



## **US 2: Everett Port/ Naval Station to SR 9 Corridor Planning Study**



**Washington State  
Department of Transportation**



**Washington State Department of Transportation  
Strategic Planning and Programming Division  
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**US 2: Everett Port/Naval Station to  
SR 9 Corridor Planning Study  
Everett (MP 0.0) to Snohomish (5.0)**

**August 2016**

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*Prepared by*

Washington State Department of Transportation

# Participating Agencies and Individuals

Agencies and organizations provided input and/or participated in the development of the US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study. The Washington State Department of Transportation would like to acknowledge and thank them for their involvement in this Corridor Planning Study.

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City of Everett

City of Marysville

City of Lake Stevens

City of Snohomish

Community Transit

WSDOT Urban Planning Office

WSDOT NW Region Traffic

WSDOT Program Management

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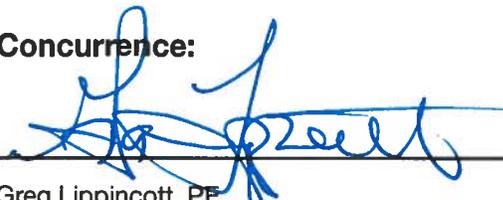
Washington State Department of Transportation  
Northwest Region

**US 2: Everett Port/Naval Station to  
SR 9 Corridor Planning Study**

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# Acronyms

<b>AADT</b>	Annual Average Daily Traffic	<b>FGTS</b>	Freight and Goods Transportation System (Washington State)
<b>AASHTO</b>	American Association of State Highway and Transportation Officials	<b>FHWA</b>	Federal Highway Administration
<b>AAWDT</b>	Annual Average Weekday Traffic	<b>FTA</b>	Federal Transit Administration
<b>ADT</b>	Average Daily Traffic	<b>GHGs</b>	Greenhouse Gases
<b>ARM</b>	Accumulated Route Mileage	<b>GIS</b>	Geographic Information Systems
<b>ATM</b>	Active Traffic Management	<b>GMA</b>	Growth Management Area
<b>AVMT</b>	Annual Vehicle Miles Traveled	<b>HCM</b>	Highway Capacity Manual
<b>AWDT</b>	Average Weekday Traffic	<b>HCS</b>	Highway Capacity Software
<b>AWSC</b>	All-Way Stop Controlled Intersection	<b>HNS</b>	Highway of National Significance
<b>B/C</b>	Benefit Cost	<b>HOT</b>	HOV converted to toll; all carpools free.
<b>B/C A</b>	Benefit/Cost Analysis	<b>HOV</b>	High Occupancy Vehicle
<b>CARA</b>	Critical Aquifer Recharge Area	<b>HSP</b>	Highway System Plan (Washington State)
<b>CMAQ</b>	Congestion Mitigation/Air Quality	<b>HSS</b>	Highway of Statewide Significance
<b>CPS</b>	Corridor Planning Study	<b>I</b>	Interstate (route)
<b>CTR</b>	Commute Trip Reduction	<b>I/C</b>	Interchange
<b>CWG</b>	Corridor Working Group	<b>I/S</b>	Intersection
<b>DAHP</b>	Department of Archaeology and Historic Preservation	<b>ITS</b>	Intelligent Transportation Systems
<b>DEIS</b>	Draft Environmental Impact Statement	<b>LOS</b>	Level-of-Service
<b>EB</b>	Eastbound	<b>LRT</b>	Light Rail Transit
<b>EIS</b>	Environmental Impact Statement	<b>LU</b>	Land Use
<b>EPA</b>	Environmental Protection Agency	<b>MP</b>	Master Plan
<b>EPL</b>	Express toll lanes: pay lanes, not all carpools are free.	<b>MP</b>	Milepost
<b>ESA</b>	Endangered Species Act	<b>MPH</b>	Miles per Hour
<b>FEIS</b>	Final Environmental Impact Statement	<b>MPO</b>	Metropolitan Planning Organization
<b>FEMA</b>	Federal Emergency Management Agency	<b>MSA</b>	Metropolitan Statistical Area
		<b>N/A</b>	Not Applicable
		<b>NB</b>	Northbound

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### Acronyms - continued

NEPA	National Environmental Policy Act	SRMP	State Route Milepost
NHS	National Highway System	STIP	Statewide Transportation Improvement Program
NRHP	National Register of Historic Places	STP	Surface Transportation Program
NWI	National Wetland Inventory	S/V	Seconds per Vehicle
O & D	Origin & Destination (survey or zone)	TAZ	Transportation Analysis Zone
OC	Overcrossing	TDM	Transportation Demand Management
OFM	Office of Financial Management (Washington State)	TIB	Transportation Improvement Board
OWSC	One-Way Stop Controlled Intersection	TIP	Transportation Improvement Program
P & R	Park and Ride	TWSC	Two-Way Stop Controlled Intersection
PSRC	Puget Sound Regional Council	UC	Undercrossing
PTBA	Public Transportation Benefit Area	US	United States (route)
RAB	Roundabout	V/C	Volume to Capacity Ratio
RCW	Revised Code of Washington	VMT	Vehicle Miles Traveled
RDP	Route Development Plan	VPH	Vehicles per Hour
ROD	Record of Decision	WAC	Washington Administrative Code
RTPO	Regional Transportation Planning Organization	WB	Westbound
ROW	Right-of-Way	WDFW	Washington (State) Department of Fish and Wildlife
SEIS	Supplemental Environmental Impact Statement	WSDOT	Washington State Department of Transportation
SEPA	State Environmental Policy Act	WTP	Washington (State) Transportation Plan
SOV	Single Occupancy Vehicle		
SR	State Route		

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# Executive Summary

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**Note on funding:** The recommendations in this study will need to compete for funding with other proposed improvements around the state based on performance outcome. Due to limited state funding, local jurisdictions are encouraged to seek funding from non-state sources such as developer contributions, creating a local improvement district, or federal grants to implement the recommendations.

## What is the US 2 Everett Port/Naval Station to SR 9 Corridor Planning Study?

The US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study is a planning process used to gather information to determine if improvements are needed to meet existing and future transportation needs. The process includes gathering input from local officials and the public, collecting and analyzing traffic and other data, reviewing existing local comprehensive plans and their transportation elements, examining current system performance, projecting future travel demand, and evaluating improvement options.

### Where is the US 2 Corridor Planning Study Area located?

The US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study begins in Everett (MP 0.0) and ends at the city limits of Snohomish at the junction of SR 9 (MP 5.0). This five mile section of US 2 is in Snohomish County, Washington. US 2 continues east over Stevens Pass to the western border between Washington and Idaho and beyond to Houlton, Maine. The study area also includes SR 529 from I-5 to the Port of Everett, MP 0.0 to approximately MP 3.0.

### Why did WSDOT study US 2 from I-5 to SR 9?

In 2009, the Washington State Legislature provided \$400,000 to conduct a study of US 2 between the cities of Everett and Snohomish. In addition, the city of Everett and Snohomish County each contributed \$200,000 for a total budget of \$800,000. Representatives from Everett, the city of Snohomish, and Snohomish County participated in the stakeholders group formed to assist WSDOT with the corridor planning study.

**Exhibit ES.1: US 2 Corridor Planning Study Area**



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## Who was involved in the corridor study?

A stakeholders group comprised of local and regional agencies assisted WSDOT with this corridor planning study. Called the Corridor Working Group, the stakeholders included representatives from the cities of Everett, Marysville, Lake Stevens, and Snohomish, as well as Snohomish County, Community Transit, Puget Sound Regional Council (PSRC), and WSDOT. With involvement from the Corridor Working Group, WSDOT used the Moving Washington framework for decision-making to evaluate possible improvements and to make recommendations.



## Moving Washington

Moving Washington is the Washington State Department of Transportation framework for decision-making for transportation investments that focuses on keeping people and goods moving and supporting a healthy economy, environment, and communities.

Moving Washington is anchored by the department's highest priority: maintaining and preserving the safe and long-lasting performance of existing infrastructure, facilities and services. This is the heart of Moving Washington and the primary target of the department's investments.

