# DRAFT TRANSPORTATION SYSTEM PLAN

## *VOL. 2: APPENDIX*

**Warrenton, Oregon**
**September 2018**

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SECTION 1
# TECH MEMO ONE

## PUBLIC AND STAKEHOLDER INVOLVEMENT STRATEGY

# MEMORANDUM #1

**DATE:** August 21, 2015

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates
Kate Petak, EIT, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan**
**Task 2.1 Public and Stakeholder Involvement Strategy** P14180-008

The City of Warrenton, located in Clatsop County, Oregon, has recognized that citizen involvement is necessary in making wise and legitimate decisions. The following strategy provides specific actions for engaging citizens and stakeholders in the Warrenton Transportation System Plan (TSP) development process.

The City of Warrenton will involve the public and stakeholders primarily through a series of committee meetings, public open houses, and work sessions with elected officials, in addition to the distribution of project information through a variety of media, including a project website. The following describes each of these outreach mechanisms and a milestone schedule showing the public process is attached.

Key transportation planning objectives and issues identified to date include:

- Reflect planning efforts completed since last TSP including area and neighborhood transportation plans such as the Warrenton Urban Renewal District Plan, Warrenton Parks Master Plan, Warrenton Downtown and Marina Master Plans, Warrenton Trails Master Plan, Hammond Marina Master Plan, and Greater Astoria-Warrenton Area Regional Transportation System Refinement Plan
- Address compliance with new and amended federal, state, and local plans, policies, and regulations including the Oregon Transportation Plan (OTP), the Oregon Bike and Pedestrian Plan, the Oregon Rail Freight Plan, the state Transportation Planning Rule (TPR), the Oregon Highway Plan (OHP), the State Transportation Improvement Program (STIP), Access Management Rules (OAR 734.051), the Clatsop County Transportation System Plan, and the US 101 Condition Report.

# Project Advisory Committee

A project advisory committee will inform and guide the plan. The City will not advertise for it, but the PAC meetings will be open for public attendance.

**Project Advisory Committee (PAC) –** The primary function of the PAC will be to review drafts and provide comments on technical and regulatory memorandums and reports, as well as provide recommendations for the TSP, acting as community representatives. This committee will consist of representatives from affected agencies and service providers and represent a wide array of interests, including: the Oregon Department of Transportation (ODOT), City of Warrenton, Clatsop County, Hammond Port Authority, Warrenton-Hammond School District, emergency service providers, the Warrenton Business Association, and other key community groups and stakeholders. There will be up to 20 PAC members. It is expected that the group will meet four times over the course of the project. The City will coordinate formation of the PAC.

**Project Advisory Committee (PAC)**

| Name | Affiliation |
|---|---|
| Don Snyder | Public Works Director, City of Warrenton |
| Skip Urling | Planning Director, City of Warrenton |
| Henry Balensifer | Commissioner, City of Warrenton |
| Jennifer Bunch | Clatsop County |
| Bill Johnston | Planner, ODOT |
| Jeff Hazen | Executive Director, Sunset Empire Transit |
| Roxanne Williams | Warrenton Business Association |
| Keith Pinkstaff | Harbormaster, Hammond Port Authority |
| Mark Jeffery | Superintendent, Warrenton-Hammond School District |
| Mathew Workman | Police Chief, Warrenton Police Department |
| Bob Bridgens | Urban Renewal Committee |
| Mike Moore | Hampton Lumber Mill Supervisor |
| Chris DeLong | Manager, Costco |
| Tessa Scheller | Chair, North Coast Trails Alliance |
| Rob Fulton | Representative, Central Business District |
| Mike Weston | Port of Astoria |

The PAC is currently scoped to meet four times throughout the plan development process, and these meetings will include the following content:

- The first meeting will provide a project orientation and begin the discussion of the goals and objectives that best describe how the transportation system should be developed and managed in Warrenton.
- The second meeting will be a review and discussion of existing and future transportation conditions, as well as the discussion of the process for developing alternatives to meet the existing and future transportation system deficiencies.
- The third meeting will discuss how transportation solutions will be identified, how much funding the county is expected to have, and updated standards to manage the transportation system.
- The fourth and final meeting will review the Draft TSP and consider public and agency feedback.

## Community Events

Two community events will be held during the project. The first community event will introduce the TSP project and obtain input regarding existing and future transportation needs and interests, as well as key areas of interest for inclusion in the goals and objectives. The second community event will obtain input on potential solutions to address transportation needs.

Advertisement of community events will be through a project website, the City's website, a newsletter, and media notices in local newspapers. The City may supplement advertising through the local radio station, and posters/flyers displayed in public areas or at other community events.

## City Public Outreach

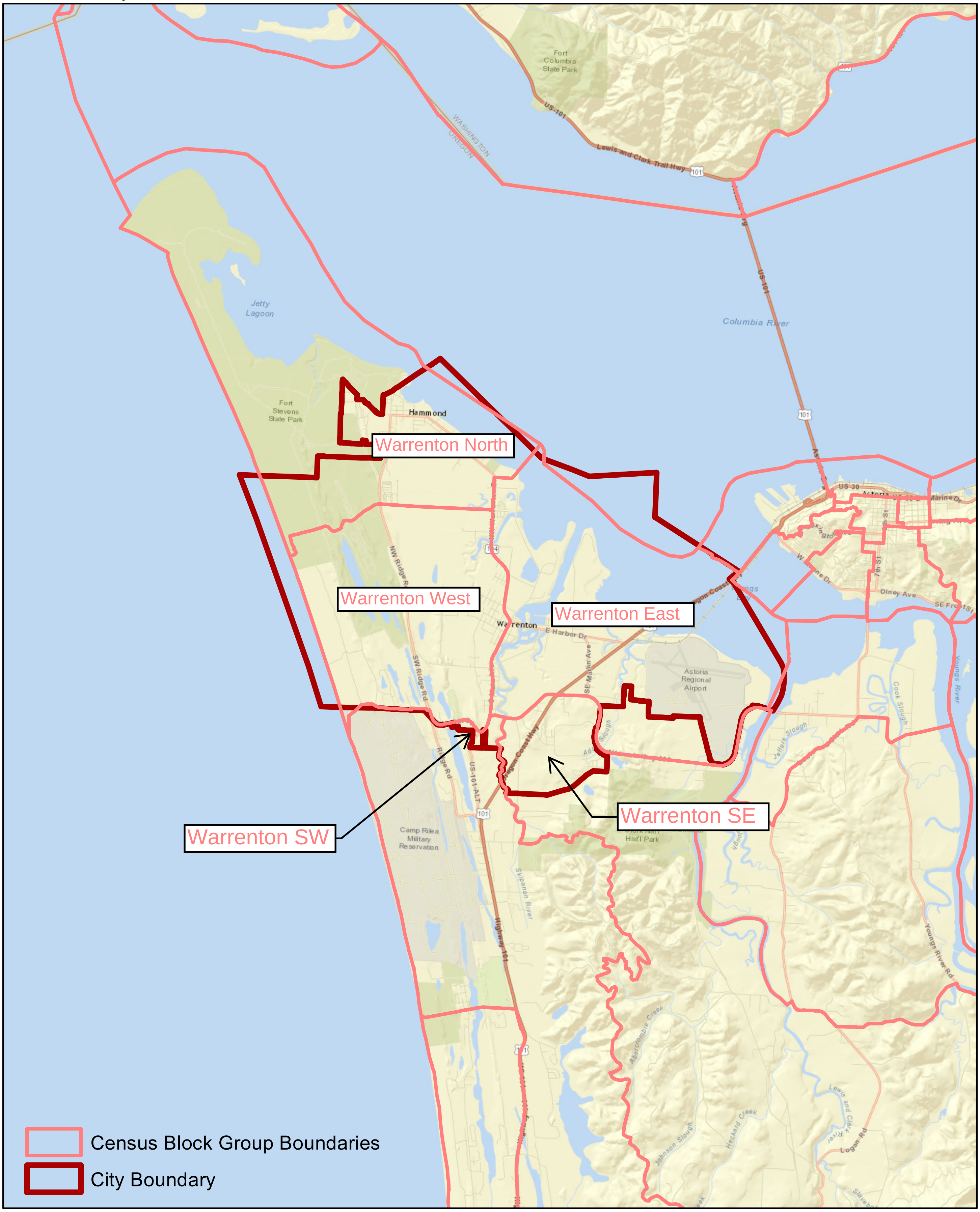
The City staff will meet with citizens and business owners to discuss the Draft TSP and provide feedback. Materials provided for outreach will include project status summaries, project graphics, or a brief PowerPoint presentation.

## Engaging Disadvantaged Populations

Implementation of this Public Involvement Plan meets requirements and guidance found in ODOT Title VI (1964 Civil Rights Act) Plan. Specifically, the Title VI Plan identifies measures to reach and solicit comments from disadvantaged populations within a community. The list of Title VI and Environmental Justice populations includes: race/color/national origin, age, gender, disabilities (mental and physical), limited English proficiency, minority races, and low-income. The community was analyzed by block groups, using data obtained for Clatsop County from the 2009-2013 American Community Survey.[1] The City of Warrenton contains 5 block groups, and data from these block groups were compared to the county and statewide averages. The block group boundaries can be seen in the figure below.

[1] United States Census Bureau. American Fact Finder. 2009-2013 American Community Survey 5-Year Estimates. Accessed August 2015. http://factfinder.census.gov/faces/nav/jsf/pages/download_center.xhtml

# City of Warrenton Census Block Group Boundaries



Compared to Clatsop County, one block group in Warrenton contained fewer racial minorities and four block groups contained a greater percentage of racial minorities (>5%). Warrenton equals the County average for percentage of Hispanic/Latino populations in two of the five blocks. Warrenton exceeds the County and State average for households below poverty in the last 12 months in three of the five blocks. Warrenton exceeds the County average for percentage of population with a disability in two of the five blocks.

According to the 2013 American Community Survey, over 91% of the population of Warrenton is Caucasian and nearly 6% of the population is of Hispanic or Latino origin. In addition, over 22% of individuals in Warrenton were below the poverty line in 2013. The comparison is shown in the table below, with values above county or state averages appearing in bold.

## Census Data for Warrenton Block Groups, Clatsop Couty, and Oregon

| | Warrenton North | Warrenton East | Warrenton West | Warrenton SW | Warrenton SE | *Clatsop County* | *Oregon* |
|---|---|---|---|---|---|---|---|
| Total Population | 1,389 | 1,143 | 2,190 | 870 | 913 | *37,039* | *3,831,074* |
| Male | 708 | 464 | 921 | 446 | 489 | *18,407* | *1,896,002* |
| Female | 681 | 679 | 1,269 | 424 | 424 | *18,632* | *1,935,072* |
| Senior Citizen (>65) | 16% | 16% | 8% | **20%** | **19%** | *17%* | *14%* |
| White Alone | 90% | **99%** | 93% | 92% | 93% | *95%* | *84%* |
| Black or Aftrican American Alone | 2% | 0% | 0% | 0% | 0% | *1%* | *2%* |
| American Indian and Alaska Native Alone | 0% | 0% | 1% | 0% | 1% | *1%* | *1%* |
| Asian Alone | 1% | 0% | 1% | 0% | 0% | *1%* | *4%* |
| Native Hawaiian and Other Pacific Islander Alone | 0% | 1% | 0% | 0% | 0% | *0%* | *0%* |
| Some Other Race Alone | **7%** | 0% | 0% | **6%** | 1% | *3%* | *5%* |
| Two or More Races | 0% | 1% | **5%** | 2% | **5%** | *3%* | *4%* |
| Hispanic or Latino | 8% | 8% | 1% | **11%** | 3% | *8%* | *12%* |
| Limited English Household | 1% | 0% | 0% | 4% | 0% | *6%* | *6%* |
| Households below Poverty Level in Last 12 Months | **18%** | 30% | 11% | **19%** | 12% | *13%* | *16%* |
| Population with Disability | 17% | **20%** | **22%** | 11% | 17% | *18%* | *14%* |

Given the considerable size of the Hispanic or Latino community in Warrenton, written materials and translation service will be made available in Spanish upon request. In addition, the City will post project advertisements in locations where Hispanic or Latino community members are likely to see them.

The City will also post project advertisements in locations where representatives or members of Native American tribes in the region such as the Confederated Tribes of the Grand Ronde, Confederated Tribes of Siletz Indians, Confederated Tribes of Warm Springs, Clatsop-Nehalem Confederated Tribes, and the Chinook Indian Nation are likely to see them.

To assist those that cannot drive, town hall meetings will be at locations accessible via transit, walking or biking when feasible given the meeting location. The county will provide downloadable materials on the project website. Hard copies of project documents will be available upon request for those without internet access.

To help engage senior citizens, the county will post project advertisements in locations where seniors will be likely to see them. Such locations may include drugstores, grocery stores, and retirement and assisted living communities.

## Distribution and Review of Work Products

The City will email project work products directly to PAC members, and post them to the project website for access by the general public. PAC members will be able to comment directly through regular committee meetings. The general public will be able to comment during the public comment period at the end of PAC meetings, at town hall meetings, and through the project website. The project website will facilitate public input by including a comment mapping feature. The project team will review comments input through the website and include them as part of the project record of public comments.

# SECTION 2
# TECH MEMO TWO

## BACKGROUND DOCUMENT REVIEW

# MEMORANDUM #2

**DATE:** October 13, 2015

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates
Kate Petak, EIT, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Background Document Review** P14180-008

The purpose of this memorandum is to summarize a review of planning documents, policies, and regulations applicable to the Warrenton Transportation System Plan (TSP) update. The City's current TSP will serve as the foundation for the update process, to which new information obtained from system analysis and stakeholder input will be applied to address changing transportation needs through the year 2040. As new strategies for addressing transportation needs are proposed, compliance and coordination with the plans, policies, and regulations described herein will be required. For the purposes of this memo, the roadway identification is as follows:

- Fort Stevens Highway 104 is used to reference Highway 104, which is also known as S Main Ave in downtown Warrenton
- US 101 Business is used to reference the Warrenton-Astoria Highway that runs between Fort Stevens Highway 104 and the Astoria Regional Airport. US 101 Business is also known as the Warrenton-Astoria Highway and Marlin Avenue
- 105 AA Connect is used to reference E Harbor Street (between US 101 Business and US 101)
- OR-104S (Fort Stevens Spur) is used to reference the Fort Stevens Spur between Fort Stevens Highway 104 and US 101
- 105 AC Connect is used to reference the Fort Stevens Spur located between US 101 and US 101 Business

## Summary of Key Background Plan Outcomes

The following table summarizes the key background plan outcomes that were identified in the review of the background documents that follow.

| Key Issue(s) |
|---|
| Motor vehicle capacity improvements at US 101/SE Dolphin Avenue, US 101/US101 Business, Old Youngs Bay Bridge, 105 AA Connect/US101 Business, Fort Stevens Highway 104/US 101 Business, and Fort Stevens Highway 104/US 101 |
| Pedestrian and bicyclist safety along and across Highway 101, US 101 Business, Fort Stevens Highway 104, and 105 AA Connect. Construct sidewalks, bike lanes, and crosswalks throughout the City |
| Improve pedestrian and bicycle access on New Youngs Bay Bridge and Old Youngs Bay Bridge |
| Develop a truck circulation plan to limit number of trucks traveling through downtown |

# City/Local Plans, Policies, and Regulations

The following sections summarize local plans, policies, and regulations.

## City of Warrenton Comprehensive Plan – 2011

Article 8, Transportation, in the Warrenton Comprehensive Plan includes a summary of the last TSP update process and the objectives and content of the adopted TSP. The 2004 TSP and the 2009 TSP revision were adopted as addenda to the Comprehensive Plan and Article 8 clarifies that, where goals or policies within the Comprehensive Plan contradict or inconsistent with the TSP, the standards of the TSP prevail. Article 8 includes the following transportation goal:

*Encourage and help provide a safe, convenient, well-maintained and economic transportation system that recognizes the relationship of the system to other land uses and takes into account the value of various modes of transportation.*

Many of the transportation policies in the Comprehensive Plan refer to the standards and recommendations in the adopted TSP. Policies that directly reference the TSP include those related to street classification and design, parking, and financing. Policies under Section 8.350 address multi-modal transportation and, among other things, express specific community objectives related to the Astoria Regional Airport, boating and shipping activities, land development along the Skipanon Channel, pedestrian walkways, and the bicycle system.

The policies in the adopted Comprehensive Plan will inform the development of the TSP update project goals and objectives (Technical Memorandum #4). The Comprehensive Plan transportation policies will be updated to reflect current community objectives, expected transportation conditions, and the standards and recommendations of the updated TSP.

## City of Warrenton Transportation System Plan – 2004

The current City of Warrenton Transportation System Plan (TSP) was adopted in 2004. The plan discusses key transportation issues being faced by the city, establishes evaluation criteria to determine a preferred alternative, and identifies additional improvements needed. The plan assumed that the city would grow from its 2002 population of 4,280 residents to 5,741 residents by the year 2020. The goals of the TSP included the following:

- Develop a multimodal transportation system that serves the travel needs of residents, businesses, visitors, and freight transport
- Provide a transportation system that balances transportation system needs with the community's desire to maintain a pleasant, economically viable city.
- Maintain a TSP that is consistent with the goals and objectives of Warrenton, Clatsop County, and the State
- Work to improve cost-effective and safe public transportation through and within Warrenton
- Provide for an interconnected system of pedestrian and bicycle facilities in Warrenton to serve commuters and recreational users
- Provide a transportation system that serves the needs of all members of the community
- Provide a transportation system that balances transportation services with the need to protect the environment and significant natural features
- Work to ensure that development does not preclude the construction of identified future transportation improvements and that development mitigates the transportation impacts it generates when appropriate.
- Provide a transportation system that has sufficient capacity to serve the needs of all users
- Provide reasonable and effective funding mechanisms for City transportation improvements identified in the TSP
- Provide a transportation system that maintains adequate levels of safety for all users

### Key Issues

Some of the main issues raised in the previous TSP that are still outstanding or have only partially been addressed are listed below. The current TSP update will determine how to address these outstanding concerns:

- Traffic volume levels were expected to cause operations at nine intersections to not meet mobility standards by 2022: US 101/105 AA Connect, US 101/SE Neptune Ave, US 101/US 101 Business, Fort Stevens Highway 104/US 101 Business, US 101/Fort Stevens Highway 104/Perkins Lane, US 101 Business/105 AA Connect, US 101/OR-104 S (Fort StevensSpur), US 101/SE Dolphin Avenue, 105 AA Connect/SE Neptune Avenue. Several of these are unsignalized intersections that were considered likely to meet traffic signal warrants.
- Motor vehicle safety concerns due high crash rates or skewed geometry in growing areas, such as US 101/US 101 Business, Fort Stevens Highway 104/7th Ave (Hammond), US 101/SE Dolphin Avenue, US 101/OR-104S (Fort Stevens Highway Spur), DeLaura Beach Lane/Ridge Road
- Bicycle and pedestrian safety on the Old Youngs Bay and New Youngs Bay Bridges
- Pedestrian safety and accessibility along and across Highway 101, Fort Stevens Highway 104, US 101 Business, DeLaura Beach Lane, SW 9th Street, and SE Neptune Avenue

### Key Standards

- Access spacing guidelines in the Warrenton Development Code require minimum spacing of 25 feet on local streets, and follow ODOT guidelines for arterials and collectors
- Traffic signal spacing follows ODOT guidelines
- The City of Warrenton does not have an adopted mobility standard for intersections under City jurisdiction. The Warrenton Development Code states that facilities shall be managed to maintain adequate performance standards

### Recommended Improvements

Improvements were recommended to ensure acceptable future traffic operations through the 2022 planning horizon year. Note that the previous Warrenton TSP included an Astoria-Warrenton Parkway and Astoria Bypass project via Highway 105 and US 101 in Warrenton. The current TSP update will assume that the bypass will not be constructed within the planning horizon year of 2022 and will recommend improvements without the bypass. The current TSP update will, however, determine how to address other outstanding improvements recommended in the prior TSP, shown later in this document under the "Key Projects" section.

## Clatsop County Transportation System Plan

The Clatsop County Transportation System Plan (TSP) was adopted in 2003, and is currently being updated. The TSP is the County's long-range plan for developing and managing its transportation system and providing for the transportation needs outside of incorporated city boundaries. The 2003 plan discusses key transportation issues being faced by the county, establishes evaluation criteria to determine a preferred alternative, and identifies additional improvements needed.

The TSP included the following goals:

- Mobility
- Livability
- Coordination
- Pedestrian and Bicycle Facilities
- Environment
- System Preservation
- Capacity
- Transportation Funding

Clatsop County facilities located in the City of Warrenton include the following:

- Ridge Road (between Pacific Drive and US 101)
- Lake Drive
- DeLaura Beach Lane
- Whiskey Road
- Ensign Lane (between US 101 and Business 101)
- SE 19th Street
- SE Airport Lane

Clatsop County uses the ODOT mobility target for district/local interest roads under county jurisdiction. The mobility targets require operation with a v/c of 0.75 or better on rural lands outside of Urban Growth Boundaries, 0.80 or better in unincorporated communities outside of Urban Growth Boundaries, 0.95 or better along streets with posted speeds less than 35 mph inside Urban Growth Boundaries, or 0.90 or better along streets with posted speeds greater than 35 mph inside Urban Growth Boundaries.

When the new Clatsop County Transportation System Plan is adopted, the mobility targets will be updated. The following standards would be evaluated for the highest one-hour period on an average weekday (typically, but not always, the evening peak period between 4 p.m. and 6 p.m. during the spring or fall). For signalized, all-way stop, or roundabout controlled intersections, the intersection should meet Level of Service (LOS) "E" or better and a volume to capacity (v/c) ratio not higher than 0.85. For two-way stop or yield controlled intersections, all movements serving more than 20 vehicles should meet LOS "E" or better and a v/c ratio not higher than 0.90. LOS "F" is acceptable at movements serving no more than 20 vehicles during the peak hour.

### Recommended Improvements

The current Warrenton TSP update will determine how to address the recommended Clatsop County improvements, shown later in this document under the "Key Projects" section.

## Hammond Marina Master Plan Update – 2005

The Hammond Marina Master Plan update provides a current plan for improvement of the Hammond Marina, located at the northwest corner of the City of Warrenton. It covers land use and proposed a circulation and parking plan surrounding the existing marina, as well as a plan to realign the channel for optimum use of the basin. The original Hammond Marina Master Plan, completed in 1991, also proposed a circulation and parking plan. If the recommended full development of the Hammond Marina Master Plan is completed, Lake Drive to Seafarer's Park would have a 241 stall parking lot located on the east side of the road, and a 30,000 square foot multi-purpose building on the west side of the road with a smaller 105 stall parking lot located on the southwest side of Lake Drive. The current TSP update will determine how to address the recommendations from the plan, shown later in this document under the "Key Projects" list.

## Downtown and Marina Master Plans – 2010

The Warrenton Downtown and Marina Master Plans document contains goals developed for downtown Warrenton and the adjacent Warrenton marina, including design guidelines for both districts. The five key ideas for improving the downtown area are to: focus on the natural setting; connect to the waterfront, improve bicycle and pedestrian circulation, create a green downtown, and have the city lead by example. The major elements of the Downtown Master Plan contain proposed streetscape and intersection improvements for key roadways (US 101 Business and Fort Stevens Highway 104), strategies to strengthen the street grid, and zoning code adjustments to encourage redevelopment. The Downtown Plan includes short-, mid-, and long-term action plan items and cost estimates. Parks and open spaces, including a public plaza and improvements to Skipanon Park, are incorporated into the master plan. The Marina Master Plan includes a considerable amount of redevelopment of upland areas associated with the Marina and proposes parking, street, and access improvements. The document acknowledges that a traffic study will likely be required to evaluate traffic generation by the proposed changes in the plan and that ODOT will need to be consulted regarding existing and proposed approaches to the highway. The current TSP update will determine how to address the recommendations from the plan, shown later in this document under the "Key Projects" list.

## Warrenton Parks Master Plan – 2010

The Warrenton Parks Master Plan includes a long-term vision for the Warrenton Parks System and is intended to guide development of the city parks system from 2011 until 2030. The plan provides an existing inventory, identifies current and future park needs, includes a capital improvement plan, creates a strategy for short and long-term land acquisition, and identifies potential funding techniques and sources. The plan recommends that Skipanon River Park, located downtown, construct parking, access, and circulation improvements and that Tansy Point construct parking improvements and build a trail connection between Tansy Point and Carruthers Park.

## Warrenton Trails Master Plan – 2008

The Warrenton Trails Master Plan was developed in order to plan a network of trails that links destinations, natural features, historic landmarks, community facilities, other transportation facilities, neighborhoods, businesses, regional trails, adjacent communities, and state and federal parks. The overall goals of the Warrenton Trails Master Plan are to provide connections for residents to recreate, increase access to the trail system, and encourage trail use around schools.

The plan includes several new trail connections. These include Beaver Trail, which will run along Iredale Street and former logging roads between the Hammond Post Office and 11$^{th}$ Street, bringing trail access to the Warrenton Soccer Fields. Creekside Trail will bridge King Street and 105 AA Connect to 14$^{th}$, and will connect the Eastern Skipanon River Trail Spur at Fort Stevens Highway 104 along Ensign Lane and across US 101.

## Warrenton Urban Renewal District Plan - 2007

The Warrenton Urban Renewal District Plan outlines infrastructure upgrades for the improvement and redevelopment of Warrenton. The main goal of this plan is to improve economic health and appearance of the area by providing for more attractive shopping, dining, living, working, and recreating.

The plan outlines goals for developing the downtown area through bike and pedestrian trails with portals and trailheads, focusing on connectivity. The plan states that during the second phase of the Warrenton Urban Renewal District Plan, $25,000 is to be used for tourist and bicycle directional signage. For the third phase, it provides $200,000 for restrooms and $50,000 for additional trailheads and directional/interpretive signage.

## Greater Astoria – Warrenton Area Regional Transportation System Refinement Plan – 2007

The Greater Astoria-Warrenton Area Regional Transportation System Refinement Plan identifies future regional transportation needs in the City of Astoria, the City of Warrenton, and western Clatsop County and recommends a set of improvements to meet those needs over the short (0-10 years), medium (10-20 years), and long term (20+ years). The current TSP update will determine how to address the recommendations from the plan, shown later in this document under the "Key Projects" section.

## Sunset Empire Transit District Long Range Transportation Plan

The Sunset Empire Transit District (SETD) is currently developing a long range transportation plan. Several goals include increasing ridership, decreasing headways, adding bus pullouts on US 101, adding bus shelters and kiosks, and improving inter-city connetions to Columbia County, Kelso/Longview, and Portland.

## City of Warrenton Development Code

Warrenton's Development Code, Title 16 of the City's Municipal Code, implements the Comprehensive Plan by providing descriptions of land use designations, allowable uses within those districts, and development regulations. In addition to residential, commercial, and industrial districts, the City has water-dependent and aquatic development zones, as well as a number of overlay zones focused on the protection of the Astoria Regional Airport airspace and natural resource areas (floodplain, beaches and dunes, compressible soils, etc.). The Zoning Map shows the location of land use designations and helps direct the type, location, and density of land uses in the city.

The code chapters and sections below are relevant to the development of transportation facilities and system development in Warrenton.

**16.12.010 Definitions.** The Development Code has defined a number of transportation-related terms, including Level of Service, Pathway/Walkway/Access Way, and Transportation Mode. Transportation Facilities are described as the "physical improvements used to move people and goods from one place to another (e.g., streets, sidewalks, pathways, bike lanes, airports, transit stations and bus stops, etc.)."

**16.20.040 Review of Transportation Facilities and Improvements for Compliance with Land Use Regulations.** This section establishes that transportation facilities and improvements meeting one or more of the definitions for transportation facilities and improvements in Chapter 16.12 are permitted outright in most of the City's land use districts.

**Chapter 16.120 Access and Circulation** includes sections for both vehicular and pedestrian circulation. Vehicular Access and Circulation requires permits for access to public streets and provides options for meeting access spacing requirements. Additional requirements cover shared driveways, connectivity and block formation, vision clearance fire access and circulation, and other topics relating to vehicular access. All developments, except single-family detached housing, duplexes, or triplexes on individual lots, must provide a continuous pedestrian and/or multi-use pathway system, the standards for which are found in Section 16.120.030.

**Chapter 16.128 Vehicle and Bicycle Parking** includes the City's parking standards. Providing bicycle parking is required for all uses with more than 10 vehicle parking spaces; multi-family uses with four or more dwelling units must provide at least one sheltered bicycle parking space for each dwelling unit.

**16.136.020 Transportation Standards** includes the City's minimum street rights-of-way and required improvements by street type (see Table 1 below and Table 16.136.010 in the Development Code).

## Table 1

## City of Warrenton Street Design Standards

| Type of Street | Average Daily Trips (ADT) | Right-of-Way Width | Curb-to-Curb Pavement Width | Motor Vehicle Travel Lanes[4] | Median/Flex Lane[5] | Bike Lanes or On-Street Parking (both sides) | Curb | Planting Strip[5] | Sidewalks |
|---|---|---|---|---|---|---|---|---|---|
| *Arterial Roads* | | | | | | | | | |
| **4-Lane Arterial** | Varies | 80 - 102 ft. | 64 - 78 ft. | 12 ft.[4] | 14 ft. | 8 ft. | Yes | 6 ft. | 6 ft. |
| **2-Lane Arterial** | Varies | 80 ft. | 40 - 54 ft. | 12 ft.[4] | 14 ft. | 8 ft. | Yes | 6 ft. | 6 ft. |
| *Collector Roads* | | | | | | | | | |
| **Collector Road** | Varies | 60 - 64 ft. | 36 - 40 ft. | 12 ft.[4] | None | 6-8 ft. | Yes | 6 ft. | 6 ft. |
| *Local Roads* | | | | | | | | | |
| **Local Road** | Varies | 50 - 60 ft. | 28 - 36 ft. | 10-12 ft. | None | 8 ft. parking (on one or both sides[1]) | Yes (on one or both sides) | 5 ft. | 5 ft.[3] |
| **Alternative Local Road[2]** | < 250 | 50 ft. | 20 - 28 ft. (no curbs required) | 10 ft. | None | None [1] | None | 5 ft. | None |
| **Alleys** | N/A | 12 - 24 ft. | 12 - 24 ft. | N/A | N/A | None | None | None | None |
| **Multi-Use Paths** | N/A | 8 - 16 ft. | 8 - 16 ft. | N/A | N/A | None | None | None | None |

1 Bike lanes are generally not needed on low volume (less than 3,000 ADT) and/or low travel speed (less than 35 mph) roads.

2 The alternative local road standard may be used when approved by the City of Warrenton. The standard is intended to apply under the following circumstances:
- The local road will serve 18 or fewer dwelling units upon buildout of adjacent property.
- The ADT volume of the road is less than 250 vehicles per day.
- Significant topographical or environmental constraints are present.
- Use of the alternative local road standard will not create gaps in connectivity or roadway standards with adjacent roadway sections (i.e. sidewalk, parking, travel lane widths).
- The City-appointed engineer and Emergency Service Providers have reviewed and accepted usage of the alternative local roadway standard.

3 Sidewalks are required on all local roads in high-density residential and commercial zones unless exempted by the City-appointed engineer or Planning Commission.

4 Where parking is constructed next to a travel lane, the travel lane shall be increased to a width of 14 feet to function as a shared roadway and accommodate bicycles.

5 Footnote indicates that these features are optional. Flex lanes would provide for traffic flow in one direction or another depending upon the specific traffic patterns and demands for an area. Flex lanes could be used for transit routes or emergencies, and would provide extra right-of-way width for future rail or transit. Appropriate safety measures would need to be installed in conjunction with flex lanes.

This code section also refers to TSP Figures 5-3, 5-4, and 5-5 for local, collector and arterial roads cross sections. Requirements include submitting a street plan for future extensions as part of a subdivision application, local street spacing, and limitations on cul-de-sacs and dead-end streets.

As part of the TSP update the street functional classifications and cross-section standards will be reviewed and potentially revised to ensure that they meet community needs. Where modifications are proposed, the Development Code standards will need to be updated for consistency with the updated TSP. In addition, the Development Code contains a number of other transportation-related development requirements (e.g., Traffic Impact Study (TIS) requirements in Chapter 16.256). Amendments to the City's development requirements may be needed in order to implement the recommendations of the updated TSP and to better comply with the State's Transportation Planning Rule (see Technical Memorandum #3, Regulatory Review).

## City of Warrenton Capital Improvement Plan

The City of Warrenton has a Capital Improvement Plan (CIP) that outlines specific projects that will be funded through 2021.

2015-16 Fiscal Year Projects:

- DeLaura Beach: $120,000 to build a multi-use trail along SW DeLaura Beach between Ridge Road and Fort Stevens State Park
- Hammond Post Office: $100,000 to install sidewalk and crosswalk improvements by the Hammond Post Office
- NW Cedar Court Improvement Project: $137,000 to rebuild NW Cedar Court south of Warrenton Drive and upgrade water and sewer mains
- Chokeberry Avenue: $90,000 to improve access right-of-way between SE 19th Street and Food Bank
- NW 13th Street and Warrenton Drive Trail Improvements: $141,000 to provide a multi-use trail along NW 13th Street between Warrenton Drive and the Riverfront Trail
- SW 3rd Street Improvement Project: $87,000 to improve roadway and drainage on SW 3rd Street between SW Main Ct and Fort Stevens Highway 104
- N Main/NW 7th Place Improvements: $391,600 to upgrade the water system and repair and rebuild N Main St and NE 7th St
- $550,650 in unallocated SDC revenue funded improvements

2016-17

- 105 AA Connect (East Harbor Street) sidewalks: $100,000 to install sidewalk improvements along ODOT rights of way, including 105 AA Connect (East Harbor Drive) to connect downtown Warrenton to US 101
- SE 2nd Street: $325,000 to rebuild SE 2nd Street east of US 101 Business to the old CostCo site
- SW 4th Street: $118,000 to improve SW 4th Street between Fort Stevens Highway 104 and SW Alder Court
- NE Skipanon Improvement Project: $143,000 to improve NE Skipanon Drive north of Fort Stevens Highway 104
- 4th Avenue Improvement Project: $195,000 to rebuild Fourth Avenue between Lake and Jetty
- SW 2nd Street: $48,000 to construct new roadway for SW 2nd Street between Elm and Gardenia

2017-18

- Quick Fix Funds: $100,000 to install sidewalk improvements along ODOT rights of way
- SW 2nd St: $267,000 to construct new roadway for SW 2nd Street between Elm and Gardenia
- SE Anchor Storm Improvements: $354,000 to install new storm drain on SE Anchor south of 1st St, waterlines on Anchor Ave/3rd Street, and rebuild roadway
- SW Alder Ave Reconstruction Project: $185,000 to rebuild SW Alder Ave with curbs from 1st St to 2nd St and grind and overlay from 2nd St to 3rd St

2018-19

- Quick Fix Funds: $100,000 to install sidewalk improvements along ODOT rights of way
- SE Main Court Reconstruction Project: $107,000 to rebuild SE Main Court between SE 9th St and SE 11th St

2019-20

- Quick Fix Funds: $100,000 to install sidewalk improvements along ODOT rights of way
- SE 2nd St Improvement Project: $281,000 to rebuild SE 2nd St between Fort Stevens Highway 104 and SE Anchor
- Fort Stevens Highway 104 and SW 14th Place sidewalks: $24,000 to provide sidewalks onFort Stevens Highway 104 and SW 14th Place

2020-21

- Quick Fix Funds: $100,000 to install sidewalk improvements along ODOT rights of way

## City transportation projects constructed since 2004

Major transportation projects constructed in the City since 2004 include the following:

- Ensign Lane Improvements. This project included installing a traffic signal at US 101/SE Ensign Lane and constructing a new roadway between OR-104S (Fort Stevens Spur) and US 101 Business
- US 101 Business Improvements: This project included realigning the US 101/US 101 Business intersection and installing a traffic signal
- New Neighborhood Construction: Roads were built for new residential construction: Salal Loop, SE Willow Drive, SE Azalea Ave, SE Huckleberry Ave, and the SW Juniper Ave/SW Gardenia Ave area

## Transportation Funding

The City of Warrenton currently has the following transportation funding mechanisms:

| Funding Sources (Past 5 Years) | | | | | |
|---|---|---|---|---|---|
| | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 |
| **State Tax Street Funds** | $1,499,595 | $1,510,465 | $1,719,455 | $2,013,543 | $1,741,391 |
| **Streets SDC Fund** | N/A | $126,985 | $167,559 | $71,698 | $550,650 |

The State Tax Street Funds are provided by the Oregon Department of Transportation, the State Highway Trust Fund, and the City 0.03 cent fuel tax. One percent of all gas tax receipts are set aside for bicycle lanes and pedestrian paths. The City fuel tax will net approximately $288,000 in fiscal year 2015-16. The City fuel tax is used to pay for rebuilding and overlaying city streets, with the remaining balance going towards street maintenance, street repair, and street lighting.

The Streets SDC Fund may be used for transportation improvements "including but not limited to streets, sidewalks, bike paths, street lights, trees, mass public transportation, vehicle parking, and bridges."[1]
The proposed expenditures for 2015-16 include the following:

- Personnel Services - $75,643
- Materials and Services - $374,033
- Capital Outlay - $1,488,976
- Contingency - $89,535

The total expected funding for 2015-16 is $2,292,041 and the total expected expenditures are $2,026,187, leaving an expected balance of $265,854.

[1] City of Warrenton. *Draft Report for System Development Charges.* Prepared by FCS Group. December, 2011.

# State Plans, Policies, and Regulations

The following sections summarize state plans, policies, and regulations.

## Oregon Transportation System Plan Guidelines

ODOT's Transportation System Plan Guidelines is comprised of four chapters: an overview of transportation system planning (Chapter 1); guidance for the preparation of a jurisdiction's first TSP and of TSP updates (Chapters 2 and 3); and policy guidance on transportation and land use issues in a series of technical appendices (Chapter 4). The 2008 Guidelines differ from the 2001 Guidelines in that they focus more on TSP updates, make stronger connections between local transportation needs and the availability of transportation funding, and provide more guidance related to mobility standards, the OTP, and project financing in the technical appendices, in addition to new electronic links throughout the document for easy access to additional resources.

The chapter on TSP updates is divided into three steps: determining if an update is needed and scoping the update project; preparing an assessment; and addressing recent regulatory and policy changes, the latter two of which are most applicable to the Warrenton TSP update.

The TSP Guidelines direct TSP updates to address recent policy and regulatory changes, and calls out recent changes to the Oregon Transportation Plan (OTP), The Oregon Highway Plan (OHP), and the Transportation Planning Rule (TPR). Since adoption of the 2004 Warrenton TSP, the OTP was updated (2006) to emphasize maintaining assets in place, optimizing existing system performance through technology and better system integration, creating sustainable funding, and investing in strategic capacity enhancements. Policy 1F (Mobility Standards) of the OHP was amended to allow for the adoption of alternative mobility standards where "practical difficulties make conformance with the highway mobility standards infeasible," as was Appendix C (Access Management Spacing Standards) to be consistent with amendments to the Access Management Rule, OAR 734-051. Amendments to the TPR are described in the section of this memorandum that reviews the TPR.

## Oregon Transportation Plan

An update of the Oregon Transportation Plan (OTP) was adopted by the Oregon Transportation Commission (OTC) in 2006. The OTP is a comprehensive plan that addresses the future transportation needs of the State of Oregon through the year 2030. It considers all modes of transportation, including airports, bicycle and pedestrian facilities, highways and roadways, pipelines, ports and waterway facilities, public transportation, and railroads.

The following seven goals with associated policies and strategies are provided in the plan to address the core challenges and opportunities facing transportation in Oregon:

- Goal 1 – Mobility and Accessibility
- Goal 2 – Management of the System
- Goal 3 – Economic Vitality
- Goal 4 – Sustainability
- Goal 5 – Safety and Security
- Goal 6 – Funding the Transportation System
- Goal 7 – Coordination, Communication and Cooperation.

There are also six key initiatives identified to reflect the desired direction of the plan and to frame the plan implementation. These initiatives are:

1. Maintain the existing transportation system to maximize the value of the assets. If funds are not available to maintain the system, develop a triage method for investing available funds.
2. Optimize system capacity and safety through information technology and other methods.
3. Integrate transportation, land use, economic development and the environment.
4. Integrate the transportation system across jurisdictions, ownerships and modes.
5. Create a sustainable funding plan for Oregon transportation.
6. Invest strategically in capacity enhancements.

The TSP update will be developed to be consistent with the goals and policies of the OTP. It will emphasize, as the updated OTP has, maintaining and building upon existing investments and using system management, technology, and transportation options to maximize the existing state highway system in the city.

## Oregon Highway Plan

The Oregon Highway Plan (OHP) was originally adopted in 1999 and was reaffirmed as a modal element of the 2006 Oregon Transportation Plan (OTP). The OHP defines policies and investment strategies for Oregon's state highway system. The plan contains three elements: <u>a vision element</u> that describes the broad goal for how the highway system should look in 20 years; <u>a policy element</u> that contains goals, policies, and actions to be followed by state, regional, and local jurisdictions; and <u>a system element</u> that includes an analysis of needs, revenues, and performance measures.

The OHP addresses the following issues:

- Efficient management of the system to increase safety, preserve the system, and extend its capacity
- Increased partnerships, particularly with regional and local governments
- Links between land use and transportation
- Access management
- Links with other transportation modes
- Environmental and scenic resources

The policy element contains several policies and actions that are particularly relevant to the Warrenton TSP, described in the following subsections.

### Policy 1A (State Highway Classification System)

Action 1A.1 categorizes state highways for planning and management decisions. US 101 (No. 9) in Warrenton is classified as a Statewide Highway, part of the National Highway System (NHS), a Truck Route, and a Scenic Byway. US 101 Business (No. 105), Fort Stevens Highway 104, and OR-104S (Fort Stevens Spur) are classified as District Highways with no other designations.

According to OHP policy, statewide highways are intended to provide inter-urban and inter-regional mobility and connections to larger urban areas, ports and major recreational areas not directly served by Interstate highways. District highways are intended to provide connections between small urbanized areas, rural centers, and also serve local access. Updates to the TSP will support the existing highway classifications and will enhance the ability of the highways in Warrenton to serve in their defined functions.

### Policy 1B (Land Use and Transportation)

Policy 1B, recognizes the need for coordination between state and local jurisdictions. Action 1B.7 gives special highway segment designations for specific types of land use patterns to foster compact development. The three segment designations available are Special Transportation Area, Commercial Center, and Urban Business Area.

### Policy 1C (State Highway Freight System)

Policy 1C addresses the need to balance the movement of goods and services with other uses. In addition, Action 1C.4 states that the timeliness of freight movements should be considered when developing and implementing plans and projects on freight routes. There are currently no freight routes through Warrenton.

### Policy 1F (Highway Mobility Standards)

Policy 1F sets mobility standards for ensuring a reliable and acceptable level of mobility on the highway system. Pursuant to Policy 1F, Table 6:

- Statewide highways inside Urban Growth Boundaries (UGBs) in non-MPO areas that are freight routes but do not have special OHP land use designations (US 101 in Warrenton) have a mobility standard requiring that the highway operate at or below a volume to capacity (v/c) ratio of 0.80
- Statewide highways inside UGBs in non-MPO areas that are not freight routes or do not have special OHP land use designations have a mobility standard requiring that the highway operate at or below a volume to capacity (v/c) ratio of 0.80-0.90 depending on the posted speed
- District highways inside UGBs in non-MPO areas that are not freight routes or do not have special OHP land use designations (US 101 Business, Fort Stevens Highway 104, OR-104S (Fort Stevens Spur) in Warrenton) have a mobility standard requiring that the highway operate at or below a volume to capacity (v/c) ratio of 0.85-0.90 depending on the posted speed
- Unsignalized side street approaches to state highways are required to meet the district highway standards

### Policy 1G (Major Improvements)

Policy 1G requires maintaining performance and improving safety by improving efficiency and management before adding capacity. The intent of policy 1G and Action 1G.2 is to ensure that major improvement projects to state highway facilities have been through a planning process that involves coordination between state, regional, and local stakeholders and the public, and that there is substantial support for the proposed improvement.

### Policy 2B (Off–System Improvements)

Policy 2B establishes ODOT's interest in improvements on local roads that maintain or improve safety and mobility performance on state roadways, and supports local jurisdictions in adopting land use and access management policies. The TSP will include sections describing existing and future land use patterns, access management, and implementation measures.

### Policy 2D (Public Involvement)

Public involvement in transportation  planning and project development will be a critical part of the TSP process.

### Policy 2F (Traffic Safety)

Policy 2F identifies the need for projects in the state to improve safety for all users of the state highway system through engineering, education, enforcement, and emergency services. One component of the TSP is to identify existing crash patterns and rates and to develop strategies to address safety issues.  Proposed improvements will aim to reduce the vehicle crash potential and/or improve bicycle and pedestrian safety by providing upgraded facilities that meet current standards.

### Policy 3A (Classification and Spacing Standards)

Policy 3A sets access spacing standards for driveways and approaches to the state highway system.  The TSP will address local access management policies and standards for inclusion in the Warrenton Development Code and will identify recommended traffic signal spacing guidelines.

### Policy 4B, Action 4B.4 (Alternative Passenger Modes)

Action 4B.4 requires that highway projects encourage the use of alternative passenger modes to reduce local trips. The TSP will develop ways to support and increase the use of alternative passenger modes to reduce trips on highways and other facilities.  This will include improvement to bicycle and pedestrian facilities and consideration of transit movement along roadways.

## Oregon Bicycle and Pedestrian Plan

The provision of safe and accessible bicycling and walking facilities in an effort to encourage increased levels of bicycling and walking is the goal of the Oregon Bicycle and Pedestrian Plan, which is an element of the Oregon Transportation Plan (OTP). The plan identifies actions that will assist local jurisdictions in understanding the principles and policies that ODOT follows in providing bikeways and walkways along state highways. In order to achieve the plan’s objectives, the strategies for system design are outlined, including:

- Providing bikeway and walkway systems and integrating with other transportation systems
- Providing a safe and accessible biking and walking environment
- Developing educational programs that improve bicycle and pedestrian safety

The plan is currently comprised of two parts: the Policy and Action Plan and the Oregon Bicycle and Pedestrian Design Guide. The Policy and Action section contains background information, legal mandates and current conditions, goals, actions and implementation strategies ODOT proposes to improve bicycle and pedestrian transportation.  Originally adopted in 1995 and reaffirmed as an element of the OTP in 2006, this section is currently being updated as the “Bicycle and Pedestrian Mode Plan.” The Design Guide is the technical element of the plan that guides the design and management of bicycle and pedestrian facilities on state-owned facilities. It has been designated as a companion piece to the Highway Design Manual and includes updated and innovative pedestrian and bicycle treatments. The Design Guide was updated in 2011 and will remain separate from the policy portion of the plan .

## Oregon Public Transportation Plan

The Oregon Public Transportation Plan (OPTP) constitutes the transit modal plan of the Oregon Transportation Plan. The plan contains goals, policies, and strategies relating to the statewide public transportation system. The plan is intended to provide guidance for ODOT and public transportation agencies regarding the development of public transportation systems. The vision guiding the Public Transportation Plan is as follows:

- A comprehensive, interconnected and dependable public transportation system, with stable funding, that provides access and mobility in and between communities of Oregon in a convenient, reliable, and safe manner that encourages people to ride
- A public transportation system that provides appropriate service in each area of the state, including service in urban areas that is an attractive alternative to the single-occupant vehicle, and high-quality, dependable service in suburban, rural, and frontier (remote) areas
- A system that enables those who do not drive to meet their daily needs
- A public transportation system that plays a critical role in improving the livability and economic prosperity for Oregonians.

The OPTP Implementation Plan directs ODOT investments towards commuter and mobility needs in larger communities and urban areas and also in smaller communities where warranted. It also directs investments towards intercity connections statewide. Long-term implementation and funding will support both modernization and preservation projects while, in the short term, funding will likely be available for preservation projects.

An assessment of existing transit conditions in Warrenton and, potentially, proposed improvements will be included in the TSP update process, and will be guided by the vision and implementation plan set forth in the Oregon Public Transportation Plan.

## Oregon Rail Plan

The Oregon Rail Plan, another modal plan within the OTP, addresses long-term freight and passenger rail planning in Oregon. The plan includes a freight element and passenger element that describes infrastructure and service conditions historically and at the time the plan was prepared. In terms of freight rail, a branch line once provided freight rail service from Astoria to Seaside; however, this line has been abandoned. In terms of passenger rail, Amtrak does not provide service to Warrenton, but there is established intercity bus service between Warrenton and other cities in Northwest Oregon.

The Oregon Rail Plan also includes a chapter on rail policies and planning. General policy is set for passenger rail: “This system shall consist of an efficient operation, reliable service, access to all potential users, and compliance with state environmental and land use standards. Convenient connections with other modes should integrate passenger train service into a network linking all areas of the state, nation, and the world.” Policies for freight rail include the following

- Increase economic opportunities for the State by having a viable and competitive rail system.
- Strengthen the retention of local rail service where feasible.
- Protect abandoned rights-of-way for alternative or future use.

- Integrate rail freight considerations into the State's land use planning process.

Since there are already several rails-to-trails in Warrenton with plans for expansion, the policy regarding protecting abandoned rights-of-way for alternative use will be important in updating the Warrenton TSP.

## Transportation Planning Rule (OAR 660.012)

The Transportation Planning Rule (TPR) implements Oregon Statewide Planning Goal 12, which supports transportation facilities and systems that are safe, efficient, and cost-effective and are designed to reduce reliance on single-occupancy vehicles. The objective of the TPR is to reduce air pollution, congestion, and other livability problems, and to maximize investments made in the transportation system. The following subsections of the TPR are relevant to the Warrenton TSP update.

### 660-012-0020 – Elements of Transportation System Plans

Section 0020 of the TPR specifies what is required in a TSP, including an inventory and assessment of existing conditions; forecasts of transportation needs; a road system plan; a public transportation plan; a bicycle and pedestrian plan; air, rail, water, and pipeline plans as applicable; transportation system and demand management plans; a financing program; and implementing policies and land use regulations.

### 660-012-0035 – Evaluation and Selection of Transportation System Alternatives

Section 0035 describes standards and alternatives available to agencies evaluating and selecting transportation projects, including benefits to different modes, land use alternatives, and environmental and economic impacts.

### 660-012-0045 – Implementation of the Transportation System Plan

The TPR requires local governments to adopt land use regulations consistent with state and federal requirements "to protect transportation facilities, corridors and sites for their identified functions." This is achieved through a variety of measures, including locally adopting access control measures, standards to protect future operations of roads, expanded notice requirements and coordinated review procedures for land use applications, processes to apply conditions of approval to development proposals, and regulations ensuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP.

### 660-012-0050 – Transportation Project Development

Section 0050 requires that transportation projects be reviewed for compliance with local and regional plans and, when applicable, undergo a NEPA environmental review process. Amendments to Section 0050 made since adoption of the 2004 Warrenton TSP protect determinations of need, mode, function and general location for projects identified in TSPs.

### 660-012-0060 – Plan and Land Use Regulation Amendments

Amendments made to Section 0060 in 2005 are among the most significant changes that have been made to the TPR since adoption of the City's TSP in 2004. The amendments require local jurisdictions to balance the need for development with the need for transportation improvements, establish the end of the planning period as the measure for determining "significant effect", define the transportation improvements that a local government can consider in determining significant effect, and identify methods for local jurisdictions in determining whether a needed transportation facility is reasonably likely to be provided within the planning horizon.

## US 101 Condition Report – 2005

The US 101 Conditions Report provides physical and traffic operational information about the US 101 corridor, including the portion through Warrenton, in graphical format. It covers material such as land use, traffic operations, facility inventory, safety, approach inventory, and geometrics data of the highway by mile-point. The report also provides a video log by mile-point for the north and southbound directions of the highway. The data from this plan will be considered in compiling existing conditions information for this TSP update.

## State Transportation Improvement Program

There is currently one project in Warrenton on 2015-2018 Oregon State Transportation Improvement Program funding list. The US 101: New Youngs Bay Bridge Repair project consists of applying a deck overlay and cathodic protection, which will cost approximately $12.5 million and is scheduled for construction in 2018.

# Key Projects

The following sections summarize key projects recommended from the prior plans and studies.

## City of Warrenton Transportation System Plan

**Motor Vehicle Improvements**

- Intersection improvements at US 101, Fort Stevens Highway 104, and Perkins Lane (Cost: $10,000)
- 105 AA Connect/SE Neptune Ave – Signalize intersection (Cost: $300,000)
- Fort Stevens Highway 104 and US 101 Business – Signalize intersection, reconfigure geometry, and improve pedestrian crossings (Cost:$1,000,000)
- Delaura Beach Lane – Upgrade roadway width with shoulders (Cost: $775,000)
- Realign US 101 Business and SE 12th Place/Airport (Cost: $500,000)
- DeLaura Beach Lane/Ridge Road – Improve intersection geometry (Cost: $500,000)
- Extend SW 2nd St to connect with SW Juniper Ave (Cost: $685,000)
- Construct curb, sidewalk, and new local roadway along SE 7th St from Fort Stevens Highway 104 to US 101 Business (Cost: $3,530,000)
- Connect Juniper Ave with Ridge Road (Cost: $550,000)
- Fort Stevens Highway 104 and SE 5th Street – Improve intersection geometry (Cost: $200,000)
- Realign US 101/Fort Stevens Highway 104 (Cost: $1,000,000)
- Improve intersection geometry at US 101/SE Dolphin Ave (Cost: $400,000)
- Improve intersection geometry at Fort Stevens Highway 104 and 7th Ave (Cost: $250,000)
- Add turn lanes at 105 AA Connect/US 101 Business and signalize intersection (Cost: $550,000)
- Add turn lanes to US 101 Business at US 101 (Cost: $300,000)

**Pedestrian and Bicycle Improvements**

- 105 AA Connect from US 101 to Marlin Dr – add bike lanes and sidewalks (Cost: $490,000)

- Connect Hammond to Fort Stevens State Park with bike path (Cost: $205,000)
- Stripe 6' bike lanes on both sides of Hwy 104 Spur (Cost: $25,000)
- US 101 Business – Construct sidewalk and bike lane on both sides of US 101 Business (Cost: $460,000)
- SW 9th St – Upgrade width, add bike lanes and sidewalks (Cost: $1,700,000)
- Construct sidewalks on NW Warrenton Drive from NW 14th St to NW 1st St (cost not estimated)
- Construct sidewlks on east side of Ridge Road from SW 9th St to soccer fields (cost not estimated)
- SE Neptune Ave from 105 AA Connect to US 101 – add curb and sidewalk on both sides (Cost: $670,000)
- SE Neptune Drive – add sidewalks and bike lanes on both sides (Cost: $280,000)
- Fort Stevens Highway 104 – Install curb and sidewalks both sides from MP 0.1 to 1.17, 3.28 to 3.4, and 4.73 to 4.82 (Cost: $1,400,000)
- US 101 Business – Install curb and sidewalks on both sides from MP 0 to 0.87 (Cost: $950,000)
- Construct curb and sidewalks on both sides of OR-104S (Fort Stevens Spur) (Cost: $920,000)
- Pave top of dike from Fort Stevens Highway 104/US 101 Business to Hammond (Cost: $325,000)

**Transit, Sea, and Air Improvements**

- Install shelters and kiosks on US 101 north and south of the New Youngs Bay Bridge (Cost: $20,000)
- ADA compliance at transit stops
- Improve service between Cannon Beach and Astoria and Astoria and Warrenton
- Provide covered shelters, signage, bus pullouts
- Improve efficiency of dial-a-ride

## Clatsop County Transportation System Plan

### Recommended Improvements

The current Warrenton TSP update will determine how to address the recommended Clatsop County improvements listed below:

- Warrenton-Miles Crossing Off-Highway Shared Use Path Study (Cost: $150,000)
- US 101 New Youngs Bay Bridge – pedestrian and bicycle improvements (Cost: $1,000,000)
- US 101/Fort Steven Highway 104 – install advance warning signing on US 101 (Cost: $75,000)
- US 101/Fort Steven Highway 104 – add eastbound right turn lane (Cost: $450,000)
- Add bicycle route designation signage on Hwy 105 (Cost: $10,000)
- Add shoulders to DeLaura Beach Lane (Cost: $775,000)
- Intersection improvements at US 101, Fort Stevens Hwy 104, and Perkins Lane (Cost: $10,000)
- Install shelters and kiosks on US 101 north and south of the New Youngs Bay Bridge (Cost: $20,000)
- Add parking at Warrenton Mooring Basin

## Greater Astoria – Warrenton Area Regional Transportation System Refinement Plan

### Recommended Improvements

The current Warrenton TSP update will determine how to address the recommended improvements listed below:

- Install traffic signal at Fort Stevens Highway 104/US 101 Business and Fort Stevens Highway 104/Skipanon Drive and add turn pockets
- 105 AA Connect/Neptune – modify intersection to be right-in/right-out by installing a raised island
- Install traffic signal or roundabout at 105 AA Connect/US 101 Business
- US 101 Business between 105 AA Connect and US 101 – add shoulders, bike lanes, and sidewalks
- Eliminate southbound left turns at US 101/OR-104S (Fort Stevens Spur)
- Modify US 101/Perkins Road intersection to improve mobility and safety
- Construct new roadway in North Coast Business Park area
- Realign Dolphin Road to connect with the new US 101 Bus alignment and eliminate Dolphin Rd/US 101 intersection
- Replace the New Youngs Bay Bridge with a new 4 lane facility with bike and pedestrian facilities

## Hammond Marina Master Plan Update - 2005

### Recommended Improvements

The current Warrenton TSP update will determine how to address the recommended improvements listed below:

- Construct parking lot to accommodate 160 cars and up to 200 cars in the future
- Install planted barrier between through lane and stacking lane for boat trailers on Lake Drive
- Install signage in Warrenton directing users to the site

## Warrenton Downtown and Marina Master Plans - 2010

### Recommended Improvements

The current Warrenton TSP update will determine how to address the recommended improvements listed below:

- Improve Harbor Drive – add street trees, lighting, sidewalks, crosswalks, and bike lanes.
- Improve pedestrian facilities on Skipanon River Bridge
- Harbor Drive/S Main Ave Improvements – consider installing wider sidewalks, street trees, new lighting, new crosswalks, and curb extensions when improving this intersection
- Install wider sidewalks on S Main Ave, narrow the travel lanes and parking stalls. Consider adding curb extensions at crosswalks and street trees
- Strengthen street grid by extending existing streets to areas of future redevelopment
- Expand and enhance Skipanon Trail
- Plan truck routing to discourage trucks from driving through downtown

# SECTION 3
# TECH MEMO THREE
## REGULATORY REVIEW

# DRAFT TECHNICAL MEMORANDUM #3

**DATE:** October 14, 2015

**TO:** Warrenton TSP Project Management Team

**FROM:** Darci Rudzinski, Angelo Planning Group
Shayna Rehberg, Angelo Planning Group

**SUBJECT: Warrenton Transportation System Plan**
**Task 3.3, Technical Memorandum #3, Regulatory Review** – PAC REVIEW DRAFT

Pursuant to Task 3.3, the purpose of this memorandum is to discuss and identify City of Warrenton Comprehensive Plan and Development Code provisions that may need to be updated in order to be reflect and implement the updated TSP and to be consistent and comply with the Oregon Transportation Plan (OTP) and the Transportation Planning Rule (TPR). Information provided in this memorandum includes an overview of the relationship between the TSP update and these regulatory documents as well as a detailed TPR compliance audit (Table 1). Upon City review of the findings and recommendations in this memorandum, additional recommended changes to the Development Code may be identified.

## Draft Updated Transportation System Plan (TSP)

Policy and code amendments may be needed in order to ensure that the Warrenton Comprehensive Plan and Development Code are consistent with the updated TSP. Proposed amendments will be presented as part of the implementation phase of this project. Updated policy language will likely emphasize issues that have received enhanced state and local attention since the TSP was adopted in 2004, such as strategies to optimize the management and efficiency of the existing transportation system and the role that the transportation system plays in human health.

Policy amendments will also reflect community priorities identified through the TSP update process, including Technical Memorandum #4, which involves the project team's review of existing transportation goals and policies in the TSP and Comprehensive Plan. As discussed in Technical Memorandum #2, both the City's TSP and Comprehensive Plan (Article 8 Transportation) contain transportation policies, with the standards in the TSP prevailing where conflicts between adopted policies exist. Adopted policies address the transportation system in general, as well as parking, street classification and design, multi-modal transportation, and issues particular to the Astoria Regional Airport and boating and shipping activities. Technical Memorandum #4 will assess these policies for current relevance as well as use these policies as a basis for project goals and evaluation criteria.

Article 8 of the Comprehensive Plan will need to be amended to implement the TSP recommendations and reflect updated policy direction.

It is expected that Development Code amendments also will be necessary to fully implement the recommendations of the updated TSP. Examples include modifying street standards and other design standards related to transportation facilities. These policy and code changes will be identified and developed as part of the TSP update process.

# Oregon Transportation Plan (OTP)

The OTP is the State's comprehensive transportation plan. The planning horizon of the current plan extends through 2030. Its purpose is to establish goals, policies, strategies, and initiatives for long-range transportation planning in the state.

The OTP emphasizes maximizing the investment in the existing transportation system, integrating transportation and land use regulations, and integrating the transportation system across jurisdictions and modes. The following are key initiatives in the OTP:

- Maintain the existing transportation system to maximize the value of the assets. If funds are not available to maintain the system, develop a triage method for investing available funds.
- Optimize system capacity and safety through information technology and other methods.
- Integrate transportation, land use, economic development and the environment.
- Integrate the transportation system across jurisdictions, ownerships and modes.
- Create a sustainable funding plan for Oregon transportation.
- Invest strategically in capacity enhancements.

Consistent with these key initiatives, as well as related OTP's goals, the TSP update will:

- Promote the most cost-effective modes and solutions over the long term that are easy to use, reliable, and accessible to all potential users, including the transportation disadvantaged.
- Prioritize transportation demand management and transportation system operations techniques that aim to fine tune existing systems and policies instead of implementing costly major roadway capacity improvements.
- Develop projects that ensure the transportation system maintains and improves individual safety and security and maximizes public safety and service access.
- Identify projects that support a prosperous and competitive economy by preserving and enhancing business opportunities, and ensuring the efficient movement of people and goods to recreational, employment, housing and other destinations.
- Identify solutions that support the movement of people over vehicles, and that reduce transportation barriers to daily activities for people walking, bicycling, and using public transportation. The solutions will be environmentally responsible and be sensitive to the physical setting and context of the surrounding land use.

- Provide public involvement opportunities to all stakeholders and residents, and will coordinate with other jurisdictions and agencies to ensure the planned transportation system limits minimizes barriers and functions as one integrated system.
- Include an assessment of the level of transportation funding projected to be available through the 20-year planning horizon in comparison to the cost of developing a transportation system that is able to meet the City's needs. Opportunities to establish stable funding sources will be discussed and project prioritization will consider the feasibility of funding.

OTP policy and investment strategies are translated into plans for specific transportation modes in order to implement statewide multimodal priorities. The Oregon Highway Plan, the Oregon Bicycle and Pedestrian Plan, the Oregon Public Transportation Plan, and the Oregon Rail Plan are modal plans that have been reviewed for this project to ensure that the updated TSP will be consistent with policies, strategies, and design guidelines in these modal plans. (See Technical Memorandum #2 for a summary of the OTP and State modal plans and their relevancy to Warrenton's TSP update.)

# Transportation Planning Rule (TPR)

The Transportation Planning Rule (TPR) (OAR 660-012) implements Statewide Planning Goal 12 (Transportation), which is intended to promote the development of safe, convenient, and economic transportation systems that are designed to maximize the benefit of investment and reduce reliance on the automobile. The TPR includes direction for preparing, coordinating, and implementing TSPs. In particular, TPR Section -0045 (Implementation of the Transportation System Plan) requires local governments to amend their land use regulations to implement the TSP. It also requires local governments to adopt land use and subdivision regulations to protect transportation facilities for their identified functions.

TPR Section -0060 (Plan and Land Use Regulation Amendments) addresses amendments to plans and land use regulations. It specifies measures to be taken to ensure that allowed land uses are consistent with the identified function and capacity of existing and planned transportation facilities. Local code requirements that address this TPR provision include: access control measures; standards to protect future operations of roads; expanded notice requirements and coordinated review procedures for land use applications; procedures that specify needed transportation improvements as a possible condition of approval; and regulations ensuring that amendments to land use designations, densities, and design standards are consistent with the functions, capacities, and performance standards of facilities identified in the TSP. Section -0060 also establishes criteria for identifying the significant effects of plan or land use regulation amendments on transportation facilities, actions to be taken when a significant effect would occur, identification of planned facilities, and coordination with transportation facility providers.

Table 1 provides an evaluation of the City of Warrenton's Development Code (Title 16 of the Warrenton Municipal Code) based on Sections -0045 and -0060 of the TPR.[1] The evaluation includes findings confirming whether existing code language complies with the TPR. Where necessary, Table 1 provides recommendations for amending the code to better address TPR requirements.



[1] Note that the focus of the TPR evaluation is on how the City implements the local transportation plan through land use and development requirements. As such, Table 2 does not include an evaluation of existing policy language. However, as stated earlier in this memorandum, a review and update of policy language will be conducted later in the TSP update process.

| **Table 1: TPR Review of Warrenton Development Code** | |
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| TPR Requirement | Local Development Code References and Recommendations |
| **OAR 660-012-0045** | |
| (1) Each local government shall amend its land use regulations to implement the TSP. | |
| (a) The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances, do not have a significant impact on land use:<br>(A) Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals;<br>(B) Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards;<br>(C) Uses permitted outright under ORS 215.213(1)(m) through (p)[2] and 215.283(1)(k) through | Section 16.20.040 Review of Transportation Facilities and Improvements for Compliance with Land Use Regulations establishes that transportation facilities and improvements meeting one or more of the definitions for transportation facilities and improvements in Chapter 16.12 are permitted outright in most of the City's land use districts.<br>The Development Code has defined a number of transportation-related terms in Section 16.12.010 Definitions, including Level of Service, Pathway/Walkway/Access Way, and Transportation Mode. Transportation Facilities are described as the "physical improvements used to move people and goods from one place to another (e.g., streets, sidewalks, pathways, bike lanes, airports, transit stations and bus stops, etc.)."<br>**<u>Recommendation:</u> Existing code provisions address this TPR requirement. No changes to the code are recommended.** |

[2] Transportation uses in ORS 215.213 and .283 include:

- Climbing and passing lanes within the right of way existing as of July 1, 1987.

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| (n)[3], consistent with the provisions of 660-012-0065[4]; and<br>(D) Changes in the frequency of transit, rail and airport services.<br>(b) To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, | |

- Reconstruction or modification of public roads and highways, including the placement of utility facilities overhead and in the subsurface of public roads and highways along the public right of way, but not including the addition of travel lanes, where no removal or displacement of buildings would occur, or no new land parcels result.
- Temporary public road and highway detours that will be abandoned and restored to original condition or use at such time as no longer needed.
- Minor betterment of existing public road and highway related facilities, such as maintenance yards, weigh stations and rest areas, within right of way existing as of July 1, 1987, and contiguous public-owned property utilized to support the operation and maintenance of public roads and highways.

[4] OAR 660-012-0065 (Transportation Improvements on Rural Lands); *(1) This rule identifies transportation facilities, services and improvements which may be permitted on rural lands consistent with Goals 3, 4, 11, and 14 without a goal exception.*

**Table 1: TPR Review of Warrenton Development Code**

| TPR Requirement | Local Development Code References and Recommendations |
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| policy or legal judgment. | |
| (c) In the event that a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment, the local government shall provide a review and approval process that is consistent with 660-012-0050. To facilitate implementation of the TSP, each local government shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project. | Referenced TPR Section -0050 addresses project development and implementation – how a transportation facility or improvement authorized in a TSP is designed and constructed. Project development may or may not require land use decision-making. The TPR directs that during project development, projects authorized in an acknowledged TSP will not be subject to further justification with regard to their need, mode, function, or general location.<br>The City's review process as described in Section 16.20.040 Review of Transportation Facilities and Improvements for Compliance with Land Use Regulations and Section 16.208.070 General Provisions (D.2, Consolidation of Proceedings) is consistent with this TPR requirement.<br>**<u>Recommendation:</u> Existing code provisions address this TPR requirement. No changes to the code are recommended.** |
| (2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities corridors and sites for their identified functions. Such regulations shall include: | |
| (a) Access control measures, for example, driveway and public road spacing, median control and signal spacing standards, which are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities; | Section 16.120.020 Vehicular Access and Circulation refers to access spacing standards in the TSP, and sets block size (including a diagram) for land divisions and large development sites.<br>Transportation standards in Section 16.136.020 are consistent with Vehicular Access and Circulation Standards (e.g., with maximum 1,000-foot block length for non-arterials and non-constrained areas or with minimum 1,800 feet for arterials).<br>Subdivision standards for block size (Section 16.216.050 Approval Criteria—Preliminary Plat) refer to Access and Circulation chapter (Chapter 16.120).<br>**<u>Recommendation:</u> Existing code provisions address this TPR requirement. Access standards in Chapter 16.120 will need to be reviewed for consistency with the recommendations of the updated TSP, and revised if necessary.** |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| (b) Standards to protect the future operations of roads, transitways and major transit corridors; | Chapter 16.256 Traffic Impact Study sets thresholds for studies and includes general requirements (Section 16.256.030 cited below).<br><br>*16.256.030 When Required.*<br><br>*A traffic impact study may be required to be submitted to the City with a land use application, when the following conditions apply:*<br><br>*A. The development application involves a change in zoning or a plan amendment designation; or,*<br><br>*B. The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation manual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:*<br><br>*1. An increase in site traffic volume generation by 300 average daily trips (ADT) or more; or*<br><br>*2. An increase in ADT hour volume of a particular movement to and from the state highway by 20% or more; or*<br><br>*3. An increase in use of adjacent streets by vehicles exceeding the 20,000 pound gross vehicle weights by 10 vehicles or more per day; or*<br><br>*4. The location of the access driveway does not meet minimum site distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the state highway, creating a safety hazard; or* |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| | *5. A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.*<br><br>*16.256.040 Traffic Impact Study Requirements.*<br><br>*A. Preparation. A traffic impact study shall be prepared by a professional engineer in accordance with OAR 734-051-180.*<br><br>*B. Transportation planning rule compliance, Section 16.232.060.*<br><br>**Recommendation: Existing code provisions generally address this TPR requirement. It is recommended that the City review the existing threshold requirements for a TIA in the context of updated TSP recommendations and identify whether any amendments are needed. In addition, the City should consider the addition of approval criteria (including mitigation measures that must meet adopted safety and/or mobility standards) and replacing the Division 51 reference (which applies to state highway approach applications) with local preparation requirements. If retained, the OAR reference should be updated to correctly reference OAR 734-051-3030.** |
| (c) Measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation; | Chapter 16.92 Airport Hazard Overlay (AHO) District provides definitions of terms specific to the overlay, establishes uses permitted outright and conditionally, and includes standards and requirements that protect airport operations from surrounding land use.<br><br>**Recommendation: Existing provisions in the code address this TPR requirement. No changes to the code are recommended.** |
| (d) A process for coordinated review of future land use decisions affecting transportation facilities, corridors or | *See responses and recommendation for TPR Section -0045(1)(c) and -0045(2)(f).* |

**Table 1: TPR Review of Warrenton Development Code**

| TPR Requirement | Local Development Code References and Recommendations |
|---|---|
| sites; | |
| (e) A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites; | The ability of the decision making body to approve proposals with conditions is authorized for Type II Procedures (Administrative), Type III Procedures (Quasi-Judicial), and Type III Procedures (Legislative and Map Amendments). Review criteria for conditional use applications include transportation impacts, and establish criteria specifically for transportation system facilities and improvements (Section 16.220.030)<br>**<u>Recommendation:</u> Existing provisions in the code address this TPR requirement. No changes to the code are recommended.** |
| (f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of:<br>(A) Land use applications that require public hearings;<br>(B) Subdivision and partition applications;<br>(C)Other applications which affect private access to roads; and<br>(D)Other applications within airport noise corridor and imaginary surfaces which affect airport operations. | General Provisions (Section 16.208.070) allow for coordinated review with other agencies "(w)hen required by this Code, or at the direction of the Community Development Director." Notice to ODOT, pursuant to Type II, III, and IV procedures, is required when a proposal is adjacent to a State facility or if ODOT is considered an "affected agency." Notice procedures also include requirements related to airports "in accordance with ORS 227.175" for Type II and IV proposals.<br><br>**<u>Recommendations:</u> Existing provisions in the code address this TPR requirement. To strengthen compliance with this requirement, it is recommended that the City consider broadening the types of proposals that would trigger notification to proposals that may have a significant impact on a facility (or service) under the transportation agency's jurisdiction and adding language to involve these agencies in pre-application conferences and application review.** |
| (g) Regulations assuring amendments to land use designations, densities, and design standards are consistent with the functions, capacities and performance standards of facilities identified in the | *See responses and recommendations related to traffic impact study requirements, TPR Section -0045(2)(b), and to plan and land use regulation amendments, TPR Section -0060.* |

**Table 1: TPR Review of Warrenton Development Code**

| TPR Requirement | Local Development Code References and Recommendations |
|---|---|
| TSP. | |
| (3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth below. The purposes of this section are to provide for safe and convenient pedestrian, bicycle and vehicular circulation consistent with access management standards and the function of affected streets, to ensure that new development provides on-site streets and accessways that provide reasonably direct routes for pedestrian and bicycle travel in areas where pedestrian and bicycle travel is likely if connections are provided, and which avoids wherever possible levels of automobile traffic which might interfere with or discourage pedestrian or bicycle travel. | |
| (a) Bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots. | Section 16.128.040 addresses bicycle parking requirements for multi-family housing, schools, and public and private parking lots. Providing bicycle parking is required for all uses with more than 10 vehicle parking spaces; multi-family uses with four or more dwelling units must provide at least one sheltered bicycle parking space for each dwelling unit.<br>**Recommendations: Existing provisions in the code generally address this TPR requirement. The City should consider if requirements for all institutional uses (e.g., hospitals, churches, vocational schools) are sufficiently addressed in existing provisions and if there is a need to distinguish the requirements for transit-related uses.** |
| (b) On-site facilities shall be provided which accommodate safe and convenient pedestrian and bicycle access from within new subdivisions, multi-family developments, planned developments, shopping centers, and commercial districts to adjacent residential areas and transit stops, and to neighborhood activity centers within one-half mile of the development. Single-family residential developments shall generally include streets and accessways. Pedestrian circulation | Provisions of this TPR requirement are addressed in the following ways:<br>▪ **Connections between proposed development and adjacent development, transit stops, and community destinations** – Requirements for non-motorized connections are found in Section 16.120.030 Pedestrian Access and Circulation.<br>▪ **Bikeways and sidewalks** – Table 16.136.010 provides City of Warrenton Street Design Standards and includes reference to figures in TSP. Sidewalks are required for all street functional classifications except for "alternative local road," which are intended for low-volume streets in constrained areas. "Bike lanes or on-street parking" are required for all street functional classifications except for "alternative local road." |

**Table 1: TPR Review of Warrenton Development Code**

| TPR Requirement | Local Development Code References and Recommendations |
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| through parking lots should generally be provided in the form of accessways.<br>(A) "Neighborhood activity centers" includes, but is not limited to, existing or planned schools, parks, shopping areas, transit stops or employment centers;<br>(B) Bikeways shall be required along arterials and major collectors. Sidewalks shall be required along arterials, collectors and most local streets in urban areas except that sidewalks are not required along controlled access roadways, such as freeways;<br>(C) Cul-de-sacs and other dead-end streets may be used as part of a development plan, consistent with the purposes set forth in this section;<br>(D) Local governments shall establish their own standards or criteria for providing streets and accessways consistent with the purposes of this section. Such measures may include but are not limited to: standards for spacing of streets or accessways; and standards for excessive out-of-direction travel;<br>(E) Streets and accessways need not be required where one or more of the following conditions exist:<br>(i) Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, | ■ **Cul-de-sacs** – Cul-de-sacs are allowed only where environmental or topographical constraints, existing development patterns, or compliance with other Code standards preclude street extension. They may not provide access to more than 18 dwelling units and are limited to 200 feet in length (Section 16.136.020.M). Pathways (for pedestrians and bicycles) are required where cul-de-sacs or dead-end streets are planned, to connect the ends of the streets together, to other streets, and/or to other developments, as applicable (Section 16.120.030.A.4).<br>■ **Street spacing standards** – *See response and recommendations related to street and access standards in TPR Section -0045(2)(a).*<br>■ **Exceptions for streets and accessways** – Block size can be varied to accommodate topography (Section 16.12.020.J.1). Pathway requirements that apply where street connectivity standards cannot be met may be waived due physical or topographic conditions (Section 16.120.030.A.4.e).<br>**Recommendations:**<br>■ **Add provisions to require non-motorized improvements providing connection(s) from planned development to adjacent existing and planned transit stops.**<br>■ **"Bike lanes or on-street parking" are required for all street functional classifications except for "alternative local roads." More clearly establish where bike lanes are required.**<br>■ **Consider adding standards for minimum walkway spacing through large parking lots.**<br>■ **To ensure consistency with the recommendations of the updated TSP, update street design standards in Table 16.136.010. (Update TSP figure numbers in the lead-in to Table 16.136.010.)** |

**Table 1: TPR Review of Warrenton Development Code**

| TPR Requirement | Local Development Code References and Recommendations |
|---|---|
| railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided;<br>(ii) Buildings or other existing development on adjacent lands physically preclude a connection now or in the future considering the potential for redevelopment; or<br>(iii) Where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995, which preclude a required street or accessway connection. | |
| (c) Off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle and pedestrian travel, including bicycle ways on arterials and major collectors | *See responses and recommendations related to recommended improvements in TIAs in TPR Section -0045(2)(b) and conditions of approval in Section -0045(2)(e).* |
| (e) Internal pedestrian circulation within new office parks and commercial developments shall be provided through clustering of buildings, construction of accessways, walkways and similar techniques. | *See responses and recommendations related to on-site walkways in TPR Section -0045(3)(b).* |
| (4) To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where a determination has been made that a public transit system is feasible, local governments shall adopt land use and subdivision regulations as provided in (a)-(g) below: | |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| (a) Transit routes and transit facilities shall be designed to support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate; | The updated TSP will identify transit routes and incorporate appropriate standards for these transportation facilities, consistent with Sunset Empire Transit District Master Plan and this TPR requirement. Table 16.136.010, Footnote 5 indicates Median/Flex Lane can be used for transit routes, including providing extra right-of-way for future transit.<br>**<u>Recommendations:</u> Existing code provisions partially address this TPR requirement. Identify design requirements for transit routes and transit facilities through the TSP update process, and then update development code requirements as necessary.** |
| (b) New retail, office and institutional buildings at or near major transit stops shall provide for convenient pedestrian access to transit through the measures listed in (A) and (B) below.<br>(A) Walkways shall be provided connecting building entrances and streets adjoining the site;<br>(B) Pedestrian connections to adjoining properties shall be provided except where such a connection is impracticable as provided for in OAR 660-012-0045(3)(b)(E). Pedestrian connections shall connect the on-site circulation system to existing or proposed streets, walkways, and driveways that abut the property. Where adjacent properties are undeveloped or have potential for redevelopment, streets, accessways and walkways on site shall be laid out or stubbed to allow for extension to the | *See the responses and recommendations related to on-site pedestrian circulation and pedestrian connections to adjacent sites in TPR Sections -0045(3)(b).* |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| adjoining property; | |
| (C) In addition to (A) and (B) above, on sites at major transit stops provide the following:<br>(i) Either locate buildings within 20 feet of the transit stop, a transit street or an intersecting street or provide a pedestrian plaza at the transit stop or a street intersection;<br>(ii) A reasonably direct pedestrian connection between the transit stop and building entrances on the site;<br>(iii) A transit passenger landing pad accessible to disabled persons;<br>(iv) An easement or dedication for a passenger shelter if requested by the transit provider; and<br>(v) Lighting at the transit stop. | *See the responses and recommendations for pedestrian connections to transit stops in TPR Sections -0045(3)(b) and -0045(4)(a) and for transit amenities in TPR Section -0045(4)(a).*<br>Responses in TPR Sections -0045(3)(b) and -0045(4)(a) describe existing code language for providing connections between buildings and streets and transit stops. However, maximum distances between buildings and major transit stops (those with frequent service, within one-quarter mile of medium to high density development, and/or with high ridership volumes) are not established in existing code requirements.<br>**<u>Recommendations:</u> Establish maximum distance requirements between building entrances and major transit stops.** |
| (c) Local governments may implement (4)(b)(A) and (B) above through the designation of pedestrian districts and adoption of appropriate implementing measures regulating development within pedestrian districts. Pedestrian districts must comply with the requirement of (4)(b)(C) above; | The City is not proposing to designate a pedestrian district at this time.<br>**<u>Recommendation:</u> No code changes are recommended.** |
| (d) Designated employee parking areas in new | Existing code language does not address this TPR requirement. |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| developments shall provide preferential parking for carpools and vanpools; | **<u>Recommendation:</u> Add requirements for off-street parking (Section 16.128.030) to include preferential parking for carpools and vanpools in designated employee parking areas in new commercial, industrial, and civic developments. Note that these requirements can be narrowly applied to parking areas over a certain size or number of parking spaces, and the number of carpool/vanpool spaces required can be calculated as a percentage of total off-street vehicle parking required.** |
| (e) Existing development shall be allowed to redevelop a portion of existing parking areas for transit-oriented uses, including bus stops and pullouts, bus shelters, park and ride stations, transit-oriented developments, and similar facilities, where appropriate; | Existing code language does not address this TPR requirement.<br>**<u>Recommendation:</u> Add provisions in Section 16.128.030 that allow existing development to redevelop a portion of existing parking areas for transit-related improvements identified in the Sunset Empire Transit District Master Plan, granted that minimum parking requirements can still be met.** |
| (f) Road systems for new development shall be provided that can be adequately served by transit, including provision of pedestrian access to existing and identified future transit routes. This shall include, where appropriate, separate accessways to minimize travel distances; | *See the responses and recommendations related to transit access in TPR Sections -0045(3)(b) and -0045(4)(a).* |
| (g) Along existing or planned transit routes, designation of types and densities of land uses adequate to support transit. | Existing code and zoning is generally consistent with this TPR requirement to the extent that transit facility improvements recommended in the adopted Sunset Empire Transit District long-range transit plan are located in areas of the city with urban zoning that allows mixed uses and a range of densities.<br>**<u>Recommendation:</u> No code changes are recommended at this time. To the extent** |

| **Table 1: TPR Review of Warrenton Development Code** | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| | **possible, the TSP update process will be coordinated with the Sunset Empire Transit District's plan update and City TSP recommendations will be consistent with the transit plan outcomes.** |
| (6) In developing a bicycle and pedestrian circulation plan as required by 660-012-0020(2)(d), local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas. Appropriate improvements should provide for more direct, convenient and safer bicycle or pedestrian travel within and between residential areas and neighborhood activity centers (i.e., schools, shopping, transit stops). Specific measures include, for example, constructing walkways between cul-de-sacs and adjacent roads, providing walkways between buildings, and providing direct access between adjacent uses. | This requirement will be addressed by the TSP update planning process. The requirement can be met by adopting improvements in developed areas that meet the needs identified in the TSP's pedestrian and bicycle circulation elements.<br>Specific measures identified in this TPR requirement are addressed by the code in the following ways.<br>▪ **Walkways between cul-de-sacs and adjacent roads** – Pathways (for pedestrians and bicycles) are required at or near mid-block where the block length exceeds the required length (Section 16.120.020) and where cul-de-sacs or dead-end streets are planned, to connect the ends of the streets together, to other streets, and/or to other developments (Section 16.120.030.A.4).<br>▪ **Walkways between buildings** – *See responses and recommendations related to on-site pedestrian circulation on-site in TPR Section -0045(3)(b).*<br>▪ **Access between adjacent uses** – *See responses and recommendations related to connections to adjacent sites and community destinations in TPR Section -0045(3)(b).*<br><br>**<u>Recommendation:</u> Existing code provisions address this TPR requirement. No changes to the code are recommended other than those recommended in TPR Section -0045(3)(b).** |

| Table 1: TPR Review of Warrenton Development Code | |
|---|---|
| TPR Requirement | Local Development Code References and Recommendations |
| (7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facility. The intent of this requirement is that local governments consider and reduce excessive standards for local streets and accessways in order to reduce the cost of construction, provide for more efficient use of urban land, provide for emergency vehicle access while discouraging inappropriate traffic volumes and speeds, and which accommodate convenient pedestrian and bicycle circulation. Notwithstanding section (1) or (3) of this rule, local street standards adopted to meet this requirement need not be adopted as land use regulations. | Street design standards are established in Table 16.136.010 City of Warrenton Street Design Standards and Section 16.136.020 Transportation Standards. They include standards for an "alternative local road," which allows for narrower cross section and pavement sections in constrained situations<br>**Recommendation: Existing code provisions address this TPR requirement. Street standards will need to be updated to reflect the recommendations of the updated TSP.** |
| **OAR 660-12-0060** | |
| Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified function, capacity, and performance standards of the facility. | Section 16.232.060 specifically addresses TPR compliance.<br>**Recommendations: Existing code provisions address this TPR requirement. Section 16.232.060 should be amended to reflect up-to-date TPR citations and the amendments that became effective in 2012. The City may also wish to simplify this code requirement by referencing the TPR, rather than including language from the Rule.** |

# SECTION 4
# TECH MEMO FOUR

## GOALS, OBJECTIVES, AND CRITERIA

# MEMORANDUM #4

**DATE:** November 4, 2015

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates
Kate Petak, EIT, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Goals, Objectives, and Evaluation Criteria** P14180-008

The purpose of this memorandum is to present the transportation-related goals, objectives and evaluation criteria for the City of Warrenton. The goals are broad statements that describe the community's aspirations for its future. Each goal is developed around a topic area and may never be completely attainable, but is used as a point toward which to strive. Objectives are statements that provide a specific course of action moving the community toward the attainment of its goals. Each new capital improvement project, land use application, or implementation measure must be consistent with the objectives.

The goals and objectives will guide the development of the transportation system plan, while the evaluation criteria will be used to evaluate and prioritize future transportation programs and improvements against the goals and objectives. Once adopted, the goals and objectives, as well as the project list, will become part of Warrenton's Comprehensive Plan. The goals and objectives outlined below were largely developed from previous local plans, including: 2004 Warrenton Transportation System Plan, 2009 Revised Warrenton Transportation System Plan, 2007 Warrenton Urban Renewal District Plan, Warrenton Comprehensive Plan , 2010 Warrenton Downtown and Marina Master Plans, 2005 Hammond Marina Master Plan, 2010 Warrenton Parks Master Plan, and 2008 Warrenton Trails Master Plan.

# Goal 1: Health

Develop a transportation system that maintains and improves individual health by maximizing active transportation options[1].

## Goal 1 Objectives

1. Maximize active transportation options.
2. Provide recreational opportunities outlined in the 2008 Warrenton Trails Master Plan.

## Goal 1 Evaluation Criteria

- Increases active transportation options
- Increases recreational opportunities

# Goal 2: Safety

Develop a transportation system that maintains and improves public safety and effectively manages evacuations and emergency response preceding and following natural disasters.

## Goal 2 Objectives

1. Improve safety and provide safe connections for all modes.
2. Meet applicable City and Americans with Disabilities (ADA) standards.
3. Increase public safety.
4. Improve signage for streets, pedestrian and bike ways, and trails as well as directional signs to points of interest.
5. Create safe routes and connections for vehicles, bicycles, and pedestrians, especially across US 101.
6. Limit access points on highways and major arterials, and use techniques such as alternative access points when possible.
7. Increase the city's resilience to natural hazards.

[1] Active transportation refers to any form of travel that is non-motorized and self-propelled, such as walking and bicycling, as well as public transportation, since most trips on public transportation include walking or bicycling.

### Goal 2 Evaluation Criteria

- Improves road and railroad crossing safety for all modes
- Increases ADA compliant sidewalks and intersection curb ramps
- Improves public safety
- Improves route connectivity
- Decreases access point along highways and major arterials
- Improves response times/evacuation efficiency

## Goal 3: Travel Choices

Develop and maintain a well-connected transportation system that offers travel choices, reduces travel distance, improves reliability, and manages congestion for all modes.

### Goal 3 Objectives

1. Reduce travel distance for all modes.
2. Improve travel reliability for all modes.
3. Manage congestion for all modes.
4. Encourage ride sharing.
5. Work with the Sunset Empire Transportation District to expand transit service, improve amenities, and develop stations in appropriate locations that efficiently serve resident and employee needs.
6. Provide a network of arterials, collectors, and paths that are interconnected, appropriately spaced, and reasonably direct.
7. Develop unused rights-of-way for pedestrian and bike ways or trails where appropriate.
8. Increase access to the transportation system for all modes regardless of age, ability, income, and geographic location.
9. Encourage development patterns that offer connectivity and mobility options for all members of the community.
10. Balance the desires of community members with public agency requirements.

### Goal 3 Evaluation Criteria

- Improves roadway operations
- Improves bus travel time reliability
- Improves bus service for local employees
- Improves bus service for employees commuting to nearby coastal destinations
- Increases connectivity across and between all modes
- Improves pedestrian/bicycle access to key destinations, including transit service

## Goal 4: Economic Vitality

Support the development and revitalization efforts of the City, Region, and State economies and create a climate that encourages growth of existing and new businesses.

### Goal 4 Objectives

1. Balance needs for freight system efficiency, access, and capacity with needs for local circulation, safety, and access.
2. Manage parking efficiently and ensure that it supports downtown business needs and promotes new development.
3. Balance the simultaneous needs to accommodate local traffic and through-travel on state highways.
4. Provide transportation facilities that support existing and planned land uses.
5. Enhance the vitality of the Warrenton downtown area by incorporating design elements for all modes in roadway design standards.
6. Ensure that all new development contributes a fair share toward on-site and off-site transportation system improvements.
7. Support expansion of local boating and shipping activities, including the development of waterfront activities along the Skipanon River, Youngs Bay, and Alder Cove.
8. Enhance the connection of the Warrenton Harbor to the surrounding community.
9. Enhance tourism opportunities and access to tourist attractions.

### Goal 4 Evaluation Criteria

- Minimizes negative impacts to existing land uses (built environment)
- Improves parking efficiency
- Improves freight access/connectivity
- Improves bicycle and pedestrian access to the downtown area
- Increases capacity for boating and shipping activities

## Goal 5: Livability

Customize transportation solutions to suit the local context while providing a system that supports active transportation, promotes public health, facilitates access to daily needs and services, and enhances the livability of Warrenton neighborhoods and business community.

