more feet except areas composed of consolidated rock. A slope is delineated by establishing its toe and top and measured by averaging the inclination over at least ten feet of vertical relief.

Landslide Hazard areas are mapped near Sapp Road, Tumwater Hill, Black Lake Boulevard, and along the Deschutes River.

Extent

Same as described in Chapter 4.4 of the Regional Risk Assessment.

Previous Incidents

The areas within the City that are most susceptible to landslides are shown on the City Steep Slopes map. Most of the steep slopes are in the northern portion of the City and include the bluffs along the Deschutes Valley, portions of Tumwater Hill, areas on Bush Mountain, and some areas west of Black Lake Boulevard including Jones Quarry.

A landslide occurred on Desoto Street near the base of Tumwater Hill in 1999.[25] The street lies along a short steep canyon called Desoto Canyon. The landslide occurred during the prolonged and heavy rainfall episode that happened in 1999.

However, the majority of landslides have occurred at the southeast end of Capitol Lake near the historic Old Brewhouse. This area is across the water from Tumwater Historical Park and behind the row of historic homes on Capitol Boulevard.

The following is an excerpt from the Brewery Neighborhood Appendix of the Tumwater Land Use Element:

> *There have been a number of landslides within this neighborhood. A slide in 1902 demolished several of the brewery buildings that were located east of the Old Brewhouse.[26] Slides in this same area have also occurred in 1965, 1996, 2001, and 2008 and have caused significant damage, mainly to infrastructure such as sewer lines.[27] The slides in 1965 and 1996 both ruptured main sewer lines resulting in untreated wastewater flowing directly into the Deschutes River and Capitol Lake.*

[25] Desoto Street landslide (1999)-Picture sourced from City's Public Works Water Resource Division.
[26] Source: 75th Anniversary Olympia Brewing Company Booklet ~1971.
[27] Source: *Natural Hazards Mitigation Plan for the Thurston Region-2009.*

The 1965 earthquake triggered a landslide in this area that took out the railroad tracks and the sewer line that transported wastewater from the City to the LOTT treatment facility in the City of Olympia.[28]

Figure 8-10. Hillside slid away from beneath this four-hundred-foot section of a Union Pacific Railway branch line at Tumwater, near Olympia, Washington, during the Puget Sound Earthquake of 1965. A large landslide during the heavy-rainfall winter of 1996-97 also damaged the rail line. Photo by G.W. Thorsen, Washington Division of Geology and Earth Resources.

Another landslide in 1996 in the same area again took out the railroad tracks and the two main sewer lines.[29] The 1996 landslide was not triggered by an earthquake but occurred during a prolonged and intense period of precipitation. The wastewater has since been redirected to a new pipe that is located on the other side of the valley along Deschutes Parkway.[30]

Another landslide in this general vicinity was observed to have occurred during the 2001 Nisqually earthquake.[31] This landslide was

located slightly further to the north than the two previous landslides, but still south of Interstate 5. No damage to facilities or infrastructure resulted from this landslide.

There have not been any recent landslides since the 2017 City Annex update.

[28] 1965 landslide: Washington Emergency Management Division Washington State Hazard Mitigation Plan p.7 of the landslides section. http://www.emd.wa.gov/plans/documents/Tab_7.1.5_Landslide_final.pdf.
[29] 1996 landslide: "Sewer line plan upended by quake." Tuesday, March 20, 2001. John Dodge. *The Olympian*. 1996 landslide: Washington Emergency Management Division Washington State Hazard Mitigation Plan. November 2007. Hazard Profile-Landslide. p.9 http://www.emd.wa.gov/plans/documents/LandslideNov2007Tab5.6.pdf
[30] 1996 landslide: "Sewer line plan upended by quake." Tuesday, March 20, 2001. John Dodge. The Olympian.
[31] 2001 landslide: Landslide was noted in the 2002 Capitol Lake Adaptive Management Plan, "Also the February 2001 Nisqually earthquake caused a large landslide along the eastern shore of the South Basin across from Tumwater Historical Park." http://academic.evergreen.edu/curricular/sustainabledesign/CLAMPPlan2003-2013.pdf

The most recent landslide occurred in December 2008, at a location closer to the old brewery building. This slide was in close proximity to a minor sewer lift station and contributed partially to its temporary failure. This minor lift station only serves about twenty residences on and near Capitol Boulevard.[32]

In February 2019, an oil spill from the Brewery spilled gallons of toxic sludge into the soil of Tumwater Historical Park's eastern trail. Clean up efforts by the State Department of Ecology repaired the soil, but after heavy rain the repairs were not enough. The soil was eroded, and rain caused segments of the trail to collapse into the Deschutes River. Continued rains only made things worse when the waterfall underneath the Boston Street bridge deteriorated, sending massive volumes of water down onto the east trail. The rush of water broke a fence and caused a rock buttress that holds up the trail to topple down onto the banks of the river.

Probability of Occurrence

The probability of a landslide in the City is high, meaning an event is likely to occur in the next 25 years.

Changes in Development

Tumwater Municipal Code addresses new and redeveloped areas that may be in areas mapped with geologic hazard areas. There are standard setbacks from hazard areas and special technical reports required as part of the development proposal. A geotechnical engineer or geologist must prepare

[32] Phone conversation with Steve Craig-Tumwater Public Works Operations Manager-June 15, 2009.

reports. The Development Code will be checked to ensure current state regulations are adopted through the periodic update in 2025.

Effects of Climate Change

With climate change, more frequent and intense rain, decreased summer precipitation, wildfires, and flooding, landslides and erosion frequencies and processes are altered. Warmer air will break down soils, allowing more water to be penetrated, wildfires and loss of vegetation and root systems that stabilize slopes, can affect rates of erosion and increase the chances of landslides.

Vulnerability

Impacts to People

An estimated 223 people within the City live within areas that are at risk of landslides. Landslides could catch people unaware and cause serious injury or death. People could be stranded if roads are blocked and transportation unavailable. People can lose their homes and experience displacement. If serious injury occurs, help and assistance could be extended or not able to reach those in need.

Impacts to Structures

Landslides can damage and destroy homes, property, critical facility structures, and infrastructure. There are seventy-four structures identified in potential landslide hazard areas according to the Regional Plan Table 4.4.3. Tumwater Hill is a highly populated area with residences, duplexes, apartments, a school, and businesses. A landslide could carry structural debris and cause damage to anything in its flow path.

Impacts to Systems

Water, sewers, and other critical infrastructure could be damaged in the case of a landslide. Tumwater Hill and the Deschutes Valley have water systems and transport lines that could be impacted or broken in a landslide. There is also the potential for contamination of water and to the environment. Landslides could block off transportation systems, damage roads and infrastructure needed for emergency services and evacuation, and isolate or strand people.

Impacts to Natural, Cultural, and Historic Resources

There are multiple historical structures and natural resources that could be affected by a landslide. Landslides in the Deschutes Valley could transmit contamination from the Historic Brewery site into the Deschutes River and damage the Tumwater Historical Park.

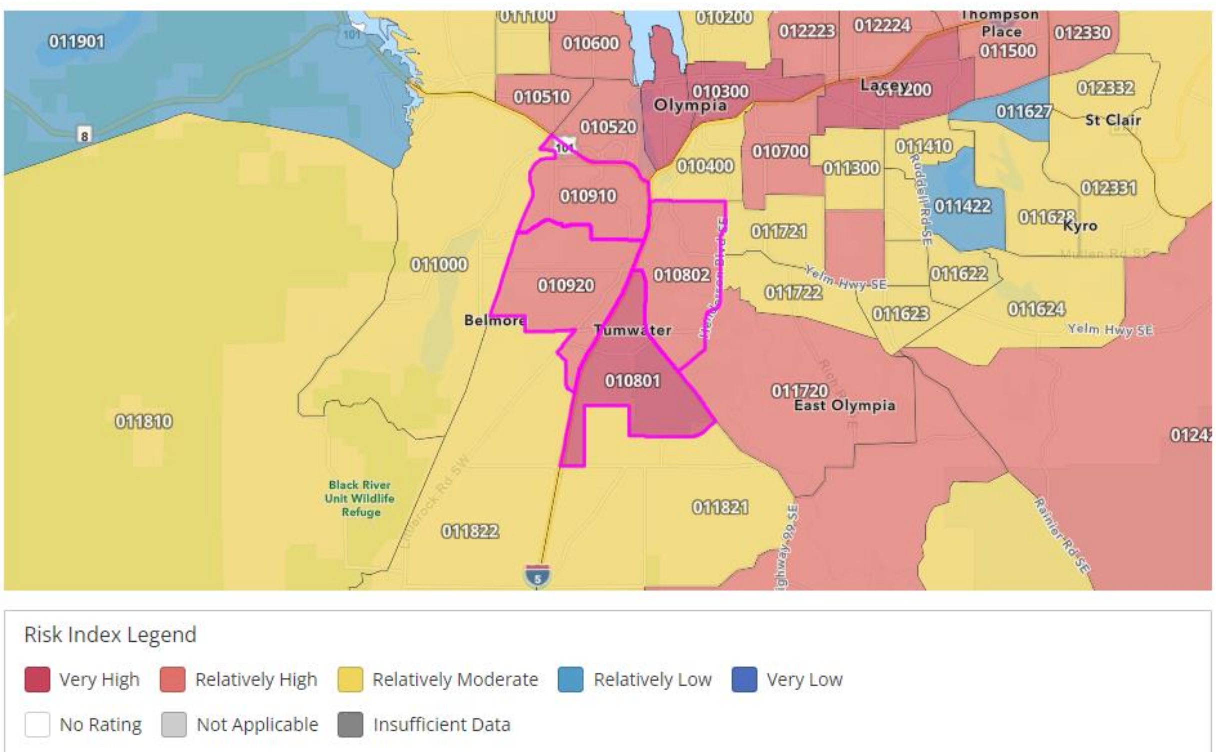
Risk

Hazard Risk Rating

Chapter 4.4 of the Regional Plan describes social vulnerability rating and the risk index for Landslide Hazard Areas. The City's risk index is relatively high to high according to the FEMA National Risk Index report. The overall hazard risk rating for the City is 18.

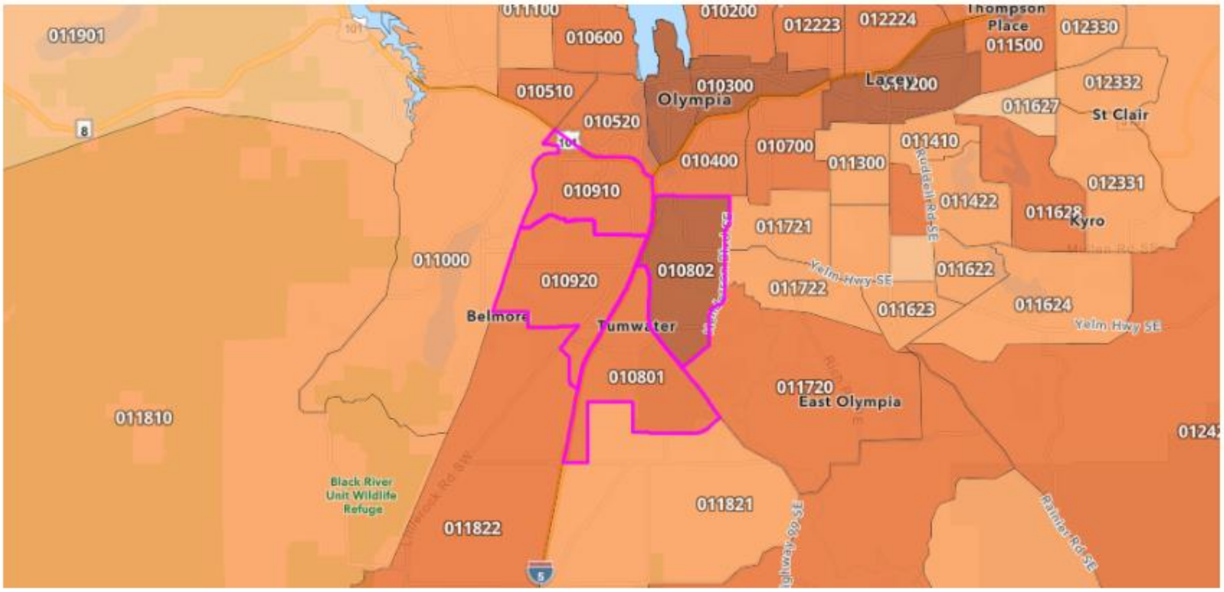
The maps below show the risk index and expected annual loss from landslides.

Risk Index



Expected Annual Loss

Expected Annual Loss measures the expected loss each year due to natural hazards.



Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Expected Annual Losses | Not Applicable | Insufficient Data

Rank	Community	State	EAL Value	Score
1	Census tract 53067010802	WA	$3,944,128	97.13
2	Census tract 53067010910	WA	$3,772,236	96.86
3	Census tract 53067010801	WA	$3,377,825	96.04
4	Census tract 53067010920	WA	$2,951,985	94.83

Severe Weather Risk Assessment

Area of Impact

In general, all Thurston County communities are affected by extreme heat events, extreme cold events, and other storm activities (winds, rains, and snow). See Chapter 4.6 of the Regional Plan for definitions and statistics.

Extent

Same as described in Chapter 4.6 of the Regional Risk Assessment.

Previous Incidents

Lightning has caused damage to the infrastructure in the City several times over the last couple of decades.

In 1991, a deep freeze resulted in several frozen and broken water mains. Most of the water mains that froze were on overpasses. A couple of these frozen water mains were part of construction projects, so the water was not moving inside the pipes, just sitting still. Usually, a minor amount of water movement will prevent water from freezing inside a pipe. Steps have since been taken to prevent water mains from freezing again.

During the December 2008 snowstorm, several apartment complexes in the City had carports collapse. These included the Breckenridge Heights apartments, Indian Creek condominiums (pictured below), and Capitol Heights apartments.[33] The Olympics West Retirement facility on Trosper Road was evacuated due to the threat of roof collapse from heavy snow.[34] Other relatively minor damage occurred to the Headquarters Fire Station when the weight of the snow tore the gutters off of the building. No injuries were reported due to the collapses.