Moving Washington combines three essential transportation strategies to achieve and align the objectives of WSDOT and its partners: manage demand, operate efficiently, and add capacity strategically. It is through the application of these strategies that WSDOT is able to ensure that investments are integrated and cost-effective.

**Manage Demand** – reduce traffic during the most congested times and provide traveler information to allow users to move efficiently through the system.

**Operate Efficiently** – use traffic-management tools to optimize the flow of traffic and maximize available capacity.

**Add Capacity Strategically** – targeting our worst traffic hotspots or filling critical system gaps to best serve an entire corridor, community or region means fixing bottlenecks that constrain the flow.

For more information on Moving Washington, visit:  
[www.wsdot.wa.gov/movingwashington/](http://www.wsdot.wa.gov/movingwashington/)

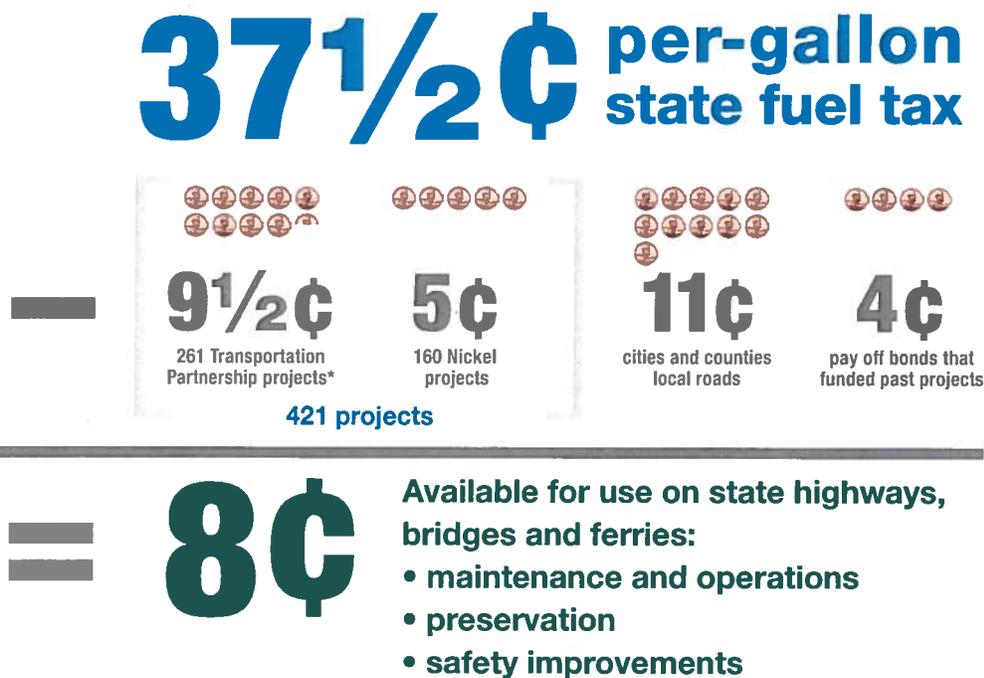
## Why Moving Washington?

At its most basic level Moving Washington is a budgeting and investment framework that is more important now than ever, given declining transportation revenue and growing demands on our state's highways, ferries and rails. The state is not in a position to build everything everyone wants so the state must have a way to prioritize its transportation needs and find the most efficient solutions that support and enhance Washington's economic vitality.

Exhibit ES.2 below illustrates how transportation revenue is derived and spent in Washington State. As the exhibit demonstrates, only 8 cents (21 percent) of the 37.5 cents gas tax collected on each gallon of fuel is available to operate, maintain, and improve the transportation system. Given this challenging financial situation it is necessary for WSDOT and to think of and approach transportation investments in a strategic manner.

### Exhibit ES.2: Transportation Revenue

## Transportation fuel tax is limited and committed



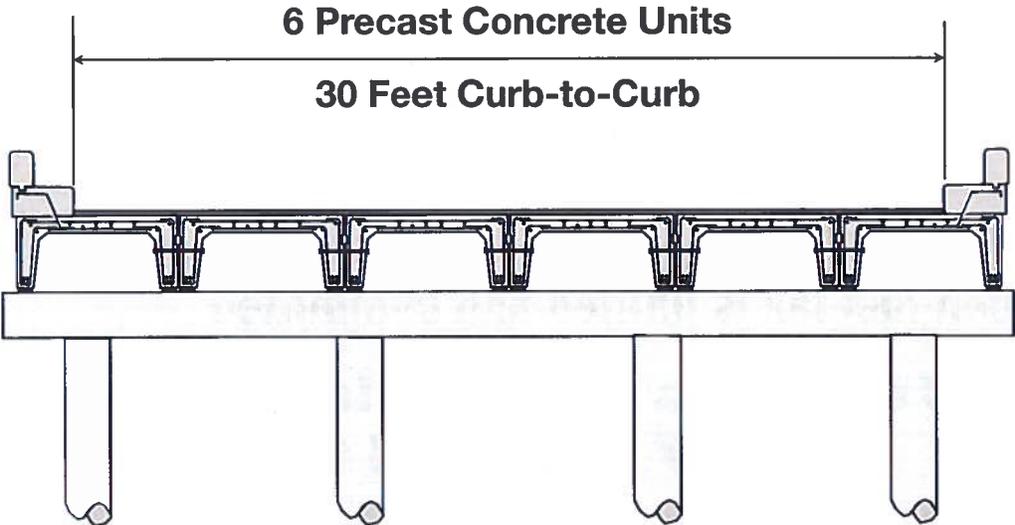
\* Of the 9 1/2 cents, 8 1/2 cents is used by the state for highway projects, 1 cent goes to cities and counties for street and road improvements.

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## Background

The focus of the study is on short and long range improvements for the westbound trestle. Construction of the trestle was completed in 1968 with an expected useful life of 75 years. The structure has 12 foot lanes (two) and three foot shoulders.

**Exhibit ES.3:** Typical cross section of the US 2 westbound trestle



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## **Westbound Trestle Rehab Projects**

When the westbound trestle started showing sign of aging and need of repair, WSDOT's Bridge Division concluded that the most cost effective approach to extending the life of the structure was to apply carbon fiber wrap to the girders. In 2011 WSDOT completed a phased rehabilitation project that is expected to extend the life of the trestle until approximately 2045. For more information see Appendix A.

### **Stage 1 – US 2 WB Ebey Island Viaduct and Ebey Slough Bridge Rehabilitation**

**Complete: September 2007**

**Cost: \$10.8 million**

**Description:** Repaired 136, 40 foot-long girders by chipping away old cracking concrete and removing corrosion from the steel frame. The steel was treated to prevent additional corrosion and was strengthened. The structure was re-sealed by applying carbon fiber mesh and new concrete over the exposed steel.

### **Stage 2 – US 2 Trestle Ebey Island Bridge Rehabilitation**

**Complete: October 2011**

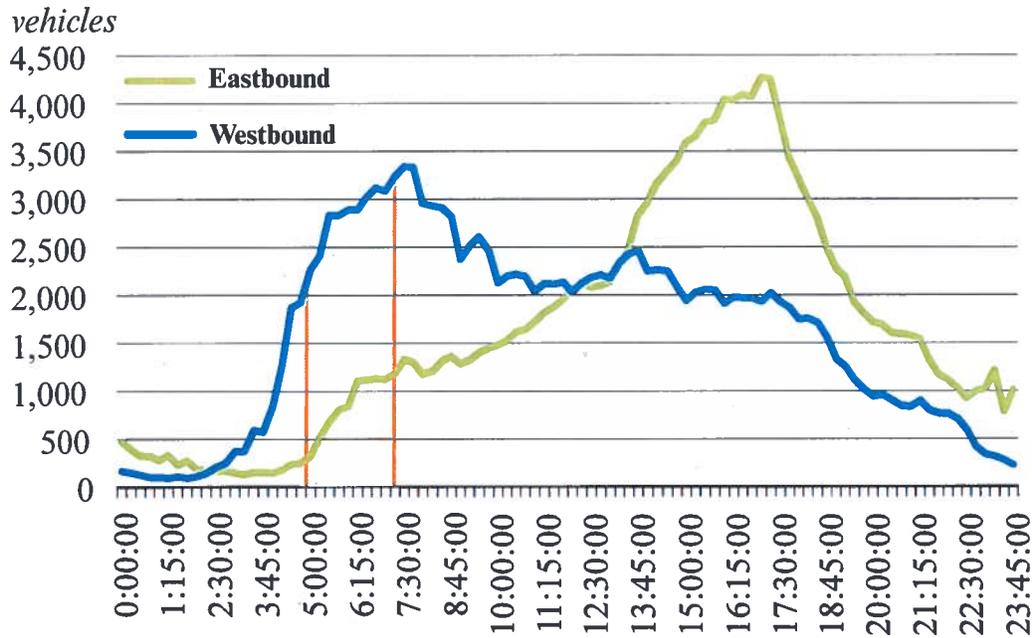
**Cost: \$5.1 million**

**Description:** Repaired and reinforced 844, girders by chipping away old cracking concrete and removing corrosion from the steel frame. The steel was treated to prevent additional corrosion and was strengthened. The structure was re-sealed by applying carbon fiber mesh and new concrete over the exposed steel.