### Goal 5 Objectives

1. Minimize adverse social and economic impacts created by the transportation system, including balancing the need for street connectivity and the need to minimize neighborhood cut-through traffic.
2. Develop safe, connected pedestrian and bicycle facilities near schools, high-density residential districts, commercial districts, and waterfront areas.
3. Balance downtown livability with the need to accommodate freight access to industrial and waterfront areas.
4. Design streets to serve the widest range of users, support adjacent land uses, and increase livability.
5. Enhance the quality of life in commercial areas and in neighborhoods.
6. Improve public access to the waterfront and trails along the waterfront.
7. Develop transportation facilities that will allow development without major disruption of existing neighborhoods or the downtown area.

### Goal 5 Evaluation Criteria

- Reduces/discourages through travel in residential neighborhoods
- Increases connections/access to community amenities
- Enhances street aesthetics
- Reduces impacts from trucks downtown

# Goal 6: Sustainability

Provide a sustainable transportation system that meets the needs of present and future generations and is environmentally, fiscally and socially sustainable.

## Goal 6 Objectives

1. Support travel options that allow individuals to reduce single-occupant vehicle trips.
2. Minimize damage to the environment.
3. Support the reduction of greenhouse gas emissions from transportation sources.
4. Support and encourage transportation system management (TSM) and transportation demand management (TDM) solutions to congestion.
5. Preserve and protect the City's historic sites.

## Goal 6 Evaluation Criteria

- Avoids negative impacts to environmentally sensitive areas
- Reduces vehicle miles traveled
- Minimizes impacts to historic sites
- Increases alternatives to single-occupant vehicle travel

# Goal 7: Fiscal Responsibility

Plan for and implement an economically viable transportation system that protects and improves existing transportation assets while cost-effectively enhancing the total system.

## Goal 7 Objectives

1. Plan for an economically viable and cost-effective transportation system.
2. Identify and develop diverse and stable funding sources to implement recommended projects in a timely fashion and ensure sustained funding for transportation projects and maintenance.
3. Make maintenance and safety of the transportation system a priority.
4. Maximize the cost effectiveness of transportation improvements by prioritizing operational enhancements and improvements that address key safety and congestion issues.
5. Identify local street improvement projects that can be funded through grant programs.

6. Provide funding for the local share (i.e. match) of capital projects jointly funded with other public partners.

7. Prioritize funding of projects that are most effective at meeting the goals and policies of the Transportation System Plan.

### Goal 7 Evaluation Criteria

- Increases the efficiency of existing facilities without expanding or building new facilities
- Provides significant increase in mobility/accessibility

## Goal 8: Compatibility

Develop a transportation system that is consistent with the City's Comprehensive Plan and that is coordinated with County, State, and Regional plans.

### Goal 8 Objectives

1. Coordinate, support, and cooperate with adjacent jurisdictions and other transportation agencies to develop transportation projects that benefit the City, Region, and State as a whole (e.g. evacuation routes, countywide transit, and jurisdictional transfer of roadways).

2. Work collaboratively with other jurisdictions and agencies to ensure the transportation system functions seamlessly.

3. Coordinate land use and transportation decisions to efficiently use public infrastructure investments to meet goals and objectives.

4. Maintain and implement functional classification standards and criteria.

5. Coordinate with other jurisdictions and community organizations to develop and distribute transportation-related information.

6. Review City transportation standards periodically to ensure consistency with Regional, State, and Federal standards.

7. Coordinate with the County and State agencies to ensure that improvements to County and State highways within the city benefit all modes of transportation.

8. Participate with ODOT, Clatsop County, and Astoria in the revision of their transportation system plans, and coordinate with neighboring jurisdictions regarding land development outside of the Warrenton urban growth boundary to ensure provision of a transportation system that serves the needs of all users.

9. Participate in updates of the ODOT State Transportation Improvement Program (STIP) and Clatsop County Capital Improvement Program (CIP) to promote the inclusion of projects identified in the Warrenton TSP.

10. Coordinate with the U.S. Army Corps of Engineers and the Oregon Division of State Lands to maintain

appropriate operating depths at marina facilities, and identify beneficial uses of dredged material resulting from maintenance dredging.

11. Work to protect airspace corridors and airport approaches.

12. Coordinate planning for lifeline and evacuation routes with local, State, and private entities.

## Goal 8 Evaluation Criteria

- Supports and is consistent with regulatory documents

SECTION 5
# TECH MEMO FIVE
## EXISTING CONDITIONS

# MEMORANDUM #5

**DATE:** October 31, 2016

**TO:** Warrenton TSP Project Management Team

**FROM:** Shelly Alexander, PE, David Evans and Associates, Inc.
Angela Rogge, PE, David Evans and Associates, Inc.

**SUBJECT: Warrenton Transportation System Plan**
**Task 4.2 Evaluate Existing Conditions** P14180-008

This memorandum provides an existing transportation system conditions analysis to determine existing conditions, problems, and deficiencies for all modes within the City of Warrenton, Oregon. The study area and analysis intersections, shown in Figure 1, fall within the City limits.

An inventory of the existing transportation system in Warrenton was conducted as part of the Transportation System Planning (TSP) process. This memorandum highlights what it means to live in Warrenton and what a visitor to the area might experience. In addition to looking at what makes Warrenton unique, this inventory includes a closer look at what infrastructure is currently in place, including the street, pedestrian, bikeway, public transportation, rail, air, water, and pipeline systems within the City of Warrenton City Limits and Urban Growth Boundary (UGB).

## Warrenton City Character

Warrenton is situated on the most northwestern point of Oregon, adjacent to the Pacific Ocean, Fort Stevens Park and the mouth of the Columbia River. Although Warrenton has a shared history and ongoing connection with the City of Astoria, its neighbor to the northeast, Warrenton has its own unique character. Warrenton residents and visitors alike have access to significant amounts of open space, city parks and water features, as well as important historical sites, within the City's boundaries.

### Points of Interest

An important aspect of evaluating and planning an effective transportation system is knowing where the people want to go. Warrenton has several destinations that attract a variety of visitors (see Figure 2, Page 3). Generally, these community features can be grouped into the following:

- Schools (e.g. Warrenton Prep, Warrenton Grade School, Warrenton High School)
- Places of employment (e.g. business areas, industrial areas, offices, airport)
- Shopping (e.g. downtown core, grocery stores, shopping centers, restaurants)
- Recreational (e.g., Fort Stevens State Park, beach, Warrenton Waterfront Trail)
- Cultural (e.g. Maddox Dance Studio, library, Wreck of Peter Iredale)
- Public Transportation (e.g. Bus stops)


CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

# Figure 1

*Study Area*

0 4,500 9,000 *Feet*


**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

# Figure 2

*Community Features*

*Document Path: P:\D\DKSA00000004\0600INFO\GS\Maps\WarrentonTSP - TM5\Fig_02_WarrentonTSP_CommunityFeatures.mxd*

## Travel Patterns

As previously mentioned, Warrenton has its own unique transportation identity, although it is important to recognize its connection to the City of Astoria; many people live in one community and work in the other. Table 1 summarizes the year 2014 employment destinations for people who lived within the City Limits of Warrenton; 2014 is the most recent year of available data. The majority of Warrenton residents actually work outside of the city. Conversely, approximately 80 percent of the people working in Warrenton commute from outside of the city limits; further emphasizing the two-way connections between Warrenton and surrounding communities and the dependence on the transportation network to get from home to work.

**Table 1. 2014 Inflow/Outflow Job Counts**

| Employment Destination | Warrenton Residents |
|---|---|
| **Living and Employed in Warrenton** | **18%** |
| **Outside of Warrenton** | **82%** |
| Astoria | 18% |
| Seaside | 8% |
| Portland | 8% |
| Other | 48% |

Source: U.S. Census Bureau. 2016. OnTheMap Application. Longitudinal-Employer Household Dynamics Program. http://onthemap.ces.census.gov/

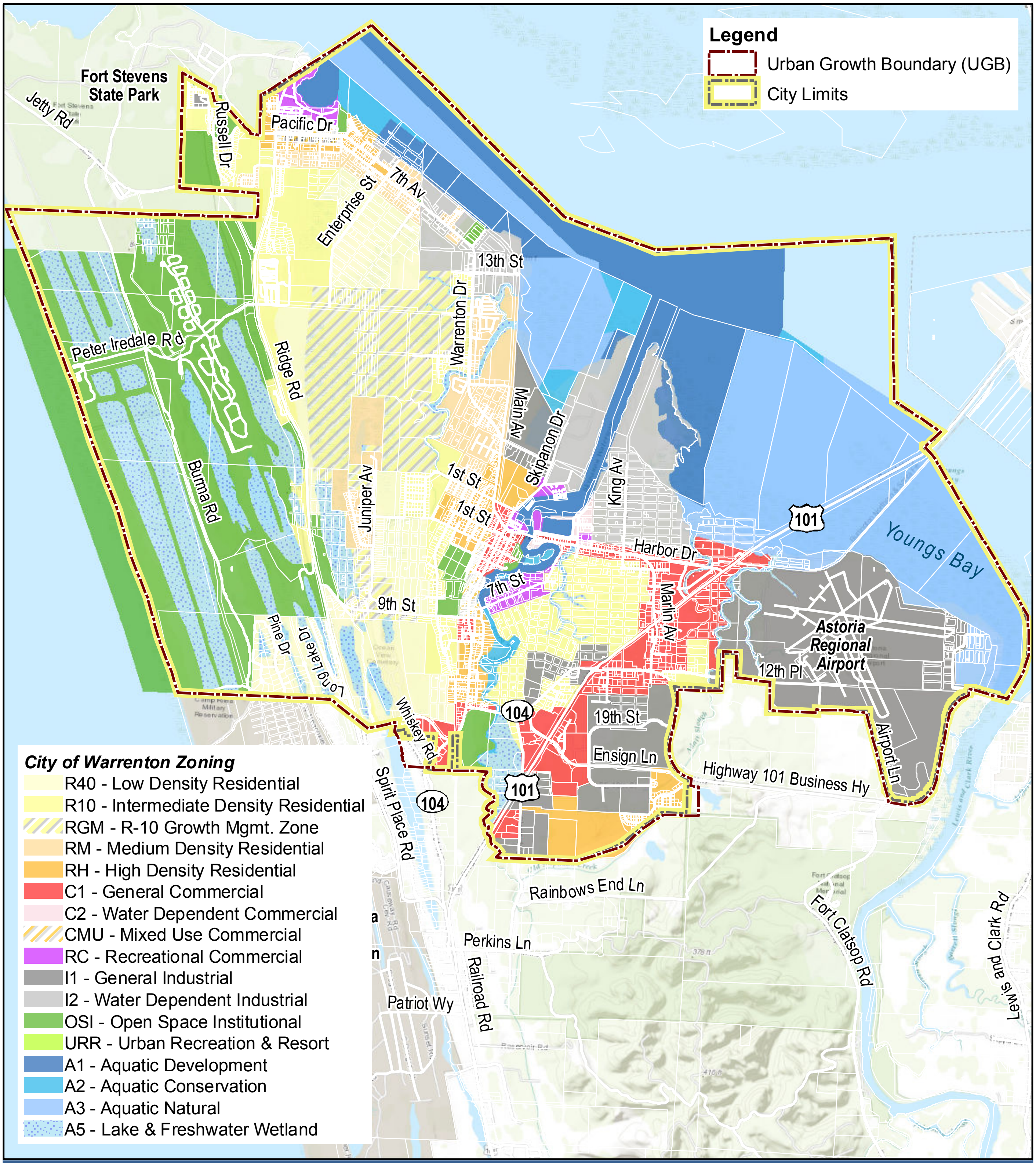
## Balancing Natural Resources with Commercial Needs

Warrenton is surrounded by and includes significant areas of open space and natural resources. These resources are important to the economic vitality of the region and many areas are of historical significance due to their association with the Lewis and Clark Expedition.

As seen in Figure 3, commercial development is concentrated in downtown along Fort Stevens Highway (OR 104) and US 101, including several regional or national chains such as Costco, Home Depot and Fred Meyer.

Industrial development is primarily located in the southeastern portion of Warrenton (east of US 101 near the Astoria Regional Airport and SE Dolphin Avenue) and in the north central portion of Warrenton (off NE Skipanon Drive near the Skipanon Waterway and Warrenton Mooring Basin), and further north along Fort Stevens Highway OR 104 adjacent to the Columbia River.

Residential areas are scattered throughout Warrenton and west of US 101. The residential pockets provide a buffer between commercial and industrial land uses and the natural resources (Wetlands, Open Space, Recreation, Shorelands, as seen in Figure 4) on the western edges of Warrenton. Figures with additional details on land use and natural resources may be found in Appendix A.




**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

# Figure 3

*Land Use*

0 4,500 9,000 Feet

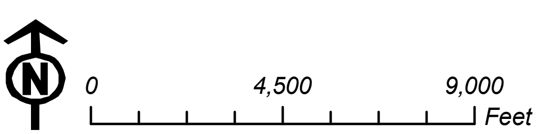
*Document Path: P:\D\DKSA00000004\0600INFO\GS\Maps\WarrentonTSP - TM5\Fig_03_WarrentonTSP_LandUse_Inventory.mxd*


**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*Oregon Geospatial Enterprise, US Fish and Wildlife Service, FEMA,*
*City of Warrenton, Clatsop County, Oregon. 2015.*

# Figure 4

*Natural Resources*

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# Demographics

Demographic characteristics usually inform what modes and methods of transportation will most benefit a population. The approximate population of Warrenton is 5,175[1], but like many cities, the population isn't homogenous. The transportation system also is expected to serve more than just its residents, with large numbers of people visiting the Oregon Coast every year.

## Transportation Disadvantaged Population (Environmental Justice)

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations of February 11, 1994, requires agencies undertaking federal projects to identify low-income and minority populations; assess whether high and adverse human health or environmental impacts would result from the alternatives; and ensure participation of low-income and minority populations in the transportation decision making process. Many roadways within Warrenton are under the State's jurisdiction. Since it is possible the state could utilize federal funds for transportation projects, the City must also integrate environmental justice in its transportation planning work. Environmental justice communities include low income, minority, or elderly households.

Elderly, residents over 65 years old, and youth, residents under 18 years old are less likely to be able to drive and are more dependent on walking, bicycling, or taking transit for transportation. Downtown Warrenton experiences a higher density of seniors and a greater number of households than the remainder of Warrenton. Figures with additional details on the transportation disadvantaged populations may be found in Appendix A

### Barriers to Accessible Transportation

Transit is accessible in downtown Warrenton; both the number 10 and 15 bus lines service this area and connect individuals to both northwestern Warrenton and US 101. However, public transportation does not connect down to Warrenton High School, located along OR 104 between OR 104S and Southwest 18th Street, or the surrounding communities. This is limiting for individuals attempting to reach the school or southernmost residential areas by public transportation. However, recent pedestrian and bicycle upgrades along OR 104 extend to the high school and improve the accessibility of active transportation[2] to the area. Warrenton Grade School, located at Southwest 9th Street and Southwest Cedar Avenue, is in a residential area with local roads, but still over a half mile from the nearest transit stop. While the transit stops are over a half mile away from the area schools, there is a school bus system that provides transportation to students; routes are updated each school year. The major collector and arterial roads nearest to the school have sidewalks present.

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[1] Portland State Univeristy Population Estimates, website: https://www.pdx.edu/prc/population-reports-estimates , 2015.

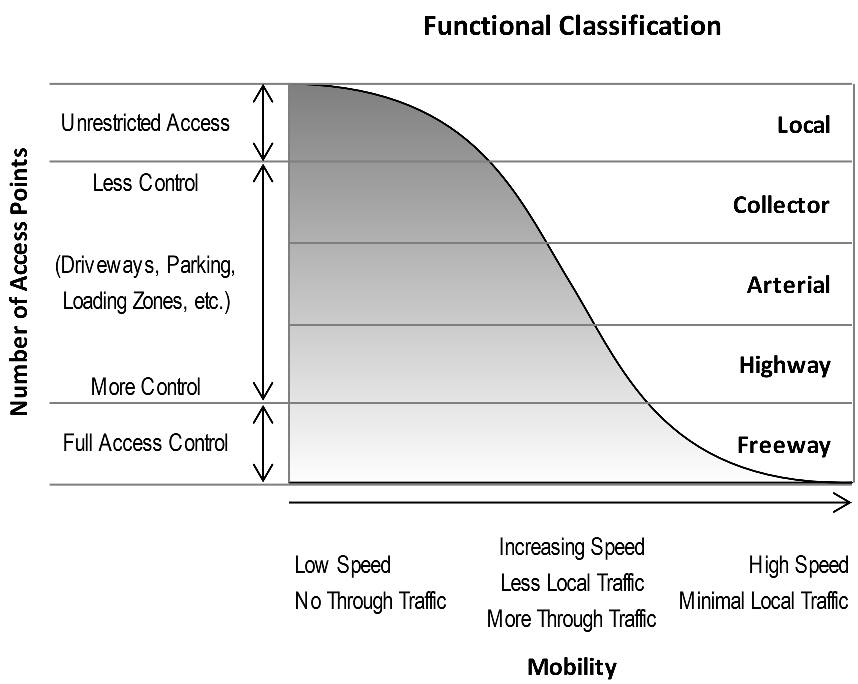
[2] Active transportation is any self-propelled, human-powered mode of transportation, such as walking or bicycling.

# Street System

This section summarizes the existing street network and important characteristics of the study area roadways. Several jurisdictions, including the Oregon Department of Transportation (ODOT), Clatsop County and the City of Warrenton, maintain portions of the existing street system within the study area. A comprehensive inventory was conducted of all arterial and collector streets within the City's UGB. This data collection was updated using aerial photography and online databases.

## Functional Classification

Streets and highways are assigned a classification to indicate purpose, design and function. This functional classification ensures that streets are built and maintained with features that can support demand from both the surrounding land uses and from traffic that may be traveling through parts of the city. It also describes how adjacent properties are accessed and how much mobility the street provides, as illustrated below.




There are four roadway classifications within the city of Warrenton including principal arterial (highway), minor arterial, major collector, and local roadways. If desired, these classifications can be further divided by land use (rural and urban). The classification system facilitates the design and management of the roadway; it allows for safe and efficient travel based on the desired objectives, as described above.

There is one state highway and three district highways that provide connections throughout Warrenton. US 101 and Fort Stevens Highway travel north-south while Fort Stevens Spur and Warrenton-Astoria Highway travel east-west. The district highways and collector routes generally provide access and circulation throughout Warrenton and to US 101.

General descriptions of the classifications include:

- **Arterial** streets are intended to serve as primary routes for travel between major urban activity. Major/principle and minor arterial streets provide the same general function while varying in the level of traffic volume.
- **Collector** streets gather traffic from neighborhoods but also serve abutting lands, particularly commercial uses. Major collector streets can serve residential, commercial, industrial, or mixed land uses, while minor collector streets are primarily intended to serve abutting lands and local access needs of neighborhoods. Minor collector streets can serve residential, commercial, industrial, or mixed land uses.
- **Local streets** are intended to serve the adjacent land without carrying through traffic. Generally, local streets operate at low speeds, provide limited mobility and carry low traffic volumes.

Roadway ownership and maintenance responsibilities of the various roadways in the study area are carried out by the respective local and county agencies while state routes are under ODOT jurisdiction.

### Access Spacing

Access management is an important key to balanced urban growth. As evidence, the lack of a prudent access management plan has led to miles of strip commercial development along the arterial streets of many urban areas. Business activities along arterial streets lead to increased traffic demands and the provision of roadway improvements to accommodate the increasing traffic demand. Roadway improvements stimulate more business activity and traffic demands. This often continues in a cyclical fashion, and requires extensive capital investments for roadway improvements and relocation. However, with the tightening of budgets by federal, state, and local governments, the financial resources to pay for such solutions are becoming increasingly scarce.

Reducing capital expenditures is not the only argument for access management. Additional driveways along arterial streets lead to an increased number of potential conflict points among vehicles entering and exiting the driveways, and through vehicles on the arterial streets. This leads to increased vehicle delay and deterioration in the level of service on the arterial.  Increases in volumes and conflict points may also lead to a reduction in safety. Thus, it is essential that all levels of government try to maintain the efficiency of existing streets through better access management.

Table 2 describes recommended access management spacing standards by roadway functional classification for all categories of streets in Warrenton.

**Table 2. ODOT Access Spacing Standards**

| Functional Classification | Posted Speed | Minimum Spacing |
|---|---|---|
| US 101 | 55 mph | 1320 Feet |
| US 101 | 40-45 mph | 800 feet |
| District Highway | 40-45 mph | 500 feet |
| District Highway | 30-35 mph | 350 feet |
| District Highway | 25 mph | 250 feet |
| Local Roadways | -- | 25 Feet |

Source: *Oregon Highway Plan (OHP), Appendix C

## Roadway Inventory

An inventory was conducted for arterial and collectors within the study area, and Table 3 presents an overview of these roadways, their functional classification, as well as their jurisdiction, typical right-of-way (ROW), posted speed, number of lanes, pavement information, and important road usages. Figure 5 also displays the roadway system and other transportation related inventory information such as bridge locations, intersection traffic control, and functional classification of roadways.

All of the arterials and collectors listed in Table 3 are listed Evacuation Routes. Additionally, US 101 is part of the National Highway System (NHS), is a designated a High Clearance Freight Route, and is a listed Lifeline Route. All bridges within Warrenton are considered fair or better, and their locations can be seen in Figure 5. However, one bridge—along OR 104S and over the Skipanon River—is considered functionally obsolete, while still being in satisfactory condition.

The only freight route through Warrenton is US 101, which serves as a Federal Truck Route. US 101 crosses over Youngs Bay and handles freight traffic to and from Astoria and the Port of Astoria, as well as more southern destinations.

### Tsunami/Earthquake Evacuation Routes

Much of the coast line surrounding Warrenton, including downtown Warrenton, falls under a distant tsunami evacuation zone, while the majority of remaining area within Warrenton should evacuate if a local Cascadia earthquake occurs. Much of the land surrounding the Skipanon River also falls under a distant tsunami evacuation zone. The safest evacuation areas within Warrenton include Ridge Road and the area bounded by southeast of US 101, Ensign Lane, and US 101B. These include congregation areas near Ridge Road and Southwest 9th Road, Ridge Road and Southwest Long Lake Drive, and Ensign Lane and Southeast 19th Street. Most evacuation routes follow the collector and arterial road network, with prominent routes including Ridge Road, OR 104, US 101, and East Harbor Road. However, because much of OR 104 falls under a distant tsunami zone, and includes two bridges—one over Alder Creek, one over the Skipanon River that connects OR 104 to Northwest Harbor Place—there are inherent risks to relying on this as an evacuation route. If this route fails, there are limited possibilities for residences along the northeastern shoreline to evacuate. However, if Ridge Road can be reached, its relatively high elevation and capacity provide sufficient support to move people south to safe congregation areas.[3]

[3] Tsunami Evacuation Map: http://www.oregongeology.org/pubs/tsubrochures/WarrentonEvacBrochure-5-29-13_onscreen.pdf

### Table 3. Inventory of Arterials and Collectors

| Roadway Name | Functional Classification | Jurisdiction | ROW (ft) | Speed (mph) | No. of Lanes | Paved Width (ft) | Pavement Condition | Important Uses |
|---|---|---|---|---|---|---|---|---|
| US 101 (Oregon Coast Hwy) | Principal Arterial | State | 150-250 | 45-55[1] | 2-4[2] | 24-36 | Good/Fair | NHS, High Clearance Route, Tier 3 lifeline route, Evacuation Route |
| OR 104/Ft. Stevens Hwy | Major Collector | State | 60-100 | 25-45[3] | 2 | 22-46[4] | Fair | Evacuation Route |
| US 101B/ Warrenton-Astoria Hwy | Major Collector/ Minor Arterial[5] | State | 90-220 | 25-55[6] | 2 | 24-44 | Poor/Good | Evacuation Route |
| E Harbor St | Major Collector | State | 60-125 | 45 | 2-3[7] | 26-40 | Good/Very Good | Evacuation Route |
| Ridge Rd | Major Collector | Clatsop County | 155-330 | 45 | 2 | 22-30 | * | Evacuation Route |
| SE Ensign Ln | Major Collector | Clatsop County/ Municipal Street | 100-160 | 35 | 3-5 | 36-76 | Very Good | Evacuation Route |
| OR 104S | Major Collector | State | 65-80 | 45 | 2 | * | Very Good | Evacuation Route |
| Marlin Ave | Minor Arterial | State | 70-120 | 35 | 2 | * | Good | |
| SW 18th St | Major Collector | City of Warrenton | 100-130 | 35 | 2 | * | Good | Evacuation Route |
| SE 12th Pl | Minor Arterial | City of Warrenton | 75-80 | 35 | 2 | * | Very Good | Evacuation Route |

Notes:
1. Speed limit is 55 mph on Youngs Bay Bridge and shortly after the SE Ensign Ln at US 101 intersection.
2. Number of lanes increases from 2 to 3 to 4 as cars approach the signalized intersection of US 101 and SE Ensign Ln
3. Speed limit is 25 mph in the Hammond and Warrenton core, then transitions to 35 mph before reaching 45 mph from 7th Avenue to NW 4th Street.
4. Width of roadway significantly increases through town on S Main Avenue
5. Classified as a Major Collector west of US 101 and as a Minor Arterial east of US 101
6. Speed limit increases in 10 mph increments from 25 mph at downtown Warrenton to 55 mph at the eastern City Limits.
7. Number of lanes increases to three across Holbrook Slough River.
8. Data sourced from TransGIS[4], Google StreetView, and Bing Streetview.

[4] TransGIS: http://gis.odot.state.or.us/transgis/


**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

**Figure 5**

*Functional Classification*

# Existing Transportation Operations

The assessment of traffic conditions includes development of existing traffic volumes and an assessment of traffic operations.

## Study Area Intersections

The TSP study area includes 24 intersections for analysis (see Figure 1, page 2):

1. Pacific Dr at Ridge Rd/Lake Dr
2. Pacific Dr at Iredale St
3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street
4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave
5. Warrenton-Astoria Hwy at SE Galena Ave
6. E Harbor St at Marlin Dr
7. E Harbor St at SE Neptune Dr¬
8. E Harbor St at Young's Bay Plaza Access
9. E Harbor St at US 101 (signalized)
10. SW 2nd St/SW Gardenia Ave
11. OR 104/S Main Ave at SW 2nd St
12. US 101 at SE Neptune Dr (signalized)
13. US 101 at Marlin Dr (signalized)
14. NW Ridge Rd at SW 9th St
15. SW 9th St at OR 104/Ft Stevens Hwy
16. OR 104S/Ft Stevens Hwy Spur at US 101
17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr
18. Delaura Beach Ln at Ridge Rd
19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave
20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy
21. SE Ensign Ln at US 101
22. SE Ensign Ln at SE 19th St
23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur
24. US 101 at SE Dolphin Ave

## Traffic Data Collection

The transportation and traffic analysis was based on existing year 2015 conditions for the design hour (30th highest) volumes.

ODOT provided the following traffic counts:

- 16-hour turning movement counts, including bicycles and pedestrians with 15 minute breakdowns between 7:00 AM to 10:00 AM and 4:00 PM to 7:00 PM – 3 locations
- 3-hour PM peak turning movement counts, including bicycles and pedestrians, with 15 minute break downs between 4:00 PM and 7:00 PM – 19 locations
- 4-hour PM peak turning movement counts near schools, including bicycles and pedestrians, with 15 minute breakdowns between 2:30 PM and 6:30 PM – 2 locations

Generally, the majority of the traffic counts were conducted in the year 2015. There are three intersections that were conducted in September, 2013 which were grown to year 2015.

## Design Hourly Volumes

ODOT generally requires that transportation facilities be analyzed under design hourly volumes (DHVs), known as 30th highest hour volumes. The 30th highest hour volumes are used in traffic operations analysis so that results are valid for all but a few hours of the year. The procedure for determining 30th highest hour volumes is specified in ODOT's Analysis Procedures Manual (APM)[5]. Further details on the traffic analysis methodology may be found in Appendix B, while the volume development is available in Appendix C. Also available in Appendix C is the Average Weekday Traffic.

Motor vehicle volumes on the roadways in Warrenton peak during the evening between 4:00 p.m. and 5:00 p.m., but generally vary depending on the time of year. During the summer months, traffic volumes increase due to an influx of vacationers and visitors to Warrenton.

Figure 6 (page 16) shows the existing balanced 30th highest hour PM peak volumes developed for this project. The intersections that see the highest vehicular volumes during the peak hour are all located along US 101, with highest vehicular volumes occurring at the intersection of SE Ensign Lane and US 101.

### Truck Traffic

The percentages of trucks per approach at the study intersections, based on the intersection counts, range from 0-15% during the peak hour. Heavy vehicle traffic is highest along US 101 and at the intersections along Warrenton-Astoria Highway, which is consistent with US 101's designation as a High Clearance Freight Route and the industrial land uses served along Warrenton-Astoria Highway. Other roads under ODOT jurisdiction (Fort Stevens Highway OR 104 and Fort Stevens Highway OR 104 Spur) also move truck traffic through Warrenton. During the peak hour, US 101 at Marlin Drive experienced the highest volume of heavy vehicles, with nearly 90 trucks traveling through the intersection (five percent of the peak hour total entering volume). The intersection with the next highest volume of trucks during the peak hour was Fort Stevens Highway OR 104 at Skipanon Drive/Main Avenue; the 64 trucks during the peak hour accounted for six percent of the total entering volume.

Generally, heavy vehicles are more likely to be traveling north-south. Much of the freight movement in Warrenton may be attributed to the logging and fish processing operations around Tansy Point and Skipanon Waterway (accessed via Skipanon Drive). The Astoria Regional Airport also generates significant truck traffic. See Table 4 for a summary of heavy vehicle percentages by approach at study area intersections.

[5] Analysis Procedures Manual, Oregon Department of Transportation, Transportation Development Division Planning Section, Transportation Planning and Analysis Unit, Salem, Oregon, April, 2006, Section 4.3.

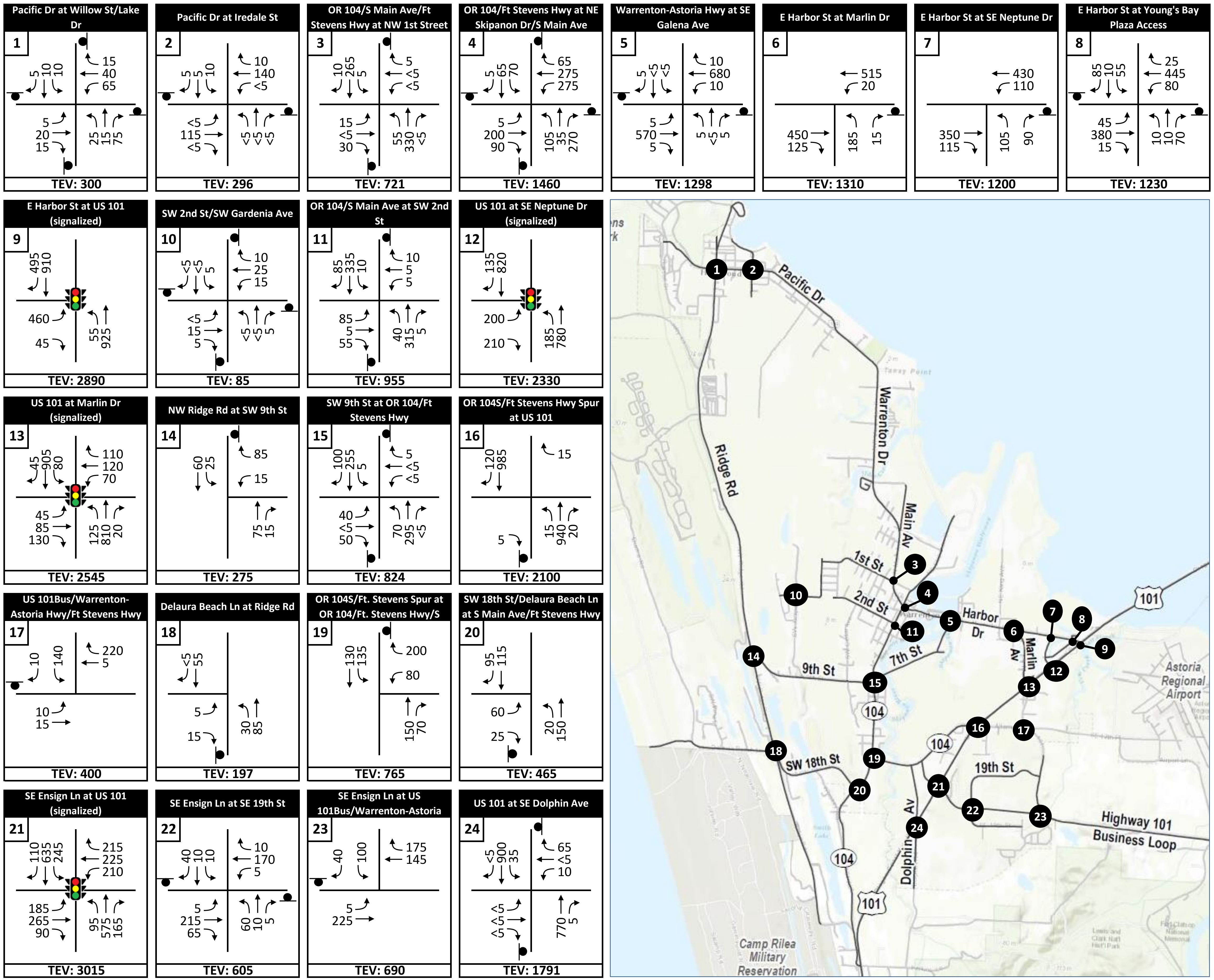
### Table 4. Existing (Year 2015) Peak Hour Truck Freight Percentages by Approach

| Intersection | Approach | | | |
|---|---|---|---|---|
| | Eastbound | Westbound | Northbound | Southbound |
| 1. Pacific Dr at Ridge Rd/Lake Dr | 0% | 2% | 6% | 0% |
| 2. Pacific Dr at Iredale St | 4% | 1% | 0% | 15% |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | 2% | 0% | 2% | 4% |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | 9% | 4% | 5% | 11% |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | 3% | 2% | 0% | 0% |
| 6. E Harbor St at Marlin Dr | 4% | 3% | 1% | - |
| 7. E Harbor St at SE Neptune Dr¬ | 4% | 3% | 0% | - |
| 8. E Harbor St at Young's Bay Plaza Access | 5% | 3% | 3% | 2% |
| 9. E Harbor St at US 101 (signalized) | 2% | - | 1% | 0% |
| 10. SW 2nd St/SW Gardenia Ave | 0% | 3% | 11% | 0% |
| 11. OR 104/S Main Ave at SW 2nd St | 3% | 9% | 1% | 2% |
| 12. US 101 at SE Neptune Dr (signalized) | 0% | - | 1% | 1% |
| 13. US 101 at Marlin Dr (signalized) | 5% | 5% | 6% | 7% |
| 14. NW Ridge Rd at SW 9th St | - | 3% | 10% | 3% |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | 0% | 0% | 2% | 1% |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | 0% | 0% | 2% | 3% |
| 17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | 8% | 2% | 0% | 3% |
| 18. Delaura Beach Ln at Ridge Rd | 7% | 8% | 0% | 5% |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | - | 3% | 6% | 2% |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | 5% | - | 7% | 4% |
| 21. SE Ensign Ln at US 101 | 0% | 0% | 1% | 1% |
| 22. SE Ensign Ln at SE 19th St | 3% | 0% | 7% | 0% |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | 5% | 4% | - | 11% |
| 24. US 101 at SE Dolphin Ave | 3% | 2% | 3% | 0% |

# Warrenton TSP

## Figure 6

*Existing Conditions (2015)*
*PM Peak Hour (4:00 - 5:00 PM)*
*Turning Movement Volumes*




**Legend**

- Allowable Movement
- TEV Total Entering Volume
- ## PM Peak Hour Turning Movement Volume
- Signalized Intersection
- STOP Controlled Approach
- ## Study Area Intersection

## Operational Criteria

Transportation engineers have established various methods for measuring traffic operations of roadways and intersections. Most jurisdictions use either volume-to-capacity (v/c) ratio or level of service (LOS) to establish performance criteria. Both the LOS and v/c ratio concepts require consideration of factors that include traffic demand, capacity of the intersection or roadway, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, convenience, and operating cost.

**Volume-to-Capacity (V/C) Ratio**

A comparison of traffic volume demand to intersection capacity is one method of evaluating how well an intersection is operating. This comparison is presented as a v/c ratio. A v/c ratio of less than 1.00 indicates that the volume is less than capacity. When it is closer to 0, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays.

**Level of Service (LOS)**

Level of service is also a widely recognized and accepted measure and descriptor of traffic operations. At both stop-controlled and signalized intersections, LOS is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Six standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

It should be noted that, although delays can sometimes be long for some movements at a STOP-controlled intersection, the v/c ratio may indicate that there is adequate capacity to process the demand for that movement. Similarly at signalized intersections, some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green time during a signal cycle, but their v/c ratio may be relatively low. For these reasons, it is important to examine both v/c ratio and LOS when evaluating overall intersection operations. Both are reported in the following section.

### Operational Standards

The City does not currently have a mobility target for its local streets; the project team anticipates reviewing mobility targets as part of the work involving updates to the City code. The traffic analysis will rely on Clatsop County and ODOT mobility targets for evaluation of intersection operations. A summary of mobility targets by study area intersection is provided in Table 5.

Clatsop County facilities have mobility targets that vary by intersection control. For signalized, all-way stop, or roundabout controlled intersections, the intersection as a whole must meet Level of Service (LOS) "E" or better and a volume to capacity (v/c) ratio not higher than 0.85. For two-way stop and yield controlled intersections, all movements serving more than 20 vehicles shall be maintained at LOS "E" or better and a v/c ratio not higher than 0.90. LOS "F" is acceptable at movements serving no more than 20 vehicles during the peak hour.

For State facilities, the Oregon Highway Plan (OHP) and the Highway Design Manual (HDM) will be used in the assessment of intersection operations. Both documents base their mobility performance on the calculation of volume-to-capacity (v/c) ratios; however, the standards in the HDM are based on higher performance levels than those in the OHP. The mobility targets from the OHP will be applied to the existing and future baseline (no build) analysis while the standards from the HDM will be applied to the evaluation of design alternatives.

### Table 5. Mobility Targets by Study Intersection

| ID | Count Location | Mobility Target[1] Clatsop County[2] | OHP[3] |
|---|---|---|---|
| 1 | Pacific Dr at Ridge Rd/Lake Dr[4] | v/c <=0.85, LOS E | 1.0 |
| 2 | Pacific Dr at Iredale St[4] | v/c <=0.90, LOS E | 1.0 |
| 3 | OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | v/c <=0.90, LOS E | 0.95 |
| 4 | OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | v/c <=0.85, LOS E | 0.95 |
| 5 | Warrenton-Astoria Hwy at SE Galena Ave | v/c <=0.90, LOS E | 0.95 |
| 6 | E Harbor St at Marlin Dr[4] | -- | 0.90 / 0.95 |
| 7 | E Harbor St at SE Neptune Dr | v/c <=0.90, LOS E | 0.90 |
| 8 | E Harbor St at Young's Bay Plaza Access | v/c <=0.90, LOS E | 0.90 |
| 9 | E Harbor St at US 101 (signalized) | -- | 0.80 |
| 10 | SW 2nd St/SW Gardenia Ave | v/c <=0.90, LOS E | -- |
| 11 | OR 104/S Main Ave at SW 2nd St[4] | v/c <=0.90, LOS E | 1.00 |
| 12 | US 101 at SE Neptune Dr (signalized) | -- | 0.80 |
| 13 | US 101 at Marlin Dr (signalized) | -- | 0.80 |
| 14 | NW Ridge Rd at SW 9th St | v/c <=0.90, LOS E | -- |
| 15 | SW 9th St at OR 104/Ft Stevens Hwy | v/c <=0.90, LOS E | 0.95 |
| 16 | OR 104S/Ft Stevens Hwy Spur at US 101 | -- | 0.80 / 0.90 |
| 17 | US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | -- | 0.90 / 0.95 |
| 18 | Delaura Beach Ln at Ridge Rd | v/c <=0.90, LOS E | -- |
| 19 | OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | -- | 0.95/0.90 |
| 20 | SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | v/c <=0.90, LOS E | 0.95 |
| 21 | SE Ensign Ln at US 101 (signalized) | v/c <=0.85, LOS E | 0.80 |
| 22 | SE Ensign Ln at SE 19th St | v/c <=0.90, LOS E | -- |
| 23 | SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | v/c <=0.90, LOS E | 0.90 |
| 24 | US 101 at SE Dolphin Ave | v/c <=0.90, LOS E | 0.80 |

Notes:
1. Unsignalized intersections may have two different mobility targets for the major and minor approaches
2. As the City of Warrenton does not currently have an adopted mobility target for local roads, the Clatsop County mobility targets were assumed for operational analysis
3. Table 6: Volume to Capacity Ratio Targets Outside Metro, Oregon Highway Plan, 1999
4. Intersection part of a Special Transportation Area (STA)

As noted in the table, a few of the study area intersections fall along highway segments designated as Special Transportation Areas (STA). An STA provides access to community activities, businesses, and residences, including pedestrian access along and across a highway, within a downtown, business district, and/or community center. Intersections within an STA have mobility targets that are less conservative, accepting of a higher level of congestion due to the increased activity in the vicinity.

## Traffic Operations Analysis Procedures

All operations for unsignalized intersections were evaluated using the methodology outlined in the 2010 Highway Capacity Manual (HCM), all operations for signalized intersections were evaluated using methodology outlined in the 2000 HCM, and operations were further benefited by procedures outlined in ODOT's Analysis Procedures Manual

(APM). The Synchro (version 9) analysis software was selected to perform the intersection analysis since it can provide the v/c ratio and LOS output of an HCM analysis.

Synchro is a macroscopic model similar to the Highway Capacity Software (HCS), and like the HCS, is based on the 2000 and 2010 HCM. The Synchro model explicitly evaluates traffic operations under coordinated and uncoordinated systems of signalized and unsignalized intersections. The v/c ratios and LOS presented in this report are based on the Synchro model output.

## Existing PM Peak Traffic Operations

Existing (2015) PM peak hour traffic operations were evaluated at the 24 study area intersections. Operations are described in the following sections and the detailed analysis worksheets are presented in Appendix D.

### Intersection Operations

Table 6 reports the operational results for the critical movement (worst movement that must stop or yield the right of travel to other traffic flows) with all individual movements reported in Figure 7. Critical movements at unsignalized intersections are typically the minor-street left turns or, in the case of single-lane approaches, the minor street approaches. These movements are required to yield to all other movements at the intersection and thus are subject to the longest delays and have the least capacity. Left turns from the major street are also subject to delays, since motorists making these maneuvers must also yield to oncoming major-street traffic.

Analysis of the PM peak shows there are four intersections within the study area that are not meeting mobility targets. All intersections are signalized and located along US 101, thus are held to the OHP standard of a 0.80 v/c. These intersections are US 101 at East Harbor Street (1.05), US 101 at Neptune Drive (0.88), US 101 at Marlin Drive (1.02), and US 101 at Ensign Lane (1.03).

Each of these intersections far exceeds the applicable mobility targets. In addition to not meeting mobility targets, three of the intersections experience v/c's greater than 1.0. Under seasonally factored conditions, when the traffic demand exceeds the available capacity (v/c greater than 1.0) vehicles experience excessive delay and queuing. It is also expected that vehicles may require more than one signal cycle to pass through the intersection.

For many of these intersections, the southbound movements exceed available capacity, although most movements experience high levels of delay. The intersection of US 101 at East Harbor Street has approximately 460 vehicles attempting to turn left onto US 101 from East Harbor Street. The general rule of thumb would suggest dual left-turn lanes if the left-turning volume exceeds 300 vehicles per hour[6]; however, there is only one receiving lane on US 101 to accommodate northbound traffic. Although the number of northbound vehicles is slightly greater than the southbound volume during the peak hour, the southbound through movement exceeds capacity because it has a shorter green light due to the northbound protected left-turn.

[6] Transportation Research Board (TRB). Highway Capacity Manual 2000. Washington, DC: TRB, National Research Council (NRC), 2000.

US 101 at Neptune Drive does not exceed capacity, however it does exceed ODOT's mobility target v/c of 0.80. This intersection provides the most direct access to the Fred Meyer driveways. This intersection has constraints similar to the intersection of US 101 at East Harbor Street, however the volumes are generally lower and the number of vehicles turning left onto US 101 is significantly lower.

For vehicles traveling south on US 101, US 101 at Marlin Drive is the first intersection providing access east of the highway. During the peak hour of the peak season, the volume just exceeds capacity. The southbound shared through-right movement has the highest volumes.

US 101 at Ensign Lane also exceeds capacity during the peak hour of the peak season. This intersection experiences the highest volume of traffic, which can be attributed to the large box stores on either side of US 101 (The Home Depot and Costco). The left-turning movements on all four approaches are failing while the through movements appear to operate well within acceptable levels. The allowable green time for the protected lefts is minimal for the amount of volume trying to get through the intersection; timing adjustments could potentially alleviate some delay for these movements, although it would likely be at the expense of the through movements.

The signal timing for the existing conditions analysis was collected from the most recent signal timing worksheets provided by ODOT; in order to most accurately reflect current conditions, timing was not optimized for analysis.

### Table 6. Existing (Year 2015) PM Peak Hour Traffic Operations Analysis Results

| Intersection | Major Approach V/C [1,2] | Major Approach LOS [2] | Minor Approach V/C [1,2] | Minor Approach LOS [2] | Mobility Target[3,4] |
|---|---|---|---|---|---|
| **Unsignalized Intersections** | | | | | |
| 1. Pacific Dr at Ridge Rd/Lake Dr | 0.16 | A | 0.14 | A | v/c <=0.85, LOS E |
| 2. Pacific Dr at Iredale St | 0.01 | A | 0.04 | B | v/c <=0.90, LOS E |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | 0.05 | A | 0.10 | B | v/c <=0.90, LOS E |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | 0.74 | D | 0.81 | D | v/c <=0.85, LOS E |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | 0.01 | A | 0.03 | C | v/c <=0.90, LOS E |
| 6. E Harbor St at Marlin Dr | 0.02 | A | 0.78 | F | 0.90 / 0.95 |
| 7. E Harbor St at SE Neptune Dr | 0.10 | A | 0.48 | D | v/c <=0.90, LOS E |
| 8. E Harbor St at Young's Bay Plaza Access | 0.08 | A | 0.55 | D | v/c <=0.90, LOS E |
| 10. SW 2nd St/SW Gardenia Ave | 0.07 | A | 0.01 | A | v/c <=0.90, LOS E |
| 11. OR 104/S Main Ave at SW 2nd St | 0.04 | A | 0.49 | D | v/c <=0.90, LOS E |
| 14. NW Ridge Rd at SW 9th St | 0.02 | A | 0.13 | A | v/c <=0.90, LOS E |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | 0.06 | A | 0.22 | C | v/c <=0.90, LOS E |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | 0.03 | B | 0.02 | C | 0.80 / 0.90 |
| 17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | 0.01 | A | 0.20 | B | 0.90 / 0.95 |
| 18. Delaura Beach Ln at Ridge Rd | 0.02 | A | 0.03 | A | v/c <=0.90, LOS E |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | 0.12 | A | 0.47 | C | 0.95/0.90 |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | 0.02 | A | 0.12 | B | v/c <=0.90, LOS E |
| 22. SE Ensign Ln at SE 19th St | 0.01 | A | 0.18 | B | v/c <=0.90, LOS E |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | 0.01 | A | 0.22 | B | v/c <=0.90, LOS E |
| 24. US 101 at SE Dolphin Ave | 0.05 | A | 0.47 | E | v/c <=0.80, LOS E |
| **Signalized Intersections** | | | | | |
| 9. E Harbor St at US 101 (signalized) | Overall | | **1.05** | D | 0.80 |
| 12. US 101 at SE Neptune Dr (signalized) | Overall | | **0.88** | C | 0.80 |
| 13. US 101 at Marlin Dr (signalized) | Overall | | **1.02** | E | 0.80 |
| 21. SE Ensign Ln at US 101 | Overall | | **1.03** | F | 0.80 |

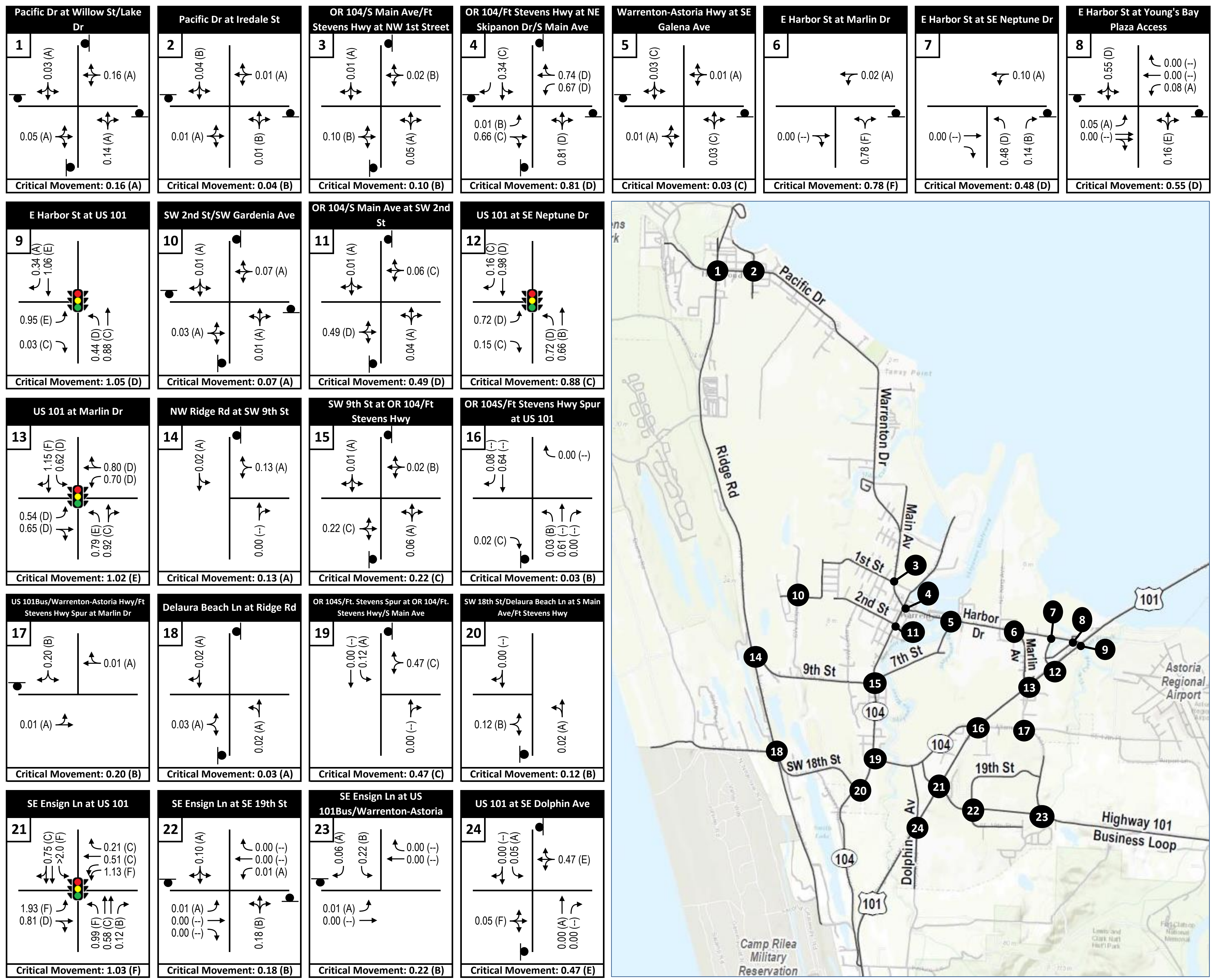
Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.

**SHADED** cells indicate the movement fails to meet applicable mobility target

Notes:

1. At intersections the results are reported for the worst operating movements on major and minor approaches that must stop or yield the right of travel to other traffic flows.
2. The v/c ratios and LOS are based on the results of the macrosimulation analysis using Synchro, which cannot account for the influence of adjacent intersection operations.
3. Mobility target is reported for the critical movement.
4. LOS mobility targets are not applied to State facilities.

*Source: David Evans and Associates, Inc.*




# Figure 7
*Existing Conditions (2015)*
*PM Peak Hour (4:00 - 5:00 PM)*
*Traffic Operations*

**Legend**

- Allowable Movement
- ## V/C Ratio
- ( ) Level Of Service
- Signalized Intersection
- STOP Controlled Approach
- ## Study Area Intersection

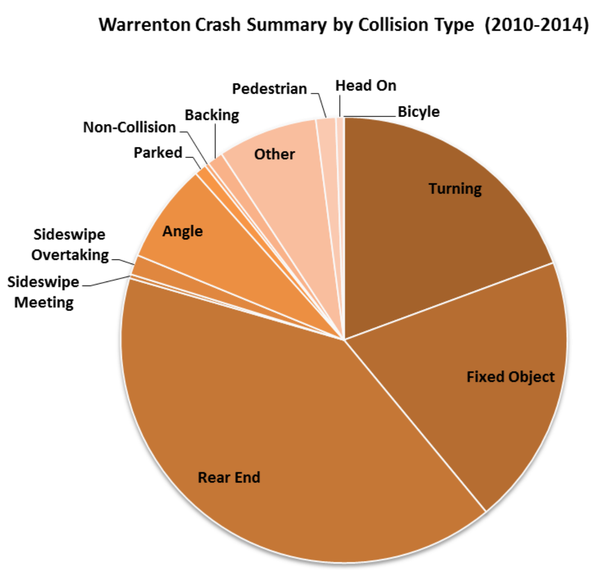
## Roadway Safety Analysis

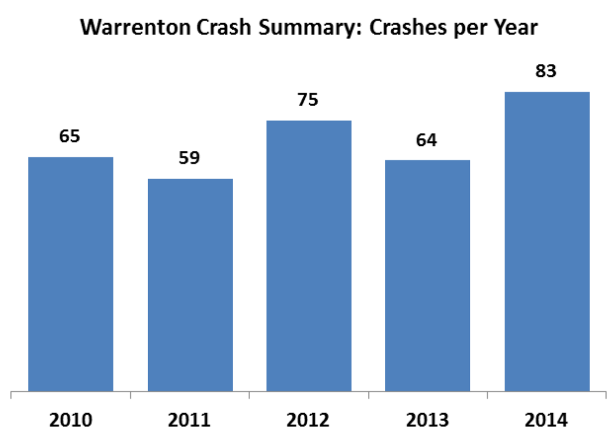
A safety analysis was conducted to determine whether any significant, documented safety issues exist within the management area and to inform future measures or general strategies for improving overall safety. This analysis includes a review of crash records, crash rates, and ODOT Safety Priority Index System (SPIS) data.

### Crash History

The crash analysis included a review of crash history data supplied by the ODOT Crash Analysis and Reporting Unit for the period between January 1, 2010, and December 31, 2014, which were the five most recent full years for which crash data were available at the time of the analysis. The city-wide data is summarized in Figure 8 and breakdown of crashes at study area intersections is presented in Table 7 (Page 27). Detailed crash reports may be found in Appendix E.

Within the entire City of Warrenton, there were 346 crashes during the five-year analysis period. A breakdown of the collision types and crashes by year is presented in the charts below.




A more detailed analysis was completed for the study area intersections. There were 173 crashes reported at project intersections during the five-year analysis period. The two intersections with the highest number of crashes were East Harbor Street at US 101 (38 crashes and a SPIS site) and US 101 at Marlin Drive (45 crashes). Of the reported crashes, 88 resulted in minor injury(s), 84 resulted in property damage only, and one resulted in a fatality or serious injury. While none of the crashes were bicycle related, two crashes involved pedestrians. The highest proportions of crashes were rear-end collisions. Three of the crashes involved alcohol, while nine involved speeding.


CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*
*ODOT 2010-1014.*

0 4,500 9,000 Feet

## Figure 8

*City of Warrenton*
*Crash Locations*
*(Years 2010 - 2014)*

## Network Screening

The Highway Safety Manual (HSM) Part B describes the critical crash rate method as a means of identifying locations that warrant further investigation. The critical crash rate is based upon average crash rates at comparable sites, traffic volume, and a confidence interval. Locations where the calculated crash rate exceeds the critical crash rate should be reviewed more closely to assess crash patterns. HSM Part B calculations are available in Appendix F.

Based on critical crash rates determined by the HSM Part B Network Screening methodology, two intersections had observed crash rates exceeding the calculated critical crash rate: Warrenton-Astoria Hwy at SE Galena Avenue and OR 104/S Main Avenue at SW 2nd Street. Nine intersections exceed statewide 90th percentile urban crash rates: Pacific Drive at Iredale Street, Warrenton-Astoria Hwy at SE Galena Avenue, East Harbor Street at US 101, OR 104/S Main Avenue at SW 2nd Street ,US 101 at Neptune Drive, US 101 at Marlin Drive, NW Ridge Road at SW 9th Street, US 101Business/Warrenton-Astoria Highway/Ft. Stevens Highway Spur at US 101Bus/Marlin Drive and Delaura Beach Lane at Ridge Road. These intersections account for 131 of the 173 crashes recorded at study area intersections within the five-year analysis period. Further detail about these locations is summarized below.

> **Warrenton-Astoria Hwy at SE Galena Avenue** had a crash rate of 0.30 crashes/MEV. There were six crashes over the five-year data period. The majority of these collisions were rear end.
>
> **OR 104/S Main Ave at SW 2nd Street** had a crash rate of 0.30 crashes/MEV and a total of eight crashes, the majority of which occurred as a result of turning vehicles (5). There were no pedestrian and bicycles involved in collisions at this intersection.
>
> **Pacific Drive at Iredale Street** had a crash rate of 0.44 crashes/MEV. There were two crashes over the five-year data period. One crash was not specific to a collision type and the other was parked. The crash rate is high because the volumes are relative low at this location.
>
> **East Harbor Street at US 101** had 38 collisions during the five-year data period; the second highest crash location in the study area with a crash rate of 0.86 crashes/MEV. The majority of these crashes were rear end collisions (33). Rear-end collisions commonly occur at signalized intersections because so many vehicles are required to stop with signalized traffic control. The one pedestrian-related collision was due to the pedestrian making an illegal crossing.
>
> **US 101 at Neptune Drive** had 27 crashes during the five-year data period with a crash rate of 0.76 crashes/MEV. The majority of these crashes were rear end collisions (20), likely caused by the congestion and the traffic signal. The one pedestrian-related collision was due to the pedestrian making an illegal crossing.
>
> **US 101 at Marlin Drive** had the highest number of crashes in the study area with 45 crashes during the five-year study period. The crash rate of 1.15 crashes/MEV was also the highest. Approximately half of the crashes were rear-end collisions, likely due to the traffic signal and congestion. Angle and turning collisions make up the majority of the remaining crashes. Many of the angle collisions were due to driver error (inattention, physically ill, slowing down). Turning collisions at this location were likely due to vehicles attempting to make the green light and hitting an oncoming vehicle.

**NW Ridge Road at SW 9th Street** had two crashes during the five-year data period with a crash rate of 0.47 crashes/MEV. One crash was a fixed-object collision and the other was turning related. The crash rate is high because the volumes are relative low at this location.

**US 101Business/Warrenton-Astoria Highway/Ft. Stevens Highway Spur at US 101Bus/Marlin Drive** had two crashes during the five-year data period with a crash rate of 0.33 crashes/MEV. One crash was a fixed-object collision and the other was turning related. The crash rate is high because the volumes are relative low at this location

**Delaura Beach Lane at Ridge Road** had one crash during the five-year data period with a crash rate of 0.33 crashes/MEV. The one crash was turning related. The crash rate is high because the volumes are the second lowest of all the study intersections.

One intersection not flagged for its crash rate but still significant was the intersection of US 101 at Ensign Lane. There were 29 crashes during the five-year data period with a crash rate of 0.63 crashes/MEV. The majority of these crashes were turning collisions (14) that occurred before the intersection was signalized, likely caused by side street traffic failing to yield right-of-way when turning onto US 101. The number of turning collisions dropped dramatically after the installation of the traffic signal.

This location was the only recorded fatality in the study area. The fatality resulted from a head-on collision where a vehicle crossed the center lane. This collision involved three vehicles, andfive people. A driver and passenger in one vehicle were killed, the driver and passenger in the vehicle that crossed the center lane sustained serious injuries and the third vehicle was property damage only. Although this crash is attributed to an intersection, the cause (head-on) and mile point (8.00) implies it more likely occurred along the segment of US 101 north of the intersection.

## Table 7. Crash History at Study Area Intersections

| Location | Collision Type: Rear End | Fixed Object | Angle | Backing | Turning | Sideswipe | Head On | Non-Collision | Parked | Bicycle/ Pedestrian | Miscellaneous | Total | Severity[1]: Fatal & Serious Injury | Minor Injury | Property Damage Only | Critical Crash Rate[2] (per MEV) | Statewide 90th Percentile Crash Rate (Rural) | Observed Crash Rate (per MEV) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Pacific Dr at Ridge Rd/Lake Dr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.52 | 0.41 | 0.00 |
| 2. Pacific Dr at Iredale St | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 2 | 0.52 | 0.41 | ***0.44*** |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 1 | 0.36 | 0.41 | 0.27 |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 2 | 0.28 | 0.41 | 0.13 |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 3 | 3 | 0.29 | 0.29 | ***0.30*** |
| 6. E Harbor St at Marlin Dr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.29 | 0.29 | 0.00 |
| 7. E Harbor St at SE Neptune Dr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.30 | 0.29 | 0.00 |
| 8. E Harbor St at Young's Bay Plaza Access | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.30 | 0.41 | 0.00 |
| 9. E Harbor St at US 101 (signalized) | 33 | 1 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 38 | 0 | 23 | 15 | --[4] | 0.51 | ***0.86*** |
| 10. SW 2nd St/SW Gardenia Ave | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.04 | 0.41 | 0.00 |
| 11. OR 104/S Main Ave at SW 2nd St | 0 | 1 | 2 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 3 | 5 | 0.32 | 0.41 | ***0.55*** |
| 12. US 101 at SE Neptune Dr (signalized) | 20 | 0 | 1 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 27 | 0 | 12 | 15 | --[4] | 0.51 | ***0.76*** |
| 13. US 101 at Marlin Dr (signalized) | 23 | 4 | 9 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 1 | 45 | 0 | 20 | 25 | --[4] | 0.86 | ***1.15*** |
| 14. NW Ridge Rd at SW 9th St | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0.53 | 0.29 | ***0.47*** |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 2 | 0.34 | 0.41 | 0.24 |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 0.25 | 0.41 | 0.06 |
| 17. US 101Bus/Warrenton-Astoria Hwy/ Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0.45 | 0.29 | ***0.33*** |
| 18. Delaura Beach Ln at Ridge Rd | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0.63 | 0.29 | ***0.33*** |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0.34 | 0.29 | 0.09 |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0.42 | 0.29 | 0.14 |
| 21. SE Ensign Ln at US 101 (signalized) | 11 | 1 | 0 | 0 | 14 | 2 | 1 | 0 | 0 | 0 | 0 | 29 | 1 | 17 | 11 | --[4] | 0.86 | 0.63 |
| 22. SE Ensign Ln at SE 19th St | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.38 | 0.41 | 0.00 |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.36 | 0.29 | 0.00 |
| 24. US 101 at SE Dolphin Ave | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.26 | 0.41 | 0.00 |

**Notes:** ***Bold and Italicized*** indicates crash rate over statewide 90th percentile crash rate, shaded indicates crash rate over reference population critical crash rate.

1. There were no fatal collisions recorded in the most recent 5-years of available crash data
2. Critical crash rate (per Million Entering Vehicles) calculated based on 95% confidence level
3. Crash rates could only be calculated for intersections where traffic count data has been collected.
4. Not enough of intersection type to perform reference population critical crash rates.

### Excess Proportion of Specific Crash Types

The Excess Proportion of Specific Crash Types method quantifies the extent to which a specific crash type (the target crash type) is overrepresented at an analysis site, compared to the average representation within a reference population.[7] Excess proportion of specific crash types analysis does not consider the overall frequency or rate of crashes, instead it considers only the types of crashes observed. ODOT provides a limited spreadsheet tool that implements excess proportion of specific crash types; the outputs from this spreadsheet are available in Appendix E.

For the Warrenton TSP study area, two intersections have greater than a 90 percent probability of a greater than expected proportion of either rear-end or turning collisions. The results are summarized below:

**Table 8. Excess Proportion Crash Locations**

| Intersection | Crash Type | Probability[1] | Excess Proportion[2] |
|---|---|---|---|
| US 101 at Neptune Dr | Rear End | 0.96 | 0.14 |
| SE Ensign Ln at US 101 | Turning | 0.96 | 0.21 |

Note: Full results in Appendix E

1. Excess Proportion analysis assumed greater than 90% minimum probability
2. Excess Proportioin analysis assumed 10% minimum excess proportion

This means that there is a 96% chance that the long term expected proportion of rear end crashes at US 101 at Neptune Drive will be greater than the long term expected proportion of rear end crashes at three-legged signalized intersections when compared to the rest of the three-legged signalized intersections in the study area. There is a 96% chance that the long term expected proportion of turning crashes at US 101 at SE Ensign Lane will be greater than the long term expected proportion of rear end crashes at four-legged signalized intersections when compared to the rest of the four-legged signalized intersections in the study area.

The great the excess proportion value, the greater likelihood that the site will benefit from a countermeasure targeted at the collision type under consideration.[8] Both of the flagged interesctions in Table 8 are signalized intersections. The alternatives analysis should consider potential safety improvements that would provide countermeasures to turning and rear end collisions at the intersections listed.

### Safety Priority Index System (SPIS)

The SPIS is a method used in Oregon to identify safety problem areas along state highways. Highways are evaluated in approximately one-tenth mile increments (often grouped into larger segments). Each year these segments are ranked by assigning a SPIS score based on the frequency and severity crashes observed, while taking traffic volume into account. When a segment is ranked in the top 10% of the index, a crash analysis is typically warranted and corrective

[7] ODOT Analysis Procedure Manual Version 2, Section 4.3.5, p. 4-76, 2016.

[8] Highway Safety Manual 4-58

actions are considered. These segments can be found in Table 9. There are two segments along US 101 within the study area that are identified as being in the top 10% of the most recent SPIS rankings.

### Table 9. Top 10% ODOT SPIS Site Summary

| Highway | Beginning Mile Point | End Mile Point | ADT | Total Crashes | Fatal & Injury A[1] Crashes | City/ County | Connection |
|---|---|---|---|---|---|---|---|
| **US 101** | 6.48 | 6.58 | 13,500 | 20 | 0 | Warrenton | - |
| **US 101** | 7.96 | 8.09 | 13,600 | 16 | 1 | Warrenton | SE Ensign Ln |

Note:

1. Incapacitating or serious Injury

Source: ODOT SPIS Report 2015 (2012-2014 Data)

The first segment, between mile point 6.48 and 6.58 on US 101 includes the signalized intersection with East Harbor Street and an unsignalized driveway that provides access to some commercial businesses. An overwhelming majority (85 percent) of the 20 crashes at this location were rear-end collisions caused by following too closely or driver inattention. Both the traffic signal and driveway could be contributing to the high number of crashes along this section of US 101, however the prevalence of rear-end collisions would imply that the traffic signal at East Harbor Street is the likely cause.

The other segment, between mile point 7.96 and 8.09 on US 101 includes the signalized intersection with Ensign Lane, which provides access to large chain stores (The Home Depot, Costco, TJ Maxx and others). There are no other access points within this segment. As previously mentioned, this intersection became signalized in the midst of the analysis period. The majority of the crashes in this segment were caused by following too closely and failing to yield the right-of-way. As summarized in the Network Screening section, the one fatal collision was a result of a head-on collision where the driver crossed the centerline into oncoming traffic.

ODOT is finalizing a project list of 2017-2021 All Roads Transportation Safety (ARTS) projects. One such potential ARTS project will seek to improve safety along US 101 at the signalized intersections in both SPIS locations. This project allows for signal hardware upgrades and includes: reflectorized backplanes (making the signals more visible) and countdown pedestrian heads for all signals, and dilemma zone protection at US 101 and East Harbor Street. Dilemma zone protection would likely consisted of warning signs equipped with one or more yellow flashing beacons that instruct drivers of the upcoming traffic signal. At the time this memorandum was written, the project had been shelved as the ARTS program pursues a separate funding source.

# Pedestrian and Bicycle System Inventory

This section describes the existing pedestrian and bicycle facilities within the city of Warrenton. Pedestrian facilities include sidewalks, multi-use paths, trails and crosswalks that help to facilitate safe and efficient pedestrian travel. Bicycle facilities include bicycle lanes, multi-use paths and trails along regionally significant corridors.

## Trail System

Several multi-use paths exist within Warrenton. The Warrenton Waterfront trail, roughly five miles in length, runs from SE 3rd Street at its southern terminus to NW 13th Street as its northern terminus. The trail is a mix of on-road and rail-trail bridges. Lagoon trail meets up with the Warrenton Waterfront Trail, and connects to NE Skipanon Drive. The Skipanon River Loop Trail performs a loop that travels along the east bank and west bank of the Skipanon River. In addition to paved multi-use paths, there is an extensive "soft" path trail system throughout Warrenton, generally providing access to the park system (both State and local). Soft trails may be "unofficial" (abandoned railroad bed) or made of softer surface such as bark dust or woodchips.

Soft Trails:

- Fort to Sea Trail
- South Slough Trail
- Netul River Trail
- Jetty Trail
- Kwis Kwis Loop
- Airport Dike Trail
- Bayfront Dike Trail
- Skipanon River Loop Trail
- Warrenton Waterfront Trail
- Lagoon Spur Trail
- Dump Station Trail
- Jetty Trail
- Isaac Stevens Trail
- Trestle Bay Trail
- Kestrel Dune Trail
- DeLaura Dune Trail
- Sunset Trail
- Coffenbury Lake Trail
- Bettery Russel South
- Russel Dune Trail
- East Spur Trail

## Pedestrian Facilities

The bicycle and pedestrian systems within Warrenton mainly follow the local arterials and State Highways; while most local streets lack facilities. See Figure 9 for the complete list of bicycle and pedestrian facilities. Key pedestrian volumes occur at the following study intersections (see Figure 1) Fort Stevens Highway and Northeast Skipanon Drive (#4), South Main Avenue and Southwest 2nd Avenue (#11), and Pacific Drive and Ridge Road (#1). While the highest concentration of sidewalks can be found in downtown Warrenton, the majority of the facilities are along roadway shoulders where pedestrians must share the shoulder with cyclists and parked cars. Locations of sidewalks along arterial and collector streets can be found in Table 10, while the quality of the segment can be found in **Error! Reference source not found.** (page 35.)


CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*ODOT, City of Warrenton, Clatsop County, Oregon. 2015.*

N
0 4,500 9,000 Feet

# Figure 9

*Bicycle/Pedestrian Inventory*

**Table 10. Inventory of Bicycle and Pedestrian Facilities on Arterials and Collectors**

| Roadway Name | Sidewalks | Bike Lanes | Street Lighting | Shoulder | On-Street Parking |
|---|---|---|---|---|---|
| US 101 | Yes[1] | Yes[1] | At intersections | Yes | No |
| OR 104 (Ft. Stevens Hwy) | Yes[2] | Yes[2] | Minimal/Some intersections | Yes[2] | Yes[2] |
| US 101B (Warrenton-Astoria Hwy) | Yes[3] | No | At intersections | Yes | No |
| E Harbor St | No | No | Minimal/some intersections | Yes | Yes |
| Ridge Rd | No | No | Some intersections | Yes | Yes |
| SE Ensign Ln | Yes[3] | Yes | No | Yes | No |
| OR 104 S | No | Yes | No | Yes | No |
| Marlin Ave | No | Yes | Yes | Yes | Yes |
| SW 18th St | No | Yes | Minimal | Yes | Yes |
| SE 12th Pl | No | No | Yes | No | No |

Notes:
1. Sidewalk and bicycle lanes exist in limited locations on the northwest side of US 101
2. Sidewalks and bicycles lanes are inconsistent on OR 104
3. Sidewalk is discontinuous

In a review of aerial maps, more detailed bicycle and pedestrian information was determined. There is a of sidewalk approximately 1,000 feet long on the northwest side of US 101 on either side of the intersection at US 101 and SE Ensign Lane, as well as a roughly 600 foot stretch heading south along the eastern side of US 101 from SE Ensign Lane.

Along OR 104, there is no sidewalk present from Enterprise Street to nearly North Main Avenue, where sidewalk starts and exists on either side of North Main Avenue.

On Warrenton-Astoria Highway, there is no sidewalk present on the south side of the roadway from 160 feet east of SE Anchor Avenue to SE Galena Avenue. Sidewalk does not exist from SE/NE King Avenue to SE 2nd Street, or on the east side of the roadway approximately 160 feet north of SE 11th Place to the City limits. Sidewalk does exist on the north side of Warrenton-Astoria Highway between NE Heron Avenue and Ensign Road.

On SE Ensign Lane, sidewalk fully present on the north side, and partially on the south side, of the roadway between OR 104S and US 101, on the north side of the roadway between US 101 and SE 19th Street and on both sides of the roadway from SE 19th Street to US 101B.

A qualitative assessment of the pedestrian facilities was also performed. Most pedestrian facilities can be rated "poor" when considering what type of system is currently in place in Warrenton. This means that facilities either are not in place or a pedestrian is required to travel along a roadway shoulder against vehicles at higher speeds. Figure 10 and Table 11 (Page 36) summarize the qualitative assessment for pedestrian facilities.


**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*ODOT, Clatsop County, Oregon. 2015.*

0 4,500 9,000 Feet

# Figure 10

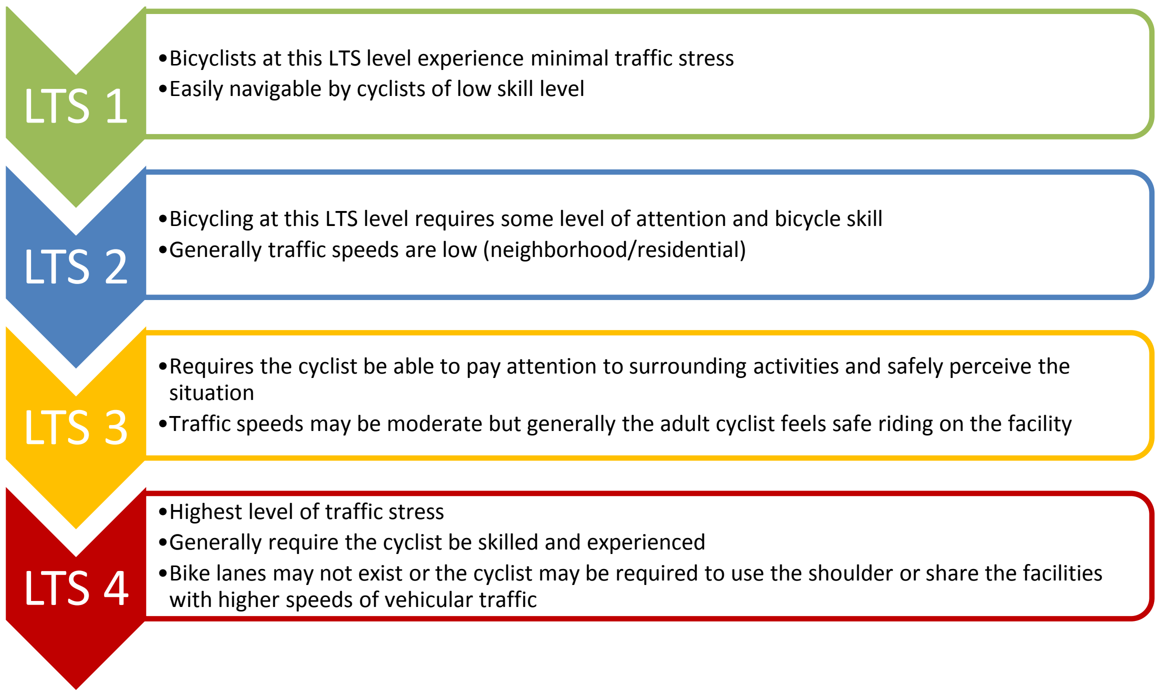
*Pedestrian Qualitative Assessment*

## Bicycle Facilities

### Bicycle Level of Traffic Stress

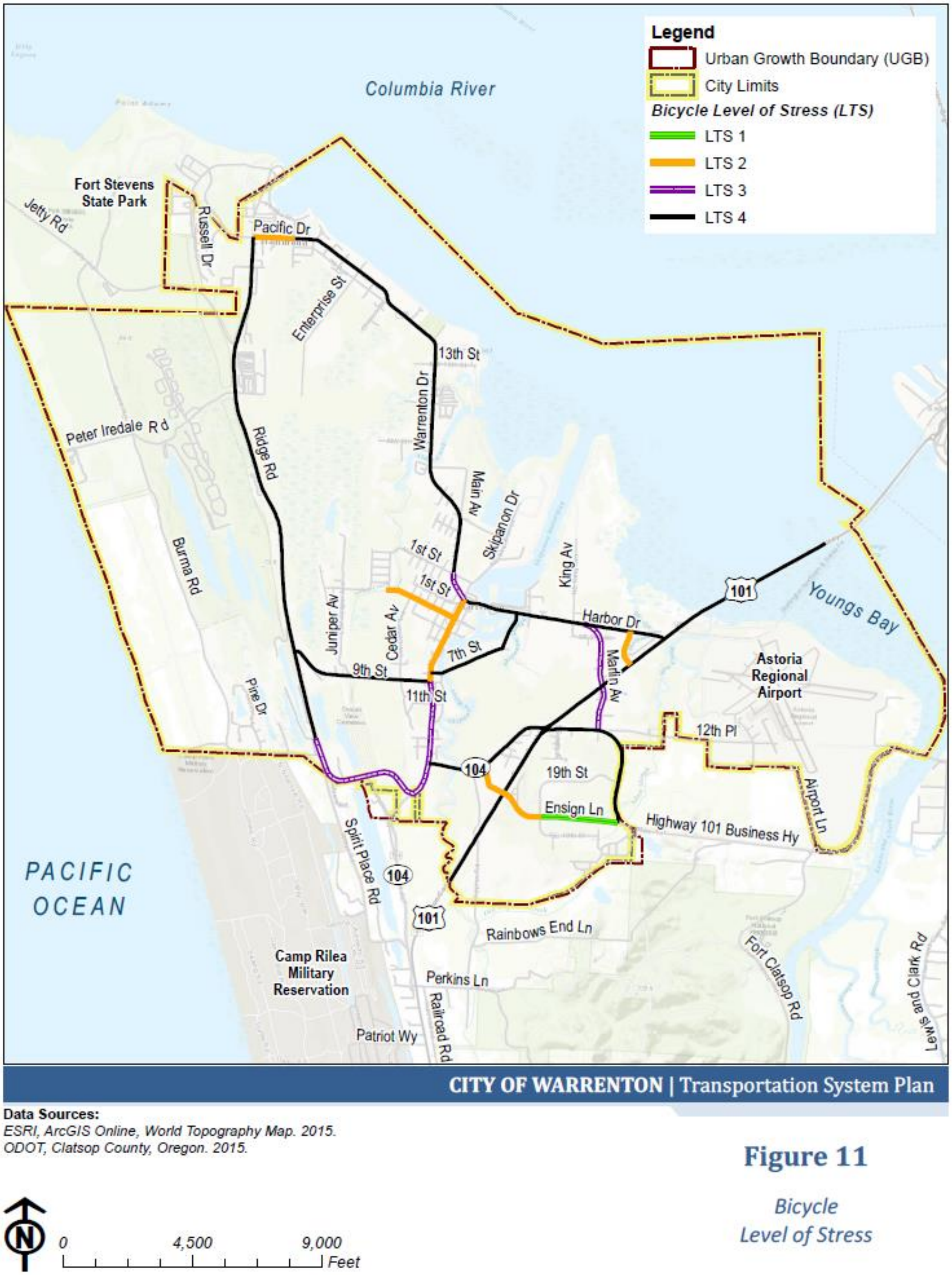
The bicycle operations within the study area were analyzed using ODOT's methodology for Bicycle Level of Traffic Stress (LTS) for roadway segments. LTS measures the effect of traffic-based stress on bicycles by quantifying the perceived comfort levels a bicyclist experiences on a given facility. Some characteristics used to determine LTS are presence of a bicycle lane, width of facilities, posted speed, adjacent parking facilities and land use (rural or urban).

LTS can be classified as Level 1, 2, 3 or 4, where Level 1 is low stress and Level 4 is high stress.




In addition to reviewing LTS, a qualitative assessment of the bicycle facilities was performed. Most bicycle facilities can be rated "fair" when considering what type of system is currently in place in Warrenton. This means that though the facilities may not be ideal; there is a route for the experienced rider to use.

Along US 101, bicycle facilities consist of wide outside lanes where there exists enough shoulder for an automobile to comfortably pass a cyclist. Along Fort Stevens Highway OR 104, between US 101 and SW 9th Street, there exist new constructed bikeways as part of a OTC STIP project. The majority of the study area roadways were measured at a LTS 4, due to lack of facilities/buffers and high vehicular speeds. There were no roadways classified as LTS 1. Figure 11 displays the LTS for each collector/arterial within the City of Warrenton, and Table 11 lists qualitative facility assessment (good, fair, poor) for bicycle and pedestrian facilities along the study area arterials and collectors. Background information for how the LTS was calculated is available in Appendix G.




Data Sources:
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*ODOT, Clatsop County, Oregon. 2015.*

**Figure 11**

*Bicycle Level of Stress*

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### Table 11. Bicycle and Pedestrian Qualitative Assessment

| | Mode | |
|---|---|---|
| Segment (Intersection-Intersection) | Pedestrian | Bicycle |
| Pacific Dr between Ridge Rd & Iredale St (1-2) | Poor | Fair |
| Ridge Rd between Pacific Dr and SW 9th St (1-14) | Poor | Fair |
| Pacific Dr between Iredale St and 1st St (2-3) | Poor | Fair |
| Main Ave between NW 1st St and OR 104 (3-4) | Poor | Fair |
| OR 104 between Harbor Dr and SW 2nd St (4-15) | Good | Poor |
| Harbor Dr between OR 104 and SE Galena Ave (4-5) | Fair | Fair |
| Harbor Dr between SE Galena Ave and Marlin Dr (5-6) | Poor | Fair |
| SE Galena/7th St between Harbor Dr and OR 104 (5-15) | Poor | Poor |
| Harbor Dr between Marlin Dr and SE Neptune Dr (6-7) | Poor | Fair |
| Marlin Dr between Harbor Dr and Us 101 (6-13) | Fair | Fair |
| Harbor Dr between SE Neptune Dr and US 101 (7-9) | Fair | Fair |
| SE Neptune Dr between Harbor Dr and US 101 (7-12) | Good | Poor |
| US 101 between Harbor Dr and Marlin Ave (9-13) | Poor | Fair |
| SW 2nd St between SW Gardenia Ave and OR 104 (10-11) | Fair | Fair |
| Marlin Dr between US 101 and US 101B (13-17) | Poor | Fair |
| SW 9th St between NW Ridge Rd. and OR 104 (14-15) | Poor | Fair |
| NW Ridge Rd. between SW 9th St and SW 18th St (14-18) | Poor | Fair |
| OR 104 between SW 9th St and OR 104S (15-19) | Poor | Fair |
| US 101 Bus between US 101 and Marlin Dr (16-17) | Poor | Fair |
| OR 104S between OR 104 and US 101 (16-19) | Poor | Fair |
| US 101 between OR 104S and SE Ensign Ln (16-21) | Poor | Fair |
| US 101 Bus between Marlin Dr and SE Ensign Ln (17-23) | Poor | Fair |
| SW 18th St between Ridge road and OR 104 (18-20) | Poor | Fair |
| OR 104 between OR 104S and SW 18th St (19-20) | Poor | Fair |
| SE Ensign Ln between OR 104 and 19th St (21-22) | Good | Good |
| SE Ensign Ln between 19th St and US 101 Business (22-23) | Good | Excellent |
| US 101 between SE Ensign St and SE Dolphin Ave (21-24) | Poor | Fair |
| SE Ensign Ln between 19th St and US 101 Business (22-23) | Good | Good |

**Table 12. Study Intersection Ramp Inventory**

| Intersection | Ramp Location | | | | Marked Crossing |
|---|---|---|---|---|---|
| | NW Corner | NE Corner | SW Corner | SE Corner | |
| 1. Pacific Dr at Ridge Rd/Lake Dr | No | No | No | No | No approaches |
| 2. Pacific Dr at Iredale St | No | No | No | No | No approaches |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | No | No | No | No | No approaches |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | Yes | Yes | Yes | Yes | NW-SW, SW-SE, SE-NE |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | Yes | Yes | No | No | No approaches |
| 6. E Harbor St at Marlin Dr | No | No | No | No | No approaches |
| 7. E Harbor St at SE Neptune Dr | No | No | Yes | No | No approaches |
| 8. E Harbor St at Young's Bay Plaza Access | No | No | No | No | No approaches |
| 9. E Harbor St at US 101 (signalized) | Yes* | Yes* | Yes* | Yes* | NW-SW, SW-SE |
| 10. SW 2nd St/SW Gardenia Ave | No | No | No | - | No approaches |
| 11. OR 104/S Main Ave at SW 2nd St | Yes | Yes | Yes | Yes | All approaches |
| 12. US 101 at SE Neptune Dr (signalized) | No | No | No | No | All approaches |
| 13. US 101 at Marlin Dr (signalized) | Yes | Yes | Yes | Yes | All approaches |
| 14. NW Ridge Rd at SW 9th St | No | No | - | - | No approaches |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | Yes | No | No | No | NW-NE |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | No | No | No | No | No approaches |
| 17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | No | No | No | No | No approaches |
| 18. Delaura Beach Ln at Ridge Rd | - | - | - | - | No approaches |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | - | No | - | Yes | No approaches |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | No | No | No | - | No approaches |
| 21. SE Ensign Ln at US 101 | Yes | Yes | Yes | Yes | All approaches |
| 22. SE Ensign Ln at SE 19th St | Yes | Yes | No | Yes | NW-SW, NW-NE |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | Yes | No | - | - | No approaches |
| 24. US 101 at SE Dolphin Ave | No | No | No | No | No approaches |
| * Curb ramp built, but no connecting sidewalk. | | | | | |

## Bicycle and Pedestrian Deficiencies

In reviewing the current network of bicycle and pedestrian facilities throughout Warrenton, it is apparent the system is only partially connected. Along US 101, bicycle facilities consist of wide outside lanes where there exists enough shoulder for an automobile to comfortably pass a cyclist. Along Fort Stevens Highway OR 104, between US 101 and SW 9th Street, there exist new constructed bikeways as part of a OTC STIP project. The system is disjointed and could benefit from connecting the facilities that do exist.

# Public Transportation Inventory

## Local Transit Service

Local, public transit services are provided by Sunset Empire Transportation District (SETD). SETD provides transit services in Clatsop County and buses are equipped with bicycle racks and either a ramp or a lift to allow wheelchair access. Their services include:

- Fixed-Route Service – routes operate seven days a week within the five incorporated cities (Astoria, Warrenton, Gearhart, Seaside and Cannon Beach) and see roughly 3,500 rides per week.
- RIDEASSIST – paratransit service provided to aid persons with disabilities that cannot access the fixed route system.
- RIDECARE – assisted travel for medical purposes.

### Fixed-Route Service – SETD

The following routes serve Warrenton:

- **Route 10:** Connects Astoria, Hammond, and Warrenton, and only operates Monday thru Friday. Headways are 60 minutes between the hours of 6:00 am and 7:00 pm. Key destinations along the route include Astoria Transit Center, Clatsop Community College, Emerald Heights, and the Department of Motor Vehicles.
- **Route 15:** Connects the Transit Center in Warrenton with the Transit Center in Astoria, and passes through Hammond. The route operates Monday through Friday between roughly 6:00 am and 6:00 pm, with headways that fluctuate between 30 minutes and 190 minutes.
- **Route 101:** Operating Monday through Friday from 6:00 am to 8:00 pm, headways are roughly 60 minutes. This route connects Astoria, Warrenton, Gearhart, Seaside, and Cannon Beach.
- **Pacific Connector:** Connects Astoria, Warrenton, Gearhart, Seaside, Cannon Beach, and Tillamook County, with runs happening on weekends. Southbound buses have two trips in the morning, with roughly two hour spacing, and one trip in the afternoon. Northbound buses have three departures at approximately three-hour intervals.
- **Route 12 (Seasonal):** This route generally runs in the summer and stops at Port of Astoria, Fred Meyer and Costco.

### RIDEASSIST – SETD

A paratransit service provided by the public transit agency to aid those who cannot access the fixed-route service. This service is curb to curb, wheelchair accessible, and operates Monday through Friday. Pick up and drop off times and locations can be arranged, and reservations should be made at least one day in advance.

## Regional Transit Connections

### NorthWest POINT

Provides passenger bus service between Astoria and Portland. Nine stops in total, of which include Warrenton, Cannon Beach, and Seaside. Bus service is operated by MTR Western in a public-private partnership to provide transit to the coastal region. There are two departures a day (morning and evening). The buses are wheelchair accessible, and are Wi-Fi enabled.

**Pacific Transit**

Route-fixed bus service provided by Pacific Transit that operates in Pacific County, Washington and the City of Astoria. Can transfer to SETD Routes 10, 15, or 101 in Astoria.

## Transit Facilities

There are about 10 bus stops in Warrenton including stops Downtown on Main Street, Costco, Fred Meyer, KOA, Parkview Apartments and Hammond neighborhood. Of the bus stops, only a fraction offer benches and shelter and some lack sidewalks connections to the surrounding neighborhoods and businesses.

SETD Bus Stop/Shelter at Hammond 4 Way Bus Stop

SETD Bus Stop/Shelter at Warrenton Mini Mart Bus Stop (Main Street)

## Rail Inventory

There are currently no active railroad lines in Warrenton, as all old lines have been removed. However, services provide connections to Astoria where rail does travel. Route-fixed bus service operated by SETD provides connections via routes 10, 15, or 101, and both Pacific Transit and NorthWest POINT provide bus service to Astoria.