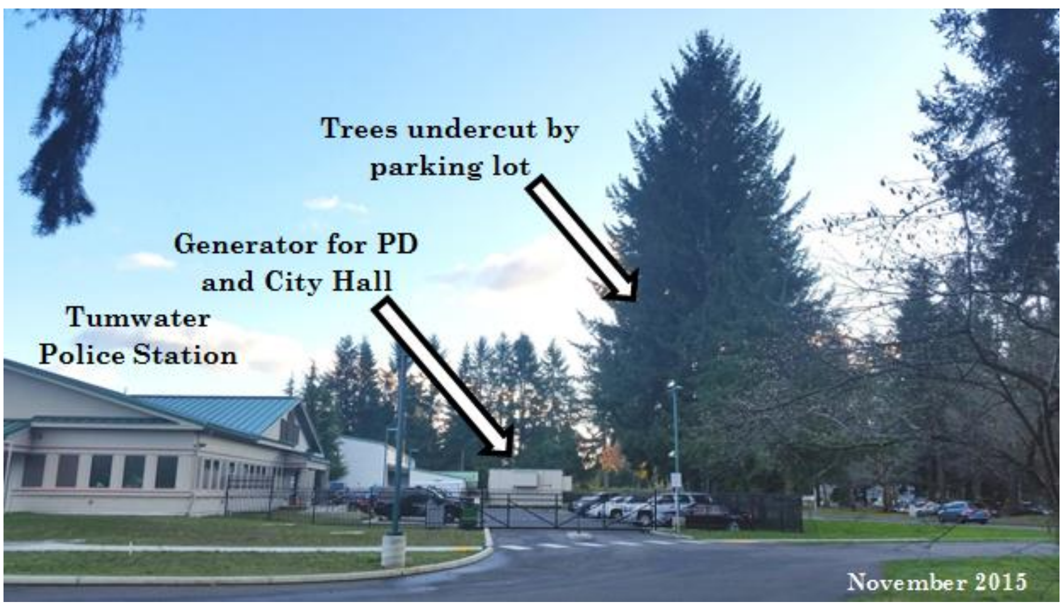
Due to the number of trees in the City, power outages are expected during storms. The most recent severe and long lasting power outages were during the December 2006, 2008, and 2012 winter storms. The 2006 windstorm resulted in City facilities without power for several days. A half million-dollar generator was installed at City Hall in 2009 to provide uninterrupted power for both City Hall and the Police Station. In addition, there are generators for most of the City facilities including, but not limited to,

[33] Picture from the Fire Department of collapsed carport at Indian Creek Condos 220 Israel Road in Tumwater on December 25, 2008 and conversation with Fire Department front counter staff.
[34] The Olympian newspaper article 12-28-2008 (online). "Riding arenas roof collapses." by Rolf Boone.

the Emergency Operations Center, which is inside the Headquarters Fire Station, the North End Fire Station, the Operations & Maintenance Facility, and several critical components of the water and sewer systems. Most City facilities are now able to function due to the generators.

Besides power outages, the other significant issue from storms is the damage to structures, utilities, and the transportation system from falling trees, as well as the cost of cleanup afterwards. The 2012 storm was a combination of heavy snow and ice, which severely damaged many trees throughout the City. The damage and cleanup costs for removal of tree debris from City streets and properties were approximately $317,796.56.[35] Some of the structure and infrastructure damage included a partially collapsed Headquarters Fire Station wash rack roof (~$42,000) and part of the computer system for the SCADA sewer and water management system had to be replaced (~$16,000).[36]

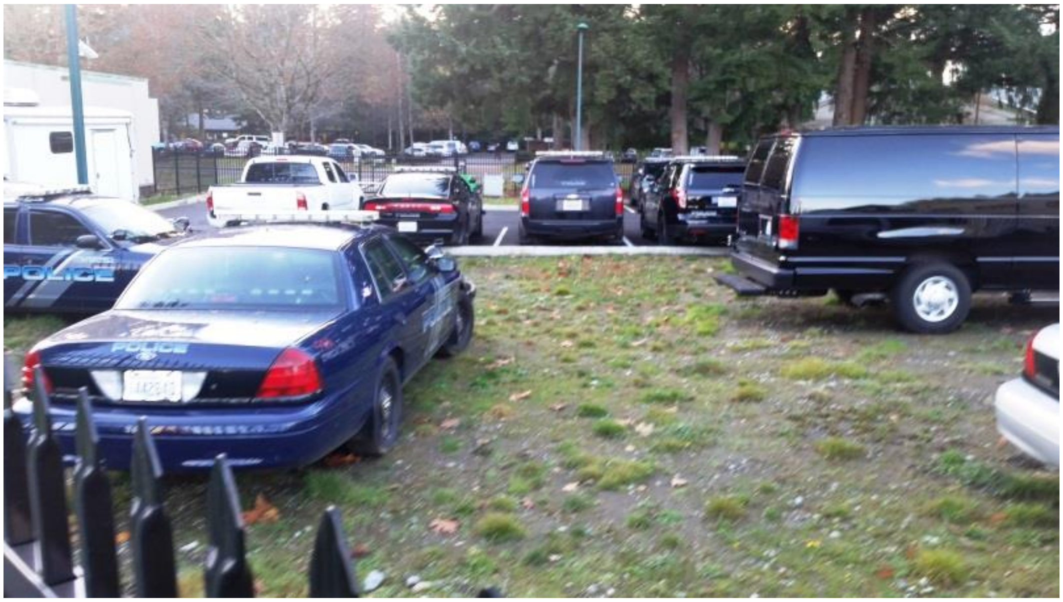
During the Police Department expansion at City Hall in 2014, the row of ten large fir trees on the west side of the building had their root zones significantly disturbed during construction. These trees are within falling distance of the newly expanded Police Station, which is a critical facility attached to City Hall, as well as the half million-dollar generator, which supplies power to the Police Station and City Hall. This generator also includes a special device to remove power fluctuations. For this reason, all power for City Hall, the Police Station, and the Operations & Maintenance Facility are routed from the Puget Sound Energy lines and through this device first before being distributed on-site. If a tree fell on the generator, it would also damage this special controller and completely interrupt power service on-site.



On May 4, 2017, a wet microburst touched down in parts of the City and the Cities of Olympia and Lacey causing substantial damage in a relatively small area. Many trees and utility poles were broken or blown down in the short but severe storm. Localized urban flooding occurred as well due to the large amount of precipitation that occurred within a short time period. Microbursts happen when air cools quickly inside a thunderstorm, moves to the surface, hits the ground and then spreads horizontally on the ground. Microbursts tend to affect small areas, usually no larger than a few square miles. This weather

[35] Project reimbursement worksheet for submittal to FEMA prepared by Fire Department staff 2012.
[36] Project reimbursement worksheet for submittal to FEMA prepared by Fire Department staff 2012.

phenomenon produces damage in a starburst pattern. The damaging winds radiate away from the point of impact in straight lines.



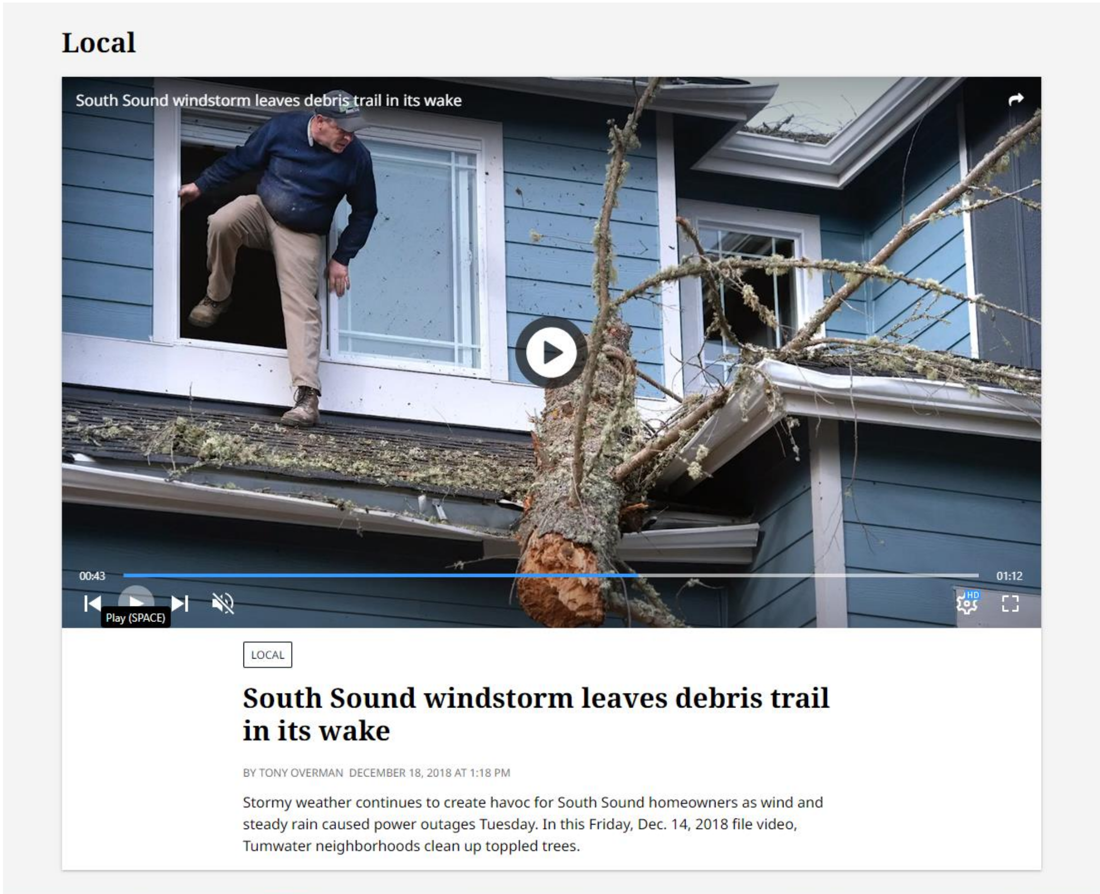
Other issues associated with these fir trees in this location are the clogging of the porous asphalt parking lot, fir needles and debris falling into and on cars, and tree sap dripping on to cars. Both of the latter issues can cause visibility issues with windshields on emergency vehicles. Police officers have taken to avoiding utilizing half of the parking lot for this reason and are parking on the grass at the back of the facility at times.

Trees undercut by police station parking lot – November 2015

Special care should be taken to have a tree professional inspect these trees on a regular basis. An alternative and more initiative-taking approach would be to remove them before a strong storm occurs and they topple onto a critical facility, the generator that powers the critical facility, or police vehicles or personnel. A first step may be to trim the lower branches to lighten the wind load on the trees.

In a somewhat similar situation, very tall fir trees also surround the Headquarters Fire Station, which contains the Emergency Operations Center. These trees have not been disturbed since the construction of the Headquarters Fire Station in 2000 and have weathered several significant storms in the last decade and a half. However, one tree was hit by lightning in summer 2015 and much of its bark was blown off. The groves of trees on both sides of this critical facility should be assessed every few years as to their health and their ability to weather a severe storm. Monitoring the health of trees within falling distance of critical facilities should be done on a regular basis.

On December 11, 2018 heavy rains and windstorms swept through Puget Sound and caused power outages to about 2,000 Puget Sound Energy customers, mostly in the City. Trees fell, taking down power lines and poles. This left homeowners, businesses, and even students at school without power. Students at Tumwater High School were released early due to the school not having power and lights. Busy intersections were turned into four way stops. This storm was one of many projected throughout that week. The pictures below show City residents trying to clear debris from the windstorm days later on December 14, 2018.


Local

LOCAL

South Sound windstorm leaves debris trail in its wake

BY TONY OVERMAN DECEMBER 18, 2018 AT 1:18 PM

Stormy weather continues to create havoc for South Sound homeowners as wind and steady rain caused power outages Tuesday. In this Friday, Dec. 14, 2018 file video, Tumwater neighborhoods clean up toppled trees.

At the end of June 2021, the City experienced a historic heat wave. The heat was caused by a dome of high pressure over the northwest and worsened by climate change. One man in the City died due to the extreme heat, he was found deceased in his apartment. Temperatures were as high as 105 degrees. Many homes in the City are not equipped with air conditioning, the chances of hyperthermia are high, and most of the population is at risk.

Probability of Occurrence

The City matches the regional risk assessment for storms in regard to probability of "high." A high rating means a hazard event is likely to occur within 25 years.

Changes in Development

Any development within the City is subject to storm hazards, especially heat. The City's Building Codes are up to state standards and Washington State Energy Code standards are met. This helps in times of severe cold or heat storm events. The City is working to promote infill to reduce urban sprawl and heat islands caused by hard surfaces, such as concrete. The retention of trees will help keep areas cooler, the City is updating its tree and vegetation code.

Effects of Climate Change

It is projected that over the next thirty years summer temperatures will rise 3.4 degrees, this will impact economic development, agriculture, ecosystems, and human health. Warmer summers are expected to increase concentrations of air pollutants, such as ozone and some vector-borne illnesses, such as West Nile virus. Warmer summer temperatures could decrease opportunities for warm season recreation activities. Warmer summers are expected to reduce summer soil moisture and increase physiological stress for some plants and animals. The elderly, very young, and people with preexisting health conditions are more likely to be affected by warmer summers.

Warmer temperatures set the stage for algal blooms, in 2015, the waters off the west coast from California up to Washington experienced one of the largest observed toxic algal blooms in recent decades when the neurotoxin domoic acid formed and spread. Droughts can concentrate harmful substances in streams or wells. Extended or intense droughts can impact smaller surface water and shallow groundwater systems by significantly reducing the quantity of water available for use. While impacts on individual water supply systems will vary, the projected increase in both flooding and drought could increase risks to drinking water quality and quantity.

Heavy precipitation is expected to increase by ten percent. Floods can introduce hazardous and toxic substances to water ways and threaten public water supplies. Neighborhoods and developments that are low-lying or have problems with drainage will be more vulnerable to flooding. Transportation routes and infrastructure located in low-lying areas, within or near current floodplains or regulatory flood zones, or adjacent to unstable slopes are expected to be more exposed to an increase in heavy precipitation.

Vulnerability

As stated above, the City is vulnerable to the effects of severe weather and storm hazard events. Infrastructure, water systems, waste management, ecosystems, development, economic development, human health, and more can be impacted.

Impacts to People

The elderly, young, and people with existing medical conditions are the most vulnerable to extreme weather events and storms. As temperatures rise, more stress is placed on the body, which increases the risk of heat exhaustion and heat stroke. Prolonged summers can increase pollen and allergens, affecting those with asthma or allergies. During heat waves, there is an increase in the number of emergency calls, hospitalizations, and heat-related deaths. People with pre-existing health conditions, such as diabetes or a suppressed immune system, are also at a higher risk of experiencing health complications. Outdoor laborers are more exposed, placing them at a relatively higher risk as well.

Residents who do not have access to housing, housing with air conditioning or fans, heaters, access or transportation to medical or emergency weather centers, families without medical care, are all at risk. Households that are damaged by storm events are financially burdened, while public safety is at risk. Storm events can leave households displaced due to structural damage. Without power, transportation, heat, access to clean water, cooling centers, and medical care people are burdened emotionally, physically, and financially.

Impacts to Structures

There have been historic incidents where the Headquarters Fire Station, City Hall, and structures have been impacted by severe weather and storm events. It is vital that trees are inspected around critical facilities to reduce damage from trees and limbs falling during a severe storm, so damage to City property such as roofs, vehicles, and buildings are minimized. During winter storm events, water mains can freeze or weight from snow and falling debris can cause physical damage.

Impacts to Systems

During power outages, it is critical the Emergency Operations Center at the Headquarters Fire Station and Police Department at City Hall are still functioning. City staff are looking at resources and funding to secure solar panels in case the main generator at City Hall fails. Power lines and utility lines are susceptible to damage from tree limbs and trees falling. If utilities and communication systems are installed underground, there is less impact on critical communication systems. Homes can remain with power and heat during winter storms and have the ability to communicate with emergency services in case of an emergency.