## Traffic Volumes

According to the 2012 Annual Traffic Report, the US 2 trestle (east and west bound) carries 73,000 vehicles a day. The graphic below shows that the westbound trestle has about two hours of congestion that occurs between 5:30 and 7:30 a.m., coinciding with Boeing's staggered work shifts.

**Exhibit ES.4:** US 2 Trestle Average Weekday Volumes (2012)



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## Safety

Between March 2007 and February 2012, 569 collisions were reported on the mainline and ramps. Three of these collisions resulted in fatal injuries and six resulted in serious injuries. A detailed review of the probable contributing factors to collisions on the corridor revealed that the majority of the collisions were behavior-related. Based on the finding, it is concluded that the safety performance of the corridor will most likely benefit from increased enforcement and activities by a Target Zero community task force.

## Recommendations

The recommendations in the corridor study acknowledge the current financial situation and adhere to the principles and strategies of Moving Washington. The US 2 Corridor Study recommendations include three short-term improvements ranging from \$200,000 per year for Transportation Demand Management (TDM) programs to \$3.1 million dollars for Intelligent Transportation System (ITS) improvements. There is one existing safety project, two completed maintenance projects (including the \$17 million dollar rehabilitation project of the westbound trestle), and one programmed maintenance project to replace a culvert, as well as ongoing maintenance and preservation of the westbound trestle. WSDOT evaluated the three proposed improvement projects based on the Moving Washington strategies: Safety, Preservation and Maintenance, Operate Efficiently, Manage Demand, and Strategic Capacity. Input from the public, stakeholders, and agencies was taken into consideration during the evaluation process. Consideration was also given to benefit cost ratios and VISSIM model results like travel time savings.

As the economy recovers or traffic conditions change, the data that was used to develop the recommendations for this corridor study should be updated or reevaluated if future conditions along the corridor evolve differently than anticipated in this study.

## US 2 Corridor Planning Study Safety and Preservation Projects

The recommended projects and planning level cost estimates are listed in the following table:

Moving Washington	Project Number		Cost	Funding Status
<b>Safety Projects</b>				
 <b>Keep Safe</b>	<b>e</b>	US 2/ Bickford Ave – Intersection Safety Improvements. Under construction.	\$20 Million	2013
	<b>Preservation Projects</b>			
 <b>Maintain</b>	<b>a</b>	US 2/ Ebey Slough Bridge Vicinity to Bickford Ave Vicinity – Culvert replacement (multiple culverts). Benefit: Preserves roadway, may benefit fish & wildlife, improves safety.	\$2.4 Million	2012
	<b>b</b>	US 2 Westbound Trestle Rehabilitation Phase I and Phase II Benefit: Extends the lifespan of the structure by 25 years.	\$14.7 Million	Construction completed 2011
	<b>c</b>	US 2 Westbound Trestle Maintenance and Preservation. Ongoing.	NA	NA
	<b>d</b>	US 2/Bickford Ave Vicinity – Stormwater Pipe Replacement. Benefit: Preserves roadway, may benefit fish & wildlife, improves safety.	\$760 K	Unfunded

## Short Range Study Recommendations

Moving Washington	Project Number	Improvement	Cost Estimate (2011 \$)
 <b>Operate Efficiently and Manage Demand</b>	<b>B</b>	Travel Demand Management (TDM). Benefits: reduces travel demand on a congested facility.	\$200 K per year
	<b>C</b>	US 2/ West Abutment Snohomish River (Sign Bridge) and US 2/I-5 to SR 204 – ITS Improvements. Benefits: provides drivers with early information travel conditions.	\$3.1 Million
 <b>Operate Efficiently</b>	<b>A</b>	Incident Response Team. Benefits: detects and clears disabled vehicles. Prevents and reduces congestion that would otherwise result.	\$100 K per year

### What is TDM?

Transportation Demand Management (TDM) encourages the use of travel options such as transit, car/vanpooling, bicycling, telecommuting and walking as alternatives to driving alone. The other focus of TDM is to redistribute transportation demand in space or in time. Managing transportation demand can be a cost-effective alternative to increasing capacity.

**Exhibit ES.5: US 2 Corridor Planning Study Projects**



**Recommended Projects**

- A. Incident Response Team
- B. Travel Demand Management (TDM)
- C. US 2/West Abutment Snohomish River (Sign Bridge) and US 2/I-5 to SR 204 – ITS improvements

**Safety and Preservation Projects**

- a. US 2/Ebey Slough Bridge Vicinity to Bickford Ave Vicinity – Culvert Replacement (multiple replacements)
- b. US 2 Westbound Trestle Rehabilitation, Phases I and II
- c. US 2 Westbound Trestle Maintenance and Preservation – Ongoing
- d. US 2/Bickford Ave Vicinity – Stormwater Pipe Replacement
- e. US 2/Bickford Ave – Intersection Safety Improvements

## Long Range Study Recommendations:

### Long Range Westbound Trestle Replacement Approach

The future replacement of the westbound trestle will be driven by the useful life of the existing structure. The westbound trestle is considered to be in “Fair” condition following completion of the rehabilitation projects in 2011. Continued maintenance of the trestle will extend the useful life of the westbound trestle to approximately 2045.

The WSDOT Bridge Division will continue to inspect the trestle every two years and collect information about the condition of the trestle. Once the Bridge Division determines that trestle is showing signs of needing to be replaced, it will be added to the “Structural Deficient” list which will make it eligible for federal bridge funds.

### WSDOT's Bridge Classifications

**Good:** A range from no problems to some minor deterioration of structural elements.

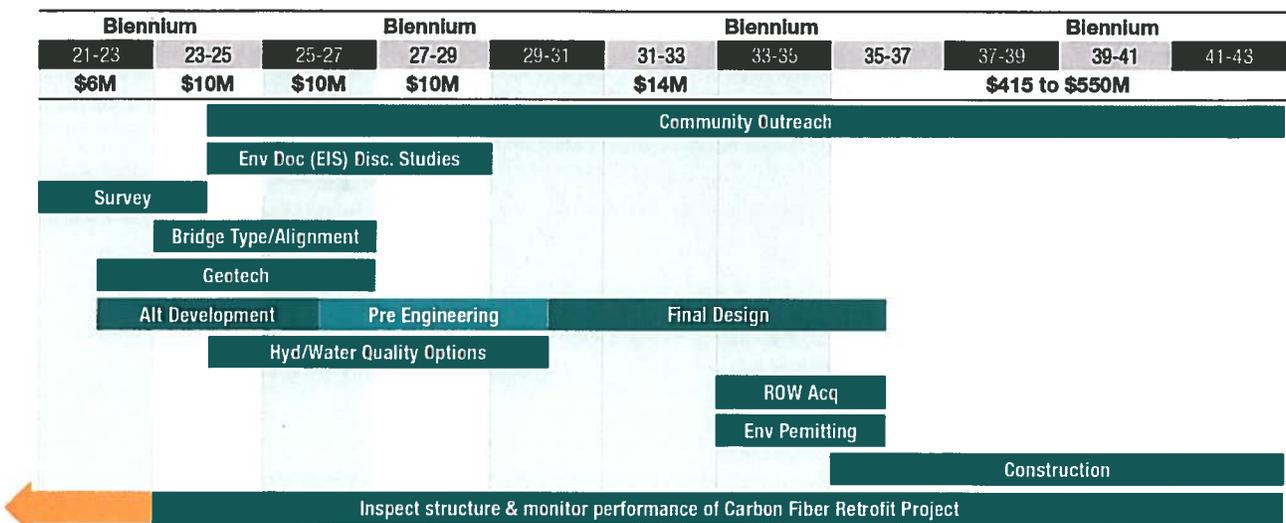
**Fair:** All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.