## Aviation Inventory

The Astoria Regional Airport, owned and operated by the Port of Astoria, is located within the Warrenton city limits/UGB and is home to the Coast Guard Air Station Astoria. The Regional Airport is 10 minutes from Astoria, 20 minutes from the City of Seaside, and 40 minutes from Cannon Beach. The Astoria Regional Airport Master Plan Update was completed in 2008, and provides a comprehensive evaluation and inventory of the airport. The airport has two runways, and includes passenger terminal facilities, US Coast Guard Facilities, hangers and aircraft storage, commercial aviation businesses, and a fuel storage facility. Nearly 82% of operations are attributed to general aviation operations. Many of which are single engine aircrafts.

## Water (Marine) Transportation

While much of the coast is given over to residential waterfront, there are two main marinas within Warrenton. Hammond Marina is located in northwestern Warrenton and provides access and dock space for smaller private and commercial vessels, being able to handle recreational boats up to 50 feet long. It can be accessed by Iredale Street and Lake Drive. The Skipanon waterway provides water access to the Warrenton Marina as well as access to Hampton Lumber Mills and the Pacific Coast Seafoods site, as well as the east bank Skipanon Peninsula. The channel is 30 feet deep, and the mooring basin is 12 feet deep. Nygaard logging is also located along the northeastern shoreline, and vessels are able to access the lumberyard near Tansy Point. The only other feature along the shoreline is a 300-foot wharf located near Point Adams Packing. Vessels too large to use these two waterways can be referred to the nearby Port of Astoria.

## Pipeline Transportation

Warrenton is served by a Northwest Natural Gas pipeline that runs along the Columbia River from US 101 toward Hammond. No other significant pipelines exist within Warrenton.

## Intelligent Transportation Systems (ITS)

Two pieces of ITS equipment exist along US 101: a Highway Advisory Radio (HAR) Beacon Sign and a Variable Message Sign (VMS). The HAR Beacon is located just north of Dolphin Avenue and alerts northbound traffic to upcoming congestion with flashing lights. The VMS is just over a mile south of Warrenton. Although it is outside City Limits, it provides alerts to northbound travelers on US 101.

# Current Funding Summary

The City of Warrenton currently has the following transportation funding mechanisms:

| Funding Sources (Past 5 Years) | | | | | |
|---|---|---|---|---|---|
| | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 |
| **State Tax Street Funds** | $1,499,595 | $1,510,465 | $1,719,455 | $2,013,543 | $1,741,391 |
| **Streets SDC Fund** | N/A | $126,985 | $167,559 | $71,698 | $550,650 |

The State Tax Street Funds are provided by the Oregon Department of Transportation, the State Highway Trust Fund, and the City 0.03 cent fuel tax. One percent of all gas tax receipts are set aside for bicycle lanes and pedestrian paths. The City fuel tax will net approximately $288,000 in fiscal year 2015-16. The City fuel tax is used to pay for rebuilding and overlaying city streets, with the remaining balance going towards street maintenance, street repair, and street lighting.

The Streets SDC Fund may be used for transportation improvements "including but not limited to streets, sidewalks, bike paths, street lights, trees, mass public transportation, vehicle parking, and bridges."[9]

The proposed expenditures for 2015-16 include the following:

- Personnel Services - $75,643
- Materials and Services - $374,033
- Capital Outlay - $1,488,976
- Contingency - $89,535

The total expected funding for 2015-16 is $2,292,041 and the total expected expenditures are $2,026,187, leaving an expected balance of $265,854.

[9] City of Warrenton. Draft Report for System Development Charges. Prepared by FCS Group. December, 2011.

# MEMORANDUM #5 - Appendix

Appendix A

Land Use and Natural Resources

Appendix B

Traffic Methodology

Appendix C

Volume Development

Appendix D

Synchro Worksheets

Appendix E

ODOT Crash Reports

Appendix F

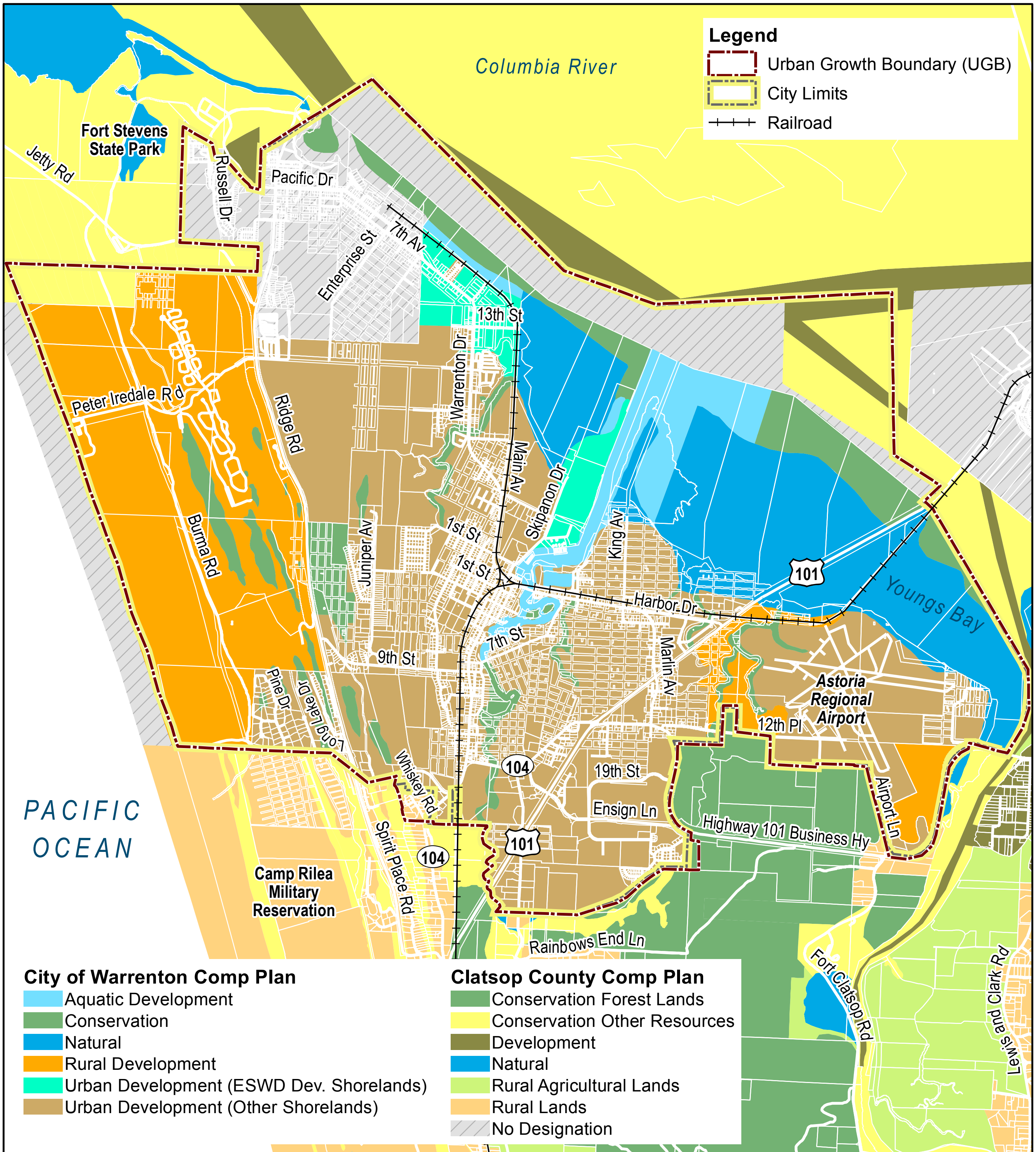
Critical Crash Rate

Appendix G

Bicycle Level of Traffic Stress

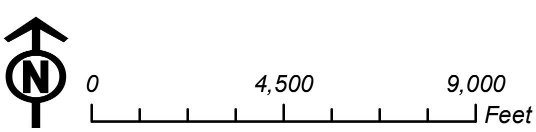
# Appendix A

## Land Use, Natural Resources and Transportation Disadvantaged Populatioins






**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*




*Comprehensive Plan Designations*


**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

*Environmental Justice: Households per Square Mile*

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CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

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*Environmental Justice: Seniors per Square Mile*

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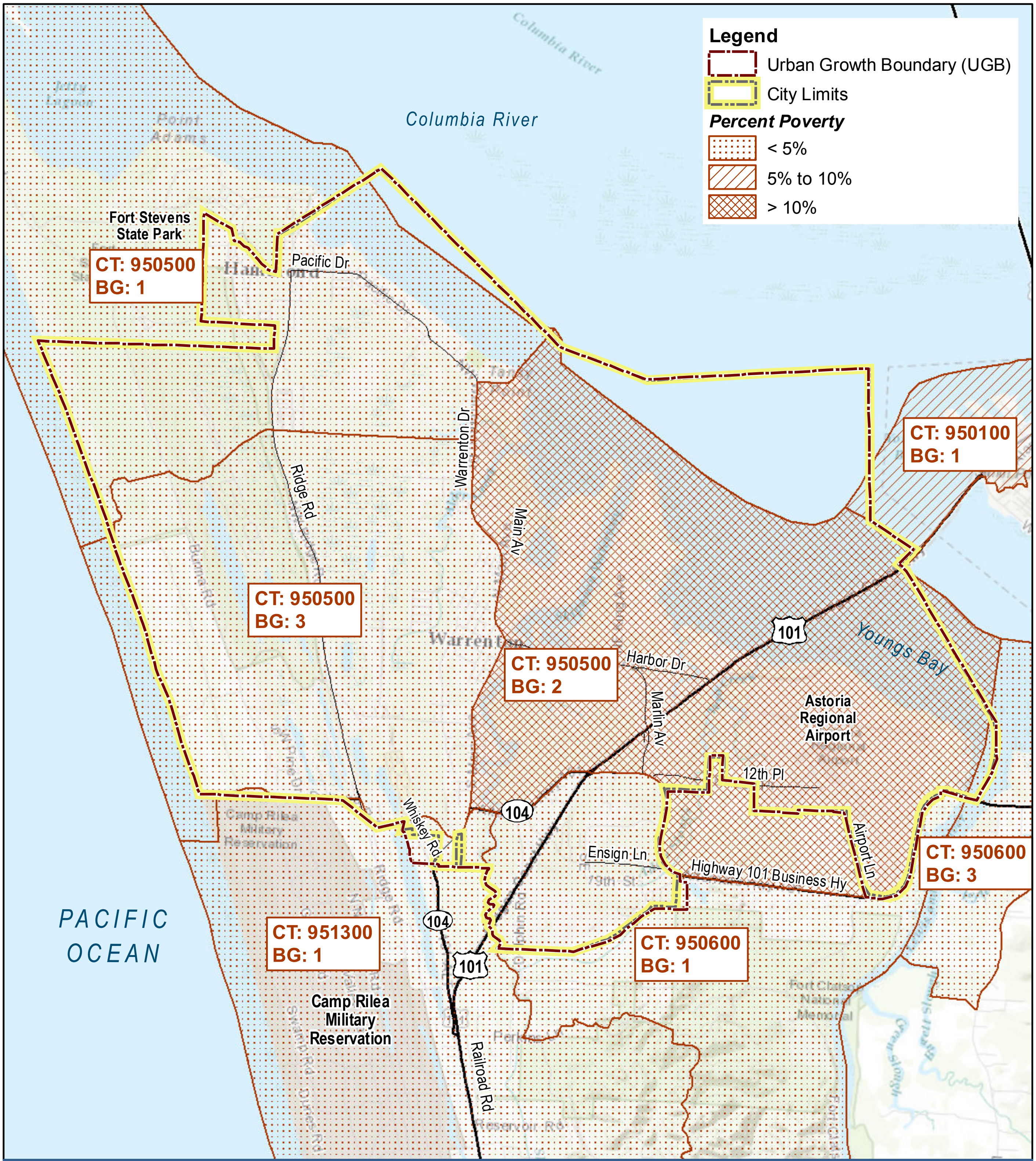



CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*



*Environmental Justice: Percent Poverty*

# Appendix B

## Traffic Methodology

# METHODOLOGY MEMORANDUM

**DATE:** July 5, 2016

**TO:** Warrenton TSP Project Management Team

**FROM:** Shelly Alexander, PE, David Evans and Associates, Inc.
Angela Rogge, PE, David Evans and Associates, Inc.

**SUBJECT: Warrenton Transportation System Plan**
**Traffic Analysis Methodology** P14180-008

This memorandum summarizes the approach for collection and evaluation of information that the City of Warrenton Transportation System Plan (TSP) will use for traffic analysis purposes. The study area includes the City of Warrenton within the City Limits and the Urban Growth Boundary (UGB). This area is located on the south side of the mouth of the Columbia River in Clatsop County. The City covers approximately 17 square miles and is bisected by US 101.

## Volume Development

### Study Area Intersections

The TSP includes 24 intersections for analysis:

1. Pacific Dr at Willow St/Lake Dr
2. Pacific Dr at Iredale St
3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street
4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave
5. Warrenton-Astoria Hwy at SE Galena Ave
6. E Harbor St at Marlin Dr
7. E Harbor St at SE Neptune Dr
8. E Harbor St at Young's Bay Plaza Access
9. E Harbor St at US 101 (signalized)
10. SW 2nd St/SW Gardenia Ave
11. OR 104/S Main Ave at SW 2nd St
12. US 101 at SE Neptune Dr (signalized)
13. US 101 at Marlin Dr (signalized)
14. NW Ridge Rd at SW 9th St
15. SW 9th St at OR 104/Ft Stevens Hwy
16. OR 104S/Ft Stevens Hwy Spur at US 101
17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr
18. Delaura Beach Ln at Ridge Rd
19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave
20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy
21. SE Ensign Ln at US 101
22. SE Ensign Ln at SE 19th St
23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur
24. US 101 at SE Dolphin Ave

## Traffic Data Collection

The transportation and traffic analysis will be based on existing year 2015 conditions for the design hour (30th highest) volumes.

The Consultant shall assemble manual classification counts as provided by ODOT (summarized in Table 1):

- 16-hour turning movement counts, including bicycles and pedestrians with 15 minute breakdowns between 7:00 AM to 10:00 AM and 4:00 PM to 7:00 PM – **3 locations**
- 3-hour PM peak turning movement counts, including bicycles and pedestrians, with 15 minute break downs between 4:00 PM and 7:00 PM – **19 locations**
- 4-hour PM peak turning movement counts near schools, including bicycles and pedestrians, with 15 minute breakdowns between 2:30 PM and 6:30 PM – **2 locations**

**Table 1. Summary of Traffic Counts**

| ID | Count Location | Count Type | Duration | Date |
|---|---|---|---|---|
| 1 | Pacific Dr at Willow St/Lake Dr | Turning Movement | 3 Hour | 5/27/2015 |
| 2 | Pacific Dr at Iredale St | Turning Movement | 3 Hour | 5/27/2015 |
| 3 | OR 104/S Main Ave/Ft Stevens Hwy at NW 1st St | Turning Movement | 3 Hour | 5/27/2015 |
| 4 | OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | Turning Movement | 3 Hour | 9/26/2013 |
| 5 | Warrenton-Astoria Hwy at SE Galena Ave | Turning Movement | 3 Hour | 5/27/2015 |
| 6 | E Harbor St at Marlin Dr | Turning Movement | 3 Hour | 5/27/2015 |
| 7 | E Harbor St at SE Neptune Dr | Turning Movement | 3 Hour | 5/27/2015 |
| 8 | E Harbor St at Young's Bay Plaza Access | Turning Movement | 3 Hour | 5/27/2015 |
| 9 | E Harbor St at US 101 (signalized) | Turning Movement | 16 Hour | 5/28/2015 |
| 10 | SW 2nd St/SW Gardenia Ave | Turning Movement | 3 Hour | 5/28/2015 |
| 11 | OR 104/S Main Ave at SW 2nd St | Turning Movement | 3 Hour | 5/27/2015 |
| 12 | US 101 at SE Neptune Dr (signalized) | Turning Movement | 16 Hour | 5/28/2015 |
| 13 | US 101 at Marlin Dr (signalized) | Turning Movement | 3 Hour | 9/26/2013 |
| 14 | NW Ridge Rd at SW 9th St | Turning Movement | 3 Hour | 5/27/2015 |
| 15 | SW 9th St at OR 104/Ft Stevens Hwy | Turning Movement | 4 Hour | 5/27/2015 |
| 16 | OR 104S/Ft Stevens Hwy Spur at US 101 | Turning Movement | 3 Hour | 5/27/2015 |
| 17 | US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | Turning Movement | 3 Hour | 5/27/2015 |
| 18 | Delaura Beach Ln at Ridge Rd | Turning Movement | 3 Hour | 5/27/2015 |
| 19 | OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | Turning Movement | 3 Hour | 9/26/2013 |
| 20 | SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | Turning Movement | 4 Hour | 5/27/2015 |
| 21 | SE Ensign Ln at US 101 | Turning Movement | 16 Hour | 5/28/2015 |
| 22 | SE Ensign Ln at SE 19th St | Turning Movement | 3 Hour | 5/27/2015 |
| 23 | SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | Turning Movement | 16 Hour | 10/21/2015 |
| 24 | US 101 at SE Dolphin Ave | Turning Movement | 3 Hour | 5/27/2015 |

Generally, the majority of the traffic counts were conducted in the year 2015. There are three intersections that were conducted of September, 2013 which will need to be grown to year 2015.

### Design Hour (30th Highest) Volumes

Data for existing weekday counts will be reviewed to determine which hour is the highest traffic demand hour for the study area. Turning movements, peak hour factors, vehicle classification, and other data describing demand in the study area will be derived for this peak hour.

## Inventory of Existing Facilities

The transportation system inventory is a city-wide inventory of the street network, bicycle and pedestrian facilities and transit facilities.

## Traffic Volumes

Traffic volumes will be developed for two study periods: existing year 2015 and future year 2035.

### Existing Volumes

The existing PM peak hour volumes will be determined from the existing weekday counts and adjusted to design hourly volumes following the methodologies outlined in the ODOT Transportation Planning and Analysis Unit's (TPAU) *Analysis Procedures Manual* (APM) *Volume 2*.

#### Peak Hour Selection

A single system peak hour will be used for analysis purposes. Traffic counts will be reviewed in 15-minute intervals to determine the true peak hour for the entire study area. The final selection of a peak hour will be based on a simple majority of counts that have the same peak hour, with attention paid to Old Salem Road intersections and I-5 ramp terminals.

#### Adjustment to Baseline Analysis Year

The project base year is 2015 but three of the counts available were counted in 2013. The Future Volume Table is used to adjust the counts to the base year. The following intersections were counted on September 26, 2013:

- OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave
- US 101 at Marlin Dr
- OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave

Assuming linear growth in the future, the annual growth factor was calculated based on the 22-year growth factor from ODOT's 2034 Future Volume Table. If more than one growth factor is applicable to an intersection, the factors were averaged and applied to all movements of the study intersection. Table 2 summarizes the growth factors for each of the three intersections.

Table 2. Growth Factors (Year 2013 to Year 2015 )

| Hwy No. | Description | 2012 | 2034 | 2 Year Growth Factor |
|---|---|---|---|---|
| 9 | 0.02 mile northeast of Warrenton-Astoria Highway, (US101 Bus.) | 12800 | 14900 | 1.015 |
| 9 | 0.20 mile northeast of Fort Stevens Highway Spur and connection to Warrenton-Astoria Highway (US101 Bus.) | 13800 | 16500 | 1.018 |
| | | | **US 101 at Marlin Dr** | **1.016** |
| 104 | 0.10 mile north of Warrenton-Astoria Highway (US101 Bus.) | 6300 | 6800 | 1.007 |
| 104 | 0.01 mile south of Warrenton-Astoria Highway (US101 Bus.) | 6400 | 6800 | 1.006 |
| 105 | 0.04 mile east of Fort Stevens Highway | 8800 | 9200 | 1.004 |
| | | | **OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave** | **1.006** |
| 104 | 0.07 mile north of Fort Stevens Highway Spur | 5300 | 6500 | 1.021 |
| 104 | 0.02 mile south of Fort Stevens Highway Spur | 4500 | 5200 | 1.014 |
| 485 | 0.10 mile east of Fort Stevens Highway | 3800 | 4200 | 1.010 |
| | | | **OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave** | **1.015** |

## Seasonal Adjustment Factors

Since traffic counts were taken during various times of the year, data from varying months will need to be converted to peak month equivalents using calculated seasonal adjustment factors. TPAU has three methods for developing seasonal factors: On-Site ATR Method, ATR Characteristic Table Method, and ATR Seasonal Trend Table Method. To accommodate the varying road types within the study area, different methods were used to develop seasonal factors for US 101, Distric Highways and local streets.

There are no ATRs in the study area; the closest ATRs are to the north and south of Warrenton in the cities of Astoria and Gearhart, respectively. For local system traffic, the seasonal trend table will be applied to identify a seasonal adjustment for the commuter trend.

Seasonal factors will be calculated for the count months of May, September and October and applied to the existing count data. Traffic volumes will then be multiplied by their appropriate seasonal factor to determine the 30th highest hour volumes.

### US 101/District Highways/Routes to Fort Stevens Campground

There are no ATR locations along US 101 in close proximity to the study area that have similar characteristics to US 101 through the study area. To develop seasonal factors appropriate for ramp volumes, both the ATR Characteristic Table Method and Seasonal Trend table were considered as viable methods. Based on the characteristics of US 101 through the study area and AADTs within 10% of the study area US 101 volumes, US 101 ATR 04-001 (Gearhart) was selected. Seasonal factors were also determined using the average of the Coastal Destination and Coastal Destination Route trends. A comparison of the ATR method factors and Seasonal Trend Table factors resulted in choosing the Seasonal Trend Table method due to a difference greater than 30% of the peak period. These factors will be applied to the majority (17) of the study area intersections.

**District Highways Not Leading to Fort Stevens Campground**

To develop seasonal factors for study area intersections on District Highways northwest and southeast of US 101 not leading to the Fort Stevens Campground, the Seasonal Trend Table was used for the summer trend. These factors will be applied to five study area intersections.

**Local Traffic**

The seasonal factors for traffic moving within the local street network was calculated based on the count date using the ATR Seasonal Trend Method for a commuter route. These factors will be applied to two study area intersections.

**Table 3. Seasonal Factors**

| SEASONAL FACTORS | **US 101/District Highways/Routes to Fort Stevens Campground** *Average of Coastal Destination and Coastal Destination Route Trends* | **District Highways Not Leading to Fort Stevens Campground** *Summer Trend* | **Local Traffic** *Commuter Trend* |
|---|---|---|---|
| **May** | 1.284 | 1.121 | 1.035 |
| **September** | 1.239 | N/A | N/A |
| **October** | N/A | 1.201 | N/A |

### Balancing

After the seasonal factors are applied, the volumes are input into Synchro and balanced accordingly. For conservative analysis, it is preferable to add traffic to the system instead of remove. This approach is taken whenever possible. Volume imbalances between intersections are managed to represent the volumes into and out of residential developments and commercial lots between study area intersections, whenever applicable.

## Future Design Year 2035 Volumes

Forecast (year 2035) traffic volumes will be developed at count locations using the Asotria-Warrenton Regional Travel Demand Model. Consultant shall post-process (on a link-basis) model volumes using the National Cooperative Highway Research Program Report 765 guidelines in order to create future baseline 2035 traffic volumes. Consultant shall develop PM peak hour volumes for the scenario in accordance with ODOT's APM.

# Evaluation Comparison Tools

Tools and techniques used to evaluate and compare the alternatives include traffic operations analysis tools for more detailed assessment of area conditions. Due to the potential latent demand shifts, the future baseline model volumes will be compared with the alternative model volumes and adjustment factors created and used as needed.

## Traffic Mobility Targets

The City does not currently have a mobility target for its local streets; the project team anticipates reviewing mobility targets as part of the work involving updates to the City code. The traffic analysis will rely on Clatsop County and ODOT mobility targets for evaluation of intersection operations. A summary of mobility targets by study area intersection is provided in Table 4.

Clatsop County facilities have mobility targets that vary by intersection control. For signalized, all-way stop, or roundabout controlled intersections, the intersection as a whole must meet Level of Service (LOS) "E" or better and a volume to capacity (v/c) ratio not higher than 0.85. For two-way stop and yield controlled intersections, all movements serving more than 20 vehicles shall be maintained at LOS "E" or better and a v/c ratio not higher than 0.90. LOS "F" is acceptable at movements serving no more than 20 vehicles during the peak hour.

For State facilities, the Oregon Highway Plan (OHP) and the Highway Design Manual (HDM) will be used in the assessment of intersection operations. Both documents base their mobility performance on the calculation of volume-to-capacity (v/c) ratios; however, the standards in the HDM are based on higher performance levels than those in the OHP. The mobility targets from the OHP will be applied to the existing and future baseline (no build) analysis while the standards from the HDM will be applied to the evaluation of design alternatives.

**Table 4. Mobility Targets by Study Intersection**

| ID | Count Location | Mobility Target[1] | | |
|---|---|---|---|---|
| | | Clatsop County[2] | OHP[3] | HDM[4] |
| 1 | Pacific Dr at Willow St/Lake Dr[5] | v/c <=0.85, LOS E | 1.0 | 0.95 |
| 2 | Pacific Dr at Iredale St[5] | v/c <=0.90, LOS E | 1.0 | 0.95 |
| 3 | OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | v/c <=0.90, LOS E | 0.95 | 0.80 |
| 4 | OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | v/c <=0.85, LOS E | 0.95 | 0.80 |
| 5 | Warrenton-Astoria Hwy at SE Galena Ave | v/c <=0.90, LOS E | 0.95 | 0.80 |
| 6 | E Harbor St at Marlin Dr[5] | -- | 0.90 / 0.95 | 0.75 / 0.80 |
| 7 | E Harbor St at SE Neptune Dr | v/c <=0.90, LOS E | 0.90 | 0.75 |
| 8 | E Harbor St at Young's Bay Plaza Access | v/c <=0.90, LOS E | 0.90 | 0.75 |
| 9 | E Harbor St at US 101 (signalized) | -- | 0.80 | 0.70 |
| 10 | SW 2nd St/SW Gardenia Ave | v/c <=0.90, LOS E | -- | -- |
| 11 | OR 104/S Main Ave at SW 2nd St[5] | v/c <=0.90, LOS E | 1.00 | 0.95 |
| 12 | US 101 at SE Neptune Dr (signalized) | -- | 0.80 | 0.70 |
| 13 | US 101 at Marlin Dr (signalized) | -- | 0.80 | 0.70 |
| 14 | NW Ridge Rd at SW 9th St | v/c <=0.90, LOS E | -- | -- |
| 15 | SW 9th St at OR 104/Ft Stevens Hwy | v/c <=0.90, LOS E | 0.95 | 0.80 |
| 16 | OR 104S/Ft Stevens Hwy Spur at US 101 | -- | 0.80 / 0.90 | 0.70 / 0.75 |
| 17 | US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | -- | 0.90 / 0.95 | 0.75 / 0.80 |
| 18 | Delaura Beach Ln at Ridge Rd | v/c <=0.90, LOS E | -- | -- |
| 19 | OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | -- | 0.95/0.90 | 0.80 / 0.75 |
| 20 | SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | v/c <=0.90, LOS E | 0.95 | 0.80 |
| 21 | SE Ensign Ln at US 101 (signalized) | v/c <=0.85, LOS E | 0.80 | 0.70 |
| 22 | SE Ensign Ln at SE 19th St (signalized) | v/c <=0.90, LOS E | -- | -- |
| 23 | SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | v/c <=0.90, LOS E | 0.90 | 0.75 |
| 24 | US 101 at SE Dolphin Ave | v/c <=0.90, LOS E | 0.80 | 0.70 |

Notes:

1. Unsignalized intersections may have two different mobility targets for the major and minor approaches
2. As the City of Warrenton does not currently have an adopted mobility target for local roads, the Clatsop County mobility targets were assumed for operational analysis
3. Table 6: Volume to Capacity Ratio Targets Outside Metro, Oregon Highway Plan, 1999
4. Table 10-2: 20 Year Design-Mobility Standards (Volume/Capacity [V/C] Ratio), Highway Design Manual, 2012
5. Intersection part of City of Warrenton Special Transportation Area

## Arterial and Intersection Operations

The operational analysis will evaluate v/c ratios and level of service (LOS) using the Synchro/SimTraffic software program as outlined in the APM. Throughout the analysis process, TPAU and Region 2 Traffic staff will review modeling assumptions, analysis settings, and other assumptions to help ensure consistency of data with other studies under way.

An assessment of adding or removing traffic signals may be needed. Any assessments of new traffic signals will use ODOT's preliminary signal warrant spreadsheets. Addition or removal of a traffic signal would require State Traffic-Roadway Engineer approval with support from the Region Traffic Engineer. Operational analysis results will be compared with applicable mobility standards, and specific recommendations for mitigation improvements needed to meet standards must be identified and verified by TPAU and Region 2 Traffic.

### Traffic Operations Analysis Procedures

All operations will be evaluated using the methodology outlined in the *2000 and 2010 Highway Capacity Manual*s (HCM) along with the procedures outlined in the APM. For signalized intersections, operations will be reported using HCM 2000, while HCM 2010 will be used for unsignalized intersections. The Synchro/SimTraffic analysis software was selected to perform the intersection analysis since it can provide the v/c ratio and LOS output of an HCM analysis and consider the systematic interaction of the intersections with regard to queuing and delays.

## Crash History Analysis

Crash data for this project will be obtained from the ODOT Crash Analysis and Reporting Unit for the most recent five complete years. The most recent Safety Priority Index System ("SPIS") data will be obtained as well. Data will be requested for study area intersections and both state and non-state arterials and collectors with the City of Warrenton within the City Limits.

The study area evaluation will include an analysis of the most recent five-year crash history on state and non-state roadways at count locations and arterial and collector segments between count locations. This analysis screen for patterns amongst the crashes that are indicative of existing geometric or operational deficiencies.  The Highway Safety Manual Part B Network Screening Probability of Specific Crash Types Exceeding Threshold Proportions method will be used in the screening process where sufficient reference populations are available.  Based on the crash patterns, the analysis may identify improvements for the build alternatives that could mitigate safety issues. ODOT SPIS locations (if applicable) will be included in the crash history.

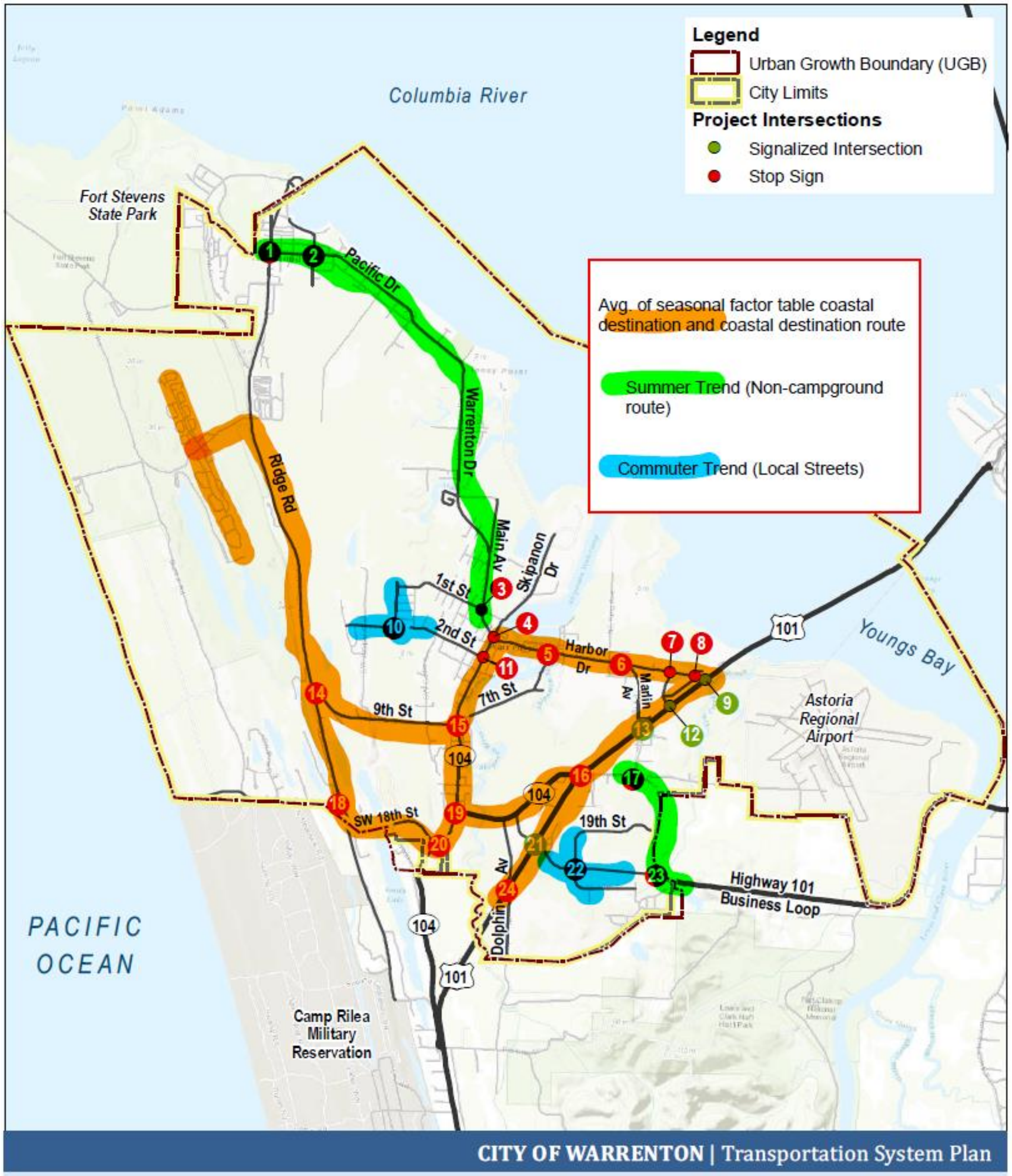
Intersection crash rates will be calculated for each study area intersection and compared against the published 90$^{th}$ Percentile rates in the APM (Version 2). If there are enough ADT volumes available, the critical crash rate will be calculated.

### K-Factor

The K-factor is the percent of ADT in the peak hour. A K-factor will be used to develop an estimate for ADT along roadway segments and itnersections for the purpose of calculating crash rates. As no 24-hour counts were collected, the average K-factor developed from the 3, 16-hour counts (See Table 1 for list of these intersection locations). The APM suggests an expansion factor or 1.10 for 16-hour counts. The system peak (4:00 – 5:00 PM) hourly volume was divided by the 24-hour count for each of the three count locations to develop K-factors (0.085, 0.084, 0.082). Averaged, this is a K-factor of 0.084.

# Attachments

## Attachment 1 – Seasonal Factor Application



# Attachment 2 – Seasonal Factor Calculations

2015 SEASONAL TREND TABLE (Updated: 11/09/15 )

| TREND | 1-Jan | 15-Jan | 1-Feb | 15-Feb | 1-Mar | 15-Mar | 1-Apr | 15-Apr | 1-May | 15-May | 1-Jun | 15-Jun |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INTERSTATE URBANIZED | 1.0354 | 1.0413 | 1.0201 | 0.9989 | 0.9830 | 0.9672 | 0.9579 | 0.9486 | 0.9527 | 0.9567 | 0.9381 | 0.9195 |
| INTERSTATE NONURBANIZED | 1.2439 | 1.3049 | 1.2574 | 1.2100 | 1.1401 | 1.0701 | 1.0599 | 1.0496 | 1.0241 | 0.9986 | 0.9501 | 0.9016 |
| COMMUTER | 1.0496 | 1.0551 | 1.0313 | 1.0074 | 0.9956 | 0.9838 | 0.9651 | 0.9465 | 0.9434 | 0.9403 | 0.9495 | 0.9586 |
| COASTAL DESTINATION | 1.2026 | 1.2084 | 1.1729 | 1.1374 | 1.1039 | 1.0705 | 1.0686 | 1.0668 | 1.0441 | 1.0214 | 0.9840 | 0.9465 |
| COASTAL DESTINATION ROUTE | 1.4607 | 1.4921 | 1.4221 | 1.3521 | 1.2817 | 1.2114 | 1.2020 | 1.1926 | 1.1319 | 1.0712 | 1.0110 | 0.9509 |
| AGRICULTURE | 1.2495 | 1.2659 | 1.2218 | 1.1778 | 1.1386 | 1.0994 | 1.0579 | 1.0165 | 0.9771 | 0.9378 | 0.9092 | 0.8807 |
| RECREATIONAL SUMMER | 1.7234 | 1.7892 | 1.7314 | 1.6737 | 1.5620 | 1.4504 | 1.3916 | 1.3329 | 1.1751 | 1.0174 | 0.9368 | 0.8563 |
| RECREATIONAL SUMMER WINTER | 1.1753 | 1.2460 | 1.2580 | 1.2699 | 1.2940 | 1.3182 | 1.4411 | 1.5640 | 1.5262 | 1.4884 | 1.2854 | 1.0826 |
| RECREATIONAL WINTER | 0.9698 | 0.9363 | 0.9427 | 0.9491 | 0.9747 | 1.0002 | 1.2456 | 1.4910 | 1.8800 | 2.2689 | 1.9669 | 1.6650 |
| SUMMER | 1.2080 | 1.2355 | 1.1988 | 1.1622 | 1.1230 | 1.0838 | 1.0548 | 1.0258 | 0.9932 | 0.9607 | 0.9257 | 0.8907 |
| SUMMER < 2500 | 1.2981 | 1.3274 | 1.2867 | 1.2461 | 1.1836 | 1.1211 | 1.0715 | 1.0218 | 0.9712 | 0.9206 | 0.8897 | 0.8588 |

| TREND | 1-Jul | 15-Jul | 1-Aug | 15-Aug | 1-Sep | 15-Sep | 1-Oct | 15-Oct | 1-Nov | 15-Nov | 1-Dec | 15-Dec | Peak Period Seasonal Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INTERSTATE URBANIZED | 0.9220 | 0.9266 | 0.9215 | 0.9164 | 0.9352 | 0.9539 | 0.9565 | 0.9589 | 0.9775 | 0.9960 | 1.0119 | 1.0277 | 0.9164 |
| INTERSTATE NONURBANIZED | 0.8748 | 0.8438 | 0.8431 | 0.8425 | 0.8920 | 0.9416 | 0.9820 | 1.0224 | 1.0449 | 1.0675 | 1.1177 | 1.1679 | 0.8425 |
| COMMUTER | 0.9409 | 0.9239 | 0.9194 | 0.9149 | 0.9276 | 0.9402 | 0.9425 | 0.9446 | 0.9731 | 1.0016 | 1.0239 | 1.0463 | 0.9149 |
| COASTAL DESTINATION | 0.8933 | 0.8286 | 0.8273 | 0.8260 | 0.8771 | 0.9283 | 0.9852 | 1.0421 | 1.0991 | 1.1560 | 1.1766 | 1.1972 | 0.8260 |
| COASTAL DESTINATION ROUTE | 0.8643 | 0.7555 | 0.7552 | 0.7549 | 0.8330 | 0.9111 | 1.0208 | 1.1305 | 1.2110 | 1.2915 | 1.3498 | 1.4080 | 0.7549 |
| AGRICULTURE | 0.8642 | 0.8445 | 0.8412 | 0.8380 | 0.8419 | 0.8459 | 0.8791 | 0.9123 | 0.9800 | 1.0477 | 1.1405 | 1.2332 | 0.8380 |
| RECREATIONAL SUMMER | 0.7953 | 0.7218 | 0.7327 | 0.7436 | 0.8027 | 0.8618 | 0.9653 | 1.0688 | 1.2301 | 1.3915 | 1.5047 | 1.6180 | 0.7218 |
| RECREATIONAL SUMMER WINTER | 0.9657 | 0.8120 | 0.8456 | 0.8793 | 1.0312 | 1.1831 | 1.4133 | 1.6219 | 1.7084 | 1.7733 | 1.4489 | 1.1245 | 0.8120 |
| RECREATIONAL WINTER | 1.4562 | 1.1365 | 1.1639 | 1.1912 | 1.3347 | 1.4782 | 1.7869 | 2.0956 | 2.4558 | 2.8160 | 1.9444 | 1.0729 | 0.9363 |
| SUMMER | 0.8658 | 0.8350 | 0.8379 | 0.8407 | 0.8779 | 0.9152 | 0.9494 | 0.9836 | 1.0382 | 1.0929 | 1.1341 | 1.1753 | 0.8350 |
| SUMMER < 2500 | 0.8385 | 0.8142 | 0.8233 | 0.8324 | 0.8482 | 0.8639 | 0.9022 | 0.9405 | 1.0159 | 1.0913 | 1.1759 | 1.2606 | 0.8142 |

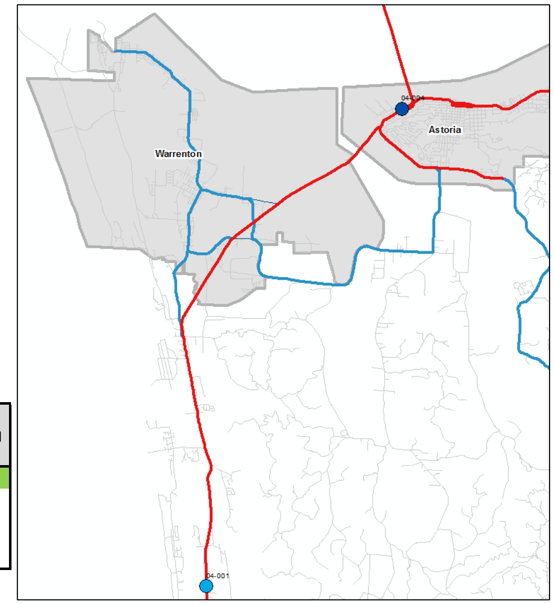
*Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.
*Grey shading indicates months where seasonal factor is greater than 30%

**ATR 04-001 (Gearhart)**

ATR Characteristic Table- 30th HV occurs on a weekend, use %ADT

| | 2011 | 2012 | 2013 | 2014 | 2015 | AVG | SF |
|---|---|---|---|---|---|---|---|
| JANUARY | 81 | 77 | 78 | 79 | 79 | 79 | 1.6737 |
| FEBRUARY | 87 | 88 | 88 | 80 | 90 | 85 | 1.5430 |
| MARCH | 91 | 87 | 93 | 92 | 95 | 92 | 1.4312 |
| APRIL | 96 | 99 | 99 | 98 | 100 | 99 | 1.3345 |
| MAY | 100 | 103 | 103 | 102 | 100 | 102 | 1.2951 |
| JUNE | 111 | 108 | 111 | 110 | 114 | 111 | 1.1898 |
| JULY | 125 | 127 | 128 | 127 | 124 | 126 | 1.0422 |
| AUGUST | 131 | 134 | 131 | 133 | 127 | 132 | 1.0000 |
| SEPTEMBER | 116 | 115 | 109 | 114 | 112 | 114 | 1.1584 |
| OCTOBER | 95 | 95 | 97 | 96 | 95 | 95 | 1.3811 |
| NOVEMBER | 85 | 86 | 86 | 87 | 86 | 86 | 1.5310 |
| DECEMBER | 83 | 82 | 79 | 82 | 80 | 81 | 1.6189 |

| | 15-May | Interpolated 27-May | 1-Jun | Peak Period | May Seasonal Factor | 15-Sep | Interpolated 26-Sep | 1-Oct | Peak Period | September Seasonal Factor | 15-Oct | Interpolated 21-Oct | 1-Nov | Peak Period | October Seasonal Factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Summer | 0.9607 | 0.9360 | 0.9257 | 0.8350 | 1.121 | - | - | - | - | - | 0.9836 | 1.0029 | 1.0382 | 0.8350 | 1.201 |
| Coastal | 1.0214 | 0.9950 | 0.9840 | 0.8260 | 1.205 | 0.9283 | 0.9674 | 0.9852 | 0.8260 | 1.171 | - | - | - | - | - |
| Coastal Dest | 1.0712 | 1.0287 | 1.0110 | 0.7549 | 1.363 | 0.9111 | 0.9865 | 1.0208 | 0.7549 | 1.307 | - | - | - | - | - |
| | average of coastal and coastal destination: | | | | 1.284 | average of coastal and coastal destination: | | | | 1.239 | - | - | - | - | - |
| Commuter | 0.9403 | 0.9468 | 0.9495 | 0.9149 | 1.035 | - | - | - | - | - | - | - | - | - | - |




| City of Warrenton Seasonal Adjustment Factors | May | eptembe | October |
|---|---|---|---|
| Summer trend from seasonal factor table | 1.121 | - | 1.201 |
| Avg. of seasonal factor table coastal destination and coastal destination roı | 1.284 | 1.239 | - |
| Commuter trend from Sesonal Factor Table | 1.035 | - | - |

# Appendix C

## Volume Development

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/16/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | Pacific Dr at Willow St/Lake Dr | | EBL | 10 | 4 | 4 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | 10 | | EB | EBT | 10 | 14 | 14 | 0 | 0% | 1.00 | 1.12 | 15 | 5 | 20 |
| | 10 | Count Date: 5/27/2015 | | EBR | 10 | 12 | 12 | 0 | 0% | 1.00 | 1.12 | 15 | 0 | 15 |
| | 10 | | | WBL | 10 | 59 | 59 | 2 | 3% | 1.00 | 1.12 | 65 | 0 | 65 |
| | 10 | | WB | WBT | 10 | 35 | 35 | 0 | 0% | 1.00 | 1.12 | 40 | 0 | 40 |
| | 10 | | | WBR | 10 | 9 | 9 | 0 | 0% | 1.00 | 1.12 | 10 | 5 | 15 |
| | 10 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 10 | 22 | 22 | 1 | 5% | 1.00 | 1.12 | 25 | 0 | 25 |
| | 10 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 10 | 12 | 12 | 0 | 0% | 1.00 | 1.12 | 15 | 0 | 15 |
| | 10 | | | NBR | 10 | 68 | 68 | 5 | 7% | 1.00 | 1.12 | 75 | 0 | 75 |
| | 10 | | | SBL | 10 | 10 | 10 | 0 | 0% | 1.00 | 1.12 | 10 | 0 | 10 |
| | 10 | PHF: | SB | SBT | 10 | 9 | 9 | 0 | 0% | 1.00 | 1.12 | 10 | 0 | 10 |
| | 10 | 0.90 | | SBR | 10 | 4 | 4 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | | | **TEV** | **TEV** | **10** | **258** | **258** | **8** | | | | **290** | **10** | **300** |
| 2 | 20 | Pacific Dr at Iredale St | | EBL | 20 | 2 | 2 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 20 | | EB | EBT | 20 | 111 | 111 | 5 | 5% | 1.00 | 1.12 | 125 | -10 | 115 |
| | 20 | Count Date: 5/27/2015 | | EBR | 20 | 2 | 2 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 20 | | | WBL | 20 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 20 | | WB | WBT | 20 | 127 | 127 | 0 | 0% | 1.00 | 1.12 | 140 | 0 | 140 |
| | 20 | | | WBR | 20 | 8 | 8 | 1 | 13% | 1.00 | 1.12 | 10 | 0 | 10 |
| | 20 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 20 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 20 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 20 | 0 | 0 | 0 | 0% | 1.00 | 1.12 | 0 | 1 | 1 |
| | 20 | | | NBR | 20 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 20 | | | SBL | 20 | 9 | 9 | 1 | 11% | 1.00 | 1.12 | 10 | 0 | 10 |
| | 20 | PHF: | SB | SBT | 20 | 1 | 1 | 1 | 100% | 1.00 | 1.12 | 0 | 5 | 5 |
| | 20 | 0.89 | | SBR | 20 | 3 | 3 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | | | **TEV** | **TEV** | **20** | **266** | **266** | **8** | | | | **290** | **6** | **296** |
| 3 | 30 | OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Str | | EBL | 30 | 13 | 13 | 0 | 0% | 1.00 | 1.12 | 15 | 0 | 15 |
| | 30 | | EB | EBT | 30 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 1 | 1 |
| | 30 | Count Date: 5/27/2015 | | EBR | 30 | 28 | 28 | 1 | 4% | 1.00 | 1.12 | 30 | 0 | 30 |
| | 30 | | | WBL | 30 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 1 | 1 |
| | 30 | | WB | WBT | 30 | 2 | 2 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 30 | | | WBR | 30 | 3 | 3 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | 30 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 30 | 50 | 50 | 0 | 0% | 1.00 | 1.12 | 55 | 0 | 55 |
| | 30 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 30 | 296 | 296 | 7 | 2% | 1.00 | 1.12 | 330 | 0 | 330 |
| | 30 | | | NBR | 30 | 2 | 2 | 0 | 0% | 1.00 | 1.12 | 0 | 2 | 2 |
| | 30 | | | SBL | 30 | 5 | 5 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | 30 | PHF: | SB | SBT | 30 | 238 | 238 | 9 | 4% | 1.00 | 1.12 | 265 | 0 | 265 |
| | 30 | 0.94 | | SBR | 30 | 11 | 11 | 1 | 9% | 1.00 | 1.12 | 10 | 0 | 10 |
| | | | **TEV** | **TEV** | **30** | **650** | **650** | **18** | | | | **715** | **6** | **721** |
| 4 | 40 | OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Mair | | EBL | 40 | 4 | 4 | 1 | 25% | 1.01 | 1.24 | 5 | 0 | 5 |
| | 40 | | EB | EBT | 40 | 142 | 142 | 14 | 10% | 1.01 | 1.24 | 175 | 25 | 200 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/16/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40 | Count Date: 9/26/2013 | | EBR | 40 | 77 | 77 | 6 | 8% | 1.01 | 1.24 | 95 | -5 | 90 |
| | 40 | | | WBL | 40 | 203 | 203 | 2 | 1% | 1.01 | 1.24 | 255 | 20 | 275 |
| | 40 | | WB | WBT | 40 | 203 | 203 | 12 | 6% | 1.01 | 1.24 | 255 | 20 | 275 |
| | 40 | | | WBR | 40 | 50 | 50 | 4 | 8% | 1.01 | 1.24 | 60 | 5 | 65 |
| | 40 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 40 | 86 | 86 | 8 | 9% | 1.01 | 1.24 | 105 | 0 | 105 |
| | 40 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 40 | 30 | 30 | 2 | 7% | 1.01 | 1.24 | 35 | 0 | 35 |
| | 40 | | | NBR | 40 | 157 | 157 | 3 | 2% | 1.01 | 1.24 | 195 | 75 | 270 |
| | 40 | | | SBL | 40 | 56 | 56 | 7 | 13% | 1.01 | 1.24 | 70 | 0 | 70 |
| | 40 | PHF: | SB | SBT | 40 | 54 | 54 | 4 | 7% | 1.01 | 1.24 | 65 | 0 | 65 |
| | 40 | 0.96 | | SBR | 40 | 3 | 3 | 1 | 33% | 1.01 | 1.24 | 5 | 0 | 5 |
| | | | **TEV** | **TEV** | **40** | **1065** | **1065** | **64** | | | | **1320** | **140** | **1460** |
| 5 | 50 | Warrenton-Astoria Hwy at SE Galena Ave | | EBL | 50 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 50 | | EB | EBT | 50 | 444 | 444 | 13 | 3% | 1.00 | 1.28 | 570 | 0 | 570 |
| | 50 | Count Date: 5/27/2015 | | EBR | 50 | 3 | 3 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 50 | | | WBL | 50 | 6 | 6 | 0 | 0% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 50 | | WB | WBT | 50 | 531 | 531 | 13 | 2% | 1.00 | 1.28 | 680 | 0 | 680 |
| | 50 | | | WBR | 50 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 5 | 10 |
| | 50 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 50 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 50 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 50 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 50 | | | NBR | 50 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 50 | | | SBL | 50 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 50 | PHF: | SB | SBT | 50 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 50 | 0.95 | | SBR | 50 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | | | **TEV** | **TEV** | **50** | **995** | **995** | **26** | | | | **1290** | **8** | **1298** |
| 6 | 60 | E Harbor St at Marlin Dr | | EBL | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 60 | | EB | EBT | 60 | 374 | 354 | 17 | 5% | 1.00 | 1.28 | 455 | -5 | 450 |
| | 60 | Count Date: 5/27/2015 | | EBR | 60 | 77 | 97 | 0 | 0% | 1.00 | 1.28 | 125 | 0 | **125** |
| | 60 | | | WBL | 60 | 16 | 16 | 1 | 6% | 1.00 | 1.28 | 20 | 0 | 20 |
| | 60 | | WB | WBT | 60 | 415 | 400 | 11 | 3% | 1.00 | 1.28 | 515 | 0 | 515 |
| | 60 | | | WBR | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 60 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 60 | 129 | 144 | 1 | 1% | 1.00 | 1.28 | 185 | 0 | 185 |
| | 60 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 60 | | | NBR | 60 | 11 | 11 | 0 | 0% | 1.00 | 1.28 | 15 | 0 | 15 |
| | 60 | | | SBL | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 60 | PHF: | SB | SBT | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 60 | 0.96 | | SBR | 60 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | | | **TEV** | **TEV** | **60** | **1022** | **1022** | **30** | | | | **1315** | **-5** | **1310** |
| 7 | 70 | E Harbor St at SE Neptune Dr | | EBL | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 70 | | EB | EBT | 70 | 294 | 274 | 15 | 5% | 1.00 | 1.28 | 350 | 0 | 350 |
| | 70 | Count Date: 5/27/2015 | | EBR | 70 | 90 | 90 | 1 | 1% | 1.00 | 1.28 | 115 | 0 | 115 |
| | 70 | | | WBL | 70 | 84 | 84 | 0 | 0% | 1.00 | 1.28 | 110 | 0 | 110 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/16/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 70 | Signalized | WB | WBT | 70 | 354 | 339 | 12 | 3% | 1.00 | 1.28 | 435 | -5 | 430 |
| | 70 | | | WBR | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 70 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 70 | 83 | 83 | 0 | 0% | 1.00 | 1.28 | 105 | 0 | 105 |
| | 70 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 70 | | | NBR | 70 | 65 | 65 | 0 | 0% | 1.00 | 1.28 | 85 | 5 | 90 |
| | 70 | | | SBL | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 70 | PHF: | SB | SBT | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 70 | 0.95 | | SBR | 70 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | | | **TEV** | **TEV** | **70** | **970** | **935** | **28** | | | | **1200** | **0** | **1200** |
| 8 | 80 | E Harbor St at Young's Bay Plaza Access | | EBL | 80 | 36 | 36 | 1 | 3% | 1.00 | 1.28 | 45 | 0 | 45 |
| | 80 | | EB | EBT | 80 | 320 | 300 | 15 | 5% | 1.00 | 1.28 | 385 | -5 | 380 |
| | 80 | Count Date: 5/27/2015 | | EBR | 80 | 13 | 13 | 0 | 0% | 1.00 | 1.28 | 15 | 0 | 15 |
| | 80 | | | WBL | 80 | 67 | 67 | 2 | 3% | 1.00 | 1.28 | 85 | -5 | 80 |
| | 80 | | WB | WBT | 80 | 364 | 349 | 10 | 3% | 1.00 | 1.28 | 450 | -5 | 445 |
| | 80 | | | WBR | 80 | 21 | 21 | 0 | 0% | 1.00 | 1.28 | 25 | 0 | 25 |
| | 80 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 80 | 6 | 6 | 0 | 0% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 80 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 80 | 8 | 8 | 1 | 13% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 80 | | | NBR | 80 | 54 | 54 | 1 | 2% | 1.00 | 1.28 | 70 | 0 | 70 |
| | 80 | | | SBL | 80 | 46 | 46 | 0 | 0% | 1.00 | 1.28 | 60 | -5 | 55 |
| | 80 | PHF: | SB | SBT | 80 | 9 | 9 | 0 | 0% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 80 | 0.93 | | SBR | 80 | 68 | 68 | 2 | 3% | 1.00 | 1.28 | 85 | 0 | 85 |
| | | | **TEV** | **TEV** | **80** | **1012** | **977** | **32** | | | | **1250** | **-20** | **1230** |
| 9 | 90 | E Harbor St at US 101 (signalized) | | EBL | 90 | 377 | 357 | 8 | 2% | 1.00 | 1.28 | 460 | 0 | 460 |
| | 90 | | EB | EBT | 90 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 90 | Count Date: 5/28/2015 | | EBR | 90 | 35 | 35 | 0 | 0% | 1.00 | 1.28 | 45 | 0 | 45 |
| | 90 | | | WBL | 90 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 90 | | WB | WBT | 90 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 90 | | | WBR | 90 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 90 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 90 | 41 | 41 | 1 | 2% | 1.00 | 1.28 | 55 | 0 | 55 |
| | 90 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 90 | 817 | 737 | 6 | 1% | 1.00 | 1.28 | 945 | -20 | 925 |
| | 90 | | | NBR | 90 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 90 | | | SBL | 90 | 5 | 5 | 0 | 0% | 1.00 | 1.28 | 5 | -5 | 0 |
| | 90 | PHF: | SB | SBT | 90 | 733 | 708 | 1 | 0% | 1.00 | 1.28 | 910 | 0 | 910 |
| | 90 | 0.98 | | SBR | 90 | 400 | 385 | 4 | 1% | 1.00 | 1.28 | 495 | 0 | 495 |
| | | | **TEV** | **TEV** | **90** | **2408** | **2268** | **20** | | | | **2915** | **-25** | **2890** |
| 10 | 100 | SW 2nd St/SW Gardenia Ave | | EBL | 100 | 0 | 0 | 0 | 0% | 1.00 | 1.24 | 0 | 1 | 1 |
| | 100 | | EB | EBT | 100 | 11 | 11 | 0 | 0% | 1.00 | 1.24 | 15 | 0 | 15 |
| | 100 | Count Date: 5/28/2015 | | EBR | 100 | 3 | 3 | 0 | 0% | 1.00 | 1.24 | 5 | 0 | 5 |
| | 100 | | | WBL | 100 | 11 | 11 | 0 | 0% | 1.00 | 1.24 | 15 | 0 | 15 |
| | 100 | | WB | WBT | 100 | 19 | 19 | 1 | 5% | 1.00 | 1.24 | 25 | 0 | 25 |
| | 100 | | | WBR | 100 | 7 | 7 | 0 | 0% | 1.00 | 1.24 | 10 | 0 | 10 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: ***PM Turning Movement Volumes***

8/16/2016

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Traffic adjustments due to bridge closure: Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 100 | 2 | 2 | 0 | 0% | 1.00 | 1.24 | 0 | 1 | 1 |
| | 100 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 100 | 2 | 2 | 0 | 0% | 1.00 | 1.24 | 0 | 1 | 1 |
| | 100 | | | NBR | 100 | 5 | 5 | 1 | 20% | 1.00 | 1.24 | 5 | 0 | 5 |
| | 100 | | | SBL | 100 | 4 | 4 | 0 | 0% | 1.00 | 1.24 | 5 | 0 | 5 |
| | 100 | PHF: | SB | SBT | 100 | 1 | 1 | 0 | 0% | 1.00 | 1.24 | 0 | 1 | 1 |
| | 100 | 0.84 | | SBR | 100 | 0 | 0 | 0 | 0% | 1.00 | 1.24 | 0 | 1 | 1 |
| | | | **TEV** | **TEV** | **100** | **65** | **65** | **2** | | | | **80** | **5** | **85** |
| 11 | 110 | OR 104/S Main Ave at SW 2nd St | | EBL | 110 | 65 | 65 | 3 | 5% | 1.00 | 1.28 | 85 | 0 | 85 |
| | 110 | | EB | EBT | 110 | 5 | 5 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 110 | Count Date: 5/27/2015 | | EBR | 110 | 43 | 43 | 0 | 0% | 1.00 | 1.28 | 55 | 0 | 55 |
| | 110 | | | WBL | 110 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 110 | | WB | WBT | 110 | 3 | 3 | 1 | 33% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 110 | | | WBR | 110 | 6 | 6 | 0 | 0% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 110 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 110 | 33 | 33 | 0 | 0% | 1.00 | 1.28 | 40 | 0 | 40 |
| | 110 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 110 | 247 | 247 | 4 | 2% | 1.00 | 1.28 | 315 | 0 | 315 |
| | 110 | | | NBR | 110 | 5 | 5 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 110 | | | SBL | 110 | 5 | 5 | 1 | 20% | 1.00 | 1.28 | 5 | 5 | 10 |
| | 110 | PHF: | SB | SBT | 110 | 262 | 262 | 4 | 2% | 1.00 | 1.28 | 335 | 0 | 335 |
| | 110 | 0.92 | | SBR | 110 | 65 | 65 | 2 | 3% | 1.00 | 1.28 | 85 | 0 | 85 |
| | | | **TEV** | **TEV** | **110** | **741** | **741** | **15** | | | | **950** | **5** | **955** |
| 12 | 120 | US 101 at SE Neptune Dr (signalized) | | EBL | 120 | 156 | 156 | 1 | 1% | 1.00 | 1.28 | 200 | 0 | 200 |
| | 120 | | EB | EBT | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | Count Date: 5/28/2015 | | EBR | 120 | 163 | 163 | 0 | 0% | 1.00 | 1.28 | 210 | 0 | 210 |
| | 120 | | | WBL | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | | WB | WBT | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | | | WBR | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | PM Peak Hour: 4:15 PM-5:15 PM | | NBL | 120 | 147 | 147 | 1 | 1% | 1.00 | 1.28 | 190 | -5 | 185 |
| | 120 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 120 | 686 | 606 | 5 | 1% | 1.00 | 1.28 | 780 | 0 | 780 |
| | 120 | | | NBR | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | | | SBL | 120 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 120 | PHF: | SB | SBT | 120 | 664 | 639 | 3 | 0% | 1.00 | 1.28 | 820 | 0 | 820 |
| | 120 | 0.94 | | SBR | 120 | 104 | 104 | 1 | 1% | 1.00 | 1.28 | 135 | 0 | 135 |
| | | | **TEV** | **TEV** | **120** | **1920** | **1815** | **11** | | | | **2335** | **-5** | **2330** |
| 13 | 130 | US 101 at Marlin Dr (signalized) | | EBL | 130 | 29 | 29 | 5 | 17% | 1.02 | 1.24 | 35 | 10 | 45 |
| | 130 | | EB | EBT | 130 | 67 | 67 | 2 | 3% | 1.02 | 1.24 | 85 | 0 | 85 |
| | 130 | Count Date: 9/26/2013 | | EBR | 130 | 105 | 105 | 7 | 7% | 1.02 | 1.24 | 130 | 0 | 130 |
| | 130 | | | WBL | 130 | 57 | 57 | 0 | 0% | 1.02 | 1.24 | 70 | 0 | 70 |
| | 130 | | WB | WBT | 130 | 97 | 97 | 6 | 6% | 1.02 | 1.24 | 120 | 0 | 120 |
| | 130 | | | WBR | 130 | 87 | 87 | 8 | 9% | 1.02 | 1.24 | 110 | 0 | 110 |
| | 130 | PM Peak Hour: 4:15 PM-5:15 PM | | NBL | 130 | 101 | 101 | 11 | 11% | 1.02 | 1.24 | 125 | 0 | 125 |
| | 130 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 130 | 528 | 528 | 19 | 4% | 1.02 | 1.24 | 665 | 145 | 810 |

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 130 | | | NBR | 130 | 14 | 14 | 1 | 7% | 1.02 | 1.24 | 20 | 0 | 20 |
| | 130 | | | SBL | 130 | 65 | 65 | 2 | 3% | 1.02 | 1.24 | 80 | 0 | 80 |
| | 130 | PHF: | SB | SBT | 130 | 563 | 563 | 26 | 5% | 1.02 | 1.24 | 710 | 195 | 905 |
| | 130 | 0.91 | | SBR | 130 | 26 | 26 | 2 | 8% | 1.02 | 1.24 | 35 | 10 | 45 |
| | | | **TEV** | **TEV** | **130** | **1739** | **1739** | **89** | | | **1** | **2185** | **360** | **2545** |
| 14 | 140 | NW Ridge Rd at SW 9th St | | EBL | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 140 | | EB | EBT | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 140 | Count Date: 5/27/2015 | | EBR | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 140 | | | WBL | 140 | 12 | 12 | 1 | 8% | 1.00 | 1.28 | 15 | 0 | 15 |
| | 140 | | WB | WBT | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 140 | | | WBR | 140 | 66 | 66 | 1 | 2% | 1.00 | 1.28 | 85 | 0 | 85 |
| | 140 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 140 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 140 | 59 | 59 | 5 | 8% | 1.00 | 1.28 | 75 | 0 | 75 |
| | 140 | | | NBR | 140 | 9 | 9 | 2 | 22% | 1.00 | 1.28 | 10 | 5 | 15 |
| | 140 | | | SBL | 140 | 17 | 17 | 0 | 0% | 1.00 | 1.28 | 20 | 5 | 25 |
| | 140 | PHF: | SB | SBT | 140 | 48 | 48 | 2 | 4% | 1.00 | 1.28 | 60 | 0 | 60 |
| | 140 | 0.84 | | SBR | 140 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | | | **TEV** | **TEV** | **140** | **211** | **211** | **11** | | | | **265** | **10** | **275** |
| 15 | 150 | SW 9th St at OR 104/Ft Stevens Hwy | | EBL | 150 | 33 | 33 | 0 | 0% | 1.00 | 1.28 | 40 | 0 | 40 |
| | 150 | | EB | EBT | 150 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 150 | Count Date: 5/27/2015 | | EBR | 150 | 40 | 40 | 0 | 0% | 1.00 | 1.28 | 50 | 0 | 50 |
| | 150 | | | WBL | 150 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 150 | | WB | WBT | 150 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 150 | | | WBR | 150 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 150 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 150 | 56 | 56 | 0 | 0% | 1.00 | 1.28 | 70 | 0 | 70 |
| | 150 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 150 | 231 | 231 | 5 | 2% | 1.00 | 1.28 | 295 | 0 | 295 |
| | 150 | | | NBR | 150 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 150 | | | SBL | 150 | 2 | 2 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 150 | PHF: | SB | SBT | 150 | 199 | 199 | 3 | 2% | 1.00 | 1.28 | 255 | 0 | 255 |
| | 150 | 0.95 | | SBR | 150 | 76 | 76 | 0 | 0% | 1.00 | 1.28 | 100 | 0 | 100 |
| | | | **TEV** | **TEV** | **150** | **642** | **642** | **8** | | | | **820** | **4** | **824** |
| 16 | 160 | OR 104S/Ft Stevens Hwy Spur at US 101 | | EBL | 160 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 160 | | EB | EBT | 160 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 160 | Count Date: 5/27/2015 | | EBR | 160 | 5 | 5 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 160 | | | WBL | 160 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 160 | | WB | WBT | 160 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 160 | | | WBR | 160 | 11 | 11 | 0 | 0% | 1.00 | 1.28 | 15 | 0 | 15 |
| | 160 | PM Peak Hour: 4:30 PM-5:30 PM | | NBL | 160 | 11 | 11 | 0 | 0% | 1.00 | 1.28 | 15 | 0 | 15 |
| | 160 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 160 | 714 | 669 | 15 | 2% | 1.00 | 1.28 | 860 | 80 | 940 |
| | 160 | | | NBR | 160 | 16 | 16 | 2 | 13% | 1.00 | 1.28 | 20 | 0 | 20 |
| | 160 | | | SBL | 160 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 160 | PHF: | SB | SBT | 160 | 695 | 685 | 21 | 3% | 1.00 | 1.28 | 880 | 105 | 985 |
| | 160 | 0.91 | | SBR | 160 | 110 | 95 | 3 | 3% | 1.00 | 1.28 | 120 | 0 | 120 |
| | | | **TEV** | **TEV** | **160** | **1563** | **1493** | **41** | | | | **1915** | **185** | **2100** |
| 17 | 170 | US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hw | | EBL | 170 | 10 | 10 | 0 | 0% | 1.00 | 1.12 | 10 | 0 | 10 |
| | 170 | | EB | EBT | 170 | 14 | 14 | 2 | 14% | 1.00 | 1.12 | 15 | 0 | 15 |
| | 170 | Count Date: 5/27/2015 | | EBR | 170 | 0 | 0 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | | | WBL | 170 | 0 | 0 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | | WB | WBT | 170 | 4 | 4 | 0 | 0% | 1.00 | 1.12 | 5 | 0 | 5 |
| | 170 | | | WBR | 170 | 166 | 196 | 3 | 2% | 1.00 | 1.12 | 220 | 0 | 220 |
| | 170 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 170 | 0 | 0 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 170 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | | | NBR | 170 | 0 | 0 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | | | SBL | 170 | 73 | 123 | 4 | 5% | 1.00 | 1.12 | 140 | 0 | 140 |
| | 170 | PHF: | SB | SBT | 170 | 1 | 1 | 0 | 0% | 1.00 | 1.12 | 0 | 0 | 0 |
| | 170 | 0.90 | | SBR | 170 | 9 | 9 | 0 | 0% | 1.00 | 1.12 | 10 | 0 | 10 |
| | | | **TEV** | **TEV** | **170** | **278** | **358** | **9** | | | | **400** | **0** | **400** |
| 18 | 180 | Delaura Beach Ln at Ridge Rd | | EBL | 180 | 3 | 3 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 180 | | EB | EBT | 180 | 12 | 12 | 1 | 8% | 1.00 | 1.28 | 15 | -14 | 1 |
| | 180 | Count Date: 5/27/2015 | | EBR | 180 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 15 | 15 |
| | 180 | **Intersection has unconventional** | | WBL | 180 | 3 | 3 | 0 | 0% | 1.00 | 1.28 | 5 | -4 | 1 |
| | 180 | **geometric configuration** | WB | WBT | 180 | 19 | 19 | 0 | 0% | 1.00 | 1.28 | 25 | -24 | 1 |
| | 180 | | | WBR | 180 | 66 | 66 | 7 | 11% | 1.00 | 1.28 | 85 | -84 | 1 |
| | 180 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 180 | 1 | 1 | 0 | 0% | 1.00 | 1.28 | 5 | 25 | 30 |
| | 180 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 180 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 85 | 85 |
| | 180 | | | NBR | 180 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 180 | | | SBL | 180 | 42 | 42 | 2 | 5% | 1.00 | 1.28 | 55 | -54 | 1 |
| | 180 | PHF: | SB | SBT | 180 | 12 | 12 | 1 | 8% | 1.00 | 1.28 | 15 | 40 | 55 |
| | 180 | 0.86 | | SBR | 180 | 4 | 4 | 0 | 0% | 1.00 | 1.28 | 5 | -4 | 1 |
| | | | **TEV** | **TEV** | **180** | **162** | **162** | **11** | | | | **215** | **-18** | **197** |
| 19 | 190 | OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens | | EBL | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |
| | 190 | | EB | EBT | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |
| | 190 | Count Date: 9/26/2013 | | EBR | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |
| | 190 | | | WBL | 190 | 64 | 64 | 5 | 8% | 1.02 | 1.24 | 80 | 0 | 80 |
| | 190 | | WB | WBT | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |
| | 190 | | | WBR | 190 | 142 | 142 | 1 | 1% | 1.02 | 1.24 | 180 | 20 | 200 |
| | 190 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |
| | 190 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 190 | 121 | 121 | 5 | 4% | 1.02 | 1.24 | 150 | 0 | 150 |
| | 190 | | | NBR | 190 | 56 | 56 | 5 | 9% | 1.02 | 1.24 | 70 | 0 | 70 |
| | 190 | | | SBL | 190 | 106 | 106 | 0 | 0% | 1.02 | 1.24 | 135 | 0 | 135 |
| | 190 | PHF: | SB | SBT | 190 | 103 | 103 | 5 | 5% | 1.02 | 1.24 | 130 | 0 | 130 |
| | 190 | 0.88 | | SBR | 190 | 0 | 0 | 0 | 0% | 1.02 | 1.24 | 0 | 0 | 0 |

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **TEV** | **TEV** | **190** | **592** | **592** | **21** | | | | **745** | **20** | **765** |
| 20 | 200 | SW 18th St/Delaura Beach Ln at S Main Ave/Ft Ste | EB | EBL | 200 | 47 | 47 | 2 | 4% | 1.00 | 1.28 | 60 | 0 | 60 |
| | 200 | | EB | EBT | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | Count Date: 5/27/2015 | EB | EBR | 200 | 19 | 19 | 1 | 5% | 1.00 | 1.28 | 25 | 0 | 25 |
| | 200 | | WB | WBL | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | | WB | WBT | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | | WB | WBR | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 200 | 16 | 16 | 3 | 19% | 1.00 | 1.28 | 20 | 0 | 20 |
| | 200 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 200 | 101 | 101 | 5 | 5% | 1.00 | 1.28 | 130 | 20 | 150 |
| | 200 | | NB | NBR | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | | SB | SBL | 200 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 0 | 0 |
| | 200 | PHF: | SB | SBT | 200 | 81 | 81 | 3 | 4% | 1.00 | 1.28 | 105 | 10 | 115 |
| | 200 | 0.94 | SB | SBR | 200 | 57 | 57 | 3 | 5% | 1.00 | 1.28 | 75 | 20 | 95 |
| | | | **TEV** | **TEV** | **200** | **321** | **321** | **17** | | | | **415** | **50** | **465** |
| 21 | 210 | SE Ensign Ln at US 101 (signalized) | EB | EBL | 210 | 179 | 144 | 0 | 0% | 1.00 | 1.28 | 185 | 0 | 185 |
| | 210 | | EB | EBT | 210 | 136 | 206 | 1 | 1% | 1.00 | 1.28 | 265 | 0 | 265 |
| | 210 | Count Date: 5/28/2015 | EB | EBR | 210 | 72 | 72 | 0 | 0% | 1.00 | 1.28 | 90 | 0 | 90 |
| | 210 | | WB | WBL | 210 | 125 | 165 | 0 | 0% | 1.00 | 1.28 | 210 | 0 | 210 |
| | 210 | | WB | WBT | 210 | 124 | 174 | 0 | 0% | 1.00 | 1.28 | 225 | 0 | 225 |
| | 210 | | WB | WBR | 210 | 169 | 169 | 0 | 0% | 1.00 | 1.28 | 215 | 0 | 215 |
| | 210 | PM Peak Hour: 4:15 PM-5:15 PM | NB | NBL | 210 | 73 | 73 | 0 | 0% | 1.00 | 1.28 | 95 | 0 | 95 |
| | 210 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 210 | 402 | 377 | 6 | 1% | 1.00 | 1.28 | 485 | 90 | 575 |
| | 210 | | NB | NBR | 210 | 88 | 128 | 1 | 1% | 1.00 | 1.28 | 165 | 0 | 165 |
| | 210 | | SB | SBL | 210 | 192 | 192 | 0 | 0% | 1.00 | 1.28 | 245 | 0 | 245 |
| | 210 | PHF: | SB | SBT | 210 | 486 | 476 | 3 | 1% | 1.00 | 1.28 | 610 | 25 | 635 |
| | 210 | 0.91 | SB | SBR | 210 | 87 | 87 | 1 | 1% | 1.00 | 1.28 | 110 | 0 | 110 |
| | | | **TEV** | **TEV** | **210** | **2133** | **2263** | **12** | | | | **2900** | **115** | **3015** |
| 22 | 220 | SE Ensign Ln at SE 19th St | EB | EBL | 220 | 3 | 3 | 0 | 0% | 1.00 | 1.24 | 5 | 0 | 5 |
| | 220 | | EB | EBT | 220 | 60 | 170 | 5 | 8% | 1.00 | 1.24 | 210 | 5 | 215 |
| | 220 | Count Date: 5/27/2015 | EB | EBR | 220 | 52 | 52 | 2 | 4% | 1.00 | 1.24 | 65 | 0 | 65 |
| | 220 | | WB | WBL | 220 | 4 | 4 | 0 | 0% | 1.00 | 1.24 | 5 | 0 | 5 |
| | 220 | | WB | WBT | 220 | 49 | 139 | 0 | 0% | 1.00 | 1.24 | 170 | 0 | 170 |
| | 220 | | WB | WBR | 220 | 7 | 7 | 0 | 0% | 1.00 | 1.24 | 10 | 0 | 10 |
| | 220 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 220 | 47 | 47 | 4 | 9% | 1.00 | 1.24 | 60 | 0 | 60 |
| | 220 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 220 | 10 | 10 | 0 | 0% | 1.00 | 1.24 | 10 | 0 | 10 |
| | 220 | | NB | NBR | 220 | 2 | 2 | 0 | 0% | 1.00 | 1.24 | 0 | 5 | 5 |
| | 220 | | SB | SBL | 220 | 4 | 4 | 0 | 0% | 1.00 | 1.24 | 5 | 5 | 10 |
| | 220 | PHF: | SB | SBT | 220 | 7 | 7 | 0 | 0% | 1.00 | 1.24 | 10 | 0 | 10 |
| | 220 | 0.88 | SB | SBR | 220 | 33 | 33 | 0 | 0% | 1.00 | 1.24 | 40 | 0 | 40 |
| | | | **TEV** | **TEV** | **220** | **278** | **478** | **11** | | | | **590** | **15** | **605** |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/16/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Existing Heavy Vehicle Count | Existing Heavy Vehicle Percentage | Base Year Adjustment Factor | Seasonal Adjustment Factor | 30th Highest Hour Adjusted 1-Hr Volume PM Peak | Volume Balancing Adjustments | 2015 Balanced Volumes PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | 230 | SE Ensign Ln at US 101Bus/Warrenton-Astoria Hw | | EBL | 230 | 2 | 2 | 0 | 0% | 1.00 | 1.20 | 5 | 0 | 5 |
| | 230 | | EB | EBT | 230 | 187 | 187 | 9 | 5% | 1.00 | 1.20 | 225 | 0 | 225 |
| | 230 | Count Date: 10/21/2015 | | EBR | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | | | WBL | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | | WB | WBT | 230 | 120 | 120 | 5 | 4% | 1.00 | 1.20 | 145 | 0 | 145 |
| | 230 | | | WBR | 230 | 50 | 50 | 1 | 2% | 1.00 | 1.20 | 60 | 115 | 175 |
| | 230 | PM Peak Hour: 4:30 PM-5:30 PM | | NBL | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | | | NBR | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | | | SBL | 230 | 84 | 84 | 10 | 12% | 1.00 | 1.20 | 100 | 0 | 100 |
| | 230 | PHF: | SB | SBT | 230 | 0 | 0 | 0 | 0% | 1.00 | 1.20 | 0 | 0 | 0 |
| | 230 | 0.79 | | SBR | 230 | 10 | 10 | 0 | 0% | 1.00 | 1.20 | 10 | 30 | 40 |
| | | | **TEV** | **TEV** | **230** | **453** | **453** | **25** | | | **1** | **545** | **145** | **690** |
| 24 | 240 | US 101 at SE Dolphin Ave | | EBL | 240 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 240 | | EB | EBT | 240 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 240 | Count Date: 5/27/2015 | | EBR | 240 | 0 | 0 | 2 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 240 | | | WBL | 240 | 7 | 7 | 0 | 0% | 1.00 | 1.28 | 10 | 0 | 10 |
| | 240 | | WB | WBT | 240 | 0 | 0 | 0 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 240 | | | WBR | 240 | 52 | 52 | 0 | 0% | 1.00 | 1.28 | 65 | 0 | 65 |
| | 240 | PM Peak Hour: 9:15 AM-10:15 AM | | NBL | 240 | 0 | 0 | 1 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | 240 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 240 | 520 | 520 | 14 | 3% | 1.00 | 1.28 | 670 | 100 | 770 |
| | 240 | | | NBR | 240 | 4 | 4 | 0 | 0% | 1.00 | 1.28 | 5 | 0 | 5 |
| | 240 | | | SBL | 240 | 29 | 29 | 0 | 0% | 1.00 | 1.28 | 35 | 0 | 35 |
| | 240 | PHF: | SB | SBT | 240 | 582 | 612 | 15 | 3% | 1.00 | 1.28 | 785 | 115 | 900 |
| | 240 | 0.89 | | SBR | 240 | 0 | 0 | 1 | 0% | 1.00 | 1.28 | 0 | 1 | 1 |
| | | | **TEV** | **TEV** | **240** | **1194** | **1224** | **33** | | | **0.72** | **1570** | **221** | **1791** |

| | 15-May | AVERAGE Interpolated 27-May | 1-Jun | Peak Period | May AVERAGE | 15-Sep | AVERAGE Interpolated 26-Sep | 1-Oct | Peak Period | September AVERAGE | 15-Oct | AVERAGE Interpolated 21-Oct | 1-Nov | Peak Period | October AVERAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Summer** | 0.9607 | **0.9360** | 0.9257 | 0.8350 | 1.121 | - | - | - | - | - | 0.9836 | **1.0029** | 1.0382 | 0.8350 | |
| **Coastal** | 1.0214 | 0.9950 | 0.9840 | 0.8260 | 1.205 | 0.9283 | 0.9674 | 0.9852 | 0.8260 | 1.171 | - | - | - | - | - |
| **Coastal Dest** | 1.0712 | 1.0287 | 1.0110 | 0.7549 | 1.363 | 0.9111 | 0.9865 | 1.0208 | 0.7549 | 1.307 | - | - | - | - | - |
| | average of coastal and coastal destination: | | | | **1.012** | average of coastal and coastal destination: | | | | **0.977** | - | - | - | - | - |
| **Commuter** | 0.9403 | **0.9468** | 0.9495 | 0.9149 | 1.035 | - | - | - | - | - | - | - | - | - | - |

| City of Warrenton Seasonal Adjustment Factors - AVERAGE | May | Septembe | October |
|---|---|---|---|
| **Summer trend from seasonal factor table** | **0.936** | **-** | **1.003** |
| **Avg. of seasonal factor table coastal destination and coastal destination route** | **1.012** | **0.977** | **-** |
| **Commuter trend from Sesonal Factor Table** | **0.947** | **-** | **-** |

| City of Warrenton Seasonal Adjustment Factors | May | Septembe | October |
|---|---|---|---|
| Summer trend from seasonal factor table | 1.121 | - | 1.201 |
| Avg. of seasonal factor table coastal destination and coastal destination route | 1.284 | 1.239 | - |
| Commuter trend from Sesonal Factor Table | 1.035 | - | - |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/18/2016

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Traffic adjustments due to bridge closure: Existing Counts (with adjustments) 1-Hr Volume PM Peak | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | Pacific Dr at Willow St/Lake Dr | EB | EBL | 10 | 4 | 4 | 1.00 | 0.94 | 5 |
| | 10 | | EB | EBT | 10 | 14 | 14 | 1.00 | 0.94 | 15 |
| | 10 | Count Date: 5/27/2015 | EB | EBR | 10 | 12 | 12 | 1.00 | 0.94 | 10 |
| | 10 | | WB | WBL | 10 | 59 | 59 | 1.00 | 0.94 | 55 |
| | 10 | | WB | WBT | 10 | 35 | 35 | 1.00 | 0.94 | 35 |
| | 10 | | WB | WBR | 10 | 9 | 9 | 1.00 | 0.94 | 10 |
| | 10 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 10 | 22 | 22 | 1.00 | 0.94 | 20 |
| | 10 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 10 | 12 | 12 | 1.00 | 0.94 | 10 |
| | 10 | | NB | NBR | 10 | 68 | 68 | 1.00 | 0.94 | 65 |
| | 10 | | SB | SBL | 10 | 10 | 10 | 1.00 | 0.94 | 10 |
| | 10 | PHF: | SB | SBT | 10 | 9 | 9 | 1.00 | 0.94 | 10 |
| | 10 | 0.90 | SB | SBR | 10 | 4 | 4 | 1.00 | 0.94 | 5 |
| | | | **TEV** | **TEV** | **10** | **258** | **258** | | | **250** |
| 2 | 20 | Pacific Dr at Iredale St | EB | EBL | 20 | 2 | 2 | 1.00 | 0.94 | 0 |
| | 20 | | EB | EBT | 20 | 111 | 111 | 1.00 | 0.94 | 105 |
| | 20 | Count Date: 5/27/2015 | EB | EBR | 20 | 2 | 2 | 1.00 | 0.94 | 0 |
| | 20 | | WB | WBL | 20 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 20 | | WB | WBT | 20 | 127 | 127 | 1.00 | 0.94 | 120 |
| | 20 | | WB | WBR | 20 | 8 | 8 | 1.00 | 0.94 | 5 |
| | 20 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 20 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 20 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 20 | 0 | 0 | 1.00 | 0.94 | 0 |
| | 20 | | NB | NBR | 20 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 20 | | SB | SBL | 20 | 9 | 9 | 1.00 | 0.94 | 10 |
| | 20 | PHF: | SB | SBT | 20 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 20 | 0.89 | SB | SBR | 20 | 3 | 3 | 1.00 | 0.94 | 5 |
| | | | **TEV** | **TEV** | **20** | **266** | **266** | | | **245** |
| 3 | 30 | OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Stre | EB | EBL | 30 | 13 | 13 | 1.00 | 0.94 | 10 |
| | 30 | | EB | EBT | 30 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 30 | Count Date: 5/27/2015 | EB | EBR | 30 | 28 | 28 | 1.00 | 0.94 | 25 |
| | 30 | | WB | WBL | 30 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 30 | | WB | WBT | 30 | 2 | 2 | 1.00 | 0.94 | 0 |
| | 30 | | WB | WBR | 30 | 3 | 3 | 1.00 | 0.94 | 5 |
| | 30 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 30 | 50 | 50 | 1.00 | 0.94 | 45 |
| | 30 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 30 | 296 | 296 | 1.00 | 0.94 | 275 |
| | 30 | | NB | NBR | 30 | 2 | 2 | 1.00 | 0.94 | 0 |
| | 30 | | SB | SBL | 30 | 5 | 5 | 1.00 | 0.94 | 5 |
| | 30 | PHF: | SB | SBT | 30 | 238 | 238 | 1.00 | 0.94 | 225 |
| | 30 | 0.94 | SB | SBR | 30 | 11 | 11 | 1.00 | 0.94 | 10 |
| | | | **TEV** | **TEV** | **30** | **650** | **650** | | | **600** |
| 4 | 40 | OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main | EB | EBL | 40 | 4 | 4 | 1.01 | 0.98 | 5 |
| | 40 | | EB | EBT | 40 | 142 | 142 | 1.01 | 0.98 | 140 |
| | 40 | Count Date: 9/26/2013 | EB | EBR | 40 | 77 | 77 | 1.01 | 0.98 | 75 |
| | 40 | | WB | WBL | 40 | 203 | 203 | 1.01 | 0.98 | 200 |
| | 40 | | WB | WBT | 40 | 203 | 203 | 1.01 | 0.98 | 200 |
| | 40 | | WB | WBR | 40 | 50 | 50 | 1.01 | 0.98 | 50 |
| | 40 | PM Peak Hour: 4:45 PM-5:45 PM | NB | NBL | 40 | 86 | 86 | 1.01 | 0.98 | 85 |
| | 40 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 40 | 30 | 30 | 1.01 | 0.98 | 30 |
| | 40 | | NB | NBR | 40 | 157 | 157 | 1.01 | 0.98 | 155 |
| | 40 | | SB | SBL | 40 | 56 | 56 | 1.01 | 0.98 | 55 |
| | 40 | PHF: | SB | SBT | 40 | 54 | 54 | 1.01 | 0.98 | 55 |
| | 40 | 0.96 | SB | SBR | 40 | 3 | 3 | 1.01 | 0.98 | 5 |
| | | | **TEV** | **TEV** | **40** | **1065** | **1065** | | | **1055** |
| 5 | 50 | Warrenton-Astoria Hwy at SE Galena Ave | | EBL | 50 | 2 | 2 | 1.00 | 1.01 | 0 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/18/2016

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak (Traffic adjustments due to bridge closure) | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| | 50 | | EB | EBT | 50 | 444 | 444 | 1.00 | 1.01 | 450 |
| | 50 | Count Date: 5/27/2015 | | EBR | 50 | 3 | 3 | 1.00 | 1.01 | 5 |
| | 50 | | | WBL | 50 | 6 | 6 | 1.00 | 1.01 | 5 |
| | 50 | | WB | WBT | 50 | 531 | 531 | 1.00 | 1.01 | 535 |
| | 50 | | | WBR | 50 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 50 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 50 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 50 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 50 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 50 | | | NBR | 50 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 50 | | | SBL | 50 | 1 | 1 | 1.00 | 1.01 | 0 |
| | 50 | PHF: | SB | SBT | 50 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 50 | 0.95 | | SBR | 50 | 2 | 2 | 1.00 | 1.01 | 0 |
| | | | **TEV** | **TEV** | **50** | **995** | **995** | | | **995** |
| 6 | 60 | E Harbor St at Marlin Dr | | EBL | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 60 | | EB | EBT | 60 | 374 | 354 | 1.00 | 1.01 | 360 |
| | 60 | Count Date: 5/27/2015 | | EBR | 60 | 77 | 97 | 1.00 | 1.01 | 100 |
| | 60 | | | WBL | 60 | 16 | 16 | 1.00 | 1.01 | 15 |
| | 60 | | WB | WBT | 60 | 415 | 400 | 1.00 | 1.01 | 405 |
| | 60 | | | WBR | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 60 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 60 | 129 | 144 | 1.00 | 1.01 | 145 |
| | 60 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 60 | | | NBR | 60 | 11 | 11 | 1.00 | 1.01 | 10 |
| | 60 | | | SBL | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 60 | PHF: | SB | SBT | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 60 | 0.96 | | SBR | 60 | 0 | 0 | 1.00 | 1.01 | 0 |
| | | | **TEV** | **TEV** | **60** | **1022** | **1022** | | | **1035** |
| 7 | 70 | E Harbor St at SE Neptune Dr | | EBL | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 70 | | EB | EBT | 70 | 294 | 274 | 1.00 | 1.01 | 275 |
| | 70 | Count Date: 5/27/2015 | | EBR | 70 | 90 | 90 | 1.00 | 1.01 | 90 |
| | 70 | | | WBL | 70 | 84 | 84 | 1.00 | 1.01 | 85 |
| | 70 | **Signalized** | WB | WBT | 70 | 354 | 339 | 1.00 | 1.01 | 345 |
| | 70 | | | WBR | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 70 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 70 | 83 | 83 | 1.00 | 1.01 | 85 |
| | 70 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 70 | | | NBR | 70 | 65 | 65 | 1.00 | 1.01 | 65 |
| | 70 | | | SBL | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 70 | PHF: | SB | SBT | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 70 | 0.95 | | SBR | 70 | 0 | 0 | 1.00 | 1.01 | 0 |
| | | | **TEV** | **TEV** | **70** | **970** | **935** | | | **945** |
| 8 | 80 | E Harbor St at Young's Bay Plaza Access | | EBL | 80 | 36 | 36 | 1.00 | 1.01 | 35 |
| | 80 | | EB | EBT | 80 | 320 | 300 | 1.00 | 1.01 | 305 |
| | 80 | Count Date: 5/27/2015 | | EBR | 80 | 13 | 13 | 1.00 | 1.01 | 15 |
| | 80 | | | WBL | 80 | 67 | 67 | 1.00 | 1.01 | 70 |
| | 80 | | WB | WBT | 80 | 364 | 349 | 1.00 | 1.01 | 355 |
| | 80 | | | WBR | 80 | 21 | 21 | 1.00 | 1.01 | 20 |
| | 80 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 80 | 6 | 6 | 1.00 | 1.01 | 5 |
| | 80 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 80 | 8 | 8 | 1.00 | 1.01 | 10 |
| | 80 | | | NBR | 80 | 54 | 54 | 1.00 | 1.01 | 55 |
| | 80 | | | SBL | 80 | 46 | 46 | 1.00 | 1.01 | 45 |
| | 80 | PHF: | SB | SBT | 80 | 9 | 9 | 1.00 | 1.01 | 10 |
| | 80 | 0.93 | | SBR | 80 | 68 | 68 | 1.00 | 1.01 | 70 |
| | | | **TEV** | **TEV** | **80** | **1012** | **977** | | | **995** |
| 9 | 90 | E Harbor St at US 101 (signalized) | | EBL | 90 | 377 | 357 | 1.00 | 1.01 | 360 |
| | 90 | | EB | EBT | 90 | 0 | 0 | 1.00 | 1.01 | 0 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/18/2016