Impacts to Activities

Outdoor recreation and economic development will be impacted. In a heat event, sports and games may have to be cancelled, people who work outside may not be able to work in extreme heat, dust and allergens will affect air quality and people will have to stay indoors. Parks and outdoor areas will be exposed to drought, waterbodies and areas to swim will have water level decreases and prone to more water quality issues.

Risk

Hazard Risk Rating

Hazard risk ratings are based on social vulnerability ratings and the national risk index as explained in Chapter 4.6 of the Regional Plan. The City has a relatively high to high risk index and broad range of socially vulnerable areas. Those who live in homes without heat and air conditioning or are elderly and have medical conditions are most at risk.

Wildfire Risk Assessment

Area of Impact

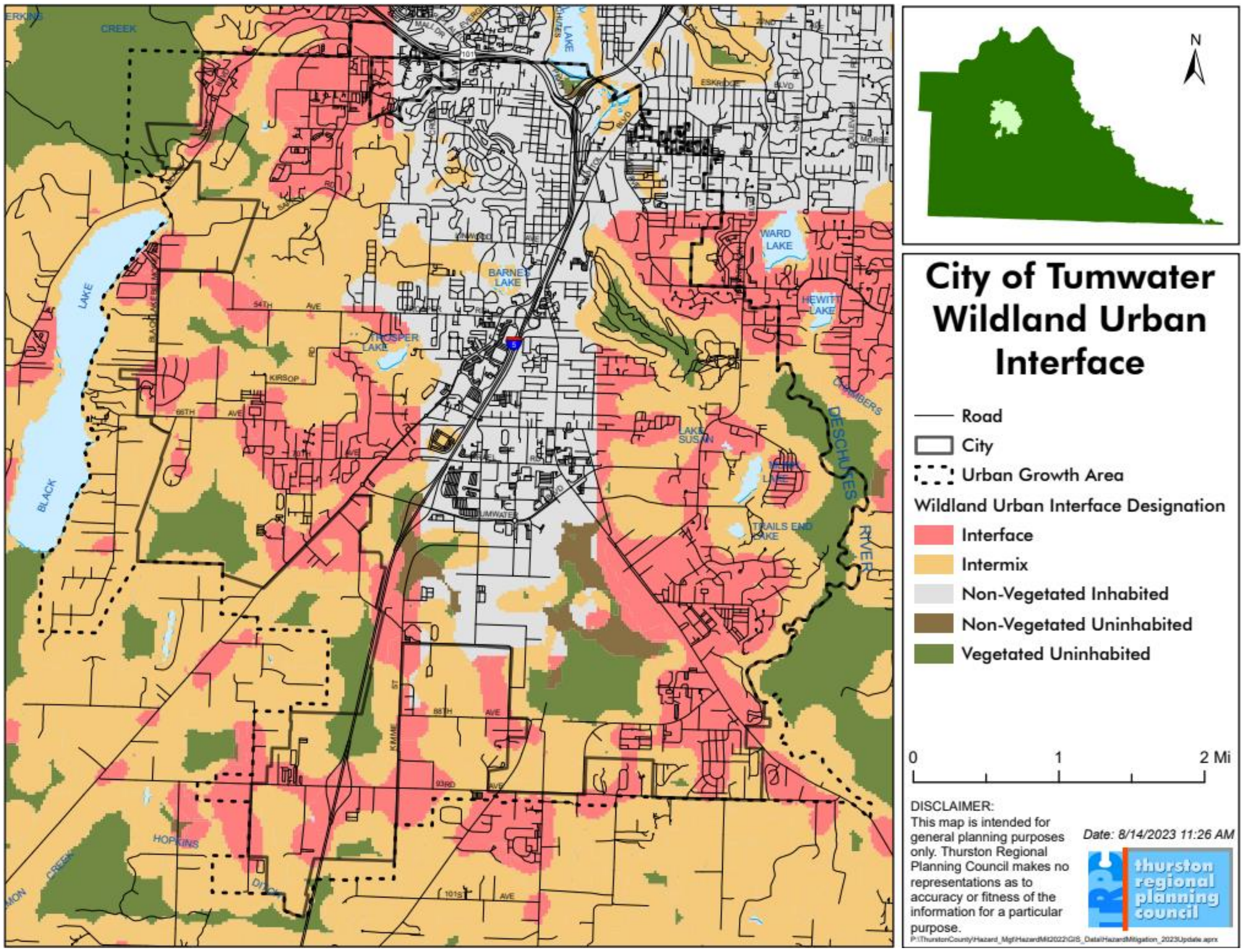


Figure 4. City Wildland Urban Interface

In 2019, the State Department of Natural Resources completed statewide mapping for wildlands and wildland-urban interface areas. For the purposes of the wildfire hazard risk analysis, the hazard assessment area is defined as wildland-urban interface and intermix mapped areas. Approximately two thirds of the City are mapped in the wildland urban interface and intermix areas according to the state mapping.

In general, wildlands are areas covered with 50 percent or higher burnable vegetative cover (Map 4.9.1). There are two major land use characterizations for areas that are prone for wildfires:

1. Wildland-Urban Interface – located on the periphery of urbanized areas where homes, businesses, and other structures meet wildlands. Areas mapped as a wildland-urban interface and intermix include development that is bordered by wildlands on at least one side. Approximately 32 percent of Thurston County's population is located in areas mapped as a wildland-urban interface.
2. Wildland-Urban Intermix – located between both the urban interface and wildlands. Most wildland-urban intermix areas in Thurston County are near lower density areas further away from

urbanized areas. The urban intermix is where homes and structures intermingle with wildlands. Areas characterized as intermix consists of development or structures that are surrounded on two or more sides by wildlands. Approximately 33 percent of the county's population is located in areas mapped as wildland-urban intermix.

WDNR's Wildland-Urban Intermix map is not a wildfire risk map, but it is a useful planning tool to inform the region's wildland fire risk assessment. Wildland-urban interface and intermix areas are prone to wildfires because they contain people and structures adjacent to wildland vegetation. People are attracted to natural and less developed rural landscapes. Over time, wildlands can convert to intermix as development spreads in unincorporated areas of Thurston County. The wildland-urban interface and intermix communities and the adjacent wildlands are at risk for wildland fire hazards because a fire may originate in the wildland area and spread to structures and dwellings and vice versa.

Extent

Human behavior, weather, fuel, terrain, and road access influence wildland fire behavior and suppression response activity. Chapter 4.9 of the Regional Plan goes into further detail of each factor.

Previous Incidents

According to Table 4.9.1 in the Regional Plan, the City has had nineteen wildfire starts from 2008-2022. A total of 5.9 acres have burned in the incidents.

Table 4.9.1 Total Wildfire Starts and Acres Burned by Fire District, Thurston County, 2008-2022[ii]

Agency[1]	Total Starts[2]	Sum of Acres Burned	Average Acres Burned	Max Acre Burn Event
Bald Hills Fire Department FD 17	17	11.5	0.7	4.5
Bucoda	2	0.5	0.2	0.3
East Olympia FD 6	28	8.1	0.3	2.0
Griffin Fire Department FD 13	17	3.3	0.2	1.0
Lacey FD 3	87	54.2	0.6	4.6
McLane Black Lake FD 9	63	43.2	0.7	8.5
Olympia	14	3.7	0.3	1.4
Outside Taxing Boundaries	37	24.4	0.7	9.7
South Bay FD 8	15	2.3	0.2	0.8
South East Thurston Fire Authority FD 2&4	117	144.2	1.2	29.0
South Thurston Fire and EMS FD 12	42	55.9	1.3	13.0
Tumwater	19	5.9	0.3	1.3
West Thurston Regional Fire Authority FD 1&11	179	859.0	4.8	384.0
Grand Total	**637**	**1216.1**	**1.9**	**384.0**

Between 2018 and August 2023, the Fire Department responded to eighty-eight natural brush or vegetation fires.[37]

[37] Data provided by the Fire Department, Chief Hurley.

Probability of Occurrence

The probability of a wildfire in the City is low according to the hazard risk rating index. This means a hazard event is not likely to occur within one hundred years.

Changes in Development

With two thirds of the City mapped within a fire hazard area (wildland-urban interface and intermix) most existing development is within a wildfire hazard area. Starting in October 2023 all new and existing developments will have to be reviewed for proximity to vegetation and trees, also known as “defensible space”. There will need to be a protective buffer from residential structures and development, even if they were established prior to the Washington Wildland Urban Interface Code requirements. All development within the wildland hazard areas is at risk as shown on the map.

Effects of Climate Change

Large and severe fires are associated with warm and dry conditions, which are likely to intensify with climate change. Climate related factors such as increased temperatures and drought, hotter and drier summers, drier soils and vegetation, earlier spring melting and reduced snowpack, and decreased summer water availability all contribute to conditions that fuel wildfires. Interactions between fire and other disturbances, such as drought and insect outbreaks, are likely to be the primary drivers of ecosystem change in a warming climate. Reburns are also likely to occur more frequently with warming and drought, with potential effects on tree regeneration and species composition. Hotter, drier sites may be particularly at risk for reburns, or regeneration failure. A reburn occurs when the perimeter of a recent past fire is breached by a subsequent fire.

Vulnerability

The City has many parks, residential communities, and vulnerable populations mapped in the wildland fire hazard area. Approximately 75% of the City is within a wildfire hazard area, the majority of residents, infrastructure, and businesses are at risk and exposed. A wildfire could be devastating to the economy and the health of people and vulnerable populations.

The most vulnerable populations are mapped between East of Interstate 5 and west of Capital Boulevard, from Trosper Road to 88th Avenue according to FEMA national Risk Index Mapping.

Many schools, businesses, and City facilities are located in wildfire hazard areas.

Impacts to People

Approximately 3,499 people are exposed to the Wildland Urban Intermix area, and 11,431 people are exposed to the Wildland Urban Intermix area.[38]

Wildfires create air pollution and affect air quality. The effects of smoke from wildfires can range from eye and respiratory tract irritation to more serious disorders, including reduced lung function, bronchitis, exacerbation of asthma and heart failure, and premature death. Children, pregnant women, and the elderly are especially vulnerable to smoke exposure. Emissions from wildfires are known to cause increased visits to hospitals and clinics by those exposed to smoke.[39]

There are many homes in Washington State that are not equipped with Air Conditioning, and during peak wildfire season in the summer, many people rely on opening windows to cool homes in the summer.

Impacts to Structures and Systems

Structures that lack adequate defensible spaces from fire-prone vegetative fuels are at risk of ignition during a fast-moving fire. Wildfires can destroy or cause damage to homes, businesses, schools, vehicles, electric utilities, and critical infrastructure. Wildfires can delay transportation in and around affected areas. Loss of power disrupts communications which in turn can impact a wide range of public and private sector lines of service and business operations.

Risk

Hazard Risk Rating

Hazard risk ratings are determined by social vulnerability and ratings and the national risk index as explained in Chapter 4.9 of the Regional Plan. The City's risk ranking for wildland urban interface was medium and low for wildland urban intermix.

[38] Data from the Loss Matrix provided by Tetra Tec.

[39] Wildland Fire Research: Health Effects Research | US EPA.

Table 6. Estimated Exposure to Wildland Fire for the City.

Estimated Population[40]	Total Number of Buildings[41]	Total Number of Residential Buildings[2]	Total Building Value (Structure & contents)[2]	Washington DNR Wildland Urban Interface[42]						
				Estimated Exposure						
				Estimated Buildings Exposed[43]	Population Exposed	%Population Exposed	Exposed Value Structure[2]	Exposed Value Contents [2]	Total Value Exposed [2]	% Total Value
26,360	9,513	8,408	$9,362,171,728	4,142	11,431	43.4%	$1,930,103,308	$1,495,341,610	$3,425,444,918	36.6%

Table 7. Types of Structures Exposed in Wildland Urban Interface in the City.

Number of Structures in Wildland Urban Interface (2)							
Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
3,646	433	48	1	1	6	7	4,142

[40] 2022 population from the State Office of Financial Management, Forecasting and Research Division.
[41] Values based on 2022 tax assessor data provided by Thurston County.
[42] Wildland Urban Interface and Intermix data provided by the State Department of Natural Resources.
[43] Percent of residential buildings exposed multiplied by the estimated population.

Mitigation Strategy

City Mitigation Initiatives

Central to the City Annex and Regional Plan are its recommended projects, programs, and activities the planning partners will implement to provide long-term and sustained benefits that will reduce losses from the impacts of the hazards that are identified in this plan's risk assessment. Each initiative was screened and ranked using a benefit-cost review criteria worksheet. Each initiative will require significant investments in planning, design, and construction or coordination, and may take years to complete. The desired outcomes of this plan's mitigation strategy are that communities:

- Build the necessary capacities to improve their knowledge of hazards and their risks
- Identify actions that will effectively reduce their vulnerabilities from hazards; and
- Implement their mitigation strategies to fulfill the Plan Goals and Objectives

The City Annex contains City specific initiatives. The City Annex identifies actions that are specific to the vulnerabilities of its community. The City is responsible for implementing the actions.

Mitigation Initiative Prioritization Process

During all City Annex and Regional Plan updates, the previous mitigation initiatives were reviewed for current status and relevance. After this was completed, new mitigation initiatives were considered. This process included a review of emerging hazards and initiatives from the other jurisdictions' earlier plans to see if there were items that would also benefit the City.

For the 2023 City Annex and Regional Plan update, several new ideas were selected and crafted into new mitigation initiatives for the City. The hazards mitigation planning team discussed the benefits and costs of each initiative recommended for inclusion in the 2023 City Annex and Regional Plan update. Members of the team provided input based on their experience with an understanding of past disaster events and the ability of the mitigation initiatives to protect public and private property.

The hazards mitigation planning team weighed the significance of the initiatives using the criteria established for the regional planning process. The final scoring of the initiatives against the regional criteria shown below occurred through an iterative, consensus-based process.

- **Hazard Risk Rating**: Does the mitigation initiative address a high, medium, or low-risk hazard?
- **Project Cost**: Is the implementation of the mitigation initiative expected to cost less than $100K, between $100K to $500K, or more than $500K?
- **Natural Hazards Mitigation Plan Goals and Objectives**: Does the mitigation initiative strongly support at least four policies, at least two policies, or one policy?

- **Social Vulnerability:** Will the action produce a significant and direct benefit for socially vulnerable or underserved communities, or will the action produce a benefit for socially vulnerable or underserved communities, or will the action have minimal benefit?
- **Changes in Development:** Does the action include measures that strongly account for changes in development, or does the action include some measures that account for changes in development, or does the action include minimal measures?
- **Climate Change:** Does the action strongly account for the effects of climate change, or does the action account for the effect of climate change, or does the action minimally account for the effects of climate change?
- **Geographic Impact:** Does the action address hazard risks for the entire affected area of the community, across at least half of the affected area or a very limited portion of the affected area?

The results of the scoring exercise completed by the hazards mitigation planning team appear below.