**Poor:** Advanced deficiencies such as section loss, deterioration, cracking, spalling, scour, or seriously affected primary structural components. Bridges rated in poor condition may be posted with truck weight restrictions.

### Preparing for the Trestle Replacement

WSDOT and the Corridor Working Group (CWG) recognize that replacing the trestle will require significant lead time because of the complex environmental and constructability issues involved. Given the time needed to plan, design and construct the trestle replacement, the project development steps will require a timeline similar to the one shown in the graphic below.

### Exhibit ES.6: Trestle Replacement Process



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Dedicated project funding triggers the start of the formal environmental review process. The shelf life of environmental documentation for projects of this complexity is limited to 3 to 5 years. Therefore, the environmental review and documentation phase should not be completed too far in advance of actual construction. There are some preliminary activities that could be completed in advance of the formal environmental review, such as survey, geotechnical work, and identifying project funding strategies.

## **Next Steps**

While this study does not guarantee funding for the proposed recommendations, it does allow future consideration for funding requests to be focused on near term improvement recommendations subject to competition with other projects around the state based on performance outcome.

The recommendations will be considered for incorporation into the State Highway System Plan (HSP), the PSRC's metropolitan transportation plan (Transportation 2040), and respective county and city comprehensive plans.

# Introduction and Background

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## What is the Purpose of a Corridor Planning Study?

A corridor planning study is used by WSDOT and local jurisdictions to identify existing and emerging transportation related issues along a specific state highway and to develop recommendations to address those issues. The recommended projects may be implemented over a 20 year period as funding becomes available. Corridor planning studies are part of the WSDOT long-range planning program and are intended to identify potential investments in state roads while ensuring alignment with the Highway System Plan and the goals of Moving Washington. The corridor plan can also be used by transportation stakeholders in the planning processes of local agencies and regional transportation planning organizations. A corridor study includes analysis of operating conditions, environmental concerns, population and employment growth, land use development, right of way needs, and other elements that affect the highway's traffic operations. To ensure that the study recommendations are consistent with the corridor vision, the corridor plan includes a public participation process. This process seeks public involvement on multiple levels from the creation of a stakeholders group and a study website to briefings for elected officials. The study website keeps the public informed of the progress of the study:

[www.wsdot.wa.gov/projects/us2/everettnavalstationtosr9/](http://www.wsdot.wa.gov/projects/us2/everettnavalstationtosr9/).

## US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study (Everett to Snohomish)

The US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study covers the five mile area of US 2 between the I-5 interchange in Everett (MP 0.0) and SR 9 (MP 5.0). It also includes SR 529 from I-5 to the Port of Everett, MP 0.0 to approximately MP 3.0. The study area is a mixture of urbanized communities and pockets of development surrounded by rural open space. Analysis for the study included current and future travel conditions as well as planned future growth along the study corridor. This analysis was used to identify low, medium, and high-cost improvements that could be incrementally implemented to improve safety and traffic operations and reasonably accommodate forecasted 2030 travel demand between now and 2030. At this time, funding has not been allocated for the recommendations.

Exhibit 1.1: US 2 Corridor Planning Study Area



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The recommendations in this study are consistent with state and regional policies for investments in transportation outlined below.

## **State Policies**

The **US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study** recommendations are consistent with the six investment guidelines set forth in RCW 47.04.280. Public investments in transportation should support achievement of these six policy goals:

**Economic Vitality:** To promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods to ensure a prosperous economy;

**Preservation:** To maintain, preserve, and extend the life and utility of prior investments in transportation systems and services;

**Safety:** To provide for and improve the safety and security of transportation customers and the transportation system;

**Mobility:** To improve the predictable movement of goods and people throughout Washington State;

**Environment:** To ensure Washington's quality of life through transportation investments that promote energy conservation, enhance healthy communities, and protect the environment; and

**Stewardship:** To continuously improve the quality, effectiveness, and efficiency of the transportation system. The text of RCW 47.04.280 can be found at the URL below: <http://apps.leg.wa.gov/rcw/default.aspx?cite=47.04.280>

The recommended improvements are also consistent with RCW 47.06.050, which requires that WSDOT first assess strategies to enhance operational efficiency of the existing system before expanding the system. Strategies to improve operational efficiencies include, but are not limited to: transportation systems management, transportation demand management, high-occupancy vehicle (HOV) facilities, and Express Toll Lanes/Hot Lanes.

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## Moving Washington

The **US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study** recommendations are consistent with WSDOT's Moving Washington program. Moving Washington is WSDOT's framework for making decisions for transportation investments that focus on keeping people and goods moving and supporting a healthy economy, environment, and communities. This framework is anchored by the Department's highest priority: maintaining and preserving the safe and long-lasting performance of existing infrastructure, facilities and services. This is the heart of Moving Washington and the primary target of the Department's investments.



Moving Washington combines three strategies to achieve and align the objectives of WSDOT and its partners: manage demand, operate efficiently, and add capacity strategically. It is through the application of these strategies that the Department is able to ensure that investments are integrated and solutions are cost-effective. Following is a brief description of the Moving Washington strategies.

- **Managing demand** by offering more commute choices
- **Operating efficiently** to get the most use out of the roads and infrastructure we have
- **Adding capacity strategically** to best use limited resources by targeting the most congested areas.

Visit the following website for more information on Moving Washington:  
[www.wsdot.wa.gov/movingwashington](http://www.wsdot.wa.gov/movingwashington)

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## Regional Policies

The recommended improvements are consistent with the Puget Sound Regional Council's VISION 2040. VISION 2040 is the Puget Sound Regional Council's framework for long-range transportation planning in King, Pierce, Kitsap and Snohomish counties. The PSRC regional perspective for transportation recognizes the critical link between transportation, land use planning, economic development, and the environment by integrating freight, ferries, highways, local roads, transit, bicycling, and walking. The recommendations in this study support the three transportation goals of VISION 2040 listed below.

1. As a high priority, the region will maintain, preserve, and operate its existing transportation system in a safe and usable state.
2. The future transportation system will support the regional growth strategy by focusing on connecting centers with a highly efficient multimodal transportation network.
3. The region will invest in transportation systems that offer greater options, mobility, and access in support of the regional growth strategy.

The recommended improvements are also consistent with Puget Sound Regional Council's Transportation 2040. Transportation 2040 is the region's 30-year transportation plan that will assist Puget Sound in moving forward by making transportation decisions and investments that move the region in the direction of sustainability, mobility, and environmental responsibility. Transportation 2040 includes:

- Transit, bike, pedestrian, and roadway investments needed to support the region's expected growth (1.5 million more people and 1.2 million more jobs by 2040).
- Strategies for reducing greenhouse gas emissions and protecting the health of the Puget Sound. These strategies are intended to complement steps being taken at the national level and are consistent with state programs and direction.
- Transportation investments that fully support the region's growth strategy, VISION 2040, focusing job and housing growth in vibrant centers and supporting livability throughout the region.
- An innovative and equitable financing plan that shifts how transportation improvements are funded, that may include tolling as a way to pay for improvements and manage travel demand.