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Traffic adjustments due to bridge closure Existing Counts (with adjustments) 1-Hr Volume PM Peak | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| | 90 | Count Date: 5/28/2015 | | EBR | 90 | 35 | 35 | 1.00 | 1.01 | 35 |
| | 90 | | WB | WBL | 90 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 90 | | | WBT | 90 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 90 | | | WBR | 90 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 90 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 90 | 41 | 41 | 1.00 | 1.01 | 40 |
| | 90 | PM Peak Hour Used: 4:00 PM-5:00 PM | | NBT | 90 | 817 | 737 | 1.00 | 1.01 | 745 |
| | 90 | | | NBR | 90 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 90 | | SB | SBL | 90 | 5 | 5 | 1.00 | 1.01 | 5 |
| | 90 | PHF: | | SBT | 90 | 733 | 708 | 1.00 | 1.01 | 715 |
| | 90 | 0.98 | | SBR | 90 | 400 | 385 | 1.00 | 1.01 | 390 |
| | | | **TEV** | **TEV** | **90** | **2408** | **2268** | | | **2290** |
| 10 | 100 | SW 2nd St/SW Gardenia Ave | EB | EBL | 100 | 0 | 0 | 1.00 | 0.98 | 0 |
| | 100 | | | EBT | 100 | 11 | 11 | 1.00 | 0.98 | 10 |
| | 100 | Count Date: 5/28/2015 | | EBR | 100 | 3 | 3 | 1.00 | 0.98 | 5 |
| | 100 | | WB | WBL | 100 | 11 | 11 | 1.00 | 0.98 | 10 |
| | 100 | | | WBT | 100 | 19 | 19 | 1.00 | 0.98 | 20 |
| | 100 | | | WBR | 100 | 7 | 7 | 1.00 | 0.98 | 5 |
| | 100 | PM Peak Hour: 4:45 PM-5:45 PM | NB | NBL | 100 | 2 | 2 | 1.00 | 0.98 | 0 |
| | 100 | PM Peak Hour Used: 4:00 PM-5:00 PM | | NBT | 100 | 2 | 2 | 1.00 | 0.98 | 0 |
| | 100 | | | NBR | 100 | 5 | 5 | 1.00 | 0.98 | 5 |
| | 100 | | SB | SBL | 100 | 4 | 4 | 1.00 | 0.98 | 5 |
| | 100 | PHF: | | SBT | 100 | 1 | 1 | 1.00 | 0.98 | 0 |
| | 100 | 0.84 | | SBR | 100 | 0 | 0 | 1.00 | 0.98 | 0 |
| | | | **TEV** | **TEV** | **100** | **65** | **65** | | | **60** |
| 11 | 110 | OR 104/S Main Ave at SW 2nd St | EB | EBL | 110 | 65 | 65 | 1.00 | 1.01 | 65 |
| | 110 | | | EBT | 110 | 5 | 5 | 1.00 | 1.01 | 5 |
| | 110 | Count Date: 5/27/2015 | | EBR | 110 | 43 | 43 | 1.00 | 1.01 | 45 |
| | 110 | | WB | WBL | 110 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 110 | | | WBT | 110 | 3 | 3 | 1.00 | 1.01 | 5 |
| | 110 | | | WBR | 110 | 6 | 6 | 1.00 | 1.01 | 5 |
| | 110 | PM Peak Hour: 4:00 PM-5:00 PM | NB | NBL | 110 | 33 | 33 | 1.00 | 1.01 | 35 |
| | 110 | PM Peak Hour Used: 4:00 PM-5:00 PM | | NBT | 110 | 247 | 247 | 1.00 | 1.01 | 250 |
| | 110 | | | NBR | 110 | 5 | 5 | 1.00 | 1.01 | 5 |
| | 110 | | SB | SBL | 110 | 5 | 5 | 1.00 | 1.01 | 5 |
| | 110 | PHF: | | SBT | 110 | 262 | 262 | 1.00 | 1.01 | 265 |
| | 110 | 0.92 | | SBR | 110 | 65 | 65 | 1.00 | 1.01 | 65 |
| | | | **TEV** | **TEV** | **110** | **741** | **741** | | | **750** |
| 12 | 120 | US 101 at SE Neptune Dr (signalized) | EB | EBL | 120 | 156 | 156 | 1.00 | 1.01 | 160 |
| | 120 | | | EBT | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | Count Date: 5/28/2015 | | EBR | 120 | 163 | 163 | 1.00 | 1.01 | 165 |
| | 120 | | WB | WBL | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | | | WBT | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | | | WBR | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | PM Peak Hour: 4:15 PM-5:15 PM | NB | NBL | 120 | 147 | 147 | 1.00 | 1.01 | 150 |
| | 120 | PM Peak Hour Used: 4:00 PM-5:00 PM | | NBT | 120 | 686 | 606 | 1.00 | 1.01 | 615 |
| | 120 | | | NBR | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | | SB | SBL | 120 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 120 | PHF: | | SBT | 120 | 664 | 639 | 1.00 | 1.01 | 645 |
| | 120 | 0.94 | | SBR | 120 | 104 | 104 | 1.00 | 1.01 | 105 |
| | | | **TEV** | **TEV** | **120** | **1920** | **1815** | | | **1840** |
| 13 | 130 | US 101 at Marlin Dr (signalized) | EB | EBL | 130 | 29 | 29 | 1.02 | 0.98 | 30 |
| | 130 | | | EBT | 130 | 67 | 67 | 1.02 | 0.98 | 65 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: ***PM Turning Movement Volumes***

8/18/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| | 130 | Count Date: 9/26/2013 | | EBR | 130 | 105 | 105 | 1.02 | 0.98 | 105 |
| | 130 | | | WBL | 130 | 57 | 57 | 1.02 | 0.98 | 55 |
| | 130 | | WB | WBT | 130 | 97 | 97 | 1.02 | 0.98 | 95 |
| | 130 | | | WBR | 130 | 87 | 87 | 1.02 | 0.98 | 85 |
| | 130 | PM Peak Hour: 4:15 PM-5:15 PM | | NBL | 130 | 101 | 101 | 1.02 | 0.98 | 100 |
| | 130 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 130 | 528 | 528 | 1.02 | 0.98 | 525 |
| | 130 | | | NBR | 130 | 14 | 14 | 1.02 | 0.98 | 15 |
| | 130 | | | SBL | 130 | 65 | 65 | 1.02 | 0.98 | 65 |
| | 130 | PHF: | SB | SBT | 130 | 563 | 563 | 1.02 | 0.98 | 560 |
| | 130 | 0.91 | | SBR | 130 | 26 | 26 | 1.02 | 0.98 | 25 |
| | | | **TEV** | **TEV** | **130** | **1739** | **1739** | | **1** | **1725** |
| 14 | 140 | NW Ridge Rd at SW 9th St | | EBL | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 140 | | EB | EBT | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 140 | Count Date: 5/27/2015 | | EBR | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 140 | | | WBL | 140 | 12 | 12 | 1.00 | 1.01 | 10 |
| | 140 | | WB | WBT | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 140 | | | WBR | 140 | 66 | 66 | 1.00 | 1.01 | 65 |
| | 140 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 140 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 140 | 59 | 59 | 1.00 | 1.01 | 60 |
| | 140 | | | NBR | 140 | 9 | 9 | 1.00 | 1.01 | 10 |
| | 140 | | | SBL | 140 | 17 | 17 | 1.00 | 1.01 | 15 |
| | 140 | PHF: | SB | SBT | 140 | 48 | 48 | 1.00 | 1.01 | 50 |
| | 140 | 0.84 | | SBR | 140 | 0 | 0 | 1.00 | 1.01 | 0 |
| | | | **TEV** | **TEV** | **140** | **211** | **211** | | | **210** |
| 15 | 150 | SW 9th St at OR 104/Ft Stevens Hwy | | EBL | 150 | 33 | 33 | 1.00 | 1.01 | 35 |
| | 150 | | EB | EBT | 150 | 1 | 1 | 1.00 | 1.01 | 0 |
| | 150 | Count Date: 5/27/2015 | | EBR | 150 | 40 | 40 | 1.00 | 1.01 | 40 |
| | 150 | | | WBL | 150 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 150 | | WB | WBT | 150 | 1 | 1 | 1.00 | 1.01 | 0 |
| | 150 | | | WBR | 150 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 150 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 150 | 56 | 56 | 1.00 | 1.01 | 55 |
| | 150 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 150 | 231 | 231 | 1.00 | 1.01 | 235 |
| | 150 | | | NBR | 150 | 1 | 1 | 1.00 | 1.01 | 0 |
| | 150 | | | SBL | 150 | 2 | 2 | 1.00 | 1.01 | 0 |
| | 150 | PHF: | SB | SBT | 150 | 199 | 199 | 1.00 | 1.01 | 200 |
| | 150 | 0.95 | | SBR | 150 | 76 | 76 | 1.00 | 1.01 | 75 |
| | | | **TEV** | **TEV** | **150** | **642** | **642** | | | **640** |
| 16 | 160 | OR 104S/Ft Stevens Hwy Spur at US 101 | | EBL | 160 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 160 | | EB | EBT | 160 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 160 | Count Date: 5/27/2015 | | EBR | 160 | 5 | 5 | 1.00 | 1.01 | 5 |
| | 160 | | | WBL | 160 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 160 | | WB | WBT | 160 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 160 | | | WBR | 160 | 11 | 11 | 1.00 | 1.01 | 10 |
| | 160 | PM Peak Hour: 4:30 PM-5:30 PM | | NBL | 160 | 11 | 11 | 1.00 | 1.01 | 10 |
| | 160 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 160 | 714 | 669 | 1.00 | 1.01 | 675 |
| | 160 | | | NBR | 160 | 16 | 16 | 1.00 | 1.01 | 15 |
| | 160 | | | SBL | 160 | 1 | 1 | 1.00 | 1.01 | 0 |
| | 160 | PHF: | SB | SBT | 160 | 695 | 685 | 1.00 | 1.01 | 695 |
| | 160 | 0.91 | | SBR | 160 | 110 | 95 | 1.00 | 1.01 | 95 |
| | | | **TEV** | **TEV** | **160** | **1563** | **1493** | | | **1505** |
| 17 | 170 | US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy | | EBL | 170 | 10 | 10 | 1.00 | 0.94 | 10 |
| | 170 | | EB | EBT | 170 | 14 | 14 | 1.00 | 0.94 | 15 |

Project: Warrenton TSP Update

Job #: DKSA00000004

Subject: *PM Turning Movement Volumes*

8/18/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| | 170 | Count Date: 5/27/2015 | | EBR | 170 | 0 | 0 | 1.00 | 0.94 | 0 |
| | 170 | | | WBL | 170 | 0 | 0 | 1.00 | 0.94 | 0 |
| | 170 | | WB | WBT | 170 | 4 | 4 | 1.00 | 0.94 | 5 |
| | 170 | | | WBR | 170 | 166 | 196 | 1.00 | 0.94 | 185 |
| | 170 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 170 | 0 | 0 | 1.00 | 0.94 | 0 |
| | 170 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 170 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 170 | | | NBR | 170 | 0 | 0 | 1.00 | 0.94 | 0 |
| | 170 | | | SBL | 170 | 73 | 123 | 1.00 | 0.94 | 115 |
| | 170 | PHF: | SB | SBT | 170 | 1 | 1 | 1.00 | 0.94 | 0 |
| | 170 | 0.90 | | SBR | 170 | 9 | 9 | 1.00 | 0.94 | 10 |
| | | | **TEV** | **TEV** | **170** | **278** | **358** | | | **340** |
| 18 | 180 | Delaura Beach Ln at Ridge Rd | | EBL | 180 | 3 | 3 | 1.00 | 1.01 | 5 |
| | 180 | | EB | EBT | 180 | 12 | 12 | 1.00 | 1.01 | 10 |
| | 180 | Count Date: 5/27/2015 | | EBR | 180 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 180 | **Intersection has unconventional** | | WBL | 180 | 3 | 3 | 1.00 | 1.01 | 5 |
| | 180 | **geometric configuration** | WB | WBT | 180 | 19 | 19 | 1.00 | 1.01 | 20 |
| | 180 | | | WBR | 180 | 66 | 66 | 1.00 | 1.01 | 65 |
| | 180 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 180 | 1 | 1 | 1.00 | 1.01 | 5 |
| | 180 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 180 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 180 | | | NBR | 180 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 180 | | | SBL | 180 | 42 | 42 | 1.00 | 1.01 | 45 |
| | 180 | PHF: | SB | SBT | 180 | 12 | 12 | 1.00 | 1.01 | 10 |
| | 180 | 0.86 | | SBR | 180 | 4 | 4 | 1.00 | 1.01 | 5 |
| | | | **TEV** | **TEV** | **180** | **162** | **162** | | | **170** |
| 19 | 190 | OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens H | | EBL | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | 190 | | EB | EBT | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | 190 | Count Date: 9/26/2013 | | EBR | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | 190 | | | WBL | 190 | 64 | 64 | 1.02 | 0.98 | 65 |
| | 190 | | WB | WBT | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | 190 | | | WBR | 190 | 142 | 142 | 1.02 | 0.98 | 140 |
| | 190 | PM Peak Hour: 4:45 PM-5:45 PM | | NBL | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | 190 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 190 | 121 | 121 | 1.02 | 0.98 | 120 |
| | 190 | | | NBR | 190 | 56 | 56 | 1.02 | 0.98 | 55 |
| | 190 | | | SBL | 190 | 106 | 106 | 1.02 | 0.98 | 105 |
| | 190 | PHF: | SB | SBT | 190 | 103 | 103 | 1.02 | 0.98 | 100 |
| | 190 | 0.88 | | SBR | 190 | 0 | 0 | 1.02 | 0.98 | 0 |
| | | | **TEV** | **TEV** | **190** | **592** | **592** | | | **585** |
| 20 | 200 | SW 18th St/Delaura Beach Ln at S Main Ave/Ft Ste | | EBL | 200 | 47 | 47 | 1.00 | 1.01 | 50 |
| | 200 | | EB | EBT | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | Count Date: 5/27/2015 | | EBR | 200 | 19 | 19 | 1.00 | 1.01 | 20 |
| | 200 | | | WBL | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | | WB | WBT | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | | | WBR | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 200 | 16 | 16 | 1.00 | 1.01 | 15 |
| | 200 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 200 | 101 | 101 | 1.00 | 1.01 | 100 |
| | 200 | | | NBR | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | | | SBL | 200 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 200 | PHF: | SB | SBT | 200 | 81 | 81 | 1.00 | 1.01 | 80 |
| | 200 | 0.94 | | SBR | 200 | 57 | 57 | 1.00 | 1.01 | 60 |
| | | | **TEV** | **TEV** | **200** | **321** | **321** | | | **325** |
| 21 | 210 | SE Ensign Ln at US 101 (signalized) | | EBL | 210 | 179 | 144 | 1.00 | 1.01 | 145 |
| | 210 | | EB | EBT | 210 | 136 | 206 | 1.00 | 1.01 | 210 |

Project: Warrenton TSP Update
Job #: DKSA00000004
Subject: *PM Turning Movement Volumes*

8/18/2016

Traffic adjustments due to bridge closure

| N-S ID | Synchro ID | Intersection | Direction | Movement | Int ID | Existing Counts 1-Hr Volume PM Peak | Existing Counts (with adjustments) 1-Hr Volume PM Peak | Base Year Adjustment Factor | AVERAGE ANNUAL Adjustment Factor | Average Peak Hour 1-Hr Volume PM Peak |
|---|---|---|---|---|---|---|---|---|---|---|
| | 210 | Count Date: 5/28/2015 | | EBR | 210 | 72 | 72 | 1.00 | 1.01 | 75 |
| | 210 | | | WBL | 210 | 125 | 165 | 1.00 | 1.01 | 165 |
| | 210 | | WB | WBT | 210 | 124 | 174 | 1.00 | 1.01 | 175 |
| | 210 | | | WBR | 210 | 169 | 169 | 1.00 | 1.01 | 170 |
| | 210 | PM Peak Hour: 4:15 PM-5:15 PM | | NBL | 210 | 73 | 73 | 1.00 | 1.01 | 75 |
| | 210 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 210 | 402 | 377 | 1.00 | 1.01 | 380 |
| | 210 | | | NBR | 210 | 88 | 128 | 1.00 | 1.01 | 130 |
| | 210 | | | SBL | 210 | 192 | 192 | 1.00 | 1.01 | 195 |
| | 210 | PHF: | SB | SBT | 210 | 486 | 476 | 1.00 | 1.01 | 480 |
| | 210 | 0.91 | | SBR | 210 | 87 | 87 | 1.00 | 1.01 | 90 |
| | | | **TEV** | **TEV** | **210** | **2133** | **2263** | | | **2290** |
| 22 | 220 | SE Ensign Ln at SE 19th St | | EBL | 220 | 3 | 3 | 1.00 | 0.98 | 5 |
| | 220 | | EB | EBT | 220 | 60 | 170 | 1.00 | 0.98 | 165 |
| | 220 | Count Date: 5/27/2015 | | EBR | 220 | 52 | 52 | 1.00 | 0.98 | 50 |
| | 220 | | | WBL | 220 | 4 | 4 | 1.00 | 0.98 | 5 |
| | 220 | | WB | WBT | 220 | 49 | 139 | 1.00 | 0.98 | 135 |
| | 220 | | | WBR | 220 | 7 | 7 | 1.00 | 0.98 | 5 |
| | 220 | PM Peak Hour: 4:00 PM-5:00 PM | | NBL | 220 | 47 | 47 | 1.00 | 0.98 | 45 |
| | 220 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 220 | 10 | 10 | 1.00 | 0.98 | 10 |
| | 220 | | | NBR | 220 | 2 | 2 | 1.00 | 0.98 | 0 |
| | 220 | | | SBL | 220 | 4 | 4 | 1.00 | 0.98 | 5 |
| | 220 | PHF: | SB | SBT | 220 | 7 | 7 | 1.00 | 0.98 | 5 |
| | 220 | 0.88 | | SBR | 220 | 33 | 33 | 1.00 | 0.98 | 30 |
| | | | **TEV** | **TEV** | **220** | **278** | **478** | | | **460** |
| 23 | 230 | SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy | | EBL | 230 | 2 | 2 | 1.00 | 1.00 | 5 |
| | 230 | | EB | EBT | 230 | 187 | 187 | 1.00 | 1.00 | 190 |
| | 230 | Count Date: 10/21/2015 | | EBR | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | | | WBL | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | | WB | WBT | 230 | 120 | 120 | 1.00 | 1.00 | 120 |
| | 230 | | | WBR | 230 | 50 | 50 | 1.00 | 1.00 | 50 |
| | 230 | PM Peak Hour: 4:30 PM-5:30 PM | | NBL | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | | | NBR | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | | | SBL | 230 | 84 | 84 | 1.00 | 1.00 | 85 |
| | 230 | PHF: | SB | SBT | 230 | 0 | 0 | 1.00 | 1.00 | 0 |
| | 230 | 0.79 | | SBR | 230 | 10 | 10 | 1.00 | 1.00 | 10 |
| | | | **TEV** | **TEV** | **230** | **453** | **453** | | **1** | **460** |
| 24 | 240 | US 101 at SE Dolphin Ave | | EBL | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 240 | | EB | EBT | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 240 | Count Date: 5/27/2015 | | EBR | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 240 | | | WBL | 240 | 7 | 7 | 1.00 | 1.01 | 5 |
| | 240 | | WB | WBT | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 240 | | | WBR | 240 | 52 | 52 | 1.00 | 1.01 | 55 |
| | 240 | PM Peak Hour: 9:15 AM-10:15 AM | | NBL | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | 240 | PM Peak Hour Used: 4:00 PM-5:00 PM | NB | NBT | 240 | 520 | 520 | 1.00 | 1.01 | 525 |
| | 240 | | | NBR | 240 | 4 | 4 | 1.00 | 1.01 | 5 |
| | 240 | | | SBL | 240 | 29 | 29 | 1.00 | 1.01 | 30 |
| | 240 | PHF: | SB | SBT | 240 | 582 | 612 | 1.00 | 1.01 | 620 |
| | 240 | 0.89 | | SBR | 240 | 0 | 0 | 1.00 | 1.01 | 0 |
| | | | **TEV** | **TEV** | **240** | **1194** | **1224** | | **0.72** | **1240** |

# Appendix D

## Synchro Worksheets

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 0 | 5 | 15 | 940 | 985 | 120 |
| Future Volume (Veh/h) | 0 | 5 | 15 | 940 | 985 | 120 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Hourly flow rate (vph) | 0 | 5 | 16 | 1033 | 1082 | 132 |
| Pedestrians | | | | | | |
| Lane Width (ft) | | | | | | |
| Walking Speed (ft/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (ft) | | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 2147 | 1082 | 1082 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2147 | 1082 | 1082 | | | |
| tC, single (s) | 6.4 | 6.2 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 98 | 98 | | | |
| cM capacity (veh/h) | 53 | 267 | 652 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 |
|---|---|---|---|---|---|
| Volume Total | 5 | 16 | 1033 | 1082 | 132 |
| Volume Left | 0 | 16 | 0 | 0 | 0 |
| Volume Right | 5 | 0 | 0 | 0 | 132 |
| cSH | 267 | 652 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.02 | 0.02 | 0.61 | 0.64 | 0.08 |
| Queue Length 95th (ft) | 1 | 2 | 0 | 0 | 0 |
| Control Delay (s) | 18.7 | 10.7 | 0.0 | 0.0 | 0.0 |
| Lane LOS | C | B | | | |
| Approach Delay (s) | 18.7 | 0.2 | | 0.0 | |
| Approach LOS | C | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.1 | | |
| Intersection Capacity Utilization | 66.3% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 460 | 45 | 55 | 925 | 910 | 495 |
| Future Volume (vph) | 460 | 45 | 55 | 925 | 910 | 495 |
| Ideal Flow (vphpl) | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Total Lost time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.4 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1630 | 1488 | 1630 | 1733 | 1750 | 1488 |
| Flt Permitted | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1630 | 1488 | 1630 | 1733 | 1750 | 1488 |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 469 | 46 | 56 | 944 | 929 | 505 |
| RTOR Reduction (vph) | 0 | 32 | 0 | 0 | 0 | 82 |
| Lane Group Flow (vph) | 469 | 14 | 56 | 944 | 929 | 423 |
| Heavy Vehicles (%) | 2% | 0% | 2% | 1% | 0% | 0% |
| Turn Type | Prot | Perm | Prot | NA | NA | pt+ov |
| Protected Phases | 8 | | 1 | 6 | 2 | 2 8 |
| Permitted Phases | | 8 | | | | |
| Actuated Green, G (s) | 29.7 | 29.7 | 7.3 | 60.4 | 48.6 | 83.7 |
| Effective Green, g (s) | 30.2 | 30.2 | 7.8 | 61.8 | 50.0 | 83.7 |
| Actuated g/C Ratio | 0.30 | 0.30 | 0.08 | 0.62 | 0.50 | 0.84 |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 5.4 | 5.4 | |
| Vehicle Extension (s) | 2.5 | 2.5 | 2.5 | 4.7 | 4.7 | |
| Lane Grp Cap (vph) | 492 | 449 | 127 | 1070 | 875 | 1245 |
| v/s Ratio Prot | c0.29 | | 0.03 | c0.54 | c0.53 | 0.28 |
| v/s Ratio Perm | | 0.01 | | | | |
| v/c Ratio | 0.95 | 0.03 | 0.44 | 0.88 | 1.06 | 0.34 |
| Uniform Delay, d1 | 34.2 | 24.6 | 44.0 | 16.0 | 25.0 | 1.9 |
| Progression Factor | 1.00 | 1.00 | 0.98 | 0.92 | 1.00 | 1.00 |
| Incremental Delay, d2 | 28.9 | 0.0 | 1.4 | 8.5 | 48.2 | 0.1 |
| Delay (s) | 63.1 | 24.6 | 44.6 | 23.3 | 73.2 | 2.0 |
| Level of Service | E | C | D | C | E | A |
| Approach Delay (s) | 59.7 | | | 24.5 | 48.1 | |
| Approach LOS | E | | | C | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 42.1 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 1.05 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 13.9 |
| Intersection Capacity Utilization | 87.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 200 | 210 | 185 | 780 | 820 | 135 |
| Future Volume (vph) | 200 | 210 | 185 | 780 | 820 | 135 |
| Ideal Flow (vphpl) | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Total Lost time (s) | 4.5 | 4.5 | 4.5 | 5.4 | 5.4 | 5.4 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (prot) | 1646 | 1488 | 1646 | 1733 | 1750 | 1473 |
| Flt Permitted | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 |
| Satd. Flow (perm) | 1646 | 1488 | 1646 | 1733 | 1750 | 1473 |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 213 | 223 | 197 | 830 | 872 | 144 |
| RTOR Reduction (vph) | 0 | 183 | 0 | 0 | 0 | 27 |
| Lane Group Flow (vph) | 213 | 40 | 197 | 830 | 872 | 117 |
| Heavy Vehicles (%) | 1% | 0% | 1% | 1% | 0% | 1% |
| Turn Type | Prot | Perm | Prot | NA | NA | Perm |
| Protected Phases | 8 | | 1 | 6 | 2 | |
| Permitted Phases | | 8 | | | | 2 |
| Actuated Green, G (s) | 17.9 | 17.9 | 16.7 | 72.2 | 51.0 | 51.0 |
| Effective Green, g (s) | 17.9 | 17.9 | 16.7 | 72.2 | 51.0 | 51.0 |
| Actuated g/C Ratio | 0.18 | 0.18 | 0.17 | 0.72 | 0.51 | 0.51 |
| Clearance Time (s) | 4.5 | 4.5 | 4.5 | 5.4 | 5.4 | 5.4 |
| Vehicle Extension (s) | 2.5 | 2.5 | 2.5 | 4.8 | 4.8 | 4.8 |
| Lane Grp Cap (vph) | 294 | 266 | 274 | 1251 | 892 | 751 |
| v/s Ratio Prot | c0.13 | | 0.12 | c0.48 | c0.50 | |
| v/s Ratio Perm | | 0.03 | | | | 0.08 |
| v/c Ratio | 0.72 | 0.15 | 0.72 | 0.66 | 0.98 | 0.16 |
| Uniform Delay, d1 | 38.7 | 34.6 | 39.4 | 7.4 | 23.9 | 13.0 |
| Progression Factor | 0.99 | 0.95 | 0.87 | 1.47 | 1.71 | 2.38 |
| Incremental Delay, d2 | 8.0 | 0.2 | 4.1 | 1.4 | 12.3 | 0.1 |
| Delay (s) | 46.3 | 33.0 | 38.3 | 12.3 | 53.1 | 31.1 |
| Level of Service | D | C | D | B | D | C |
| Approach Delay (s) | 39.5 | | | 17.3 | 50.0 | |
| Approach LOS | D | | | B | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 34.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.88 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 14.4 |
| Intersection Capacity Utilization | 82.0% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 45 | 85 | 130 | 70 | 120 | 110 | 125 | 810 | 20 | 80 | 905 | 45 |
| Future Volume (vph) | 45 | 85 | 130 | 70 | 120 | 110 | 125 | 810 | 20 | 80 | 905 | 45 |
| Ideal Flow (vphpl) | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Total Lost time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 5.4 | | 4.5 | 5.4 | |
| Lane Util. Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.91 | | 1.00 | 0.93 | | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1525 | 1506 | | 1662 | 1497 | | 1421 | 1692 | | 1630 | 1648 | |
| Flt Permitted | 0.31 | 1.00 | | 0.35 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (perm) | 495 | 1506 | | 609 | 1497 | | 1421 | 1692 | | 1630 | 1648 | |
| 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) | 49 | 93 | 143 | 77 | 132 | 121 | 137 | 890 | 22 | 88 | 995 | 49 |
| RTOR Reduction (vph) | 0 | 58 | 0 | 0 | 35 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 49 | 178 | 0 | 77 | 218 | 0 | 137 | 911 | 0 | 88 | 1042 | 0 |
| Heavy Vehicles (%) | 9% | 2% | 8% | 0% | 9% | 8% | 17% | 3% | 4% | 2% | 5% | 14% |
| Turn Type | Perm | NA | | Perm | NA | | Prot | NA | | Prot | NA | |
| Protected Phases | | 8 | | | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | 8 | | | 4 | | | | | | | | |
| Actuated Green, G (s) | 18.2 | 18.2 | | 18.2 | 18.2 | | 12.2 | 58.6 | | 8.8 | 55.2 | |
| Effective Green, g (s) | 18.2 | 18.2 | | 18.2 | 18.2 | | 12.2 | 58.6 | | 8.8 | 55.2 | |
| Actuated g/C Ratio | 0.18 | 0.18 | | 0.18 | 0.18 | | 0.12 | 0.59 | | 0.09 | 0.55 | |
| Clearance Time (s) | 4.5 | 4.5 | | 4.5 | 4.5 | | 4.5 | 5.4 | | 4.5 | 5.4 | |
| Vehicle Extension (s) | 2.5 | 2.5 | | 2.5 | 2.5 | | 2.5 | 4.5 | | 2.5 | 4.5 | |
| Lane Grp Cap (vph) | 90 | 274 | | 110 | 272 | | 173 | 991 | | 143 | 909 | |
| v/s Ratio Prot | | 0.12 | | | c0.15 | | c0.10 | c0.54 | | 0.05 | c0.63 | |
| v/s Ratio Perm | 0.10 | | | 0.13 | | | | | | | | |
| v/c Ratio | 0.54 | 0.65 | | 0.70 | 0.80 | | 0.79 | 0.92 | | 0.62 | 1.15 | |
| Uniform Delay, d1 | 37.1 | 37.9 | | 38.3 | 39.2 | | 42.7 | 18.6 | | 44.0 | 22.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.12 | 0.62 | |
| Incremental Delay, d2 | 5.2 | 4.6 | | 16.4 | 15.0 | | 20.9 | 13.5 | | 3.6 | 73.4 | |
| Delay (s) | 42.4 | 42.6 | | 54.7 | 54.2 | | 63.5 | 32.1 | | 52.9 | 87.3 | |
| Level of Service | D | D | | D | D | | E | C | | D | F | |
| Approach Delay (s) | | 42.5 | | | 54.3 | | | 36.2 | | | 84.6 | |
| Approach LOS | | D | | | D | | | D | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 58.6 | HCM 2000 Level of Service | E |
| HCM 2000 Volume to Capacity ratio | 1.02 | | |
| Actuated Cycle Length (s) | 100.0 | Sum of lost time (s) | 14.4 |
| Intersection Capacity Utilization | 97.1% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 185 | 265 | 90 | 210 | 225 | 215 | 95 | 575 | 165 | 245 | 635 | 110 |
| Future Volume (vph) | 185 | 265 | 90 | 210 | 225 | 215 | 95 | 575 | 165 | 245 | 635 | 110 |
| Ideal Flow (vphpl) | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 |
| Total Lost time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | | 0.97 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | |
| Frt | 1.00 | 0.96 | | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.98 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1662 | 1671 | | 3225 | 1750 | 1488 | 1662 | 3292 | 1473 | 1662 | 3219 | |
| Flt Permitted | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (perm) | 1662 | 1671 | | 3225 | 1750 | 1488 | 1662 | 3292 | 1473 | 1662 | 3219 | |
| 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) | 203 | 291 | 99 | 231 | 247 | 236 | 104 | 632 | 181 | 269 | 698 | 121 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 148 | 0 | 0 | 121 | 0 | 15 | 0 |
| Lane Group Flow (vph) | 203 | 377 | 0 | 231 | 247 | 88 | 104 | 632 | 60 | 269 | 804 | 0 |
| Heavy Vehicles (%) | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 1% | 1% | 0% | 1% | 1% |
| Turn Type | Prot | NA | | Prot | NA | Perm | Prot | NA | Perm | Prot | NA | |
| Protected Phases | 3 | 8 | | 7 | 4 | | 1 | 6 | | 5 | 2 | |
| Permitted Phases | | | | | | 4 | | | 6 | | | |
| Actuated Green, G (s) | 5.1 | 22.4 | | 5.1 | 22.4 | 22.4 | 5.1 | 26.6 | 26.6 | 5.1 | 26.6 | |
| Effective Green, g (s) | 5.1 | 22.4 | | 5.1 | 22.4 | 22.4 | 5.1 | 26.6 | 26.6 | 5.1 | 26.6 | |
| Actuated g/C Ratio | 0.06 | 0.28 | | 0.06 | 0.28 | 0.28 | 0.06 | 0.33 | 0.33 | 0.06 | 0.33 | |
| Clearance Time (s) | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 6.0 | 6.0 | 5.0 | 6.0 | |
| Vehicle Extension (s) | 2.5 | 2.5 | | 2.5 | 2.5 | 2.5 | 2.5 | 4.8 | 4.8 | 2.5 | 4.8 | |
| Lane Grp Cap (vph) | 105 | 466 | | 205 | 488 | 415 | 105 | 1091 | 488 | 105 | 1067 | |
| v/s Ratio Prot | c0.12 | c0.23 | | 0.07 | 0.14 | | 0.06 | 0.19 | | c0.16 | c0.25 | |
| v/s Ratio Perm | | | | | | 0.06 | | | 0.04 | | | |
| v/c Ratio | 1.93 | 0.81 | | 1.13 | 0.51 | 0.21 | 0.99 | 0.58 | 0.12 | 2.56 | 0.75 | |
| Uniform Delay, d1 | 37.6 | 26.9 | | 37.6 | 24.3 | 22.1 | 37.5 | 22.2 | 18.7 | 37.6 | 23.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 452.9 | 9.7 | | 101.1 | 0.6 | 0.2 | 84.6 | 1.1 | 0.2 | 729.9 | 3.6 | |
| Delay (s) | 490.5 | 36.6 | | 138.7 | 24.9 | 22.3 | 122.1 | 23.3 | 18.9 | 767.5 | 27.5 | |
| Level of Service | F | D | | F | C | C | F | C | B | F | C | |
| Approach Delay (s) | | 192.0 | | | 60.8 | | | 33.6 | | | 210.4 | |
| Approach LOS | | F | | | E | | | C | | | F | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 125.9 | HCM 2000 Level of Service | F |
| HCM 2000 Volume to Capacity ratio | 1.03 | | |
| Actuated Cycle Length (s) | 80.2 | Sum of lost time (s) | 21.0 |
| Intersection Capacity Utilization | 77.1% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 5 | 215 | 65 | 5 | 170 | 10 | 60 | 10 | 5 | 10 | 10 | 40 |
| Future Volume (vph) | 5 | 215 | 65 | 5 | 170 | 10 | 60 | 10 | 5 | 10 | 10 | 40 |
| Ideal Flow (vphpl) | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 | 1750 |
| 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 | 1.00 | | 1.00 | | | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.99 | | | 0.91 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.96 | | | 0.99 | |
| Satd. Flow (prot) | 1662 | 1620 | 1430 | 1662 | 1750 | 1488 | | 1555 | | | 1578 | |
| Flt Permitted | 0.68 | 1.00 | 1.00 | 0.68 | 1.00 | 1.00 | | 0.77 | | | 0.96 | |
| Satd. Flow (perm) | 1186 | 1620 | 1430 | 1186 | 1750 | 1488 | | 1247 | | | 1521 | |
| Peak-hour factor, PHF | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| Adj. Flow (vph) | 6 | 244 | 74 | 6 | 193 | 11 | 68 | 11 | 6 | 11 | 11 | 45 |
| RTOR Reduction (vph) | 0 | 0 | 55 | 0 | 0 | 8 | 0 | 4 | 0 | 0 | 27 | 0 |
| Lane Group Flow (vph) | 6 | 244 | 19 | 6 | 193 | 3 | 0 | 81 | 0 | 0 | 40 | 0 |
| Heavy Vehicles (%) | 0% | 8% | 4% | 0% | 0% | 0% | 9% | 0% | 0% | 0% | 0% | 0% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 8 | | | 4 | | | 6 | | | 2 | |
| Permitted Phases | 8 | | 8 | 4 | | 4 | 6 | | | 2 | | |
| Actuated Green, G (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | 9.4 | | | 9.4 | |
| Effective Green, g (s) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | | 9.4 | | | 9.4 | |
| Actuated g/C Ratio | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | | 0.40 | | | 0.40 | |
| Clearance Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | | 4.0 | |
| Vehicle Extension (s) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | | 2.5 | | | 2.5 | |
| Lane Grp Cap (vph) | 300 | 410 | 362 | 300 | 443 | 376 | | 503 | | | 613 | |
| v/s Ratio Prot | | c0.15 | | | 0.11 | | | | | | | |
| v/s Ratio Perm | 0.01 | | 0.01 | 0.01 | | 0.00 | | c0.07 | | | 0.03 | |
| v/c Ratio | 0.02 | 0.60 | 0.05 | 0.02 | 0.44 | 0.01 | | 0.16 | | | 0.07 | |
| Uniform Delay, d1 | 6.5 | 7.6 | 6.6 | 6.5 | 7.3 | 6.5 | | 4.4 | | | 4.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | 0.0 | 1.9 | 0.0 | 0.0 | 0.5 | 0.0 | | 0.1 | | | 0.0 | |
| Delay (s) | 6.5 | 9.6 | 6.6 | 6.5 | 7.8 | 6.5 | | 4.5 | | | 4.3 | |
| Level of Service | A | A | A | A | A | A | | A | | | A | |
| Approach Delay (s) | | 8.9 | | | 7.7 | | | 4.5 | | | 4.3 | |
| Approach LOS | | A | | | A | | | A | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 7.5 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.33 | | |
| Actuated Cycle Length (s) | 23.3 | Sum of lost time (s) | 8.0 |
| Intersection Capacity Utilization | 30.1% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 7.9 |
| Intersection LOS | A |

| Movement | EBU | EBL | EBT | EBR | WBU | WBL | WBT | WBR | NBU | NBL | NBT | NBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 5 | 20 | 15 | 0 | 65 | 40 | 15 | 0 | 25 | 15 | 75 |
| Future Vol, veh/h | 0 | 5 | 20 | 15 | 0 | 65 | 40 | 15 | 0 | 25 | 15 | 75 |
| Peak Hour Factor | 0.92 | 0.90 | 0.90 | 0.90 | 0.92 | 0.90 | 0.90 | 0.90 | 0.92 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 2 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 2 | 5 | 0 | 6 |
| Mvmt Flow | 0 | 6 | 22 | 17 | 0 | 72 | 44 | 17 | 0 | 28 | 17 | 83 |
| 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 | 7.4 | 8.2 | 7.8 |
| HCM LOS | A | A | A |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|---|---|---|---|---|
| Vol Left, % | 22% | 12% | 54% | 40% |
| Vol Thru, % | 13% | 50% | 33% | 40% |
| Vol Right, % | 65% | 38% | 12% | 20% |
| Sign Control | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 115 | 40 | 120 | 25 |
| LT Vol | 25 | 5 | 65 | 10 |
| Through Vol | 15 | 20 | 40 | 10 |
| RT Vol | 75 | 15 | 15 | 5 |
| Lane Flow Rate | 128 | 44 | 133 | 28 |
| Geometry Grp | 1 | 1 | 1 | 1 |
| Degree of Util (X) | 0.144 | 0.052 | 0.159 | 0.034 |
| Departure Headway (Hd) | 4.071 | 4.182 | 4.291 | 4.395 |
| Convergence, Y/N | Yes | Yes | Yes | Yes |
| Cap | 886 | 860 | 824 | 818 |
| Service Time | 2.076 | 2.19 | 2.378 | 2.402 |
| HCM Lane V/C Ratio | 0.144 | 0.051 | 0.161 | 0.034 |
| HCM Control Delay | 7.8 | 7.4 | 8.2 | 7.6 |
| HCM Lane LOS | A | A | A | A |
| HCM 95th-tile Q | 0.5 | 0.2 | 0.6 | 0.1 |

| Intersection | | | | |
|---|---|---|---|---|
| Intersection Delay, s/veh | | | | |
| Intersection LOS | | | | |

| Movement | SBU | SBL | SBT | SBR |
|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 10 | 10 | 5 |
| Future Vol, veh/h | 0 | 10 | 10 | 5 |
| Peak Hour Factor | 0.92 | 0.90 | 0.90 | 0.90 |
| Heavy Vehicles, % | 2 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 11 | 11 | 6 |
| 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 | 7.6 |
| HCM LOS | A |

| Lane |
|---|

| Intersection | |
|---|---|
| Int Delay, s/veh | 1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 2 | 115 | 2 | 2 | 140 | 10 | 2 | 1 | 2 | 10 | 5 | 5 |
| Future Vol, veh/h | 2 | 115 | 2 | 2 | 140 | 10 | 2 | 1 | 2 | 10 | 5 | 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 | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 |
| Heavy Vehicles, % | 0 | 5 | 0 | 0 | 0 | 13 | 0 | 0 | 0 | 11 | 100 | 0 |
| Mvmt Flow | 2 | 129 | 2 | 2 | 157 | 11 | 2 | 1 | 2 | 11 | 6 | 6 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 169 | 0 | 0 | 131 | 0 | 0 | 308 | 308 | 130 | 304 | 303 | 163 |
| Stage 1 | - | - | - | - | - | - | 135 | 135 | - | 167 | 167 | - |
| Stage 2 | - | - | - | - | - | - | 173 | 173 | - | 137 | 136 | - |
| Critical Hdwy | 4.1 | - | - | 4.1 | - | - | 7.1 | 6.5 | 6.2 | 7.21 | 7.5 | 6.2 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.21 | 6.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.5 | - | 6.21 | 6.5 | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.599 | 4.9 | 3.3 |
| Pot Cap-1 Maneuver | 1421 | - | - | 1467 | - | - | 648 | 609 | 925 | 631 | 477 | 887 |
| Stage 1 | - | - | - | - | - | - | 873 | 789 | - | 814 | 608 | - |
| Stage 2 | - | - | - | - | - | - | 834 | 760 | - | 845 | 630 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1421 | - | - | 1467 | - | - | 636 | 607 | 925 | 627 | 475 | 887 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 636 | 607 | - | 627 | 475 | - |
| Stage 1 | - | - | - | - | - | - | 871 | 787 | - | 812 | 607 | - |
| Stage 2 | - | - | - | - | - | - | 819 | 758 | - | 840 | 629 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.1 | 10 | 11 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 719 | 1421 | - | - | 1467 | - | - | 623 |
| HCM Lane V/C Ratio | 0.008 | 0.002 | - | - | 0.002 | - | - | 0.036 |
| HCM Control Delay (s) | 10 | 7.5 | 0 | - | 7.5 | 0 | - | 11 |
| HCM Lane LOS | B | A | A | - | A | A | - | B |
| HCM 95th %tile Q(veh) | 0 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 3.3 |

| Movement | EBT | EBR | WBL | WBT | NWL | NWR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 200 | 5 | 130 | 150 | 5 |
| Future Vol, veh/h | 5 | 200 | 5 | 130 | 150 | 5 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | 100 | - | - | 75 | 0 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 217 | 5 | 141 | 163 | 5 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 5 | 0 | 157 | 5 |
| Stage 1 | - | - | - | - | 5 | - |
| Stage 2 | - | - | - | - | 152 | - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 | - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | - | - | 1616 | - | 834 | 1078 |
| Stage 1 | - | - | - | - | 1018 | - |
| Stage 2 | - | - | - | - | 876 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1616 | - | 831 | 1078 |
| Mov Cap-2 Maneuver | - | - | - | - | 831 | - |
| Stage 1 | - | - | - | - | 1018 | - |
| Stage 2 | - | - | - | - | 873 | - |

| Approach | EB | WB | NW |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.3 | 10.3 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NWLn1 | NWLn2 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 831 | 1078 | - | - | 1616 | - |
| HCM Lane V/C Ratio | 0.196 | 0.005 | - | - | 0.003 | - |
| HCM Control Delay (s) | 10.4 | 8.4 | - | - | 7.2 | 0 |
| HCM Lane LOS | B | A | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.7 | 0 | - | - | 0 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 1.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 15 | 1 | 30 | 1 | 2 | 5 | 55 | 330 | 2 | 5 | 265 | 10 |
| Future Vol, veh/h | 15 | 1 | 30 | 1 | 2 | 5 | 55 | 330 | 2 | 5 | 265 | 10 |
| 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 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 4 | 9 |
| Mvmt Flow | 16 | 1 | 32 | 1 | 2 | 5 | 59 | 351 | 2 | 5 | 282 | 11 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 771 | 768 | 287 | 783 | 772 | 352 | 293 | 0 | 0 | 353 | 0 | 0 |
| Stage 1 | 298 | 298 | - | 469 | 469 | - | - | - | - | - | - | - |
| Stage 2 | 473 | 470 | - | 314 | 303 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.1 | 6.5 | 6.24 | 7.1 | 6.5 | 6.2 | 4.1 | - | - | 4.1 | - | - |
| 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 | 3.336 | 3.5 | 4 | 3.3 | 2.2 | - | - | 2.2 | - | - |
| Pot Cap-1 Maneuver | 320 | 334 | 747 | 314 | 333 | 696 | 1280 | - | - | 1217 | - | - |
| Stage 1 | 715 | 671 | - | 579 | 564 | - | - | - | - | - | - | - |
| Stage 2 | 576 | 563 | - | 701 | 667 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 301 | 313 | 747 | 286 | 312 | 696 | 1280 | - | - | 1217 | - | - |
| Mov Cap-2 Maneuver | 301 | 313 | - | 286 | 312 | - | - | - | - | - | - | - |
| Stage 1 | 674 | 668 | - | 546 | 532 | - | - | - | - | - | - | - |
| Stage 2 | 537 | 531 | - | 667 | 664 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 13.1 | 12.8 | 1.1 | 0.1 |
| HCM LOS | B | B | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1280 | - | - | 494 | 468 | 1217 | - | - |
| HCM Lane V/C Ratio | 0.046 | - | - | 0.099 | 0.018 | 0.004 | - | - |
| HCM Control Delay (s) | 7.9 | 0 | - | 13.1 | 12.8 | 8 | 0 | - |
| HCM Lane LOS | A | A | - | B | B | A | A | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.3 | 0.1 | 0 | - | - |

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 27.9 |
| Intersection LOS | D |

| Movement | EBU | EBL | EBT | EBR | WBU | WBL | WBT | WBR | NBU | NBL | NBT | NBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 5 | 200 | 90 | 0 | 275 | 275 | 65 | 0 | 105 | 35 | 270 |
| Future Vol, veh/h | 0 | 5 | 200 | 90 | 0 | 275 | 275 | 65 | 0 | 105 | 35 | 270 |
| Peak Hour Factor | 0.92 | 0.96 | 0.96 | 0.96 | 0.92 | 0.96 | 0.96 | 0.96 | 0.92 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles, % | 2 | 13 | 7 | 33 | 2 | 25 | 10 | 8 | 2 | 1 | 6 | 8 |
| Mvmt Flow | 0 | 5 | 208 | 94 | 0 | 286 | 286 | 68 | 0 | 109 | 36 | 281 |
| Number of Lanes | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |

| Approach | EB | WB | NB |
|---|---|---|---|
| Opposing Approach | WB | EB | SB |
| Opposing Lanes | 2 | 2 | 1 |
| Conflicting Approach Left | SB | NB | EB |
| Conflicting Lanes Left | 1 | 1 | 2 |
| Conflicting Approach Right | NB | SB | WB |
| Conflicting Lanes Right | 1 | 1 | 2 |
| HCM Control Delay | 24.5 | 28.5 | 33.4 |
| HCM LOS | C | D | D |

| Lane | NBLn1 | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBLn1 |
|---|---|---|---|---|---|---|
| Vol Left, % | 26% | 100% | 0% | 100% | 0% | 50% |
| Vol Thru, % | 9% | 0% | 69% | 0% | 81% | 46% |
| Vol Right, % | 66% | 0% | 31% | 0% | 19% | 4% |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 410 | 5 | 290 | 275 | 340 | 140 |
| LT Vol | 105 | 5 | 0 | 275 | 0 | 70 |
| Through Vol | 35 | 0 | 200 | 0 | 275 | 65 |
| RT Vol | 270 | 0 | 90 | 0 | 65 | 5 |
| Lane Flow Rate | 427 | 5 | 302 | 286 | 354 | 146 |
| Geometry Grp | 2 | 7 | 7 | 7 | 7 | 2 |
| Degree of Util (X) | 0.812 | 0.013 | 0.658 | 0.677 | 0.746 | 0.345 |
| Departure Headway (Hd) | 6.95 | 8.787 | 7.96 | 8.505 | 7.587 | 8.511 |
| Convergence, Y/N | Yes | Yes | Yes | Yes | Yes | Yes |
| Cap | 525 | 409 | 456 | 427 | 478 | 424 |
| Service Time | 4.95 | 6.509 | 5.66 | 6.215 | 5.297 | 6.524 |
| HCM Lane V/C Ratio | 0.813 | 0.012 | 0.662 | 0.67 | 0.741 | 0.344 |
| HCM Control Delay | 33.4 | 11.6 | 24.7 | 27.3 | 29.4 | 15.9 |
| HCM Lane LOS | D | B | C | D | D | C |
| HCM 95th-tile Q | 7.9 | 0 | 4.7 | 4.9 | 6.2 | 1.5 |

| Intersection | | | | |
|---|---|---|---|---|
| Intersection Delay, s/veh | | | | |
| Intersection LOS | | | | |

| Movement | SBU | SBL | SBT | SBR |
|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 70 | 65 | 5 |
| Future Vol, veh/h | 0 | 70 | 65 | 5 |
| Peak Hour Factor | 0.92 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles, % | 2 | 9 | 7 | 2 |
| Mvmt Flow | 0 | 73 | 68 | 5 |
| Number of Lanes | 0 | 0 | 1 | 0 |

| Approach | SB |
|---|---|
| Opposing Approach | NB |
| Opposing Lanes | 1 |
| Conflicting Approach Left | WB |
| Conflicting Lanes Left | 2 |
| Conflicting Approach Right | EB |
| Conflicting Lanes Right | 2 |
| HCM Control Delay | 15.9 |
| HCM LOS | C |

| Lane |
|---|

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 15 | 1 | 5 | 25 | 0 | 5 | 0 | 5 | 0 | 15 | 5 |
| Future Vol, veh/h | 0 | 15 | 1 | 5 | 25 | 0 | 5 | 0 | 5 | 0 | 15 | 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 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 16 | 1 | 5 | 27 | 0 | 5 | 0 | 5 | 0 | 16 | 5 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 46 | 35 | 19 | 42 | 36 | 3 | 22 | 0 | 0 | 5 | 0 | 0 |
| Stage 1 | 19 | 19 | - | 14 | 14 | - | - | - | - | - | - | - |
| Stage 2 | 27 | 16 | - | 28 | 22 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 | 2.218 | - | - | 2.218 | - | - |
| Pot Cap-1 Maneuver | 955 | 857 | 1059 | 961 | 856 | 1081 | 1593 | - | - | 1616 | - | - |
| Stage 1 | 1000 | 880 | - | 1006 | 884 | - | - | - | - | - | - | - |
| Stage 2 | 990 | 882 | - | 989 | 877 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 930 | 854 | 1059 | 944 | 853 | 1081 | 1593 | - | - | 1616 | - | - |
| Mov Cap-2 Maneuver | 930 | 854 | - | 944 | 853 | - | - | - | - | - | - | - |
| Stage 1 | 997 | 880 | - | 1003 | 881 | - | - | - | - | - | - | - |
| Stage 2 | 957 | 879 | - | 970 | 877 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 9.3 | 9.3 | 3.6 | 0 |
| HCM LOS | A | A | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1593 | - | - | 864 | 867 | 1616 | - | - |
| HCM Lane V/C Ratio | 0.003 | - | - | 0.02 | 0.038 | - | - | - |
| HCM Control Delay (s) | 7.3 | 0 | - | 9.3 | 9.3 | 0 | - | - |
| HCM Lane LOS | A | A | - | A | A | A | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.1 | 0.1 | 0 | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 7.5 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 415 | 250 | 235 | 35 | 35 | 400 |
| Future Vol, veh/h | 415 | 250 | 235 | 35 | 35 | 400 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | 100 | - | - | - | 0 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 451 | 272 | 255 | 38 | 38 | 435 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 293 | 0 | - | 0 | 1312 | 147 |
| Stage 1 | - | - | - | - | 274 | - |
| Stage 2 | - | - | - | - | 1038 | - |
| Critical Hdwy | 4.14 | - | - | - | 6.84 | 6.94 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.84 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.84 | - |
| Follow-up Hdwy | 2.22 | - | - | - | 3.52 | 3.32 |
| Pot Cap-1 Maneuver | 1265 | - | - | - | 150 | 873 |
| Stage 1 | - | - | - | - | 747 | - |
| Stage 2 | - | - | - | - | 302 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1265 | - | - | - | 97 | 873 |
| Mov Cap-2 Maneuver | - | - | - | - | 166 | - |
| Stage 1 | - | - | - | - | 747 | - |
| Stage 2 | - | - | - | - | 194 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 5.9 | 0 | 14.7 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1265 | - | - | - | 166 | 873 |
| HCM Lane V/C Ratio | 0.357 | - | - | - | 0.229 | 0.498 |
| HCM Control Delay (s) | 9.4 | - | - | - | 33 | 13.1 |
| HCM Lane LOS | A | - | - | - | D | B |
| HCM 95th %tile Q(veh) | 1.6 | - | - | - | 0.8 | 2.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 0.3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 570 | 5 | 10 | 680 | 10 | 1 | 1 | 5 | 1 | 1 | 5 |
| Future Vol, veh/h | 5 | 570 | 5 | 10 | 680 | 10 | 1 | 1 | 5 | 1 | 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 | - | - | - | - | - | - | - | - | - | - | - | - |
| 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 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 5 | 600 | 5 | 11 | 716 | 11 | 1 | 1 | 5 | 1 | 1 | 5 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 726 | 0 | 0 | 605 | 0 | 0 | 1358 | 1360 | 603 | 1358 | 1358 | 721 |
| Stage 1 | - | - | - | - | - | - | 613 | 613 | - | 742 | 742 | - |
| Stage 2 | - | - | - | - | - | - | 745 | 747 | - | 616 | 616 | - |
| Critical Hdwy | 4.1 | - | - | 4.1 | - | - | 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 | 2.2 | - | - | 2.2 | - | - | 3.5 | 4 | 3.3 | 3.5 | 4 | 3.3 |
| Pot Cap-1 Maneuver | 886 | - | - | 983 | - | - | 127 | 150 | 503 | 127 | 150 | 431 |
| Stage 1 | - | - | - | - | - | - | 483 | 486 | - | 411 | 425 | - |
| Stage 2 | - | - | - | - | - | - | 409 | 423 | - | 481 | 485 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 886 | - | - | 983 | - | - | 122 | 146 | 503 | 122 | 146 | 431 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 122 | 146 | - | 122 | 146 | - |
| Stage 1 | - | - | - | - | - | - | 479 | 482 | - | 407 | 417 | - |
| Stage 2 | - | - | - | - | - | - | 395 | 415 | - | 471 | 481 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.1 | 18.2 | 19.1 |
| HCM LOS | | | C | C |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 280 | 886 | - | - | 983 | - | - | 263 |
| HCM Lane V/C Ratio | 0.026 | 0.006 | - | - | 0.011 | - | - | 0.028 |
| HCM Control Delay (s) | 18.2 | 9.1 | 0 | - | 8.7 | 0 | - | 19.1 |
| HCM Lane LOS | C | A | A | - | A | A | - | C |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 26 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 200 | 5 | 200 | 145 | 85 | 0 | 0 | 200 | 140 | 0 | 10 |
| Future Vol, veh/h | 0 | 200 | 5 | 200 | 145 | 85 | 0 | 0 | 200 | 140 | 0 | 10 |
| 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 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 217 | 5 | 217 | 158 | 92 | 0 | 0 | 217 | 152 | 0 | 11 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 250 | 0 | 0 | 223 | 0 | 0 | 864 | 905 | 220 | 968 | 862 | 204 |
| Stage 1 | - | - | - | - | - | - | 220 | 220 | - | 639 | 639 | - |
| Stage 2 | - | - | - | - | - | - | 644 | 685 | - | 329 | 223 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1316 | - | - | 1346 | - | - | 274 | 276 | 820 | 233 | 293 | 837 |
| Stage 1 | - | - | - | - | - | - | 782 | 721 | - | 464 | 470 | - |
| Stage 2 | - | - | - | - | - | - | 461 | 448 | - | 684 | 719 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1316 | - | - | 1346 | - | - | 231 | 224 | 820 | ~ 146 | 238 | 837 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 231 | 224 | - | ~ 146 | 238 | - |
| Stage 1 | - | - | - | - | - | - | 782 | 721 | - | 464 | 381 | - |
| Stage 2 | - | - | - | - | - | - | 369 | 363 | - | 503 | 719 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0 | 3.8 | 11 | 145.4 |
| HCM LOS | | | B | F |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 820 | 1316 | - | - | 1346 | - | - | 155 |
| HCM Lane V/C Ratio | 0.265 | - | - | - | 0.162 | - | - | 1.052 |
| HCM Control Delay (s) | 11 | 0 | - | - | 8.2 | 0 | - | 145.4 |
| HCM Lane LOS | B | A | - | - | A | A | - | F |
| HCM 95th %tile Q(veh) | 1.1 | 0 | - | - | 0.6 | - | - | 8.3 |

| Notes | | | |
|---|---|---|---|
| ~: Volume exceeds capacity | $: Delay exceeds 300s | +: Computation Not Defined | *: All major volume in platoon |

| Intersection | |
|---|---|
| Int Delay, s/veh | 9.2 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 450 | 0 | 20 | 515 | 185 | 15 |
| Future Vol, veh/h | 450 | 0 | 20 | 515 | 185 | 15 |
| 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 | 25 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 96 | 96 | 96 | 96 | 96 | 96 |
| Heavy Vehicles, % | 5 | 0 | 6 | 3 | 1 | 0 |
| Mvmt Flow | 469 | 0 | 21 | 536 | 193 | 16 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 469 | 0 | 1047 | 469 |
| Stage 1 | - | - | - | - | 469 | - |
| Stage 2 | - | - | - | - | 578 | - |
| Critical Hdwy | - | - | 4.16 | - | 6.41 | 6.2 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.41 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.41 | - |
| Follow-up Hdwy | - | - | 2.254 | - | 3.509 | 3.3 |
| Pot Cap-1 Maneuver | - | - | 1072 | - | 254 | 598 |
| Stage 1 | - | - | - | - | 632 | - |
| Stage 2 | - | - | - | - | 563 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1072 | - | 247 | 598 |
| Mov Cap-2 Maneuver | - | - | - | - | 247 | - |
| Stage 1 | - | - | - | - | 632 | - |
| Stage 2 | - | - | - | - | 547 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0.3 | 53.7 |
| HCM LOS | | | F |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 247 | 598 | - | - | 1072 | - |
| HCM Lane V/C Ratio | 0.78 | 0.026 | - | - | 0.019 | - |
| HCM Control Delay (s) | 57.1 | 11.2 | - | - | 8.4 | 0 |
| HCM Lane LOS | F | B | - | - | A | A |
| HCM 95th %tile Q(veh) | 5.8 | 0.1 | - | - | 0.1 | - |

| Intersection | | | | | | |
|---|---|---|---|---|---|---|
| Int Delay, s/veh | 0 | | | | | |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 125 | 0 | 200 | 20 | 0 |
| Future Vol, veh/h | 0 | 125 | 0 | 200 | 20 | 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 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 0 | 136 | 0 | 217 | 22 | 0 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 217 | 0 | 0 | 0 | 217 | 217 |
| Stage 1 | - | - | - | - | 217 | - |
| Stage 2 | - | - | - | - | 0 | - |
| Critical Hdwy | 4.12 | - | - | - | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - |
| Follow-up Hdwy | 2.218 | - | - | - | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1353 | - | - | - | 681 | 823 |
| Stage 1 | - | - | - | - | 723 | - |
| Stage 2 | - | - | - | - | - | - |
| Platoon blocked, % | | - | | - | | |
| Mov Cap-1 Maneuver | 1353 | - | - | - | 0 | 823 |
| Mov Cap-2 Maneuver | - | - | - | - | 0 | - |
| Stage 1 | - | - | - | - | 0 | - |
| Stage 2 | - | - | - | - | 0 | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 0 | |
| HCM LOS | | | - |

| Minor Lane/Major Mvmt | NBL | NBT | EBL | EBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | 1353 | - | - |
| HCM Lane V/C Ratio | - | - | - | - | - |
| HCM Control Delay (s) | 0 | - | 0 | - | - |
| HCM Lane LOS | A | - | A | - | - |
| HCM 95th %tile Q(veh) | - | - | 0 | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.6 |

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 350 | 115 | 110 | 430 | 105 | 90 |
| Future Vol, veh/h | 350 | 115 | 110 | 430 | 105 | 90 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | Yield | - | None | - | None |
| Storage Length | - | 155 | 250 | - | 150 | 0 |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 95 | 95 | 95 | 95 | 95 | 95 |
| Heavy Vehicles, % | 5 | 1 | 0 | 3 | 0 | 0 |
| Mvmt Flow | 368 | 121 | 116 | 453 | 111 | 95 |

| Major/Minor | Major1 | | Major2 | | Minor1 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 0 | 0 | 368 | 0 | 1052 | 368 |
| Stage 1 | - | - | - | - | 368 | - |
| Stage 2 | - | - | - | - | 684 | - |
| 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 | - | - | 1202 | - | 253 | 682 |
| Stage 1 | - | - | - | - | 704 | - |
| Stage 2 | - | - | - | - | 505 | - |
| Platoon blocked, % | - | - | | - | | |
| Mov Cap-1 Maneuver | - | - | 1202 | - | 229 | 682 |
| Mov Cap-2 Maneuver | - | - | - | - | 229 | - |
| Stage 1 | - | - | - | - | 704 | - |
| Stage 2 | - | - | - | - | 456 | - |

| Approach | EB | WB | NB |
|---|---|---|---|
| HCM Control Delay, s | 0 | 1.7 | 23.8 |
| HCM LOS | | | C |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 229 | 682 | - | - | 1202 | - |
| HCM Lane V/C Ratio | 0.483 | 0.139 | - | - | 0.096 | - |
| HCM Control Delay (s) | 34.6 | 11.1 | - | - | 8.3 | - |
| HCM Lane LOS | D | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 2.4 | 0.5 | - | - | 0.3 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 5.9 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 45 | 380 | 15 | 80 | 445 | 25 | 10 | 10 | 70 | 55 | 10 | 85 |
| Future Vol, veh/h | 45 | 380 | 15 | 80 | 445 | 25 | 10 | 10 | 70 | 55 | 10 | 85 |
| 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 | 225 | - | - | 100 | - | 50 | 150 | - | - | - | - | - |
| 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 | 5 | 0 | 3 | 3 | 0 | 0 | 13 | 2 | 0 | 0 | 3 |
| Mvmt Flow | 48 | 409 | 16 | 86 | 478 | 27 | 11 | 11 | 75 | 59 | 11 | 91 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 478 | 0 | 0 | 425 | 0 | 0 | 1215 | 1164 | 212 | 957 | 1173 | 478 |
| Stage 1 | - | - | - | - | - | - | 513 | 513 | - | 651 | 651 | - |
| Stage 2 | - | - | - | - | - | - | 702 | 651 | - | 306 | 522 | - |
| Critical Hdwy | 4.13 | - | - | 4.16 | - | - | 7.3 | 6.695 | 6.93 | 7.3 | 6.5 | 6.245 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.5 | 5.695 | - | 6.1 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.1 | 5.695 | - | 6.5 | 5.5 | - |
| Follow-up Hdwy | 2.227 | - | - | 2.23 | - | - | 3.5 | 4.1235 | 3.319 | 3.5 | 4 | 3.3285 |
| Pot Cap-1 Maneuver | 1079 | - | - | 1124 | - | - | 149 | 181 | 794 | 227 | 194 | 584 |
| Stage 1 | - | - | - | - | - | - | 517 | 513 | - | 461 | 468 | - |
| Stage 2 | - | - | - | - | - | - | 432 | 442 | - | 684 | 534 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1079 | - | - | 1124 | - | - | 109 | 160 | 794 | 178 | 171 | 584 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 109 | 160 | - | 178 | 171 | - |
| Stage 1 | - | - | - | - | - | - | 494 | 490 | - | 440 | 432 | - |
| Stage 2 | - | - | - | - | - | - | 328 | 408 | - | 579 | 510 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.9 | 1.2 | 16.3 | 31.5 |
| HCM LOS | | | C | D |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 109 | 531 | 1079 | - | - | 1124 | - | - | 292 |
| HCM Lane V/C Ratio | 0.099 | 0.162 | 0.045 | - | - | 0.077 | - | - | 0.552 |
| HCM Control Delay (s) | 41.6 | 13.1 | 8.5 | - | - | 8.5 | - | - | 31.5 |
| HCM Lane LOS | E | B | A | - | - | A | - | - | D |
| HCM 95th %tile Q(veh) | 0.3 | 0.6 | 0.1 | - | - | 0.2 | - | - | 3.1 |

HCM 2010 analysis expects stop-line detection. Detectors cannot be further than 20 feet from the stop bar.

| Intersection | |
|---|---|
| Intersection Delay, s/veh | 7.1 |
| Intersection LOS | A |

| Movement | EBU | EBL | EBT | EBR | WBU | WBL | WBT | WBR | NBU | NBL | NBT | NBR | SBU | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 0 | 1 | 15 | 5 | 0 | 15 | 25 | 10 | 0 | 1 | 1 | 5 | 0 | 5 | 1 | 1 |
| Future Vol, veh/h | 0 | 1 | 15 | 5 | 0 | 15 | 25 | 10 | 0 | 1 | 1 | 5 | 0 | 5 | 1 | 1 |
| Peak Hour Factor | 0.92 | 0.84 | 0.84 | 0.84 | 0.92 | 0.84 | 0.84 | 0.84 | 0.92 | 0.84 | 0.84 | 0.84 | 0.92 | 0.84 | 0.84 | 0.84 |
| Heavy Vehicles, % | 2 | 0 | 0 | 0 | 2 | 0 | 5 | 0 | 2 | 0 | 0 | 20 | 2 | 0 | 0 | 0 |
| Mvmt Flow | 0 | 1 | 18 | 6 | 0 | 18 | 30 | 12 | 0 | 1 | 1 | 6 | 0 | 6 | 1 | 1 |
| Number of Lanes | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| Opposing Approach | WB | EB | SB | NB |
| Opposing Lanes | 1 | 1 | 1 | 1 |
| Conflicting Approach Left | SB | NB | EB | WB |
| Conflicting Lanes Left | 1 | 1 | 1 | 1 |
| Conflicting Approach Right | NB | SB | WB | EB |
| Conflicting Lanes Right | 1 | 1 | 1 | 1 |
| HCM Control Delay | 7 | 7.2 | 6.7 | 7.2 |
| HCM LOS | A | A | A | A |

| Lane | NBLn1 | EBLn1 | WBLn1 | SBLn1 |
|---|---|---|---|---|
| Vol Left, % | 14% | 5% | 30% | 71% |
| Vol Thru, % | 14% | 71% | 50% | 14% |
| Vol Right, % | 71% | 24% | 20% | 14% |
| Sign Control | Stop | Stop | Stop | Stop |
| Traffic Vol by Lane | 7 | 21 | 50 | 7 |
| LT Vol | 1 | 1 | 15 | 5 |
| Through Vol | 1 | 15 | 25 | 1 |
| RT Vol | 5 | 5 | 10 | 1 |
| Lane Flow Rate | 8 | 25 | 60 | 8 |
| Geometry Grp | 1 | 1 | 1 | 1 |
| Degree of Util (X) | 0.008 | 0.027 | 0.064 | 0.01 |
| Departure Headway (Hd) | 3.652 | 3.838 | 3.886 | 4.109 |
| Convergence, Y/N | Yes | Yes | Yes | Yes |
| Cap | 977 | 934 | 924 | 870 |
| Service Time | 1.685 | 1.856 | 1.898 | 2.141 |
| HCM Lane V/C Ratio | 0.008 | 0.027 | 0.065 | 0.009 |
| HCM Control Delay | 6.7 | 7 | 7.2 | 7.2 |
| HCM Lane LOS | A | A | A | A |
| HCM 95th-tile Q | 0 | 0.1 | 0.2 | 0 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.7 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 85 | 5 | 55 | 5 | 5 | 10 | 40 | 315 | 5 | 10 | 335 | 85 |
| Future Vol, veh/h | 85 | 5 | 55 | 5 | 5 | 10 | 40 | 315 | 5 | 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, % | 5 | 0 | 0 | 0 | 33 | 0 | 0 | 2 | 0 | 20 | 2 | 3 |
| Mvmt Flow | 92 | 5 | 60 | 5 | 5 | 11 | 43 | 342 | 5 | 11 | 364 | 92 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 872 | 867 | 410 | 897 | 910 | 345 | 457 | 0 | 0 | 348 | 0 | 0 |
| Stage 1 | 432 | 432 | - | 432 | 432 | - | - | - | - | - | - | - |
| Stage 2 | 440 | 435 | - | 465 | 478 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.15 | 6.5 | 6.2 | 7.1 | 6.83 | 6.2 | 4.1 | - | - | 4.3 | - | - |
| Critical Hdwy Stg 1 | 6.15 | 5.5 | - | 6.1 | 5.83 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.15 | 5.5 | - | 6.1 | 5.83 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.545 | 4 | 3.3 | 3.5 | 4.297 | 3.3 | 2.2 | - | - | 2.38 | - | - |
| Pot Cap-1 Maneuver | 268 | 293 | 646 | 263 | 244 | 702 | 1114 | - | - | 1117 | - | - |
| Stage 1 | 596 | 586 | - | 606 | 533 | - | - | - | - | - | - | - |
| Stage 2 | 590 | 584 | - | 581 | 507 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 247 | 275 | 646 | 224 | 229 | 702 | 1114 | - | - | 1117 | - | - |
| Mov Cap-2 Maneuver | 247 | 275 | - | 224 | 229 | - | - | - | - | - | - | - |
| Stage 1 | 567 | 578 | - | 577 | 507 | - | - | - | - | - | - | - |
| Stage 2 | 547 | 556 | - | 515 | 500 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 26.2 | 16.2 | 0.9 | 0.2 |
| HCM LOS | D | C | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1114 | - | - | 324 | 342 | 1117 | - | - |
| HCM Lane V/C Ratio | 0.039 | - | - | 0.486 | 0.064 | 0.01 | - | - |
| HCM Control Delay (s) | 8.4 | 0 | - | 26.2 | 16.2 | 8.3 | 0 | - |
| HCM Lane LOS | A | A | - | D | C | A | A | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 2.5 | 0.2 | 0 | - | - |

HCM 2010 analysis expects stop-line detection. Detectors cannot be further than 20 feet from the stop bar.

HCM 2010 analysis expects stop-line detection. Detectors cannot be further than 20 feet from the stop bar.

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.1 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 15 | 85 | 75 | 15 | 25 | 60 |
| Future Vol, veh/h | 15 | 85 | 75 | 15 | 25 | 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 | 84 | 84 | 84 | 84 | 84 | 84 |
| Heavy Vehicles, % | 8 | 2 | 8 | 22 | 0 | 4 |
| Mvmt Flow | 18 | 101 | 89 | 18 | 30 | 71 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 229 | 98 | 0 | 0 | 107 | 0 |
| Stage 1 | 98 | - | - | - | - | - |
| Stage 2 | 131 | - | - | - | - | - |
| Critical Hdwy | 6.48 | 6.22 | - | - | 4.1 | - |
| Critical Hdwy Stg 1 | 5.48 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.48 | - | - | - | - | - |
| Follow-up Hdwy | 3.572 | 3.318 | - | - | 2.2 | - |
| Pot Cap-1 Maneuver | 746 | 958 | - | - | 1497 | - |
| Stage 1 | 911 | - | - | - | - | - |
| Stage 2 | 880 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | 730 | 958 | - | - | 1497 | - |
| Mov Cap-2 Maneuver | 730 | - | - | - | - | - |
| Stage 1 | 911 | - | - | - | - | - |
| Stage 2 | 862 | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 9.5 | 0 | 2.2 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | 915 | 1497 | - |
| HCM Lane V/C Ratio | - | - | 0.13 | 0.02 | - |
| HCM Control Delay (s) | - | - | 9.5 | 7.5 | 0 |
| HCM Lane LOS | - | - | A | A | A |
| HCM 95th %tile Q(veh) | - | - | 0.4 | 0.1 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.6 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 40 | 1 | 50 | 1 | 1 | 5 | 70 | 295 | 1 | 5 | 255 | 100 |
| Future Vol, veh/h | 40 | 1 | 50 | 1 | 1 | 5 | 70 | 295 | 1 | 5 | 255 | 100 |
| 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 | 2 | 0 | 0 | 2 | 0 |
| Mvmt Flow | 42 | 1 | 53 | 1 | 1 | 5 | 74 | 311 | 1 | 5 | 268 | 105 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 794 | 791 | 321 | 816 | 842 | 311 | 374 | 0 | 0 | 312 | 0 | 0 |
| Stage 1 | 332 | 332 | - | 458 | 458 | - | - | - | - | - | - | - |
| Stage 2 | 462 | 459 | - | 358 | 384 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 | 4.1 | - | - | 4.1 | - | - |
| 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 | - | - | 2.2 | - | - |
| Pot Cap-1 Maneuver | 308 | 324 | 724 | 298 | 303 | 734 | 1196 | - | - | 1260 | - | - |
| Stage 1 | 686 | 648 | - | 587 | 570 | - | - | - | - | - | - | - |
| Stage 2 | 584 | 570 | - | 664 | 615 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 286 | 298 | 724 | 259 | 279 | 734 | 1196 | - | - | 1260 | - | - |
| Mov Cap-2 Maneuver | 286 | 298 | - | 259 | 279 | - | - | - | - | - | - | - |
| Stage 1 | 635 | 645 | - | 543 | 527 | - | - | - | - | - | - | - |
| Stage 2 | 535 | 527 | - | 612 | 612 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 15.8 | 12.4 | 1.6 | 0.1 |
| HCM LOS | C | B | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1196 | - | - | 429 | 491 | 1260 | - | - |
| HCM Lane V/C Ratio | 0.062 | - | - | 0.223 | 0.015 | 0.004 | - | - |
| HCM Control Delay (s) | 8.2 | 0 | - | 15.8 | 12.4 | 7.9 | 0 | - |
| HCM Lane LOS | A | A | - | C | B | A | A | - |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 0.8 | 0 | 0 | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 4.1 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 10 | 15 | 5 | 220 | 140 | 10 |
| Future Vol, veh/h | 10 | 15 | 5 | 220 | 140 | 10 |
| 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 | 90 | 90 | 90 | 90 | 90 | 90 |
| Heavy Vehicles, % | 0 | 14 | 0 | 2 | 5 | 0 |
| Mvmt Flow | 11 | 17 | 6 | 244 | 156 | 11 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 250 | 0 | - | 0 | 167 | 128 |
| Stage 1 | - | - | - | - | 128 | - |
| Stage 2 | - | - | - | - | 39 | - |
| Critical Hdwy | 4.1 | - | - | - | 6.45 | 6.2 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.45 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.45 | - |
| Follow-up Hdwy | 2.2 | - | - | - | 3.545 | 3.3 |
| Pot Cap-1 Maneuver | 1327 | - | - | - | 817 | 927 |
| Stage 1 | - | - | - | - | 890 | - |
| Stage 2 | - | - | - | - | 976 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1327 | - | - | - | 810 | 927 |
| Mov Cap-2 Maneuver | - | - | - | - | 810 | - |
| Stage 1 | - | - | - | - | 890 | - |
| Stage 2 | - | - | - | - | 968 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 3.1 | 0 | 10.5 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1327 | - | - | - | 817 |
| HCM Lane V/C Ratio | 0.008 | - | - | - | 0.204 |
| HCM Control Delay (s) | 7.7 | 0 | - | - | 10.5 |
| HCM Lane LOS | A | A | - | - | B |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.8 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.1 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 15 | 30 | 85 | 55 | 0 |
| Future Vol, veh/h | 5 | 15 | 30 | 85 | 55 | 0 |
| 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 | 86 | 86 | 86 | 86 | 86 | 86 |
| Heavy Vehicles, % | 0 | 8 | 0 | 11 | 5 | 8 |
| Mvmt Flow | 6 | 17 | 35 | 99 | 64 | 0 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 233 | 64 | 64 | 0 | - | 0 |
| Stage 1 | 64 | - | - | - | - | - |
| Stage 2 | 169 | - | - | - | - | - |
| Critical Hdwy | 6.4 | 6.28 | 4.1 | - | - | - |
| Critical Hdwy Stg 1 | 5.4 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.4 | - | - | - | - | - |
| Follow-up Hdwy | 3.5 | 3.372 | 2.2 | - | - | - |
| Pot Cap-1 Maneuver | 760 | 984 | 1551 | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 866 | - | - | - | - | - |
| Platoon blocked, % | | | | - | - | - |
| Mov Cap-1 Maneuver | 742 | 984 | 1551 | - | - | - |
| Mov Cap-2 Maneuver | 742 | - | - | - | - | - |
| Stage 1 | 964 | - | - | - | - | - |
| Stage 2 | 845 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 9.1 | 1.9 | 0 |
| HCM LOS | A | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT | SBR |
|---|---|---|---|---|---|
| Capacity (veh/h) | 1551 | - | 910 | - | - |
| HCM Lane V/C Ratio | 0.022 | - | 0.026 | - | - |
| HCM Control Delay (s) | 7.4 | 0 | 9.1 | - | - |
| HCM Lane LOS | A | A | A | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | 0.1 | - | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 6.9 |

| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 80 | 200 | 150 | 70 | 135 | 130 |
| Future Vol, veh/h | 80 | 200 | 150 | 70 | 135 | 130 |
| 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 | - | - | - | 100 | - |
| Veh in Median Storage, # | 0 | - | 0 | - | - | 0 |
| Grade, % | 0 | - | 0 | - | - | 0 |
| Peak Hour Factor | 88 | 88 | 88 | 88 | 88 | 88 |
| Heavy Vehicles, % | 8 | 1 | 4 | 9 | 0 | 5 |
| Mvmt Flow | 91 | 227 | 170 | 80 | 153 | 148 |

| Major/Minor | Minor1 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 665 | 210 | 0 | 0 | 250 | 0 |
| Stage 1 | 210 | - | - | - | - | - |
| Stage 2 | 455 | - | - | - | - | - |
| Critical Hdwy | 6.48 | 6.21 | - | - | 4.1 | - |
| Critical Hdwy Stg 1 | 5.48 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.48 | - | - | - | - | - |
| Follow-up Hdwy | 3.572 | 3.309 | - | - | 2.2 | - |
| Pot Cap-1 Maneuver | 416 | 833 | - | - | 1327 | - |
| Stage 1 | 811 | - | - | - | - | - |
| Stage 2 | 627 | - | - | - | - | - |
| Platoon blocked, % | | | - | - | | - |
| Mov Cap-1 Maneuver | 368 | 833 | - | - | 1327 | - |
| Mov Cap-2 Maneuver | 456 | - | - | - | - | - |
| Stage 1 | 811 | - | - | - | - | - |
| Stage 2 | 555 | - | - | - | - | - |

| Approach | WB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 15 | 0 | 4.1 |
| HCM LOS | C | | |

| Minor Lane/Major Mvmt | NBT | NBR | WBLn1 | SBL | SBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | - | - | 674 | 1327 | - |
| HCM Lane V/C Ratio | - | - | 0.472 | 0.116 | - |
| HCM Control Delay (s) | - | - | 15 | 8.1 | - |
| HCM Lane LOS | - | - | C | A | - |
| HCM 95th %tile Q(veh) | - | - | 2.5 | 0.4 | - |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.8 |

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 60 | 25 | 20 | 150 | 115 | 95 |
| Future Vol, veh/h | 60 | 25 | 20 | 150 | 115 | 95 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Free | Free | Free | Free |
| RT Channelized | - | None | - | None | - | Free |
| Storage Length | 0 | - | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 94 | 94 | 94 | 94 | 94 | 94 |
| Heavy Vehicles, % | 4 | 5 | 19 | 5 | 4 | 5 |
| Mvmt Flow | 64 | 27 | 21 | 160 | 122 | 101 |

| Major/Minor | Minor2 | | Major1 | | Major2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 324 | 122 | 122 | 0 | - | 0 |
| Stage 1 | 122 | - | - | - | - | - |
| Stage 2 | 202 | - | - | - | - | - |
| Critical Hdwy | 6.44 | 6.25 | 4.29 | - | - | - |
| Critical Hdwy Stg 1 | 5.44 | - | - | - | - | - |
| Critical Hdwy Stg 2 | 5.44 | - | - | - | - | - |
| Follow-up Hdwy | 3.536 | 3.345 | 2.371 | - | - | - |
| Pot Cap-1 Maneuver | 666 | 921 | 1366 | - | - | 0 |
| Stage 1 | 898 | - | - | - | - | 0 |
| Stage 2 | 827 | - | - | - | - | 0 |
| Platoon blocked, % | | | | - | - | |
| Mov Cap-1 Maneuver | 655 | 921 | 1366 | - | - | - |
| Mov Cap-2 Maneuver | 685 | - | - | - | - | - |
| Stage 1 | 898 | - | - | - | - | - |
| Stage 2 | 813 | - | - | - | - | - |

| Approach | EB | NB | SB |
|---|---|---|---|
| HCM Control Delay, s | 10.5 | 0.9 | 0 |
| HCM LOS | B | | |

| Minor Lane/Major Mvmt | NBL | NBT | EBLn1 | SBT |
|---|---|---|---|---|
| Capacity (veh/h) | 1366 | - | 741 | - |
| HCM Lane V/C Ratio | 0.016 | - | 0.122 | - |
| HCM Control Delay (s) | 7.7 | 0 | 10.5 | - |
| HCM Lane LOS | A | A | B | - |
| HCM 95th %tile Q(veh) | 0 | - | 0.4 | - |

HCM 2010 analysis expects stop-line detection. Detectors cannot be further than 20 feet from the stop bar.

| Intersection | |
|---|---|
| Int Delay, s/veh | 3 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 215 | 65 | 5 | 170 | 10 | 60 | 10 | 5 | 10 | 10 | 40 |
| Future Vol, veh/h | 5 | 215 | 65 | 5 | 170 | 10 | 60 | 10 | 5 | 10 | 10 | 40 |
| 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 | 200 | - | 0 | 200 | - | 175 | - | - | - | - | - | - |
| 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, % | 0 | 8 | 4 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |
| Mvmt Flow | 6 | 244 | 74 | 6 | 193 | 11 | 68 | 11 | 6 | 11 | 11 | 45 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 193 | 0 | 0 | 244 | 0 | 0 | 489 | 461 | 244 | 469 | 461 | 193 |
| Stage 1 | - | - | - | - | - | - | 256 | 256 | - | 205 | 205 | - |
| Stage 2 | - | - | - | - | - | - | 233 | 205 | - | 264 | 256 | - |
| Critical Hdwy | 4.1 | - | - | 4.1 | - | - | 7.19 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.19 | 5.5 | - | 6.1 | 5.5 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.19 | 5.5 | - | 6.1 | 5.5 | - |
| Follow-up Hdwy | 2.2 | - | - | 2.2 | - | - | 3.581 | 4 | 3.3 | 3.5 | 4 | 3.3 |
| Pot Cap-1 Maneuver | 1392 | - | - | 1334 | - | - | 478 | 500 | 800 | 508 | 500 | 854 |
| Stage 1 | - | - | - | - | - | - | 733 | 699 | - | 802 | 736 | - |
| Stage 2 | - | - | - | - | - | - | 755 | 736 | - | 746 | 699 | - |
| Platoon blocked, % | | - | - | | - | - | | | | | | |
| Mov Cap-1 Maneuver | 1392 | - | - | 1334 | - | - | 442 | 496 | 800 | 492 | 496 | 854 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 442 | 496 | - | 492 | 496 | - |
| Stage 1 | - | - | - | - | - | - | 730 | 696 | - | 799 | 733 | - |
| Stage 2 | - | - | - | - | - | - | 701 | 733 | - | 725 | 696 | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 0.1 | 0.2 | 14.5 | 10.8 |
| HCM LOS | | | B | B |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 463 | 1392 | - | - | 1334 | - | - | 687 |
| HCM Lane V/C Ratio | 0.184 | 0.004 | - | - | 0.004 | - | - | 0.099 |
| HCM Control Delay (s) | 14.5 | 7.6 | - | - | 7.7 | - | - | 10.8 |
| HCM Lane LOS | B | A | - | - | A | - | - | B |
| HCM 95th %tile Q(veh) | 0.7 | 0 | - | - | 0 | - | - | 0.3 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.5 |

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 5 | 225 | 145 | 175 | 100 | 40 |
| Future Vol, veh/h | 5 | 225 | 145 | 175 | 100 | 40 |
| 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 | - | - | 275 | 150 | 0 |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 79 | 79 | 79 | 79 | 79 | 79 |
| Heavy Vehicles, % | 0 | 5 | 4 | 2 | 12 | 0 |
| Mvmt Flow | 6 | 285 | 184 | 222 | 127 | 51 |

| Major/Minor | Major1 | | Major2 | | Minor2 | |
|---|---|---|---|---|---|---|
| Conflicting Flow All | 184 | 0 | - | 0 | 481 | 184 |
| Stage 1 | - | - | - | - | 184 | - |
| Stage 2 | - | - | - | - | 297 | - |
| Critical Hdwy | 4.1 | - | - | - | 6.52 | 6.2 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.52 | - |
| Follow-up Hdwy | 2.2 | - | - | - | 3.608 | 3.3 |
| Pot Cap-1 Maneuver | 1403 | - | - | - | 526 | 864 |
| Stage 1 | - | - | - | - | 824 | - |
| Stage 2 | - | - | - | - | 732 | - |
| Platoon blocked, % | | - | - | - | | |
| Mov Cap-1 Maneuver | 1403 | - | - | - | 524 | 864 |
| Mov Cap-2 Maneuver | - | - | - | - | 589 | - |
| Stage 1 | - | - | - | - | 824 | - |
| Stage 2 | - | - | - | - | 729 | - |

| Approach | EB | WB | SB |
|---|---|---|---|
| HCM Control Delay, s | 0.2 | 0 | 11.8 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 | SBLn2 |
|---|---|---|---|---|---|---|
| Capacity (veh/h) | 1403 | - | - | - | 589 | 864 |
| HCM Lane V/C Ratio | 0.005 | - | - | - | 0.215 | 0.059 |
| HCM Control Delay (s) | 7.6 | - | - | - | 12.8 | 9.4 |
| HCM Lane LOS | A | - | - | - | B | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.8 | 0.2 |

| Intersection | |
|---|---|
| Int Delay, s/veh | 2.1 |

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Vol, veh/h | 1 | 1 | 1 | 10 | 1 | 65 | 0 | 770 | 5 | 35 | 900 | 1 |
| Future Vol, veh/h | 1 | 1 | 1 | 10 | 1 | 65 | 0 | 770 | 5 | 35 | 900 | 1 |
| 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 | - | - | Yield | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | 300 | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 | 89 |
| Heavy Vehicles, % | 0 | 0 | 4 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 3 | 25 |
| Mvmt Flow | 1 | 1 | 1 | 11 | 1 | 73 | 0 | 865 | 6 | 39 | 1011 | 1 |

| Major/Minor | Minor2 | | | Minor1 | | | Major1 | | | Major2 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conflicting Flow All | 1992 | 1955 | 1012 | 1957 | 1956 | 865 | 1012 | 0 | 0 | 865 | 0 | 0 |
| Stage 1 | 1090 | 1090 | - | 865 | 865 | - | - | - | - | - | - | - |
| Stage 2 | 902 | 865 | - | 1092 | 1091 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.1 | 6.5 | 6.24 | 7.1 | 6.5 | 6.2 | 4.13 | - | - | 4.1 | - | - |
| 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 | 3.336 | 3.5 | 4 | 3.3 | 2.227 | - | - | 2.2 | - | - |
| Pot Cap-1 Maneuver | 46 | 65 | 288 | 48 | 65 | 356 | 681 | - | - | 787 | - | - |
| Stage 1 | 263 | 294 | - | 351 | 374 | - | - | - | - | - | - | - |
| Stage 2 | 335 | 374 | - | 262 | 293 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | | - | - |
| Mov Cap-1 Maneuver | 35 | 62 | 288 | 45 | 62 | 356 | 681 | - | - | 787 | - | - |
| Mov Cap-2 Maneuver | 35 | 62 | - | 45 | 62 | - | - | - | - | - | - | - |
| Stage 1 | 263 | 279 | - | 351 | 374 | - | - | - | - | - | - | - |
| Stage 2 | 265 | 374 | - | 247 | 278 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|---|---|---|---|---|
| HCM Control Delay, s | 66.4 | 41.5 | 0 | 0.4 |
| HCM LOS | F | E | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | WBLn1 | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Capacity (veh/h) | 681 | - | - | 62 | 181 | 787 | - | - |
| HCM Lane V/C Ratio | - | - | - | 0.054 | 0.472 | 0.05 | - | - |
| HCM Control Delay (s) | 0 | - | - | 66.4 | 41.5 | 9.8 | - | - |
| HCM Lane LOS | A | - | - | F | E | A | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.2 | 2.3 | 0.2 | - | - |