Mitigation Initiative Format

To support organization, every initiative in the plan follows a consistent format that includes a title, a background and needs description, a brief scope, priority, hazard addressed, project category, related Goals and Objectives, department or project lead, estimated cost, estimated timeline for implementation, potential funding sources, relationship to other community planning documents – if applicable – and implementation status. Refer to the Sample Mitigation Initiative to view the layout of the mitigation initiative content.

Sample Mitigation Initiative

Initiative identification, benefit cost review score, and title

New, existing, modified, ongoing, or removed during the plan update process

CW-WH-2: Countywide Multijurisdictional Community Wildfire Protection Plan

Benefit-cost review score. Higher score is a higher priority

Benefit-Cost Review Score: 36 **Status:** New

Hazard addressed and action category

Hazard Addressed: Wildland Fire
Category: Plan Coordination and Implementation

Background and Need description

Background and Need: Thurston County wildfire frequency and size have trended upward over the last 15 years. On September 8, 2020, a 268-acre fire in southwest Thurston County, intensified by sustained high speed winds, destroyed two homes and two outbuildings near Mima and Bordeaux Roads SW. The fire forced area residents to evacuate. The incident resulted in Thurston County receiving immediate federal fire management assistance, an uncommon wildfire declaration for communities in Western Washington lowlands.
The effects of climate change will make summers warmer, drier, and longer. Climate change combined with the region's growing population will increase the likelihood for more frequent, larger, and perhaps more severe wildfires. Planning is necessary to understand the wildfire risks for current and future households and businesses located in wildland urban interface and intermix areas. In addition, wildfire smoke will adversely impact people who suffer from chronic respiratory diseases or people who are exposed and unable to seek indoor refuge.
Building on the momentum of the 2023 Wildfire Ready Neighbors Program partnership and the 2023 Assessing Structural Ignition Potential courses hosted by Thurston County Emergency Management, the region will pursue the development of a multijurisdictional countywide Community Wildfire Protection Plan. The planning process will involve a whole community approach to engage a variety of stakeholders to identify areas of the community, especially underserved communities, that are at greatest risk for wildfire losses and establish a collaborative framework for communities to identify strategies for wildfire response, hazard mitigation, and community education and preparedness.

Relationship to plan goals

Relates to Plan Goal(s) and Objectives: 3C, 5C, 6A, 6B, 7B, 7D, 7E, 9A, 9B

Implementation details

Lead: The Association of Thurston County Fire Chiefs in partnership with the tribes, county, cities, special purpose districts, Wash. Dept. of Natural Resources, the US Forest Service, TRPC, the public, and other stakeholders.
Estimated Cost: Medium, $100,000 to $300,000
Time Period: 2024-2028
Funding Source: Wash. Dept. of Natural Resources Community Wildfire Defense Grant

Source for the initiative

Source and Date: 2023 Natural Hazards Mitigation Plan

Progress toward the initiative's implementation

Initiative and Implementation Status: This is a new initiative. Information about this initiative's status will be reported during the next plan update.

City Mitigation Initiatives

The City Annex Mitigation Strategy consists of twenty initiatives that, if implemented, will improve the City's ability to perform hazards mitigation planning, respond to natural hazards, and strengthen community resiliency. Seven initiatives were carried over from the previous plan. Five new initiatives were added through the City Annex and Regional Plan update process.

The priority of implementation could vary from the order shown below due to changing hazard conditions, emerging priorities, or the condition of grant funding opportunities.

Table 8. City Annex Mitigation Strategy Initiatives.

Initiative	Status	Benefit-Cost Review Score
Public Outreach and Information		
TUM-MH-22 Mail flood insurance information to owners of properties located within a floodplain and to residents who live in a floodplain	Ongoing	22
Plan Coordination and Implementation		
TUM-FH-36 Continue to be actively involved in inter-jurisdictional flood hazard reduction efforts where the City and other jurisdictions are located within the same basin	Ongoing	36
Data Collection and Mapping		
TUM-WH-33 Update GIS (City Map) maps to show wildland-urban interface and intermix	New	33
Development Regulations		
TUM-WH-42 Update Building Code to wildland-urban interface and intermix requirements	New	42
TUM-WH-38 Develop a wildland-urban interface and intermix Vegetation Management Plan and Planting Species Plan	New	38
TUM-SH-36 Reduce heat islands through street tree, tree preservation, and landscape code updates	New	36
TUM-LH-31 Update Critical Area Code and Development Code and Regulations during the Comprehensive Plan periodic update	New	31

TUM-SH-30 Reduce damage to utilities by updating City Development Code	New	30
Hazard Preparedness		
TUM-WH-23 Routinely inspecting the functionality of fire hydrants	New	28
TUM-MH-34 Encourage the public to be ”Two Weeks Ready” prior to a disaster	Modified	34
TUM-LH-28 Keep a supply of air filters on hand for critical equipment, generators, wells, and vehicles in case of ash fall from a volcanic eruption, fires, or wildfires	Ongoing	28
Hazard Damage Reduction		
TUM-EH-36 Conduct a voluntary non-structural earthquake readiness inspection for all critical facilities on an annual basis	Ongoing	36
TUM-EH-31 Include retrofitting and replacement of critical system elements in Capital Facilities Plan	Modified	31
TUM-WH-27 Maintain vegetation on City Property on heavily wooded hills in the City	Modified	27
TUM-FH-23 Draft a prioritized list of residences the City would acquire (buyout) if state or federal monies are available	Existing	23
TUM-FH-23 Work with stakeholders to reforest corridors along river and stream shorelines.	Existing	23
Critical Facilities Replacement and Retrofit		
TUM-SH-29 Periodically Inspect all trees within falling distance of City-owned critical facilities	Existing	29
TUM-FH-33 Investigate funding sources for projects that will reduce or eliminate damage from flooding	Existing	33
TUM-MH-31 Install auxiliary backup power to power the City main Well and water supply	New	31
TUM-MH-30 Install auxiliary power and battery storage at City Hall and Tumwater Timberland Library (secondary Emergency Operations Center)	New	30

TUM-FH-22: Mail flood insurance information to owners of properties located within a floodplain and to residents who live in a floodplain

Benefit-Cost Review Score: 36 **Status:** Ongoing
Hazard Addressed: Multi Hazard
Category: Public Information

Background and Need: Knowledge of flood insurance opportunities and other related information will be helpful for residents and property owners who may not be aware of the options. Preliminary work has been completed to map hazard areas, develop mailing list, and notification. Mailing postponed due to COVID staffing shortage.

Relates to Plan Goal(s) and Objectives: 7f, 8a, 9a, 9b
Lead: Community Development and Executive Departments
Estimated Cost: Low on an annual basis.
Time Period: Fall 2023
Funding Source: General funds, City
Source and Date: 2023 City Annex and Regional Plan

Initiative and Implementation Status: In 2023, this existing initiative was revised to become an ongoing action. Originally this initiative was ranked 12 of 18 in 2003 and removed in 2008. Removal from the plan was because the City had no repetitive loss or severe loss properties (Source: FEMA National Flood Insurance Program Report, Washington, May 4, 2009). In addition, since 1978 the City had only two claims paid for a total of $12,515 (same source as above). This information was not readily available during the initial drafting of the plan in 2003. However, the City annexed an area on 58th Avenue off Henderson Boulevard in the Deschutes Valley with several homes that are frequently flooded. A subcommittee of the City Council decided it would be appropriate to put this mitigation initiative back into the plan due to the aforementioned change of circumstances. Preliminary work has been completed to map hazard areas, develop a mailing list, and create a notification. The mailing was postponed due to COVID-19 staffing shortage.

TUM-FH-36: Continue to be actively involved in inter-jurisdictional flood hazard reduction efforts where the City and other jurisdictions are located within the same basin

Benefit-Cost Review Score: 36 **Status:** Existing
Hazard Addressed: Flood
Category: Plan Coordination and Implementation

Background and Need: The City, being located at the mouth of the Deschutes River, is directly affected by activities occurring upstream and "downstream". The City should work closely with upstream jurisdictions as well as the City of Olympia which is "downstream" to ensure that any activities in these other jurisdictions do not adversely affect the City. The City of Olympia is referred to as "downstream" because it controls the lake at the mouth of the Deschutes River with a dam. The lake has been filling in with silt and debris over the past several decades and now has very little storage capacity. Tumwater Historical Park and the historic Old Brewhouse are located at the base of the falls, effectively the mouth of the Deschutes River, which would be significantly impacted by lake level rise during a flooding event. A study was conducted in 2023 to consider flood impacts and mitigation needs for properties in the Deschutes Valley, known as the "Deschutes River Flood Reduction Study 2023."

Relates to Plan Goal(s) and Objectives: 4d, 5c, 6a, 6c, 7b, 7c, 7f
Lead: Community Development, Water Resources & Sustainability, and Parks & Recreation Departments
Estimated Cost: Unknown, this initiative would require staff time and inter-jurisdictional collaboration
Time Period: 2023-2028
Funding Source: City
Source and Date: 2023 City Annex and Regional Plan

Initiative and Implementation Status: The City continues to be involved with other jurisdictions in regard to the Deschutes River. The Water Resources & Sustainability and Parks & Recreation Departments both represent the City on the Deschutes River, Capitol Lake, and Budd Inlet TMDL Technical Advisory Group. The scientific research on the river has been completed and the advisory group is working on an action plan to deal with the activities and land uses currently impacting the river. Currently logging and agricultural practices, as well as riparian habitat issues, are impacting the river. Although the focus of the research, the committee, and the eventual action plan is on water quality, it will also result in better quality riparian habitat, more naturally regulated flows in the river, and some positive impacts on the effects of downstream flooding episodes. In addition, the City's Stream Team often works in conjunction with the Thurston Conservation District for riparian habitat restoration projects that involve agricultural uses and lands.

TUM-WH-33: Update GIS (City Map) maps to show Wildland-Urban Interface and Intermix

Benefit-Cost Review Score: 42 **Status:** New
Hazard Addressed: Wildland Fire
Category: Data Collection and Mapping

Background and Need: The majority of the City is within the wildland-urban interface and intermix regulatory area. Developers, homeowners, and City staff will need a mapping system to help determine which wildland-urban interface and intermix regulations will apply. Offering GIS hazard mapping online for residents and design professionals creates an opportunity for the City to develop an app map to transfer data to the City's City Annex website and link to state and federal websites.

Relates to Plan Goal(s) and Objectives: 7b, 7e, 7f, 9a, 9b
Lead: Transportation & Engineering (GIS Team) Department
Estimated Cost: Low
Time Period: 2023-2024
Funding Source: City
Source and Date: 2023 City Annex and Regional Plan

Initiative and Implementation Status: This is a new initiative. The GIS Team is assisting by adding the wildland-urban interface and intermix areas to the internal staff maps. The GIS Team is creating a vegetation layer and trying to find a solution to allow for staff to select any point on the map and have the app automatically create a 40 acre square buffer around the point, show the buffer, and automatically calculate the percentage of land covered by vegetation and the number of buildings within the buffer.

TUM-WH-42: Update Building Code to Wildland-Urban Interface and Intermix requirements

Benefit-Cost Review Score: 42 **Status:** New
Hazard Addressed: Wildland Fire
Category: Development Regulations

Background and Need: Approximately two-thirds of the City is within the wildland-urban interface and intermix area, and at risk for wildfires. To reduce the loss of life and property due to wildfires, the Washington Wildland-Urban Interface Code establishes minimum state requirements for land use and built environment in designated wildland-urban interface and intermix areas. These requirements include specific fire resistant materials for structures and limiting the amount and type of trees and vegetation in “defensible space” within 30 to 100 feet of structures. The Washington Wildland-Urban Interface Code would apply to the wildland-urban interface and intermix area as mapped by the State Department of Natural Resources. The intent is to reduce the amount of fuel for wildfires in areas where there are people and structures.

Relates to Plan Goal(s) and Objectives: 1b, 7d, 8b
Lead: Community Development Department
Estimated Cost: Low
Time Period: 2024 Building Code Update
Funding Source: City
Source and Date: Regional Plan, City Work Plan

Initiative and Implementation Status: This is a new initiative.

TUM-WH 38: Develop a Wildland-Urban Interface and Intermix Vegetation Management Plan and Planting Species Plan

Benefit-Cost Review Score: 38 **Status:** New
Hazard Addressed: Wildland Fire
Category: Development Regulations

Background and Need: Critical fire weather frequency occurs between 2 to 7 days a year in Thurston County. A vegetation management plan may reduce the fire hazard severity. By establishing a drought tolerant tree and plant species list and required setbacks and locations for landscaping, there will be a decrease in the chances of landscaping vegetation becoming wildfire fuel. As part of the adoption of the Washington Wildland Urban Interface Code, there are established "fuel models." The fuel models will evaluate the types of vegetation and size of trees and their proximity to structures, slopes, and defensible space.

Relates to Plan Goal(s) and Objectives: 4a, 4b, 7d, 8b
Lead: Community Development and Water Resources & Sustainability Departments
Estimated Cost: Low
Time Period: 2023-2028
Funding Source: City
Source and Date: Regional Plan, City Work Plan

Initiative and Implementation Status: This is a new initiative.

TUM-SH-36: Reduce heat islands through street tree, tree preservation, and landscape code updates

Benefit-Cost Review Score: 36 **Status:** New
Hazard Addressed: Storm/Weather
Category: Development Regulations

Background and Need: As urban areas develop and buildings and roads replace open land and vegetation, urban regions become warmer than their rural surroundings, forming an “island” of heat. By implementing updates to the City’s tree and vegetation, landscape, and street tree codes, proper tree and vegetation planting and maintenance will help reduce the effects of increased ambient and surface temperatures. Increasing tree and vegetation cover lowers surface and air temperatures by providing shade and cooling and reducing the amount of energy needed to cool buildings, resulting in improved reliability of the electric system, particularly during extreme weather events.

Relates to Plan Goal(s) and Objectives: 4a, 4b, 7d, 8b
Lead: Community Development and Water Resources & Sustainability Departments
Estimated Cost: Low to Medium; $100,000 to $500,000
Time Period: 2024-2028
Funding Source: Grants and City Funds
Source and Date: City Annex and Regional Plan

Initiative and Implementation Status: Since 2021 staff have been working with consultants, the public, The Tree Board, internal staff, Planning Commission, and City Council to move forward with updates to the Urban Forest Management Plan. In June 2023, staff were informed about updates to the Washington Wildland-Urban Interface Code and Development Code. Staff will need to reassess the updated plan and take into consideration Washington Wildland-Urban Interface Code requirements relating to trees and vegetation.

TUM-LH-31: Update Critical Areas Regulations and Development Regulations during the 2025 Comprehensive Plan periodic update

Benefit-Cost Review Score: 31 **Status:** New
Hazard Addressed: Flood
Category: Development Regulations

Background and Need: During the 2025 Comprehensive Plan periodic update, staff will review the Critical Area Checklist and Tumwater Municipal Code to ensure flood and geological and landslide hazards are minimized using the most current development regulations. This will ensure any future development or redevelopment of these areas mitigate and avoid risks for landslide hazards. During a Community Assistance Visit, it was determined the City's floodplain ordinance (TMC 18.38 *FP Floodplain Overlay*) is overall in fair standing, with minor updates needed to bring the ordinance into compliance with National Flood Insurance Program and state standards. The City will complete all needed updates and adopt a compliant ordinance in order to close out the Community Assistance Visit.