For more information, visit the PSRC website: [www.psrc.org](http://www.psrc.org)

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## **What was the planning process for the US 2 Corridor Planning Study?**

The US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study process engaged the local jurisdictions and agencies to help identify transportation-related needs and develop, evaluate, and select recommended improvement projects. To identify transportation needs the following were considered:

- Population and employment growth
- Where future development is planned to occur
- Environmental resources and constraints
- Future travel demand and deficiencies
- Solutions and benefits
- Public and local agency input

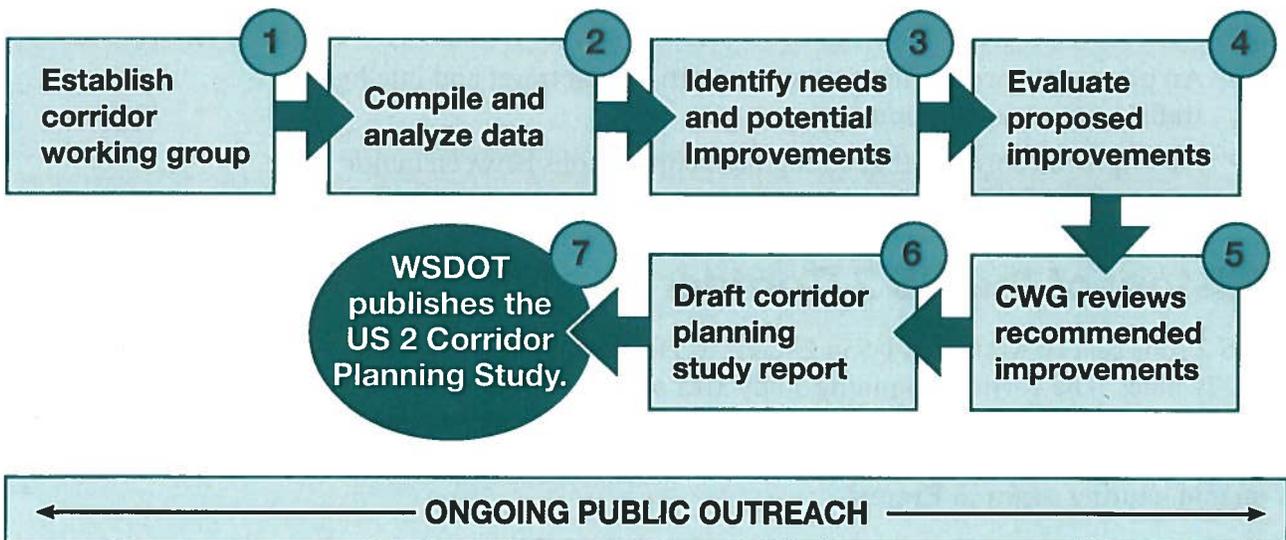
## Who was involved in the US 2 Corridor Planning Study?

The study was led by WSDOT's Urban Planning Office with assistance from a stakeholders group. The stakeholders group also acted as a sounding board for the development of the recommendations. The stakeholders group was composed of transportation planners, engineers, managers, and policy makers from the cities and various businesses along the study corridor; along with regional planning and transit agencies. The typical planning process is shown in Exhibit 1.2 below.

Stakeholders included:

- Snohomish County
- City of Everett
- City of Marysville
- City of Lake Stevens
- City of Snohomish
- Community Transit
- Puget Sound Regional Council (PSRC)

**Exhibit 1.2: WSDOT Typical Corridor Planning Study Process**



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## The Corridor Vision and Study Goals

In July 2009, a Corridor Working Group consisting of transportation stakeholders representing a variety of interests met to identify the corridor vision for the development of the US 2 corridor plan for US 2 between the Everett Port/Naval Station and SR 9. The Corridor Working Group (CWG) met four times between 2009 and 2011. Together they developed a vision for the corridor through the year 2030. Their primary focus was on the existing and future operational issues and the long term structural integrity of the westbound trestle.

The CWG vision for the US 2 corridor from Everett Port /Naval Station to SR 9 is as follows.

*Provide a safe and efficient connection between Naval Station Everett and the Port of Everett to the residential communities east of the Snohomish River. Improve short and long term structural and operational sufficiency with safe and efficient movement of commuters, freight, and recreational traffic. Accommodate environmental objectives and support the growing economic vitality of the region and state.*

Goals underlying the corridor vision statement include the development of:

- An improved corridor that is safe to travel
- An improved corridor that serves intra-regional travel
- An improved corridor that enables business and residential growth in the local communities
- An improved corridor that enhances multi-modal travel and intelligent traffic systems integration
- An improved corridor that strengthens connections between major economic and jobs centers.

## History of the US 2 Corridor

US 2 runs east to west from I-5 in Everett to Houlton, Maine and covers 2,579 miles. The corridor planning study area serves growing commuter, freight and recreational traffic between the Seattle/Everett metropolitan area and the region. The study area includes many commuters to the aerospace manufacturing sector in Everett.

## Brief History of the Westbound Trestle Bridge

The original trestle bridge over the Snohomish River was constructed of timber. A trestle bridge design is composed of a number of short spans supported by rigid frames. Many timber trestles were built in the 19th and early 20th centuries, often to support railroad crossings over rivers and canyons. In the 21st century, trestle bridges are more commonly built of steel and concrete, though timber trestles remain common in some areas.

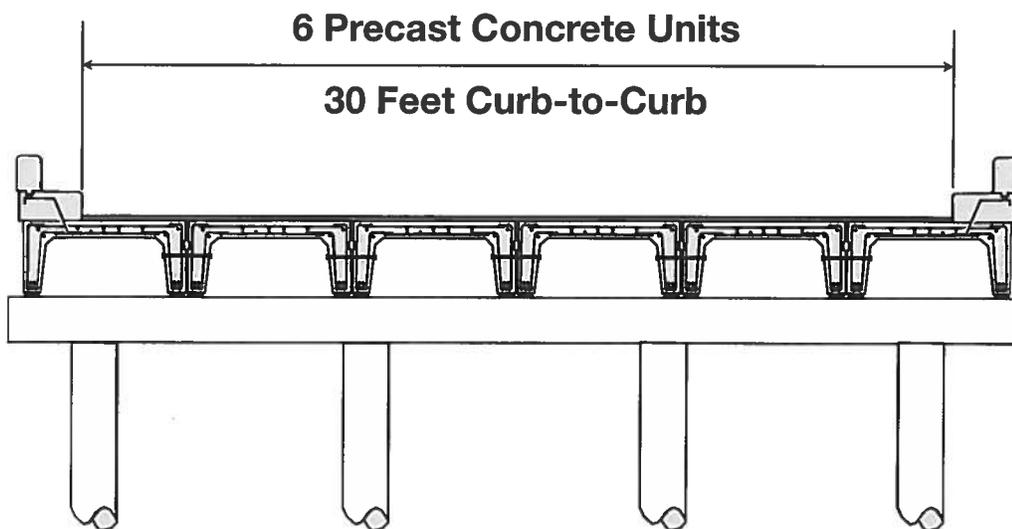
The current US 2 westbound trestle was built out of concrete and constructed in the 1960s, with construction completed in 1968 with a design life expectancy of 75 years. All westbound traffic moved to the new structure and the original timber trestle bridge continued to support eastbound traffic. In the 1990s the original timber trestle was replaced in phases with a concrete structure in the same footprint as the original timber trestle bridge.



US 2 Trestle Bridge, MP 0.0 - 3.0

The trestle crosses Ebey Slough and the Snohomish River. US 2 is one of four primary routes that bridge cross the Snohomish River in the Everett area (the other bridges across the Snohomish Rivers are on I-5, SR 529, and SR 9). Alternatives to SOV travel across the trestle include transit and ride share options. Community Transit routes crossing the trestle include Routes 270, 275, 277, 280 and 425.

### Exhibit 1.3: Typical Cross Section – Constructed in 1968



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Chapter 2:

# Existing Functional Classifications and Roadway Inventory

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This chapter contains information about the existing facilities, services, and characteristics of US 2 between mileposts 0.00 and 5.00 and on SR 529 between MP 0.0 and 3.0.

## Federal Functional Classification

Federal Functional Classification is one of the determining factors of eligibility for federal transportation funding. The classification reflects the residential, commercial and industrial uses served by the route, municipal boundaries, and the urbanized area designations of the U.S. Bureau of the Census.