# Appendix E

## ODOT Crash Reports and ODOT Excess Proportion of Specific Crash Type Worksheet

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | --PEOPLE-- KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00193 | 05/22/2010 | 1P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.00 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00107 | 03/21/2010 | 1P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.00 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00450 | 09/14/2014 | 3P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.20 | REAR | | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00241 | 05/14/2011 | 8P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.25 | PED | | 19 | 057 | DRY | 1 | 011 | | 0 | 1 | Y | N |
| 00585 | 12/15/2010 | 6P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.25 | REAR | 092,124 | 26,07,01 | 043,047,043,( | WET | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00283 | 07/08/2010 | 3P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.29 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00374 | 08/12/2014 | 2P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.30 | REAR | 092 | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00325 | 07/23/2013 | 12A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.30 | FIX | 092,046 | 26 | 080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00372 | 08/15/2010 | 1P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.34 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00352 | 08/06/2014 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.50 | REAR | 092 | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00328 | 08/01/2012 | 5P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.56 | REAR | | 01 | 042 | DRY | 2 | 011 | 011 | 0 | 0 | N | Y |
| 00170 | 05/05/2011 | 3P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.57 | REAR | | 07,27 | 043,016 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00446 | 10/05/2011 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 5.97 | REAR | | 01 | 042 | UNK | 2 | 011 | 011 | 0 | 0 | N | Y |
| 00366 | 08/09/2010 | 11A | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.00 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00412 | 09/16/2011 | 3P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | REAR | 092 | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00120 | 03/26/2013 | 7P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | REAR | | 07,27 | 043,042,016 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00359 | 08/12/2013 | 2P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00315 | 07/23/2014 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | REAR | 092 | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00400 | 09/11/2011 | 12P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | NCOL | 092 | 01 | 047 | DRY | 1 | 091 | | 0 | 2 | N | Y |
| 00089 | 03/01/2012 | 6A | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.07 | FIX | 124,043 | 01 | 047,080 | ICE | 1 | 011 | | 0 | 0 | N | Y |
| 00051 | 02/04/2014 | 2P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.40 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00476 | 10/15/2012 | 7P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.40 | TURN | 124 | 01 | 047,080 | WET | 2 | 011 | 011 | 0 | 2 | N | Y |
| 00003 | 01/07/2013 | 3P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.40 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00314 | 07/18/2013 | 4P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.40 | TURN | | 02 | 028 | DRY | 2 | 011 | 091 | 0 | 1 | N | N |
| 00113 | 03/15/2011 | 11A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.41 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00117 | 03/20/2011 | 12P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.41 | TURN | 110 | 01,08 | 047,001 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00041 | 02/24/2010 | 7A | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.47 | TURN | | 08 | 001,080 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00528 | 11/26/2011 | 5P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.48 | OTH | 035 | 12 | | UNK | 1 | 011 | | 0 | 0 | N | N |
| 00378 | 09/02/2011 | 3P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.48 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00602 | 12/10/2014 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.48 | REAR | 124 | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00207 | 05/21/2012 | 5P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.48 | FIX | 124,079 | 01 | 047,080 | WET | 1 | 011 | | 0 | 0 | N | Y |
| 00393 | 08/31/2012 | 4P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.49 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00492 | 11/09/2010 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.51 | REAR | | 07,01 | 043,041 | WET | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00347 | 08/08/2012 | 1P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.51 | REAR | 013 | 07,27 | 043,016 | DRY | 3 | 011 | 011 | 0 | 5 | N | N |
| 00469 | 10/01/2013 | 5P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.51 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00636 | 12/30/2014 | 3P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.51 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00029 | 01/22/2011 | UNK | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.51 | FIX | 058,079,086 | 33,10 | 051,080,081 | WET | 1 | 011 | | 0 | 1 | Y | N |
| 00198 | 05/28/2010 | 12P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.53 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00397 | 08/21/2014 | 12P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.53 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00628 | 12/26/2014 | 10A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.54 | REAR | 013 | 27 | 016 | WET | 4 | 011 | 011 | 0 | 2 | N | N |
| 90628 | 12/26/2014 | 10A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.54 | REAR | 013 | 27 | 016 | WET | 4 | 011 | 011 | 0 | 2 | N | N |
| 00304 | 07/05/2010 | 12P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.55 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00001 | 01/02/2013 | 4P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.55 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 3 | N | N |
| 00471 | 10/12/2013 | 12P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.55 | REAR | | 22 | 017 | DRY | 2 | 011 | 011 | 0 | 4 | N | N |
| 00035 | 02/11/2010 | 5P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.56 | REAR | 124,013 | 07,27 | 043,016 | WET | 3 | 011 | 011 | 0 | 3 | N | N |
| 00599 | 12/22/2010 | 6P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.56 | REAR | | 27 | 016 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00445 | 10/04/2011 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.56 | SS-O | | 06 | 045 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00230 | 06/16/2011 | 8P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | PED | | 02 | 029 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00011 | 01/05/2010 | 5P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | 124 | 07 | 026 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00383 | 08/24/2010 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | PEOPLE KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00442 | 09/27/2010 | 12P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00486 | 11/02/2010 | 11A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | 013 | 10 | 026 | DRY | 3 | 011 | 011 | 0 | 1 | N | N |
| 00018 | 01/10/2011 | 3P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00546 | 12/09/2011 | 1P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00214 | 06/01/2012 | 11A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | 124 | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00347 | 08/06/2013 | 3P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00427 | 09/15/2013 | 3P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | 124 | 07,01 | 043,047 | WET | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00400 | 08/22/2014 | 6A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 27,14 | 016,044 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00432 | 09/03/2014 | 5P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00499 | 10/08/2014 | 11A | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | SS-O | | 13 | 045 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00443 | 09/24/2013 | 10A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.57 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00153 | 04/16/2012 | 3P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.58 | REAR | 092 | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00504 | 11/03/2012 | 6P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.58 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00162 | 04/14/2010 | 1P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.59 | REAR | | 07,27 | 043,016,042 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00267 | 07/03/2012 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.61 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00084 | 02/25/2013 | 4P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.63 | REAR | 124,013 | 07 | 043 | WET | 3 | 011 | 011 | 0 | 2 | N | N |
| 00419 | 08/27/2014 | 4P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.66 | REAR | 013 | 07 | 043 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00337 | 07/31/2013 | 10A | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.76 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00136 | 04/04/2012 | 4P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.77 | REAR | 013 | 07 | 043 | WET | 3 | 011 | 011 | 0 | 2 | N | N |
| 00182 | 05/07/2012 | 9A | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.82 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00036 | 02/14/2010 | 3P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 27 | 016,026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00126 | 03/31/2010 | 12P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00349 | 08/15/2010 | 1P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00390 | 08/28/2010 | 3P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 27,07 | 016,026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00124 | 03/27/2011 | 5P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00370 | 08/30/2011 | 9A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00071 | 02/23/2012 | 5P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | 099 | 27 | 016 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00044 | 01/28/2013 | 2P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | 124 | 07 | 043 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00503 | 10/12/2014 | 12P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00210 | 05/06/2012 | 12P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.83 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00163 | 04/15/2010 | 5P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.84 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00379 | 08/20/2013 | 1P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.85 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00498 | 10/07/2014 | 1P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.85 | REAR | 092 | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00508 | 11/06/2012 | 1P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.87 | REAR | 124 | 01,07 | 047,043 | WET | 2 | 011 | 014 | 0 | 0 | N | Y |
| 00623 | 12/23/2014 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.87 | REAR | 013 | 07,27 | 043,016 | WET | 4 | 011 | 011 | 0 | 3 | N | N |
| 00624 | 12/23/2014 | 1P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.89 | SS-O | | 29,02 | 042,028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00364 | 08/13/2013 | 11A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.92 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00304 | 07/18/2012 | 5P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.93 | REAR | 013 | 07 | 043 | DRY | 3 | 011 | 011 | 0 | 1 | N | N |
| 00239 | 06/15/2012 | 5P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 6.96 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00535 | 11/30/2011 | 4P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.03 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00544 | 12/09/2011 | 3P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.03 | FIX | 079,086 | 16 | 016,080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00249 | 06/07/2010 | 4P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.04 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00251 | 06/07/2010 | 4P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.05 | REAR | | 07 | 026 | UNK | 2 | 011 | 011 | 0 | 0 | N | N |
| 00349 | 08/07/2013 | 12P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.05 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00223 | 06/11/2011 | 12P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | ANGL | | 04,02 | 020,028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00605 | 12/12/2014 | 6A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | ANGL | | 04,27 | 020,016 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00288 | 07/14/2010 | 10A | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00499 | 11/12/2010 | 9A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 27 | 016,026 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00193 | 05/25/2011 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00502 | 11/10/2011 | 5P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | 092 | 07 | 043,042 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
STATE HIGHWAY SYSTEM CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00202 | 05/21/2012 | 3P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07 | 026 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00460 | 10/05/2012 | 6P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00599 | 12/27/2012 | 4P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00021 | 01/18/2013 | 5P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | 013 | 07,27 | 043,016 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00179 | 05/03/2013 | 8P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | 013 | 22 | 017 | DRY | 3 | 011 | 011 | 0 | 3 | N | N |
| 00327 | 07/24/2013 | 5P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | 013 | 07,27 | 043,016 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00248 | 06/13/2014 | 4P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00416 | 08/25/2014 | 1P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | REAR | 013 | 07 | 043 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00101 | 03/04/2011 | 5P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00419 | 09/08/2012 | 3P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | TURN | | 27,02 | 016,028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00467 | 09/20/2014 | 8P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | TURN | | 04 | 020 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00591 | 12/04/2014 | 5P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | TURN | | 08 | 006 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00138 | 04/10/2010 | 4A | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.07 | FIX | 058 | 16 | 016,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00590 | 12/21/2012 | 5P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.08 | REAR | 013 | 07 | 043 | DRY | 3 | 011 | 011 | 0 | 2 | N | N |
| 00140 | 04/04/2011 | 3P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.09 | REAR | 124 | 07,01 | 043,041 | WET | 2 | 011 | 011 | 0 | 0 | N | Y |
| 00531 | 10/25/2014 | 1P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.09 | REAR | | 07 | 026 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00366 | 08/13/2013 | 3P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.11 | REAR | | 07 | 042 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00290 | 07/05/2013 | 1P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.13 | REAR | 092 | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00076 | 03/08/2010 | 1P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.16 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00360 | 08/08/2014 | 11A | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.32 | REAR | 092 | 07,01 | 043,047 | DRY | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00243 | 06/11/2014 | 10P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.51 | FIX | 035,044,058 | 32,30 | 052,050,080 | DRY | 1 | 011 | | 0 | 0 | N | Y |
| 00247 | 06/13/2013 | 9P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.68 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00313 | 07/18/2013 | 3P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 7.99 | REAR | 013 | 07,27 | 043,016 | DRY | 3 | 013 | 011 | 0 | 2 | N | N |
| 00146 | 04/19/2013 | 6P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.00 | HEAD | | 05 | 039 | WET | 3 | 011 | 011 | 2 | 2 | N | N |
| 00554 | 11/21/2013 | 1P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.03 | REAR | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00230 | 06/03/2014 | 3P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.04 | REAR | | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00335 | 07/29/2014 | 4P | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.04 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00476 | 09/24/2014 | 8A | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.04 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00555 | 11/21/2013 | 1P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.04 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00504 | 11/13/2010 | 11A | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00008 | 01/07/2011 | 2P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00557 | 12/08/2012 | 12P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00332 | 07/28/2013 | 2P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | REAR | 003 | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00279 | 07/03/2014 | 12P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | REAR | | 04 | 020 | DRY | 2 | 011 | 011 | 0 | 2 | Y | N |
| 00127 | 03/31/2010 | 3P | WE | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | SS-M | | 04,05,10 | 020,039,016 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00169 | 04/24/2010 | 10A | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00284 | 07/10/2010 | 12P | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 08,02 | 006,003,028 | DRY | 2 | 091 | 011 | 0 | 1 | N | N |
| 00407 | 09/03/2010 | 4P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00279 | 07/11/2011 | 2P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00001 | 01/01/2012 | 11A | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 004,028 | DRY | 2 | 091 | 011 | 0 | 1 | N | N |
| 00068 | 02/20/2012 | 8P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 04 | 020 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00246 | 06/18/2012 | 10A | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00354 | 08/12/2012 | 10A | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00104 | 03/10/2013 | 6P | SU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00146 | 04/04/2014 | 7P | FR | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.05 | TURN | | 02 | 004,028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00143 | 04/07/2011 | 4P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.09 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00067 | 02/18/2012 | 11A | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.16 | OTH | 035 | 12 | | UNK | 1 | 011 | | 0 | 0 | N | N |
| 00381 | 08/20/2013 | 6A | TU | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.48 | FIX | 035,062,010 | 27 | 016,080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00347 | 08/12/2010 | 9P | TH | Warrenton | MN | R | HY 009, OREGON COAST AT MP 8.50 | OTH | 035 | 12 | | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00422 | 09/08/2012 | UNK | SA | Warrenton | MN | R | HY 009, OREGON COAST AT MP 999.99 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
STATE HIGHWAY SYSTEM CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | PEOPLE KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00424 | 09/13/2010 | 2P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 999.99 | REAR | | 27 | 016,026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00060 | 02/14/2011 | 4P | MO | Warrenton | MN | R | HY 009, OREGON COAST AT MP 999.99 | REAR | 124 | 07,01 | 047,026 | WET | 2 | 011 | 011 | 0 | 0 | N | Y |

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00560 | 11/23/2013 | 10P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.36 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00162 | 04/22/2012 | 12P | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.50 | REAR | | 27 | 016 | DRY | 2 | 011 | 051 | 0 | 1 | N | N |
| 00558 | 11/22/2013 | 8A | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.52 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00324 | 07/23/2012 | 8A | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.74 | FIX | 059 | 08 | 002,080 | DRY | 1 | 041 | | 0 | 0 | N | N |
| 00431 | 09/19/2013 | 5P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.87 | TURN | | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00449 | 09/28/2012 | 7P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 0.93 | FIX | 053 | 33,01 | 051,047,080 | DRY | 1 | 011 | | 0 | 1 | N | Y |
| 00002 | 01/02/2013 | 8P | WE | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.02 | FIX | 035,060,058 | 10 | 080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00038 | 01/31/2012 | 2A | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.52 | FIX | 058 | 30 | 050,080,081 | WET | 1 | 011 | | 0 | 0 | N | Y |
| 00021 | 01/17/2014 | 11P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.53 | FIX | 079,121 | 01 | 047,080,081 | WET | 1 | 011 | | 0 | 0 | Y | Y |
| 00306 | 07/14/2013 | 12A | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.54 | FIX | 093,062 | 27 | 016,080,083 | DRY | 1 | 011 | | 0 | 0 | Y | N |
| 00246 | 06/05/2010 | 6P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.56 | FIX | 092,058 | 26,10 | 080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00459 | 10/02/2013 | 4P | WE | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.57 | FIX | 035,079 | 10 | 080,081 | WET | 1 | 011 | | 0 | 1 | N | N |
| 00228 | 06/01/2010 | 9P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.58 | FIX | 079 | 22 | 017 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00538 | 12/03/2011 | 9P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.60 | FIX | 079 | 33 | 051,080,081 | WET | 1 | 011 | | 0 | 0 | Y | N |
| 00275 | 07/10/2011 | 7P | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.69 | FIX | 079 | 01,08 | 007,047,016 | UNK | 1 | 011 | | 0 | 0 | N | Y |
| 00050 | 02/07/2012 | 10P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.71 | OTH | 035 | 12 | | WET | 1 | 011 | | 0 | 0 | N | N |
| 00116 | 03/25/2010 | 4P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.78 | TURN | | 02 | 004,028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00611 | 12/16/2014 | 5P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.88 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00563 | 11/25/2013 | 8P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 1.98 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00379 | 08/22/2010 | 6P | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.23 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00083 | 02/26/2012 | 11P | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.37 | OTH | 035 | 12 | | WET | 1 | 011 | | 0 | 0 | N | N |
| 00180 | 05/06/2012 | 10A | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.42 | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00287 | 07/13/2010 | 5P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.58 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00269 | 06/23/2014 | 6P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.63 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00445 | 09/25/2012 | 5A | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.71 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00199 | 05/13/2014 | 4P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.71 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00126 | 03/28/2013 | 9A | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.83 | HEAD | 058 | 16,05 | 080 | WET | 2 | 011 | 041 | 0 | 0 | N | N |
| 00642 | 12/31/2014 | 3P | WE | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.85 | PED | | 02,19 | 029 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00273 | 07/09/2011 | 12P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.87 | REAR | 079 | 07,27 | 043,016 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00292 | 07/18/2011 | 1A | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 2.91 | FIX | 053 | 33,10 | 051,016,081 | DRY | 1 | 011 | | 0 | 1 | Y | N |
| 00129 | 04/01/2010 | 6P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.12 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00021 | 01/17/2012 | 3P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.13 | ANGL | | 02 | 028 | WET | 2 | 019 | 011 | 0 | 1 | N | N |
| 00194 | 05/26/2011 | 4P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.13 | REAR | | 07,01 | 043,047 | WET | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00151 | 04/05/2014 | 7P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.17 | REAR | | 27 | 016,080 | WET | 1 | 011 | | 0 | 1 | N | N |
| 00082 | 03/11/2010 | 4P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.20 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00595 | 12/07/2014 | 1P | SU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.20 | REAR | | 22,01 | 017,047 | DRY | 2 | 011 | 011 | 0 | 0 | N | Y |
| 00122 | 03/27/2013 | 6A | WE | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.32 | ANGL | 044,058 | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00258 | 06/21/2013 | 1P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.32 | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00241 | 06/03/2010 | 3P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.35 | ANGL | 082 | 10 | 028 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00477 | 10/24/2011 | 9P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.35 | TURN | | 02 | 027 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00451 | 10/07/2011 | 4P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.38 | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00103 | 03/16/2010 | 6P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.42 | TURN | 082 | 02 | 028,022 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00596 | 12/06/2014 | 6P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.44 | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00382 | 08/25/2012 | 9P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.44 | TURN | | 08 | 002,080 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00560 | 12/10/2012 | 7A | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.44 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00460 | 09/15/2014 | 3P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.44 | TURN | | 10 | 060 | DRY | 1 | 011 | | 0 | 1 | Y | N |
| 00509 | 10/13/2014 | 7A | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.44 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00204 | 05/13/2011 | 6P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.50 | REAR | 003,054 | 32,27 | 052,016,081 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00028 | 01/20/2014 | 4P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.54 | REAR | 004 | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00423 | 08/28/2014 | 7P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.84 | TURN | | 32,01 | 052,047 | DRY | 2 | 011 | 011 | 0 | 1 | N | Y |

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
STATE HIGHWAY SYSTEM CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00548 | 11/06/2014 | 9A | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.86 | FIX | 101 | 10 | 080,081 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00222 | 04/11/2014 | 2P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.88 | FIX | 064 | 10 | 016 | DRY | 1 | 053 | | 0 | 0 | N | N |
| 00291 | 07/12/2012 | 3P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.90 | REAR | 099 | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00246 | 06/13/2013 | 11A | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 3.93 | TURN | | 02,08 | 028,008 | WET | 2 | 051 | 011 | 0 | 0 | N | N |
| 00289 | 07/07/2014 | 3P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.00 | BACK | | 10 | 011 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00177 | 05/10/2011 | 1P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.04 | FIX | 058 | 16 | 016,080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00475 | 09/23/2014 | 9P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.06 | OTH | 035 | 12 | | WET | 1 | 013 | | 0 | 0 | N | N |
| 00098 | 03/03/2012 | 7P | SA | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.07 | FIX | 040,061,013 | 10 | 080,081 | WET | 3 | 011 | 011 | 0 | 0 | N | N |
| 00380 | 08/23/2010 | 6P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.24 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00270 | 07/08/2011 | 4P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.48 | TURN | | 07 | 042 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00459 | 09/15/2014 | 12P | MO | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 4.68 | PED | | 02 | 029 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00140 | 04/03/2012 | 3P | TU | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 999.99 | REAR | 013 | 07 | 043 | DRY | 3 | 011 | 011 | 0 | 0 | N | N |
| 00630 | 12/26/2013 | 11P | TH | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 999.99 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00023 | 01/14/2011 | 9P | FR | Warrenton | MN | R | HY 104, FORT STEVENS AT MP 999.99 | FIX | 079 | 10 | 080,081 | WET | 1 | 011 | | 0 | 1 | Y | N |

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00225 | 05/27/2010 | 2P | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.00 | REAR | | 07 | 026 | DRY | 2 | 011 | 051 | 0 | 1 | N | N |
| 00025 | 01/20/2013 | 9A | SU | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.05 | TURN | | 02 | 028 | ICE | 2 | 011 | 011 | 0 | 1 | N | N |
| 00006 | 01/06/2014 | 6P | MO | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.17 | OTH | 035 | 12 | | WET | 1 | 011 | | 0 | 0 | N | N |
| 00602 | 12/23/2010 | 8A | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.26 | REAR | | 07 | 043 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00266 | 06/22/2014 | 6P | SU | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.35 | FIX | 022,023 | 10 | 017 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00435 | 09/29/2011 | 12P | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.38 | REAR | | 07,22 | 043 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00251 | 06/17/2013 | 6P | MO | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.38 | REAR | | 07,27 | 043,016 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00643 | 10/09/2013 | 3P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.39 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00456 | 09/13/2014 | 9P | SA | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.40 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00433 | 09/29/2011 | 7A | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.43 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00052 | 02/10/2010 | 2P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.45 | FIX | 095 | 08 | 083,080,081 | WET | 1 | 111 | | 0 | 0 | N | N |
| 00008 | 01/05/2012 | 1P | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.56 | TURN | 110 | 10 | 062 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00527 | 10/24/2014 | 8A | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.58 | REAR | | 29 | 026 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00188 | 05/22/2011 | 11A | SU | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.63 | REAR | 034 | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00451 | 09/28/2012 | 9A | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.67 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00103 | 03/07/2014 | 5A | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.69 | FIX | 092,079,091 | 26 | 080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00142 | 04/06/2012 | 12P | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 0.74 | REAR | 013,092 | 27 | 016 | DRY | 4 | 011 | 011 | 0 | 4 | N | N |
| 00357 | 08/24/2011 | 12P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.00 | BACK | | 02 | 011,028 | DRY | 2 | 051 | 073 | 0 | 0 | N | N |
| 00592 | 12/05/2014 | 5P | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.16 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00618 | 12/18/2014 | 1P | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.17 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00250 | 06/22/2012 | 2P | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.22 | TURN | 003 | 02 | 028,016 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00048 | 02/05/2010 | 10A | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.22 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00374 | 08/31/2011 | 1P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | FIX | 040,058 | 10 | 080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00587 | 12/02/2014 | 5A | TU | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | FIX | 124,079 | 01 | 047,080,081 | ICE | 1 | 011 | | 0 | 1 | N | Y |
| 00357 | 08/05/2010 | 11A | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.31 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00392 | 08/19/2014 | 11A | TU | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.37 | TURN | | 02 | 028 | DRY | 2 | 014 | 011 | 0 | 0 | N | N |
| 00489 | 11/02/2011 | 7P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.47 | FIX | 100 | 10 | 011,080 | WET | 1 | 041 | | 0 | 0 | N | N |
| 00047 | 01/30/2013 | 2P | WE | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.61 | FIX | 079,010 | 27 | 016,080,081 | WET | 1 | 041 | | 0 | 1 | N | N |
| 00417 | 09/09/2010 | 3P | TH | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 1.64 | TURN | | 08 | 002 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00582 | 12/06/2010 | 5P | MO | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 999.99 | OTH | 035 | 12 | | WET | 1 | 011 | | 0 | 1 | N | N |
| 00526 | 11/08/2013 | 12P | FR | Warrenton | MN | R | HY 105, WARRENTON-ASTORIA AT MP 999.99 | FIX | 035,062 | 10 | 080 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00082 | 02/26/2012 | 6P | SU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.11 | TURN | 079,088 | 08 | 004 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00336 | 08/03/2012 | 1P | FR | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.11 | TURN | | 08,27 | 002,016,080 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00427 | 09/26/2011 | 9P | MO | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.11 | FIX | 072 | 08,27 | 001,016 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00259 | 06/19/2014 | 2A | TH | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.12 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00545 | 12/09/2011 | 5P | FR | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.15 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00606 | 12/11/2013 | 4P | WE | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.26 | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00316 | 06/24/2014 | 1P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.26 | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00308 | 07/19/2012 | 2P | TH | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.26 | TURN | 082 | 08,02 | 004,028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00078 | 03/08/2010 | 5P | MO | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00412 | 09/07/2010 | 3P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | ANGL | | 02 | 028 | DRY | 2 | 091 | 011 | 0 | 2 | N | N |
| 00427 | 09/16/2010 | 11A | TH | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 2 | N | N |
| 00537 | 10/29/2014 | 12P | WE | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | ANGL | 086 | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00625 | 12/23/2014 | 4P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00016 | 01/07/2010 | 10A | TH | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00134 | 04/02/2012 | 3P | MO | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | TURN | 082 | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00585 | 12/20/2012 | 3P | TH | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.27 | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00488 | 11/01/2011 | 2P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.33 | REAR | | 10 | 011 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00564 | 11/26/2013 | 12P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.33 | TURN | | 02 | 007 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00022 | 01/17/2012 | 1P | TU | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.34 | REAR | | 07 | 026 | WET | 2 | 011 | 011 | 0 | 0 | N | N |

City of Warrenton
January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | VEHICLE TYP/OWN #2 | PEOPLE KILL | PEOPLE INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00133 | 02/06/2012 | 11A | MO | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.34 | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00145 | 04/04/2014 | 5P | FR | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.55 | TURN | 124 | 01,08 | 047,001,080 | WET | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00332 | 08/12/2011 | 6P | FR | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.57 | FIX | 058,079,086 | 10 | 080,081 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00460 | 10/14/2011 | 11P | FR | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.71 | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00390 | 09/07/2011 | 4P | WE | Warrenton | CN | R | HY 105, WARRENTON-ASTORIA AT MP 1.81 | TURN | | 02,27 | 028,016,004 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

STATE HIGHWAY SYSTEM CRASH LOCATIONS - DRIVER BEHAVIOR FORMAT

City of Warrenton

January 1, 2010 through December 31, 2014

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | COMPNT | MLG TYP | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | PEOPLE KILL | PEOPLE INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00316 | 07/14/2010 | 10P | WE | Warrenton | MN | R | HY 485, FORT STEVENS SPUR AT MP 4.83 | SS-O | | 32,35,06 | 052,034,038 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CITY STREET LOCATIONS BY COUNTY - DRIVER BEHAVIOR FORMAT

City of Warrenton
January 1, 2010 through December 31, 2014

CLATSOP COUNTY

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | KILL | INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00555 | 12/07/2012 | 1A | FR | Warrenton | SE 11TH ST 150 FT W OF SE ANCHOR AVE | FIX | 088,100 | 10 | 080,081 | WET | 1 | 011 | | 0 | 0 | Y | N |
| 00075 | 02/10/2014 | 3P | MO | Warrenton | SE 13TH PL 50 FT E OF S MAIN AVE | FIX | 073,062 | 10 | 080,083,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00416 | 09/17/2011 | 8A | SA | Warrenton | NW 13TH ST 320 FT W OF WARRENTON DR | FIX | 079,010 | 10 | 080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00074 | 02/10/2014 | 3P | MO | Warrenton | SE SE 13TH ST 175 FT SE OF FT STEVENS HY SPUR | FIX | 073,062,010 | 01 | 047,080 | WET | 1 | 011 | | 0 | 0 | N | Y |
| 00048 | 01/31/2013 | 11A | TH | Warrenton | NE 1ST ST 20 FT E OF NE HERON AVE | PARK | | 10 | 011 | DRY | 2 | 013 | 011 | 0 | 0 | N | N |
| 00216 | 05/27/2014 | 5P | TU | Warrenton | NE 1ST ST 120 FT NW OF NE SKIPANON DR | FIX | 053 | 32 | 052,080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00067 | 02/15/2013 | 7A | FR | Warrenton | SW 2ND ST UNK FT UN OF | REAR | 092 | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 90030 | 01/20/2014 | 3P | MO | Warrenton | SW 2ND ST 40 FT NW OF S MAIN AVE | FIX | 064,089 | 10 | 017 | DRY | 1 | 051 | | 0 | 0 | N | N |
| 00224 | 05/24/2010 | 4P | MO | Warrenton | SW 2ND ST 100 FT NW OF S MAIN AVE | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00104 | 03/06/2012 | 4P | TU | Warrenton | SW 3RD ST 100 FT NW OF ALDER AVE | PARK | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00135 | 04/01/2011 | 9P | FR | Warrenton | NE 5TH ST 600 FT NW OF NE SKIPANON DR | FIX | 034,079,088 | 10 | 080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00357 | 07/23/2014 | 2P | WE | Warrenton | NW 7TH ST 100 FT E OF WARRENTON DR | FIX | 052 | 10 | 080 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00603 | 12/24/2010 | 8P | FR | Warrenton | SW 9TH ST 600 FT SE OF RIDGE RD | FIX | 092,062 | 26,27 | 016,080,081 | WET | 1 | 011 | | 0 | 1 | N | N |
| 00443 | 09/23/2012 | 9A | SU | Warrenton | SW ALDER AVE 100 FT SW OF N MAIN AVE | REAR | 092,099 | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00170 | 04/22/2014 | 1P | TU | Warrenton | SW ALDER AVE AT SW 1ST ST | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00181 | 05/01/2014 | 7A | TH | Warrenton | SW ALDER AVE AT SW 1ST ST | ANGL | 110 | 03 | 021 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00228 | 05/31/2013 | 3P | FR | Warrenton | SW ALDER AVE AT SW 2ND ST | REAR | | 07 | 043 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00030 | 01/20/2014 | 3P | MO | Warrenton | SW ALDER AVE UNK FT NE OF SW 2ND ST | FIX | 064,089 | 10 | 017 | DRY | 1 | 051 | | 0 | 0 | N | N |
| 00211 | 05/22/2013 | 3P | WE | Warrenton | SW ALDER CT AT SW 1ST ST | FIX | 088 | 32 | 052,001,080 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00552 | 12/06/2012 | 10A | TH | Warrenton | SE ANCHOR AVE 250 FT N OF SE 10TH PL | BACK | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00156 | 04/19/2012 | 2P | TH | Warrenton | SE ANCHOR AVE AT SE 1ST ST | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00404 | 09/12/2011 | 11P | MO | Warrenton | SE ANCHOR AVE AT SE 3RD ST | FIX | 088,062,093 | 27 | 016,080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00517 | 11/11/2012 | 8P | SU | Warrenton | SW BIRCH AVE 150 FT NE OF SW 2ND ST | FIX | 070 | 10 | 011,080 | WET | 2 | 011 | 991 | 0 | 0 | N | N |
| 00057 | 02/12/2011 | 1P | SA | Warrenton | SW BIRCH AVE 100 FT SW OF W HARBOR ST | TURN | | 10 | 080 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00131 | 03/29/2012 | 7P | TH | Warrenton | BURMA RD 700 FT N OF PETER IREDALE RD | FIX | 076 | 01 | 047 | WET | 1 | 011 | | 0 | 0 | N | Y |
| 00210 | 05/22/2013 | 6P | WE | Warrenton | SW CEDAR AVE AT SW 2ND ST | ANGL | | 03 | 021 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00311 | 05/19/2014 | 2P | MO | Warrenton | SW CEDAR AVE 200 FT NW OF SW 2ND ST | FIX | 064 | 10 | 082 | DRY | 1 | 053 | | 0 | 0 | N | N |
| 00601 | 12/10/2014 | 7A | WE | Warrenton | SW CEDAR AVE 250 FT N OF SW 9TH ST | REAR | 013 | 07 | 043 | WET | 4 | 073 | 011 | 0 | 3 | N | N |
| 00140 | 03/30/2014 | 8P | SU | Warrenton | DELAURA BEACH LN AT RIDGE RD | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00547 | 12/03/2012 | 8P | MO | Warrenton | DELAURA BEACH LN 950 FT E OF RIDGE RD | FIX | 092,079,010 | 10 | 080,081 | WET | 1 | 011 | | 0 | 1 | N | N |
| 00598 | 12/07/2013 | 6A | SA | Warrenton | DELAURA BEACH LN 545 FT SW OF WHISKEY RD | FIX | 124,088 | 01 | 047,080 | ICE | 1 | 011 | | 0 | 0 | N | Y |
| 00315 | 07/31/2011 | 10A | SU | Warrenton | DISCOVERY LN AT ENSIGN AVE | BACK | | 10 | 011 | DRY | 2 | 111 | 011 | 0 | 0 | N | N |
| 00323 | 07/22/2013 | 2P | MO | Warrenton | DISCOVERY LN AT ENSIGN AVE | REAR | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00417 | 09/09/2013 | 6P | MO | Warrenton | DISCOVERY LN AT ENSIGN AVE | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00395 | 08/27/2013 | 7A | TU | Warrenton | DISCOVERY LN AT ENSIGN AVE | FIX | 044,058,025 | 32,16 | 052,016,080 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00320 | 07/24/2014 | 4P | TH | Warrenton | DISCOVERY LN 500 FT N OF ENSIGN AVE | FIX | 040 | 27 | 016,080,081 | UNK | 1 | 011 | | 0 | 0 | N | N |
| 00059 | 02/06/2014 | 4P | TH | Warrenton | ENSIGN AVE AT NW 19TH ST | REAR | 124 | 01 | 047 | ICE | 2 | 071 | 011 | 0 | 0 | N | Y |
| 00500 | 11/07/2011 | 6P | MO | Warrenton | ENSIGN AVE UNK FT UN OF NW 19TH ST | FIX | 057,100 | 22 | 017,080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00271 | 06/26/2014 | 11A | TH | Warrenton | ENSIGN AVE AT OREGON COAST HY | REAR | | 29 | 026 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00479 | 10/29/2010 | 7A | FR | Warrenton | ENSIGN AVE 0 FT NW OF OREGON COAST HY | FIX | 044,058 | 10 | 080 | WET | 1 | 011 | | 0 | 1 | N | N |
| 00044 | 02/03/2012 | 10A | FR | Warrenton | ENSIGN AVE 200 FT SE OF OREGON COAST HY | SS-O | | 13 | 045,010 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00114 | 03/13/2012 | 2P | TU | Warrenton | ENSIGN AVE 200 FT NW OF OREGON COAST HY | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 1 | N | N |
| 00429 | 09/17/2013 | 12P | TU | Warrenton | ENSIGN AVE 450 FT NW OF OREGON COAST HY | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00455 | 10/08/2011 | UNK | SA | Warrenton | JETTY ST 100 FT N OF 5TH AVE | ANGL | 092 | 26 | 080,081 | UNK | 2 | 011 | 041 | 0 | 0 | N | N |
| 00311 | 07/17/2013 | 6P | WE | Warrenton | JUNIPER AVE 300 FT S OF SW 2ND ST | FIX | 061 | 16 | 016,080,081 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00375 | 08/13/2010 | 7P | FR | Warrenton | NE KING AVE 1431 FT N OF E HARBOR ST | FIX | 035,079 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00410 | 09/07/2012 | 11A | FR | Warrenton | LAKE DR UNK FT UN OF 7TH AVE | FIX | 079 | 27,05 | 016,044 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00087 | 02/24/2011 | 10P | TH | Warrenton | LAKE DR 50 FT S OF 9TH AVE | FIX | 124,100 | 01 | 047,080,081 | ICE | 1 | 011 | | 0 | 0 | N | Y |
| 00516 | 10/17/2014 | 6P | FR | Warrenton | NEPTUNE DR 625 FT S OF E HARBOR ST ALT | TURN | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00463 | 10/09/2012 | 2P | TU | Warrenton | NEPTUNE DR 200 FT NW OF OREGON COAST HY | REAR | | 27 | 016 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00286 | 07/12/2010 | 12P | MO | Warrenton | NEPTUNE DR 200 FT NW OF OREGON COAST HY | TURN | | 07 | 026 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |

City of Warrenton
January 1, 2010 through December 31, 2014

CLATSOP COUNTY

| SERIAL NO | DATE | TIME | DAY | *COUNTY OR CITY NAME | CRASH LOCATION | COLL TYPE | EVENT | CAUSE | ERROR | SURF | TOT VEH | VEHICLE TYP/OWN #1 | #2 | PEOPLE KILL | PEOPLE INJ | ALC | SPEED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00194 | 05/15/2012 | 2P | TU | Warrenton | NEPTUNE DR 300 FT NW OF OREGON COAST HY | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00465 | 09/19/2014 | 6P | FR | Warrenton | NEPTUNE DR 325 FT W OF OREGON COAST HY | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00155 | 04/04/2010 | 1P | SU | Warrenton | NEPTUNE DR 400 FT N OF OREGON COAST HY | ANGL | | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00501 | 10/11/2014 | 7P | SA | Warrenton | NEPTUNE DR 825 FT N OF OREGON COAST HY | TURN | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00518 | 11/12/2012 | 5P | MO | Warrenton | PACIFIC DR 300 FT E OF IREDALE ST | PARK | 082 | 02 | 028 | WET | 2 | 011 | 011 | 0 | 0 | N | N |
| 00500 | 11/02/2012 | 1P | FR | Warrenton | PETER IREDALE RD 300 FT SE OF BURMA RD | FIX | 035,079 | 10 | 080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00017 | 01/14/2014 | 10P | TU | Warrenton | PETER IREDALE RD 2640 FT W OF BURMA RD | FIX | 035,062 | 10 | 080,081 | DRY | 1 | 011 | | 0 | 2 | N | N |
| 00389 | 08/18/2014 | 2P | MO | Warrenton | PETER IREDALE RD 90 FT SW OF COFFENBURY LAKE RD | FIX | 058 | 30 | 050,080,081 | DRY | 1 | 011 | | 0 | 0 | N | Y |
| 00326 | 07/23/2010 | 2P | FR | Warrenton | PETER IREDALE RD AT RIDGE RD | ANGL | 110 | 03,02 | 021,028 | DRY | 1 | 011 | | 0 | 1 | N | N |
| 00298 | 07/14/2012 | 2P | SA | Warrenton | PETER IREDALE RD AT RIDGE RD | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 1 | N | N |
| 00331 | 08/04/2012 | 9A | SA | Warrenton | PETER IREDALE RD AT RIDGE RD | ANGL | | 02 | 028 | DRY | 2 | 011 | 011 | 0 | 2 | N | N |
| 00390 | 08/18/2014 | 3P | MO | Warrenton | PETER IREDALE RD AT RIDGE RD | REAR | | 01 | 047 | DRY | 2 | 011 | 011 | 0 | 1 | N | Y |
| 00222 | 06/11/2011 | 9P | SA | Warrenton | PETER IREDALE RD AT RIDGE RD | TURN | | 03,02 | 021,028 | DRY | 2 | 011 | 011 | 0 | 3 | N | N |
| 00175 | 05/03/2012 | 2P | TH | Warrenton | PETER IREDALE RD AT RIDGE RD | FIX | 040,062,058 | 27 | 016 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00255 | 06/20/2013 | 10A | TH | Warrenton | PETER IREDALE RD AT RIDGE RD | FIX | 062,079 | 10 | 016,080,081 | WET | 1 | 011 | | 0 | 0 | N | N |
| 00480 | 10/20/2012 | 8P | SA | Warrenton | RIDGE RD 175 FT NW OF CAMP KIWANILONG RD | OTH | 035 | 12 | | WET | 1 | 011 | | 0 | 0 | N | N |
| 00551 | 11/20/2013 | 5P | WE | Warrenton | RIDGE RD 500 FT N OF PETER IREDALE RD | OTH | 035 | 12 | | UNK | 1 | 011 | | 0 | 0 | N | N |
| 00072 | 02/08/2014 | 7P | SA | Warrenton | RIDGE RD 575 FT N OF PETER IREDALE RD | FIX | 124,058 | 01 | 047,080,081 | SNO | 1 | 011 | | 0 | 1 | N | Y |
| 00606 | 07/28/2012 | 7P | SA | Warrenton | RIDGE RD AT SW 9TH ST | TURN | | 08,11 | 010,002 | DRY | 2 | 011 | 011 | 0 | 0 | N | N |
| 00368 | 08/17/2012 | 9P | FR | Warrenton | RIDGE RD 5280 FT N OF SW 9TH ST | OTH | 035 | 12 | | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00596 | 12/07/2013 | 7P | SA | Warrenton | RIDGE RD 5280 FT N OF SW 9TH ST | FIX | 124,079,010 | 01 | 047,080 | ICE | 1 | 011 | | 0 | 0 | N | Y |
| 00335 | 07/29/2013 | 2A | MO | Warrenton | NE SKIPANON DR 50 FT SW OF NE 1ST ST | FIX | 035,079,100 | 10 | 080,081 | DRY | 1 | 011 | | 0 | 0 | N | N |
| 00261 | 06/15/2010 | 9P | TU | Warrenton | WILLOW DR 10 FT W OF AZALEA AVE | PED | | 02 | 029 | DRY | 1 | 011 | | 0 | 1 | N | N |

VEHICLE OWNERSHIP CODES

| Code | Short Description | Long Description |
|---|---|---|
| 1 | PRVTE | Private |
| 2 | GOVMT | Government |
| 3 | PUBLC | Public |
| 4 | RENTL | Rental vehicle |
| 5 | STOLN | Stolen vehicle |
| 9 | UNKN | Unknown ownership |

VEHICLE TYPE CODES

| Code | Short Description | Long Description |
|---|---|---|
| 01 | PSNGR CAR | Passenger car, pickup, light delivery, etc. |
| 02 | BOBTAIL | Truck tractor with no trailers (bobtail) |
| 03 | FARM TRCTR | Farm tractor or self-propelled farm equipment |
| 04 | SEMI TOW | Truck Tractor with trailer/mobile home in tow |
| 05 | TRUCK | Truck with non-detachable bed, panel, etc. |
| 06 | MOPED | Moped, minibike, seated motor scooter, motor bike |
| 07 | SCHL BUS | School bus (includes van) |
| 08 | OTH BUS | Other bus |
| 09 | MTRCYCLE | Motorcycle, dirt bike |
| 10 | OTHER | Other: forklift, backhoe, etc. |
| 11 | MOTRHOME | Motorhome |
| 12 | TROLLEY | Motorized Street Car/Trolley (no rails/wires) |
| 13 | ATV | ATV |
| 14 | MTRSCTR | Motorized scooter (standing) |
| 15 | SNOWMOBILE | Snowmobile |
| 99 | UNKNOWN | Unknown vehicle type |

CAUSE CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 00 | NO CODE | NO CODE APPLICABLE | No cause associated at this level |
| 01 | TOO-FAST | TOO FAST FOR COND | Too fast for conditions (not exceed posted speed) |
| 02 | NO-YIELD | FAILED YIELD ROW | Did not yield right-of-way |
| 03 | PAS-STOP | PASSED STOP SIGN | Passed stop sign or red flasher |
| 04 | DIS SIG | DISREGRD TRAF SIGNAL | Disregarded traffic signal |
| 05 | LEFT-CTR | LEFT OF CTR/STRADDLE | Drove left of center on two-way road; straddling |
| 06 | IMP-OVER | IMPROPER PASSING | Improper overtaking |
| 07 | TOO-CLOS | FOLLOW TOO CLOSE | Followed too closely |
| 08 | IMP-TURN | IMPROPER TURN | Made improper turn |
| 09 | DRINKING | ALC OR DRUGS | Alcohol or Drug Involved |
| 10 | OTHR-IMP | OTHER DRIVE ERR | Other improper driving |
| 11 | MECH-DEF | MECH DEFECT | Mechanical defect |
| 12 | OTHER | OTHER | Other (not improper driving) |
| 13 | IMP LN C | IMP LANE CHANGE | Improper change of traffic lanes |
| 14 | DIS TCD | DISRG OTHR TCD | Disregarded other traffic control device |
| 15 | WRNG WAY | WRONG WAY / 1-WAY RD | Wrong way on one-way road; wrong side divided road |
| 16 | FATIGUE | DRIVER FATIGUED | Driver drowsy/fatigued/sleepy |
| 17 | ILLNESS | PHYSICAL ILLNESS | Physical illness |
| 18 | IN RDWY | ILLEGALLY IN RDWY | Non-motorist illegally in roadway |
| 19 | NT VISBL | NOT VISIBLE | Not motorist not visible; non-reflective clothing |
| 20 | IMP PKNG | IMPROPER PARKING | Vehicle improperly parked |
| 21 | DEF STER | DEFECTIVE STEERING | Defective steering mechanism |
| 22 | DEF BRKE | DEFECTIVE BRAKES | Inadequate or no brakes |
| 24 | LOADSHFT | LOAD SHIFTED | Vehicle lost load or load shifted |
| 25 | TIREFAIL | TIRE FAILURE | Tire Failure |
| 26 | PHANTOM | PHANTOM VEHICLE | Phantom / Non-contact Vehicle |
| 27 | INATTENT | INATTENTION | Inattention |
| 28 | NM INATT | NON-MTRST INATTENT | Non-Motorist Inattention |
| 29 | F AVOID | FAIL AVOID VEH AHEAD | Failed to avoid vehicle ahead |
| 30 | SPEED | EXCED POSTED SPEED | Driving in excess of posted speed |
| 31 | RACING | SPEED RACING | Speed Racing (per PAR) |
| 32 | CARELESS | CARELESS DRIVING | Careless Driving (per PAR) |
| 33 | RECKLESS | RECKLESS DRIVING | Reckless Driving (per PAR) |
| 34 | AGGRESV | AGGRESSIVE DRIVING | Aggressive Driving (per PAR) |
| 35 | RD RAGE | ROAD RAGE | Road Rage (per PAR) |
| 40 | VIEW OBS | VIEW OBSCURED | View obscured |
| 50 | USED MDN | IMP USE MEDIAN/SHLDR | Improper use of median or shoulder |

ERR CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 000 | NONE | NO ERROR | No error |
| 001 | WIDE TRN | WIDE TURN | Wide turn |
| 002 | CUT CORN | CUT CORNER | Cut corner on turn |
| 003 | FAIL TRN | F OBEY TRN | Failed to obey mandatory traffic turn signal, sign or lane markings |
| 004 | L IN TRF | LTRN FNT TRAF | Left turn in front of oncoming traffic |
| 005 | L PROHIB | LTRN PROHIB | Left turn where prohibited |
| 006 | FRM WRNG | T FRM WRNG LN | Turned from wrong lane |
| 007 | TO WRONG | T TO WRONG LN | Turned into wrong lane |
| 008 | ILLEG U | ILLEG U-TURN | U-turned illegally |
| 009 | IMP STOP | IMP STOP | Improperly stopped in traffic lane |
| 010 | IMP SIG | IMP/FAIL SIG | Improper signal or failure to signal |
| 011 | IMP BACK | IMP BACKING | Backing improperly (not parking) |
| 012 | IMP PARK | IMP PARKED | Improperly parked |
| 013 | UNPARK | IMP STRT PARK | Improper start leaving parked position |
| 014 | IMP STRT | IMP STRT STOP | Improper start from stopped position |
| 015 | IMP LGHT | IMP/NO LIGHTS | Improper or no lights (vehicle in traffic) |
| 016 | INATTENT | INATTENTION | Inattention (Failure to Dim Lights prior to 4/1/97) |
| 017 | UNSF VEH | DR UNSAFE VEH | Driving unsafe vehicle (no other error apparent) |
| 018 | OTH PARK | PRK MAN N/CLR | Entering/exiting parked position w/ insufficient clearance; other improper parking maneuver |
| 019 | DIS DRIV | DISRG DR SIG | Disregarded other driver's signal |
| 020 | DIS SGNL | DISRG TRF SIG | Disregarded traffic signal |
| 021 | RAN STOP | DISRG STP SGN | Disregarded stop sign or flashing red |
| 022 | DIS SIGN | DISRG WRN SGN | Disregarded warning sign, flares or flashing amber |
| 023 | DIS OFCR | DISRG POL/FLG | Disregarded police officer or flagman |
| 024 | DIS EMER | DISRG SIR/EMR | Disregarded siren or warning of emergency vehicle |
| 025 | DIS RR | DISRG RR SIG | Disregarded RR signal, RR sign, or RR flagman |
| 026 | REAR-END | F AVOID STP V | Failed to avoid stopped or parked vehicle ahead other than school bus |
| 027 | BIKE ROW | F/YLD ROW BIK | Did not have right-of-way over pedalcyclist |
| 028 | NO ROW | NO R-O-W | Did not have right-of-way |
| 029 | PED ROW | F/YLD ROW PED | Failed to yield right-of-way to pedestrian |
| 030 | PAS CURV | PASS ON CURVE | Passing on a curve |
| 031 | PAS WRNG | PASS WRNG SID | Passing on the wrong side |
| 032 | PAS TANG | PASS TANGENT | Passing on straight road under unsafe conditions |
| 033 | PAS X-WK | PASS STP4PED | Passed vehicle stopped at crosswalk for pedestrian |
| 034 | PAS INTR | PASS AT INTER | Passing at intersection |
| 035 | PAS HILL | PASS ON HILL | Passing on crest of hill |
| 036 | N/PAS ZN | PASS N/PASSNG | Passing in "No Passing" zone |
| 037 | PAS TRAF | PASS ONC TRAF | Passing in front of oncoming traffic |
| 038 | CUT-IN | CUTTING IN | Cutting in (two lanes - two way only) |
| 039 | WRNGSIDE | DR WRONG SIDE | Driving on wrong side of the road (2-way undivided roadways) |
| 040 | THRU MED | DR THRU MEDN | Driving through safety zone or over island |
| 041 | F/ST BUS | F/STP SCHLBUS | Failed to stop for school bus |
| 042 | F/SLO MV | F/SLO SLO VEH | Failed to decrease speed for slower moving vehicle |
| 043 | TOO CLOSE | FOLLW TO CLOS | Following too closely (must be on officer's report) |
| 044 | STRDL LN | STRD/DR WRNG | Straddling or driving on wrong lanes |
| 045 | IMP CHG | IMP LANE CHG | Improper change of traffic lanes |

ERR CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 046 | WRNG WAY | WRNG WY/1 WAY | Wrong way on one-way roadway; wrong side divided road |
| 047 | BASCRULE | V BASIC RULE | Driving too fast for conditions (not exceeding posted speed) |
| 048 | OPN DOOR | OPN DOOR TRAF | Opened door into adjacent traffic lane |
| 049 | IMPEDING | IMPEDING TRAF | Impeding Traffic |
| 050 | SPEED | SPEED | Driving in excess of posted speed |
| 051 | RECKLESS | RECKLSS DRVNG | Reckless driving (per PAR) |
| 052 | CARELESS | CARELSS DRVNG | Careless driving (per PAR) |
| 053 | RACING | RACING | Speed Racing (per PAR) |
| 054 | X N/SGNL | X-INT NO SGNL | Crossing at intersection, no traffic signal present |
| 055 | X W/SGNL | X-INT W/ SGNL | Crossing at intersection, traffic signal present |
| 056 | DIAGONAL | X-INT DIAGNL | Crossing at intersection - diagonally |
| 057 | BTWN INT | X-BTWN INTER | Crossing between intersections |
| 059 | W/TRAF-S | W SHLD W/TRAF | Walking, running, riding, etc., on shoulder WITH traffic |
| 060 | A/TRAF-S | W SHLD A/TRAF | Walking, running, riding, etc., on shoulder FACING traffic |
| 061 | W/TRAF-P | W PAVE W/TRAF | Walking, running, riding, etc., on pavement WITH traffic |
| 062 | A/TRAF-P | W PAVE A/TRAF | Walking, running, riding, etc., on pavement FACING traffic |
| 063 | PLAYINRD | PLAY IN RDWY | Playing in street or road |
| 064 | PUSH MV | PUSH MV IN RD | Pushing or working on vehicle in road or on shoulder |
| 065 | WORK IN RD | WORK IN RD | Working in roadway or along shoulder |
| 070 | LAY ON RD | LYING IN RD | Standing or lying in roadway |
| 071 | NM IMP USE | N-M IMP USE | Improper use of traffic lane by non-motorist |
| 073 | ELUDING | ELUDING | Eluding / Attempt to elude |
| 079 | F NEG CURV | FAIL NEG CURV | Failed to negotiate a curve |
| 080 | FAIL LN | F MAINT LANE | Failed to maintain lane |
| 081 | OFF RD | RAN OFF RD | Ran off road |
| 082 | NO CLEAR | MISJUDGE CLR | Driver misjudged clearance |
| 083 | OVRSTEER | OVERSTEER | Over-correcting |
| 084 | NOT USED | NOT USED | Code not in use |
| 085 | OVRLOAD | OVERLOAD | Overloading or improper loading of vehicle with cargo or passengers |
| 097 | UNA DIS TC | UNA DISRG TCD | Unable to determine which driver disregarded traffic control device |

EVENT CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 001 | FEL/JUMP | FELL/JUMPED MV | Occupant fell, jumped or was ejected from moving vehicle |
| 002 | INTERFER | PSNGR INTERFERED | Passenger interfered with driver |
| 003 | BUG INTF | ANML INTERFERED | Animal or insect in vehicle interfered with driver |
| 004 | INDRCT PED | PED INDRCTLY INVLV | Pedestrian indirectly involved (not struck) |
| 005 | SUB-PED | SUBSEQUENT PED | "Sub-Ped": pedestrian injured subsequent to collision, etc. |
| 006 | INDRCT BIK | BIKE INDRCTLY INVLV | Pedalcyclist indirectly involved (not struck) |
| 007 | HITCHIKR | HITCHHIKER | Hitchhiker (soliciting a ride) |
| 008 | PSNGR TOW | PSNGR TOWED | Passenger or non-motorist being towed or pushed on conveyance |
| 009 | ON/OFF V | ON/OFF STOP VEH | Getting on/off stopped/parked vehicle (occupants only; must have physical contact w/ vehicle) |
| 010 | SUB OTRN | SUBSEQ OVERTURN | Overturned after first harmful event |
| 011 | MV PUSHD | VEH BEING PUSHED | Vehicle being pushed |
| 012 | MV TOWED | VEH TOWED/TOWING | Vehicle towed or had been towing another vehicle |
| 013 | FORCED | FORCED BY IMPACT | Vehicle forced by impact into another vehicle, pedalcyclist or pedestrian |
| 014 | SET MOTN | MV SET IN MOTION | Vehicle set in motion by non-driver (child released brakes, etc.) |
| 015 | RR ROW | RAILROAD ROW | At or on railroad right-of-way (not Light Rail) |
| 016 | LT RL ROW | LIGHT RAIL ROW | At or on Light-Rail right-of-way |
| 017 | RR HIT V | TRAIN HIT VEH | Train struck vehicle |
| 018 | V HIT RR | VEH HIT TRAIN | Vehicle struck train |
| 019 | HIT RR CAR | VEH HIT RR CAR | Vehicle struck railroad car on roadway |
| 020 | JACKNIFE | JACKKNIFE | Jackknife; trailer or towed vehicle struck towing vehicle |
| 021 | TRL OTRN | TRAILER O'TURN | Trailer or towed vehicle overturned |
| 022 | CN BROKE | TRLR CONN BROKE | Trailer connection broke |
| 023 | DETACH TRL | DETCHD TRLR STRKNG | Detached trailing object struck other vehicle, non-motorist, or object |
| 024 | V DOOR OPN | V DOOR OPN IN TRAF | Vehicle door opened into adjacent traffic lane |
| 025 | WHEELOFF | WHEEL CAME OFF | Wheel came off |
| 026 | HOOD UP | HOOD FLEW UP | Hood flew up |
| 028 | LOAD SHIFT | LOAD SHIFTED | Lost load, load moved or shifted |
| 029 | TIREFAIL | TIRE FAILURE | Tire failure |
| 030 | PET | PET | Pet: cat, dog and similar |
| 031 | LVSTOCK | LIVESTOCK | Stock: cow, calf, bull, steer, sheep, etc. |
| 032 | HORSE | HORSE | Horse, mule, or donkey |
| 033 | HRSE&RID | HORSE & RIDER | Horse and rider |
| 034 | GAME | GAME NO DEER/ELK | Wild animal, game (includes birds; not deer or elk) |
| 035 | DEER ELK | DEER OR ELK | Deer or elk, wapiti |
| 036 | ANML VEH | ANIMAL-DRAWN VEH | Animal-drawn vehicle |
| 037 | CULVERT | CULVERT/MANHOLE | Culvert, open low or high manhole |
| 038 | ATENUATN | IMPACT CUSHION | Impact attenuator |
| 039 | PK METER | PARKING METER | Parking meter |
| 040 | CURB | CURB | Curb (also narrow sidewalks on bridges) |
| 041 | JIGGLE | JIGGLE BAR N/MED | Jiggle bar or traffic snake for channelization |

EVENT CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 042 | GDRL END | GUARDRAIL END | Leading edge of guardrail |
| 043 | GARDRAIL | GUARDRAIL | Guard rail (not metal median barrier) |
| 044 | BARRIER | MEDIAN BARRIER | Median barrier (raised or metal) |
| 045 | WALL | WALL | Retaining wall or tunnel wall |
| 046 | BR RAIL | BRIDGE RAIL | Bridge railing or parapet (on bridge or approach) |
| 047 | BR ABUTMNT | BRIDGE ABUTMENT | Bridge abutment (included "approach end" thru 2013) |
| 048 | BR COLMN | BRIDGE COLUMN | Bridge pillar or column |
| 049 | BR GIRDR | BRIDGE GIRDER | Bridge girder (horizontal bridge structure overhead) |
| 050 | ISLAND | TRAFFIC ISLAND | Traffic raised island |
| 051 | GORE | GORE | Gore |
| 052 | POLE UNK | POLE-UNKNOWN | Pole – type unknown |
| 053 | POLE UTL | POLE-UTILITY | Pole – power or telephone |
| 054 | ST LIGHT | POLE-ST LIGHT | Pole – street light only |
| 055 | TRF SGNL | POLE-TRAF SIGNAL | Pole – traffic signal and ped signal only |
| 056 | SGN BRDG | POLE-SIGN BRIDGE | Pole – sign bridge |
| 057 | STOPSIGN | STOP/YIELD SIGN | Stop or yield sign |
| 058 | OTH SIGN | OTHER SIGN | Other sign, including street signs |
| 059 | HYDRANT | HYDRANT | Hydrant |
| 060 | MARKER | DELINEATOR | Delineator or marker (reflector posts) |
| 061 | MAILBOX | MAILBOX | Mailbox |
| 062 | TREE | TREE/STUMP | Tree, stump or shrubs |
| 063 | VEG OHED | VEGTN OVER RDWY | Tree branch or other vegetation overhead, etc. |
| 064 | WIRE/CBL | CABLE ACROSS RD | Wire or cable across or over the road |
| 065 | TEMP SGN | TEMP SIGN/BARR | Temporary sign or barricade in road, etc. |
| 066 | PERM SGN | PERM SIGN/BARR | Permanent sign or barricade in/off road |
| 067 | SLIDE | SLIDE/ROCKS | Slides, fallen or falling rocks |
| 068 | FRGN OBJ | FOREIGN OBJECT | Foreign obstruction/debris in road (not gravel) |
| 069 | EQP WORK | EQUIP WORKING | Equipment working in/off road |
| 070 | OTH EQP | OTHER EQUIPMENT | Other equipment in or off road (includes parked trailer, boat) |
| 071 | MAIN EQP | MAINTNCE EQUIP | Wrecker, street sweeper, snow plow or sanding equipment |
| 072 | OTHER WALL | OTHER WALL | Rock, brick or other solid wall |
| 073 | IRRGL PVMT | IRREGULAR PAVEMENT | Other bump (not speed bump), pothole or pavement irregularity (per PAR) |
| 074 | OVERHD OBJ | OTHER OVERHEAD OBJ | Other overhead object (highway sign, signal head, etc.); not bridge |
| 075 | CAVE IN | CAVE IN | Bridge or road cave in |
| 076 | HI WATER | HIGH WATER | High Water |
| 077 | SNO BANK | SNOW BANK | Snow Bank |
| 078 | LO-HI EDGE | LOW-HIGH PVMNT EDGE | Low or high shoulder at pavement edge |
| 079 | DITCH | CUT SLOPE/DITCH | Cut slope or ditch embankment |
| 080 | OBJ FRM MV | OBJ FRM OTHR VEH | Struck by rock or other object set in motion by other vehicle (incl. lost loads) |
| 081 | FLY-OBJ | OTHER MOVING OBJ | Struck by rock or other moving or flying object (not set in motion by vehicle) |
| 082 | VEH HID | VEH OBSCURE VIEW | Vehicle obscured view |
| 083 | VEG HID | VEG OBSCURE VIEW | Vegetation obscured view |

EVENT CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 084 | BLDG HID | BLD OBSCURE VIEW | View obscured by fence, sign, phone booth, etc. |
| 085 | WIND GUST | WIND GUST | Wind Gust |
| 086 | IMMERSED | IMMERSION | Vehicle immersed in body of water |
| 087 | FIRE/EXP | FIRE/EXPLOSION | Fire or explosion |
| 088 | FENC/BLD | FENCE/BUILDING | Fence or building, etc. |
| 089 | OTHR CRASH | REFER OTHR CRASH | Crash related to another separate crash |
| 090 | TO 1 SIDE | TWO WAY ONE SIDE | Two-way traffic on divided roadway all routed to one side |
| 091 | BUILDING | BUILDING | Building or other structure |
| 092 | PHANTOM | PHANTOM VEH | Other (phantom) non-contact vehicle |
| 093 | CELL PHONE | CELL PHONE PER PAR | Cell phone (on PAR or driver in use) |
| 094 | VIOL GDL | VIOL GRAD DR LIC | Teenage driver in violation of graduated license pgm |
| 095 | GUY WIRE | GUY WIRE | Guy wire |
| 096 | BERM | BERM | Berm (earthen or gravel mound) |
| 097 | GRAVEL | GRAVEL IN RDWY | Gravel in roadway |
| 098 | ABR EDGE | ABRUPT EDGE | Abrupt edge |
| 099 | CELL WTNSD | CELL PHONE WITNESSED | Cell phone use witnessed by other participant |
| 100 | UNK FIXD | UNK FIX OBJ | Fixed object, unknown type. |
| 101 | OTHER OBJ | OTHER OBJ NOT FIXED | Non-fixed object, other or unknown type |
| 102 | TEXTING | TEXTING | Texting |
| 103 | WZ WORKER | WZ WORKER | Work Zone Worker |
| 104 | ON VEHICLE | RIDE ON VEH EXTERIOR | Passenger riding on vehicle exterior |
| 105 | PEDAL PSGR | PSNGR ON PEDALCYCLE | Passenger riding on pedalcycle |
| 106 | MAN WHLCHR | NONMOTOR WHEELCHAIR | Pedestrian in non-motorized wheelchair |
| 107 | MTR WHLCHR | MOTORIZED WHEELCHAIR | Pedestrian in motorized wheelchair |
| 108 | OFFICER | POLICE OFFICER | Law Enforcement / Police Officer |
| 109 | SUB-BIKE | SUBSEQUENT BICYCLIST | "Sub-Bike": pedalcyclist injured subsequent to collision, etc. |
| 110 | N-MTR | NM STR VEH | Non-motorist struck vehicle |
| 111 | S CAR VS V | ST CAR STRUCK VEH | Street Car/Trolley (on rails or overhead wire system) struck vehicle |
| 112 | V VS S CAR | VEH STRUCK ST CAR | Vehicle struck Street Car/Trolley (on rails or overhead wire system) |
| 113 | S CAR ROW | STREET CAR ROW | At or on street car or trolley right-of-way |
| 114 | RR EQUIP | VEH STRUCK RR EQUIP | Vehicle struck railroad equipment (not train) on tracks |
| 115 | DSTRCT GPS | DISTRACT GPS DEVICE | Distracted by navigation system or GPS device |
| 116 | DSTRCT OTH | DISTRACT OTHR DEVICE | Distracted by other electronic device |
| 117 | RR GATE | RR DROP-ARM GATE | Rail crossing drop-arm gate |
| 118 | EXPNSN JNT | EXPANSION JOINT | Expansion joint |
| 119 | JERSEY BAR | JERSEY BARRIER | Jersey barrier |
| 120 | WIRE BAR | WIRE BARRIER | Wire or cable median barrier |
| 121 | FENCE | FENCE | Fence |
| 123 | OBJ IN VEH | LOOSE OBJ IN VEHICLE | Loose object in vehicle struck occupant |
| 124 | SLIPPERY | SLIPPERY SURFACE | Sliding or swerving due to wet, icy, slippery or loose surface (not gravel) |
| 125 | SHLDR | SHLDR GAVE | Shoulder gave way |
| 126 | BOULDER | ROCKS / BOULDER | Rock(s), boulder (not gravel; not rock slide) |

EVENT CODES

| Code | Short Description | Medium Description | Long Description |
|---|---|---|---|
| 127 | LAND SLIDE | ROCK OR LAND SLIDE | Rock slide or land slide |
| 128 | CURVE INV | CURVE PRESENT | Curve present at crash location |
| 129 | HILL INV | HILL PRESENT | Vertical grade / hill present at crash location |
| 130 | CURVE HID | CURVE OBSCURED VIEW | View obscured by curve |
| 131 | HILL HID | HILL OBSCURED VIEW | View obscured by vertical grade / hill |
| 132 | WINDOW HID | WINDOW VIEW OBSCURED | View obscured by vehicle window conditions |
| 133 | SPRAY HID | SPRAY OBSCURED VIEW | View obscured by water spray |

| Rte | Rdwy | BMP | EMP | Length | ADT | Crash | Fatal | A | B | C | PDO | City | County | Connection | Percent | SPIS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **001 Pacific** | | | | | | | | | | | | | | | | |
| I-5 | 1 | 231.89 | 232.06 | 0.17 | 49,900 | 7 | 0 | 2 | 4 | 0 | 1 | | Linn | | 90 | 51.98 |
| I-5 | 1 | 234.91 | 235.09 | 0.18 | 60,700 | 20 | 1 | 0 | 2 | 8 | 9 | | Linn | | 90 | 53.17 |
| I-5 | 1 | 235.93 | 236.11 | 0.18 | 58,700 | 14 | 1 | 2 | 3 | 5 | 3 | | Linn | | 95 | 65.36 |
| I-5 | 1 | 238.92 | 239.09 | 0.17 | 57,300 | 23 | 0 | 1 | 3 | 10 | 9 | | Linn | | 95 | 59.43 |
| I-5 | 1 | 241.91 | 242.08 | 0.17 | 57,100 | 16 | 0 | 1 | 1 | 8 | 6 | | Marion | | 90 | 49.52 |
| I-5 | 1 | 242.91 | 243.07 | 0.16 | 57,200 | 29 | 0 | 0 | 3 | 12 | 14 | | Marion | | 90 | 48.85 |
| I-5 | 1 | 243.94 | 244.09 | 0.15 | 57,000 | 20 | 0 | 1 | 3 | 6 | 10 | | Marion | | 90 | 51.84 |
| I-5 | 1 | 261.91 | 262.10 | 0.19 | 89,200 | 8 | 0 | 3 | 1 | 2 | 2 | | Marion | | 95 | 61.20 |
| I-5 | 1 | 280.93 | 281.09 | 0.16 | 87,200 | 9 | 1 | 1 | 0 | 3 | 4 | | Clackamas | | 90 | 51.55 |
| **009 Oregon Coast** | | | | | | | | | | | | | | | | |
| US-101 | 1 | 2.41 | 2.59 | 0.18 | 7,500 | 4 | 0 | 2 | 1 | 0 | 1 | | Clatsop | | 90 | 47.96 |
| US-101 | 1 | 4.32 | 4.40 | 0.08 | 20,600 | 30 | 0 | 0 | 3 | 6 | 21 | Astoria | Clatsop | | 90 | 45.78 |
| US-101 | 1 | 6.48 | 6.58 | 0.10 | 13,500 | 20 | 0 | 0 | 1 | 10 | 9 | Warrenton | Clatsop | | 90 | 45.29 |
| US-101 | 1 | 7.96 | 8.09 | 0.13 | 13,600 | 16 | 1 | 0 | 4 | 5 | 6 | Warrenton | Clatsop | SE ENSIGN LN. | 90 | 55.55 |
| US-101 | 1 | 20.37 | 20.52 | 0.15 | 17,333 | 14 | 0 | 1 | 3 | 5 | 5 | Seaside | Clatsop | 12TH AVE. | 90 | 50.97 |
| US-101 | 1 | 21.04 | 21.15 | 0.11 | 17,200 | 18 | 1 | 0 | 2 | 4 | 11 | Seaside | Clatsop | BROADWAY | 90 | 51.31 |
| US-101 | 1 | 64.48 | 64.66 | 0.18 | 18,400 | 19 | 0 | 2 | 4 | 4 | 9 | Tillamook | Tillamook | ROAD | 95 | 67.45 |
| US-101 | 1 | 112.26 | 112.44 | 0.18 | 18,800 | 13 | 0 | 2 | 1 | 5 | 5 | Lincoln City | Lincoln | DEVILS LAKE GOLF CLUB RD. | 95 | 64.00 |
| US-101 | 1 | 113.15 | 113.27 | 0.12 | 22,900 | 16 | 0 | 2 | 1 | 5 | 8 | Lincoln City | Lincoln | NE 34TH ST. | 95 | 63.16 |
| US-101 | 1 | 113.34 | 113.44 | 0.10 | 23,400 | 7 | 1 | 1 | 1 | 2 | 2 | Lincoln City | Lincoln | NE HOLMES RD. | 90 | 51.93 |
| US-101 | 1 | 114.13 | 114.21 | 0.08 | 19,600 | 21 | 0 | 0 | 1 | 11 | 9 | Lincoln City | Lincoln | 17TH ST. | 90 | 45.10 |
| US-101 | 1 | 116.44 | 116.52 | 0.08 | 21,200 | 5 | 0 | 2 | 0 | 2 | 1 | Lincoln City | Lincoln | SE 28TH ST. | 90 | 48.10 |
| US-101 | 1 | 139.23 | 139.41 | 0.18 | 24,700 | 22 | 0 | 1 | 1 | 10 | 10 | Newport | Lincoln | NW 20TH ST. | 95 | 57.32 |

**Crash data shown in the SPIS group report results from the summation of crash data between the begin and end mile points of the Group.
**ADT, SPIS Score, and Percent data shown in the SPIS group report are the highest values from all sites within the Group.

| General & Site Informaiton | | | |
|---|---|---|---|
| Analyst: | AARO | Highway Number and Name: | Hwy 9, 104, 105, 485 |
| Agency/Company: | DEA | Mile Points: | |
| Date: | 10/31/2016 | Crash Years Pulled: | 2010-2014 |
| Project Name: | Warrenton TSP | Limiting Probability: | 0.9 |

| Notes |
|---|
| |

Turn Crashes

| MP | RefPop | Street 1 | Street 2 | Probability | Excess Proportion |
|---|---|---|---|---|---|
| 8.05 | 4SG | ENSIGN AVE | OREGON COAST HY | 0.96 | 0.21 |

| MP | RefPop | Street 1 | Street 2 | Probability | Excess Proportion |
|---|---|---|---|---|---|

| MP | RefPop | Street 1 | Street 2 | Probability | Excess Proportion |
|---|---|---|---|---|---|

Rear Crashes

| MP | RefPop | Street1 | Street2 | Probability | Excess Proportion |
|---|---|---|---|---|---|
| 6.83 | 3SG | NEPTUNE DR | OREGON COAST HY | 0.96 | 0.14 |

# Appendix F

## Critical Crash Rate

*For Calculations Only*

## HSM Part B - Critical Crash Rate

| TEV | ADT | MEV | Intersection | Intersection Type (Population) | Crash Rate | Reference Population Critical Crash Rate (95% CI) | Statewide 90th Percentile Crash Rate | Intersection Control | Unsignalized Intersections | Signalized Intersections | Summary |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 300 | 2520 | 5 | Pacific Dr at Willow St/Lake Dr | 4ST | 0.00 | 0.52 | 0.41 | STOP | 0.00 | FALSE | 0.00 |
| 296 | 2486 | 5 | Pacific Dr at Iredale St | 4ST | 0.44 | 0.52 | 0.41 | STOP | 0.44 | FALSE | **0.44** |
| 721 | 6056 | 11 | OR 104/S Main Ave/Ft Stevens Hwy | 4ST | 0.27 | 0.36 | 0.41 | STOP | 0.27 | FALSE | 0.27 |
| 1460 | 12264 | 22 | OR 104/Ft Stevens Hwy at NE Skipar | 4ST | 0.13 | 0.28 | 0.41 | STOP | 0.13 | FALSE | 0.13 |
| 1298 | 10903 | 20 | Warrenton-Astoria Hwy at SE Galen | 3ST | 0.30 | 0.29 | 0.29 | STOP | 0.30 | FALSE | **0.30** |
| 1310 | 11004 | 20 | E Harbor St at Marlin Dr | 3ST | 0.00 | 0.29 | 0.29 | STOP | 0.00 | FALSE | 0.00 |
| 1200 | 10080 | 18 | E Harbor St at SE Neptune Dr | 3ST | 0.00 | 0.30 | 0.29 | STOP | 0.00 | FALSE | 0.00 |
| 1230 | 10332 | 19 | E Harbor St at Young's Bay Plaza Acc | 4ST | 0.00 | 0.30 | 0.41 | STOP | 0.00 | FALSE | 0.00 |
| 2890 | 24276 | 44 | E Harbor St at US 101 (signalized) | 3SIG | 0.86 | [redacted] | 0.51 | SIGNAL | FALSE | 0.86 | **0.86** |
| 85 | 714 | 1 | SW 2nd St/SW Gardenia Ave | 4ST | 0.00 | 1.04 | 0.41 | STOP | 0.00 | FALSE | 0.00 |
| 955 | 8022 | 15 | OR 104/S Main Ave at SW 2nd St | 4ST | 0.55 | 0.32 | 0.41 | STOP | 0.55 | FALSE | **0.55** |
| 2330 | 19572 | 36 | US 101 at SE Neptune Dr (signalized | 3SIG | 0.76 | [redacted] | 0.51 | SIGNAL | FALSE | 0.76 | **0.76** |
| 2545 | 21378 | 39 | US 101 at Marlin Dr (signalized) | 4SIG | 1.15 | [redacted] | 0.86 | SIGNAL | FALSE | 1.15 | **1.15** |
| 275 | 2310 | 4 | NW Ridge Rd at SW 9th St | 3ST | 0.47 | 0.53 | 0.29 | STOP | 0.47 | FALSE | **0.47** |
| 824 | 6922 | 13 | SW 9th St at OR 104/Ft Stevens Hwy | 4ST | 0.24 | 0.34 | 0.41 | STOP | 0.24 | FALSE | 0.24 |
| 2100 | 17640 | 32 | OR 104S/Ft Stevens Hwy Spur at US | 4ST | 0.06 | 0.25 | 0.41 | STOP | 0.06 | FALSE | 0.06 |
| 400 | 3360 | 6 | US 101Bus/Warrenton-Astoria Hwy/ | 3ST | 0.33 | 0.45 | 0.29 | STOP | 0.33 | FALSE | **0.33** |
| 197 | 1655 | 3 | Delaura Beach Ln at Ridge Rd | 3ST | 0.33 | 0.63 | 0.29 | STOP | 0.33 | FALSE | **0.33** |
| 765 | 6426 | 12 | OR 104S/Ft. Stevens Spur at OR 104 | 3ST | 0.09 | 0.34 | 0.29 | STOP | 0.09 | FALSE | 0.09 |
| 465 | 3906 | 7 | SW 18th St/Delaura Beach Ln at S M | 3ST | 0.14 | 0.42 | 0.29 | STOP | 0.14 | FALSE | 0.14 |
| 3015 | 25326 | 46 | SE Ensign Ln at US 101 (signalized) | 4SIG | 0.63 | [redacted] | 0.86 | SIGNAL | FALSE | 0.63 | 0.63 |
| 605 | 5082 | 9 | SE Ensign Ln at SE 19th St | 4ST | 0.00 | 0.38 | 0.41 | STOP | 0.00 | FALSE | 0.00 |
| 690 | 5796 | 11 | SE Ensign Ln at US 101Bus/Warrent | 3ST | 0.00 | 0.36 | 0.29 | STOP | 0.00 | FALSE | 0.00 |
| 1791 | 15044 | 27 | US 101 at SE Dolphin Ave | 4ST | 0.00 | 0.26 | 0.41 | STOP | 0.00 | FALSE | 0.00 |

**Urban (mean crash rates)**

| | |
|---|---|
| **3SIG** | **0.28** |
| **4SIG** | **0.48** |
| **3ST** | **0.13** |
| **4ST** | **0.20** |

**Average Crash Rate Per population**

| | |
|---|---|
| **3SIG** | [redacted] |
| **4SIG** | |
| **3ST** | 0.12848643 |
| **4ST** | 0.132136878 |

Crash rate exceeds critical crash rate

**Crash rate exceeds Statewide 90th Percentile**

# Appendix G

## Bicycle Level of Traffic Stress

**Exhibit 14-2 Bike Lane with Adjacent Parking Lane Criteria**

| 1 Lane per direction | | | | ≥2 lanes per direction | |
|---|---|---|---|---|---|
| **Prevailing or Posted Speed** | **≥ 15' bike lane + parking** | **14' – 14.5' bike lane + parking** | **≤ 13' bike lane + parking or Frequent blockage[1]** | **≥ 15' bike lane + parking** | **≤ 14.5' bike lane + parking or Frequent blockage[1]** |
| ≤25 mph | LTS 1 | LTS 2 | LTS 3 | LTS 2 | LTS 3 |
| 30 mph | LTS 1 | LTS 2 | LTS 3 | LTS 2 | LTS 3 |
| 35 mph | LTS 2 | LTS 3 | LTS 3 | LTS 3 | LTS 3 |
| ≥40 mph | LTS 2 | LTS 4 | LTS 4 | LTS 3 | LTS 4 |

[1]Typically occurs in urban areas (i.e. delivery trucks, parking maneuvers, stopped buses).

**Exhibit 14-3 Bike Lane without Adjacent Parking Lane Criteria**

| 1 Lane per direction | | | | | ≥2 lanes per direction | |
|---|---|---|---|---|---|---|
| Prevailing or Posted Speed | ≥ 7' (Buffered bike lane) | 5.5' – 7' Bike lane | ≤ 5.5' Bike lane | Frequent bike lane blockage[1] | ≥ 7' (Buffered bike lane) | <7' bike lane or frequent blockage[1] |
| ≤30 mph | LTS 1 | LTS 1 | LTS 2 | LTS 3 | LTS 1 | LTS 3 |
| 35 mph | LTS 2 | LTS 3 | LTS 3 | LTS 3 | LTS 2 | LTS 3 |
| ≥40 mph | LTS 3 | LTS 4 | LTS 4 | LTS 4 | LTS 3 | LTS 4 |

[1]Typically occurs in urban areas (i.e. delivery trucks, parking maneuvers, stopped buses).

**Exhibit 14-4 Urban/Suburban Mixed Traffic Criteria**

| **Prevailing Speed or Speed Limit (mph)** | **Unmarked Centerline** | **1 lane per direction** | **2 lanes per direction** | **3+ lanes per direction** |
|---|---|---|---|---|
| ≤ 25[1] | LTS 1 | LTS 2 | LTS 3 | LTS 4 |
| 30 | LTS 2 | LTS 3 | LTS 4 | LTS 4 |
| ≥ 35 | LTS 3 | LTS 4 | LTS 4 | LTS 4 |

[1]Presesence of "sharrow" markings may reduce the LTS by a level for 25 mph or less sections depending on overall area context.

| Intersection | | | LTS | Speed | On-Street Parking | Shoulders | Bike Lane Width | Bike Lane Both Sides? | Lanes per Direction |
|---|---|---|---|---|---|---|---|---|---|
| From | To | Segment | | | | | | | |
| 1 | 2 | Pacific Dr between Willow St & Iredale St (1-2) | **2** | 25 | No | 4' | -- | No | 1 |
| 1 | 14 | Ridge Rd between Pacific Dr and SW 9th St (1-14) | **4** | 45 | No | 2'-4' | -- | No | 1 |
| 2 | 3 | Pacific Dr between Iredale St and 1st St (2-3) | **4** | 45 | No | 4'-6' | -- | No | 1 |
| 3 | 4 | Main Ave between NW 1st St and OR 104 (3-4) | **3** | 35 | No | None | < 5.5' | Yes | 1 |
| 4 | 15 | US 104 between Harbor Dr and SW 9th St (4-15) | **2** | 25 | Yes | None | -- | No | 1 |
| 4 | 5 | Harbor Dr between OR 104 and SE Galena Ave (4-5) | **4** | 35 | No | 4'-9' | -- | No | 1 |
| 5 | 6 | Harbor Dr between SE Galena Ave and Marlin Dr (5-6) | **4** | 35 | No | 4'-9' | -- | No | 1 |
| 5 | 15 | SE Galena/7th St between Harbor Dr and US 104 (5-15) | **4** | 25 | No | None | -- | No | 1 |
| 6 | 7 | Harbor Dr between Marlin Dr and SE Neptune Dr (6-7) | **4** | 45 | No | 4'-6' | -- | No | 1 |
| 6 | 13 | Marlin Dr between Harbor Dr and Us 101 (6-13) | **3** | 35 | No | 0'-6' | < 5.5' | Yes and No | 1 |
| 7 | 9 | Harbor Dr between SE Neptune Dr and US 101 (7-9) | **4** | 45 | No | 4'-6' | -- | No | 1 |
| 7 | 12 | SE Neptune Dr between Harbor Dr and US 101 (7-12) | **2** | 35 | No | None | -- | No | 1 |
| 9 | 13 | US 101 between Harbor Dr and Marlin Ave (9-13) | **4** | 45 | No | 6'-12' | -- | No | 1 |
| 10 | 11 | SW 2nd St between SW Gardenia Ave and OR 104 (10-11) | **2** | 25 | Yes | No Centerline | | | 1 |
| 13 | 17 | Marlin Dr between US 101 and US 101B (13-17) | **3** | 35 | No | 1'-5' | -- | No | 1 |
| 14 | 15 | SW 9th St between NW Ridge Rd. and US 104 (14-15) | **4** | 35 | No | No | -- | No | 1 |
| 14 | 18 | NW Ridge Rd. between SW 9th St and SW 18th St (14-18) | **4** | 45 | No | 2' | -- | No | 1 |
| 15 | 19 | US 104 between SW 9th St and US 104S (15-19) | **3** | 35 | No | No | < 5.5' | Yes | 1 |
| 16 | 17 | US 101 Bus between US 101 and Marlin Dr (16-17) | **4** | 45 | No | 1'-5' | -- | No | 1 |
| 16 | 19 | US 104S between US 104 and US 101 (16-19) | **4** | 45 | No | 1'-6' | -- | No | 1 |
| 16 | 21 | US 101 between US 104S and SE Ensign Ln (16-21) | **4** | 45 | No | 6'-8' | -- | No | 1 |
| 17 | 23 | US 101 Bus between Marlin Dr and SE Ensign Ln (17-23) | **4** | 45 | No | 5'-8' | -- | No | 1 |
| 18 | 20 | SW 18th St between Ridge road and US 104 (18-20) | **3** | 45 | No | 2'-4' | < 5.5' | No | 1 |
| 19 | 20 | US 104 between US 104S and SW 18th St (19-20) | **3** | 35 | No | 2'-4' | -- | No | 1 |
| 21 | 22 | SE Ensign Ln between US 104 and 19th St (21-22) | **2** | 35 | No | None | 5.5'-7' | Yes | 2 |
| 22 | 23 | SE Ensign Ln between 19th St and US 101 Business (22-23) | **1** | 45 | No | None | 5.5'-7' | Yes | 1 |
| 21 | 24 | US 101 between SE Ensign St and SE Dolphin Ave (21-24) | **4** | 55 | No | 6'-8' | -- | No | 2 |

SECTION 6
# TECH MEMO SIX

## FUTURE FORECASTING

# DRAFT MEMORANDUM #6

**DATE:** September 8, 2017

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Future Forecasting DRAFT** P14180-008

Future forecasting, or estimating future travel demand, is an important step in the transportation planning process. This memorandum documents the forecasting process and future forecast results for the Warrenton TSP study area. Within these sections, the land use assumptions, model calibration, post-processing methodology, and resulting 2040 traffic volumes for average weekday traffic and the seasonal summer peak ($30^{th}$ HV) that will be used to analyze future transportation conditions in the project corridor are documented.

## Future Forecasting Process

The process for developing future 2040 traffic volume forecasts for Warrenton involved three keys components:

- The Astoria-Warrenton regional travel demand model was utilized as the primary tool to estimate future travel demand in Warrenton, using a base model year of 2015 and a future model year of 2035.
- Refined travel demand forecasts were developed by adding local circulation characteristics in the travel demand model as needed (using a focus area approach).
- The 20-year growth increment between the base and future year models was extrapolated to a 25-year increment and then added to the base year 2015 count data (referred to as post-processing) to develop final year 2040 traffic volume forecasts for Warrenton.

The following sections summarize the three components of the future forecasting process.

## Astoria-Warrenton Travel Demand Model

The existing Astoria-Warrenton regional travel demand model[1] was utilized as the primary tool to estimate future travel demand in Warrenton. The model includes the major roadways in and around the cities of Warrenton and Astoria, such as US 101, OR 202, the Astoria-Megler bridge, and US 30 (see Figure 1). Land use data within the model area is divided into transportation analysis zones (TAZs), which represent the origins and destinations for traffic trips throughout the region. Estimates of trips generated from each TAZ are based on associated land use data. In addition, regional trip growth on facilities connecting to the Astoria-Warrenton area are accounted for by extrapolating historic growth trends. Forecasts were developed to estimate travel demand during both the average weekday and peak seasonal (30 HV) conditions.

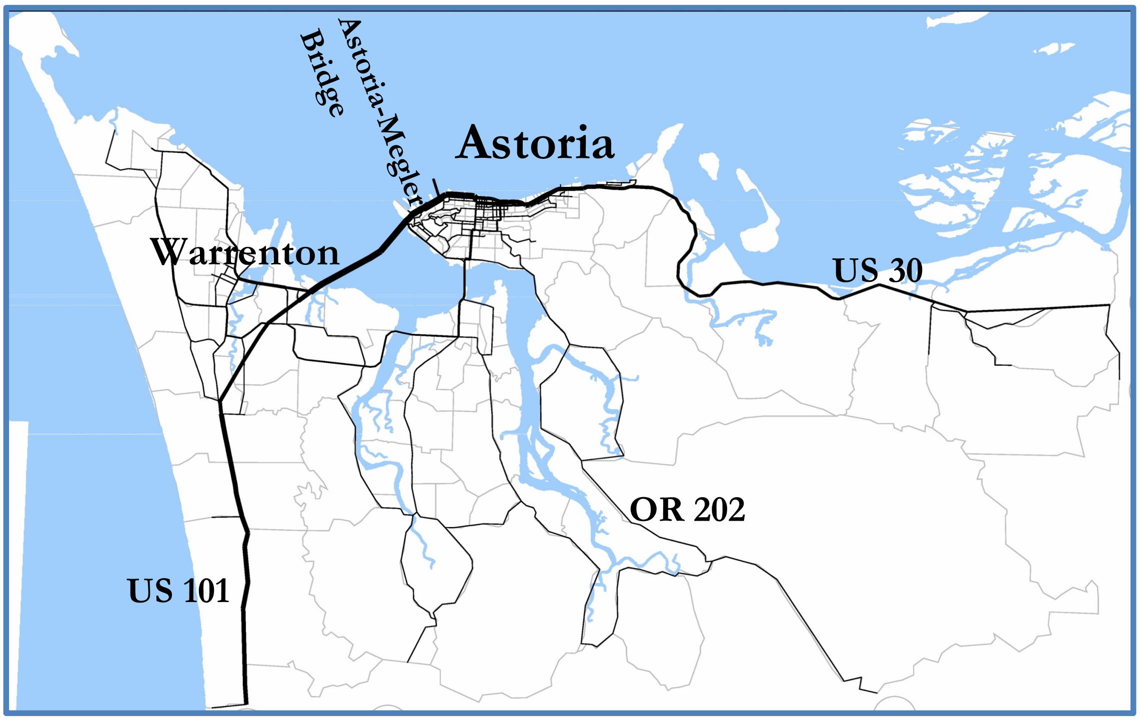



**Figure 1: Astoria-Warrenton Regional Travel Demand Model Area**

The project team collaborated to develop land use assumptions for a 2015 base scenario and 2035 future scenario of the Astoria-Warrenton model for this study. Table 1 lists the total land use estimates for the City of Warrenton Urban Growth Boundary (UGB) [2] for 2015 and 2035 Figures 2 and 3 show the existing UGB for the City of Warrenton, as well as the TAZs used in the regional travel demand model, including assumed household and employment growth between 2015 and 2035.

[1] The Astoria-Warrenton regional travel demand model is managed by the Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU).

[2] Land use data by individual TAZ cannot be reported due to confidentiality of employment information.

As shown in Table 1, the 2015 model included approximately 2,179 households (representing 5,175 people) and 3,410 employees within the Warrenton UGB. With expected growth to the horizon year 2035, 579 households (or about 27 percent growth) are projected to be added, while the total employment is projected to grow by approximately 1,370 employees (40 percent growth). These future totals within the UGB were established in coordination with City using new population forecasts for Clatsop County and its cities.[3]

Warrenton is currently experiencing a steep growth trajectory with several housing subdivision and employment-related land use applications being filed. The control totals shown in Table 1 represent our best estimate of 20-year growth given the available data and studies, and we understand that growth will not be linear over the 20 years.

**Table 1: Warrenton UGB Land Use Summary**

| Land Use | 2015 | 2035 | Projected Growth (2015 to 2035) |
|---|---|---|---|
| **Households** | **2,179** | **3,153** | **974 (+45%)** |
| *Population* | *5,175* | *7,410* | 2,235 (+43%) |
| **Employment (Total)** | **3,410** | **4,934** | **1,524 (+45%)** |
| *Agriculture Employees* | *30* | *35* | 5 (+17%) |
| *Industrial Employees* | *530* | *1,132* | 602 (+114%) |
| *Retail Employees* | *1,210* | *1,605* | 395 (+33%) |
| *Service Employees* | *993* | *1,310* | 317 (+32%) |
| *Education Employees* | *176* | *232* | 56 (+32%) |
| *Government Employees* | *155* | *204* | 49 (+32%) |
| *Other Employees* | *316* | *416* | 100 (+32%) |

**Notes:** Land use summary based on travel demand model and zones that approximate the Warrenton UGB

## 2015 and 2035 Scenarios

The base year of the Astoria-Warrenton model is 2002. Because significant changes have occurred in Warrenton between 2002 and 2015 (when traffic counts were conducted for this study), the project team elected to develop an updated 2015 scenario to use for the base-year model in the forecasting process. In addition, to allow for 20 years of growth beyond the TSP adoption date (expected in 2018), a 2035 scenario was developed. The 2035 scenario allows for an additional five years of growth extrapolation to develop 2040 traffic volumes.