Relates to Plan Goal(s) and Objectives: 3a, 4c, 8b
Lead: Community Development Department
Estimated Cost: Low
Time Period: 2025
Funding Source: City
Source and Date: City Annex and Regional Plan, 2025 Comprehensive Plan periodic update

Initiative and Implementation Status: This initiative is new; the Critical Areas Code and Development Code will be reviewed in the 2025 periodic update.

TUM-SH-30: Reduce damage to utilities by updating City Development Code

Benefit-Cost Review Score: 30 **Status:** Modified
Hazard Addressed: Storm/Weather
Category: Development Regulations

Background and Need: By updating land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors, the risk of having critical infrastructure damaged during a storm is reduced. The landscape code and other ordinances will be modified to encourage appropriate plantings near overhead power, cable, and phone lines. Furthermore, as part of the 2023 Development Code housekeeping amendments, staff are proposing a change to the Development Code requiring utilities to be installed underground, unless going through a deviation process. This will help improve reliability of services in the event of a storm or other natural hazard occurrence.

Relates to Plan Goal(s) and Objectives: 1a, 2b, 8b
Lead: Community Development Department
Estimated Cost: Low
Time Period: 2025
Funding Source: City
Source and Date: City Annex and Regional Plan

Initiative and Implementation Status: This initiative is new. Revisions to the Development Code will be processed through the 2023 Development Code housekeeping amendments in the Long Range Planning Work Program.

TUM-MH-34: Encourage the public to be "Two Weeks Ready" prior to a disaster.

Benefit-Cost Review Score: 34 **Status:** Modified
Hazard Addressed: Multi Hazard
Category: Hazard Preparedness

Background and Need: Being self-sufficient allows individuals and communities to bounce back more quickly after a disaster. When people can take care of themselves and their immediate needs, it frees up resources for larger-scale recovery efforts, such as restoring infrastructure and providing long-term aid to those who require it. Natural disasters often occur with little to no warning, leaving little time for evacuation or preparation. Having a basic understanding of self-sufficiency ensures that individuals are better equipped to handle unexpected situations when they arise. Learning how to be self-sufficient after a disaster often extends to broader preparedness efforts, such as having emergency kits, communication plans, and evacuation routes in place. This long-term preparedness mindset can contribute to safer communities overall. Regular messaging and outreach activities should provide useful information for social service providers, households, businesses, and major employers to improve their understanding of natural hazards and the effects of climate change to help people and organizations minimize losses and how to prepare in case of disaster. At a minimum, the City will be convening an annual fall season in-person Emergency Preparedness Expo, post information on City social media and websites, distribute the Thurston County Flood Bulletin and other local agency e-newsletters, and cross-promotion partnerships with other area agencies and Thurston County Emergency Management.

Relates to Plan Goal(s) and Objectives: 6b, 9a, 9b
Lead: Community Development, Executive, and Fire Departments
Estimated Cost: Low
Time Period: 2023-2028
Funding Source: City
Source and Date: City Annex and Regional Plan

Initiative and Implementation Status: This initiative is new. Emergency Preparedness Expos were held in 2018 and 2019 but paused in 2020-2022 as a safety precaution during the COVID Pandemic. The expo will resume in-person in Fall 2023. In 2022 and 2023 staff attended community events to perform outreach on hazards mitigation.

TUM-MH-31: Install auxiliary backup power for the City main well and water supply

Benefit-Cost Review Score: 31 **Status:** New
Hazard Addressed: Earthquake
Category: Critical Facilities Replacement / Retrofit

Background and Need: In the case of a natural disaster event, ensuring water supplies to emergency services and the community is critical. Having emergency power backups to the City wells (City well number 15) will ensure that even if the power grid goes out, emergency responders and residents can still have access to water. The 2024-2029 Capital Facilities Plan identifies seismic planning to Well 15 work which includes auxiliary power and review of pipeline network for seismic resiliency.

Relates to Plan Goal(s) and Objectives: 1b, 2b, 2d, 8a, 8b,
Lead: Water Resources & Sustainability Department
Estimated Cost: Medium
Time Period: 2023-2028
Funding Source: City, Grants
Source and Date: City Annex and Regional Plan and 2020 Water Plan

Initiative and Implementation Status: This initiative is new.

TUM-MH-30: Install auxiliary power and battery storage at City Hall (secondary Emergency Operations Center) and Tumwater Timberland Library.

Benefit-Cost Review Score: 30 **Status:** Modified
Hazard Addressed: Storm/Weather
Category: Critical Facilities Replacement / Retrofit

Background and Need: City Hall and Tumwater Timberland Library are critical facilities. In the event of a storm, solar power will keep City Hall and the police station functioning during an emergency. The Water Resources & Sustainability Department staff has submitted grant proposals to fund combined solar and storage feasibility assessments at (1) City Hall and (2) the Tumwater Timberland Library. The Tumwater Timberland Library is the City's only cooling center and City Hall is the secondary Emergency Operations Center for the City.

Relates to Plan Goal(s) and Objectives: 1b, 2c, 2d, 3c, 8a, 8c, 9a
Lead: Water Resources & Sustainability Department
Estimated Cost: Medium
Time Period: 2023-2028
Funding Source: City
Source and Date: City Annex and Regional Plan, Capital Facilities Plan, Thurston Climate Mitigation Plan

Initiative and Implementation Status: This initiative is New.

TUM-WH-28: Routinely inspecting the functionality of fire hydrants

Benefit-Cost Review Score: 28 **Status:** New
Hazard Addressed: Wildland Fire
Category: Hazard Preparedness

Background and Need: Water is a key factor in suppressing fire. Ensuring fire hydrants are functioning correctly is critical in reducing the spread of wildfires and increasing public safety. There are 1,905 fire hydrants currently mapped within the City. As development occurs, there are more hydrants being installed. Fire hydrants are currently inspected on a semiannual basis.

Relates to Plan Goal(s) and Objectives: 2D, 6C, 7B, 8A
Lead: Fire and Water Resources & Sustainability Departments

Estimated Cost: Low
Time Period: Every year
Funding Source: Capital Facilities Plan
Source and Date: City Annex and Regional Plan, 2022 edition of NFPA 291: Recommended Practice for Fire Flow Testing and Marking of Hydrants

Initiative and Implementation Status: This action is new. Hydrant inspections will be completed every year to include cleaning and operating of each hydrant and documenting each inspection in City's Lucity database. Any deficiencies are reported and scheduled to be fixed. An update will be provided in the 2028 City Annex and Regional Plan update.

TUM-VH-28: Keep a supply of air filters on hand for critical equipment, generators, and vehicles in case of ash fall from a volcanic eruption, fires, or wildfires

Benefit-Cost Review Score: 28 **Status:** Ongoing
Hazard Addressed: Volcanic
Category: Hazard Preparedness

Background and Need: In order to keep critical facilities operating during a volcanic ash fall situation, emergency operations equipment such as police vehicles, fire trucks, medic one units, the HVAC system for the Emergency Operations Center, and generators supporting critical facilities such as water treatment sites, should have extra filters on hand. Even though volcanic eruptions usually give indications several months in advance, the addition of this mitigation initiative will help to reduce the likelihood of forgetfulness in regard to stocking up on filters beforehand. Continued operation of emergency response equipment and critical facilities during a disaster is very important to the health, safety, and welfare of the residents of the City. Water Resources & Sustainability Department may consider needs for lift stations and other facilities.

Relates to Plan Goal(s) and Objectives: 1d, 2b, 2d, 3b, 5e
Lead: Fire, Water Resources & Sustainability, and Parks & Recreation Departments
Estimated Cost: $100,000
Time Period: 2024-2028
Funding Source: City
Source and Date: 2017 Hazards Mitigation Plan

Initiative and Implementation Status: This initiative was implemented in the 2008 Hazards Mitigation Plan.

TUM-FH-33: Investigate funding sources for projects that will reduce or eliminate damage from flooding, including damage to street, structure, utilities, etc. in flood areas.

Benefit-Cost Review Score: 33 **Status:** Modified
Hazard Addressed: Flood
Category: Hazard Damage Reduction

Background and Need: Elevating and other means of flood proofing will reduce damages, reduce or eliminate disruption to provision of services (utilities), and allow travel of emergency vehicles as well as daily traffic during periods of flooding.

Relates to Plan Goal(s) and Objectives: 6b, 9a, 9b
Lead: Water Resources & Sustainability Department
Estimated Cost: Unknown
Time Period: 2023-2028
Funding Source: City
Source and Date: City Annex and Regional Plan and Capital Facilities Plan

Initiative and Implementation Status: This initiative is ongoing.

TUM-EH-31: Include retrofitting and replacement of critical system elements in the Capital Facilities Plan

Benefit-Cost Review Score: 31 **Status:** New
Hazard Addressed: Earthquake
Category: Hazard Damage Reduction

Background and Need: Repair, replacement, and improvements to existing critical systems and critical infrastructure with seismic retrofits are included as part of the City 2020 Water System Plan. A seismic backbone map was drafted to identify critical structures and the distribution systems that would be used to serve the public after a seismic event. Inspections and assessments of key infrastructure, such as bridges, water towers and pump stations, sewer lift stations, and water and sewer main lines, should be completed in regard to their ability to withstand earthquakes will help to prioritize projects and upgrades. The Water Resources & Sustainability Department noted that formal physical assessments have not yet been completed; however, the City can plan for this in the upcoming biennial budget and Capital Facilities Plan processes. High level recommendations have been incorporated into Comprehensive Plan documents. Bridge inspections are performed for the condition of the bridge, and it is performed every two years. If the condition warrants further analysis, like load ratings or seismic analysis, they are performed separately to address the concern. The current condition of City bridges has not warranted the deeper seismic analysis. A recent load rating was performed on Capitol Street bridge per new federal requirements. This is the only structure in City that meet the specific requirements warranting the load rating.

Relates to Plan Goal(s) and Objectives: 2a, 2b, 2c, 2d, 8b
Lead: Water Resources & Sustainability Department
Estimated Cost: Medium
Time Period: 2025
Funding Source: Grants and City
Source and Date: Hazards Mitigation Catalog, Capital Facilities Plan, Comprehensive Plan periodic update

Initiative and Implementation Status: Some critical assets are inventoried in WebEOC. Implementing this project has been challenged by budget constraints, personnel changes, and COVID 19 response.

TUM-WH-27: Maintain vegetation on heavily wooded hills in the City

Benefit-Cost Review Score: 27 **Status:** Modified
Hazard Addressed: Wildland Fire
Category: Hazard Damage Reduction

Background and Need: Tumwater Hill is at high risk for wildfire due to slopes, vegetation and tree cover, and development. Maintaining vegetation next to the new houses in this area and then periodically cutting the remainder brush would help to minimize damage in the event of a localized wildfire. This work is scheduled to be done annually.

Relates to Plan Goal(s) and Objectives: 2c, 5b
Lead: Parks & Recreation Department
Estimated Cost: Low
Time Period: Annually
Funding Source: City
Source and Date: 2017 Hazards Mitigation Plan, City Work Plan,

Initiative and Implementation Status: This initiative was modified from 2017 to remove the term "fire break". City staff do not formally maintain a fire break, but ensure vegetation is cleared from private property and fence lines.

TUM-FH-23: Work with stakeholders to reforest corridors along river and stream shorelines.

Benefit-Cost Review Score: 23 **Status:** Ongoing
Hazard Addressed: Flood
Category: Hazard Damage Reduction

Background and Need: Reestablishing a forested edges along river and stream shorelines are one way to help reduce the impacts of flooding. The placement of large woody debris in rivers helps to dissipate the hydraulic energy along the riverbanks. Planting trees and other vegetation also helps to reduce erosion and contributes to long term bank stabilization. Restoration plans are in various stages of formal completion, with work plans ranging from Tumwater Falls to the Henderson Boulevard Bridge. City stakeholders will need to collaborate on efforts to implement the restorative measures.

Relates to Plan Goal(s) and Objectives: 4a, 4b, 9a
Lead: Parks & Recreation and Water Resources & Sustainability Departments
Estimated Cost: Medium to High
Time Period: 2024-2028
Funding Source: City
Source and Date: 2017 Hazards Mitigation Plan

Initiative and Implementation Status: Staff is in conversation with LOTT regarding acquisition of the property west of the railroad tracks. The Parks & Recreation Department plans to purchase the property as part of the Capital Facilities Plan. The former brewery property is the last section within the City without full tree cover along the Deschutes River.

TUM-FH-23: Draft a prioritized list of residences the City would acquire (buyout) if state or federal monies are available

Benefit-Cost Review Score: 23

Status: Ongoing

Hazard Addressed: Flood

Category: Hazard Damage Reduction

Background and Need: Repetitive loss properties negatively impact the property owner as well as the surrounding community. Frequently flooded properties and structures can also become a health and life safety issue for both residents, emergency responders, and the community in general. The City should work with regional, state and federal agencies in determining which residences should be purchased and how the funding for such actions will be acquired.

Relates to Plan Goal(s) and Objectives: 1b, 3a, 7e, 8c
Lead: Community Development, Water Resources & Sustainability, and Executive Departments
Estimated Cost: High
Time Period: Unknown
Funding Source: City
Source and Date: 2017 Hazards Mitigation Plan

Initiative and Implementation Status: Ranked 13 of 18 in 2003 and removed in 2008. Removal was because the City had no repetitive loss or severe loss properties (Source: FEMA National Flood Insurance Program Report, Washington, May 4, 2009). In addition, since 1978 the City had only two claims paid for a total of $12,515 (same source as above). This information was not readily available during the initial drafting of the plan in 2003. However, City has annexed an area on B 74 58th Avenue off Henderson Boulevard in the Deschutes Valley with several homes that are frequently flooded. A committee of the City Council decided it would be appropriate to put this mitigation initiative back into the plan due to the aforementioned change of circumstances.

TUM-EH-34: Conduct a voluntary non-structural earthquake readiness inspection for all critical facilities on an annual basis

Benefit-Cost Review Score: 34 **Status:** Ongoing
Hazard Addressed: Earthquake
Category: Critical Facilities Replacement / Retrofit

Background and Need: It is in the best interest of the City to ensure that all critical facilities are prepared for the possibility of an earthquake. An annual inspection should be done. As new staff, new equipment, and workstation and office changes occur it is possible that the earthquake damage preventative measures (such as retaining straps for books shelves, computers, or other equipment, etc.) can be lost or left unused. An annual inspection would help to keep these preventative measures in place. Furthermore, the Water Resources & Sustainability Department is planning for a water and wastewater assessment in the 2024-2025 Capital Facilities Plan.