State functional classifications group highways, roads and streets by the character of service they provide. The system was developed for transportation planning purposes and recognizes the various roles that individual routes play in the transportation network. Functional classification at this level is used to identify how to direct travel through the transportation network in the most logical and efficient manner. State highways are subdivided into three functional classifications: collector, minor arterial, and principal arterial. State highways are also characterized as rural and urban. State routes that are not rural or urban are characterized as “Other.”

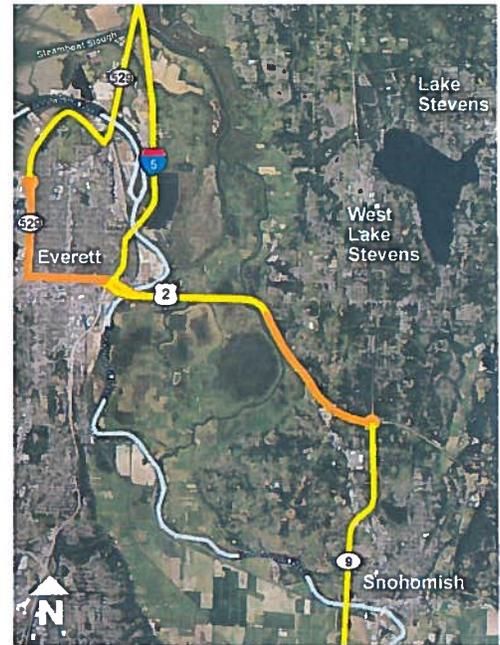
Basic to the functional classification process is the recognition that most travel involves movement through a network of roads. Transportation planning uses functional classification to determine how travel can be channeled within the network in a logical and efficient manner. Functional classification defines the role that a particular route plays in traffic flow through a highway network.





### US 2 from MP 0.0 to 5.0

US 2 is a multimodal, east-west corridor connecting I-5 and the city of Everett to the residential communities of Snohomish, Lake Stevens and Marysville, as well as businesses, and industries east of the Snohomish River. US 2 is one of four routes across the Snohomish River to the Everett area and is an important freight route connecting western and eastern Washington. US 2 is one of three, year-round routes that cross the Cascades in Washington State; and it also provides access to many recreational opportunities in local, state and national parks.



### Exhibit 2.1: Four major routes cross the Snohomish River

*There are only four major routes that cross the Snohomish River: US 2, I-5, SR 529 and SR 9.*

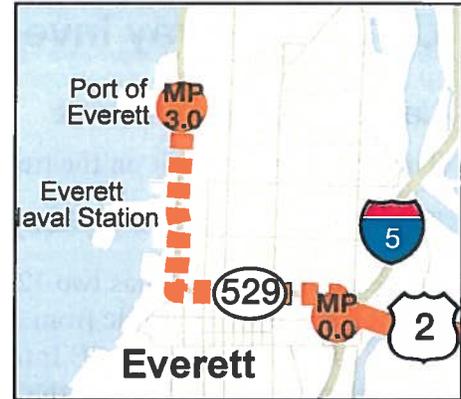
#### US 2 Federal & State Classification: I-5 to SR 9

Federal Functional Class	Urban Principal Arterial
State Functional Class	Urban Principal Arterial
Highways of Statewide Significance (HSS)	Included in HSS
National Highway System	Included in NHS
Freight and Goods Transportation System	T1 & Connector Freight Route
Scenic/Recreational	WA Scenic Byway (Cascade Loop)
Access Classification	Limited Access

## SR 529 from MP 0.0 to 3.0

State Route 529 connects the cities of Everett and Marysville. Although SR 529 is 7.88 miles long, the corridor study only looked at the section between the US 2 Trestle and the Port of Everett.

The roadway is typically two lanes in each direction with sidewalks on both sides. Total roadway width varies from 48 to 86 feet. Speed limit ranges from 25 to 35 MPH. Annual Average Daily Truck Volume is approximately 1090 vehicles per day.



### SR 529 Federal & State Classification: I-5 Interchange to Port of Everett

Federal Functional Class	Other Principal Arterial
State Functional Class	Other Principal Arterial
Highways of Statewide Significance (HSS)	Included in HSS
National Highway System	Included in NHS
Freight and Goods Transportation System	Connector Freight Route
Access Classification	Limited Access

### Local Concerns – Port of Everett and SR 529

The Port of Everett identified limitations on large truck traffic on SR 529. There is a low signal height southbound on West Marine View Drive at California Street. It is 16' 1" directly under the signal, but height is lost because of the load lifting as the truck starts up the hill. This signal is not part of the current 529 route, but could become part of the SR 529 if the highway is rerouted to better accommodate freight traffic. Long truck loads are not very compatible with Everett Avenue because of severe gradient changes between Hoyt Avenue and West Marine View Drive.

Within the scope of the US 2 and SR 529 study area, the worst corners are on the east side of town. Eastbound Everett Avenue to southbound Maple is rather tight, as is westbound Pacific to northbound Maple. These turns are encountered by many trucks that have a state permit issued all the way to the gate instead of having a state permit to Everett and then applying to the City of Everett for a local permit.

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## US 2 Roadway Inventory

### Lanes and Speed Limit

The posted speed limit on the trestle is 55 mph.

The westbound trestle is typically 30 feet curb to curb with two 12 foot lanes.

The eastbound trestle has two 12 foot lanes, and one Hard Shoulder Running (HSR) lane open to traffic from 3:00 - 7:00 P.M. Monday – Friday from I-5 to the SR 204/20th Street SE Interchange. The eastbound trestle also has a dedicated bike path between the Hewitt Avenue ramp and Homeacres ramp. The bike path continues under the trestle then onto local roads on Ebey Island.

### Ramp Meters within the Study Area

Currently, there are no ramp meters on US 2 or SR 529 but WSDOT operates ramp meters in the study area at the following locations:

- I-5: US 2, northbound
- I-5: Marine View Drive, southbound
- I-5: Pacific Ave, southbound
- I-5: 41st Street, northbound
- I-5: 41st Street, southbound
- I-5: Everett Ave, northbound
- I-5: Broadway, southbound

## Traffic Management Center – 24 hours a day, 7 days a week

Traffic engineers and other staff monitor freeway operations at a Traffic Management Center (TMC). The TMC in the WSDOT NW Region Office in Shoreline monitors freeways in the Puget Sound Region including the US 2 trestle. They use real time information to:

- Identify traffic problems using traffic cameras
- Coordinate responses with the Washington State Patrol and other law enforcement and emergency response crews when responding to incidents
- Provide up-to-the minute information about what is happening on the roadway including weather, incidents, construction, and some travel times to drivers through highway advisory radios, electronic signs, the web and the 511 traveler information phone system
- Provide up-to-the minute information to news reporters

WSDOT has traffic cameras on US 2 and I-5 at the following locations:

### Exhibit 2.2: Camera locations

Camera	Location	Milepost	Side
005vc18997	77th St SE	189.97	W
005vc19039	73rd St SE, SB	190.39	W
005vc19041	73rd St SE, NB	190.41	E
005VC19115	61st St SE, NB	191.15	E
005vc19120	60th St SE, SB	191.2	M
005vc19169	52nd St SE	191.69	M
005vc19195	47th St SE	191.95	W
005vc19234	43rd St SE	192.34	M
005vc19267	41st St	192.67	M
005vc19273	40th St	192.73	W
005vc19303	36th St	193.03	W
005vc19357	Pacific Ave	193.57	W
005vc19389	US 2 Interchange	193.89	E
005vc19406	Everett Ave	194.06	E
005vc19469	Marine View Dr	194.69	W
005vc19534	15th St	195.34	E
002vc00001	I-5	0.01	N
002vc00068	Homeacres Rd	0.68	S
002vc00200	Ebey Slough	1.97	M
002vc00240	SR 204	2.4	N
002vc00504	SR9	5.04	S

No 529 cameras in study area

# Local Road Improvements in Study Area

## US2 trestle - 20th Street SE Improvements (Lake Stevens)

The 20th Street SE corridor is located directly east of the US 2 Trestle. The western end connects to the trestle and SR 204.