Model inputs, including external station traffic volumes, land use data and roadway network changes were updated (from 2002 to 2015). 2015 household and employment data were obtained for both Warrenton and Astoria[4], reviewed by each City's staff, and adjusted to reflect 2015 land use conditions. The roadway network has changed since 2002 as well, including the construction of Ensign Lane. These changes were incorporated into the 2015 base-year scenario and 2035 scenario as well. The most recent published traffic volumes were obtained from ODOT's traffic volume tables (TVT) and adjusted to 2015 and 2035, respectively, by extrapolating the growth rates obtained from ODOT's future volume tables.

These inputs were provided to TPAU for input into the 2002 base-year model, resulting in a 2015 scenario. The resulting 2015 traffic volumes were then calibrated for use in post-processing. Similar inputs were provided to TPAU for input into the Astoria-Warrenton 2035 model.

[3] *Coordinated Population Forecast for Clatsop County, its Urban Growth Boundaries (UGB), and Area Outside UGBs 2017-2067.* Prepared by Population Research Center, Portland State University, 2017.

[4] Employment data obtained from Oregon Employment Department for 2014, provided to DKS via TPAU.

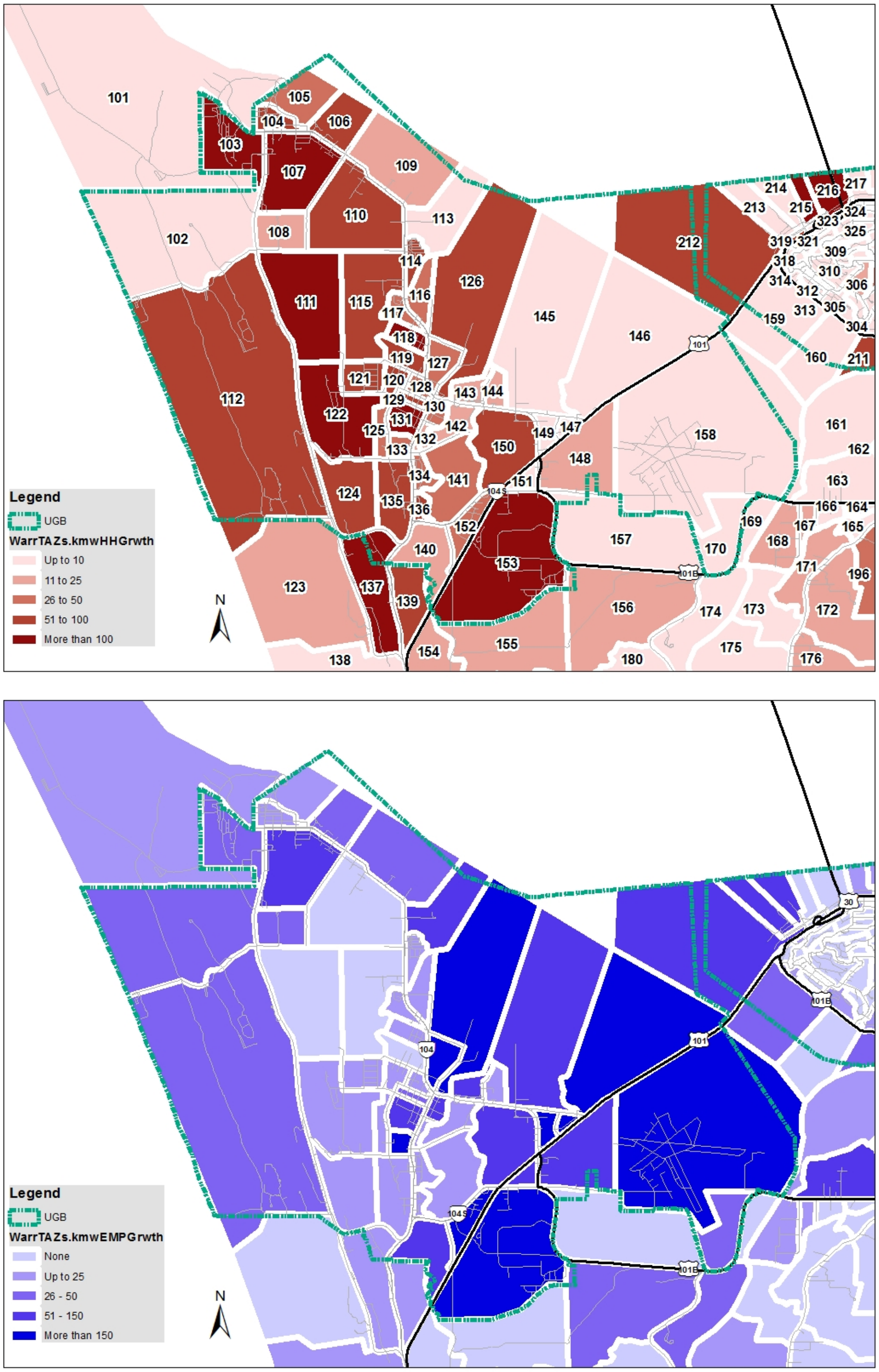



**Figure 2: Household and Employment Growth Forecasts, 2015-2035**

### Application of Regional Demand Model

As shown in Figure 1, the Astoria-Warrenton regional travel demand model has a regional scale and the roadway network includes the primary arterial and collector roadways in the model area. Many local roadways are commonly not included in regional models because they are not significant to regional travel patterns. As a result, regional models like the Astoria-Warrenton model have limited accuracy in forecasting circulation and routing on local streets and should be used carefully. Regional models also do not typically have sufficient detail to directly forecast intersection turn movements, even on roadways included in the model. Engineering judgment and manual methods (such as evaluating screen lines) are often needed to "post-process" model results to estimate turn movement volumes and to account for circulation and routing at the local level.

## Post-Processing

While the travel demand models were calibrated to local conditions and volumes, raw volumes from the travel demand model were not used for capacity analysis. Rather, motor vehicle turn movement volume forecasts were developed using post-processing methods consistent with the ODOT Analysis Procedures Manual[5]. This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 255, *Highway Traffic Data for Urbanized Area Project Planning and Design*.

The post-processing methodology involves estimating model growth (i.e., volume differences between base and future models), scaling the growth by the number of forecast years (i.e., forecast years divided by difference in model years), and adding these volumes to existing traffic counts[6]. Traffic growth on links in the travel demand models were applied to individual turn movements using a Frater method to account for growth on both inbound and outbound links. Engineering judgment is used as part of the post-processing methodology, with the routing decisions identified in the model serving as a helpful starting point in making volume adjustments. The result of this process is a future year forecast derived from the Astoria-Warrenton regional travel demand model that is calibrated to observed data.

# Future Forecasting Results

The primary purpose of forecasting 2040 traffic volumes is to allow analysis of future traffic conditions to identify operational needs and potential transportation improvements in the City of Warrenton. This following sections document the future forecasting methodology, roadway network changes, and 2040 traffic volume forecasts.

## Roadway Network Changes

Because there are no additional transportation capacity projects with committed funding (e.g., STIP or CIP), no network changes were applied within the study windowed-area or in the regional Astoria-Warrenton model. For both the newly developed 2015 scenario and the future 2035 scenario, we revised the Warrenton network to include SE Ensign Lane between Fort Stevens Highway Spur (west of US 101) and US 101 Business (east of US 101). This recently constructed facility was not included in previous versions of the model.

[5] *Analysis Procedures Manual (APM)*, Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU), Last Updated June 2010, pgs. 91-92

[6] The traffic counts for the Astoria TSP study intersections were collected in 2011 and adjusted to average weekday and 30th highest hour (summer peak) conditions, as documented in *Technical Memorandum #5 (Existing Conditions)*.

## 2015 to 2040 Traffic Volume Growth

Figure 3 illustrates the regional traffic growth on links from year 2015 model scenario to the year 2035 scenario during an average weekday of the year in the PM peak hour. The figure indicates that much of the link growth is primarily expected to occur on major regional gateways to the city – US 101 south, US 101 north (Youngs Bay Bridge), and US 101 Business towards the Lewis and Clark Bridge and the Old Youngs Bay Bridge. Figure 4 indicates a similar pattern of growth on regional facilities connecting to the City during the 30HV (summer peak) conditions.

Post processed turn movement volumes at study intersections are provided in Figure 6 for the 2040 average weekday PM peak hour and Figure 7 for the 2040 30 HV (summer peak) scenario. Forecasted bi-directional traffic volumes along US 101 would generally increase by 200 to 350 during the PM peak hour of an average weekday. This increase would generally be higher as you move south along the corridor, because the constrained capacity of the Young's Bay Bridge causes travelers to divert to the Lewis and Clark Bridge/Old Young's Bay Bridge route as congestion increases in the future. SE Ensign Lane experiences bi-directional growth of about 250-300 vehicles under average weekday PM peak conditions. Growth on other facilities is generally fewer than 150 vehicles.

Forecasted bi-directional traffic volumes along US 101 would experience larger increases during the peak season, with growth between 350 and 700 vehicles during the PM peak hour. Traffic patterns under summer conditions experience some of the same growth characteristics as the average weekday growth between 2015 and 2040: capacity constraints at the Youngs Bay Bridge and US 101/E Harbor Street intersection, and significant growth in traffic on the "southern route" of US 101 Business to the Lewis and Clark Bridge and Old Youngs Bay Bridge.

### Congested Conditions

This Future Forecasting memorandum will be followed by a Future Conditions memorandum that analyzes the impact of increased demands on Warrenton's transportation system in 2040. The Future Conditions memo will include detailed intersection operations analysis to help pinpoint the highest priority bottlenecks and operations issues.

The model used for the forecasts presented in this memorandum also includes features that allow us to assess congestion at a high level. Each roadway link in the model has an associated traffic capacity, so a volume-to-capacity (v/c) ratio can be calculated for each link based on the assigned traffic volume in the model run. We have provided four plots in the appendix showing v/c rations for each of the four modeled scenarios (average weekday and summer for 2015 and 2035). These plots show that the most significant future bottlenecks are the Young's Bay Bridge and E Harbor Street.

Another tool available in the forecasting model is a comparison of congested conditions to theoretical free-flow conditions, where it is assumed there is unlimited capacity on the shortest routes for each trip on the network. We have included a plot at the end of the appendix that shows how traffic patterns change under 2035 summer conditions when no congestion effects are present. This plot suggests that over 300 vehicles in each direction would be using the Youngs Bay Bridge if capacity were available, rather than the "southern route." There is also significant latent demand on E Harbor Street and SW 9th Street, with significant traffic diverting to SW 18th Street and SE Ensign Lane as an alternative.

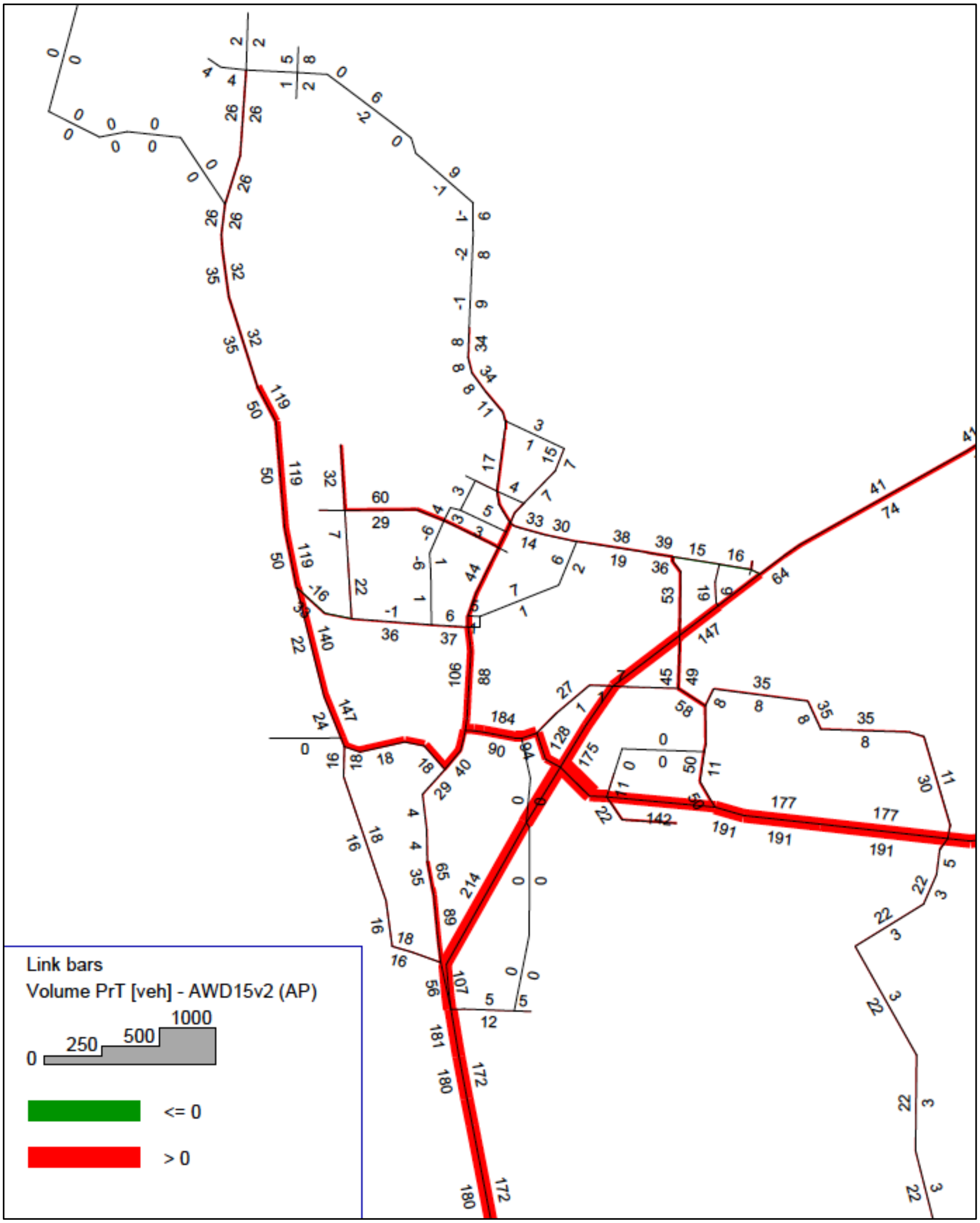



**Figure 2: Regional Traffic Growth 2015-2035 (Average Weekday PM Peak Hour)**

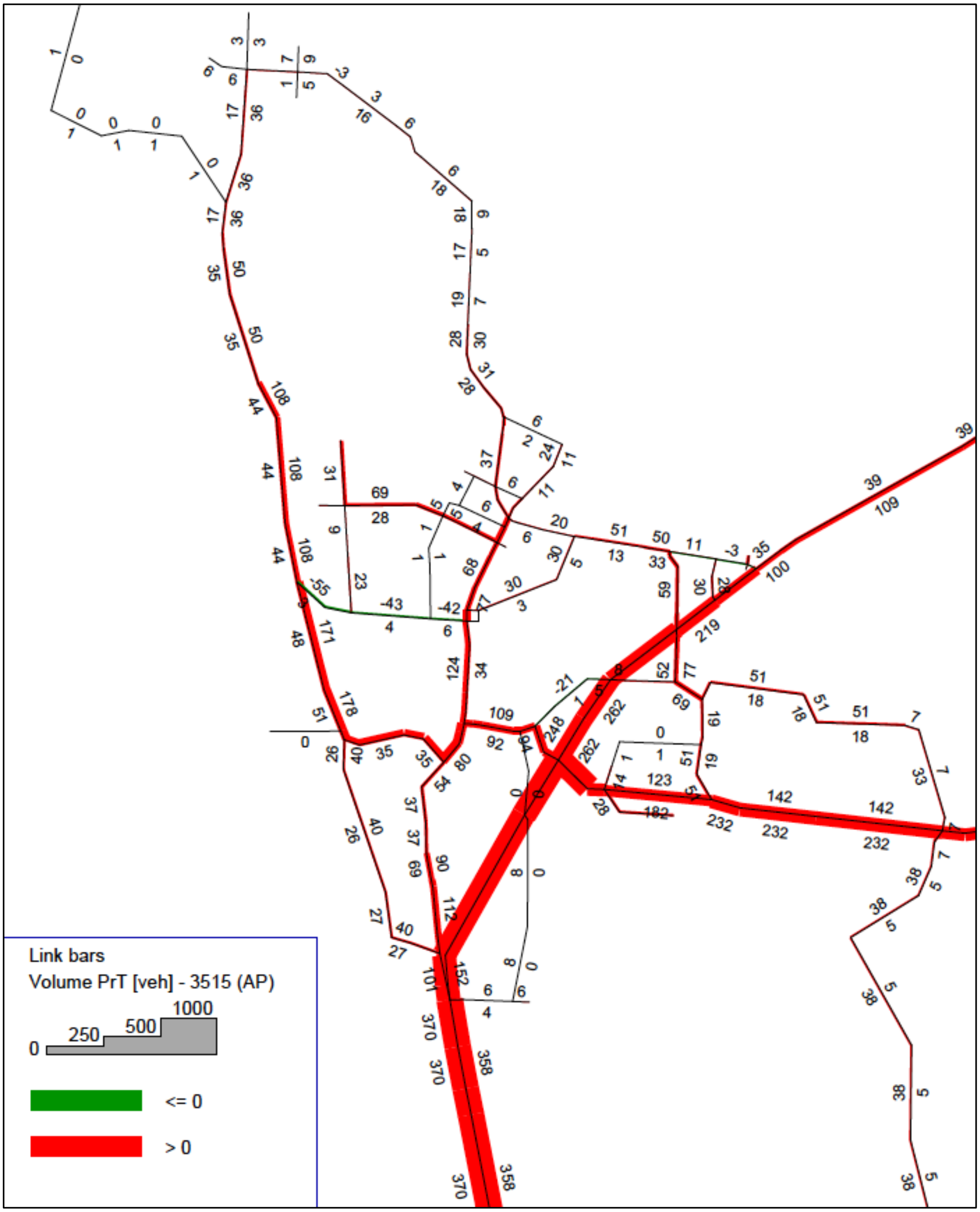
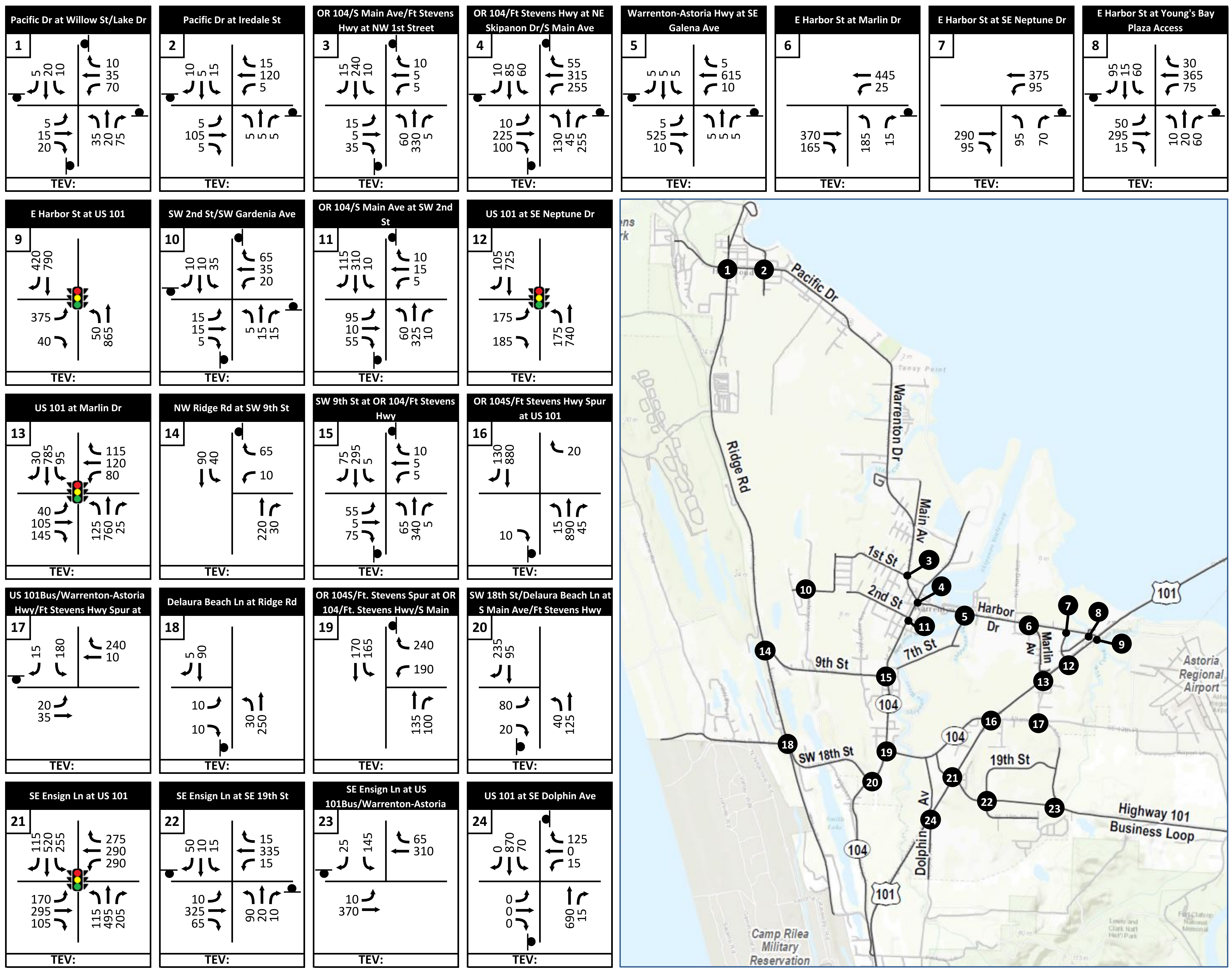



**Figure 3: Regional Traffic Growth 2015-2035 (Summer Weekday PM Peak Hour)**

## Warrenton TSP

*Figure 5*
*Average Weekday (2040)*
*PM Peak Hour (4:00 - 5:00 PM)*
*Turning Movement Volumes*

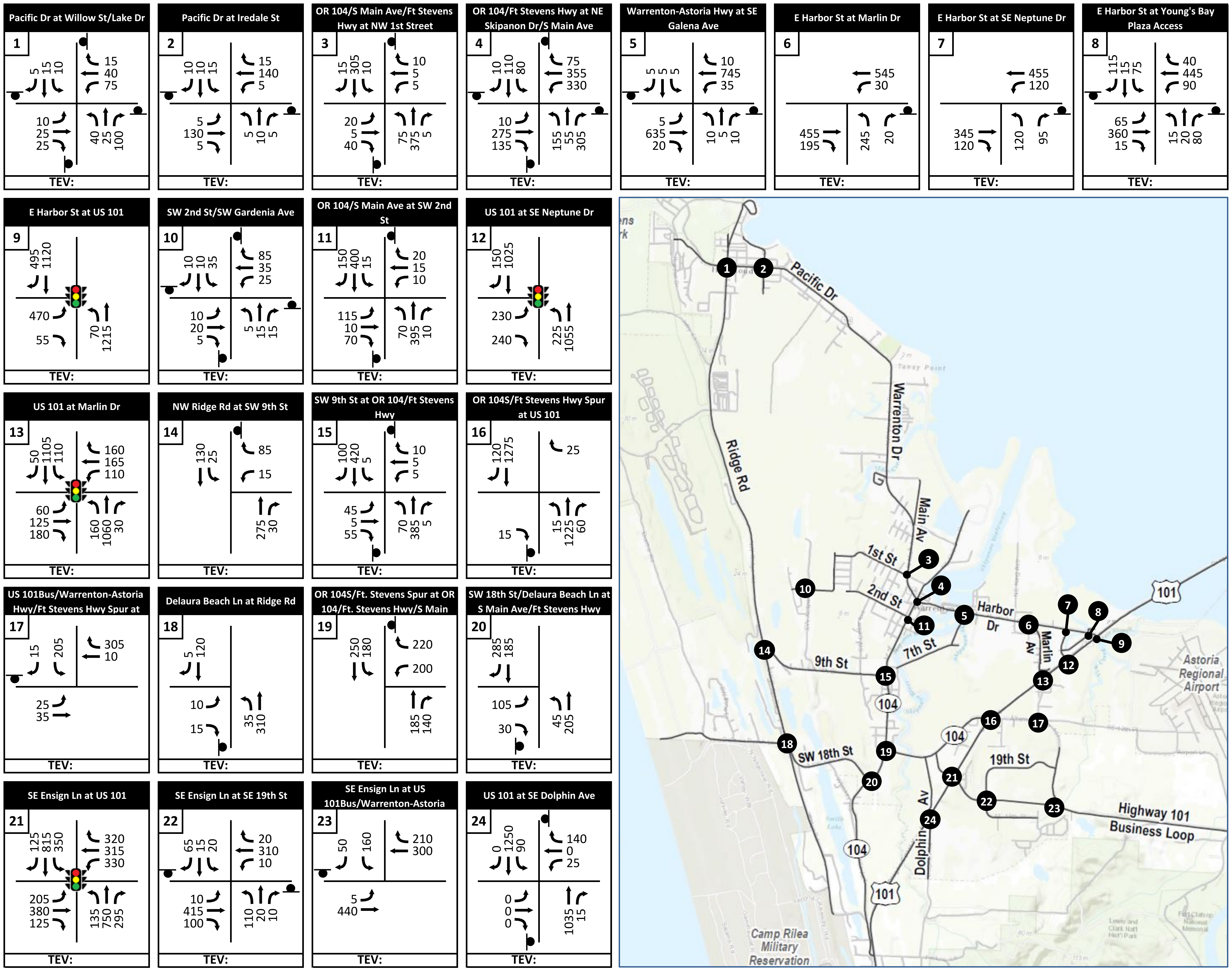



### Legend

- Allowable Movement
- TEV — Total Entering Volume
- ## — PM Peak Hour Turning Movement Volume
- Signalized Intersection
- STOP Controlled Approach
- ## — Study Area Intersection

# Warrenton TSP

Figure 6
*Summer (2040)*
*PM Peak Hour (4:00 - 5:00 PM)*
*Turning Movement Volumes*




## Legend

Allowable Movement
TEV Total Entering Volume
\#\# PM Peak Hour Turning Movement Volume
Signalized Intersection
STOP Controlled Approach
Study Area Intersection

# Appendix

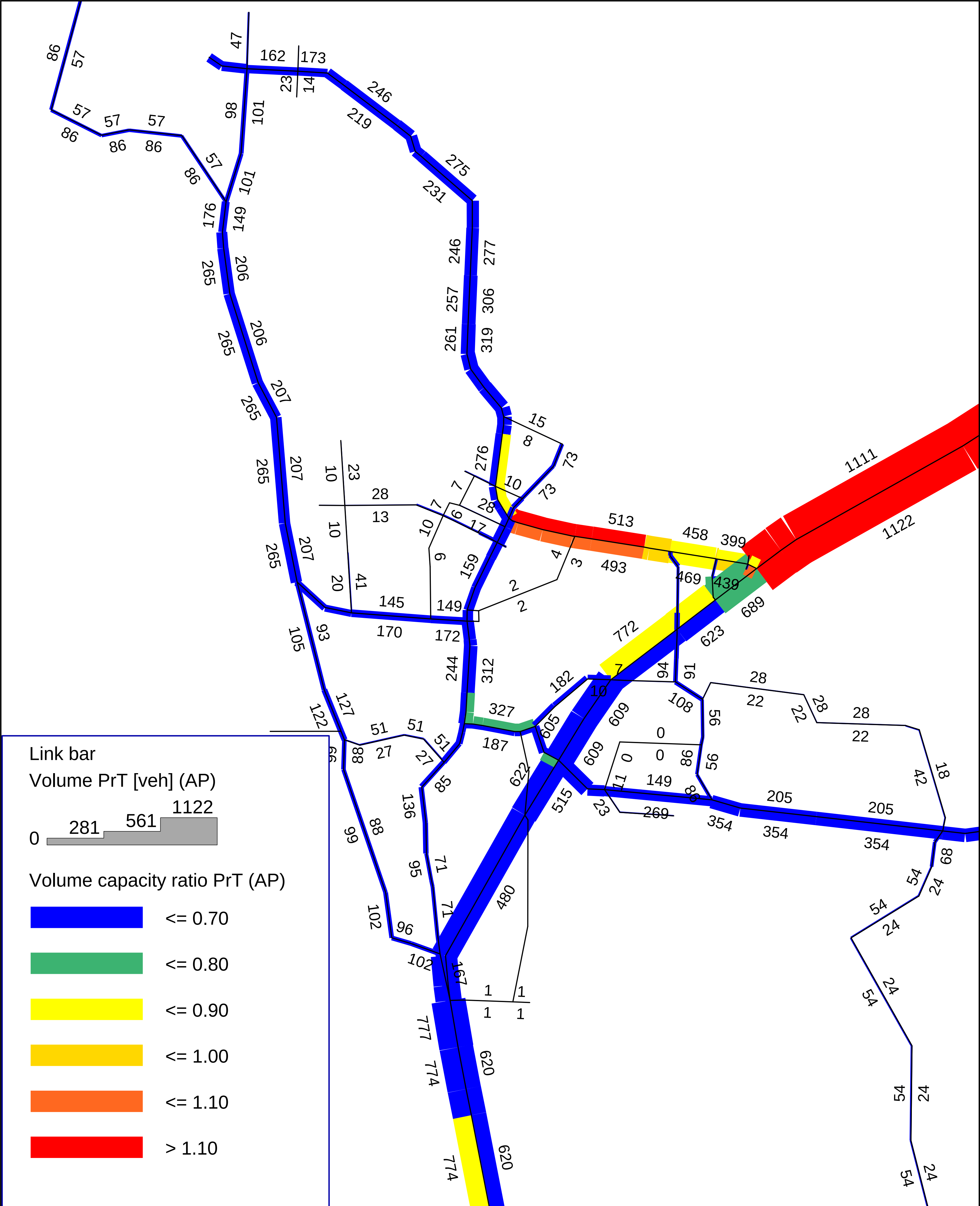
2015 Average Weekday Volume-to-Capacity Ratio Plot

2035 Average Weekday Volume-to-Capacity Ratio Plot

2015 Summer Volume-to-Capacity Ratio Plot

2035 Summer Volume-to-Capacity Ratio Plot

2035 Summer Congested/Free Flow Volume Difference Plot

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|---|---|---|
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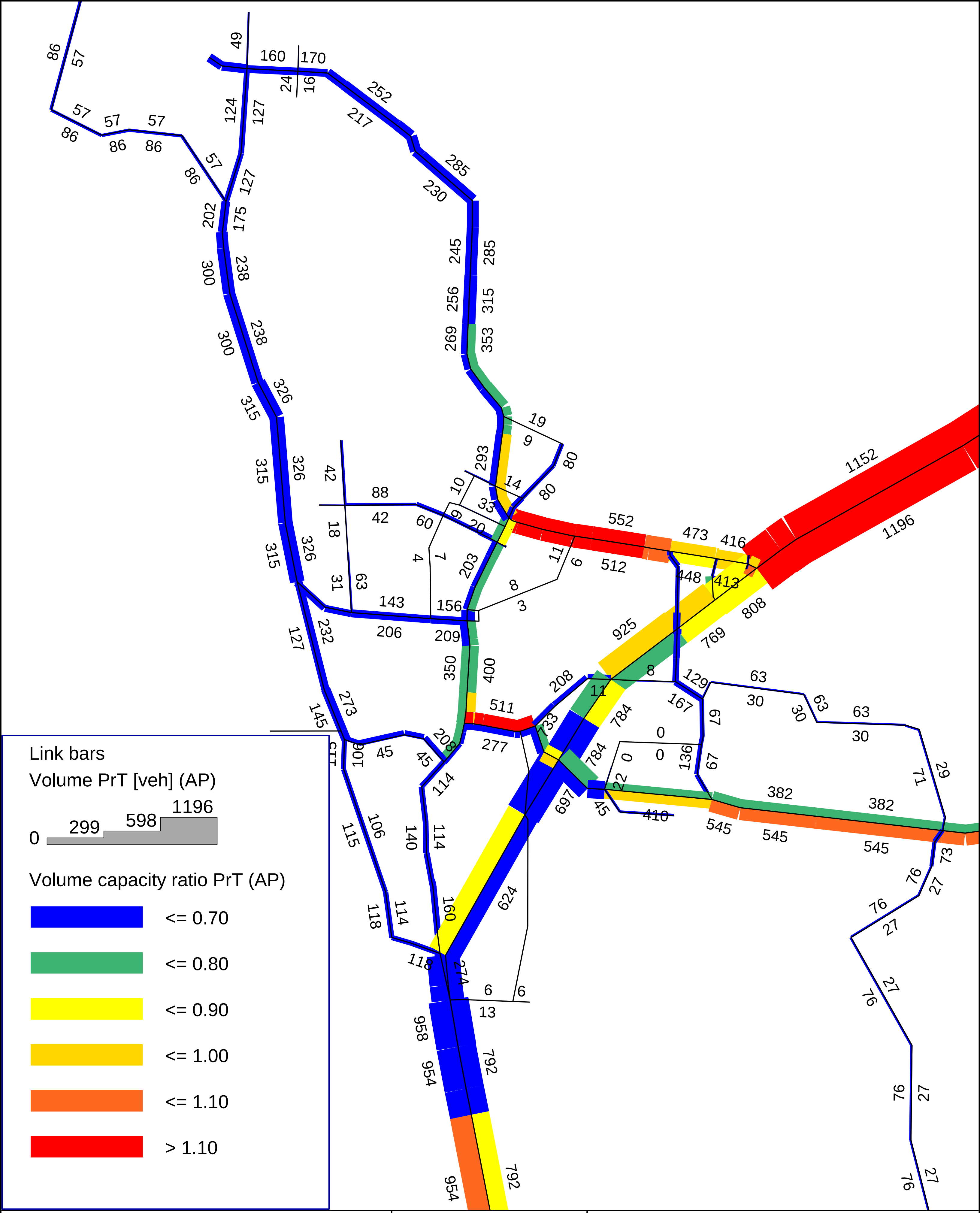


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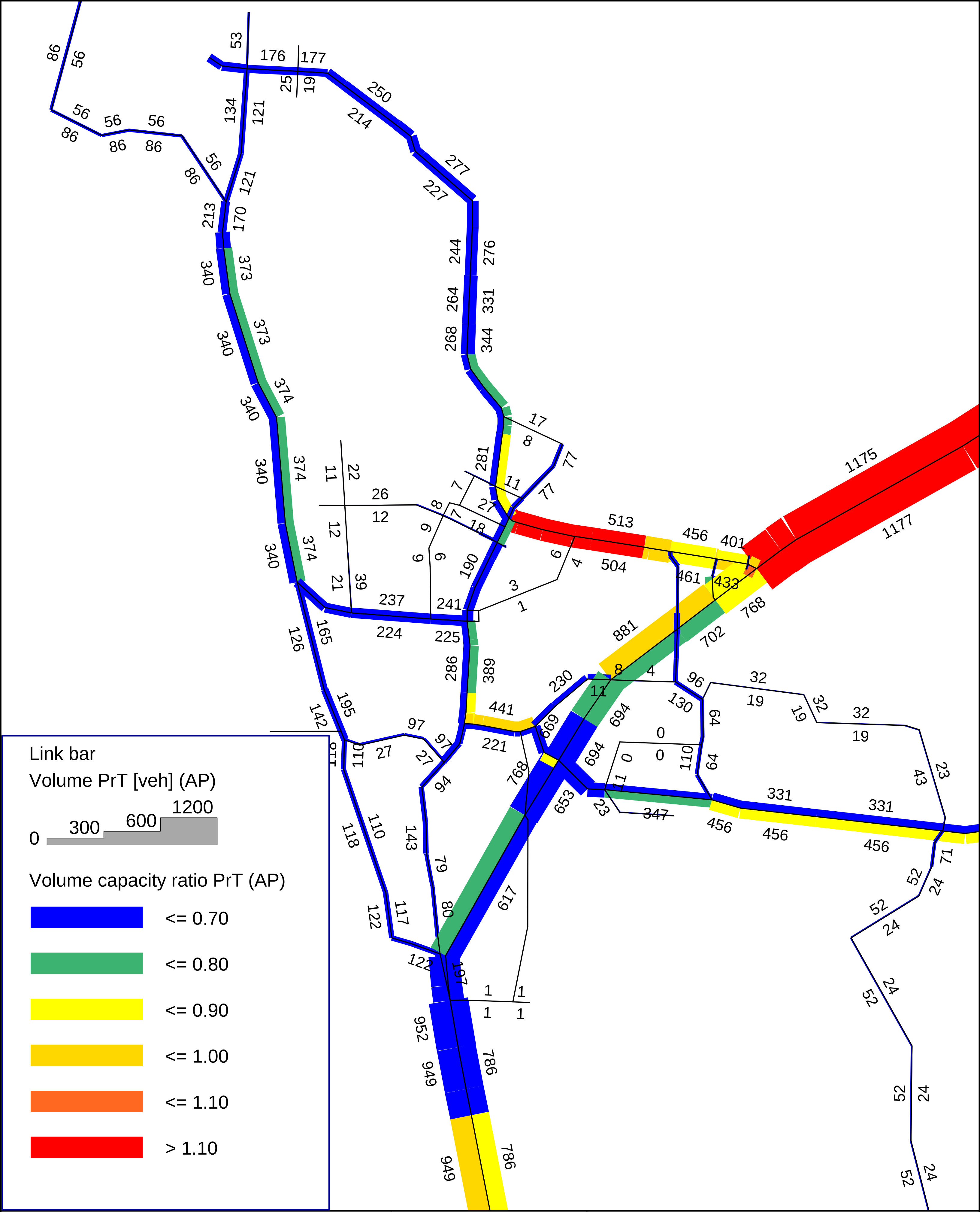


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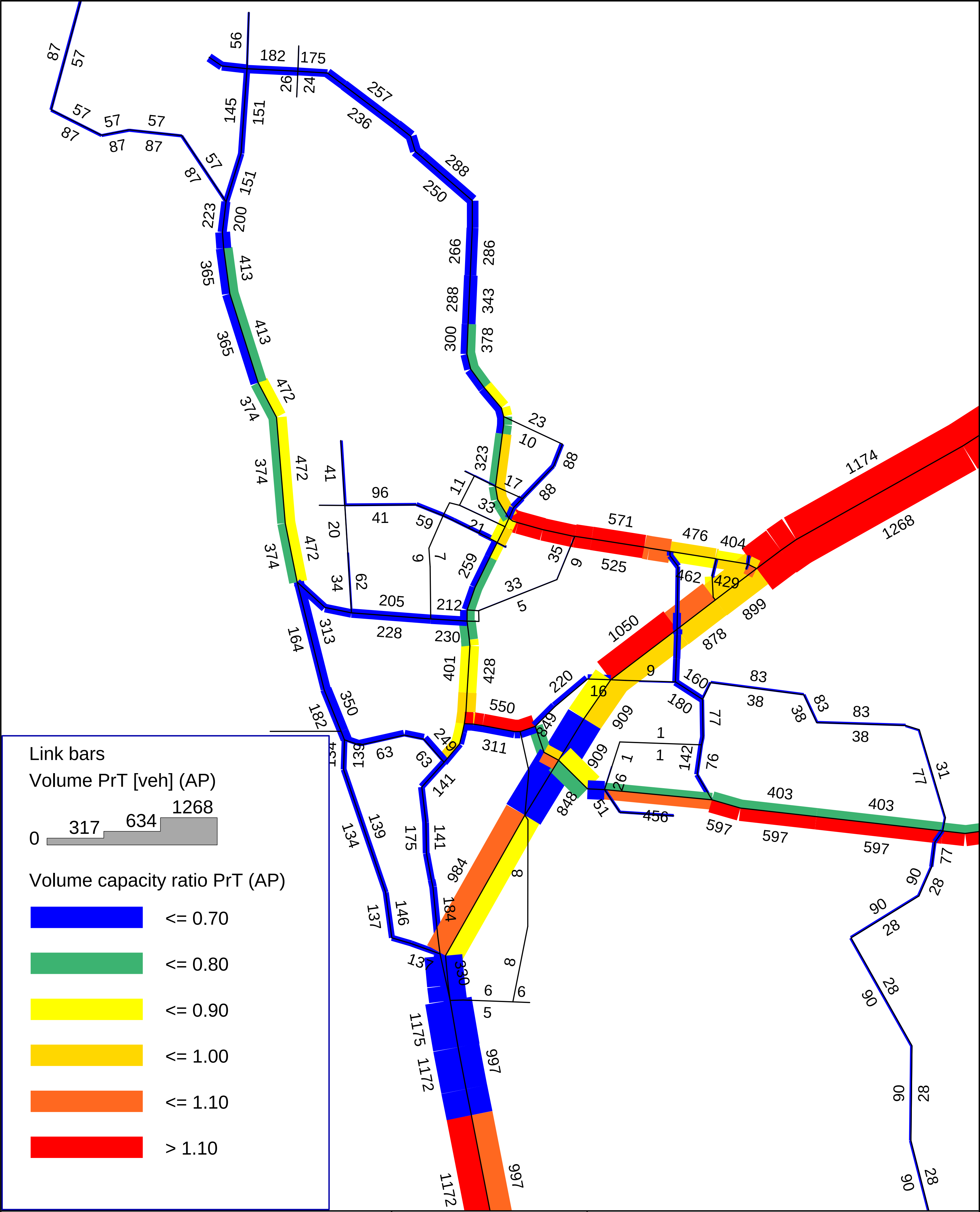


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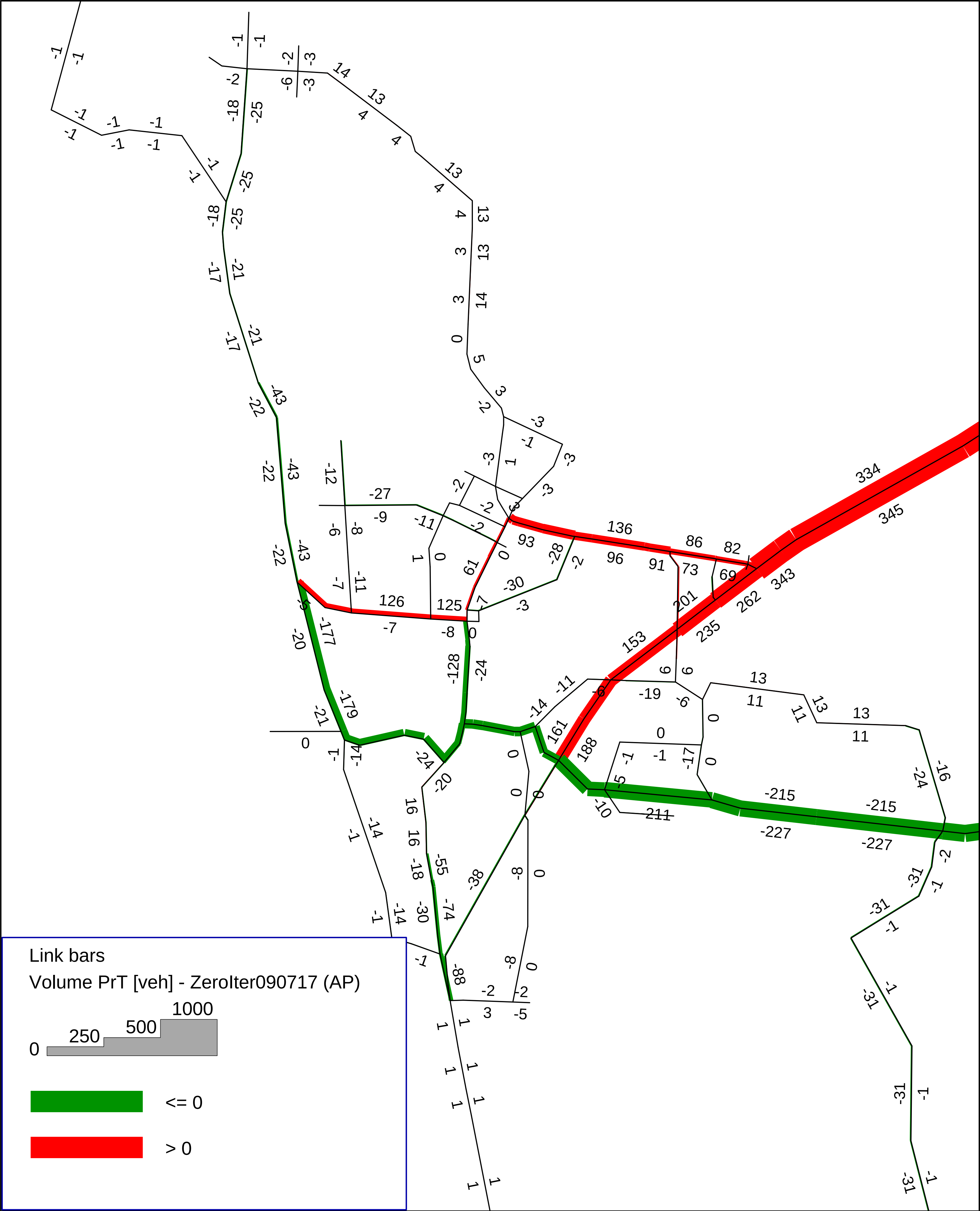


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# SECTION 7
# TECH MEMO SEVEN

## FUTURE TRANSPORTATION CONDITIONS AND NEEDS

# MEMORANDUM #7

**DATE:** November 16, 2017

**TO:** Warrenton TSP Project Management Team

**FROM:** Angela Rogge, PE, David Evans and Associates, Inc.
Shelly Alexander, PE, David Evans and Associates, Inc.
Dana Shuff, EIT, David Evans and Associates, Inc.
Natalie Warner, David Evans and Associates, Inc.

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Future Transportation Conditions and Needs** P14180-008

## Future Baseline Conditions

This memorandum provides an assessment of the future of Warrenton's transportation system through the 2040 TSP planning horizon. Included is a summary of how future transportation needs are determined, a description of what Warrenton is expected to look like in 2040, a list of areas where investments are needed, and a summary of potential improvements to consider. In addition to vehicular deficiencies, this memorandum addresses each modal element of the system including missing links, geometric deficiencies and safety needs.

The purpose of this document is to assist the City of Warrenton in their decision making process and enable them to prioritize the most critical transportation projects. The analysis process builds upon the existing conditions, considers where the transportation system has been improved by projects with programmed funding sources (if applicable) and uses the analysis from the future forecasting task to predict where traffic volumes will continue to grow. For Warrenton, no funded projects are planned.

### Employment and Household Growth

*Technical Memorandum #6: Future Forecasting* summarizes the expected household and employment growth forecasts in the Warrenton Area. The areas of highest employment growth are anticipated to occur surrounding SE Ensign, southeast of US 101, on both sides of US 101 near the Astoria Regional Airport and south of the New Youngs Bay Bridge, and northeast of downtown, surrounding the Skipanon River. High employment growth is expected in areas that have generally good connectivity in the existing system, but capacity improvements will likely be needed in future conditions.

Three different zones stand out when it comes to household growth. One area of the highest household growth is expected to be from SW 9th St to NW 9th St, just west of downtown Warrenton. SE Ensign Lane and the surrounding area, southeast of US 101 is another area of high anticipated household growth. The third is located northwest of downtown Warrenton, just south of the Hammond Marina. All of these identified locations are areas that currently are undeveloped or majority farmland and substantial additions and improvements to the existing transportation network will be necessary to accommodate the forecasted growth.

## Increased Demand

Today, the city of Warrenton is home to over 3,400 jobs and over 2,100 households (some of the jobs are held by residents outside of Warrenton and vice versa). By 2040, the number of households and employment are both expected to increase by over 45 percent. This high rate of growth, in addition to increased port (Astoria) and tourism activity, will greatly increase demand on the transportation network through 2040.

With the level of forecasted household and employment growth, Warrenton is expected to see significantly more traffic in both evening and summer peak hour trips. The origins and destinations of these trips are expected to be located within the areas that are predicted to experience the most residential and commercial growth, as shown in *Technical Memorandum #6: Future Forecasting*.

The network used in both the summer and the average weekday forecasts for Warrenton is a future network that includes roadway projects that are expected to occur by year 2040. In Warrenton, there are no roadway capacity projects that have known funding sources or are programmed to be funded in the next 25 years. Therefore, the future baseline network geometry matches the existing (2015) network.

## Future Traffic Volume Development

Future baseline traffic volume forecasts for year 2040 were developed using the Astoria-Warrenton travel demand forecasting model. Travel demand models are tools used to help predict the patterns of future commuters, school traffic, and recreational traffic. The model relies on socioeconomic data (e.g., households and employment) to determine the travel demand, and system attributes (e.g., roadway capacity, speeds, and distances) to represent the transportation supply. The long-range regional growth forecasts are consistent with current land use zoning. The detailed forecasting methodology is described in detail in *Technical Memorandum #6: Future Forecasting,* including the anticipated traffic volumes.

The highest volumes are predicted along the US 101 and OR 104 corridors. Both of these roadways provide access to both attractions within the City of Warrenton, as well as routes to the surrounding area including Astoria, southwest Washington, and the Oregon coastline. Other significant roadways within the City include E Harbor Drive, Ensign Lane, Marlin Avenue, and the Fort Stevens Highway Spur.

## Operational Criteria

Transportation engineers have established various methods for measuring traffic operations of roadways and intersections. Most jurisdictions use either volume-to-capacity (v/c) ratio or level of service (LOS) to establish performance criteria. Both the LOS and v/c ratio concepts require consideration of factors that include traffic demand, capacity of the intersection or roadway, delay, frequency of interruptions in traffic flow, relative freedom for traffic maneuvers, driving comfort, convenience, and operating cost.

### Volume-to-Capacity (V/C) Ratio

A comparison of traffic volume demand to intersection capacity is one method of evaluating how well an intersection is operating. This comparison is presented as a v/c ratio. A v/c ratio of less than 1.00 indicates that the volume is less than capacity. When it is closer to 0, traffic conditions are generally good, with little congestion and low delays for most intersection movements. As the v/c ratio approaches 1.00, traffic becomes more congested and unstable, with longer delays.

**Level of Service (LOS)**

Level of service is also a widely recognized and accepted measure and descriptor of traffic operations. At both stop-controlled and signalized intersections, LOS is a function of control delay, which includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. Six standards have been established, ranging from LOS A, where there is little or no delay, to LOS F, where there is delay of more than 50 seconds at unsignalized intersections, or more than 80 seconds at signalized intersections.

It should be noted that, although delays can sometimes be long for some movements at a stop-controlled intersection, the v/c ratio may indicate that there is adequate capacity to process the demand for that movement. Similarly at signalized intersections, some movements, particularly side street approaches or left turns onto side streets, may experience longer delays because they receive only a small portion of the green time during a signal cycle, but their v/c ratio may be relatively low. For these reasons, it is important to examine both v/c ratio and LOS when evaluating overall intersection operations. Both are reported in a later section.

### Traffic Operations Analysis Procedures

All operations were evaluated using the methodology outlined in the *2000 and 2010 Highway Capacity Manuals* (HCM), along with the procedures outlined in ODOT's APM. For signalized intersections, operations are reported using HCM 2000, while HCM 2010 are used for unsignalized intersections. The Synchro analysis software was selected to perform the intersection analysis since it can provide the v/c ratio and LOS output of an HCM analysis and consider the systematic interaction of the intersections with regard to queuing and delays.

Synchro is a macroscopic model based on the HCM. The Synchro model explicitly evaluates traffic operations under coordinated and uncoordinated systems of signalized and unsignalized intersections. The v/c ratios and LOS presented in this report are based on the Synchro model output. The detailed Synchro analysis worksheets are presented in Appendix A.

## Future Traffic Operations

More peak hour trips on the system without capacity changes will result in more delay, higher v/c ratios and worse LOS ratings at the study area intersections. In addition to the peak hour commuting trips, Warrenton is expected to experience more tourism traffic, as well as increased congestion in neighboring communities such as Astoria. The New Youngs Bay Bridge (US 101) and the Old Youngs Bay Bridge (US 101 Business) are existing bottlenecks in the traffic that travels to and from Astoria that are expected to increase by 2040.

Warrenton's traffic trends fluctuate throughout the year due to coastal and recreational opportunities in the area. Volumes for both summer and average weekday conditions were analyzed to determine where future transportation investments may be needed to accommodate future growth.

## 2040 Summer Baseline

Table 1 shows the baseline 2040 summer intersection operations. The predicted tourism and daily peak traffic increases are expected to cause eight of the study area intersections to exceed mobility targets. Along the US 101 corridor, the intersections that exceed mobility targets are at E Harbor Drive, SE Neptune Drive, Marlin Drive and SE Ensign Lane. All four of these intersections are signalized and provide access to busy commercial businesses and had also failed to meet operational mobility targets under the existing conditions. Without any planned improvements to these intersections, it makes sense they would continue to worsen in the future.

The remaining four intersections that fail to meet mobility targets are stop-controlled intersections. OR 104/Ft Stevens Highway at NE Skipanon Drive/S Main Avenue is an all-way stop and exceeds the OHP v/c target of 0.95 on both the major and minor approaches. OR 104/S Main Avenue at SW 2nd Street and E Harbor Drive at Marlin Drive both are two-way stop-controlled intersections where the minor approach exceeds the OHP v/c targets. OR 104/S Main Avenue at SW 2nd Street has a higher mobility target (v/c 1.0) due to its designation in a Special Transportation Area (STA), however the high side street volumes traveling eastbound from SW 2$^{nd}$ Street exceed the available capacity of the single approach lane. E Harbor Drive at Young's Bay Plaza Access exceeds the LOS target on the minor approach.

At the all-way stop controlled intersection of OR 104/Ft Stevens Highway and NE Skipanon Drive/S Main Avenue, the northbound approach is the critical movement, but the westbound through/right lane is over capacity as well. Because of the number of approach lanes needed to meet operational targets, this intersection could benefit from signalization or conversion to a roundabout by 2040.

All of these seven intersections have at least one approach where the v/c is greater than 1.0. Under seasonally factored conditions, when the traffic demand exceeds the available capacity (v/c greater than 1.0) vehicles experience excessive delay and queuing. For the signalized intersections, it is also expected that vehicles may require more than one signal cycle to pass through the intersection.

## 2040 Average Weekday

The analysis results show that under the 2040 future baseline conditions, most of the study area intersections would meet operational targets during the average weekday PM peak period. These results are compiled in Table 2. The study intersections operate slightly better in the average weekday PM peak scenario than in the summer PM peak.

Similar to existing conditions, the signalized intersections of E Harbor Drive at US 101, US 101 at Marlin Drive and SE Ensign Lane at US 101 are expected to exceed capacity, with v/c ratios exceeding corresponding mobility targets. The operational outputs at these intersections could lead to queuing concerns as well. With each location, movements from both US 101 and the side streets are over capacity, and improvements will likely be needed on both in order to maintain compliance with the Oregon Highway Plan (OHP) mobility targets.

It is important to note that when compared to the existing conditions analysis under average weekday conditions, the intersection of US 101 at SE Neptune Drive exceeded mobility targets, but is expected to operate below the v/c target of 0.80 in the future condition. Under future conditions, traffic patterns shift slightly so that the side street volumes increase while some of the southbound movements likely choose another route to avoid congestion. Due to this change and the optimization of signal timing, the future operations of this intersection are expected to improve slightly from existing conditions.

### Table 1. Future (Year 2040) PM peak Hour Traffic Operations Analysis Results – Summer

| Intersection | Major Approach V/C [1,2] | Major Approach LOS [2] | Minor Approach V/C [1,2] | Minor Approach LOS [2] | Mobility Target (Major / Minor) [3,4] |
|---|---|---|---|---|---|
| **Unsignalized Intersections** | | | | | |
| 1. Pacific Dr at Ridge Rd/Lake Dr[5] | 0.18 | A | 0.21 | A | 1.0 / 0.90 |
| 2. Pacific Dr at Iredale St[5] | 0.01 | A | 0.06 | B | 1.0 / 0.95 |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | 0.07 | A | 0.18 | C | 0.95 / 0.95 |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | **1.18** | **F** | **1.23** | **F** | 0.95 / 0.95 |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | 0.01 | A | 0.20 | E | 0.95 / 0.95 |
| 6. E Harbor Dr at Marlin Dr | 0.04 | A | **1.32** | **F** | 0.95 / 0.90 |
| 7. E Harbor Dr at SE Neptune Dr | 0.12 | A | 0.59 | E | v/c <=0.90, LOS E |
| 8. E Harbor Dr at Young's Bay Plaza Access | 0.08 | A | 0.87 | **F** | v/c <=0.90, LOS E |
| 10. SW 2nd St/SW Gardenia Ave | 0.08 | A | 0.18 | A | v/c <=0.90, LOS E |
| 11. OR 104/S Main Ave at SW 2nd St[5] | 0.08 | A | **1.12** | **F** | 1.0 / 1.0 |
| 14. NW Ridge Rd at SW 9th St | 0.02 | A | 0.18 | B | v/c <=0.90, LOS E |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | 0.07 | A | 0.39 | D | 0.95 / 0.95 |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | 0.03 | B | 0.09 | D | 0.80 / 0.90 |
| 17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | 0.02 | A | 0.34 | B | 0.90 / 0.95 |
| 18. Delaura Beach Ln at Ridge Rd | 0.03 | A | 0.05 | B | v/c <=0.90, LOS E |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | 0.16 | A | 0.95 | F | 0.95/0.95 |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | 0.04 | A | 0.25 | B | 0.95 / 0.95 |
| 22. SE Ensign Ln at SE 19th St | 0.01 | A | 0.63 | E | v/c <=0.90, LOS E |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | 0.01 | A | 0.39 | C | 0.90 / 0.90 |
| 24. US 101 at SE Dolphin Ave | 0.16 | B | 0.94 | F | 0.80 / 0.95 |
| **Signalized Intersections** | | | | | |
| 9. E Harbor Dr at US 101 | Overall | | **1.23** | E | 0.80 |
| 12. US 101 at SE Neptune Dr | Overall | | **1.11** | E | 0.80 |
| 13. US 101 at Marlin Dr | Overall | | **1.27** | F | 0.80 |
| 21. SE Ensign Ln at US 101 | Overall | | **1.27** | F | 0.80 |

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.

**SHADED** cells indicate the movement fails to meet applicable mobility target

1. At intersections the results are reported for the worst operating movements on major and minor approaches that must stop or yield the right of travel to other traffic flows.
2. The v/c ratios and LOS are based on the results of the macrosimulation analysis using Synchro, which cannot account for the influence of adjacent intersection operations.
3. Mobility target is reported for the critical movement; Unsignalized intersections may have two different mobility targets for the major and minor approaches (Action 1F.1, Oregon Highway Plan, 1999)
4. LOS mobility targets are not applied to State facilities.
5. Intersection part of a Special Transportation Area (STA)

*Source: David Evans and Associates, Inc.*

**Table 2. Future (Year 2040) PM peak Hour Traffic Operations Analysis Results – Average Weekday**

| Intersection | Major Approach V/C [1,2] | Major Approach LOS [2] | Minor Approach V/C [1,2] | Minor Approach LOS [2] | Mobility Target (Major / Minor) [3,4] |
|---|---|---|---|---|---|
| **Unsignalized Intersections** | | | | | |
| 1. Pacific Dr at Ridge Rd/Lake Dr[5] | 0.16 | A | 0.16 | A | 1.0 / 0.90 |
| 2. Pacific Dr at Iredale St[5] | 0.01 | A | 0.05 | B | 1.0 / 0.95 |
| 3. OR 104/S Main Ave/Ft Stevens Hwy at NW 1st Street | 0.05 | A | 0.12 | B | 0.95 / 0.95 |
| 4. OR 104/Ft Stevens Hwy at NE Skipanon Dr/S Main Ave | 0.86 | E | 0.91 | F | 0.95 / 0.95 |
| 5. Warrenton-Astoria Hwy at SE Galena Ave | 0.01 | A | 0.08 | C | 0.95 / 0.95 |
| 6. E Harbor Dr at Marlin Dr | 0.03 | A | 0.72 | E | 0.95 / 0.90 |
| 7. E Harbor Dr at SE Neptune Dr | 0.08 | A | 0.35 | C | v/c <=0.90, LOS E |
| 8. E Harbor Dr at Young's Bay Plaza Access | 0.07 | A | 0.53 | D | v/c <=0.90, LOS E |
| 10. SW 2nd St/SW Gardenia Ave | 0.05 | A | 0.08 | A | v/c <=0.90, LOS E |
| 11. OR 104/S Main Ave at SW 2nd St[5] | 0.06 | A | 0.62 | E | 1.0 / 1.0 |
| 14. NW Ridge Rd at SW 9th St | 0.04 | A | 0.12 | B | v/c <=0.90, LOS E |
| 15. SW 9th St at OR 104/Ft Stevens Hwy | 0.06 | A | 0.36 | C | 0.95 / 0.95 |
| 16. OR 104S/Ft Stevens Hwy Spur at US 101 | 0.02 | B | 0.04 | C | 0.80 / 0.90 |
| 17. US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur at US 101Bus/Marlin Dr | 0.02 | A | 0.28 | B | 0.90 / 0.95 |
| 18. Delaura Beach Ln at Ridge Rd | 0.02 | A | 0.03 | B | v/c <=0.90, LOS E |
| 19. OR 104S/Ft. Stevens Spur at OR 104/Ft. Stevens Hwy/S Main Ave | 0.14 | A | 0.81 | D | 0.95/0.95 |
| 20. SW 18th St/Delaura Beach Ln at S Main Ave/Ft Stevens Hwy | 0.03 | A | 0.15 | B | 0.95 / 0.95 |
| 22. SE Ensign Ln at SE 19th St | 0.01 | A | 0.46 | D | v/c <=0.90, LOS E |
| 23. SE Ensign Ln at US 101Bus/Warrenton-Astoria Hwy/Ft Stevens Hwy Spur | 0.01 | A | 0.34 | C | 0.90 / 0.90 |
| 24. US 101 at SE Dolphin Ave | 0.09 | A | 0.43 | C | 0.80 / 0.95 |
| **Signalized Intersections** | | | | | |
| 9. E Harbor Dr at US 101 | Overall | | **0.89** | C | 0.80 |
| 12. US 101 at SE Neptune Dr | Overall | | 0.78 | C | 0.80 |
| 13. US 101 at Marlin Dr | Overall | | **0.91** | D | 0.80 |
| 21. SE Ensign Ln at US 101 | Overall | | **1.01** | F | 0.80 |

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.

**SHADED** cells indicate the movement fails to meet applicable mobility target

1. At intersections the results are reported for the worst operating movements on major and minor approaches that must stop or yield the right of travel to other traffic flows.
2. The v/c ratios and LOS are based on the results of the macrosimulation analysis using Synchro, which cannot account for the influence of adjacent intersection operations.
3. Mobility target is reported for the critical movement; Unsignalized intersections may have two different mobility targets for the major and minor approaches (Action 1F.1, Oregon Highway Plan, 1999)
4. LOS mobility targets are not applied to State facilities.
5. Intersection part of a Special Transportation Area (STA)

*Source: David Evans and Associates, Inc.*

## Future Estimates of Walking, Biking and Transit

While there is great interest in developing forecasting models for bicycles and pedestrians, the traditional travel demand methodology used for predicting motor vehicle activity does not easily apply to bicycle and pedestrian travel for a number of reasons including:

- Data on walking and biking is typically too small or inaccurate to develop accurate models.
- The nature of bicycle and pedestrian travel and decision-making is not well understood and tends to be much more complicated than when they are motorist travel and decision-making (i.e., motorists tend to take the shortest routes while bicycles may trade directness to avoid a hill or travel on a lower volume street).

As such, the future needs for walking, biking and transit in Warrenton were determined by reviewing major growth areas of the City and seeing how they were served by existing facilities. In addition, the areas of the City in close proximity to key destinations (such as schools, parks, transit stops, shopping and employment) that have the potential to attract significant walking and biking trips and areas with existing deficiencies were reviewed. Some key destinations with the potential to generate biking and walking trips include Warrenton Elementary and Middle School, Warrenton High School, Warrenton Community Library, Skipanon River Park and Delaura Beach. Figure 1 Community Features shows these destinations.

## Safety

The crash rates at four intersections were identified as high collision locations in the existing conditions task (all along US 101 at its intersections with East Harbor Street, Neptune Drive, Marlin Drive and Ensign Lane). The following locations were identified as a high collision roadway segments (top ten percent of state highways in Oregon). All of the following roadways are owned and maintained by ODOT:

- US 101 between mile point 6.48 and 6.58:
  This high collision segment includes a signalized intersection with East Harbor Street, which experiences some queuing. The high percentage of crashes within this area that were rear-end collisions indicates that the traffic signal at East Harbor Street is the likely cause.
- US 101 between mile point 7.96 and 8.09:
  This high collision segment includes the signalized intersection with Ensign Lane. The majority of the crashes in this segment were caused by following too closely and failing to yield the right-of-way.

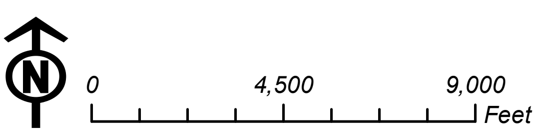
ODOT has identified funding for projects to improve safety along US 101 at the signalized intersections in both SPIS locations. The projects allow for signal hardware upgrades such as reflectorized backplanes (making the signals more visible), countdown pedestrian heads for all signals, and dilemma zone protection at US 101 and East Harbor Street. Dilemma zone usually consists of warning signs equipped with one or more yellow flashing beacons that instruct drivers of the upcoming traffic signal. By 2040, existing safety concerns are expected to become exacerbated by increasing population and traffic. The construction of these safety improvements by 2040 should improve conditions at these locations.


CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

# Figure 1

*Community Features*




Document Path: P:\D\DKSA00000004\0600INFO\GS\Maps\WarrentonTSP - TM7\Fig_01_WarrentonTSP_CommunityFeatures.mxd

## Walking

Warrenton's population is expected to increase by 43-percent from 5,175 to 7,410 in 2035. This includes a 33-percent increase in retail employees, a 32-percent increase in service employees, and a 34-percent increase in education employees based on the travel demand model and zones that approximate the Warrenton urban growth boundary. Most of the household growth is projected to occur in western Warrenton in areas zoned for residential uses.

Employment growth will be concentrated mostly on the east side of the City, however there will be substantial growth in employment along the westernmost portions of the City. These are areas that are presently zoned for commercial and industrial uses.

There is not a lot of existing connectivity for pedestrians and other forms of active transportation to provide adequate connections between areas that have projected growth in the number of households and employment. Construction of networks of bicycle and pedestrian infrastructure linking areas where future household and employment growth is projected to occur would lessen strain on the existing roadway.

A pedestrian qualitative assessment for the existing conditions rated the pedestrian experience "good" on only three short sections of roadway. The vast majority of the existing roadways within the City, including roadways linking areas with projected growth in households and employment, were rated "poor" for pedestrian travel. Additional congestion on these roadways resulting from the expected growth will exacerbate the situation, especially if advisory speeds along these roadways is not reflective of pedestrian uses.

## Biking

As mentioned in *Technical Memorandum #5: Existing Conditions,* bicycle level of traffic stress (LTS) is rated poorly (LTS 4) for bicycle traffic along the majority of roadways within the City. Similar to pedestrian needs, there is no existing lower stress bikeway linking growing residential and household areas.

Pacific Drive and Ridge Road/Harbor Drive are the only available routes linking the highest amounts of projected household growth in the north and the east of the City to areas with the highest amounts of project employment growth, which are generally concentrated on the east of the City.

## Transit

Transit is accessible in downtown Warrenton; the number 10, 15 and 101 bus lines service this area and connect passengers to both northwestern Warrenton and US 101. However, public transportation does not connect directly to Warrenton High School, located along US 104 between US 104S and Southwest 18th Street, or the surrounding communities. This is limiting for individuals attempting to reach the school or southernmost residential areas by public transportation. The following are deficiencies in the current system that will continue to be a concern in the future if no changes or improvements are made:

- **Limited number of bus stops with shelters and other amenities:** Of the about 10 bus stops in Warrenton, few provide shelter from weather. Given the rainy climate of the Pacific Northwest Coast, additional sheltered bus stops and route schedules on signs would increase the comfort of riders and encourage new riders to take transit in the future.

- **Transit service gaps and frequency:** The residential areas of Warrenton south and west of downtown are outside of comfortable walking or biking distance to transit stops. Also, with bus headways of an hour or greater, transit use can be difficult.
- **Transit service in growth areas:** Areas of the City located in a major residential and/or employment growth area should incorporate transit amenities and ensure pedestrian and bicycle connectivity in preparation for transit service. Many Warrenton residents live greater than ¼ mile walking distance from a bus stop. While biking can increase access to transit for people living in neighborhoods distant from bus stops, gaps in the existing bicycle network and a lack of bicycle parking near stops limits the attractiveness of biking to transit, which would be exacerbated by projected increases in traffic in Warrenton over time by 2040..

The availability of roadway crossing opportunities is another factor that could limit access to transit. The existing bus stops in Warrenton are not always located near an enhanced pedestrian crossing and projected increases in traffic are expected to make matters worse by 2040. Adding enhanced crossings throughout the City by 2040 would improve pedestrian access to bus stops and would increase the general pedestrian friendliness of the streets.

## Freight

The only freight route through Warrenton is US 101, which serves as a Federal Truck Route. US 101 crosses over Youngs Bay and handles freight traffic to and from Astoria and the Port of Astoria. It will be important to maintain adequate road geometry to maintain ODOT's "hole in the air" along US 101 pursuant to Oregon Revised Statutes 366.215. East Harbor Drive is not designated as a freight route, but it serves large vehicles associated with traffic to and from Hammond Marina. Future improvements should also maintain adequate geometry for larger vehicles along E Harbor Drive.

## Impacts to Title VI and Environmental Justice Populations

Title VI regulations are intended to prevent discrimination on the basis of race, color, national origin, sex (gender), age, disability, or socioeconomic status. By 2040, if no improvements are made, transportation options for Title VI and EJ populations will be lacking. Generally, Title VI and EJ populations benefit from increased multi-modal connections and public transit options which are current deficiencies of the Warrenton transportation system.

## Alternate Mobility Targets

The OHP provides guidance for how transportation analysis and plans should be prepared, but ultimately leaves the responsibility of developing improvements and mobility standards to the plans themselves. In addition to the established mobility targets in the OHP, alternative mobility targets can be developed as part of a transportation system plan and are considered the highway system performance standards in compliance with the Transportation Planning Rule (TPR) (OAR 660-012), including applicability for actions that fall under Section -0060 of the TPR.

Through the alternatives evaluation there may be a need to discuss acceptable levels of congestion and mobility targets and how they balance the other desires of the community. In some instances, it may not be feasible or fit with the community's character to construct improvements that would essentially build the intersection out of failing to meet mobility targets. At that time, alternate mobility standards or other state facility designations (e.g., a Special Transportation Area) may be part of a community-preferred solution.

## Summary of Future Deficiencies

Capital plans are documents identifying short-range projects that have secured funding for construction. Currently, there are no projects in Warrenton that have known funding sources or are programmed to be funded in future years. With that taken into consideration, many of the deficiencies identified in *Technical Memorandum #5: Existing Conditions* are expected to contribute to future deficiencies. Network connectivity and traffic operations would continue to worsen without any planned improvements/maintenance; the increased traffic volumes on the system impact not only the traffic conditions, but the comfort of bicyclist and pedestrians as well. Anticipated future deficiencies are summarized below.

- **Driving needs:** The future summer and average weekday conditions each have separate needs:
  - Future (2040) Average Weekday PM Peak Hour
    - The US 101 signalized intersections at E Harbor Drive, Marlin Drive and SE Ensign Lane are all expected to operate at levels above their corresponding mobility targets (See Table 1 for more detail).
  - Future (2040) Summer PM Peak Hour
    - Including the three intersections exceeding mobility targets under the average weekday conditions, four additional intersections worsen to exceed mobility targets: US 101 at SE Neptune Drive, OR 104/Ft Stevens Highway at NE Skipanon Drive/S Main Avenue, E Harbor Drive at Marline Drive and OR 104/S Main Avenue at SW 2nd Street (See Table 2 for more detail).
- **Alternative Mobility Targets:** Through the alternatives evaluation there may be a need to discuss acceptable levels of congestion and mobility targets (specifically along US 101 and S Main Avenue).
- **Safety Needs:** High collision locations were identified at 4 signalized intersections along US 101. Warrenton has two SPIS locations, both are on US 101 and each include a signalized intersection, at East Harbor Street and Ensign Lane.
- **Walking and Biking Needs:** Warrenton lacks existing bike and pedestrian facility networks to adequately connect neighborhoods with commercial, institutional, recreational areas, and transit stops. Future improvements could improve safety and accessibility of using active modes of transportation to get around the City.
- **Transit Needs:** There are a limited number of transit stops and there are gaps in service and frequency. Some neighborhoods to the south and west of downtown are not within comfortable walking distance to a transit stop. An expansion in the number of stops and buses on routes would be required to fully serve all areas of the City.
- **Freight Needs:** Warrenton's only Federal Truck Route is US 101. It is important that future improvements maintain the geometry required to accommodate large freight vehicles along US 101.

SECTION 8
# TECH MEMO EIGHT
## SOLUTIONS EVALUATION

# MEMORANDUM #8

**DATE:** August 30, 2018

**TO:** Warrenton TSP Project Management Team

**FROM:** Angela Rogge, PE, David Evans and Associates, Inc.
Shelly Alexander, PE, David Evans and Associates, Inc.

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Draft Solutions Evaluation** P14180-008

The purpose of the Warrenton Transportation System Plan (TSP) Update is to determine how best to serve the future transportation needs of Warrenton residents, businesses, and visitors. The existing and future conditions analysis suggest that the TSP will incorporate multi-modal options with the vision of the community to define draft transportation system solutions that address local needs.

This memorandum presents the evaluation of projects for consideration in the Warrenton TSP Update.

## Development of Solutions

The improvements and strategies identified for consideration in the TSP were developed from multiple sources:

- Review of projects in 2004 TSP Update and other Local and Regional Plans
- New Projects based on identified deficiencies and feedback from public and advisory committees
- System and Demand Management strategies

### Review of Existing Plans

The review of the projects in existing plans includes:

- Projects from the 2004 Warrenton Transportation System Plan
- Projects from Other Planning Documents
  - 2015 Clatsop County Transportation System Plan
  - 2010 City of Warrenton Downtown and Marina Master Plans
- Projects in Capital Plans
  - 2018-2023 Warrenton Streets Capital Improvement Program
  - 2010-2030 Warrenton Parks Capital Improvements Plan
  - 2018-2021 Oregon (Final as Amended) Statewide Transportation Improvement Program (STIP)

Where still relevant during the 20-year planning horizon, solutions from these plans are considered for inclusion in the TSP.

## Projects from the 2004 Warrenton Transportation System Plan

The 2004 Warrenton TSP was reviewed to determine which projects were still relevant to the TSP Update. Table 1 summarizes the applicable projects as described in the 2004 Warrenton TSP, facility jurisdiction, project type, and potential reasons for why the project may be needed.

### Table 1. Applicable Projects from the 2004 Warrenton TSP

| ID | Description[1] | Jurisdiction | Project Type | Need |
|---|---|---|---|---|
| | **Street** | | | |
| 1 | Add westbound left-turn lane at the intersection of East Harbor Dr with SE Marlin Ave (Warrenton-Astoria Hwy 105). Realign SE Marlin Ave approach and signalize intersection. | ODOT | Capacity | Vehicular traffic volumes in summer exceed ODOT mobility target |
| 2 | Signalize intersection of Fort Stevens Hwy 104 and Warrenton-Astoria Hwy 105. Reconfigure intersection to accommodate trucks and improve pedestrian crossings. ** this intersection was changed in 2005 (some movements restricted) but further improvements are needed (included as a proposed project BP4 and R17)* | ODOT | Traffic Signal; Freight | Vehicular traffic volumes in summer exceed ODOT mobility target |
| 3 | Add right-turn lanes on SE Marlin Ave (Warrenton-Astoria Hwy 105) approaches at intersection with US 101 ** this intersection was changed in 2005 (alignment changed and lights added) but further improvements are needed (included as a proposed project R22)* | ODOT | Capacity | Vehicular traffic volumes exceed ODOT mobility target year-round |
| 4 | Construct shoulder widening on both sides of Fort Stevens Hwy 104 (Main Ave) – 14th St to South of Spur | ODOT | Street Upgrade | Provide paved travel way for High School pedestrian access |
| 5 | E Harbor Dr at SE Neptune Ave: Signalize intersection | ODOT/ City | Traffic Signal | Pair with potential access control at Pacific Ave/Young's Bay Plaza |
| 6 | Delaura Beach Lane and Ridge Rd - intersection geometry | County/ City | Intersection Modification; Safety | Safety |
| 7 | Extend SW 2nd St to connect with SW Juniper Ave – Elm Ave to Juniper Ave ** Partially completed* | City | New Road | Connectivity |
| 8 | Connect NW/SW Juniper Ave with Ridge Rd – SW 9th St to Ridge Rd | City | New Road | Connectivity |
| 9 | Construct curb, sidewalk and new local roadway along private Dr (SE 7th St) from Hwy 104 (Main Ave) to SE Marlin Ave. Includes a bridge crossing over the Skipanon Slough (connectivity project) | Private | New Road | Connectivity |
| 10 | Widen New Youngs Bay Bridge to 4-lane Section (Warrenton to Astoria) | ODOT | Bridge | Regional capacity and connectivity |
| 11 | Additional turn lanes at the Harbor St - US 101 intersection (Additional Eastbound left turn lane, | ODOT | Capacity | Vehicular traffic volumes exceed ODOT mobility target year-round |

| ID | Description[1] | Jurisdiction | Project Type | Need |
|---|---|---|---|---|
| | northbound through lane, and southbound through lane) | | | |
| 12 | Widen Warrenton-Astoria Hwy 105 (SE Marlin Ave) to include sidewalk and bike lanes – Harbor Dr to US 101 | ODOT | Bicycle; Pedestrian | Multi-modal connectivity |
| 13 | Fort Stevens Hwy 104: Add bike lanes | ODOT | Bicycle | Multi-modal connectivity through downtown |
| 14 | Fort Stevens Hwy 104: Install curb and sidewalks both sides | ODOT | Pedestrian | Multi-modal connectivity through downtown |
| | **Bicycle/Pedestrian** | | | |
| 15 | New Youngs Bay Bridge: Pedestrian/bicycle improvements | ODOT | Bicycle | Regional multi-modal connectivity: Install additional bike detection for cyclists traveling along the bridge (County TSP) |
| 16 | Improve pedestrian crossing at intersection of Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave | ODOT | Pedestrian; Intersection Modification | Safety |
| 17 | Fort Stevens Hwy 104: Add crosswalk for better pedestrian access to elementary school at SW 9th St | ODOT | Pedestrian | Multi-modal connectivity; safety |
| 18 | Fort Stevens Hwy 104 Spur: Construct curb and sidewalk | ODOT | Pedestrian | Multi-modal connectivity |
| 19 | Warrenton-Astoria Hwy 105 (E Harbor): Install curb and sidewalks both sides of the road – Fort Stevens Hwy 104 (Main Ave) to Marlin Ave | ODOT | Pedestrian | Multi-modal connectivity |
| 20 | SW 9th St: Upgrade width with bike lanes and sidewalks – SW 9th St to Ridge Rd | City | Pedestrian | School access and multi-modal connectivity |
| 21 | SW Alder Ave: Install marked crosswalks near community center/park | City | Pedestrian | School access; safety |
| 22 | SW Cedar Ave/SW 7th St: Upgrade crosswalks to be ADA-compliant at Warrenton Elementary School | City | Pedestrian | School access; safety |
| 23 | East Harbor Dr: Add curb and sidewalk – Marlin Ave to US 101 | ODOT | Pedestrian | Multi-modal connectivity |
| 24 | SE Neptune Ave: Add sidewalks and bike lanes – Harbor Dr to US 101 | City | Pedestrian | Multi-modal connectivity |
| 25 | Ridge Rd: Install sidewalks from SW 9th St north along soccer fields | County | Pedestrian | Multi-modal connectivity; safety |
| 26 | Improved signage, visibility for Warrenton Waterfront trail | City | Trail | Safety |
| 27 | Warrenton Waterfront Trail: Improved pedestrian amenities including restrooms, lighting, trash receptacles | City | Trail | Safety; aesthetics |
| 28 | Pave top of dike near Airport (Airport Dike Trail) | City | Trail | Mobility |

| ID | Description[1] | Jurisdiction | Project Type | Need |
|---|---|---|---|---|
| 29 | Fort Stevens Hwy 104 Spur: Stripe 6-foot-wide bike lanes on both sides of Rd (includes minor widening) | ODOT | Bicycle | Multi-modal connectivity |
| 30 | Warrenton-Astoria Hwy 105: Add bicycle route designation signage | ODOT | Wayfinding | Visibility |
| 31 | Multi-use path to connect Hammond with Fort Stevens State Park | ODOT/ City | Trail | Multi-modal connectivity |
| 32 | Install Bike Parking | City | Bicycle | Multi-modal connectivity |
| 33 | Extend multi-use path through Fort Stevens State Park along Burma Rd to Delaura Beach Rd | City | Trail | Multi-modal connectivity |
| | **Transit** | | | |
| 34 | US 101 North and South of the New Youngs Bay Bridge - install shelters and kiosks | ODOT/ County/City | Transit Amenities | Support regional plan |
| 35 | Investigate the possibility of intercity bus service that connects downtown Warrenton with the commercial area and KOA/Fort Stevens State Park | | Transit Service | Completed. Remove from potential projects. |
| 36 | Identify ways to improve transit service between Cannon Beach and Astoria and between Astoria and Warrenton shopping areas. | | Transit Service | Completed. Remove from potential projects. |
| 37 | Provide transit amenities (covered shelters, signage, pullouts) | | Transit Amenities | Increase multi-modal facilities |
| 38 | Extend hours, decrease headway, review scheduling, improve efficiency of dial-a-ride program, meet the needs of future demands, improve connections, and advertise and promote services. In addition, transit amenities are lacking in certain areas. | | Transit Service | Multi-modal connectivity |
| 39 | ADA compliance | | Transit Amenities | Mobility |
| | **Other (Bridge, Air, Water)** | | | |
| 40 | Bridge with sufficiency rating less than 45. Skipanon River Br. No. 1400 | ODOT | Bridge | 2011: Weight Restricted<br>2017: Structurally Deficient |
| 41 | Improve runway surface at Astoria Regional Airport | | Air | Maintenance |
| 42 | Improve runway safety areas | | Air | Maintenance |
| 43 | Improve existing water facilities | | Water; recreation | Recreational and economic opportunity |

## Projects from Other Planning Documents

Two other planning documents were reviewed to identify projects related to the transportation system in Warrenton.

**2015 Clatsop County Transportation System Plan**

The Clatsop County TSP guides development of County roadways and multi-modal facilities throughout Clatsop County. The Clatsop County TSP recommends a couple new transportation projects within Warrenton city limits. Table 2 summarizes the projects, jurisdiction, and notes regarding timing (short or long-term) and funding priority (financially constrained or aspirational).[1]

### Table 2. Applicable Projects from the 2015 Clatsop County TSP

| ID | Description | Jurisdiction | Notes |
|---|---|---|---|
| W3 | Warrenton to Miles Crossing – Study for an off-highway shared-use path. Study will determine potential alignments, width, security, wayfinding details, construction materials, costs, and funding sources | County | Financially Constrained – Short Term |
| W4 | SE 19th St from SE Ensign Ln to Animal Shelter Near SE Willow Dr. – Extends shared-use path to connect with SE Ensign Ln. The animal shelter is a popular destination to walk to that is just off the pedestrian network. | County/ Warrenton | Aspirational – Long Term |
| B23 | New Young's Bay Bridge – Install additional bike detection for cyclists traveling along the bridge. | State | Financially Constrained – Long Term |
| D13 | Warrenton-Astoria Hwy. (US 101B)/Fort Clatsop Rd. – Addition of westbound right turn deceleration lane on Warrenton-Astoria Hwy. (US 101B) and southbound left turn lane on SE Airport Ln. | State | Aspirational – Long Term |
| D14 | Develop roadway network to serve area south of North Coast Business Park. Extend 19th St. (or other alignment) to provide access to Ensign Ln. Coordinate with Warrenton | County/ Warrenton | Financially Constrained – Short Term; Consistent with STIP |

**2010 City of Warrenton Downtown and Marina Master Plan**

The Warrenton Downtown and Marina Master Plans document contains goals developed for downtown Warrenton and the adjacent Warrenton marina, including design guidelines for both districts. The five key principles for improving the downtown area are to:

- focus on the natural setting;
- connect to the waterfront;
- improve bicycle and pedestrian circulation;
- create a green downtown; and
- have the City lead by example.

[1] Financially constrained projects from the 2015 Clatsop County TSP have a reasonable expectation of being funded by 2035. Aspirational projects have no identified funding source.

Table 3 lists the transportation-related projects, facility jurisdiction, and notes indicating consistency with other planning documents.

**Table 3. Applicable Projects from the 2010 City of Warrenton Downtown and Marina Master Plan**

| Description | Jurisdiction | Notes |
|---|---|---|
| Improve Harbor Dr – add street trees, lighting, sidewalks, crosswalks, and bike lanes | ODOT | Bicycle/Pedestrian improvements consistent with 2004 TSP |
| Improve pedestrian facilities on Skipanon River Bridge | ODOT | Consistent with 2004 TSP |
| Harbor Dr/Fort Stevens Hwy 104 (Main Ave) Improvements – consider installing wider sidewalks, street trees, new lighting, new crosswalks, and curb extensions when improving this intersection | ODOT/ City | Pedestrian improvements consistent with 2004 TSP |
| Install wider sidewalks on Fort Stevens Hwy 104 (Main Ave); narrow the travel lanes and parking stalls. Consider adding curb extensions at crosswalks and street trees | ODOT/ City | Supports improvements in 2004 TSP |
| Strengthen street grid by extending existing streets to areas of future redevelopment | City | Consistent with 2004 TSP, 2018-2021 STIP, new projects |
| Expand and enhance Skipanon Trail | City | Consistent with 2004 TSP, 2018-2021 STIP, new projects |
| Plan truck routing to discourage trucks from driving through downtown | ODOT/ City | Consistent with 2004 TSP, new projects |

## Projects in Capital Plans

Capital plans are documents identifying short-range projects that have secured funding for construction.

**Warrenton Streets Capital Improvement Program**

The project list for the 2018-2023 Warrenton Streets Capital Improvement Program (CIP), the most recent CIP, contains projects for the 5-year planning horizon. The projects listed in the CIP will be evaluated in addition to other potential improvements proposed in this memorandum, with lower priority given to projects outside of the city limits. See Table 4 for a summary of the project list and estimated costs in 2017 dollars. As indicated in the notes column, some of the CIP projects are consistent with, or support, projects listed in the 2004 Warrenton TSP.

**Table 4. Warrenton Streets Capital Improvement Program**

| Project Name | Project Cost Estimate[1] | | Consistency with 2004 Warrenton TSP |
|---|---|---|---|
| | Funded | Unfunded | |
| SE Anchor (Harbor – SE 3rd St) Improvements | $210,000 | | |
| SW 4th St (S Main Ave – SW Alder Ct) | $118,000 | | Supports 2004 TSP |
| N Main Ave and NW 7th Pl (NW Warrenton Dr to NE 5th St) | $367,000 | | |
| SE 2nd St (SE King – Marlin) | $225,000 | | |
| Streets SDC Improvements – Unallocated | $742,400 | | |
| SW 2nd St (Elm – Gardenia) | $48,000 | $267,000 | Consistent with 2004 TSP |
| SW Alder Ave Reconstruction Project (SW 1st – SW 3rd) | | $185,000 | |
| NW 13th St and Warrenton Dr Trail & Drainage Improvements | | $73,000 | Consistent with 2004 TSP |

| Project Name | Project Cost Estimate[1] Funded | Unfunded | Consistency with 2004 Warrenton TSP |
|---|---|---|---|
| SE Main Ct (9th – 11th) Improvement Project | | $107,000 | |
| SE 2nd St Improvement Project (Main – Skipanon River Park) | | $281,000 | |
| S Main Ave and SW 14th Pl (Orchard Subdivision) Sidewalks | | $16,000 | |
| **Total:** | **$1,710,400** | **$929,000** | |

Source: City of Warrenton 2018-2023 Capital Improvement Program (June 27, 2017)

1. Project Cost Estimates provided by City of Warrenton in 2017 dollars

### 2010-2030 Warrenton Parks Capital Improvements Plan

A component of the Warrenton Parks Master Plan is the Capital Improvement Plan, which is intended to guide development of the parks system for the 20-year period between 2010 and 2030 and includes park improvements, land acquisition, and development. The projects listed in the plan are sorted by prioritization categories. Some of the projects are currently included in other planning documents. Table 5 lists the applicable transportation-related projects, estimated costs in 2010 dollars, and priority level (I or II).

**Table 5. Applicable Projects from the 2010-2030 Warrenton Parks Capital Improvements Plan**

| ID | Description | Cost (2010 $) | Notes |
|---|---|---|---|
| CIP-3 | Quincy & Bessie Robinson Community Park Signage | $1,000 | Priority I |
| CIP-4 | Seafarers Park Trail Connection to Fort Stevens | $158,400 | Priority II |
| CIP-5 | Eben H. Carruthers Park Signage | $1,000 | Priority I |
| CIP-5 | Eben H. Carruthers Park Interior Walking Paths | $36,000 | Priority I |
| CIP-7 | Skipanon River Park Interpretive Signage | $2,000 | Priority I |
| CIP-7 | Skipanon River Park Improve Kayak Dock ADA Accessibility Route | $5,000 | Priority I |
| CIP-7 | Skipanon River Park Trail Connection (east Harbor Bridge) | $39,600 | Priority I |
| CIP-7 | Skipanon River Park Parking Improvements | $64,500 | Priority II |
| CIP-8 | Community Library Park ADA Accessibility Improvements (Rubber Chips) | $9,000 | Priority II |
| CIP-9 | Pacific Drive Park Trail Connections/Access | $39,600 | Priority I |
| CIP-10 | Warrenton LCYSA Soccer Field Trail Connections/Access | $158,400 | Priority I |
| CIP-12 | Triangle Park Signage | $1,000 | Priority I |
| CIP-13 | Tansy Point Interpretive Signage | $2,000 | Priority I |
| CIP-13 | Tansy Point Parking Improvements | $41,250 | Priority II |

### 2018-2021 Oregon (Final as Amended) Statewide Transportation Improvement Program

The 2018-2021 STIP contains two projects in the City of Warrenton. The projects are:

- US101B: Lewis and Clark River Bridge (Warrenton): Replace deck (includes deck removal); Key 20107[2]
- SE Ensign Lane – SE 19th St (Warrenton): Construct connector road between SE Ensign Lane and SE 19th Street; Key 21149

The deck replacement includes funds for preliminary engineering (2019) and construction (2021), while the new connector road is for construction only (2018).