Relates to Plan Goal(s) and Objectives: 2c, 3b
Lead: Fire and Parks & Recreation Departments
Estimated Cost: Low
Time Period: 2023, annually.
Funding Source: City General Funds
Source and Date: 2017 Hazards Mitigation Plan

Initiative and Implementation Status: Ranked 1 of 18 in the 2003 City Annex and Regional Plan and 1 of 8 in the 2008 City Annex and Regional Plan update. This initiative has never been implemented yet. In 2008 it was changed to B 55 specifying that an annual inspection should be done. Minor change in 2017 to mention supplies could be part of the estimated cost.

TUM-SH-29: Periodically inspect all trees within falling distance of City-owned critical facilities

Benefit-Cost Review Score: 29 **Status:** Modified
Hazard Addressed: Storm/Weather
Category: Critical Facilities Replacement / Retrofit

Background and Need: The Water Resources & Sustainability Department has been awarded a grant to have a formal inspection and evaluation of trees on City property. A consultant will identify maintenance needs and potential hazardous trees. Periodically Inspect all trees within falling distance of the four City-owned critical facilities (Headquarters and North End Fire Stations, the Operations & Maintenance Facility, and City Hall), related equipment such as generators, and utilities such as power and communication lines within the immediate vicinity to determine if they pose a hazard to the facility or operation of the facility during a storm. Tree roots were partially covered with pervious asphalt during the 2014 Police Department expansion. Trees have been evaluated by City arborist and are currently healthy.

Relates to Plan Goal(s) and Objectives: 1B, 2A, 2B, 2D, 5B, 6A, 6B, 7D, 8A, 9A, 9B
Lead: Water Resources & Sustainability and Parks & Recreation Departments
Estimated Cost: Low
Time Period: 2023 – 2024
Funding Source: City and Grant Funding
Source and Date: City Work Plan

Initiative and Implementation Status: This initiative has been modified. Staff are in the process of writing contracts with a private consultant to perform the formal evaluation. The evaluation is slated to be completed by April 20, 2024.

Mitigation Initiatives Removed from the City Annex Mitigation Strategy

The City Annex and Regional Plan update process removed three initiatives from the City Annex Mitigation Strategy because they are no longer relevant

Additional details about why an initiative was removed are shown in each initiative's implementation status in the pages that follow.

Table 9. Former Mitigation Initiatives Removed from the City Annex Mitigation Strategy.

Initiative	Status	Former Ranking
Hazard Damage Reduction		
TUM-FH-15 Consider and investigate methods and options of construction of a short floodwall around the Tumwater Valley Municipal Golf Course clubhouse or floodproofing the structure to FEMA standards to stop the infiltration of floodwaters during a flood event.	Removed	3 of 13
TUM-FH-10 Draft a prioritized list of residences the City would elevate above the base flood elevation, if state or federal monies are available.	Removed	10 of 13
Data Collection and Mapping		
TUM-FH-14 Install or upgrade flood elevation gauges on the Deschutes River.	Removed	6 of 13

TUM-FH-15: Consider and investigate methods and options of construction of a short floodwall around the Tumwater Valley Municipal Golf Course clubhouse or floodproofing the structure to FEMA standards to stop the infiltration of floodwaters during a flood event

Hazard Addressed: Flood **Status:** Removed

Category: Hazard Damage Reduction

Background and Need: The Tumwater Valley Municipal Golf Course clubhouse is located within the 1% (100-year) floodplain according to the most recent Flood Insurance Study and Flood Insurance Rate Map. The building has not yet been flooded but the floodwaters came within a few inches of the door in the January 2009 flood event when the Deschutes River crested at 14.5 feet at the Rainier gauge. A several million-dollar remodel of the building was completed in early 2009. Due to the significant dollar investment in the building, a flood wall surrounding the building that could prevent flood damage or upgrading the structure to include floodproofing should be seriously considered. Evaluation of these options should include costs, benefits, impacts to nearby properties including the Tumwater Valley Athletic Club, as well as impacts to the floodplain as a whole.

Relates to Plan Goal(s) and Objectives: Regional Plan Goals 2, 3. Regional Plan Objectives 2C, 3B

Lead: Parks & Recreation Department

Estimated Cost: Unknown

Time Period: 2017-2021

Funding Source: City

Source and Date: 2008 City Annex and Regional Plan

Initiative and Implementation Status: This initiative was the third ranked priority in the previous plan. The clubhouse is not considered a critical facility or infrastructure. There is no mitigation benefit for the structure.

TUM-FH-10: Draft a prioritized list of residences the City would elevate above the base flood elevation, if state or federal monies are available.

Hazard Addressed: Flood **Status:** Removed

Category: Hazard Damage Reduction

Background and Need: Repetitive loss properties negatively impact the property owner as well as the surrounding community. Frequently flooded properties and structures can also become a health and life safety issue for both residents, emergency responders, and the community in general. The City should work with regional, state and federal agencies in determining which residences should be elevated and how the funding for such actions will be acquired.

Relates to Plan Goal(s) and Objectives: Goal 3. Objective 3A.

Lead: Community Development, Transportation & Engineering, and Executive Departments.

Estimated Cost: Unknown. This is not a specific project. It involves continued participation in intergovernmental work and planning that are related to flood hazards.

Time Period: 2017-2022

Funding Source: City

Source and Date: 2023 City Annex and Regional Plan

Initiative and Implementation Status: This initiative was the 10th ranked priority in the previous plan. This initiative was removed because there are no City Work plans prioritizing elevating residences. Information on flood insurance and emergency preparedness will be shared with properties within the flood zone through other initiatives outlined in the 2023 City Annex and Regional Plan.

TUM-FH-14: Install or upgrade flood elevation gauges on the Deschutes River.

Hazard Addressed: Flood **Status:** Removed

Category: Data Collection and Mapping

Background and Need: Previously the flood gauge at the "E" Street bridge was an older type which had to be read manually. It has since been updated to provide data every 15 minutes. However, flood state information based on this gauge is not readily provided by USGS or NOAA, unlike the gauge at Rainier. This initiative was created because readings at the Rainier gauge do not always accurately reflect what is occurring twenty miles downstream in the City's portion of the Deschutes River. For example, the January 2009, flood was one foot lower than the December 2007 flood at the Rainier gauge, however, photographs at Henderson Boulevard in the City showed the water levels were higher in the 2009 flood than in the 2007 flood. A gauge at the "E" Street bridge that linked data immediately to a public website such as USFS or NOAA would help in obtaining accurate records of flood levels in the City which would be important for making decisions regarding future land use and zoning, infrastructure locations and designs, future critical facilities, etc.

Relates to Plan Goal(s) and Objectives: Regional Plan Goal 7. Regional Plan Objective 7A

Lead: Water Resources & Sustainability Department

Estimated Cost: $20,000 per gauge and $4,000 per year for operating costs

Time Period: 2017-2022

Funding Source: Department of General Administration, City of Olympia, and the City. In regard to the funding for an upgraded electronically monitored gauge at the "E" Street bridge, reportedly the USGS would be interested in installing an upgraded gauge provided the local governments pay for the installation and operation of the gauge. It appears there is some interest by the Washington State Department of General Administration, and the City of Olympia to possibly partner with the City for a new gauge. The General Administration would be interested due to their need to control the water level in Capitol Lake with the dam. A gauge would be able to be integrated into a telemetry system to automatically open and close the B 63 dam, as necessary. Also, the City of Olympia has a vested interest in making sure that Capitol Lake does not flood a portion of downtown Olympia.

Source and Date: 2017 City Annex and Regional Plan

Initiative and Implementation Status: This was the sixth ranked initiative in the previous plan. This initiative has not been implemented. The gauge at the E Street Bridge was slightly upgraded so the data does not have to be read manually, Staff state the gauge is working and functioning, no additional upgrades are needed at this time. The gauge at E street is up to USGS standards.

Benefit Cost Review Results

Purpose

The City must perform a benefit-cost review for each hazard mitigation action or project that it is considering for inclusion in a new or updated mitigation strategy. The City's hazards mitigation planning team must consider the benefits that would result from a mitigation action versus the cost to implement it. This is intended as a planning-level assessment of whether the costs are reasonable compared to the probable benefits, unlike a more comprehensive Benefit-Cost Analysis.[44] Cost estimates do not have to be exact but can be based on a range of values or the City's experience or judgement. Benefits include losses avoided, such as the number and value of structures and infrastructure protected by the action and the population protected from injury and loss of life. Qualitative benefits such as quality of life can also be estimated as part of the review process.

Evaluation Criteria

The City's hazards mitigation planning team must evaluate each proposed mitigation project or action as providing a high, medium, or low benefit using the benefit-cost review and prioritization criteria. There are eight required criteria that the planning partners must use to evaluate actions. There are four additional optional criteria that the City's hazards mitigation planning team may find useful to refine the process. The City's hazards mitigation planning team needs to agree upon the other criteria that will be used to analyze the mitigation actions. Other criteria used should be annotated in the worksheet. Descriptions of the required and optional criteria follow.

Required Benefit-Cost Review and Prioritization Criteria

1. **Hazard Risk Rating:** The City must have at least one mitigation strategy per high-risk hazard. It is acceptable to identify actions or projects for medium and low risk hazards. However, actions that address high risk hazards should be a community priority.

2. **Project Cost**: Actions or projects should produce benefits that exceed the cost to implement the project over its life cycle.

3. **Natural Hazards Mitigation Plan Goals and Policies:** how strongly does the action support the City Annex and Regional Plan's goals and policies?

4. **Life/Safety –** What type of benefits will an action or project have on the safety of residents, businesses, and properties within the community?

5. **Social Vulnerability[45]:** The City has a responsibility to ensure that the Plan's mitigation strategy complies with all applicable legal requirements related to civil rights, to ensure nondiscrimination.

[44] An in-depth Benefit-Cost Analysis using FEMA's BCA module criteria is not required for the plan but is required when applying for Hazard Mitigation Assistance grant funding.
[45] "Social vulnerability" is understood as the potential for loss within an individual or social group, recognizing that some characteristics influence an individual's or group's ability to prepare, respond, cope or recover from an event. These

Compliance can help achieve equitable outcomes through the mitigation planning process for all communities, including underserved communities and socially vulnerable populations. The City can use the CDC/ATSDR Social Vulnerability Index (SVI) interactive mapping tool to assess affected populations within communities:

https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

The City can refer to other sources of data or tools such as the Washington Tracking Network to assess social vulnerability and health disparities:

https://fortress.wa.gov/doh/wtn/WTNIBL/

6. **Changes in Development:** Does any of the following affect the City's projects or actions: 1) Construction completed since the last plan was approved; 2) Planned development or changes under consideration; or 3) Conditions that may affect the risks and vulnerabilities of the City (declining populations or projected increases in population, or foreclosures)? This could also include changes in local policies, standards, codes, regulations, land use regulations and other conditions that influence development patterns in a community.

7. **Climate Change**: Climate change is expected to increase the frequency, duration, and intensity of natural hazards, such as wildfires, extreme heat, drought, storms, heavy precipitation, and sea level rise. Impacts are expected to be felt more frequently by the mid-21st Century. These variations create new risks to local governments and challenge pre-existing mitigation plans. Impacts will threaten communities with most at-risk populations by exacerbating the impacts of disasters on underserved and socially vulnerable populations who already experience the greatest losses from natural hazards.

8. **Geographic Impact**: The area that will benefit from the proposed action. The location of a hazard is defined as the unique geographic boundaries within the planning area, or assets outside of geographic boundaries that may be affected by the identified hazard. The City should mitigate risks wherever they occur within a community.

Optional Benefit-Cost Review and Prioritization Criteria

9. **Capacity Building**: Will the action expand the City's capacity or expertise to plan for, implement, and evaluate the near- and long-term effectiveness of the proposed action or project? If outside expertise is necessary, how much will this increase the cost and complexity of implementing and operating the action or project? For example, grant writing, grant award administration and reporting, design and engineering, etc.

characteristics can overlap within populations to create heightened vulnerability, which may be compounded by infrastructure deficiencies within communities and historic or existing discriminatory government policies.
"Underserved communities" refers to populations sharing a particular characteristic, as well as geographic communities that have been systematically denied a full opportunity to participate in aspects of economic, social and civic life.

10. **Other Strategic Plan Goals**: Does the action support other strategic planning goals? For example, comprehensive plans, school, fire, and utility strategic plans, transit development plan, etc.

11. **Co-Benefits**: In addition to an action's primary purpose to reduce losses from a hazard, an action can also produce environmental, economic, or social benefits to a community. For example, removing structures from a flood plain can mitigate impacts to residential property, but also can restore the natural function of a flood plain, improve fish and wildlife habitat, and create passive recreational open space opportunities for community members. Some mitigation actions could incorporate features that support art, education, and historic preservation co-benefits.

12. **Grant Eligibility**: Is the action eligible for FEMA's Hazard Mitigation Assistance grant programs or other federal or state grant programs? Does the hazards mitigation planning team believe the project will be competitive for grant funding? Will the project's need to be funded using local revenues and decrease its likelihood of being implemented?