To improve travel time, pedestrian safety and accessibility for the growing residential and commercial development, Snohomish County completed the first of two phases to widen 1.3 miles of 20th Street SE. The first phase was completed in 2010. Lake Stevens annexed the corridor so will complete the project when funding becomes available. See also Exhibit 2.3 below.

**Exhibit 2.3: 20th Street SE Improvements**



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## **Project Description: 20th Street SE Improvements**

**Phase I** included the addition of travel lanes, bike lanes, curbs, gutters and sidewalks, illumination and several traffic signals between S. Lake Stevens Road and 91st Ave SE. The project was designed to improve traffic flow, reduce traffic congestion and provide better access to and from neighborhoods and businesses for pedestrians, bicyclists and drivers. The road is one of three east-west corridors in Snohomish County that are identified for the Curb the Congestion program, a partnership between Snohomish County and Community Transit to benefit commuters.

**Phase II** is on hold pending the identification of funding. The estimated cost of Phase II of the 20th Street SE corridor improvement project is \$22 million.

Improvements planned for Phase II include:

- Two additional travel lanes between US 2 and 91st Ave SE
- Westbound HOV/BAT lane during morning peak traffic hours
- Left turns not permitted between US 2 and Cavalero Rd
- Landscaped median Cavalero Rd to 91st Ave SE with left turns at 79th Ave SE, 83rd Ave SE, 85th Dr SE and 88th Dr SE
- Left turn lanes at Cavalero Rd, 79th Ave SE, 83rd Ave SE, 85th Dr SE and 88th Dr SE
- U-turns at US2/SR204, Cavalero Rd, 79th Ave SE, 83rd Ave SE, and 91st Ave SE
- Five to seven-foot wide sidewalks on the north and south sides of 20th St SE between 71st Ave SE and 91st Ave SE
- Street lights
- A new traffic signal at Cavalero Road and signal interconnection system
- Four Bus pull-outs
- Planter strip between the roadway and sidewalk between Cavalero Rd and 88th Ave SE
- 5-foot wide bike lanes on both sides of 20th St SE between Cavalero Rd and 91st Ave SE
- Stormwater treatment ponds
- Wetland creation, preservation and enhancement

For more information, visit the Snohomish County project website:

[www1.co.snohomish.wa.us/Departments/Public\\_Works/Services/Roads/Completed\\_Projects/20thstseph2.htm](http://www1.co.snohomish.wa.us/Departments/Public_Works/Services/Roads/Completed_Projects/20thstseph2.htm)

## Exhibit 2.4: Future Development in the 20th Street Corridor

### Future Development in the 20th Street Corridor

Current densities in the 20th Street corridor area are too low for optimal transit service. However, the City of Lake Stevens is growing and continued future development is anticipated.

The Lake Stevens comprehensive plan envisions residential and employment growth occurring in “growth centers,” such as the 20th Street SE Corridor to increase employment; improve the jobs to housing balance; conserve environmental resources; and provide efficient services and facilities.

The city would like to add significant retail and office space over the long term along the 20th Street SE Corridor in multiple retail/mixed-use nodes creating a concentrated job center.

#### 2025 Growth Assumptions

- Net housing increase: 250 -1700 dwelling units
- Net Population increase: 720 – 4900
- Net commercial increase:
  - Retail: 150,000-170,000 sf
  - Office: 20,000-30,000 sf
- Net Jobs increase: 360-465

For more information on planned development in Lake Stevens, visit the city website:

<http://wa-lakestevens.civicplus.com/DocumentView.aspx?DID=295>

#### Density and Transit Service Level

People & Jobs Per Acre	Transit Demand/Service Level
More than 45	Light Rail / BRT (less than 10 minutes)
25 to 45	
10 to 25	High Frequency / BRT (10-15 minutes)
5 to 10	Frequent (30-minutes) All-Day
2.5 to 5	Lifeline (hourly) and/or Peak-Period Commuter
0 to 2.5	Not Significant

Source: Community Transit, Transit Development Plan (TDP), 200-2012, p. 25

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# Transit

## Community Transit

Community Transit (CT) is the primary transit provider within Snohomish County and the only transit provider that uses the US 2 trestle. CT serves most communities within Snohomish County. However, many local CT routes operate during the peak commute hours with reduced schedules on weekends and holidays. CT also provides commuter bus service to downtown Seattle, the University of Washington and to the east side of Lake Washington in King County.

## US 2 Park and Ride Lots

Park and Ride lots serve bus riders, vanpoolers, and carpoolers, as well as a variety of multi-modal commuters who combine one or more means of transportation (such as bicycle and bus or walking and carpool).

There are also four park and ride lots in Marysville: the Marysville Cedar and Grove Park & Ride at 1310 Grove Street, with 213 parking spaces; the Ash Avenue Park and Ride at Ash Ave and 6th St.; Marysville I Park and Ride at Ash Ave and 2nd St; and Marysville II P&R at 34th Ave NE and 116th St.

Church lots and other park and pools provide additional commuter parking on weekdays only.

See Exhibit 2.5 below for a list of park and ride lots on the US 2 study corridor.

Lot Name	Address	Capacity	Average Utilization
Everett Station	3201 Smith Ave	1107	341 (31%)
Eastmont P&R	El Capitan Way and Hwy 527	389	129 (33%)
South Everett Freeway Station	I-5/112th St SE	397	392 (99%)
Mariner P&R	13102 4th Ave W	644	462 (72%)
McCullum P&R	620 128th St SE	409	363 (88%)
Snohomish P&R	1700 Avenue D	102	39 (38%)
Lake Stevens Transit Center	9414 - 4th St NE	207	124 (60%)

Source: PSRC, 2010 data

**Exhibit 2.5: Park and Ride Lots in Project Area and Vicinity**



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## **Vanpool Services**

CT provides vanpool services for groups of 5-15 commuters who share the ride to work together. Currently there are 24 vans and approximately 200 vanpoolers that cross the trestle.

## ***Curb The Congestion***

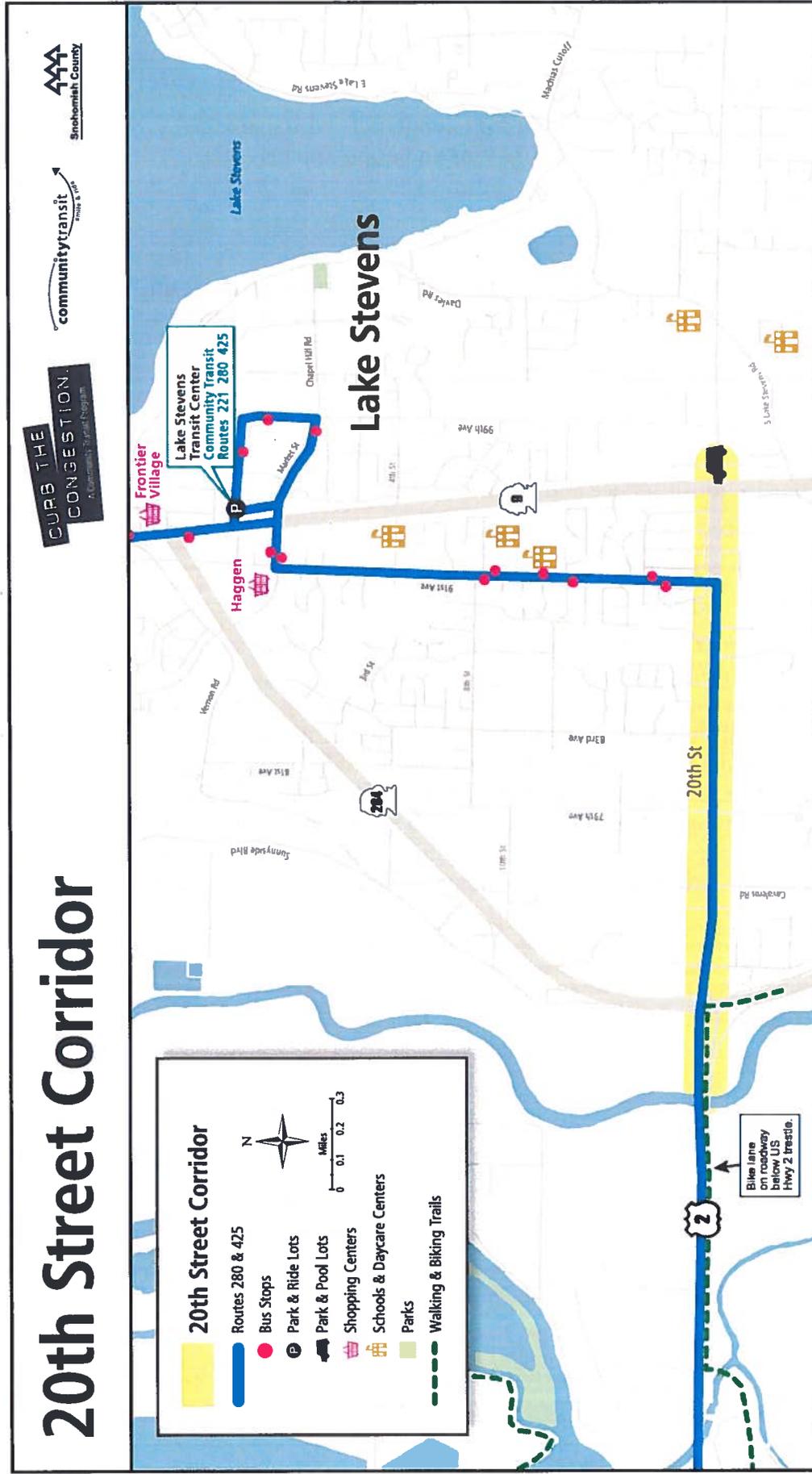
In 2008, CT and Snohomish County created the *Curb the Congestion* Program to encourage alternative modes of travel in three corridors that were deemed at or near their ultimate capacity. The Curb The Congestion Program promotes a multi-modal approach to reducing congestion. One of the three corridors, 20th Street SE, is located within the corridor study area.