# New Transportation Projects for Consideration

The alternatives evaluation considers new roadway, bicycle and pedestrian, and transit projects that could be incorporated into the TSP Update.

## New Street Alternatives for Consideration

Many of the street improvement projects in the 2004 TSP are recommended to be considered for inclusion the TSP Update. In addition, there are a few potential new roadway projects for consideration and these projects are described below in Table 6.

**Table 6. Potential New Street Solutions for Consideration**

| ID | Description | Jurisdiction | Source | Notes |
|---|---|---|---|---|
| S-1 | Add STOP-control at intersection of SE 9th at Anchor | City | Stakeholders | |
| S-2 | Truck route and improvements to access Skipanon Dr from 5th St | ODOT/ City | Stakeholders | Options:<br>• New industrial cross-section<br>• Signing/Striping |
| S-3 | Dedicated southbound left turn lane on OR 104 Spur at Ensign Ln | ODOT | Stakeholders | |
| S-4 | Flashing yellow arrows (northbound and southbound permitted lefts) on US 101 | ODOT | Traffic Operations; Stakeholders | Options:<br>• Marlin<br>• Neptune<br>• Harbor |
| S-5 | Traffic and safety improvements at Premarq Center accesses (Access control) | ODOT/ Private | Safety; Stakeholders | Should be coordinated with any potential improvement at US 101/Harbor |
| S-6 | Extend SE 19th St north (connectivity project) | City | Stakeholders; STIP | Options:<br>• Connect to SE Jetty Ave<br>• Connect to SE King Ave |

[2] Key numbers are unique project identification numbers specific to the STIP

### New Bicycle & Pedestrian Alternatives for Consideration

Many of the 2004 TSP projects recommended to be considered for inclusion in the TSP Update include bicycle and pedestrian improvements. Additional projects for consideration are described below in Table 7.

**Table 7. Potential New Bicycle & Pedestrian Solutions for Consideration**

| ID | Description | Jurisdiction | Source | Notes |
|---|---|---|---|---|
| BP-1 | Provide bicycle and pedestrian improvements at the OR 104S bridge over the Skipanon River | ODOT | Stakeholders; Existing deficiency | Options:<br>• Widen and potentially raise<br>• Cantilevered path |
| BP-2 | Pedestrian improvements on Pacific Dr | ODOT/ City | Stakeholders; Existing deficiency | Options:<br>• Sidewalks<br>• Multiuse path<br>• 6th St as alternate route |
| BP-3 | Trail on KOA access/NW 11th alignment | Private | Stakeholders | |
| BP-4 | Improve pedestrian safety near soccer fields | County | Stakeholders; Safety | Consider crossing treatment options of Ridge Rd |
| BP-5 | Construct/extend sidewalks on SE 19th | City/County | Existing deficiency | |
| BP-6 | Trail crossing for Airport Dike Trail at US 101 by routing pedestrians to Harbor St (wayfinding/path connection) | ODOT/ City | Stakeholders | |
| BP-7 | Construct sidewalk on south side of Ensign Ln (For Stevens Hwy 104 Spur to US 101) | City | Existing deficiency | |

## System and Demand Management Options

### Safe Routes to Schools (SRTS)

The existing conditions analysis (Technical Memorandum #5) identified a deficiency in safe, walkable connections around area schools. Students wanting to walk or bike to school would have to cross at least one major highway (Fort Stevens Hwy 104, named Main Avenue in the city) on routes that have limited pedestrian facilities and are adjacent to high volumes of traffic.

SRTS is a program that a school district can adopt to encourage people to walk and bike to school and identifies safe, convenient, and fun opportunities to do so. The TSP can support SRTS by focusing on and prioritizing enhancements of pedestrian and bicycle connections to schools.

Table 9 specifies whether a project supports bicycle and pedestrian connections to schools. Focus should be given to those projects that also enhance safety, such as a multi-use path that separates pedestrians from vehicular traffic.

### Transportation System Management (TSM)

TSM measures are designed to make maximum use of existing transportation facilities. Efficient management of the transportation system can reduce costs by avoiding the need for more expensive roadway expansion projects. TSM strategies include traffic control improvements, traffic signal coordination, traffic calming, access management, local street connectivity, and intelligent transportation systems (ITS).

**Traffic Calming:** Uses physical design and other measures to improve safety for motorists, pedestrians and cyclists. It aims to encourage safer, more responsible driving and potentially reduce traffic flow. Examples: bike boulevard/neighborhood greenway, neighborhood traffic circle, curb bulb-outs (roadway narrowing), and raised crosswalks/medians.

**Access Management:** Includes the management of vehicular access points to enhance safety and potentially improve traffic operations. Examples: access and driveway spacing standards, channelized turn lanes, median treatments, and turn restrictions

**ITS:** Includes collecting and conveying information regarding roadway operations to improve the operations and efficiency of a facility. Examples: variable message signs, adaptive signal timing, and variable speed limit signs.

Table 9 includes several projects that support TSM, such as improved bicycle wayfinding, access management, mid-block crossings, neighborhood greenway (bicycle sharrows) and high visibility crosswalks.

### Transportation Demand Management (TDM)

Transportation Demand Management (TDM) measures are designed to reduce vehicle demand, especially for commuter trips in the peak periods. TDM measures encourage the use of alternative, non-single-occupancy-vehicle travel modes by serving as a model for businesses and institutions in the community. Though the existing and future traffic analysis do not indicate significant roadway capacity concerns on the local system, implementing TDM measures support the goals of the TSP to plan and design a transportation system that enhances livability, supports positive health impacts, and decreases reliance on the automobile.

TDM measures that could be applicable for Warrenton include:

- Improved street connectivity
- Investing in pedestrian/bicycle facilities and amenities
- Improved amenities and access for transit stops
- Trip reduction strategies (e.g. employer based: telecommuting, rideshare, transit allowance)
- Enhanced transit facilities
- Disincentives for use of single occupancy vehicles (e.g. parking management/pricing, carpool spaces)

Table 9 includes several projects that support TDM, such as increased and improved bicycle, pedestrian and transit amenities.

# Solutions Evaluation

## Ranking Based on Evaluation Criteria

A broad set of evaluation criteria that represent the proposed set of goals for the Warrenton TSP Update were used to evaluate proposed projects and alternatives. The evaluation criteria, listed below, were developed directly from the project goals and objectives outlined in Technical Memorandum #4 and are intended to indicate how strongly each solution or project supports community-expressed interests.

***Goal 1: Health*** – Develop a transportation system that maintains and improves individual health by maximizing active transportation options.

**Evaluation Criteria**

a. Increases active transportation options
b. Increases recreational opportunities

***Goal 2: Safety*** – Develop a transportation system that maintains and improves public safety and effectively manages evacuations and emergency response preceding and following natural disasters.

**Evaluation Criteria**

a. Improves road and railroad crossing safety for all modes
b. Increases ADA compliant sidewalks and intersection curb ramps
c. Improves public safety
d. Improves route connectivity
e. Decreases access point along highways and major arterials
f. Improves response times/evacuation efficiency

***Goal 3: Travel Choices*** – Develop and maintain a well-connected transportation system that offers travel choices, reduces travel distance, improves reliability, and manages congestion for all modes.

**Evaluation Criteria**

a. Improves roadway operations
b. Improves bus travel time reliability
c. Improves bus service for local employees
d. Improves bus service for employees commuting to nearby coastal destinations
e. Increases connectivity across and between all modes
f. Improves pedestrian/bicycle access to key destinations, including transit service

***Goal 4: Economic Vitality*** – Support the development and revitalization efforts of the City, Region, and State economies and create a climate that encourages growth of existing and new businesses.

**Evaluation Criteria**

a. Minimizes negative impacts to existing land uses (built environment)
b. Improves parking efficiency
c. Improves freight access/connectivity
d. Improves bicycle and pedestrian access to the downtown area
e. Increases capacity for boating and shipping activities

***Goal 5: Livability*** – Customize transportation solutions to suit the local context while providing a system that supports active transportation, promotes public health, facilitates access to daily needs and services, and enhances the livability of Warrenton neighborhoods and business community.

**Evaluation Criteria**

a. Reduces/discourages through travel in residential neighborhoods
b. Increases connections/access to community amenities

c. Enhances street aesthetics
d. Reduces impacts from trucks downtown

***Goal 6: Sustainability*** – Provide a sustainable transportation system that meets the needs of present and future generations and is environmentally, fiscally and socially sustainable.

**Evaluation Criteria**

a. Avoids negative impacts to environmentally sensitive areas
b. Reduces vehicle miles traveled
c. Minimizes impacts to historic sites
d. Increases alternatives to single-occupant vehicle travel

***Goal 7: Fiscal Responsibility*** – Plan for and implement an economically viable transportation system that protects and improves existing transportation assets while cost-effectively enhancing the total system.

**Evaluation Criteria**

a. Increases the efficiency of existing facilities without expanding or building new facilities
b. Provides significant increase in mobility/accessibility

***Goal 8: Compatibility*** – Develop a transportation system that is consistent with the City's Comprehensive Plan and that is coordinated with County, State, and Regional plans.

**Evaluation Criteria**

a. Supports and is consistent with adopted planning documents

For projects that are being considered for inclusion in the TSP update, a qualitative and quantitative scale was used to evaluate them against each goal's evaluation criteria. Table 8 presents an example of how a goal's evaluation criteria would be used to score a proposed project.

### Table 8. Example Evaluation Criteria Scoring

| Goal: Safety | | |
|---|---|---|
| Evaluation Criteria: Criteria 2.c. Improves public safety | +2 | Project has negative public safety impact to all modes |
| | +1 | Project has negative public safety impact to at least one mode |
| | 0 | No net impact / not applicable |
| | -1 | Project has positive public safety impact at least one mode |
| | -2 | Project has positive public safety impact to all modes |

Each goal's score was averaged and the average of all eight goals, with goals being evenly weighted, represents the score for each project. See Attachment A for the complete set of scoring results.

In order to further differentiate projects that received the same primary evaluation score within a given mode, sets of secondary criteria were applied. These project scores were converted into High, Medium, and Low Priority groupings. Higher priority was assigned to projects that improve the existing system without adding capacity, while lower priority was assigned to projects that increased capacity without adding connectivity or improvements to active transportation, which aligns with the directive provided in the project scope.

## Planning Level Cost Estimates

Planning level cost estimates were developed for each potential TSP project. The cost estimates are based on assumptions about project extents, materials and desired components. Generalized unit costs and contingency factors (mobilization, traffic control, and engineering/design) were applied to the project elements to calculate total cost.

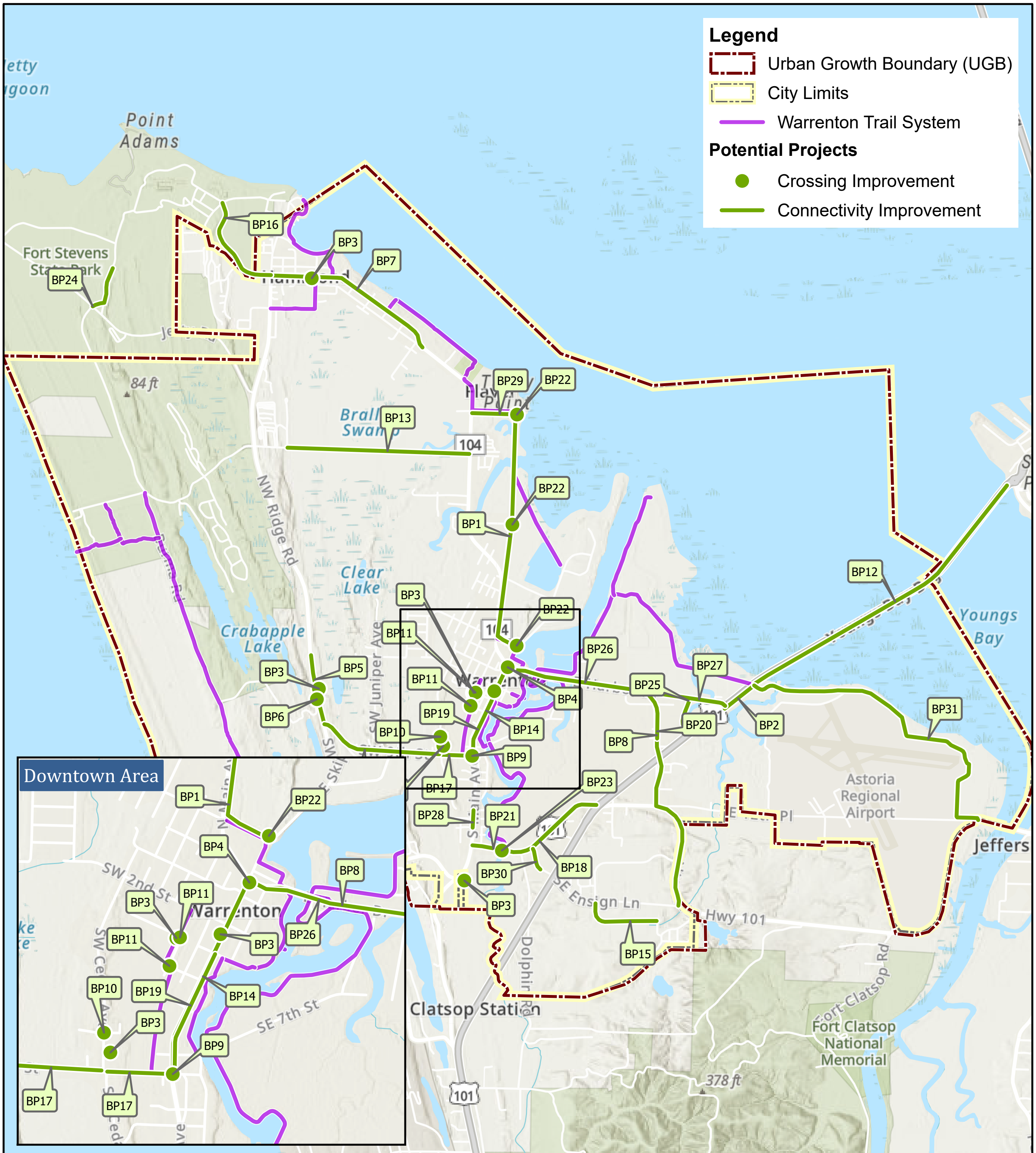
The unit costs are based on professional experience, reference documents from ODOT, and other transportation planning resources. These values are intended to provide an order of magnitude look at project costs and do not include right of way acquisition, utilities relocation, and potential hazardous materials issues.

## Project Prioritization

Since the advancement of any project is contingent upon the availability of future funding, it is important to establish a flexible program of prioritized projects that meet diverse stakeholders needs while leveraging current and future funding opportunities. Ultimately, the refined, prioritized list is intended to serve as a menu of projects, with multiple factors that can be used together to assess the highest priority projects that can be completed within the available budget.

The proposed bicycle and pedestrian improvements are mapped in Figure 1 and the proposed roadway projects are mapped in Figure 2. Transit, air and rail projects are not mapped because their locations are not defined. Table 9 organizes all the potential projects by mode and priority, based on the evaluation criteria listed in the previous section.

***The initial draft Solutions Evaluation Memorandum is intended to be part of an interactive process to develop a menu of potential improvements prioritized into financially constrained and aspirational project lists. Additional stakeholder feedback, funding forecasts, and fatal flaw analysis will help to refine the list presented in Table 9. The refined list will eventually be included in the draft TSP.***

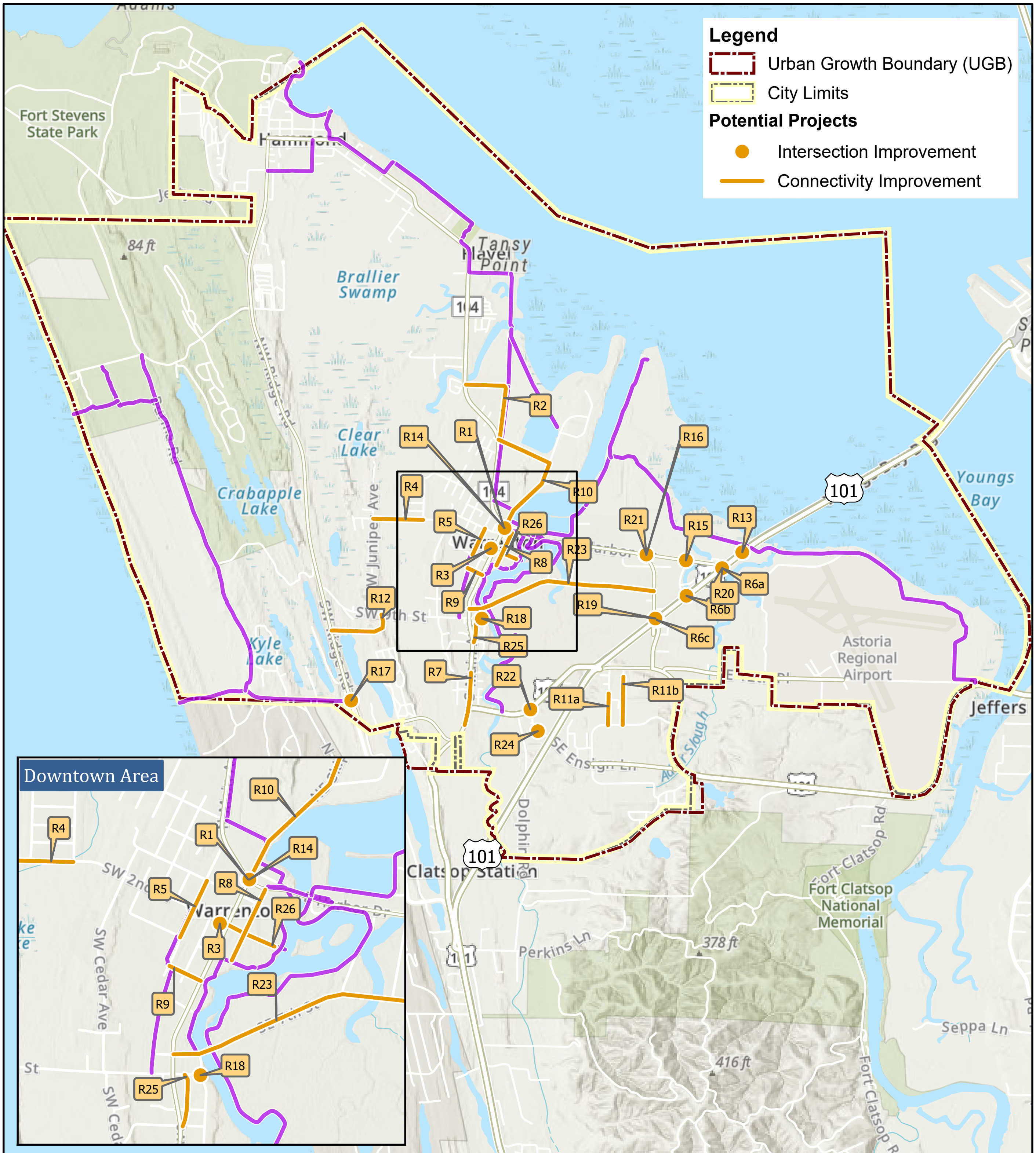



**CITY OF WARRENTON** | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*

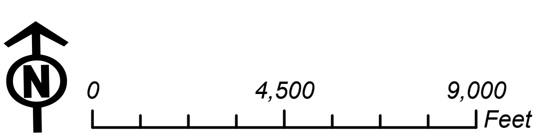
# Figure 1

*Proposed Bicycle & Pedestrian Improvements*




CITY OF WARRENTON | Transportation System Plan

**Data Sources:**
*ESRI, ArcGIS Online, World Topography Map. 2015.*
*City of Warrenton, Oregon. 2015. Clatsop County, Oregon. 2015.*




# Figure 2

*Proposed Roadway Improvements*

### Table 9. Draft Prioritized Project List (by mode)

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| | **Bicycle/Pedestrian** | | | | | |
| BP1 | Trail (Wayfinding) | Warrenton Waterfront Trail | High | $50,000 | 2004 Warrenton TSP | Warrenton |
| | Improve wayfinding signage and visibility of Warrenton Waterfront Trail. Provide a bicycle wayfinding signage network to help guide bicyclists to and from local destinations via bike routes and trails. | | | | | |
| BP2 | Trail (Wayfinding) | Airport Dike Trail: US 101 at Harbor Dr | High | $35,000-$133,000 | New; Stakeholders | Warrenton /ODOT |
| | Extend the Airport Dike Trail south from its current terminus on the east side of US 101 to the existing traffic signal (and existing pedestrian crossing) at US 101 at Harbor Street. *The current Airport Dike Trail has no formal crossing of US 101 and a new at-grade crossing is unlikely to meet the requirements of an engineering study or obtain State Traffic-Roadway Engineer approval.* | | | | | |
| BP3 | Bicycle (Parking) | Parks, downtown, soccer complex | High | $1,000/ea.<br>$5000 total | 2004 Warrenton TSP | Warrenton |
| | Install bicycle parking at points of interest, such as downtown Warrenton, the City Park and the Warrenton Soccer Complex. | | | | | |
| BP4 | Pedestrian (Crossing) | Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave | High | $100,000 | 2004 Warrenton TSP | ODOT |
| | Upgrade the pedestrian crossing at Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave to current standards. | | | | | |
| BP5 | Pedestrian (Multi-Use path); Safety | Ridge Rd: SW 9th St north along soccer fields | High | $200,000 | 2004 Warrenton TSP; Stakeholders | County/ Warrenton |
| | Construct a 10-foot wide multi-use path on the east side of Ridge Road from SW 9th Street to the north edge of the Warrenton Soccer Complex. | | | | | |
| BP6 | Pedestrian (Crossing); Safety | Soccer fields and across/along Ridge Rd | High | $20,000 | New; Stakeholders | County |
| | Construct an at-grade pedestrian crossing of Ridge Road at the Warrenton Soccer Complex with high visibility paint and advanced signage. | | | | | |
| BP7 | Bicycle and Pedestrian (Connectivity) | Pacific Dr (Hammond) | High | Option A: $50,000<br>Option B: $3.3 million | New; Stakeholders | ODOT/ Warrenton |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| | Enhance bicycle connectivity in Hammond.<br>Option A: Install wayfinding and sharrows on parallel routes (6th and 7th) through Hammond and provide high visibility crosswalk across Pacific Drive.<br>Option B: Construct curb, gutter and sidewalks on Pacific Drive through Hammond | | | | | |
| BP8 | Bicycle (Wayfinding) | Warrenton-Astoria Hwy 105 | High | $25,000 | 2004 Warrenton TSP | ODOT/ Warrenton |
| | Add bicycle route designation signage for length of Warrenton-Astoria Hwy 105 within Warrenton city limits. | | | | | |
| BP9 | Pedestrian (Crossing); Safety | Fort Stevens Hwy 104 (Main Ave) at SW 9th St | High | $2,000 | 2004 Warrenton TSP; Stakeholders | ODOT/ Warrenton |
| | Study potential highway crossing enhancements at the intersection of Fort Stevens Hwy 104 (Main Avenue) at SW 9th Street to enhance visibility of crossing near elementary school. | | | | | |
| BP10 | Pedestrian (Crossing); Safety; Modernization | SW Cedar Ave at SW 7th St | High | $40,000 | 2004 Warrenton TSP | Warrenton |
| | Upgrade curb and crosswalks to be ADA-compliant at Warrenton Elementary School. | | | | | |
| BP11 | Pedestrian (Crossing); Safety | SW Alder Ave at SW 3rd St and SW 4th St | High | $30,000 | 2004 Warrenton TSP | Warrenton |
| | New marked crosswalks near community center/park. The crossings at SW 4th Street would also require installation of new curb. | | | | | |
| BP12 | Bicycle (Visibility); Safety | New Youngs Bay Bridge | High | $500,000 (Clatsop County TSP estimate) | 2004 Warrenton TSP; 2015 Clatsop County TSP | ODOT |
| | Enhance bicycle visibility on New Youngs Bay Bridge and install additional bike detection for cyclists traveling along the bridge. | | | | | |
| BP13 | Trail (Connectivity) | KOA access/NW 11th alignment | Medium | $2.7 million | New | Private/ Warrenton |
| | Construct a new trail connection from the KOA access east to NW Warrenton Drive following the NW 11th Street alignment. Includes excavation and embankment. | | | | | |
| BP14 | Bicycle (Connectivity) | Fort Stevens Hwy 104: Harbor Dr to 9th St | Medium | Option A: $30,000<br>Option B: $695,000 | 2004 Warrenton TSP | ODOT |
| | Install bicycle facilities along Fort Stevens Hwy 104 (Main Avenue):<br>Option A: Install sharrows and "share the road" signage<br>Option B: Remove parking on one side of the roach and widening where needed to provide striped bicycle facilities | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| BP15 | Pedestrian (Connectivity) | SE 19th: Ensign Ln to Chokeberry Ave | Medium | $1.6 million | New | Warrenton |
| | Construct sidewalks on both sides of SE 19th Street south of Ensign Lane. Project includes new sidewalk, curb and gutter on the north/east side of the road and extends the sidewalk on the south/west side of the road. | | | | | |
| BP16 | Pedestrian (Multi-Use path) | Hammond to Fort Stevens State Park | Medium | $600,000 | 2004 Warrenton TSP | State Parks/ County/ Warrenton |
| | Construct a 10-foot wide multi-use path on one side of Pacific Drive from Lake Drive to Fort Stevens State Park entrance. | | | | | |
| BP17 | Pedestrian (Connectivity); Safety | SW 9th St: SW 9th St to Ridge Rd | Medium | Phase 1: $480,000<br>Phase 2: $680,000 | 2004 Warrenton TSP | Warrenton |
| | Provide enhanced bicycle and pedestrian connectivity along SW 9th Street.<br>Option A: Widen sidewalk to 10 feet on north side<br>Option B: Multiuse path (Cedar Dr to Ridge Rd) | | | | | |
| BP18 | Bicycle (Connectivity); Safety | Fort Stevens Hwy 104 Spur | Medium | $10,000 | 2004 Warrenton TSP | ODOT |
| | Study potential bicycle striping enhancements on both sides of the road for length of Fort Stevens Hwy 104 Spur to indicate bicyclists are present. | | | | | |
| BP19 | Pedestrian (Connectivity) | Fort Stevens Hwy 104: SW 3rd St to SE 9th St | Medium | $1.4 million | 2004 Warrenton TSP | ODOT |
| | Construct curb, gutter and sidewalks on the east side of Fort Stevens Hwy 104 between SW 3rd Street and SE 9th Street. | | | | | |
| BP20 | Bicycle and Pedestrian (Connectivity) | Warrenton-Astoria Hwy 105 (SE Marlin Ave): Harbor Dr to SE 6th St | Medium | $1.5 million | 2004 Warrenton TSP | ODOT |
| | Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Marlin Avenue between Harbor Drive and SE 6th Street. | | | | | |
| BP21 | Pedestrian (Connectivity) | Fort Stevens Hwy 104 Spur | Medium | Phase 1: $1.4 million<br>Phase 2: $1.9 million | 2004 Warrenton TSP | ODOT |
| | Construct curb, gutter and sidewalks on both sides of Fort Stevens Hwy 104 Spur:<br>Phase 1: Hwy 104 (Main Ave) to Ensign Ln<br>Phase 2: Ensign Ln to US 101 | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| BP22 | Trail (Amenities) | Warrenton Waterfront Trail | Medium | TBD | 2004 Warrenton TSP | Warrenton |
| | Improve pedestrian amenities along the Warrenton Waterfront Trail including restrooms, lighting, trash receptacles | | | | | |
| BP23 | Bicycle and Pedestrian (Connectivity); Safety | Skipanon River Br. No. 1400 | Medium | Option A: $25,000<br>Option B: $2.1 million | New; Stakeholders | ODOT |
| | Provide bicycle and pedestrian improvements at the OR 104S bridge over the Skipanon River<br>Option A: Advanced signing and striping to share the road with bicyclists<br>Option B: Cantilever multi-use path on one side of bridge | | | | | |
| BP24 | Trail (Connectivity) | Along Burma Rd to Delaura Beach Rd | Medium | $300,000 | 2004 Warrenton TSP | State Parks / County / Warrenton |
| | Construct multi-use path from north end of Burman Road to connect to Fort Stevens State Park trail system. | | | | | |
| BP25 | Bicycle and Pedestrian (Connectivity) | SE Neptune Ave: E Harbor Dr to US 101 | Medium | $1.4 million | 2004 Warrenton TSP | Warrenton |
| | Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Neptune Avenue between Harbor Drive and US 101. | | | | | |
| BP26 | Pedestrian (Connectivity) | Warrenton-Astoria Hwy 105 (E Harbor Dr): Fort Stevens Hwy 104 (Main Ave) to Marlin Ave | Medium | $3.2 million | 2004 Warrenton TSP | ODOT |
| | Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Fort Stevens Hwy 104 (Main Avenue) to Marlin Avenue. | | | | | |
| BP27 | Construct curb and sidewalk | Warrenton-Astoria Hwy 105 (E Harbor Dr): Marlin Ave to US 101 | Medium | $1.6 million | 2004 Warrenton TSP | ODOT |
| | Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Marlin Avenue to US 101. | | | | | |
| BP28 | Provide sidewalks on S Main Ave | S Main Ave and SW 14th Pl (Orchard Subdivision) | Medium | $24,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton /ODOT |
| | Provide sidewalks on S Main Avenue per City agreement with Orchard Subdivision Developer. | | | | | |
| BP29 | Trail (Connectivity) | NW 13th St and Warrenton Dr Trail | Medium | $113,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Provide multi-use trail along NW 13th St between Warrenton Dr and River Front Trail. | | | | | |
| BP30 | Pedestrian (Connectivity) | Fort Stevens Hwy 104 Spur to US 101 | Low | $472,000 | New | Warrenton |
| | Construct sidewalk on south side of Ensign Ln | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| BP31 | Trail (Modernization) | Airport Dike Trail | Low | $3.3 million | 2004 Warrenton TSP | Warrenton / Airport (?) |
| | Pave top of Airport Dike Trail from Hwy 105 by Lewis and Clark bridge to US 101. | | | | | |
| | **Transit** | | | | | |
| T1 | Transit | City wide | High | TBD | 2004 Warrenton TSP | Sunset Empire Transportation District / NorthWest POINT |
| | Extend hours, decrease headway, review scheduling, improve efficiency of dial-a-ride program, meet the needs of future demands, improve connections, and advertise and promote services. | | | | | |
| T2 | ADA compliance | City wide | High | Costs vary | 2004 Warrenton TSP | Warrenton |
| | Modernize transit stops to accommodate mobility devices | | | | | |
| T3 | Transit | US 101 North and South of the New Youngs Bay Bridge | High | TBD | 2004 Warrenton TSP | Warrenton / Astoria / ODOT |
| | Install transit shelters and kiosks on US 101 and both the north and south ends of the New Youngs Bay Bridge. | | | | | |
| T4 | Transit | City wide | Medium | Costs vary | 2004 Warrenton TSP | Warrenton / Varies |
| | Increase transit amenities throughout the city (covered shelters, signage, and bus pullouts). | | | | | |
| | **Street** | | | | | |
| R1 | Intersection Improvements | Fort Stevens Hwy 104 (Main Ave/Skipanon Dr) at Warrenton-Astoria Hwy 105 | High | $3 million | Stakeholders | ODOT |
| | Modify intersection to accommodate WB-62 trucks with a minimum turning radius of 45 degrees. This project rebuilds the intersection and includes water quality facilities, a new drainage system, concreate walks and curb. *Coordinate with BP4.* | | | | | |
| R2 | Maintenance | N Main Ave and NW 7th Pl (NW Warrenton Dr to NE 5th St) | Medium | $867,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Rebuild N Main Avenue and NW 7th Place between NW Warrenton Dr and NE 5th Street to improve rideability. Also includes water system upgrades. | | | | | |
| R3 | SDC | City of Warrenton | Medium | $742,400 (CIP estimate) | 2017 Warrenton CIP | Warrenton |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| | This project would allocate the SDC funds for SDC projects throughout the city. | | | | | |
| R4 | New Street (Connectivity) | SW 2nd St (Elm – Gardenia) | Medium | $315,000 (CIP estimate) | 2017 Warrenton CIP; 2004 Warrenton TSP | Warrenton |
| | Construct new section of SW 2nd Street to improve connectivity. Design will involve determining if any wetland mitigation needs to be done. Potential wetland mitigation not included in estimate. *This project builds on the work that has already been completed on 2nd St.* | | | | | |
| R5 | Street Upgrade; Maintenance | SW Alder Ave Reconstruction Project (SW 1st – SW 3rd) | Medium | $185,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Rebuild SW Alder Avenue with curbs from 1st Street to 2nd Street, grind, and overlay from 2nd Street to 3rd Street. | | | | | |
| R6 | ITS | US 101 at Harbor, Marlin and Neptune | Medium | $10,000/each $30,000 total | New; Stakeholders | ODOT |
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements such as modifying signal timing to optimize traffic operations (e.g. Flashing yellow arrows, cycle length, optimize signal splits, protecting/permitted phasing). *A detailed traffic evaluation would be required to determine appropriate features.* | | | | | |
| R7 | Street Upgrade | Fort Stevens Hwy 104 (Main Ave) – 14th St to South of Spur | Medium | $1.1 million | 2004 Warrenton TSP | ODOT |
| | Construct shoulder widening of three feet on both sides (conservative estimate) of Fort Stevens Hwy 104 (Main Avenue) between 14th Street to just south of the spur to provide additional paved width. The estimate includes a new drainage system and two water quality facilities. *Coordinate with bicycle and pedestrian improvements BP3 and BP29.* | | | | | |
| R8 | Street Upgrade | SE Anchor Ave: Harbor St to SE 3rd St | Medium | $1.323 million (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Rebuild SE Anchor Avenue and add sidewalk between Harbor Street and SE 3rd Street. Also includes drainage and power line improvements. | | | | | |
| R9 | Street Upgrade | SW 4th St: S Main Ave to SW Alder Ct | Medium | $836,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Improve SW 4th Street between S Main Avenue and SW Alder Court and add sidewalk. Also includes drainage and power line improvements. | | | | | |
| R10 | Street Upgrade (Freight) | 5th St: Hwy 104 (Warrenton Dr) to Skipanon Dr | Medium | $9 million | New | Warrenton |
| | Rebuild and widen roadway to accommodate WB 62 trucks. This improvement supports a truck route by rebuilding the intersection of Hwy 104 (Warrenton Drive) at 5th Street and roadway improvements along Skipanon Drive and 5th Street. Project assumes new water quality facilities, drainage system, curb, gutter and sidewalks. | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| R11 | New Street (Connectivity) | 19th to Jetty or King | Medium | $1.7 million | 2004 Warrenton TSP; 2015 Clatsop County TSP; STIP | Warrenton / County |
| | Construct a new road by extending SE 19th St north (connectivity project). Project assumes minor collector cross-section. | | | | | |
| R12 | New Street (Connectivity) | NW/SW Juniper Ave: SW 9th St to Ridge Rd | Medium | $3.8 million | 2004 Warrenton TSP | Warrenton |
| | Construct a new road by extending NW/SW Juniper Avenue (connectivity project). Project assumes minor collector cross-section and accounts for excavation and embankment work. | | | | | |
| R13 | Intersection Improvements; Safety | Premarq Center accesses | Medium | $10,000 | New | Private / ODOT |
| | Provide access management control measures to improve safety and traffic flow at the Premarq Center accesses. | | | | | |
| R14 | Intersection Improvements | Fort Stevens Hwy 104 (Main Ave/Skipanon Dr) at Warrenton-Astoria Hwy 105 | Medium | Option A: $1 million<br>Option B: $500,000 | 2004 Warrenton TSP | ODOT |
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements. Add capacity improvements such as:<br>Option A: Install a roundabout<br>Option B: Install a traffic signal, when warranted.<br>*Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters.* | | | | | |
| R15 | Intersection Improvements | E Harbor Dr at SE Neptune Ave | Medium | Option A: $1 million<br>Option B: $500,000 | 2004 Warrenton TSP | ODOT |
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements. Add capacity improvements such as:<br>Option A: Install a roundabout<br>Option B: Install a traffic signal, when warranted.<br>*Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters.* | | | | | |
| R16 | Intersection Improvements | East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105) | Medium | Option A: $1.2 million<br>Option B: $750,000 | 2004 Warrenton TSP | ODOT |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements. Add capacity improvements such as:<br>Option A: Modify SE Marlin Avenue approach and install a roundabout<br>Option B: Modify SE Marlin Avenue approach and install a traffic signal, when warranted.<br>*Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters.* | | | | | |
| R17 | Intersection Improvements | Delaura Beach Ln at Ridge Rd | Medium | $470,000 | 2004 Warrenton TSP | County |
| | Realign Delaura Beach Lane to intersect with Ridge Road at a T-intersection. | | | | | |
| R18 | Intersection Improvements | SE 9th St at Anchor Ave | Low | $28,000 | Stakeholders | Warrenton |
| | Add STOP-control at the intersection of SE 9th Street at SE Anchor Avenue. | | | | | |
| R19 | Intersection Improvements; Capacity | SE Marlin Ave (Warrenton-Astoria Hwy 105) at US 101 | Low | $1.1 million | 2004 Warrenton TSP | ODOT |
| | Add right-turn lanes on SE Marlin Ave (Warrenton-Astoria Hwy 105) approaches | | | | | |
| R20 | Intersection Improvements; Capacity | E Harbor Dr at US 101 | Low | $1.2 million | 2004 Warrenton TSP | ODOT |
| | Add second eastbound left-turn lane on E Harbor Drive, second northbound through lane, and second southbound through lane. | | | | | |
| R21 | Intersection Improvements; Capacity | East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105) | Low | Option A: $1.2 million<br>Option B: $400,000 | 2004 Warrenton TSP | ODOT |
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements. Add capacity improvements such as:<br>Option A: Install a roundabout<br>Option B: Add westbound left-turn lane on East Harbor Drive. This improvement would decrease traffic delays for westbound through traffic on East Harbor Drive, but further improvements would be necessary to resolve the delays on the south leg.<br>*Project is subject to ODOT approval. An engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters. Coordinate with roadway improvement R19.* | | | | | |
| R22 | Intersection Improvements; Safety | OR 104 Spur at Ensign Ln | Low | Option A: $1 million<br>Option B: $140,000 | Stakeholder | ODOT |
| | An Intersection Control Evaluation will be conducted to identify the preferred improvements. Add capacity improvements such as:<br>Option A: Install a roundabout | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| | Option B: Widen OR 104 Spur to add a dedicated westbound left-turn lane with 100 feet of storage. *Project is subject to ODOT approval. An engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters.* | | | | | |
| R23 | New Street (Connectivity) | Private road (SE 7th St): Hwy 104 (Main Ave) to SE Marlin Ave | Low | $20 million | 2004 Warrenton TSP | Private / Warrenton |
| | Construct a new local roadway by extending SE 7th Street east to connect to SE Marlin Avenue. The project assumes a new 3-lane bridge over the Skipanon Slough. | | | | | |
| R24 | Intersection Improvements; Capacity | SE Ensign Ln at Warrenton Highland Shopping Center | Low | Option A: $105,000<br>Option B: $420,000 | Stakeholders | Warrenton |
| | Provide a westbound left-turn from SE Ensign Lane to the Warrenton Highland Shopping Center.<br>Option A: Remove existing raised median and add a westbound left-turn lane to provide single-vehicle turn lane<br>Option B: Reconstruct roadway to provide a westbound left-turn lane and shared through-right<br>*Traffic counts were not collected at this intersection as part of the TSP Update and a more detailed traffic analysis is recommended before selecting a modification at this access.* | | | | | |
| R25 | Maintenance | SE Main Ct (9th – 11th) | Low | $107,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Rebuild SE Main Court between SE 9th Street and SE 11th Street. | | | | | |
| R26 | Maintenance; Street Upgrade | SE 2nd St (Main – Skipanon River Park/Anchor Ave) | Low | $281,000 (CIP estimate) | 2017 Warrenton CIP | Warrenton |
| | Rebuild SE 2nd Street between S Main Street and SE Anchor Avenue and pave from Anchor Avenue to Skipanon River Park. | | | | | |
| | **Other (Bridge, Air, Water)** | | | | | |
| O1 | Maintenance | Marina/Rivers | Medium | Cost varies | 2004 Warrenton TSP | Warrenton |
| | Improve existing water facilities | | | | | |
| O2 | Bridge | Skipanon River Br. No. 1400 | Low | $2.1 million | 2004 Warrenton TSP | ODOT |
| | Retrofit Skipanon River Bridge to address structural deficiency. | | | | | |
| O3 | Maintenance | Astoria Regional Airport | Low | TBD | 2004 Warrenton TSP | Airport |
| | Improve runway surface at Astoria Regional Airport | | | | | |

| ID | Project Type | Location | Priority | Cost Opinion (2018 dollars) | Source | Jurisdiction |
|---|---|---|---|---|---|---|
| O4 | Safety | Astoria Regional Airport | Low | TBD | 2004 Warrenton TSP | Airport |
| | Improve runway safety areas | | | | | |

SECTION 9
# TECH MEMO NINE
## FINANCE PROGRAM

# DRAFT MEMORANDUM #9

**DATE:** May 2, 2018

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates
Lorel Camacho, DKS Associates
Jasmine Teramae-Kaehuaea, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Task 5.4 Finance Program** P14180-008

The purpose of this memorandum is to present the transportation funding that is expected to be available through 2040, as well as the potential investments and associated costs identified in the solutions phase of the Transportation System Plan (TSP) process. The funding assumptions will help prioritize the investments the City can make in the transportation system, and will be utilized to develop a set of transportation improvements that will likely be funded to meet identified needs through 2040.

## Current City Funding Sources

Three general funding sources are utilized by the City for transportation, Local Motor Vehicle Fuel Tax, a System Development Charge (SDC), and State Highway Fund. In addition to City-funded projects, new private development will build some of the proposed transportation projects in Warrenton.

The City of Warrenton collects system development charges (SDCs) from new developments, which are intended to offset the burden of development on the transportation system. The funds collected are kept in a dedicated SDC fund, apart from the City's general-purpose street operations, maintenance, and capital improvements fund. State law restricts the use of SDC funds to capacity-adding projects, generally for constructing or improving portions of roadways impacted by applicable development. The SDC is a one-time fee collected at the building permit stage. The vehicle SDC rate is currently $436 per hour per trip (or $669 per single-family dwelling) based on a methodology prepared in FCS Group in 2012. The fees have not been updated or adjusted for construction cost since original adoption The City has also adopted a local, 3 cents per gallon gas tax for transportation improvements.

State funds through the State Highway Fund comes from state motor vehicle fuel taxes, vehicle registration fees, and truck weight-mile fees, and are distributed on a per capita basis. Furthermore, House Bill 2017 introduced or increased several taxes and fees such as the state gas tax and vehicle registration fees that provides new revenue to earmarked projects. By statute, the money may be used for any road-related purpose, including walking, biking, bridge, street, signal, and safety improvements. However, state highway dollars can only be spent on roads open to motor vehicles and at least 1% of these funds must be spent on bicycle and/or pedestrian infrastructure improvements.

State gas tax funds have previously failed to keep up with cost increases and inflation. With increased fuel efficiency of vehicles and the State's emphasis on reducing vehicle miles traveled, the real revenue collected has gradually eroded over time. The Oregon state fuel tax (on both gasoline and diesel) is currently 34 cents per gallon. With the passage of HB 2017, it will gradually increase by 10 cents between the years 2018 and 2024.

## Estimated Future Funding Levels

The funding sources above provide relatively stable revenue for the City of Warrenton. Based on recent and expected expenditure levels, this section discusses funding assumed to be available for the projects that will be recommended in the updated Transportation System Plan. Calculations presented here include impacts of a 27% total increase in population by the year 2040, based on the Astroia-Warrenton regional travel demand model[1].

**Revenue:** Current revenue sources are expected to provide about $21 million through 2040. This estimate is based on the assumption that the average amounts received over the previous five years will continue to be received at that per capita rate through 2040. Warrenton is expected to generate $384,000 in Local Motor Vehicle Fuel Tax and $378,000 in State Highway Fund shared revenue. House Bill 2017 is expected to contribute an additional $121,000 annually. Forecast estimated SDC revenue was based, instead, on the current SDC rates that was used in the City's SDC methodology (for residential developments $669 per single-family dwelling and for non-residential developments $436 per hour per trip) and the forecasted yearly population and employment growth through 2040. This calculation yields an estimate of $1,784,400 over the planning horizon.

**Expenditures:** Current expenditures are expected to be around $15.4 million through 2040, based on revenue and expenditures over the past five years. Over the past five years, the City averaged about $132,500 in personnel costs, $238,000 in materials and services, and $299,000 in capital costs related to operations and maintenance.

Revenue and expenditures are summarized in the table below.

## ODOT Statewide Transportation Improvement Program (STIP) Enhance Funding

ODOT has modified the process for selecting projects that receive STIP funding to allow local agencies to receive funding for projects off the state system. Projects that enhance system connectivity and improve multi-modal travel options are the focus. The updated TSP prepares the City to apply for STIP funding. It is expected that ODOT will allocate about $5 million for improvements in Warrenton over the planning horizon.

**Summary of Funds for Transportation Improvements:** About $5.5 million in City funds and $5 million in additional ODOT STIP funds are expected to be available for street improvement needs after accounting for estimated expenditures through 2040. These funds can potentially be spent on transportation improvement needs.

[1] 1 The Astoria-Warrenton regional travel demand model is managed by the Oregon Department of Transportation (ODOT) Transportation Planning and Analysis Unit (TPAU).

**Table 1: Current and Project Warrenton Transportation Funding (2018 Dollars)**

| Warrenton Transportation Funding (2018 Dollars) | | |
|---|---|---|
| **Revenue Source** | **Average Annual Amount** | **Estimated Amount Through 2040** |
| System Development Charges[1] | $ 77,600 | $ 1,784,400 |
| State Highway Funds | $ 378,000 | $ 8,694,000 |
| Local Motor Vehicle Fuel Tax | $ 384,000 | $ 8,832,000 |
| House Bill 2017 (10 Years) | $ 121,000 | $ 1,210,000 |
| Additional ODOT STIP Funds | $ 217,500 | $ 5,000,000 |
| Misc. Revenue | $ 18,500 | $ 425,500 |
| **Total Revenue** | **$ 1,196,600** | **$ 25,945,900** |
| **Expenditures** | **Average Annual Amount** | **Estimated Amount Through 2040** |
| Personnel Services | $ 132,500 | $ 3,047,500 |
| Materials & Services | $ 238,000 | $ 5,474,000 |
| Capital Expenses | $ 299,000 | $ 6,877,000 |
| **Total Expenditure** | **$ 669,500** | **$ 15,398,500** |
| **Total Estimated Funding** | **$ 527,100** | **$ 10,547,400** |

[1] Estimated SDCs were based on forecast future trip-ends rather than historical averages

# Project Investments

Taking the network approach to transportation system improvements, the projects in this plan fall within one of several categories:

- **Motor Vehicle** projects to improve connectivity, safety and capacity throughout the City. Warrenton identified 25 driving projects that will cost an estimated $46.7 million to complete.
- **Pedestrian** projects for sidewalk infill and crossing enhancements, providing seamless connections for pedestrians on major routes throughout the City. Sidewalk infill on local roads will be addressed through city code changes and these projects are expected to be financed by developers or property owners. Warrenton identified 16 walking projects on collector roadways that will cost an estimated $12 million to complete.
- **Biking** projects including an integrated network of bicycle lanes and shared roadways to facilitate convenient travel citywide. Warrenton identified five biking projects that will cost an estimated $570,000 to complete.
- **Pedestrian and Biking** projects that include both a pedestrian and bicycle improvement listed above. Warrenton identified 11 pedestrian and biking projects that will cost an estimated $9.5 million to complete.

- **Transit** projects to enhance the quality and convenience for passengers. Warrenton identified four transit projects.
- **Other** projects to improve water and airport facilities. Warrenton identified four other projects.Port of Astoria owns and manages water and streets on airport property and is working with the City to make upgrades.

Overall, Warrenton identified 65 individual transportation solutions, totaling an estimated $74 million worth of investments. Some of the projects identified in the TSP may be funded through other sources and led by development or funding partners such as Clatsop County or ODOT. Based on current funding levels, the City is expected to have funding shortfall of approximately $63.5 million to fund the projects included in the TSP. The City may wish to consider expanding its funding options in order to provide a reasonable funding strategy so improvements can be constructed in a timely manner. Potential additional funding sources are included in the next section.

# Potential Additional Funding Sources

New transportation funding options include assessments and charges, and state and federal appropriations, grants, and loans, tax increment financing (urban renewal), development agreements and public private partnerships. All of these resources can be constrained based on a variety of factors, including the willingness of local leadership and the electorate to burden citizens and businesses; the availability of local funds to be dedicated or diverted to transportation issues from other competing City programs; and the availability of state and federal funds. Nonetheless, it is important for the City to consider all opportunities for providing, or enhancing, funding for the transportation improvements included in the TSP.

The following sources have been used by cities to fund the capital and maintenance aspects of their transportation programs. There may be means to begin to or further utilize these sources, as described below, to address existing or new needs identified in the TSP.

## Transportation Utility Fee

A transportation utility fee is a recurring monthly charge that is paid by all residences and businesses within the City. The fee can be based on the number of trips a particular land use generates or as a flat fee per unit. It can be collected through the City's regular utility billing. Existing law places no express restrictions on the use of transportation utility fee funds, other than the restrictions that normally apply to the use of government funds.[2] Some cities utilize the revenue for any transportation related project, including construction, improvements and repairs. However, many cities choose to place self-imposed restrictions or parameters on the use of the funds.

Assuming a flat fee of $5.00 per month per water meter for both residential and $ 0.5 per month per square foot for non-residential uses in the City, the City could collect approximately an additional $19 million ($1.6 million average annually) for transportation related expenses through 2040. The City of Philomath, for example, charges a fee of $4

[2] Implementing Transportation Utility Fees, League of Oregon Cities

per month for single family residential units, $3.20 per month for multi-family units, and between $13.60 and $45.50 (based on type and size of the land use) per month for non-residential uses.

## ODOT All Road Transportation Safety (ARTS) Funding

ODOT All Roads Transportation Safety Program (ARTS) is used to address safety challenges on all public roads. ODOT may increase the amount of funding available for safety projects on local roads. Safety funding will be distributed to each ODOT region, which will collaborate with local governments to select projects that can reduce fatalities and serious injuries, regardless of whether they lie on a local road or a state highway.

Projects will be built into the 2021-2024 STIP timeframe. An application must be submitted to obtain ARTS funding for local roads. In addition, the funds must make use of ODOT-approved countermeasures directed towards decreasing fatal and serious injury crashes.

## Safe Routes to School

The Oregon Safe Routes to School (SRTS) Program has money allocated for projects that improve connectivity for children to walk, bike and roll to and from school. Potential grant funds are distributed as a reimbursement program through an open and competitive process. Funding is available through this program for pedestrian and bicycle infrastructure projects within two miles of schools. These funds should be pursued to implement key pedestrian and bicycle projects identified through the SRTS process.

## General Fund Revenues

At the discretion of the City Council, the City can allocate General Fund revenues to pay for its transportation program (General Fund revenues primarily include property taxes, use taxes, and any other miscellaneous taxes and fees imposed by the City). This allocation is completed as a part of the City's annual budget process, but the funding potential of this approach is constrained by competing community priorities set by the City Council. General Fund resources can fund any aspect of the program, from capital improvements to operations, maintenance, and administration. Additional revenues available from this source are only available to the extent that either General Fund revenues are increased or City Council directs and diverts funding from other City programs.

## Urban Renewal District

An Urban Renewal District (URD) would be a tax-funded district within the City. The URD would be funded with the incremental increases in property taxes that result from construction of applicable improvements. This type of tax increment financing has been used in Oregon since 1960. Use of the funding includes, but is not limited to, transportation. Improvements are funded by the incremental taxes, rather than fees.

## Local Improvement Districts

Local Improvement Districts (LIDs) can be formed to fund capital transportation projects. LIDs provide a means for funding specific improvements that benefit a specific group of property owners. LIDs require owner/voter approval and a specific project definition. Assessments are placed against benefiting properties to pay for improvements. LIDs can be matched against other funds where a project has system wide benefit beyond benefiting the adjacent properties. LIDs are often used for sidewalks and pedestrian amenities that provide local benefit to residents along the subject street.

## Debt Financing

While not a direct funding source, debt financing can be used to mitigate the immediate impacts of significant capital improvement projects and spread costs over the useful life of a project. This has been successful recently in Oregon communities such as Bend and McMinnville, where general obligation (GO) bond measures were passed. Key to the measures' success was that the increased property taxes were earmarked toward a defined set of projects with strong public support.

Though interest costs are incurred, the use of debt financing can serve not only as a practical means of funding major improvements, but is also viewed as an equitable funding strategy, spreading the burden of repayment over existing and future customers who will benefit from the projects. The obvious caution in relying on debt service is that a funding source must still be identified to fulfill annual repayment obligations.

# Developing the Plan

Warrenton must make investment decisions to develop a set of transportation improvements that will likely be funded to meet identified needs through 2040. The City is expected to have approximately $10.5 million to cover project costs identified for the highest priority projects. Unless the City expands its funding options, most of the transportation solutions identified for the City are not reasonably likely to be funded through 2040. For this reason, the transportation solutions will be split into three categories. Those reasonably expected to be funded by 2040 were included in the Likely Funded Transportation System, those that may be funded if additional funding sources are identified are included in the Possibly Funded Transportation System, and the projects that are not expected to be funded by 2040 were included in the Aspirational Transportation System.

## Likely Funded Transportation System

The Likely Funded Plan identifies the transportation solutions reasonably expected to be funded by 2040 and have the highest priority for implementation. Using the eight goals (see Technical Memorandum #4- Goals, Objectives and Evaluation Criteria), the transportation solutions were evaluated and compared to one another. Greater value was placed on the projects stakeholders felt were most important to the community. About $10.5 million worth of investments, shown in the table below, are included in the Likely Funded Transportation System.

**Likely Funded Projects**

| Project No. | Description | Location | Cost |
|---|---|---|---|
| BP1 | Improve wayfinding signage and visibility of Warrenton Waterfront Trail. Provide a bicycle wayfinding signage network to help guide bicyclists to and from local destinations via bike routes and trails. | Warrenton Waterfront Trail | $50,000 |
| BP2 | Provide a path connection and wayfinding for the Airport Dike Trail to cross US 101 at Harbor Drive. | Airport Dike Trail: US 101 at Harbor Dr | $133,000 |
| BP3 | Install bicycle parking at points of interest, such as downtown Warrenton, the City Park and the Warrenton Soccer Complex. | Parks, downtown, soccer complex | $5,000 |
| BP4 | Improve pedestrian crossing at Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave | Fort Stevens Hwy 104, Warrenton-Astoria Hwy 105 (E Harbor Dr) and Skipanon Dr/Main Ave | $100,000 |

| Likely Funded Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| BP5 | Construct a 10-foot wide multi-use path on the east side of Ridge Road from SW 9th Street to the north edge of the Warrenton Soccer Complex. | Ridge Rd: SW 9th St north along soccer fields | $200,000 |
| BP6 | Construct an at-grade pedestrian crossing of Ridge Road at the Warrenton Soccer Complex with high visibility paint and advanced signage. | Soccer fields and across/along Ridge Rd | $20,000 |
| BP7 | Enhance bicycle connectivity in Hammond.<br>Option A: Install wayfinding and sharrows on parallel routes (6th and 7th) through Hammond and provide high visibility crosswalk across Pacific Drive.<br>Option B: Construct curb, gutter and sidewalks on Pacific Drive through Hammond | Pacific Dr (Hammond) | $50,000 |
| BP8 | Add bicycle route designation signage for length of Warrenton-Astoria Hwy 105 within Warrenton city limits. | Warrenton-Astoria Hwy 105 | $25,000 |
| BP9 | Install high visibility crosswalk at the intersection of Fort Stevens Hwy 104 (Main Avenue) at SW 9th Street to enhance visibility of crossing near elementary school. | Fort Stevens Hwy 104 (Main Ave) at SW 9th St | $2,000 |
| BP10 | Upgrade curb and crosswalks to be ADA-compliant at Warrenton Elementary School. | SW Cedar Ave at SW 7th St | $40,000 |
| BP11 | New marked crosswalks near community center/park. The crossings at SW 4th Street would also require installation of new curb. | SW Alder Ave at SW 3rd St and SW 4th St | $30,000 |
| BP12 | Enhance bicycle visibility on New Youngs Bay Bridge.<br>Option A: Install signage indicating bicyclists in outer lane.<br>Option B: Install additional bike detection for cyclists traveling along the bridge | New Youngs Bay Bridge | $500,000 |
| BP25 | Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Neptune Avenue between Harbor Drive and US 101. | SE Neptune Ave: E Harbor Dr to US 101 | $1,400,000 |

| Likely Funded Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| BP27 | Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Marlin Avenue to US 101. | Warrenton-Astoria Hwy 105 (E Harbor Dr): Marlin Ave to US 101 | $1,600,000 |
| BP28 | Widen road to provide additional paved width for pedestrian connectivity on Delaura Beach Lane. | Delaura Beach Ln: Pine Dr to Ridge Rd | $1,400,000 |
| T1 | Extend hours, decrease headway, review scheduling, improve efficiency of dial-a-ride program, meet the needs of future demands, improve connections, and advertise and promote services. | City wide | TBD |
| T2 | Modernize transit stops to accommodate mobility devices | City wide | TBD |
| T3 | Install transit shelters and kiosks on US 101 and both the north and south ends of the New Youngs Bay Bridge. | US 101 North and South of the New Youngs Bay Bridge | TBD |
| R1 | Modify intersection to accommodate WB-62 trucks with a minimum turning radius of 45 degrees. This project rebuilds the intersection and includes water quality facilities, a new drainage system, concreate walks and curb. | Fort Stevens Hwy 104 (Main Ave/Skipanon Dr) at Warrenton-Astoria Hwy 105 | $3,000,000 |
| R5 | Construct new section of SW 2nd Street to improve connectivity. Design will involve determining if any wetland mitigation needs to be done. Potential wetland mitigation not included in estimate. | SW 2nd St (Elm – Gardenia) | $315,000 |
| R6 | Rebuild SW Alder Avenue with curbs from 1st Street to 2nd Street, grind, and overlay from 2nd Street to 3rd Street. | SW Alder Ave Reconstruction Project (SW 1st – SW 3rd) | $185,000 |
| R10 | Construct shoulder widening of three feet on both sides (conservative estimate) of Fort Stevens Hwy 104 (Main Avenue) between 14th Street to just south of the spur to provide additional paved width. The estimate includes a new drainage system and two water quality facilities. | Fort Stevens Hwy 104 (Main Ave) – 14th St to South of Spur | $1,100,000 |
| R12 | Improve SW 4th Street between S Main Avenue and SW Alder Court and add sidewalk. Also includes drainage and power line improvements. | SW 4th St: S Main Ave to SW Alder Ct | $296,000 |

## Possibly Funded Transportation System

The Possibly Funded Plan identifies additional transportation solutions that could be funded if the City develops new revenue sources. If the new funding sources do not become viable options, these projects would not be funded. The assumed possible new sources are summarized in the table below.

| Potential New Funding Source | |
|---|---|
| Description | Estimated Amount Through 2040 |
| Transportation Utility Fee | $19,000,000 |
| **Total New Revenue** | $19,000,000 |

Using these potential new funding sources, the additional projects in Possibly Funded table could be funded. More projects could be funded through other sources, such as development, state or federal funding, urban renewal districts, local improvement districts, and reallocating general fund and lodging tax revenues to transportation projects. The Possibly Funded Transportation System includes about $18.7 million in transportation investments.

| Possibly Funded Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| BP13 | Construct a new trail connection from the KOA access east to NW Warrenton Drive following the NW 11th Street alignment. Includes excavation and embankment. | KOA access/NW 11th alignment | $2,700,000 |
| BP14 | Install bicycle facilities along Fort Stevens Hwy 104 (Main Avenue):<br>Option A: Install sharrows and "share the road" signage<br>Option B: Remove parking on one side of the roach and widening where needed to provide striped bicycle facilities | Fort Stevens Hwy 104: Harbor Dr to 9th St | $30,000 |
| BP15 | Construct sidewalks on both sides of SE 19th Street south of Ensign Lane. Project includes new sidewalk, curb and gutter on the north/east side of the road and extends the sidewalk on the south/west side of the road. | SE 19th: Ensign Ln to Chokeberry Ave | $1,600,000 |
| BP16 | Construct a 10-foot wide multi-use path on one side of Pacific Drive from Lake Drive to Fort Stevens State Park entrance. | Hammond to Fort Stevens State Park | $600,000 |
| BP17 | Provide enhanced bicycle and pedestrian connectivity along SW 9th Street.<br>Option A: Widen sidewalk to 10 feet on north side<br>Option B: Multiuse path (Cedar Dr to Ridge Rd) | SW 9th St: SW 9th St to Ridge Rd | $1,160,000 |

| Possibly Funded Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| BP18 | Stripe bicycle lane stencil on both sides of the road for length of Fort Stevens Hwy 104 Spur to indicate bicyclists are present. | Fort Stevens Hwy 104 Spur | $10,000 |
| BP19 | Construct curb, gutter and sidewalks on the east side of Fort Stevens Hwy 104 between SW 3rd Street and SE 9th Street. | Fort Stevens Hwy 104:SW 3rd St to SE 9th St | $1,400,000 |
| BP20 | Construct bicycle lanes, curb, gutter and sidewalks on both sides of SE Marlin Avenue between Harbor Drive and SE 6th Street. | Warrenton-Astoria Hwy 105 (SE Marlin Ave): Harbor Dr to SE 6th St | $1,500,000 |
| BP23 | Provide bicycle and pedestrian improvements at the OR 104S bridge over the Skipanon River<br>Option A: Advanced signing and striping to share the road with pedestrian and bicyclists<br>Option B: Cantilever multi-use path on one side of bridge | Skipanon River Br. No. 1400 | $25,000 |
| BP24 | Construct multi-use path from north end of Burman Road to connect to Fort Stevens State Park trail system. | Along Burma Rd to Delaura Beach Rd | $300,000 |
| BP29 | Provide sidewalks on S Main Ave | S Main Ave and SW 14th Pl (Orchard Subdivision) | $24,000 |
| BP30 | Provide multi-use trail along NW 13th St between Warrenton Dr and River Front Trail. | NW 13th St and Warrenton Dr Trail | $113,000 |
| R2 | Rebuild N Main Avenue and NW 7th Place between NW Warrenton Dr and NE 5th Street to improve rideability. (Would also include water system upgrades of $500,000) | N Main Ave and NW 7th Pl (NW Warrenton Dr to NE 5th St) | $367,000 |
| R4 | This project would allocate the SDC funds for street improvements throughout the city. | City of Warrenton | $742,400 |
| R7 | Rebuild SE Main Court between SE 9th Street and SE 11th Street. | SE Main Ct (9th – 11th) | $107,000 |
| R9 | Modify signal timing to optimize traffic operations (e.g. Flashing yellow arrows, cycle length, optimize signal splits, protecting/permitted phasing) | US 101 at Harbor, Marlin and Neptune | $30,000 |
| R14 | Construct a new road by extending SE 19th St north (connectivity project). Project assumes minor collector cross-section. | 19th to Jetty or King | $1,700,000 |

| Possibly Funded Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| R15 | Construct a new road by extending NW/SW Juniper Avenue (connectivity project). Project assumes minor collector cross-section and accounts for excavation and embankment work. | NW/SW Juniper Ave: SW 9th St to Ridge Rd | $3,800,000 |
| R16 | Provide access management control measures to improve safety and traffic flow at the Premarq Center accesses. | Premarq Center accesses | $10,000 |
| R17 | Install a traffic signal, when warranted. Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters. | Fort Stevens Hwy 104 (Main Ave/Skipanon Dr) at Warrenton-Astoria Hwy 105 | $500,000 |
| R18 | Install a traffic signal, when warranted. Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager, who will forward intersection traffic control recommendations to ODOT headquarters. | E Harbor Dr at SE Neptune Ave | $500,000 |
| R19 | Modify SE Marlin Avenue approach and install a traffic signal, when warranted. Project is subject to ODOT approval. Before a signal can be installed, an engineering investigation must be conducted or reviewed by the Region Traffic Manager who will forward intersection traffic control recommendations to ODOT headquarters. | East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105) | $750,000 |
| R20 | Realign Delaura Beach Lane to intersect with Ridge Road at a T-intersection. | Delaura Beach Ln at Ridge Rd | $470,000 |

## Aspirational Transportation System

The projects and actions outlined within the Likely Funded System and Possibly Funded System will significantly improve Warrenton's transportation system. If the City is able to implement a majority of the Likely Funded System and Possibly Funded System, nearly two decades from now Warrenton residents will have access to a safer, more balanced multimodal transportation network.

The Aspirational Transportation System identifies those transportation solutions that are not reasonably expected to be funded by 2040, but many of which are critically important to the transportation system. Some of the projects will require funding and resources beyond what is available in the time frame of this plan. Others are contingent upon redevelopment that makes it possible to create currently missing infrastructure, such as sidewalk connections.

The Aspirational Transportation System, shown in the table below, includes about $45.2 million worth of investments.

| Aspirational Projects | | | |
|---|---|---|---|
| **Project No.** | **Description** | **Location** | **Cost** |
| BP21 | Construct curb, gutter and sidewalks on both sides of Fort Stevens Hwy 104 Spur:<br>Phase 1: Hwy 104 (Main Ave) to Ensign Ln<br>Phase 2: Ensign Ln to US 101 | Fort Stevens Hwy 104 Spur | $3,300,000 |
| BP22 | Improve pedestrian amenities along the Warrenton Waterfront Trail including restrooms, lighting, trash receptacles | Warrenton Waterfront Trail | - |
| BP26 | Construct curb, gutter and sidewalks on both sides of Warrenton-Astoria Hwy 105 (E Harbor Drive) from Fort Stevens Hwy 104 (Main Avenue) to Marlin Avenue. | Warrenton-Astoria Hwy 105 (E Harbor Dr): Fort Stevens Hwy 104 (Main Ave) to Marlin Ave | $3,200,000 |
| BP31 | Construct sidewalk on south side of Ensign Ln | Fort Stevens Hwy 104 Spur to US 101 | $472,000 |
| BP32 | Pave top of Airport Dike Trail from Hwy 105 by Lewis and Clark bridge to US 101. | Airport Dike Trail | $3,300,000 |
| T4 | Increase transit amenities throughout the city (covered shelters, signage, and bus pullouts). | City wide | - |
| R8 | Rebuild SE 2nd Street between S Main Street and SE Anchor Avenue and pave from Anchor Avenue to Skipanon River Park. | SE 2nd St (Main – Skipanon River Park/Anchor Ave) | $281,000 |

| Aspirational Projects | | | |
|---|---|---|---|
| Project No. | Description | Location | Cost |
| R11 | Rebuild SE Anchor Avenue and add sidewalk between Harbor Street and SE 3rd Street. Also includes drainage and power line improvements. | SE Anchor Ave: Harbor St to SE 3rd St | $654,000 |
| R13 | Rebuild and widen roadway to accommodate WB 62 trucks. This improvement supports a truck route by rebuilding the intersection of Hwy 104 (Warrenton Drive) at 5th Street and roadway improvements along Skipanon Drive and 5th Street. Project assumes new water quality facilities, drainage system, curb, gutter and sidewalks. | 5th St: Hwy 104 (Warrenton Dr) to Skipanon Dr | $9,000,000 |
| R21 | Add STOP-control at the intersection of SE 9th Street at SE Anchor Avenue. | SE 9th St at Anchor Ave | $28,000 |
| R22 | Add right-turn lanes on SE Marlin Ave (Warrenton-Astoria Hwy 105) approaches | SE Marlin Ave (Warrenton-Astoria Hwy 105) at US 101 | $1,100,000 |
| R23 | Add second eastbound left-turn lane on E Harbor Drive, second northbound through lane, and second southbound through lane. | E Harbor Dr at US 101 | $1,200,000 |
| R24 | Add westbound left-turn lane on East Harbor Drive. This improvement would decrease traffic delays for westbound through traffic on East Harbor Drive, but further improvements would be necessary to resolve the delays on the south leg. | East Harbor Dr at SE Marlin Ave (Warrenton-Astoria Hwy 105) | $400,000 |
| R25 | Widen OR 104 Spur to add a dedicated westbound left-turn lane with 100 feet of storage. | OR 104 Spur at Ensign Ln | $140,000 |
| R26 | Construct a new local roadway by extending SE 7th Street east to connect to SE Marlin Avenue. The project assumes a new 3-lane bridge over the Skipanon Slough. | Private road (SE 7th St): Hwy 104 (Main Ave) to SE Marlin Ave | $20,000,000 |
| O1 | Improve existing water facilities | Marina/Rivers | - |
| O2 | Retrofit Skipanon River Bridge to address structural deficiency. | Skipanon River Br. No. 1400 | $2,100,000 |
| O3 | Improve runway surface at Astoria Regional Airport | Astoria Regional Airport | - |
| O4 | Improve runway safety areas | Astoria Regional Airport | - |

# SECTION 10
# TECH MEMO TEN
## TRANSPORTATION STANDARDS

# MEMORANDUM #10

**DATE:** June 18, 2018

**TO:** Warrenton TSP Project Management Team

**FROM:** Ray Delahanty, AICP, DKS Associates
Lorel Camacho, DKS Associates
Jasmine Teramae-Kaehuaea, DKS Associates

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Task 5.4 Transportation Standards** P14180-008

This memorandum recommends transportation system standards for the City of Warrenton, including recommended modifications to the existing standards to be adopted as part of the Transportation System Plan update. Warrenton applies transportation standards and regulations to the construction of new transportation facilities and to the operation of all facilities to ensure the system functions as intended and investments are not wasted. These standards reflect the goals of the City for a safe and efficient transportation system and enable consistent future actions. This section highlights recommended modifications to the standards to be adopted as part of the Transportation System Plan update.

## Street Functional Classification

Street functional classification is an important tool for managing the roadway network. The street functional classification system recognizes that individual streets do not act independently of one another but instead form a network that works together to serve travel needs on a local and regional level. By designating the management and design requirements for each roadway classification, this hierarchal system supports a network of streets that perform as desired.

### Consistency with Federal Naming Conventions

Aligning Warrenton's functional classification naming conventions with federal naming conventions may facilitate future efforts to obtain federal funding for local improvement projects. Recommended updates to the City's classification designations are shown in Table 1.

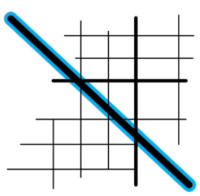
**Table 1: Proposed Federally-Aligned Functional Classification Naming Conventions**

| Proposed Federally-Aligned Functional Classification Naming Conventions | |
|---|---|
| Existing Classification Name | Proposed Aligned Classification Name |
| Arterial | Principal Arterial<br>Minor Arterial |
| Collector | Major Collector<br>Minor Collector |
| Local Street | Local Street |

## Recommended Functional Classification System

The recommended functional classification system for roadways in the City of Warrenton is described below. The functional classification map, Figure 1, shows the recommended classification for all roadways in the city, including new street extensions proposed as part of the motor vehicle system improvements.

Classifications shown for County roads inside the Warrenton UGB reflect the City's desired function for those facilities. These classifications may not match those shown in Clatsop County's TSP.



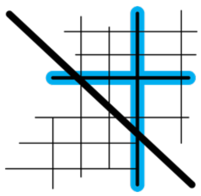
**Principal and Minor Arterials**

Principal arterials provide a high degree of mobility between major centers of metropolitan areas, as well as rural areas. They often serve high volumes of traffic (>10,000 daily vehicles) over long distances, typically maintain higher posted speeds (45 mph to 55 mph), and minimize direct access to adjacent land to support the safe and efficient movement of people and goods. Inside urban growth boundaries, speeds may be reduced to reflect the roadside environment and surrounding land uses. US 101 is the only principal arterial in the city.

Minor arterials provide service for trips of moderate length and serve geographic areas that are smaller than their higher-volume principal arterial counterparts. Because they primarily serve longer trips within the city, they should, where feasible, be provided in continuous lengths of multiple miles rather than in short segments. In an urban context, they are often used as a transition between principal arterials and collectors. Minor arterials typically serve higher volumes of traffic (>5,000 daily vehicles) at moderate to high speeds, with posted speeds generally no lower than 30 mph, unless they are passing through a downtown area.

Principal and minor arterial streets are often the fastest and most direct routes for all modes of travel, including people walking and biking. However, facilities for people walking and biking should be designed to provide a greater degree of separation from the higher volumes and speeds of auto traffic. Wider and more heavily traveled principal and minor arterial streets can also present barriers for people walking and biking where they need to cross the street to reach a destination. Therefore, the need for enhanced crossing opportunities may be greater.

Suggested spacing of minor arterial streets varies from 2 to 3 miles in suburban fringes to not more than 1 mile in fully developed areas. Access to adjacent land is provided but is a low priority.

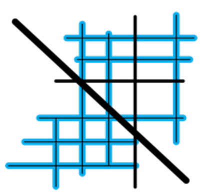


**Major and Minor Collectors**

Collectors serve a critical role in the roadway network by connecting traffic from local streets with the arterial network. Major collector routes are generally distinguished from minor collector routes by longer length; lower connecting driveway densities; higher speed limits; greater spacing intervals; higher traffic volumes; and may have more travel lanes. The general traffic volume on a major collector ranges from 1,200 to 5,000 daily vehicles and speeds are often managed between 25 mph and 35 mph. The typical traffic volume on a minor collector ranges from 1,200 to 3,000 daily vehicles and speeds are managed to no more than 25 mph.

Due to the lower auto traffic volumes and speeds compared to arterials, traveling on major and minor collectors is generally more comfortable for people walking and biking. However, separate biking facilities are still needed.

The maximum interval for spacing collector streets should be approximately 1,500 feet. While access and mobility are more balanced than on arterials, new driveways serving residential units should not be permitted where traffic volume forecasts exceed 5,000 vehicles per day.

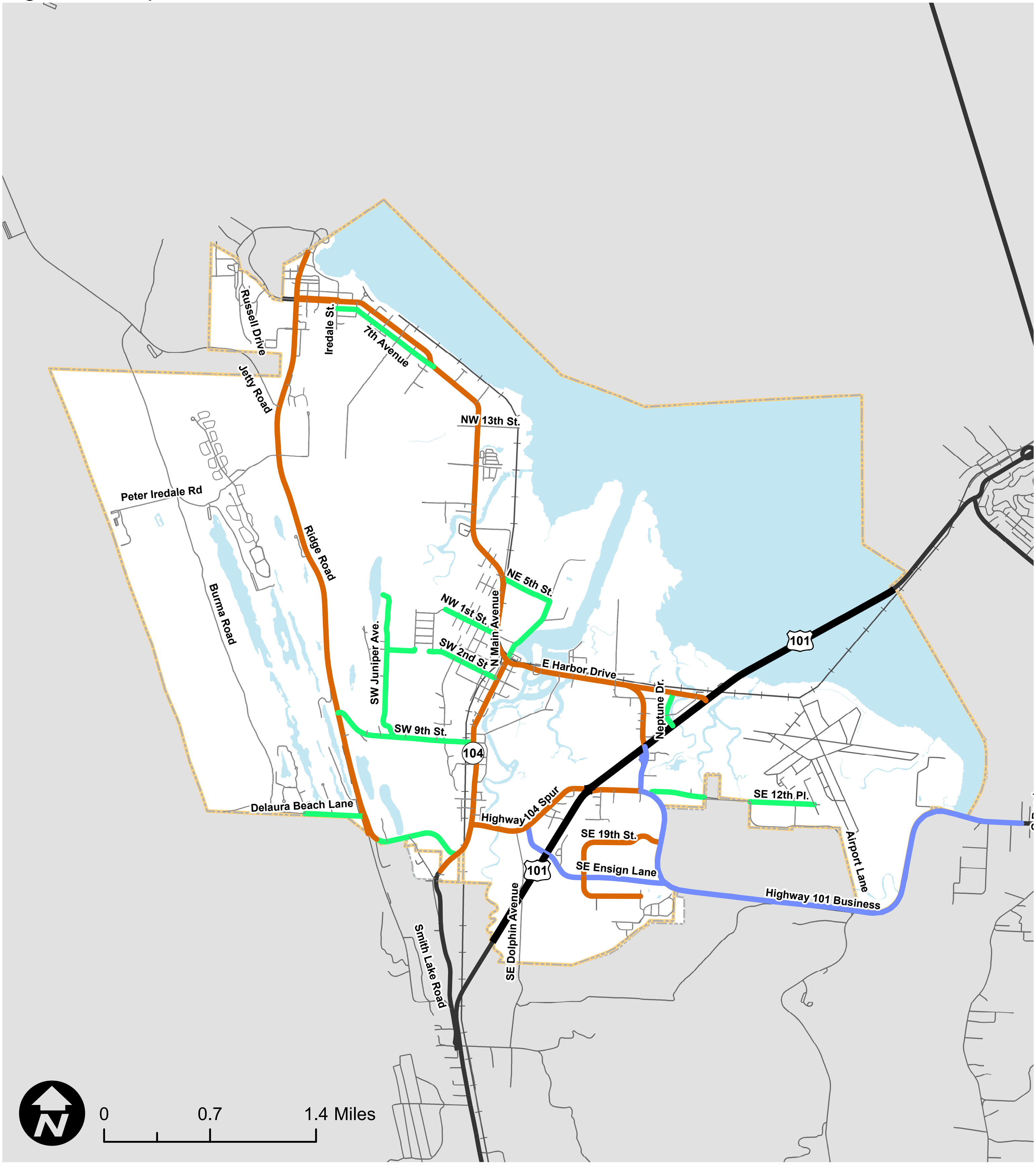


**Local Streets**

Local streets prioritize provision of immediate access to adjacent land. These streets should be designed to enhance the livability of neighborhoods and should generally accommodate less than 2,000 vehicles per day. When traffic volumes reach 1,000 to 1,200 vehicles per day through residential areas, safety and livability can be degraded. A well-connected grid system of relatively short blocks can minimize excessive volumes of motor vehicles and limits out-of-direction travel, encouraging more use by people walking and biking. Speeds are not normally posted, with a statutory 25 mph speed limit in effect. Local streets are not intended to support long distance travel and are often designed to discourage through traffic.

Local streets typically provide low-stress travel routes for people walking and biking. Due to lower vehicle volumes and speeds, dedicated bicycle facilities are not required on local streets and cyclists can share the lane with vehicles. Dedicated pedestrian facilities are required, however, even curb-adjacent sidewalks on local streets can still provide a high level of comfort.

Figure 1: Proposed Functional Classification




**Functional Classification**

- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Street
- Railroad
- City Limit
- UGB
- Water Bodies

DKS

## Proposed Functional Classification Changes in Warrenton

The following changes to street functional classifications are proposed to improve the network design and mobility within the City of Warrenton and to achieve consistency with the Federal Functional Classification system. Changes to the existing functional classifications will require coordination with ODOT to follow the formal process to update the federal classification map.

**Table 2: Proposed Functional Classification Changes**

| Proposed Functional Classification Changes | | |
|---|---|---|
| Roadway | Existing Functional Classifications | Proposed Functional Classification |
| De Laura Beach Lane – Ridge Road to West Terminus | Collector | Minor Collector |
| De Laura Beach Lane/18th Street – Main Street/Fort Stevens Highway 104 to Ridge Road | Collector | Minor Collector |
| SW 9th Street – Main Street/Fort Stevens Highway 104 to Ridge Road | Collector | Minor Collector |
| Ridge Road/Columbia Beach Road –Jetty Road to De Laura Beach Lane/18th Street | Collector | Major Collector |
| Lake Drive – Jetty Road to Hammond Marina | Collector | Major Collector |
| Seventh Avenue – Warrenton Drive/Fort Stevens Highway 104 to Iredale Road | Collector | Minor Collector |
| Highway 104 – Ridge Road to South UGB | Collector | Minor Arterial |
| NE 5th Street – Warrenton Drive/Fort Stevens Highway 104 to NE Skipanon Drive | Collector | Minor Collector |
| NE Skipanon Drive – NE 5th Street to Warrenton-Astoria Highway | Collector | Minor Collector |
| NW 1st Street – Fort Stevens Highway 104 to SW Elm Avenue | Collector | Minor Collector |
| SW 2nd Street – Fort Stevens Highway 104 to SW Juniper Avenue | Collector | Minor Collector |
| Juniper Avenue – SW 9th Street to North Terminus | Collector | Minor Collector |
| NE Neptune Avenue – Highway 101 to E Harbor Drive | Collector | Minor Collector |
| SE 19th Street – Highway 101 Bypass/Warrenton-Astoria Highway to SW Willow Drive | Collector | Major Collector |
| Ensign Lane – Highway 101 to Highway 104s Fort Stevens Highway Spur | Collector | Minor Arterial |
| Ensign Lane – Highway 101 to East UGB | Arterial | Minor Arterial |
| SE 12th Place – Highway 101 Bypass/Warrenton-Astoria Highway to Airport | Collector | Minor Collector |
| E Harbor Street – NE Skipanon Drive to Highway 101 | Collector | Major Collector |

| Proposed Functional Classification Changes cont. | | |
|---|---|---|
| Roadway | Existing Functional Classifications | Proposed Functional Classification |
| Main Avenue – E Harbor Street to Highway 104s Fort Stevens Highway Spur | Collector | Major Collector |
| Highway 104S Fort Stevens Highway Spur – Main Street/Highway 104 Fort Stevens Highway to 12th Place | Collector | Major Collector |
| Highway 101 – West UGB to East UGB | Arterial | Principal Arterial |

# Truck Routes

Streets designated as Truck Routes in Warrenton are recognized as being appropriate and commonly traveled corridors for truck passage. Decisions affecting maintenance, operation, or construction on a designated truck route must address potential impacts on the safe and efficient movement of truck traffic. However, the intent is not to compromise the safety of other street users to accommodate truck traffic, especially in areas where many conflicts with vulnerable travelers (e.g., people walking and biking) may be present. The following local roads that provide access to industrial areas and help to minimizing truck volumes in downtown have been proposed as designated Truck Routes in the currently adopted TSP:

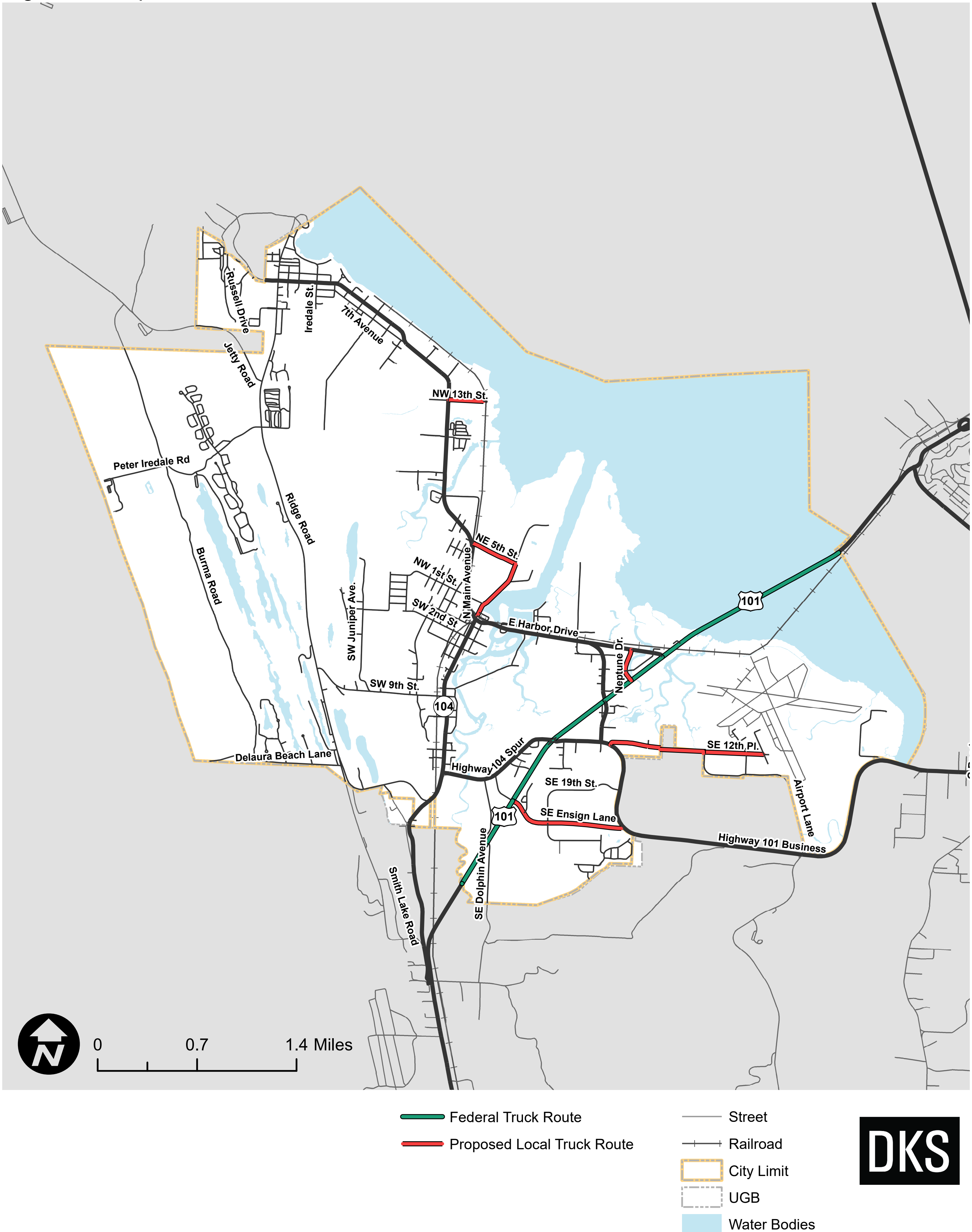
- NW 13th Street
- NE 5th Street
- NE Skipanon Drive
- SE 12th Place
- SE Ensign Lane
- SE Neptune Avenue

Designating these streets as local truck routes would establish the movement of truck traffic as a priority when considering future decisions such as whether to allow on-street parking, addressing requests for traffic calming, determining the need for separate biking facilities, or making changes to the physical curb-to-curb width and corner radii.

As noted in Technical Memorandum #2, US 101 (No. 9) is classified as a Statewide Highway, part of the National Highway System (NHS), a Truck Route, and a Scenic Byway. US 101B Business (No. 105), Fort Stevens Highway 104, and OR-104S (Fort Stevens Spur) are classified as District Highways with no other designations.

The design and management of the Truck Routes through Warrenton is subject to a number of policies and standards in the Oregon Highway Plan and Highway Design Manual intended to maintain safe and efficient movement of large vehicles.

Figure 2: Proposed Truck Routes



## Tsunami/Earthquake Evacuation Routes

Much of the coast line surrounding Warrenton, including downtown Warrenton, falls under a distant tsunami evacuation zone, while the majority of remaining area within Warrenton should evacuate if a local Cascadia earthquake occurs. Much of the land surrounding the Skipanon River also falls under a distant tsunami evacuation zone. The safest evacuation areas within Warrenton include Ridge Road and the area bounded by southeast of US 101, Ensign Lane, and US 101B. These include congregation areas near Ridge Road and Southwest 9th Road, Ridge Road and Southwest Long Lake Drive, and Ensign Lane and Southeast 19th Street. Most evacuation routes follow the collector and arterial road network, with prominent routes including Ridge Road, OR 104, US 101, and East Harbor Road. However, because much of OR 104 falls under a distant tsunami zone and includes two bridges—one over Alder Creek and one over the Skipanon River that connects OR 104 to Northwest Harbor Place—there are inherent risks in relying on this as an evacuation route. If this route fails, there are limited possibilities for residences along the northeastern shoreline to evacuate. However, if Ridge Road can be reached, its relatively high elevation and capacity provide sufficient support to move people south to safe congregation areas.

**Table 3: Inventory of Arterial and Collector Evacuation Routes**

| Inventory of Arterial and Collector Evacuation Routes | | | |
|---|---|---|---|
| Roadway Name | Functional Classification | Jurisdiction | Important Uses |
| US 101 (Oregon Coast Hwy) | Principal Arterial | State | NHS, High Clearance Route, Tier 3 lifeline route, Evacuation Route |
| OR 104/Ft. Stevens Hwy | Major Collector | State | Evacuation Route |
| US 101B/Warrenton-Astoria Hwy | Major Collector/Minor Arterial | State | Evacuation Route |
| E Harbor St | Major Collector | State | Evacuation Route |
| Ridge Rd | Major Collector | Clatsop County | Evacuation Route |
| SE Ensign Ln | Major Collector | Clatsop County/Municipal Street | Evacuation Route |
| OR 104S | Major Collector | State | Evacuation Route |
| Marlin Ave | Minor Collector | State | Evacuation Route |
| SW 18th St | Major Collector | City of Warrenton | Evacuation Route |
| SE 12th Pl | Minor Arterial | City of Warrenton | Evacuation Route |

## Roadway and Shared-Use Path Cross-Sections

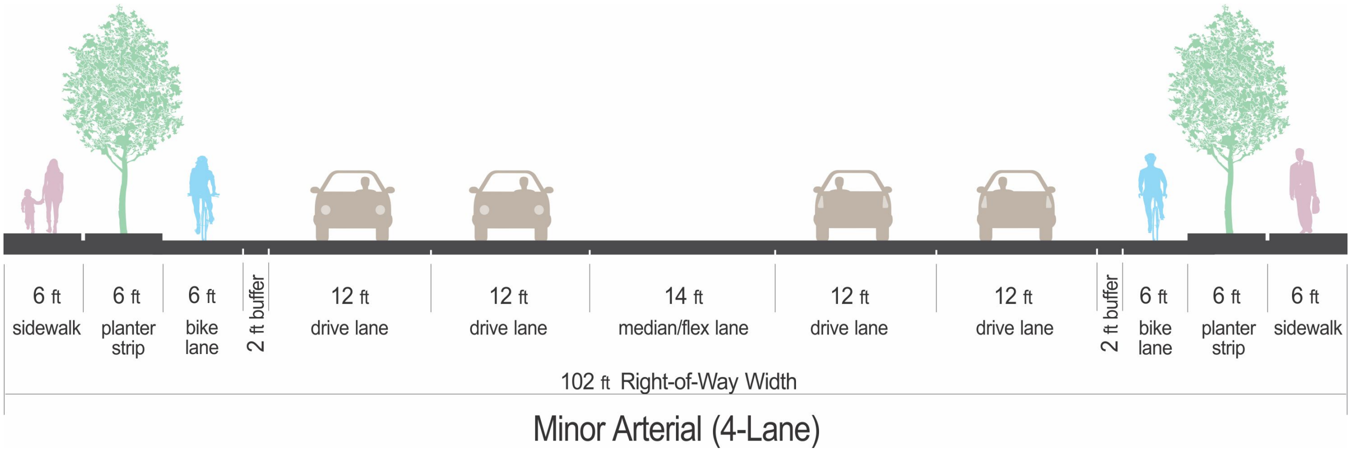
Roadway cross-section standards identify the design characteristics needed to meet the function and demand for each City of Warrenton transportation facility type. Since the actual design of a roadway can vary from segment to segment due to adjacent land uses and demands, this system allows standardization of key characteristics to provide consistency, while providing application criteria that allow some flexibility in meeting the design standards.