Required Mitigation Action Benefit-Cost Mitigation Review with Prioritization Criteria Ratings and Scores

REQUIRED CRITERIA	HIGH BENEFIT		MEDIUM BENEFIT		LOW BENEFIT		NO BENEFIT	
	Description	Pts	Description	Pts	Description	Pts	Description	Pts
1. Hazard Risk Rating	Action addresses a High-Risk Hazard	5	Action addresses a Medium-Risk Hazard	3	Action addresses a Low-Risk Hazard	1	Action Addresses a no-risk hazard	0
2. Project Cost	Low cost, less than $100K	5	Medium cost, $100K - $500K	3	High cost, more than $500K	1	Cost far exceeds the anticipated benefits	0
3. Natural Hazards Mitigation Plan Goals and Policies	Action strongly supports at least four policies	5	Action supports at least two policies	3	Action supports one policy	1	Action does not support plan policies	0
4. Life and Safety	Action will produce significant and lasting public safety benefits for residents, businesses, and property	5	Action will produce public safety benefits	3	Action will produce minimal public safety benefit	1	Action has no public safety benefits	0
5. Social Vulnerability	Action will produce a significant and direct benefit for socially vulnerable or underserved communities	5	Action will produce a benefit	3	Action will have minimal benefit	1	Action does not benefit socially vulnerable or underserved communities	0
6. Changes in Development	Action includes measures that strongly account for changes in development	5	Action includes measures that account for changes in development	3	Action includes minimal measures that account for changes in development	1	Action does not account for changes in development	0

REQUIRED CRITERIA	HIGH BENEFIT		MEDIUM BENEFIT		LOW BENEFIT		NO BENEFIT	
	Description	Pts	Description	Pts	Description	Pts	Description	Pts
7. Climate Change	Action strongly accounts for the effects of climate change on the hazard it addresses	5	Action accounts for the effects of climate change…	3	Action minimally accounts for the effects of climate change…	1	Action does not account for the effects of climate change…	0
8. Geographic Impact	Action addresses hazard risks for the entire affected area of the community	5	Action address risks across at least half of the affected area	3	Action address risk for a very limited portion of the affected area	1	Action does not address risks within the affected area	0

Optional Mitigation Action Benefit-Cost Mitigation Review with Prioritization Criteria Ratings and Scores

9. Capacity Building	Action will strengthen the City's capacity and expertise to implement the initiative and future initiatives	5	Action will assist the City's internal capacity and expertise	3	Action will have minimal effect on the City's capacity and expertise	1	Action will require outside technical expertise	0
10. Other Strategic Plan Goals	Action strongly supports the City's other strategic plan goals	5	Action supports the City's other strategic plan goals	3	Action minimally supports the City's other strategic plan goals	1	No support for the City's other strategic plan goals	0
11. Co-Benefits	Action will produce at least two co-benefits	5	Action will produce at least one co-benefit	3	Action minimally produces some co-benefit	1	Action is unlikely to produce any co-benefits	0

12. Grant Eligibility	The entire project is eligible for FEMA Hazard Mitigation Assistance grants or other federal or state grant programs 5	Most of the project is eligible for grant programs 3	Some of the project may be eligible for grant programs 1	The project is not eligible for grant programs 0

Cost-Benefit Review and Prioritization Worksheet

Jurisdiction Name:	City of Tumwater												
	Required Criteria								Optional				
Mitigation Project	1. Hazard Risk Rating	2. Project Cost	3. HMP Goals and Policies	4. Life and Safety	5. Social Vulnerability	6. Changes in Development	7. Climate Change	8. Geographic Impact	9. Capacity Building	10. Other Strategic Plan Goals	11. Co-Benefits	12. Grant Eligibility	Total Score
Public Outreach and Information													
Mail flood insurance information to owners of properties located within a floodplain and to residents who live in a floodplain	1	5	3	1	1	0	3	5	1	1	1	0	22

Jurisdiction Name:	City of Tumwater												
	Required Criteria								Optional				
Mitigation Project	1. Hazard Risk Rating	2. Project Cost	3. HMP Goals and Policies	4. Life and Safety	5. Social Vulnerability	6. Changes in Development	7. Climate Change	8. Geographic Impact	9. Capacity Building	10. Other Strategic Plan Goals	11. Co-Benefits	12. Grant Eligibility	Total Score
Plan Coordination and Implementation													
Continue to be actively involved in inter-jurisdictional flood hazard reduction efforts where the City and other jurisdictions are located within the same basin	1	5	5	5	3	3	5	5	1	1	1	1	36
Data collection and Mapping													
Install or upgrade flood elevation gauges on the Deschutes River	1	5	3	5	3	1	3	5	1	1	1	0	29
Update GIS (City Map) maps to show wildland-urban interface and intermix	3	5	5	3	3	3	3	5	1	1	1	0	33
Development Regulations													
Update Building Code to wildland-urban interface and intermix requirements	3	5	5	5	3	5	3	5	1	3	3	1	42

Jurisdiction Name:	City of Tumwater												
	Required Criteria								Optional				
Mitigation Project	1. Hazard Risk Rating	2. Project Cost	3. HMP Goals and Policies	4. Life and Safety	5. Social Vulnerability	6. Changes in Development	7. Climate Change	8. Geographic Impact	9. Capacity Building	10. Other Strategic Plan Goals	11. Co-Benefits	12. Grant Eligibility	Total Score
Develop a wildland-urban interface and intermix Vegetation Management Plan and Planting Species Plan	3	5	5	3	3	5	5	5	1	1	1	1	38
Reduce heat islands through street tree, tree preservation, and landscape code updates	3	3	5	3	3	5	5	5	1	1	1	1	36
Minimize vegetation removal in steep slopes and critical areas	3	5	3	3	3	3	3	5	1	1	1	0	31
Modify Street Tree, Tree Preservation, and Landscape codes to require appropriate planting near overhead power, cable, and phone lines	3	3	5	5	3	3	0	5	1	1	1	0	30
Hazard Preparedness													
Inspect Fire Hydrants	5	5	1	5	3	1	0	5	1	1	1	0	28
Encourage the public to be prepared to be self-sufficient for the first 72 hours after a disaster.	5	5	5	3	3	1	3	5	1	1	1	1	34

Jurisdiction Name:	City of Tumwater												
	Required Criteria								Optional				
Mitigation Project	1. Hazard Risk Rating	2. Project Cost	3. HMP Goals and Policies	4. Life and Safety	5. Social Vulnerability	6. Changes in Development	7. Climate Change	8. Geographic Impact	9. Capacity Building	10. Other Strategic Plan Goals	11. Co-Benefits	12. Grant Eligibility	Total Score
Keep a supply of air filters on hand for critical equipment, generators, and vehicles in case of ash fall from a volcanic eruption, fires, or wildfires	3	5	5	3	3	0	1	5	1	1	1	0	28
Install auxiliary generator to power City main well and water supply	5	3	5	3	3	3	1	5	1	1	1	0	31
Install solar power and battery storage at City Hall and Tumwater Timberland Library (secondary Emergency Operations Center)	5	3	5	3	3	3	1	5	1	1	1	0	30
Hazard Damage Reduction													
Include retrofitting and replacement of critical system elements in Capital Facilities Plan	5	1	5	5	3	3	1	5	1	1	1	0	31
Establish fire breaks next to residences on heavily wooded hills in the City	3	1	3	3	3	3	3	5	1	1	1	0	27
Work with landowners to reforest corridors along river and stream shorelines.	1	5	3	1	1	1	3	5	1	1	1	0	23

Jurisdiction Name:	City of Tumwater												
	Required Criteria								Optional				
Mitigation Project	1. Hazard Risk Rating	2. Project Cost	3. HMP Goals and Policies	4. Life and Safety	5. Social Vulnerability	6. Changes in Development	7. Climate Change	8. Geographic Impact	9. Capacity Building	10. Other Strategic Plan Goals	11. Co-Benefits	12. Grant Eligibility	Total Score
Draft a list of residences the City would elevate above the base flood elevation, if state or federal monies are available	1	5	3	1	1	1	3	5	1	1	1	0	23
Draft a prioritized list of residences the City would acquire (buyout) if state or federal monies are available	1	5	3	1	1	1	3	5	1	1	1	0	23
Have a professional assess infrastructure for earthquake vulnerability	5	3	5	5	3	3	3	5	1	1	1	1	36
Investigate funding for projects that will reduce damage to streets, structures, utilities, etc. in flood areas prone to flooding	1	5	5	5	3	3	3	5	1	1	1	0	33
Critical Facilities Replacement and Retrofit													
Conduct a voluntary non-structural earthquake readiness inspection for all critical facilities on an annual basis	5	5	5	3	3	1	3	5	1	1	1	1	34
Periodically Inspect all trees within falling distance of the four City-owned critical facilities	3	5	5	3	1	1	3	5	1	1	1	0	29

Benefit points: High=5; Medium=3; Low=1; No benefit=0

Public Comment Summary

The City received one comment from the community during the Final Draft Plan Public Comment period of November 3 to 17, 2023.

The public comment was an email received by Paul Brewster (Senior Planner, Thurston Regional Planning Commission) November 11, 2023 on the City of Tumwater Annex. The comment expressed concern with existing development in liquefaction areas, and whether or not residents living within the liquefaction areas were notified. The comment read as follows:

> *"I have serious concerns about* ***notification and potential actions to consider addressing <u>existing</u> development****. I live in Tumwater and am a homeowner in a 55+ manufactured home park, and am low income. In June 2017 the City of Tumwater produced document 'Resolution No. R2017-013 (copy attached below) which honestly shocked me. I had never seen it. It was an excellent report with maps and photos. It identified* ***4 mobile home parks in a high liquefaction hazardous zone, and identified all our homes here in Eagle's Landing of one of those 4 parks and further identifies a significant water issue for us.*** *Was the City's report after the 4 parks were identified given to the* ***owners*** *of these four parks? Were they notified in 2017? None of our leases or sign-in documents ever disclosed this information to us and I have not found one homeowner here who realizes we are in a high liquefaction hazardous zone. Or has ever seen the document.*
>
> *You now are producing a 2023 update. Will the final report be buried in a file cabinet or will any of us* ***affected*** *by your excellent information be notified at all? Or property owners notified of the most hazardous areas? We need this information more public."*

Appendix A – Community Capability Assessment

Capability Assessment Worksheets

Types of Capabilities

There are four mitigation worksheets. The worksheets are intended for notes about relevant capabilities within the City. Each type of capability may include laws, regulations, policies, programs, staff, or funding and may go beyond traditional mitigation. The City's hazards mitigation planning team may find other capabilities that help make the City more resilient.

1. Planning and regulatory
2. Administrative and technical
3. Financial
4. Education and outreach

Observations and Discussion Form

Each worksheet includes an 'Observations and Discussion' form. It includes a series of questions to help the City document which authorities, policies, programs, funding, and resources the City has to accomplish hazards mitigation. The discussion must account for building codes, land use and development codes, ordinances and regulations that are key to reducing risk. It must also describe ways the City and expands and improves its capabilities.

Evaluating Equity in the Capability Assessment

Consider low-income, communities of color, people with disabilities, people who lack English proficiency, people with insecure housing, and others who may be disenfranchised from economic, social, and civic life. Are there barriers to accessing resources in the community? By reducing barriers to socially vulnerable and underserved populations, the City can support a whole-community approach to hazards mitigation. Use the following questions to bring equity into the City's capability assessment.

- Which communities and populations lack resources to improve their resilience?
- What gaps might exist that decrease an underserved community's ability to access resources and plan for risk reduction?
- Do any capabilities disproportionately benefit wealthy areas or neighborhoods?
- Do any capabilities actively increase the vulnerability of underserved and socially vulnerable populations and communities?
- How can the City think differently about leveraging non-monetary and non-traditional resources and partners to support underserved communities?

Capability Assessment Worksheets

1. *Planning and Regulatory*

Evaluation for Planning and Regulatory Capabilities

- What is the legal framework for land use planning in the City?
- What kinds of plans does the City have? Which are used most often?
- Are there any specific laws or ordinances that mitigate hazards?
- How does the City regulate growth and development?
- How does the City protect community lifelines such as well heads, wastewater treatment facilities, and other critical facilities, including dams and levees?

Plans	In Place? Y or N	Notes - Does the plan address hazards? Can the plan be used to implement mitigation actions? When was it last updated? *Cite specific sections or language that supports hazards mitigation. Note if there are gaps.*
Comprehensive Plan	Yes	Plan identifies and addresses avoiding critical areas in Conservation Element. The Plan was last completely updated in 2016. Planning started for 2025 update. The update is expected to address the relationship with City Annex and Regional Plan as required by 2023 state law as a subelement of the new Climate Element. The Plan is amended on an annual basis. The last Plan amendment was in 2022.
Capital Facilities Plan	Yes	Plan identifies specific City projects for funding in six-year cycle, includes projects that address hazards and can include specific mitigation actions. The Plan was last updated in 2021 as part of the Comprehensive Plan annual amendment process. The Plan is amended on a biennial basis. Next update will be in 2023 as part of the Comprehensive Plan annual amendment process.
Climate Adaptation and Mitigation Plans	Yes	Plans address how the City will address climate change through actions for adaptation and mitigation. The Thurston Climate Adaption Plan was adopted in 2018 and the Thurston Climate Mitigation Plan was adopted in 2021. A new state required Climate Element will be added to the Comprehensive Plan as part of the 2025 periodic update.
Community Wildfire Protection Plan	No	Currently planning in conjunction with Thurston County and the Thurston Regional Planning Council.
Comprehensive Emergency Management Plans	Yes	Plan last updated 2017. Planning has started for 2023 update. The Plan identifies hazards mitigation as an area for further plan development (p. 8), but specific actions not outlined.

Plans	In Place? Y or N	Notes - Does the plan address hazards? Can the plan be used to implement mitigation actions? When was it last updated? *Cite specific sections or language that supports hazards mitigation. Note if there are gaps.*
Comprehensive Flood Management Plan	Yes	Thurston County Flood Hazard Mitigation Plan was completed in 2013. The Plan identifies specific hazard mitigation measures and assigns a priority to implement.
Continuity of Operations Plan	No	It is currently unclear whether the City has a city wide Continuity of Operations Plan or if individual departments have them.
Economic Development and Resiliency Plan	Yes	Plan last completely updated in 2019. Planning started for 2025 update. Update is expected to address resiliency.
Habitat Conservation Plan	No	Bush Prairie Habitat Conservation Plan is being prepared. There is no specific date for completion. The Plan does not address hazards.
Stormwater Management Plan	Yes	Plan was completed in 2022. Plan does not address hazards.
Transportation Plan	Yes	The Transportation Plan was last completely updated in 2016 as part of the Comprehensive Plan periodic update. Planning started for 2025 periodic update. Update is expected to address relationship with City Annex and Regional Plan as required by state law.

Land Use Planning and Ordinances	Y or N	Notes - Is the ordinance an effective measure for reducing hazard impacts? Is it adequately administered and enforced? *Cite specific language or sections of ordinances or codes that support hazards mitigation, if applicable. Note if there are gaps.*
Acquisition of land for open space, public recreation, or conservation	Yes	The City purchases property for open space and public recreation and will be purchasing property for habitat protection under the Bush Prairie Habitat Conservation Plan.
Building Codes	Yes	Building Codes were last updated in 2021. Includes building, fire, residential, mechanical, plumbing, property maintenance, and energy conservation codes, all of which address life, health, and safety. Planning has started for 2024 update. Update is expected to include adoption of the 2021 Washington Wildland-Urban Interface Code.
Flood Insurance Rate Maps	Yes	The floodplain in the City is regulated through the floodplain overlay chapter of the zoning code (TMC 18.38), the Building Code, as well as portions of critical areas and shoreline regulations. The existing floodplain maps can be seen on the Official FEMA Flood Insurance Rate Maps for the City as well as on the City's zoning map. FEMA is currently nearing the end of the process for updating the floodplain map for portions of the City including the

Land Use Planning and Ordinances	Y or N	Notes - Is the ordinance an effective measure for reducing hazard impacts? Is it adequately administered and enforced? *Cite specific language or sections of ordinances or codes that support hazards mitigation, if applicable. Note if there are gaps.*
		Deschutes Valley. The City will be required to adopt the new floodplain maps and study in the next few months.
Floodplain ordinance	Yes	The floodplain in the City is regulated through the floodplain overlay chapter of the zoning code (TMC 18.38). The State Department of Ecology completed a Community Assistance Visit with the City in 2023, which identified specific updates to the floodplain overlay chapter of the zoning code (TMC 18.38) which will be completed as part of the Development Code periodic update in 2025.
Natural hazard specific or Critical Areas Ordinance	Yes	Critical areas are regulated by TMC Title 16 *Environment*, which were last updated in 2019 and will be updated as part of the Development Code periodic update in 2025.
Subdivision ordinance	Yes	Land divisions are regulated by TMC Title 17 Land Divisions, which were last updated in 2022.
Zoning ordinance	Yes	Zoning is regulated by TMC Title 18 Zoning, which includes the City floodplain overpay regulations (TMC 18.38), aquifer protection regulations (TMC 18.39), and environmental performance standards (TMC 18.40). Regulations will be updated as part of the state required Development Code periodic update in 2025.

Plans and Regulations Capabilities Observations and Discussion

a. *What specific sections of the City's plans, land use regulations, building codes, and ordinances support the City's ability to reduce risks and implement the City's mitigation actions?*

   See chart for specific information.

b. *Are there any gaps in the City's plans, regulations, or ordinances that may prevent the City from supporting the City's mitigation actions?*

   See chart for specific information.

c. *How can the City's plans and regulations be expanded or modified to improve the City's understanding of hazards and vulnerabilities? How can they be improved to reduce risks?*

   The City is currently updating its Comprehensive Plan which must include a resiliency subelement as part of the new state required Climate Element. The Hazards Mitigation Plan for the Thurston Region can serve the purpose of the resiliency subelement.

d. *What type of development regulation mitigation initiatives, if any, could support the integration of hazards mitigation planning policies and programs?*

   As the City updates its Comprehensive Plan, the City will further its work in this area. If work on the Comprehensive Plan periodic update results in policy recommendations to update the City's development regulations related to hazards mitigation, such code updates will be considered for incorporation into the City's Annex.

2. Administrative and Technical

Evaluation for Administrative and Technical

- Who will be responsible for implementing mitigation actions?
- Have available staff been trained to support mitigation?
- Are outside technical expertise or resources needed?
- Do government agencies and departments regularly coordinate and problem-solve?
- Are agreements in place between participants or between participants and other organizations that provide regular administrative or technical assistance?
- Does the City work with nongovernmental organizations who also work in mitigation?
- Which staff and abilities are available to help carry out the City's mitigation plan?
- If the City does not have staff, consider how county, regional, and state partners can assist the City.

Administrative	In Place Y or N	Notes - Is staffing adequate to enforce regulations? Are staff trained in hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Y	The City has a City-wide Emergency Management Committee. The Building Official or designee participates in the Emergency Management Committee, which coordinates training. The Building official issues Flood Certificates. In the event someone builds in the flood zone, they will need to meet the applicable code and receive a flood certificate.
Civil Engineer	Y	The City has engineers in the Transportation & Engineering and Water Resources & Sustainability Departments. Engineering staff participate in the City-wide Emergency Management Committee. Engineering staff assist with designing and constructing city capital projects which may include projects that address mitigating for natural hazards.
Community Development Director	Y	The Community Development Director oversees the Community Development Department staff, including the Planning staff. They help enforce regulations in the Development Code such as floods and other critical areas. They also help create and implement City plans such as the City Annex and Regional Plan and the Comprehensive Plan.
Emergency Manager	N	The City has a City-wide Emergency Management Committee.

Floodplain Administrator	Y	The Planning Manager acts as the Floodplain Administrator for the City.
GIS Manager	Y	The GIS Team helps map critical facilities, infrastructure, critical areas, and more. This helps staff implement and enforce regulations.
Planning Commission		The Planning Commission are briefed in the City Annex and Regional Plan update process.
Technical	**In Place Y or N**	**Notes – Has capability been used to assess or mitigate risk in the past? Will the City use it to implement the City's current action plan?**
Grant Writing	Y	Staff have applied for many grants to help with assessments, retrofitting of critical facilities and infrastructure, purchasing of resources, and more. The current plan will be used to help facilitate funds and grant opportunities further.
Hazard data and information	Y	Hazard data and information was used in previous plans and in the current plan. Furthermore, it is used to help identify priorities for the Capital Facilities Plan update cycle.
GIS Analysis	Y	GIS mapping helps assist staff in recognizing areas that are prone to flooding, landslides, high ground water, and soon to be wildfire hazard areas.
Mutual Aid Agreements		The City's Comprehensive Emergency Management Plan contains a listing of mutual aid agreements available to the City. The City has mutual aid agreements associated with fire, emergency medical services, and police services, water interties, emergency management, including the Thurston County Emergency Management Committee. The Homeland Security Region 3 Omnibus agreement covers emergency management planning, mitigation and response for Thurston, Mason, Lewis, Pacific and Grays Harbor Counties.

Administrative and Technical Capabilities Observations and Discussion

a. *What specific administrative and technical strengths does the City have to support hazards mitigation?*

   Staff are proficient in writing and applying for grant opportunities. Staff ensure the City code and regulations are up to date- meeting state and federal standards.

b. *Are there any gaps in administrative or technical capabilities to support the City's understanding of hazards and vulnerabilities?*

   An emergency manager could potentially be established.

c. *How can the City expand or improve its administrative and technical capabilities to reduce risks or the City's mitigation actions?*

   Potentially by establishing more frequent meetings with each department to talk about funding, public outreach, and initiative updates.

d. *What type of plan coordination and implementation mitigation initiatives, if any, could enhance the City's technical and administrative capabilities?*

   As the City completes its Comprehensive Plan periodic update with the Climate Element, there may be additional items to include in the City Annex and Regional Plan.

3. Financial

Evaluation for Financial

- What financial resources can the City program for mitigation activities?
- What resources have the City used in the past?
- What grant programs can the City pursue to fund the City's mitigation actions?
- Can the City cover the 25 percent match for a federally grant funded mitigation project?
- How do the City's mitigation projects get programmed into the City's Capital Facilities Plan?
- Are there any financial policies to direct available funds to mitigation projects?

Funding Resources	In Place Y or N	Notes - Has the funding resource been used in the past and for what type of activities? Could it be used to fund future mitigation actions?
Capital Improvements Project Funding	Yes	The Capital Facilities Plan used to implement mitigation initiatives specified by the Annex.
Community Development Block Grant	Yes	No.
Non-FEMA Federal Funding Programs	Yes	No.
Impact Fees	Yes	The City has parks and transportation impact fees which fund projects related to growth.
State Funding Programs	Yes	The City received funding to update the City's Shoreline Master Program and has able for state grant funding to develop a Climate Element, which will include a resiliency subelement.
Utility Fees	Yes	Utility fees are utilized for upgrades and retrofitting projects.

Financial Capabilities Observations and Discussion

a. *What specific financial strengths does the City have to support hazards mitigation?*

   The City has some staff availability to apply for grants and low interest loans.

b. *Are there any gaps in financial capabilities to support the City's understanding of hazards and vulnerabilities?*

   Other than general financial limitations all local governments face and share, the City does not have any specific gaps.

c. *How can the City expand or improve its financial capabilities to implement the City's mitigation actions?*

   Not known.

d. *What type of actions can the City take, if any, to secure funding to make the community more resilient?*

   Apply for more opportunities and form partnerships with others.

4. Education and Outreach

Evaluation for Education and Outreach

- What outreach programs does the City use to share important information?
- What venues does the City use for outreach activities? Could they be used to promote risk reduction?
- What new or additional outreach efforts could get the most public participation and support for risk reduction?

Programs or Activities	In Place Y or N	Notes – How widespread and effective are these programs in the City's community?
Hazard awareness campaigns such as Firewise, Storm Ready, Flood Awareness Month, School Programs, or Public Events	Yes	Much of this work occurs at the regional level through Thurston County staff. The Water Resources & Sustainability Department staff do general outreach to the community about flooding.
Local News Media	Yes	The local news media is present at most Planning Commission, General Government Committee, and City Council meetings. Communication Department staff is skilled at using local and social media.
Organizations that represent or advocate for socially vulnerable and underserved populations	Yes	The City is undertaking great efforts in working with socially vulnerable and underserved populations through the Housing Action Plan, Regional Plan and City Annex, 2025 Comprehensive Plan periodic update, 2023 Capital Facilities Plan, the 2020 Water System Plan, and more. Equity is a primary focus when any plans or updates are being proposed. The City has hired consultants to establish an "Equity Toolbox."
Social Media	Yes	The City utilizes many platforms of social media. The Countywide survey and Thurston County Fair event were shared to the City Facebook page. Staff will be utilizing social media more during the Comprehensive Plan periodic update, especially the Climate Element and Resiliency Subelement, which is correlated to the Regional Plan and City Annex.

Public Outreach and Education Capabilities Observations and Discussion

a. *What specific public outreach and education capabilities and strengths do the City have to support hazards mitigation?*

   Staff involvement with the hazards mitigation planning team, the Fire Department works with emergency management and the public, and the City's Communications Department helps with public outreach, sharing of information and upcoming events, and mailing of critical information and upcoming public events. The City also has the ability to utilize Planning Commission, General Government Committee, and City Council meetings to share information and updates with the public.

b. *Are there any gaps in the City's capabilities to engage the public about natural hazards and the City's vulnerabilities?*

   Yes, a formal internal hazards mitigation planning team could be established. It will be easier to get involved with other departments to identify public engagement opportunities and the ability to share implementation statuses of the initiatives.

c. *How can the City expand or improve its public education and outreach activities?*

   Potentially by identifying a City staff member to lead or organize an internal workgroup, who will also be responsible for sharing updates on the City's Natural Hazards Mitigation Plan webpage and posting to social media. The City could develop a general communication plan around hazards mitigation to identify vulnerable populations and develop targeted outreach.

d. *What type of mitigation actions can the City take, if any, to engage the City's constituents and stakeholders about the natural hazard risks or mitigation actions?*

   The City could have a mitigation action around identifying vulnerable populations.

Appendix B – National Flood Insurance Program Assessment

National Flood Insurance Program Assessment Worksheet

Evaluation for National Flood Insurance Program Participation

- Who is the floodplain manager? Is this their primary or a secondary role? Does this person have adequate training and capacity for their role?
- Is the FIRM and FIS report in an accessible location? Does the community (or state) promote public access to floodplain information?
- How does the community support map change requests? These could be requests during the Risk MAP process or through Letters of Map Amendment or Revision.
- Does the community collect updated floodplain data or modeling? Is this shared with partners and with FEMA?
- How does the community issue development permits in the special flood hazard area? Who is responsible for permitting?
- How are floodplains regulated in new subdivisions?
- Does the community maintain elevation records? Does it track the number of buildings in the special flood hazard area?
- How does the community enforce its floodplain rules? Does enforcement include monitoring compliance and acting to correct violations?
- How does the community educate the public on floodplain management and the availability of flood insurance, in and out of the floodplain?

National Flood Insurance Program Topic	Response	Source of Information	Notes – *If the City were unsure or answered "no" to any of these questions, consider short- and long-term action items to address them.*
Staff Resources			
Who is responsible for floodplain management in the City? Do they serve any roles other than Community Floodplain Administrator?	The City's Planning Manager also serves in the role of the City's Floodplain Administrator.	City Floodplain Administrator	
Is the Community Floodplain Administrator or National Flood Insurance Program Coordinator a Certified Floodplain Manager?	No.	City Floodplain Administrator	
Is floodplain management an auxiliary function?	Yes.	City Floodplain Administrator	
Explain National Flood Insurance Program administration services (e.g., permit review, GIS, inspections, engineering capability).	The floodplain review process is handled by the Community Development Department. All major permits go through a preliminary development review before vesting and permit application. Many of these permits go in front of the Development Review Committee for review. The City's flood permit is a part of the building permit. The City currently utilizes a digital permitting and record keeping system. Upon formal application of permit, development engineering,	City Floodplain Administrator	

National Flood Insurance Program Topic	Response	Source of Information	Notes – *If the City were unsure or answered "no" to any of these questions, consider short- and long-term action items to address them.*
	permitting, and building staff review the submittal, while the Building Official reviews permits for floodplain considerations. The City's Building Official oversees the Elevation Certificate process.		
Insurance Summary			
How many National Flood Insurance Program policies are in the community? What is the total premium and coverage?	Sixteen policies are in place with a total coverage of $3,717,000 and $6,885 in total written premium and Federal Policy Fee	Community Assistance Visit summary and State Mitigation Strategist through Paul Brewster at Thurston Regional Planning Council	
How many claims have been paid out in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	There have been two paid losses worth $12,514.40 and zero substantial damage claim to date.	Community Assistance Visit summary	
How many structures (residential and non-residential) are exposed to flood risk within the community?	Twenty-two non-residential, forty-six residential, and eighteen are unknown. Total: eighty-six	GIS Team	
Are there any repetitive or severe repetitive loss structures in the community?	None.	GIS Team	

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Describe any areas of flood risk with limited NFIP policy coverage.	None.	Floodplain Administrator	
How does the community teach property owners or other stakeholders about the importance flood insurance?	The City mailed all property owners with Special Flood Hazard Areas on their property information about Thurston Lakes Map updates.	Floodplain Administrator	
What digital sources (like the FEMA Map Service Center, National Flood Hazard Layer) or non-regulatory tools does the community use?	The City maintains digital copies of DFIRM maps and Flood Insurance Study Reports at City Hall, and they are available to the public. The DFIRM map coverage has also been integrated into the City’s official zoning map which is available online and at City Hall.	Floodplain Administrator	
Compliance History			
Is the community currently suspended from the National Flood Insurance Program?	No.	Floodplain Administrator	
Are there any outstanding compliance issues? (i.e., current violations)?	No.	Floodplain Administrator and Community Assistance Visit summary	
How does the community identify substantially damaged or improved structures? What is the process to make sure these	At the time of a Development Permit Application submittal, City staff are notified that a property is in a Special Flood Hazard Areas via the City’s GIS System. During	Floodplain Administrator	

National Flood Insurance Program Topic	Response	Source of Information	Notes – *If the City were unsure or answered "no" to any of these questions, consider short- and long-term action items to address them.*
structures are brought into compliance?	plan review is the time for determination of mitigating flood damage.		
When was the most recent Community Assistance Visit or Community Assistance Contact?	The City completed its Community Assistance Visit in the spring 2023.	City Floodplain Administrator	
Is a Community Assistance Visit or Community Assistance Contact scheduled or needed?	Not at this time.	City Floodplain Administrator	A Community Assistance Visit was conducted May 1, 2023. The last Community Assistance Contacts were completed by FEMA in 2020.
Regulation			
When did the community enter the National Flood Insurance Program?	1978	Community Status Book	
Are the FIRMs digital or paper?	Digital	City Floodplain Administrator	
How does the community enforce local floodplain regulations and monitor compliance?	Tumwater Municipal Code Chapter 18.38 *FP Floodplain Overlay* applies to the special flood hazard area within the City as well as the City's Shoreline Master Program in the case of shorelands of the state, such as the Deschutes River. If there are any conflicts between the Shoreline Master Program and the Floodplain Overlay Regulations that apply in	City Floodplain Administrator and Tumwater Municipal Code, and Shoreline Master Program	The City's Flood Damage Prevention Ordinance found in Tumwater Municipal Code Chapter 18.38 *FP Floodplain Overlay was* reviewed during the Community Assistance Visit. The City's ordinance was overall in fair standing, with minor updates needed to bring the ordinance into compliance with NFIP and State of Washington standards. It was discussed during the

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	shoreline jurisdiction, the requirements of Shoreline Master Program apply.		Community Assistance Visit that the City will complete all needed updates as part of the 2025 Development Code periodic update process and adopt a compliant ordinance in order to close out the CAV.