Figures 3 through 8 and Table 4 through 7 illustrate the standard cross-sections for minor arterials, major collectors, minor collectors, local streets, and shared-use paths in the City of Warrenton. These street standards are compliant with the Oregon Transportation Planning Rule, which specifies that local governments limit excessive roadway widths. They are intended to be used as guidelines in the development of new roadways and the upgrade of existing roadways. Planning level right-of-way needs can be determined using these figures. Under some conditions a variance to the street standards may be requested from the City-appointed engineer to consider the alternative minimum cross-section or other adjustments. Typical conditions that may warrant consideration of a variance include:

- Infill sites
- Innovative designs
- Severe constraints presented by topography, environmental, or other resources present
- Existing developments and/or buildings that make it extremely difficult or impossible to meet the standards

Roadways under ODOT jurisdiction are subject to design standards in ODOT's Highway Design Manual. Roadways under Clatsop County jurisdiction are subject to design standards in the Clatsop County TSP.

**Figure 3: Proposed 4-Lane and 2-Lane Minor Arterial Typical Cross-Section Standards**



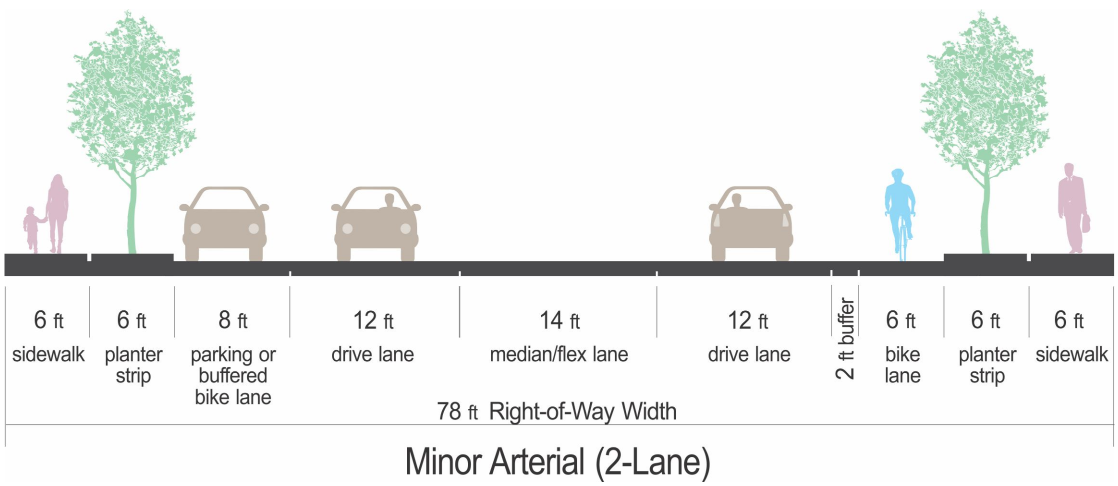



**Table 4: Proposed Minor Arterial Typical Cross-Section Standards and Alternative Minimum Standards**

| Minor Arterial | | | | | |
|---|---|---|---|---|---|
| Width | 4-Lane Standard | 4-Lane Alternative Minimum | 2-Lane Standard | 2-Lane Alternative Minimum | Considerations |
| Right-of-Way | 102 ft. | 80 ft. | 78 ft. ~~80 ft.~~ (82 ft.)[1] | 58 ft. (66 ft.)[1] | Median/flex lane and planting strips is optional depending on surrounding land use and available right-of-way. |
| Curb-to-Curb Pavement | 78 ft. | 64 ft. | 54 ft. (58 ft.)[1] | 34 ft. ~~40 ft~~. (42 ft.)[1] | The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer. |
| Travel Lanes | 12 ft. | 11 ft. | 12 ft. (14 ft.)[1] | 11 ft. ~~12 ft.~~ (14 ft,)[1] | |
| Median/Flex Lane | 14 ft. | None | 14 ft. | None | On-street parking is not permitted on 4-lane minor arterial streets. On-street parking is permitted in place of bike lanes on 2-lane minor arterial streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes. |
| Bike Lanes | 8 ft. | 6 ft. | 8 ft. | 6 ft. ~~8 ft.~~ | |
| On-Street Parking | None | None | 8 ft. | 7 ft. ~~8 ft.~~ | |
| Curb | Yes | Yes | Yes | Yes | |
| Planting Strip | 6 ft. | 6 ft. | 6 ft. | 6 ft. | |
| Sidewalks | 6 ft. | 6 ft. | 6 ft. | 6 ft. | |

*Changes from the Municipal Code Section 16.136.020 are shown in underlined text and existing standards where changes are proposed are shown in ~~strikethrough text~~. Text not underlined or stricken is consistent with the City's current standard.

[1]Width if on-street parking is constructed in place of bike lanes.

[2]Minor arterials under ODOT jurisdiction have to follow Oregon Highway Plan and Highway Design Manual.

**Figure 4: Proposed Major Collector Typical Cross-Section Standard**

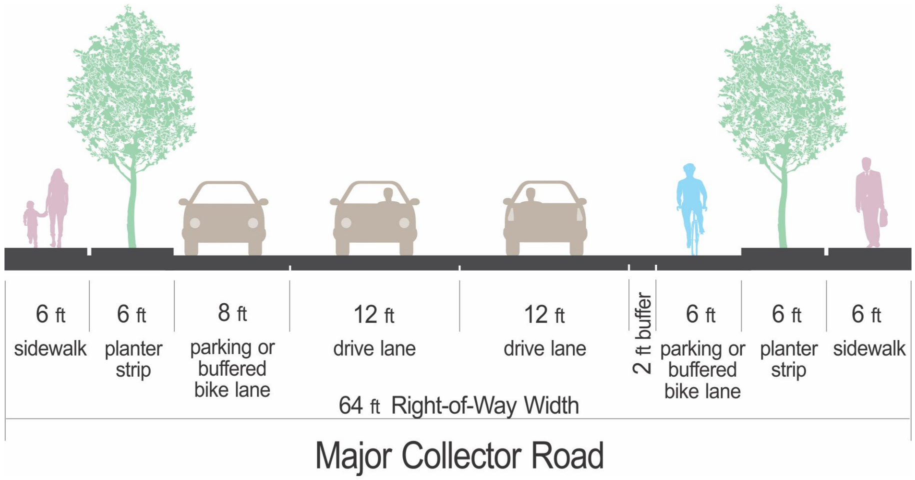



**Table 5: Proposed Major Collector Typical Cross-Section Standards and Alternative Minimum Standard**

| Major Collector | | | |
|---|---|---|---|
| Width | Standard | Alternative Minimum | Considerations |
| Right-of-Way | 64 ft. (68 ft.)[1] | 58 ft. ~~60 ft.~~ (66 ft.)[1] | Planting strips is optional depending on surrounding land use and available right-of-way.<br><br>The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer.<br><br>On-street parking is permitted in place of bike lanes on major collector streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes. On-street parking is discouraged where posted speeds are greater than 35 mph. |
| Curb-to-Curb Pavement | 40 ft. (44 ft.)[1] | 36 ft (42 ft.)[1] | |
| Travel Lanes | 12 ft. (14 ft.)[1] | 11 ft. ~~12 ft.~~ (14 ft.)[1] | |
| Median/Flex Lane | None | None | |
| Bike Lanes | 8 ft | 6 ft. | |
| On-Street Parking | 8 ft. | 7 ft. | |
| Curb | Yes | Yes | |
| Planting Strip | 6 ft. | 6 ft. | |
| Sidewalks | 6 ft. | 6 ft. | |

*Changes from the Municipal Code Section 16.136.020 are shown in underlined text and existing standards where changes are proposed are shown in ~~strikethrough text~~. Text not underlined or stricken is consistent with the City's current standard.

[1]Width if on-street parking is constructed in place of bike lanes.

**Figure 5: Proposed Minor Collector Typical Cross-Section Standard**

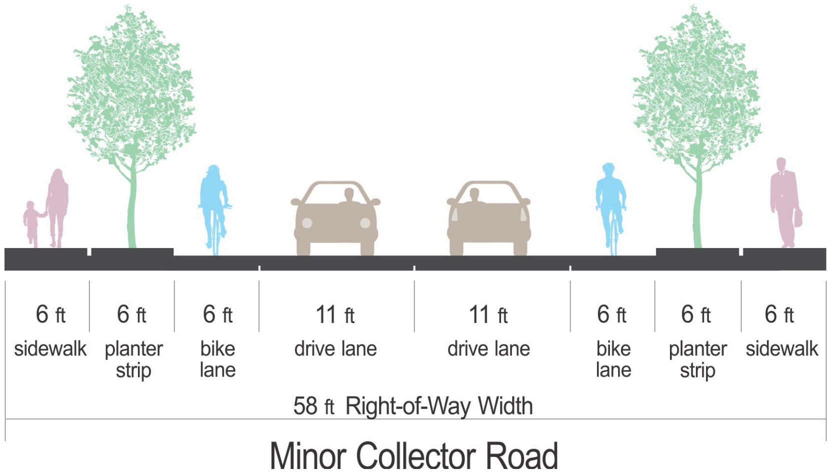


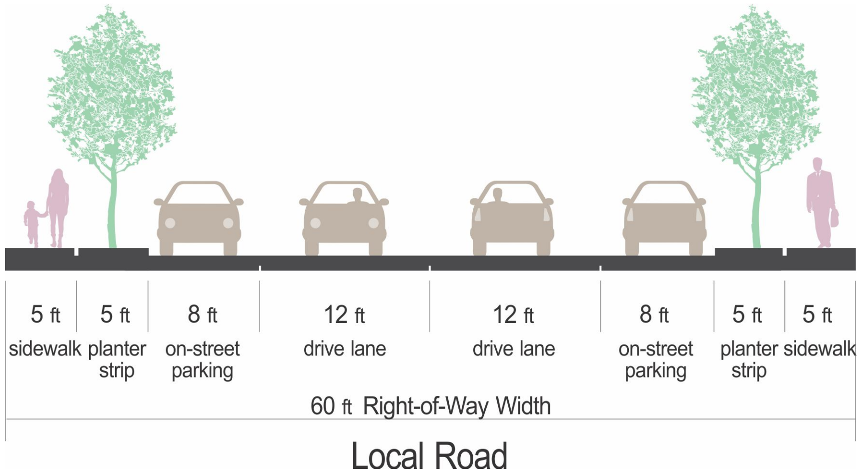

**Table 6: Proposed Minor Collector Typical Cross-Section Standards and Alternative Minimum Standard**

| Minor Collector | | | |
|---|---|---|---|
| Width | Standard | Alternative Minimum | Considerations |
| Right-of-Way | 58 ft. ~~64 ft.~~ (68 ft.)[1] | 50 ft. ~~60 ft.~~ (62 ft.)[1] | Planting strips is optional depending on surrounding land use and available right-of-way.<br>The standard design should be provided where feasible. In constrained areas where providing the standard widths are not practical, alternative minimum design requirements may be applied with approval of the City Engineer.<br>On-street parking is permitted in place of bike lanes on minor collector streets. However, where parking is constructed next to a travel lane, the travel lane width shall be increased to 14 feet to function as a shared roadway and accommodate bikes. On-street parking is discouraged where posted speeds are greater than 35 mph. |
| Curb-to-Curb Pavement | 40 ft. (44 ft.)[1] | 36 ft (42 ft.)[1] | |
| Travel Lanes | 11 ft. ~~12 ft.~~ (14 ft.)[1] | 10 ft. ~~12 ft.~~ (14 ft,)[1] | |
| Median/Flex Lane | None | None | |
| Bike Lanes | 6 ft. ~~8 ft~~ | 5 ft. ~~6 ft~~ | |
| On-Street Parking | 8 ft. | 7 ft. | |
| Curb | Yes | Yes | |
| Planting Strip | 6 ft. | 5 ft. ~~6 ft~~ | |
| Sidewalks | 6 ft. | 5 ft. ~~6 ft~~ | |

*Changes from the Municipal Code Section 16.136.020 are shown in underlined text and existing standards where changes are proposed are shown in ~~strikethrough text~~. Text not underlined or stricken is consistent with the City's current standard.

[1]Width if on-street parking is constructed in place of bike lanes.

Figure 6: Proposed Local Street Typical Cross-Section Standard



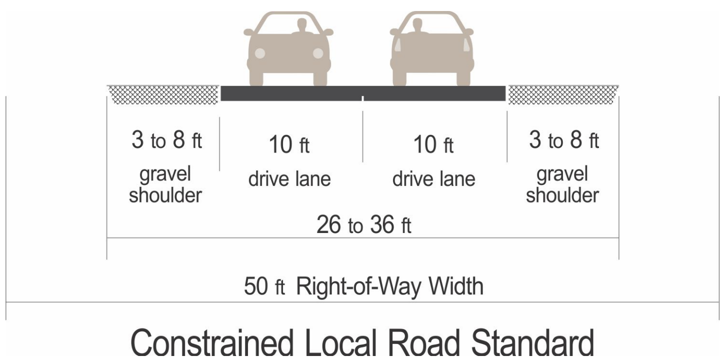



**Table 7: Proposed Local Street Typical Cross-Section Standards and Alternative Minimum Standard**

<table>
<tr><th colspan="4">Local Street</th></tr>
<tr><th>Width</th><th>Standard</th><th>Alternative Minimum</th><th>Considerations</th></tr>
<tr><td>Right-of-Way</td><td>60 ft.</td><td>50 ft.</td><td rowspan="9">Planting strips is optional depending on surrounding land use and available right-of-way.<br><br>Parking on residential neighborhood streets is allowed and may be allowed on one side only in constrained areas or where approved by the City Engineer, resulting in a curb-to-curb width of 28 feet and overall right-of-way width of 48 feet.<br><br>The constrained local road standard may be used when approved by the City of Warrenton. The standard is intended to apply under one of the following circumstances:<br>1. The local road will serve 18 or fewer dwelling units upon buildout of adjacent property.<br>2. The ADT volume of the road is less than 250 vehicle/day.<br>3. Significant topographical or environmental constraints are present.<br>Providing the following conditions will be met:<br>4. Use of the alternative local road standard will not create gaps in connectivity or roadway standards with adjacent roadway sections (i.e., sidewalk, parking, travel lane widths).<br>5. The City Engineer and emergency service providers have reviewed and accepted usage of the alternative local roadway standard.</td></tr>
<tr><td>Curb-to-Curb Pavement</td><td>36 ft.</td><td>28 ft.</td></tr>
<tr><td>Travel Lanes</td><td>12 ft.</td><td>10 ft</td></tr>
<tr><td>Median/Flex Lane</td><td>None</td><td>None</td></tr>
<tr><td>Bike Lanes</td><td>None</td><td>None</td></tr>
<tr><td>On-Street Parking</td><td>8 ft</td><td>8 ft</td></tr>
<tr><td>Curb</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Planting Strip</td><td>5 ft.</td><td>5 ft.</td></tr>
<tr><td>Sidewalks</td><td>5 ft.</td><td>5 ft.</td></tr>
<tr><td colspan="4">*Changes from the Municipal Code Section 16.136.020 are shown in underlined text and existing standards where changes are proposed are shown in ~~strikethrough text~~. Text not underlined or stricken is consistent with the City's current standard.<br>[1]Width if on-street parking is constructed in place of bike lanes.</td></tr>
</table>

Figure 7: Proposed Alley Typical Cross-Section Standard

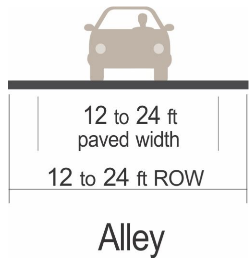
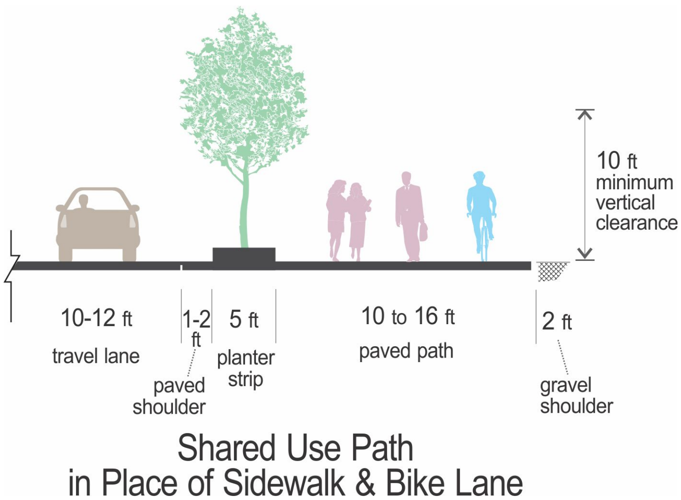
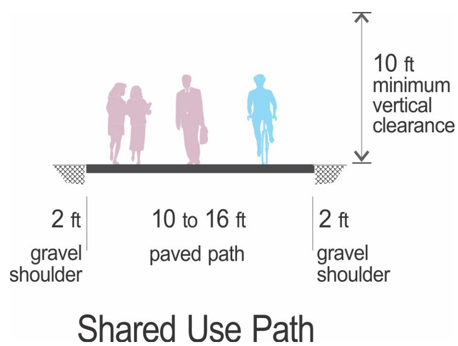



Figure 8: Proposed Shared-Use Path Typical Cross-Section Standards and Alternative Minimum Standards




## Enhanced Pedestrian Crossing Treatments

The following guidelines are intended to facilitate the development of potential alternatives for improving walking routes. A complete engineering investigation should be conducted prior to selecting an appropriate treatment for a given location.

*Mid-Block Crossings* are used in locations where the pedestrian demand is high, but access points are not conveniently located near an existing intersection. Common locations include transit stops, schools, parks, and other major destinations that attract high levels of walking and biking traffic.

Enhanced crossing treatments at mid-block crossings could include marked crosswalks, flashing beacons (which could be activated by the pedestrian), curb extensions, pavement markings and median refuge islands. Other important design elements to consider include lighting, advanced warning signs and clear, unobstructed driver views. Figure 9 shows examples of midblock crossing treatments.

**Figure 9: Examples of Mid-Block Crossings**


Source: www.pedbikeimages.org_MichaelFrederick

*Signalized Intersection Crossings* provide a greater level of protection and comfort for pedestrians because they more directly control the movement of traffic and are generally more visible to drivers. Basic signalized intersection crossings can be further enhanced through treatments such as leading pedestrian intervals, pedestrian countdown timers, median refuge islands, and curb extensions. A leading pedestrian interval is a brief period at the beginning of a green light where the pedestrian is able to enter the crosswalk before any other traffic is allowed to enter the intersection. This head start improves pedestrian visibility and helps establish them as the priority movement. This treatment is appropriate on all types of streets but is most effective where pedestrian crossings are in conflict with high volumes of right turning traffic or left turns that are allowed to proceed when no pedestrian is present.

*Bridge/Overpass Crossings* include elevated structures that provide pedestrian connections over a major obstacle such as a highway or river. Pedestrian bridges improve pedestrian safety when properly located and designed, however they can be costly. Design considerations for pedestrian bridges include path width, vertical clearance, ADA requirements and location. Pedestrian bridges are appropriate where there is moderate-to-high pedestrian demand, a large number of children that regularly cross, or over high-speed and high-volume roadways. Pedestrian bridges are often underutilized where their use requires significant out-of-direction travel or effort by the pedestrian and tend to be most effective where topography already creates a moderate elevation difference between the road being crossed and surrounding land.

Additional design guidance can be found in the National Association of City Transportation Officials (NACTO) Urban Street Design Guide and AASHTO's Guide for the Planning, Design, and Operation of Pedestrian Facilities. Also, all of these crossings and features on state highways have to be approved by ODOT.

# Roadway and Access Spacing

The number and spacing of access points, such as driveways and street intersections, along a roadway affects its function and capacity. Access management is the control of these access points to match the functionality and capacity intended by the roadway's functional classification.

Access management is especially important on arterial and collector facilities to reduce congestion and crash rates and to provide for safe and efficient travel. Since each access point is an additional conflict point, reducing or consolidating driveways on these facilities can decrease collisions and preserve capacity on high volume roads, maintaining traffic flow and mobility within the city.

Balancing access and good mobility can be achieved through various access management strategies, including establishing access management spacing standards for driveways and intersections.

## Warrenton Access Spacing Standards

Table 8 below contains recommended access spacing standards under the City of Warrenton's jurisdiction. New access points shall meet or exceed these minimum spacing requirements. However, where no reasonable alternatives exist or where strict application of the standards would create a safety hazard, the City may allow a variance.

***Existing city access spacing standards to be included in table when made available by city.***

**Table 8: Existing and Recommended Access Spacing Standards**

| Recommended Access Spacing Standards | | |
|---|---|---|
| Functional Classification | Current Minimum Access Spacing | Recommended Minimum Access Spacing |
| Minor Arterial | | 300 ft |
| Major Arterial | | 150 ft |
| Minor Collector | | 100 ft |
| Local Street | 25 ft | 15 ft |

## Clatsop County and State of Oregon Access Management Standards

Both Clatsop County and ODOT maintain access regulations for roadways under their jurisdiction. Clatsop County's access regulations are documented in the Clatsop County TSP in Volume 1. Access Management regulations for the state highways are provided through the 1999 Oregon Highway Plan and OAR 734-051.

## Local Street Connectivity

Local street connectivity is required by the state Transportation Planning Rule (OAR 660-012) and is important for Warrenton's continued development. Providing adequate connectivity can reduce the need for wider roads, traffic signals, and turn lanes. Increased connectivity can reduce a city's overall vehicle miles traveled (VMT), balance the traffic load on major facilities, encourage citizens to seek out other travel modes, and reduce emergency vehicle response times. While improvement to local street connectivity is easier to implement in newly developed areas, retrofitting existing areas to provide greater connectivity should also be attempted.

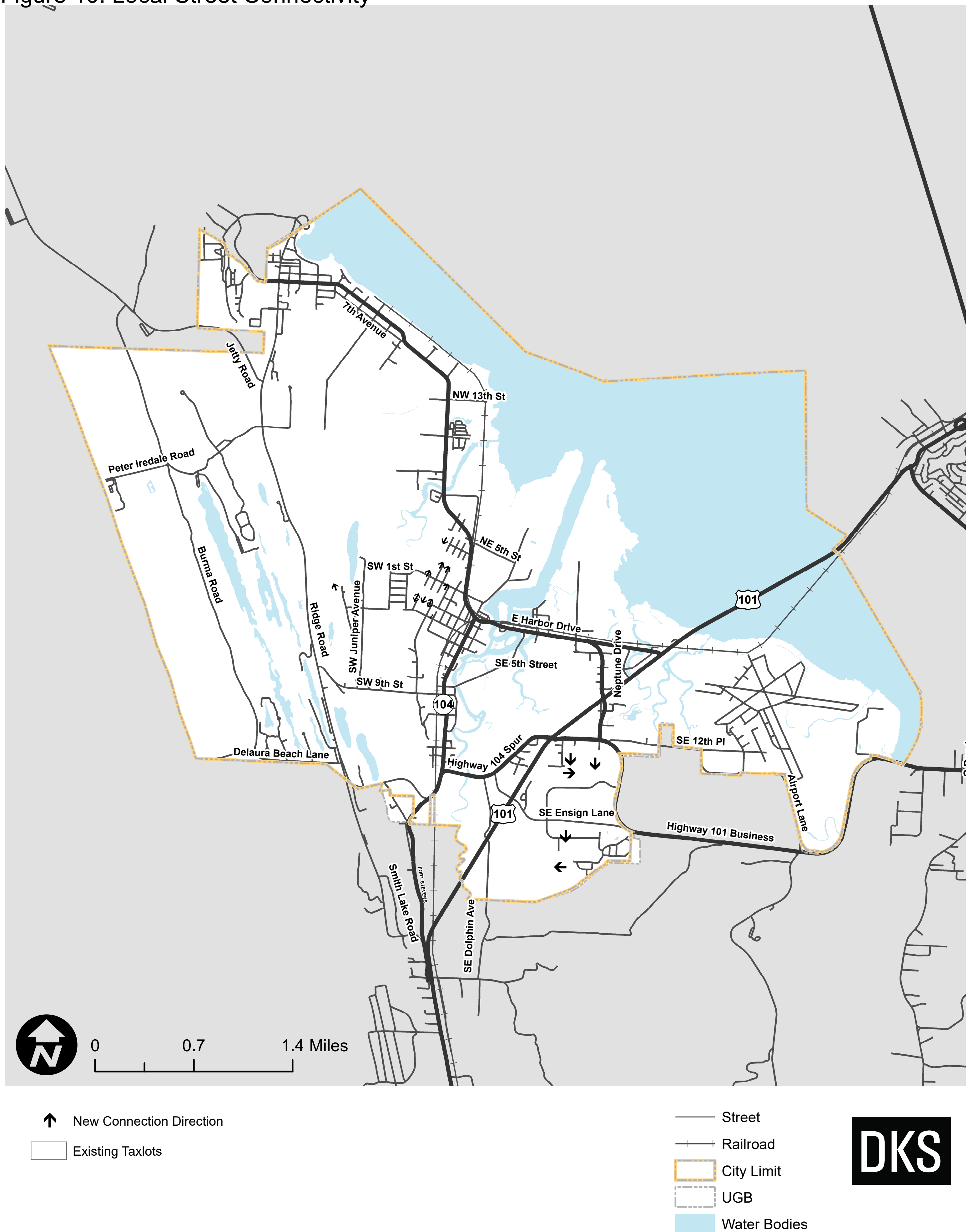
Warrenton's existing street connectivity is constrained by natural features such as wetlands, railroads, highways, and by undeveloped areas of future development. The proposed Local Street Connectivity Plan shown in Figure 10 identifies approximate locations where new local street connections should be installed as areas continue to develop.

The Warrenton Municipal Code regulates proposed development in residential zones to ensure good transportation system connectivity is provided. Table 9 highlights key requirements and some proposed changes to consider.

**Table 9: Proposed Changes to Connectivity Requirements**

| Proposed Changes to Connectivity Requirements | |
|---|---|
| Existing Requirement | Proposed Change |
| Staggering of streets making "T" intersections at collectors and arterials shall not be designed so that jogs of less than 300 feet on such streets are created, as measured from the centerline of the street. | |
| Spacing between local street intersections shall have a minimum separation of 125 feet, except where more closely spaced intersections are designed to provide an open space, pocket park, common area or similar neighborhood amenity. | |
| The maximum block length shall not exceed 1,000 feet between street corner lines unless it is adjacent to an arterial street or unless the topography or the location of adjoining streets justifies an exception. The maximum length of blocks along an arterial is 1,800 feet. | |
| Cul-de-Sacs. A dead-end street shall be no more than 200 feet long, shall not provide access to greater than 18 dwelling units, and shall only be used when environmental or topographical constraints, existing development patterns, or compliance with other standards in this Code preclude street extension and through circulation. | |
| Pedestrian Access and Circulation | Pedestrian <u>and Bicycle</u> Access and Circulation |
| Continuous Pathways. The pathway system shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks and open space areas whenever possible. | Continuous Pathways. The pathway system shall extend throughout the development site, and connect to all future phases of development, adjacent trails, public parks, <u>transit stops</u> and open space areas whenever possible. |
| Street Connectivity: Multi-use pathways (i.e., for pedestrians and bicyclists) are no less than six feet wide. | Street Connectivity: Multi-use pathways (i.e., for pedestrians and bicyclists) are no less than ~~six~~ 10 feet wide. |

Figure 10: Local Street Connectivity



# Mobility Targets

Mobility standards, or targets, are the thresholds set by an agency for the maximum amount of congestion that is acceptable for a given roadway. Warrenton does not currently have adopted mobility standards. The City would like to adopt mobility standards as part of this TSP Update process.

Similar cities, such as Philomath and Junction City, use "level of service" (LOS) as the measure of congestion for their mobility standards. Philomath has adopted LOS D as the minimum acceptable operating condition for both signalized and unsignalized intersections during the peak hour. Junction City has adopted LOS D as the minimum acceptable operating conditions for signalized intersection and LOS E for unsignalized intersections during the peak hour. LOS D equates to a maximum allowed average delay per vehicle of 55 seconds at signalized intersections and 35 seconds at stop-controlled intersections. LOS E equates to a maximum allowed average delay per vehicle of 50 seconds at unsignalized intersections.

It is recommended that Warrenton adopt LOS D as the minimum acceptable operating condition for both signalized and unsignalized intersections during the peak hour. The assessment of traffic operating conditions under existing and future (year 2040) conditions conducted in Technical Memoranda #5 and #7 found that all studied intersections under City jurisdiction comply with the adopted LOS D mobility standard and will continue to do so through 2040. Establishing the recommended mobility standard will give the City of Warrenton the ability to ensure that future development proposals do not overly burden the transportation system and that improvements are made in a timely manner to maintain the desired level of service.

For roadways within the City of Warrenton that are under ODOT or Clatsop County jurisdiction, the mobility standards/targets of those agencies will apply. All intersections under ODOT jurisdiction must comply with the volume to capacity (v/c) ratio targets in the Oregon Highway Plan (OHP). The ODOT v/c targets are based on highway classification and posted speed. Mobility standards for roadways under Clatsop County are documented in the Clatsop County TSP in Volume 1.

# Traffic Impact Analysis (TIA) Guidelines

Warrenton's development review process is designed to manage growth in a responsible and sustainable manner. By assessing the transportation impacts associated with land use proposals and requiring that adequate facilities be in place to accommodate those impacts, the City is able to maintain a safe and efficient transportation system concurrently with new development, diffusing the cost of system expansion.

Technical Memorandum #3 included a review of the Warrenton Development Code, that are needed to ensure and strengthen compliance with the state Transportation Planning Rule (OAR 660-012) and to help the transportation system serve planned growth. That review found that the existing development code already includes requirements for traffic impact analyses (TIAs) as part of development proposals. However, there are some recommended changes to consider.

First, it is recommended that the current number of new vehicle trips to trigger a TIA be reduced from

- The development application involves a change in zoning or a plan amendment designation; or,

- The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation Manual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:
  - An increase in site traffic volume generation by 300 average daily trips (ADT) or more; or
  - An increase in ADT hour volume of a particular movement to and from the state highway by 20% or more; or
  - An increase in use of adjacent streets by vehicles exceeding the 20,000-pound gross vehicle weights by 10 vehicles or more per day; or
  - The location of the access driveway does not meet minimum sight distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the state highway, creating a safety hazard; or
  - A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

The Warrenton Development Code currently does not establish minimum content required in a TIA. It is recommended that the development code be amended to specify that the scope and content of the TIA be determined in consultation with the City Engineer.

It is recommended that Warrenton add approval criteria to existing TIA requirements, as well as an acknowledgement of transportation mitigation measures that may be required as conditions of approval in order to meet adopted mobility and safety standards. Mitigation measure provisions can address multimodal transportation improvements that may be required to mitigate impacts of the proposed development and protect the function and operation of the planned transportation system.

## Intelligent Transportation System Coordination Guidelines

Two pieces of Intelligent Transportation System (ITS) equipment exist along US 101: a Highway Advisory Radio (HAR) Beacon Sign and a Variable Message Sign (VMS). The HAR Beacon is located just north of Dolphin Avenue and alerts northbound traffic to upcoming congestion with flashing lights. The VMS is just over a mile south of Warrenton. Although it is outside city limits, it provides alerts to northbound travelers on US 101.

Warrenton does not own or operate any ITS systems, or even traffic signals at this time. It is unlikely that the City of Warrenton will invest in ITS systems on its own, but there may be opportunities to work with regional partners on larger scale efforts that would benefit Warrenton residents. Such cooperation could range from agreements to share information and data or allow use of City right-of-way for regional ITS infrastructure.

For example, US 101 is a regional roadway facility that could benefit from transportation system management (TSM) infrastructure. Before future investments are made along this roadway designs should be reviewed with City and ODOT staff to determine if communications or other ITS infrastructure should be addressed as part of the street design/construction. The City should follow the Oregon Statewide ITS Plan for any projects that affect operations on state roadways.

# Neighborhood Traffic Management Tools

Neighborhood Traffic Management (NTM) describes strategies that can be deployed to slow traffic, and potentially reduce volumes, creating a more inviting environment for pedestrians and bicyclists. NTM strategies are primarily traffic calming techniques for improving neighborhood livability on local streets, though a limited set of strategies can also be applied to collectors and arterials. Mitigation measures for neighborhood traffic impacts must balance the need to manage vehicle speeds and volumes with the need to maintain mobility, circulation, and function for service providers, such as emergency responders. Figure 11 includes a visual summary of common neighborhood traffic management strategies.

**Figure 11: Summary of Neighborhood Traffic Management Strategies**

**Chicanes**

www.pedbikeimages.org/Dan Burden

**Chokers**

www.pedbikeimages.org/Dan Burden

**Curb Extensions**

www.pedbikeimages.org/Carl Sundstrom

**Diverters**


www.pedbikeimages.org/Adam Fukushima

**Median Islands**

www.pedbikeimages.org/Dan Burden

**Raised Crosswalks**

www.pedbikeimages.org/Tom Harned

**Speed Cushions**

NACTO Urban Street Design Guide

**Speed Hump**


www.pedbikeimages.org/Dan Burden

**Traffic Circles**

www.pedbikeimages.org/Carl Sundstrom

Table 10 below lists common NTM applications. Any NTM project should include coordination with emergency response staff to ensure that public safety is not compromised. NTM strategies implemented on a state freight route, OR 126, will require input from ODOT regarding freight mobility considerations.

**Table 10: Application of Neighborhood Traffic Management Strategies**

| NTM Application | Use by Function Classification | | | Impact | |
|---|---|---|---|---|---|
| | Arterials | Collectors | Local Streets | Speed Reduction | Traffic Diversion |
| Chicanes | | | ✓ | ✓ | ✓ |
| Chokers | | | ✓ | ✓ | ✓ |
| Curb Extensions | ✓ | ✓ | ✓ | ✓ | |
| Diverters (with emergency vehicle pass-through) | | ✓ | ✓ | | ✓ |
| Median Islands | ✓ | ✓ | ✓ | ✓ | |
| Raised Crosswalks | | | ✓ | ✓ | ✓ |
| Speed Cushions (with emergency vehicle pass-through) | | | ✓ | ✓ | ✓ |
| Speed Hump | | | ✓ | ✓ | ✓ |
| Traffic Circles | | | ✓ | ✓ | ✓ |

The City of Warrenton currently does not have a formal neighborhood traffic management program. If such a program were desired to help respond to future issues, suggested elements include:

- Provide a formalized process for citizens who are concerned about the traffic on their neighborhood street. The process could include filing a citizen request with petition signatures and a preliminary evaluation. If the evaluation finds cause for concern, a neighborhood meeting would be held and formal data would be collected and evaluated. If a problem is found to exist, solutions would be identified and the process continued with neighborhood meetings, feedback from service and maintenance providers, cost evaluation, and traffic calming device implementation. Six months after implementation the device would be evaluated for effectiveness.
- For land use proposals, in addition to assessing impacts to the entire transportation network, traffic studies for new developments must also assess impacts to residential streets. A recommended threshold to determine if this additional analysis is needed is if the proposed project at ultimate buildout increases through traffic on any one residential street by 200 or more vehicles per day. Once the analysis is performed, the threshold used to determine if residential streets are impacted would be if their daily traffic volume exceeds 1,200 vehicles.

SECTION 11

# TECH MEMO ELEVEN

## ALTERNATIVE MOBILITY TARGETS

# MEMORANDUM #11

**DATE:** August 1, 2018

**TO:** Warrenton TSP Project Management Team

**FROM:** Angela Rogge, PE, David Evans and Associates, Inc.
Shelly Alexander, PE, David Evans and Associates, Inc.

**SUBJECT:** **Warrenton Transportation System Plan Update**
**Alternative Mobility Targets** P14180-008

## Introduction

The Oregon Highway Plan (OHP) provides guidance for how transportation analysis and plans should be prepared, but ultimately leaves the responsibility for developing improvements and mobility standards to the plans themselves. In addition to the established mobility targets in the OHP, if it is found that adopted mobility targets cannot be achieved even with improvements that are reasonably likely to be in place by year the planning horizon year, alternative mobility targets can be developed as part of a transportation system plan. The alternative mobility targets are then considered the highway system performance standards in compliance with the Transportation Planning Rule (TPR) (OAR 660-012), including applicability for actions that fall under Section -0060 of the TPR.

As part of the Warrenton TSP Update process, findings from technical memoranda suggest the need for alternate mobility targets at select intersections along US 101. This memorandum will outline how US 101 serves the City of Warrenton, as well as its existing and forecasted traffic operations. Further discussion will highlight how the TSP can reasonably attempt to mitigate the capacity constraints, where alternate mobility targets are recommended, and what the mobility targets should be.

### Background

#### Warrenton Travel Patterns

Warrenton has its own unique transportation identity. Being a close neighbor to Astoria, many people live in one community and work in the other. As summarized in *Technical Memorandum* #5, the majority of Warrenton residents actually work outside of the city. Conversely, approximately 80 percent of the people working in Warrenton commute from outside of the city limits. Most of these commuters travel US 101 for this purpose.

Warrenton is home to tourist destinations such as Fort Stevens State Park and the Peter Iredale site, as well as access to Oregon's coastline. Most of the visitors to Warrenton will travel through intersections along US 101, either to travel to and from town, or to popular commercial sites.

US 101 through Warrenton carries a high volume of freight traffic as it is a Federal Truck Route and the only freight route through the City. US 101 crosses over Youngs Bay and handles freight traffic to and from Astoria and the Port of Astoria, as well as other southern destinations.

### Existing Roadway Network and Land Uses

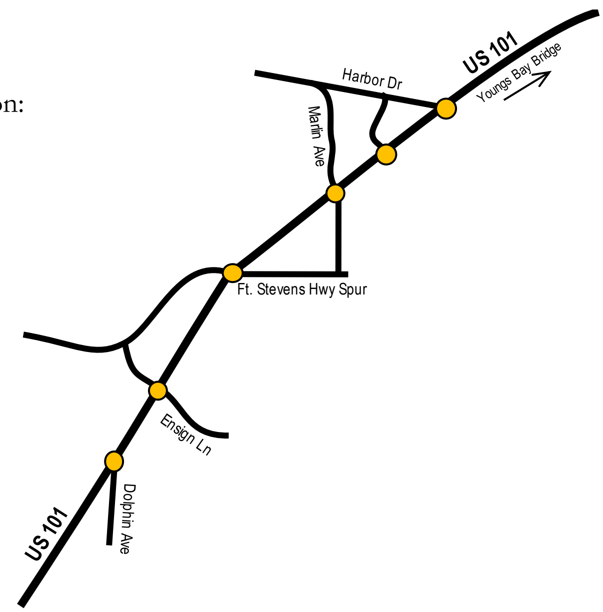
Warrenton is surrounded by and includes significant areas of open space and natural resources. These resources are important to the economic vitality of the region and many areas are of historical significance due to their association with the Lewis and Clark Expedition. The current transportation network has limited opportunities to expand without impacts to the existing natural resources (wetlands, open space, recreation).

Commercial development is primarily concentrated in the downtown core along Fort Stevens Highway (OR 104) and US 101, including several regional or national chains such as Costco, Home Depot and Fred Meyer.

# Traffic Analysis

The TSP analyzed six intersections along US 101 in Warrenton:

- E Harbor Drive at US 101
- US 101 at SE Neptune Drive
- US 101 at Marlin Drive
- OR 104S/Ft Stevens Hwy Spur at US 101
- SE Ensign Lane at US 101
- US 101 at SE Dolphin Avenue




## Existing Mobility Targets

The City does not currently have a mobility target for its local streets; the project team anticipates reviewing mobility targets as part of the work involving updates to the City code. The traffic analysis relied on Clatsop County and ODOT mobility targets for evaluation of intersection operations.

For State facilities, the Oregon Highway Plan (OHP) and the Highway Design Manual (HDM) guide the assessment of intersection operations. Both documents base their mobility performance on the calculation of volume-to-capacity (v/c) ratios; however, the standards in the HDM are based on higher performance levels than those in the OHP. The mobility targets from the OHP are applicable to the existing and future baseline (no build) analysis.

**Table 1. US 101 Mobility Targets**

| Segment | Speed Limit | OHP Classification | Signalized Intersection | Unsignalized Intersection US 101 | Unsignalized Intersection Side Street |
|---|---|---|---|---|---|
| US 101: Youngs Bay Bridge to South of Ensign Ave | 45 mph | Statewide Highway; Non-OHP Freight Route; Non-MPO; Inside UGB | 0.80 v/c | 0.80 v/c | 0.90 v/c |
| US 101: South of Ensign Ave to South City Limits | 55 mph | | 0.80 v/c | 0.80 v/c | 0.90 v/c |

Source: Oregon Highway Plan (OHP), Policy 1F, Table 6

## Existing and Future Conditions

The traffic analysis evaluated two sets of volumes (30th Highest Hour/Summer and Average Weekday) in anticipation of the need for alternate mobility targets. Typical ODOT traffic methodology uses the 30th highest hour volumes for analysis. Table 2 summarizes the results of the operational analysis.

**Table 2. Existing (Year 2015) and Future (Year 2040) PM Peak Hour Traffic Operations Analysis Results**

| Year | Intersection | Average Weekday | | | | 30th Highest Hour (Summer) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Major | | Minor | | Major | | Minor | |
| | | V/C [1,2] | LOS [2] | V/C [1,2] | LOS [2] | V/C [1,2] | LOS [2] | V/C [1,2] | LOS [2] |
| Existing (2015) | **Unsignalized Intersections** | | | | | | | | |
| | OR 104S/Ft Stevens Hwy Spur at US 101 | 0.01 | A | 0.01 | B | 0.03 | B | 0.02 | C |
| | US 101 at SE Dolphin Ave | 0.03 | A | 0.14 | B | 0.05 | A | 0.26 | C |
| | **Signalized Intersections** | | | | | | | | |
| | E Harbor Dr at US 101 | Overall | | **0.80** | C | Overall | | **1.05** | D |
| | US 101 at SE Neptune Dr | Overall | | 0.67 | C | Overall | | **0.85** | C |
| | US 101 at Marlin Dr | Overall | | 0.64 | C | Overall | | **0.99** | D |
| | SE Ensign Ln at US 101 | Overall | | 0.77 | D | Overall | | **0.95** | F |
| Future (2040) | **Unsignalized Intersections** | | | | | | | | |
| | OR 104S/Ft Stevens Hwy Spur at US 101 | 0.02 | B | 0.04 | C | 0.03 | B | 0.09 | D |
| | US 101 at SE Dolphin Ave | 0.09 | A | 0.43 | C | 0.16 | B | 0.86 | F |
| | **Signalized Intersections** | | | | | | | | |
| | E Harbor Dr at US 101 | Overall | | **0.89** | C | Overall | | **1.23** | E |
| | US 101 at SE Neptune Dr | Overall | | 0.76 | C | Overall | | **1.08** | E |
| | US 101 at Marlin Dr | Overall | | **0.88** | C | Overall | | **1.23** | F |
| | SE Ensign Ln at US 101 | Overall | | **0.90** | F | Overall | | **1.16** | F |

Acronyms: EB = eastbound; WB = westbound; NB = northbound; and SB = southbound. L = left; T = through; and R = right.

**SHADED** cells indicate the movement fails to meet applicable mobility target

1. At intersections the results are reported for the worst operating movements on major and minor approaches that must stop or yield the right of travel to other traffic flows.
2. The v/c ratios and LOS are based on the results of the macrosimulation analysis using Synchro, which cannot account for the influence of adjacent intersection operations.
3. Mobility target is reported for the critical movement; Unsignalized intersections may have two different mobility targets for the major and minor approaches (Action 1F.1, Oregon Highway Plan, 1999)

*Source: David Evans and Associates, Inc.*

The analysis concluded the following for intersections along US 101:

- In 2015:
  - Average weekday: One intersection is at the mobility target threshold (at E Harbor Dr)
  - 30th Highest Hour (Summer): All four signalized intersections along US 101 in Warrenton are expected to exceed applicable mobility targets.
- In 2040:
  - Average weekday: Three signalized intersections are expected to exceed the mobility target (at E Harbor Drive, Marlin Drive and Ensign Lane)
  - 30th Highest Hour (Summer): All signalized intersections along US 101 in Warrenton are expected to exceed applicable mobility targets.

## Mitigation

As part of the TSP Update, projects were developed to address mobility concerns under 30th highest hour (summer) conditions (see *Technical Memorandum #8*).

The first step was to evaluate the intersections exceeding a v/c of 1.0 under the 30th highest hour (summer) no build conditions using a PHF of 1.0. The result of adjusting the PHF was that the intersections were still expected to operate above a v/c of 1.0 (see Table 3).

The consultant team determined the level of improvement that would be required to meet OHP mobility targets. A summary of projects specific to US 101 and their resulting operations are summarized below in Table 3.

**Table 3. Improvements to Meet OHP Mobility Target - 30th Highest Hour (Summer)**

| Intersection | Improvement | No Build v/c [1] | Mitigated v/c |
|---|---|---|---|
| E Harbor Dr at US 101 | • Add 2nd NBT lane<br>• Convert dedicated SBR to a SBTR<br>• Add 2nd EBL turn lane (eliminate WBL to private business) | 1.20 | 0.76 |
| US 101 at SE Neptune Dr | • Add 2nd NBT lane<br>• Convert dedicated SBR to a SBTR | 1.01 | 0.67 |
| US 101 at Marlin Dr | • Add 2nd NBT lane<br>• Add 2nd SBT lane | 1.16 | 0.74 |
| SE Ensign Ln at US 101 | • Add 2nd EBL turn lane<br>• Add 2nd EBT lane (shared EBTR)<br>• Add 2nd SBL turn lane<br>• Add dedicated SBR turn lane | 1.11 | 0.78 |

Note: No Build operational analysis results reflect a PHF of 1.0

Significant capital investment would have to occur to fix a capacity problem that is most noticeable during the summer tourist season. The extent of the improvements listed in Table 3 are not necessary under average weekday conditions.

To meet mobility targets for the 30th highest hour, US 101 would have to be widened to a five-lane cross-section from the Youngs Bay Bridge south through Marlin Drive. This type of improvement would likely result in impacts to natural resources (wetland) and require a level of funding that is not anticipated within the forecasting horizon (2040). Also of note, unless the Youngs Bay bridge is widened to four lanes, the capacity improvements through Warrenton would likely result in congestion at the transition to the bridge structure.

The intersection of Ensign Lane at US 101 is expected to continue to exceed mobility targets for the summer peak conditions unless improvements are constructed that would require the widening of Ensign on both sides of US 101. This widening would likely result in impacts to existing businesses and require the reconstruction of an intersection that has recently been improved.

In summary, there are financial and environmental barriers to mitigating to the OHP mobility target:

- Mitigation would require widening of US 101 to a five-lane cross-section from the Youngs Bay Bridge south through Marlin Drive, which has potential wetland impacts and modifying three signalized intersections.
- Regional bottleneck would remain with a two-lane Youngs Bay Bridge between Warrenton and Astoria
- Capacity improvements to SE Ensign Lane would reconstruct an intersection that has recently been improved.
- Widening of side streets could require right-of-way acquisitions.
- The improvements necessary to mitigate to the current OHP mobility target would result in the average weekday traffic utilizing only 50-65% of the available intersection capacity.

# Alternative Mobility Targets

Per OHP Policy 1F.3, local jurisdictions may explore alternative mobility targets if it "is infeasible or not practical to meet the existing performance targets through the development of transportation system plans". The OHP specifically identifies facilities with high seasonal traffic as an example of where state mobility targets may not match the local expectations for a specific facility. As previously mentioned, traffic volumes on US 101 through Warrenton suffer from summer seasonal peaking.

## Alternative Mobility Target Process

As discussed in the previous sections, the project team followed the process outlined in Figure 1 to determine the appropriate alternative mobility targets. The results of each step of the process are summarized below.

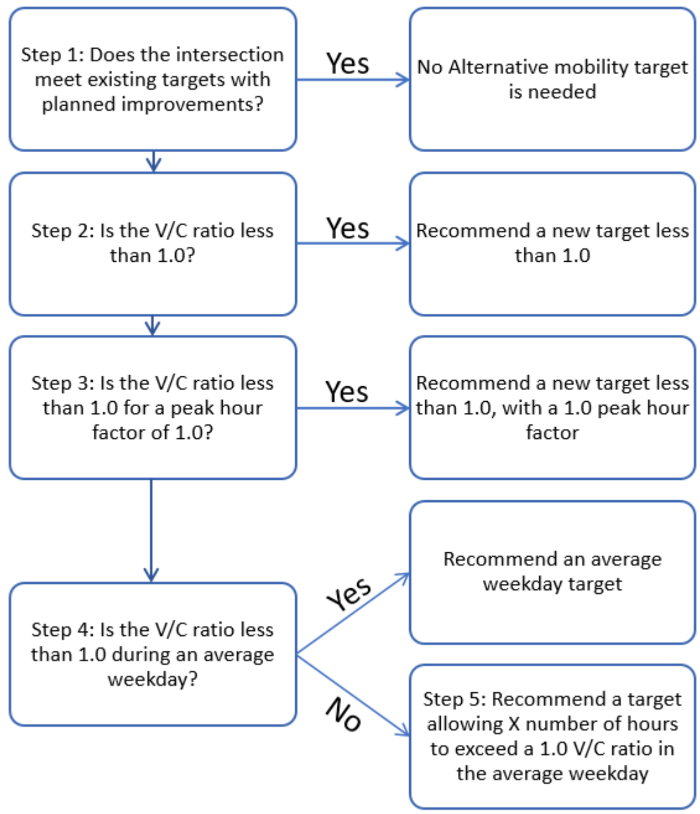
Step 1: None of the four signalized study intersections along US 101 would be expected to meet existing OHP mobility targets during the summer of 2040, after recommended improvements described earlier. To be compliant, Warrenton would need alternative mobility targets for all of the four signalized study intersections along US 101.

Step 2: None of the four signalized intersections would be expected to operate below a v/c ratio of 1.0 during the summer of 2040.

Step 3: None of the four signalized intersections would be expected to operate below a v/c ratio of 1.0 during the summer of 2040 after assuming a peak hour factor of 1.0.

Step 4: All of the four signalized intersections would be expected to operate below a v/c of 1.0 during the average weekday peak hour in 2040. Thus, an average weekday target is recommended.

**Figure 1. Alternative Mobility Target Process**



## Proposed Alternative Mobility Target

Adopting an alternative analysis methodology for US 101 through Warrenton and an alternative mobility target value accomplishes two objectives:

1. Sets a financially and operationally realistic expectation for highway improvements and related traffic conditions within this corridor segment which acknowledge that ODOT will not be able to construct enough capacity on US 101 to avoid or alleviate congestion during summer months.
2. Simplifies future analysis efforts if a land use or zoning change proposal is made that impacts US 101.

The analysis process determined that under 30th highest hour (summer) conditions and a PHF of 1.0, the v/c ratios for all signalized intersections on US 101 are expected to exceed 1.0 by 2040. This is why we suggest an average weekday analysis. The project team then evaluated potential v/c targets of 0.80, 0.85 and 0.90. A v/c target of 0.85 was selected because 0.90 would not trigger any improvements and 0.80 would require capacity improvements with little benefit for the cost.

Using the alternative methodology allows the alternative mobility target value to reference a v/c ratio target of less than or equal to 0.85. This adjustment eliminates the need to analyze the extent to which at-capacity (v/c ratio > 1.0) operations would last longer than one peak hour (as done in the Portland Metro area).

Based on the findings of the traffic analysis, the project team suggests a request of the OTC for the following:

- An alternative mobility target analysis methodology for the segment of US 101 through Warrenton, specifying that future traffic analysis will be based on annual average weekday volumes rather than the ODOT standard analysis methodology that uses 30th highest hour volumes;
- An alternative mobility target of 0.85, based on the annual average weekday analysis methodology, as the alternative mobility target for signalized intersections with US 101 through Warrenton.

**Table 4. Improvements to Meet Proposed Alternative Mobility Target – Average Weekday**

| Intersection | Improvement | No Build v/c | Mitigated v/c |
|---|---|---|---|
| E Harbor Dr at US 101 | • Add 2nd EBL turn lane (eliminate WBL to private business) | 0.89 | 0.75 |
| US 101 at SE Neptune Dr | • None | 0.76 | N/A |
| US 101 at Marlin Dr | • Install flashing yellow NBL and SBL | 0.88 | 0.84 |
| SE Ensign Ln at US 101 | • Increase cycle length from 100 sec to 120 sec | 0.90 | 0.82 |

# SECTION 12
# TECH MEMO TWELVE

## IMPLEMENTING ORDINANCES

# DRAFT TECHNICAL MEMORANDUM #12

PMT REVIEW DRAFT

**DATE:** August 27, 2018

**TO:** Warrenton TSP Project Management Team

**FROM:** Darci Rudzinski, Angelo Planning Group

**SUBJECT: Warrenton Transportation System Plan**
**Task 6.4, Technical Memorandum #12, Implementing Ordinances**

## Purpose and Organization

Pursuant to Task 6.4, the purpose of this memorandum is to propose amendments to the City of Warrenton Comprehensive Plan and to the Development Code. The proposed amendments are intended to implement the goals and strategies of the draft Warrenton Transportation System Plan (TSP) and ensure compliance with the Transportation Planning Rule (TPR). More broadly, the intent of the amendments is to ensure that the City's policies and development requirements provide sufficient guidance to ensure that future decisions and land use actions are consistent with the planned transportation system.

The first section of the memorandum explains the City's approach to updating transportation policies in the Warrenton Comprehensive Plan. The second section of the memorandum provides recommended Development Code amendments (Table 1).

## Policy Amendments

Currently, both the City's adopted TSP and Comprehensive Plan (Article 8 Transportation) contain transportation policies, with the standards in the TSP prevailing where conflicts between adopted policies exist. The City's updated TSP includes goals and objectives to guide future transportation system planning. As explained in Technical Memorandum #4, Goals, Objectives, and Evaluation Criteria, each new capital improvement project, land use application, or implementation measure must be consistent with the objectives. The TSP update anticipated that, once adopted, the goals and objectives will become part of Warrenton's Comprehensive Plan. The City is proposing to replace Comprehensive Plan Article 8 in its entirety with the following text referencing the 2018 TSP:

> <u>In 2015 the City of Warrenton began a planning project to replace the City's 2004 Transportation System Plan and to prepare associated land use ordinances. The primary objective of the project was to describe and document a new baseline condition for the City's multi-modal transportation system and to identify transportation improvements based on a 2035 planning horizon. This project was informed by several studies and plans that had</u>

been conducted and completed since the 2004 TSP was adopted, including the Warrenton Downtown and Marina Master Plans (2010), Warrenton Parks Master Plan (2010), and Warrenton Trails Master Plan (2008). The TSP update was needed to ensure consistency and further the outcomes of these and other adopted plans, as well as to plan for the community's future transportation system needs. In addition to roadway needs, the project also focused on a full evaluation of the bicycle and pedestrian systems, with special attention on identifying new and enhanced local routes and connections to the regional trail system. The resulting multi-modal plan includes project lists with recommended and prioritized system improvements based on reasonable funding forecasts for the next 20 years. The City will rely on the TSP's update street-functional classifications and cross-section standards to ensure that future investments meet community needs.

The 2018 Transportation System Plan serves as the Transportation element of the City's Comprehensive Plan; additional information, including forecasted future transportation needs, roadway functional classifications, and transportation facility standards can be found in the TSP document.

# Development Code Amendments

This section of the memorandum provides recommended changes to the City's development requirements, based on an audit and analysis of the Development Code (Title 16 of the Warrenton Municipal Code).[1] Proposed amendments to development requirements are intended to both implement the goals and policies of the draft TSP and to ensure consistency with the Transportation Planning Rule (TPR). Table 1 presents each recommendation, a reference to the relevant code section(s), and a reference to the relevant TPR section(s).

Proposed changes to the Development Code are found in the following:

**Division 2 Land Use Districts**

- Chapter 16.40 General Commercial (C-1) District)
- Chapter 16.44 Commercial Mixed Use (C-MU) District

**Division 3 Design Standards**

- Chapter 16.120 Access and Circulation
- Chapter 16.128 Vehicle and Bicycle Parking
- Chapter 16.136 Public Facilities Standards

[1] See Technical Memorandum #3, Regulatory Review, October 14, 2015.

**Division 4, Applications and Review Procedures**

- Chapter 16.208 Types of Applications and Review Procedures
- Chapter 16.232 Amendments to Comprehensive Plan Text and Map, Rezone, and Development Code

Attachment A provides the implementing code language related to each numbered recommendation in Table 1.

| Table 1: Recommended Development Code Amendments | | |
|---|---|---|
| Recommendation | Development Code Reference | Draft TSP Goal and TPR References |
| 1. **Establish new transit-related building setback standards.** As recommended in Sunset Empire Transit District Long Range Comprehensive Transportation Plan, modified code language establishes maximum setbacks for buildings in commercial districts, adjacent to transit stops. | Section 16.40.050 Design Standards<br>Section 16.44.040 Development Standards | OAR 660-012-0045(4) |
| 2. **Revise access management standards for consistency with the updated TSP.** Currently, the Development Code refers to access spacing standards in the TSP. The draft TSP is recommending adding "major" and "minor" arterials and collectors to the street classification system. Classifications are mapped on Figure X of the TSP; the plan does not have a list of City streets with their classifications, as suggested by current Development Code.<br><br>Block length standards are also in the Vehicular Access and Circulation section of the Development Code. Recommended modifications reduce maximum block length standards in zoning districts that may be more urban in nature and where transit corridors are currently located or may be located in the future. | Section 16.120.020 Vehicular Access and Circulation | OAR 660-012-0045(2)(a) |
| 3. **Add requirements to connect to transit stops.** While pedestrian access and circulation standards require that proposed development provides for non-motorized connections on site, current requirements do not include transit stops. Proposed language will allow for enhanced connections to transit as part of proposed developments near planned or existing stop. | Section16.120.030 Pedestrian Access and Circulation | OAR 660-012-0045(3)(b) |
| 4. **Allow parking area redevelopment for transit-related improvements; add requirements for carpool and vanpool parking; and establish maximum parking standards in specified situations.** Proposed changes would allow existing parking areas to be redeveloped for transit-oriented uses, provided that minimum parking requirements can still be met. In addition, proposed text amendments would require larger off-street parking lots to include preferential parking for carpools and vanpools in designated employee parking areas and would cap parking in commercial districts and adjacent to transit | Section 16.128.030 Vehicle Parking Standards | OAR 660-012-0045(4)(e)<br>OAR 660-012-0045(4)(d) |

**Table 1: Recommended Development Code Amendments**

| Recommendation | Development Code Reference | Draft TSP Goal and TPR References |
|---|---|---|
| stops. Proposed code language was developed as part of the Sunset Empire Transit District Long Range Comprehensive Transportation Plan. | | |
| **5. Allow parking reductions through a variance procedure.** Proposed code modifications will allow the Planning Director to approve a modification in required vehicular parking spaces for development that is well served by transit or provides infrastructure for modes other than the single-occupancy vehicle. Amendments include minor changes to the City's existing restrictions regarding parking in the required setbacks. Proposed code language was developed as part of the Sunset Empire Transit District Long Range Comprehensive Transportation Plan. | Section 16.128.030 Vehicle Parking Standards | OAR 660-012-0045**(4)** |
| **6. Update bicycle parking standards.** Currently, the code requires bicycle parking for multi-family housing, schools and public or private parking lots. Proposed amendments would expand bicycle parking requirements to commercial, school, and transit uses. The proposed new table specifies the short- and long-term bicycle requirements for various land uses. Proposed code language was developed as part of the Sunset Empire Transit District Long Range Comprehensive Transportation Plan. | Section 16.128.040 Bicycle Parking Requirements | OAR 660-012-0045(3)(a) |
| **7. Update street design standards**. Street design standards based on street classifications have been revised in the updated TSP. The recommendation is to replace Table 16.136.010 City of Warrenton Street Design Standards with a reference to the standards in the TSP. The list of factors on which to grant deviations from minimum standards can also be eliminated from the code, as the draft TSP includes proposed "considerations" for granting "Alternative Minimum Standards" for each roadway classification. | Section 16.136.020 Transportation Standards Table 16.136.010 City of Warrenton Street Design Standards | OAR 660-012-0045(7) |
| **8. Establish new transit stop improvement requirements.** Proposed Chapter 16.204, Transit Access and Supportive Facilities includes access and improvement requirements for development that is proposed adjacent to an existing or planned transit stop. Proposed code language was developed as part of the Sunset Empire Transit District Long Range Comprehensive Transportation Plan. | [New] Chapter 16.204 | OAR 660-012-0045(3)(b), OAR 660-012-0045(4)(a), (b), (f) |

**Table 1: Recommended Development Code Amendments**

| Recommendation | Development Code Reference | Draft TSP Goal and TPR References |
|---|---|---|
| **9. Expand notice requirements to transportation agencies.** Recommended changes ensure that transportation agencies are provided noticed of proposals that may have a significant impact on a facility (or service) under their jurisdiction are to involve these agencies in pre-application conferences and application review. Proposed code language was developed as part of the Sunset Empire Transit District Long Range Comprehensive Transportation Plan. | Section 16.208.040 Type II Procedure (Administrative)<br><br>Section 16.208.050 Type III Procedure (Quasi-Judicial).<br><br>Section 16.208.070 General Provisions | OAR 660-012-0045(1)(d)<br>OAR 660-012-0045(2)(f) |
| **10. Update TPR "significant effect" citation.** TPR Section -0060 was updated in 2012. Current Development Code language reflects the outdated State language and needs to be updated. The proposed amendment references the TPR, rather than including language from the Rule. | Section 16.232.060 | OAR 660-012-0060 |
| **11. Update Traffic Impact Study (TIS) requirements.** Recommendations include replacing the Division 51 reference (which applies to state highway approach applications) with local preparation requirements. Additions include approval criteria (new Section 16.256.050) and a section that codifies the City's ability to condition approval to provide for needed transportation improvements. | 16.256.010 Purpose<br>16.256.030 When Required<br>16.256.040 Traffic Impact Study Requirements.<br>[New] Section16.256.050 Approval Criteria<br>[New] Section 16.256.060 Conditions of Approval | OAR 660-012-0045(2)(b)<br>OAR 660-012-0045(2)(g)<br>OAR 660-012-0045(3)(c) |

# APPENDIX A: PROPOSED CODE AMENDMENTS

**Underlined bolded** text is new, ~~strikeout~~ is current text to be removed from adopted development code language.

## Recommendation 1: Establish new transit-related building setback standards.

**16.40.040 Development Standards.**

[…]

B. Setback Requirements.

1. Minimum front yard setback, commercial uses: none except where adjoining a residential zone, in which case it shall be 15 feet. See Section 16.40.050 for maximum front yard setback for commercial uses.

[…]

**16.40.050 Design Standards.**

The following design standards are applicable in the C-1 zone:

A. Any commercial development shall comply with Chapter 16.116 of the Development Code.

B. Lots fronting onto U.S. Highway 101 shall have a setback of at least 50 feet between any part of the proposed building and the nearest right-of-way line of U.S. Highway 101.

C. Signs in General Commercial Districts along Fort Stevens Highway/State Highway 104 (i.e., S. Main Avenue, N. Main Avenue, NW Warrenton Drive, and Pacific Drive) shall comply with the special sign standards of Section 16.144.040.

D. Maximum front yard setback for commercial buildings in the C-1 zone along Fort Stevens Highway/State Highway 104 shall be 10 feet.

**E. Maximum front yard setback for commercial buildings in the C- 1 zone adjacent to existing or planned transit stops shall be 10 feet.**

**1. The Community Development Director may allow a greater front yard setback when the applicant proposes extending an adjacent sidewalk or plaza for public use, or some other pedestrian amenity is proposed between the building and public right-of-way, subject to Site Design approval.**

**16.44.040 Development Standards.**

The following development standards are applicable in the C-MU district:

[…]

B. Setback Requirements (Residential and Multiple Uses).

1. Minimum front yard setback: 15 feet **(Residential); none (Multiple Uses)**.
2. Minimum side yard setback: 8 feet.
3. Minimum corner lot street side yard setback: 8 feet.
4. Minimum rear yard setback: 15 feet except accessory structures that meet the criteria of Section 16.280.020 may extend to within five feet of a rear property line.
5. **Maximum front yard setback: 10 feet for Multiple Uses adjacent to existing or planned transit stops.**
    a. **The Community Development Director may allow a greater front yard setback when the applicant proposes extending an adjacent sidewalk or plaza for public use, or some other pedestrian amenity is proposed between the building and public right-of-way, subject to Site Design approval.**

C. Setback Requirements (Commercial Uses).

1. Minimum front yard setback: none.
2. Minimum side yard setback: None except where adjoining a residential zone in which case there shall be a visual buffer strip of at least 10 feet wide to provide a dense evergreen landscape buffer which attains a mature height of at least eight feet. Such buffers must conform to the standards in Chapter 16.124, Landscaping, Street Trees, Fences and Walls.
3. Minimum rear yard setback: None except where adjoining a residential zone in which case there shall be a visual buffer strip of at least 10 feet wide to provide a dense evergreen landscape buffer which attains a mature height of at least eight feet. Such buffers must conform to the standards in Chapter 16.124, Landscaping, Street Trees, Fences and Walls.
4. **Maximum front yard setback: 10 feet for Commercial Uses adjacent to existing or planned transit stops.**
    a. **The Community Development Director may allow a greater front yard setback when the applicant proposes extending an adjacent sidewalk or plaza for public use, or some other pedestrian amenity is proposed between the building and public right-of-way, subject to Site Design approval.**

## Recommendation 2: Revise access management standards.

**16.120.020 Vehicular Access and Circulation.**

G. Access Spacing. Driveway accesses shall be separated from other driveways and street intersections in accordance with the following standards and procedures:

[…]

2. Arterial and Collector Streets. Unless directed otherwise by this Development Code or by the Warrenton Comprehensive Plan/TSP, access spacing on City collector and arterial streets ~~(see Warrenton Comprehensive Plan and TSP for a list of City collector and arterial streets)~~ and at controlled intersections (i.e., with four-way stop sign or traffic signal) in the City of Warrenton shall be determined based on the policies and standards contained in the

Warrenton Transportation System Plan, Manual for Uniform Traffic Control Devices, or other applicable documents adopted by the City.

[…]

J. Street Connectivity and Formation of Blocks Required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

1. Block Length and Perimeter. The maximum block length shall not exceed **600 feet** ~~1,000 feet~~ between street corner lines **in Residential and C-1 zones, 400 feet in the C-MU zone, and 1,000 feet in other zones** unless it is adjacent to an arterial street or unless the topography or the location of adjoining streets justifies an exception. The minimum length of blocks along an arterial **in zones other than Residential, C-1, and C-MU** is 1,800 feet. A block shall have sufficient width to provide for two tiers of building sites unless topography or location of adjoining streets justifies an exception.

## Recommendation 3: Add Requirements to connect to transit stops.

**16.120.030 Pedestrian Access and Circulation.**

A. Pedestrian Access and Circulation.

2. Safe, Direct, and Convenient Pathways. Pathways within developments shall provide safe, reasonably direct and convenient connections between primary building entrances and all adjacent streets **and existing or planned transit stops**, based on the following definitions:

   a. Reasonably Direct. A route that does not deviate unnecessarily from a straight line or a route that does not involve a significant amount of out-of-direction travel for likely users.

   b. Safe and Convenient. Bicycle and pedestrian routes that are reasonably free from hazards and provide a reasonably direct route of travel between destinations.

   c. For commercial, industrial, mixed use, public, and institutional buildings, the “primary entrance” is the main public entrance to the building. In the case where no public entrance exists, street connections shall be provided to the main employee entrance.

   d. For residential buildings the “primary entrance” is the front door (i.e., facing the street). For multifamily buildings in which each unit does not have its own exterior entrance, the “primary entrance” may be a lobby, courtyard or breezeway which serves as a common entrance for more than one dwelling.

## Recommendation 4: Allow parking area redevelopment for transit-related improvements; add requirements for carpool and vanpool parking; and establish maximum parking requirements in specified situations.

**16.128.030 Vehicle Parking Standards.**

At the time a structure is erected or enlarged, or the use of a structure or parcel of land is changed within any zone in the City, off-street parking spaces shall be provided in accordance with requirements in this section, chapter, and Code, unless greater requirements are otherwise established. The minimum number of required off-street vehicle parking spaces (i.e., parking that is located in parking lots and garages and not in the street right-of-way) shall be determined based on the standards in Table 16.128.030.A.

A. General Provisions.

[…]

7. **Parking spaces and parking areas may be used for transit related uses such as transit stops and park-and-ride/rideshare areas, provided minimum parking space requirements can still be met.**
8. **Parking areas that have designated employee parking and more than 20 automobile parking spaces shall provide at least 10% of the employee parking spaces (minimum two spaces) as preferential carpool and vanpool parking spaces. Preferential carpool and vanpool parking spaces shall be closer to the employee entrance of the building than other parking spaces, with the exception of ADA accessible parking spaces.**
9. **Sites that are adjacent to existing or planned transit stops or are in the General Commercial (C-1) and Commercial Mixed Use (C-MU) districts are subject to maximum off-street vehicle parking requirements. The maximum number of off-street vehicle parking spaces allowed per site shall be equal the minimum number of required spaces, pursuant to Table 16.128.030.A, multiplied by a factor of:**
    a. **1.2 spaces for uses fronting a street with adjacent on-street parking spaces; or**
    b. **1.5 spaces, for uses not fronting a street with adjacent on-street parking; or**
    c. **A factor determined according to a parking analysis prepared by a qualified professional/registered engineer and submitted by the applicant.**

## Recommendation 5: Allow parking reductions through a variance procedure.

10. **The applicant may propose a parking space standard that is different than the standard in Table 16.128.030.A, for review and action by the Community Development Director through a variance procedure, pursuant to Chapter 16.272. The applicant's proposal shall consist of a written request, and a parking analysis**

**prepared by a qualified professional/registered engineer. The parking analysis, at a minimum, shall assess the average parking demand and available supply for existing and proposed uses on the subject site; opportunities for shared parking with other uses in the vicinity; existing public parking in the vicinity; transportation options existing or planned near the site, such as frequent transit service, carpools, or private shuttles; and other relevant factors.**

[City: Do you want changes/reductions to parking standards to require a variance procedure and professional parking analysis, per passages above, or to be made by the CDD simply determining consistency with the following criteria?]

**The Community Development Director may reduce the off-street parking standards for sites with one or more of the following features:**

a. **Site has a transit stop with existing or planned frequent transit service (30-minute headway or less) located adjacent to it, and the site's frontage is improved with a transit stop shelter, consistent with the standards of the applicable transit service provider: Allow up to a 20 percent reduction to the standard number of automobile parking spaces;**

b. **Site has dedicated parking spaces for carpool/vanpool vehicles: Allow up to a 10 percent reduction to the standard number of automobile parking spaces;**

c. **Site has dedicated parking spaces for motorcycle and/or scooter or electric carts: Allow reductions to the standard dimensions for parking spaces and the ratio of standard to compact parking spaces;**

d. **Available on-street parking spaces adjacent to the subject site in amounts equal to the proposed reductions to the standard number of parking spaces.**

e. **Site has more than the minimum number of required bicycle parking spaces: Allow up to 10 percent reduction to the number of automobile parking spaces.**

B. Parking Location and Shared Parking.

1. Location. Vehicle parking is allowed only on approved parking shoulders (streets), within garages, carports and other structures, or on driveways or parking lots that have been developed in conformance with this Code. **Parking and loading areas shall not be located in required yards adjacent to a street unless otherwise specifically permitted in this ordinance.** [City: Specify this in the C-1 and C-MU districts, other districts, and/or adjacent to an existing or planned transit route or stop?] **Side and rear yards that are not adjacent to a street may be used for such areas when developed and maintained as required in this ordinance**. ~~Specific locations for parking are indicated in Division 2 for some land uses (e.g., the requirement that parking be located to side or rear of buildings, with access from alleys, for some uses)~~. See also Chapter 16.120, Access and Circulation.

2. Off-Site Parking. Except for single-family, two-family, and three-family dwellings, the vehicle parking spaces required by this chapter may be located on another parcel of land, provided the parcel is within 200 feet or a reasonable walking distance of the use it serves. The distance from the parking area to the use shall be measured from the nearest parking space to a building entrance, following a sidewalk or other pedestrian route. The right to

use the off-site parking must be evidenced by a recorded deed, lease, easement, or similar written instrument.

## Recommendation 6: Update bicycle parking standards.

**Bicycle Parking**

**16.128.040 Bicycle Parking Requirements.**

A. All uses shall provide bicycle parking in conformance with the following standards which are evaluated during development review or site design review.

B. Number of Bicycle Parking Spaces. **The minimum number of bicycle parking spaces required for uses is provided in Table 16.128.040.A**. ~~A minimum of two bicycle parking spaces per use is required for all uses with more than 10 vehicle parking spaces. The following additional standards apply to specific types of development:~~

~~1. Multifamily Residences. Every residential use of four or more dwelling units provides at least one sheltered bicycle parking space for each dwelling unit. Sheltered bicycle parking spaces may be located within a garage, storage shed, basement, utility room or similar area. In those instances in which the residential complex has no garage or other easily accessible storage unit, the bicycle parking spaces may be sheltered from sun and precipitation under an eave, overhang, an independent structure, or similar cover.~~

~~2. Parking Lots. All public and commercial parking lots and parking structures provide a minimum of one bicycle parking space for every 10 motor vehicle parking spaces, with a maximum of 28 bicycle parking spaces per commercial lot.~~

~~3. Schools. Elementary and middle schools, both private and public, provide one bicycle parking space for every 10 students and employees. High schools provide one bicycle parking space for every five students and employees. All spaces should be sheltered under an eave, overhang, or bicycle shelter.~~

**Where an application is subject to Conditional Use Permit approval or the applicant has requested a reduction to the vehicle parking standard, pursuant to 16.128.030(A)(10), the City may require bicycle parking spaces in addition to those in Table 16.128.040.A.**

**Table 16.128.040.A**
**Bicycle Parking Requirements**

**Table 16.128.040.A**
**Bicycle Parking Requirements**

| Minimum Required Bicycle Parking Spaces | | Long and Short Term Bicycle Parking |
|---|---|---|
| **Use** | **Minimum Number of Spaces** | **(As % of Minimum Required Bicycle Parking Spaces)** |
| **Multifamily Residential**<br><br>(required for 4 or more dwelling units) | 2 spaces per 4 dwelling units | 75% long term<br><br>25% short term |
| **Commercial** | 2 spaces per primary use or 1 per 5 vehicle spaces, whichever is greater | 25% long term<br><br>75% short term |
| **Schools**<br><br>(all types) | 2 spaces per classroom | 100% long term |
| **Parks**<br><br>(active recreation areas only) | 4 spaces | 100% short term |
| **Transit Stops** | 2 spaces | 100% short term |
| **Transit Centers** | 4 spaces or 1 per 10 vehicle spaces, whichever is greater | 50% long term<br><br>50% short term |
| **Other Uses** | 2 spaces per primary use or 1 per 10 vehicle spaces, whichever is greater | 50% long term<br><br>50% short term |

**C. Design and Location.**

1. **All bicycle parking shall be securely anchored to the ground or to a structure.**
2. **All bicycle parking shall be well lighted.**
3. **All bicycle parking shall be designed so that bicycles may be secured to them without undue inconvenience, including being accessible without removing another bicycle.** [City: The following is an option in providing more specific guidance regarding bicycle parking design if desired to supplement this more general language. Keep general (above) or specific (following) language?] **Bicycle parking spaces shall be at least six (6) feet long and two-and-one-half (2 ½) feet wide, and overhead clearance in covered spaces should be a minimum of seven (7) feet. A five (5) foot aisle for bicycle maneuvering**

**should be provided and maintained beside or between each row/rack of bicycle parking.**

4. **Bicycle parking racks shall accommodate locking the frame and both wheels using either a cable or U-shaped lock.**
5. **Direct access from the bicycle parking area to the public right-of-way shall be provided at-grade or by ramp access, and pedestrian access shall be provided from the bicycle parking area to the building entrance.**
6. **Bicycle parking shall not impede or create a hazard to pedestrians or vehicles and shall not conflict with the vision clearance standards of Chapter 16.132.**
7. **All bicycle parking should be integrated with other elements in the planter strip when in the public right-of-way.**
8. **Short-term bicycle parking.**
   a. **Short-term bicycle parking shall consist of a stationary rack or other approved structure to which the bicycle can be locked securely.**
   b. **If more than 10 short-term bicycle parking spaces are required, at least 50% of the spaces must be sheltered. Sheltered short-term parking consists of a minimum 7-foot overhead clearance and sufficient area to completely cover all bicycle parking and bicycles that are parked correctly. c. Short-term bicycle parking shall be located within 50 feet of the main building entrance or one of several main entrances, and no further from an entrance than the closest automobile parking space.**
9. **Long-term bicycle parking. Long-term bicycle parking shall consist of a lockable enclosure, a secure room in a building onsite, monitored parking, or another form of sheltered and secure parking.**

D. **Exemptions. This Section does not apply to single-family and duplex housing, home occupations, and agricultural uses. The City may exempt other uses upon finding that, due to the nature of the use or its location, it is unlikely to have any patrons or employees arriving by bicycle.**

E. **Hazards. Bicycle parking shall not impede or create a hazard to pedestrians or vehicles and shall be located so as to not conflict with the vision clearance standards of Chapter 16.132.**

## Recommendation 7: Update street design standards.

16.136.020 Transportation Standards.

F. Minimum Rights-of-Way and Street Sections. Street rights-of-way and improvements shall conform to the design standards in ~~Table 16.136.010~~ **the City of Warrenton Transportation System Plan**. A variance shall be required in accordance with Chapter 16.272 of this Code to vary the adopted standards in ~~Table 16.136.010~~ **the Transportation System Plan**. ~~Where a~~

~~range of width is indicated, the width shall be determined by the decision-making authority based upon the following factors:~~

~~1. Street classification in the Transportation System Plan or Comprehensive Plan;~~

~~2. Anticipated traffic generation;~~

~~3. On-street parking needs;~~

~~4. Sidewalk and bikeway requirements based on anticipated level of use;~~

~~5. Requirements for placement of utilities;~~

~~6. Street lighting;~~

~~7. Street tree location, as provided for in Chapter 16.124;~~

~~8. Protection of significant vegetation and wetland and riparian areas, as provided for in Chapters 16.124 and 16.156;~~

~~9. Safety and comfort for motorists, bicyclists, and pedestrians;~~

~~10. Street furnishings (e.g., benches, lighting, bus shelters, etc.), when provided;~~

~~11. Access needs for emergency vehicles; and~~

~~12. Transition between different street widths (i.e., existing streets and new streets), as applicable.~~

**~~Table 16.136.010~~**

**~~City of Warrenton Street Design Standards~~**

**[Table to be deleted.]**

[…]

J. Sidewalks, Planter Strips, Bicycle Lanes. Sidewalks, planter strips, and bicycle lanes shall be installed in conformance with the standards in ~~Table 16.136.010, applicable provisions of~~ the Transportation System Plan~~, the Comprehensive Plan,~~ and **applicable provisions in the** adopted street plans. Maintenance of sidewalks, curbs, and planter strips is the continuing obligation of the adjacent property owner.

R. Alleys, Public or Private. Alleys shall conform to the standards in ~~Table 16.136.010~~ **the Transportation System Plan**. While alley intersections and sharp changes in alignment shall be avoided, the corners of necessary alley intersections shall have a radius of not less than 12 feet.

S. Private Streets. Private streets shall not be used to avoid connections with public streets. Gated communities (i.e., where a gate limits access to a development from a public street) are prohibited. Design standards for private streets are the same as design standards for public streets and shall conform to the provisions ~~of Table 16.136.010~~ **in the Transportation System Plan**.

## Recommendation 8: Establish new transit stop improvement requirements.

**[New Chapter] 16.204 Transit Access and Supportive Improvements**

**Development that is proposed adjacent to an existing or planned transit stop, as designated in an adopted transportation or transit plan, shall provide the following transit access and supportive improvements in coordination with the transit service provider:**

**A. Reasonably direct pedestrian connections between the transit stop and primary entrances of the buildings on site. For the purpose of this Section, "reasonably direct" means a route that does not deviate unnecessarily from a straight line or a route that does not involve a significant amount of out-of-direction travel for users.**

**B. The primary entrance of the building closest to the street where the transit stop is located that is oriented to that street.**

**C. A transit passenger landing pad that is ADA accessible.**

**D. An easement or dedication for a passenger shelter or bench if such an improvement is identified in an adopted plan.**

**E. Lighting at the transit stop.**

**F. Other improvements identified in an adopted plan.**

## Recommendation 9: Expand notice requirements to transportation agencies.

**16.208.040 Type II Procedure (Administrative).**

C. Notice of Application for Type II Administrative Decision.

1. Before making a Type II administrative decision, the Community Development Director shall mail notice to:

    a. All owners of record of real property within 100 feet of the subject area not less than 20 days prior to the decision date;

    […]

    d. Any person who submits a written request to receive a notice; and

    e. Any governmental agency which is entitled to notice under an intergovernmental agreement entered into with the City. The City ~~may~~ shall notify other affected agencies, as appropriate, for review of the application. **Affected agencies include but are not limited to other City and corresponding County departments; Warrenton-**

**<u>Hammond School District; utility companies; and Sunset Empire Transportation District and other transportation facility and service providers.</u>** ODOT shall be notified when there is a land division abutting a state facility for review of, comment on, and suggestion of conditions of approval for, the application.

**16.208.050 Type III Procedure (Quasi-Judicial).**

C. Notice of Hearing.

1. Mailed Notice. Notice of a Type III application hearing (or appeal) or Type I or II appeal hearing shall be given by the Community Development Director in the following manner:

   a. At least 20 days before the hearing date, notice shall be mailed to:

      i. The applicant and all owners or contract purchasers of record of the property which is the subject of the application;

      ii. All property owners of record within 200 feet of the site (N/A for Type I appeal);

      iii. Any governmental agency which has entered into an intergovernmental agreement with the City, which includes provision for such notice, or who is otherwise entitled to such notice. ODOT shall be notified when there is a land division abutting a state facility for review of, comment on, and suggestion of conditions of approval for, the application. **<u>Transit and other transportation facility and service providers shall be notified of Type III application hearings when the application potentially affects their facility or service.</u>** [Owners of airports shall be notified of a proposed zone change in accordance with ORS 227.175.];

      iv. Any neighborhood or community organization recognized by the City Commission and whose boundaries include the property proposed for development;

      […]

**16.208.070 General Provisions.**

[…]

C. Pre-Application Conferences.

1. Participants. When a pre-application conference is required, the applicant shall meet with the Community Development Director or his/her designee(s). **<u>The Community Development Director shall invite City staff from other departments to provide technical expertise applicable to the proposal, as necessary, as well as other public agency staff such as transportation and transit agency staff.</u>**

[…]

D. Applications.

3. Check for Acceptance and Completeness.

b. Completeness.

[…]

iv. Coordinated Review. When required by this Code, or at the direction of the Community Development Director, the City shall submit the application for review and comment to ODOT and other applicable City, county, state, and federal review agencies. **Potential applicable agencies include but are not limited to City Building, Public Works, Fire, Police, and Parks departments; Clatsop County Building, Planning, Parks, Public Health, Public Safety, and Public Works departments; Warrenton-Hammond School District; utility companies; and Sunset Empire Transportation District and other transportation facility and service providers.**

## Recommendation 10: Update TPR "significant effect" citation.

**16.232.060 Transportation Planning Rule Compliance.**

A. When a development application includes a proposed Comprehensive Plan amendment**,** ~~or~~ rezone**, or land use regulation change,** the proposal **shall demonstrate it is consistent with the adopted transportation system plan and the planned function, capacity, and performance standards of the impacted facility or facilities. The proposal shall** be reviewed to determine whether it significantly affects a transportation facility, in accordance with Oregon Administrative Rule (OAR) 660-012-0060. See also Chapter 16.256, Traffic Impact Study. **Where it is found that a proposed amendment would have a significant effect on a transportation facility, the City will work with the applicant and, where applicable, with the roadway authority to modify the request or mitigate the impacts in accordance with the TPR and applicable law.** ~~Significant means the proposal would:~~

~~1. Change the functional classification of an existing or planned transportation facility. This would occur, for example, when a proposal causes future traffic to exceed the capacity of a "collector" street classification, requiring a change in the classification to an "arterial" street, as identified by the Transportation System Plan; or~~

~~2. Change the standards implementing a functional classification system; or~~

~~3. Allow types or levels of land use that would result in levels of travel or access that are inconsistent with the functional classification of a transportation facility; or~~

~~4. Reduce the level of service of the facility below the minimum acceptable level identified in the Transportation System Plan.~~

~~B. Amendments to the Comprehensive Plan and land use standards which significantly affect a transportation facility shall assure that allowed land uses are consistent with the function, capacity, and level of service of the facility identified in the Transportation System Plan. This shall be accomplished by one of the following:~~

1. ~~Limiting allowed land uses to be consistent with the planned function of the transportation facility; or~~
2. ~~Amending the Transportation System Plan to ensure that existing, improved, or new transportation facilities are adequate to support the proposed land uses consistent with the requirement of the transportation planning rule; or~~
3. ~~Altering land use designations, densities, or design requirements to reduce demand for automobile travel and meet travel needs through other modes of transportation.~~

## Recommendation 11: Update Traffic Impact Study (TIS) requirements.

**16.256.010 Purpose.**

The purpose of this chapter of the Warrenton Development Code is to implement Section 660-012-0045(2)(e) of the State Transportation Planning Rule that requires the City to adopt a process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities **(see Section 16.256.060)**. This chapter establishes the standards for when a proposal must be reviewed for potential traffic impacts; when a traffic impact study must be submitted with a development application in order to determine whether conditions are needed to minimize impacts to and protect transportation facilities; what must be in a traffic impact study; and who is qualified to prepare the study.

**16.256.020 Typical Average Daily Trips.**

~~Standards by which to gauge a~~**A**verage daily vehicle trips ~~include: 10 trips per day per single-family household; five trips per day per apartment; and 30 trips per day per 1,000 square feet of gross floor area such as a new supermarket or other retail development~~ **shall be calculated using the rates and mythology in the most recent addition of the Institute of Transportation Engineers Trip Generation Manual**.

**16.256.030 When Required.**

A traffic impact study ~~may~~ **will** be required to be submitted to the City with a land use application, when the following conditions apply :

A. The development application involves a change in zoning or a plan amendment designation; or,

B. The development shall cause one or more of the following effects, which can be determined by field counts, site observation, traffic impact analysis or study, field measurements, crash history, Institute of Transportation Engineers Trip Generation ~~m~~**M**anual; and information and studies provided by the local reviewing jurisdiction and/or ODOT:

1. An increase in site traffic volume generation by 300 average daily trips (ADT) or more; or
2. An increase in ADT hour volume of a particular movement to and from the state highway by 20% or more; or
3. An increase in use of adjacent streets by vehicles exceeding the 20,000 pound gross vehicle weights by 10 vehicles or more per day; or
4. The location of the access driveway does not meet minimum ~~site~~**sight** distance requirements, or is located where vehicles entering or leaving the property are restricted, or such vehicles queue or hesitate on the state highway, creating a safety hazard; or
5. A change in internal traffic patterns that may cause safety problems, such as back up onto the highway or traffic crashes in the approach area.

**16.256.040 Traffic Impact Study Requirements.**

A. Preparation. A traffic impact study shall be prepared by a professional engineer ~~in accordance with OAR 734-051-180~~ **registered in the State of Oregon. The study scope and content shall be determined in coordination with the City Public Works Director or designee. Traffic impact analyses required by Clatsop County or ODOT shall be prepared in accordance with the requirements of those road authorities. Preparation of the study report is the responsibility of the land owner or applicant.**

B. Transportation planning rule compliance, Section 16.232.060.

**16.256.050 Approval Criteria.**

**The traffic impact study report shall be reviewed according to the following criteria:**

**A. The study complies with the content requirements set forth by the City and/or other road authorities as appropriate;**

**B. The study demonstrates that adequate transportation facilities exist to serve the proposed land use action or identifies mitigation measures that resolve identified traffic safety problems in a manner that is satisfactory to the road authority;**

**C. For affected City facilities, the study demonstrates that the project meets mobility and other applicable performance standards established in the adopted transportation system plan, and includes identification of multi-modal solutions used to meet these standards, as needed; and**

**D. Proposed design and construction of transportation improvements are in accordance with the design standards and the access spacing standards specified in the transportation system plan.**

**16.256.060 Conditions of Approval.**

**A. The City may deny, approve, or approve a proposal with conditions necessary to meet operational and safety standards; provide the necessary right-of-way for planned**

**<u>improvements; and require construction of improvements to ensure consistency with the future planned transportation system.</u>**

**<u>B. Construction of off-site improvements may be required to mitigate impacts resulting from development that relate to capacity deficiencies and public safety; and/or to upgrade or construct public facilities to City standards.</u>**

**<u>C. Where the existing transportation system is shown to be impacted by the proposed use, improvements such as paving; curbing; installation of or contribution to traffic signals; and/or construction of sidewalks, bikeways, access ways, paths, or streets that serve the proposed use may be required.</u>**

**<u>D. Improvements required as a condition of development approval, when not voluntarily provided by the applicant, shall be roughly proportional to the impact of the development on transportation facilities. Findings in the development approval shall indicate how the required improvements directly relate to and are roughly proportional to the impact of development.</u>**