*Curb The Congestion* encourages:

- Improvements to transit service and infrastructure
- Improvements to pedestrian infrastructure
- Transit/pedestrian oriented land use
- TDM (residential and employer based)

The *20th Street Corridor Curb The Congestion* program targets drivers who use westbound 20th Street SE in the morning peak hours. The program aims to remove 200 peak period trips from 20th Street SE by providing incentives. CT offers a \$50 monthly incentive to help participants pay for alternative transportation for the first three months they take the bus, bike, walk, carpool or vanpool. After three months, those who stay with the program are eligible to win a \$150 random monthly drawing if they use an alternative mode at least eight trips a month. The program is funded by Snohomish County mitigation fees and federal grants. Exhibit 2.6 provides a map of the *20th Street Curb The Congestion* corridor.

Exhibit 2.6: 20th Street Curb the Congestion corridor



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## Policy Regulations and Programs

### Commute Trip Reduction Law Program

The Washington State Legislature passed the Commute Trip Reduction (CTR) Law in 1991. The goals of the program are to reduce traffic congestion, air pollution, and petroleum consumption through employer-based programs that decrease the number of commute trips made by people driving alone.

The state's nine most populated counties, and the cities within those counties, are required to adopt CTR ordinances and support local employers in implementing CTR. Employers with 100 or more full-time employees in a single worksite who begin their workday between 6 and 9 AM are required to develop a commuter program designed to achieve reductions in vehicle trips by offering benefits such as subsidies for transit fares, flexible work schedules, and telecommute options. The city of Everett is covered by the CTR law. Exhibit 2.7 identifies the destination of people who live east of the US 2 Trestle within the study area (zip codes: 98205, 98252, 98258, 98290) and work at CTR affected sites throughout the Puget Sound region.

### Everett Station

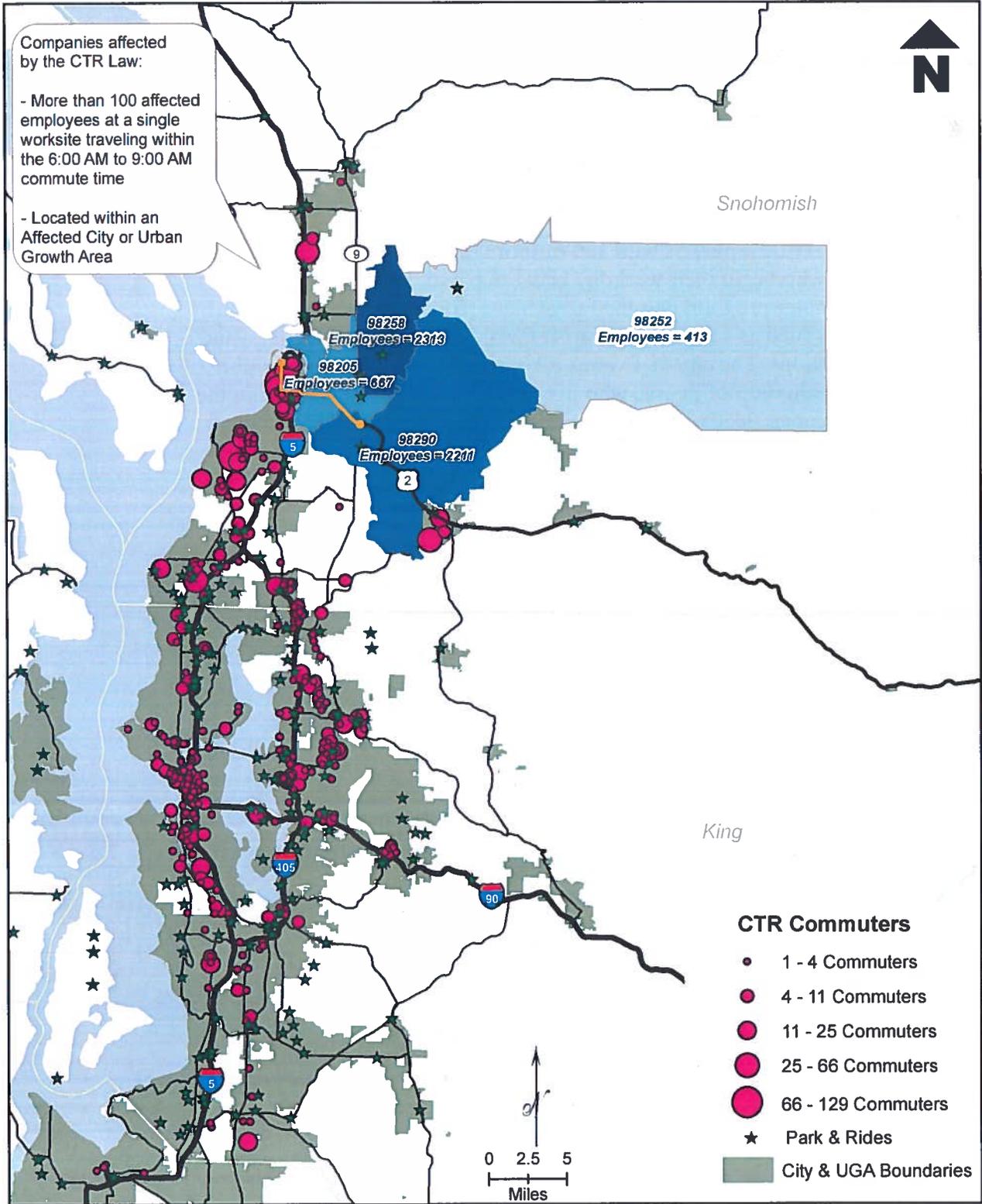
Everett Station is the central multimodal transportation hub for Everett and surrounding communities. It is located two blocks southeast of downtown Everett on Smith Avenue near Pacific Avenue. In addition to local and regional bus service, Greyhound provides national and international passenger bus service, Sound Transit (ST) provides regional commuter rail service on Sounder, and Amtrak provides national and international passenger rail service. Community Transit, Everett Transit, Skagit Transit, and Island Transit also provide service from Everett Station. Two large park-and-ride lots with approximately 500 parking stalls are provided at Everett Station.

Everett Station also houses a higher education and career development center and is a gathering place for community events, which is open seven days a week.

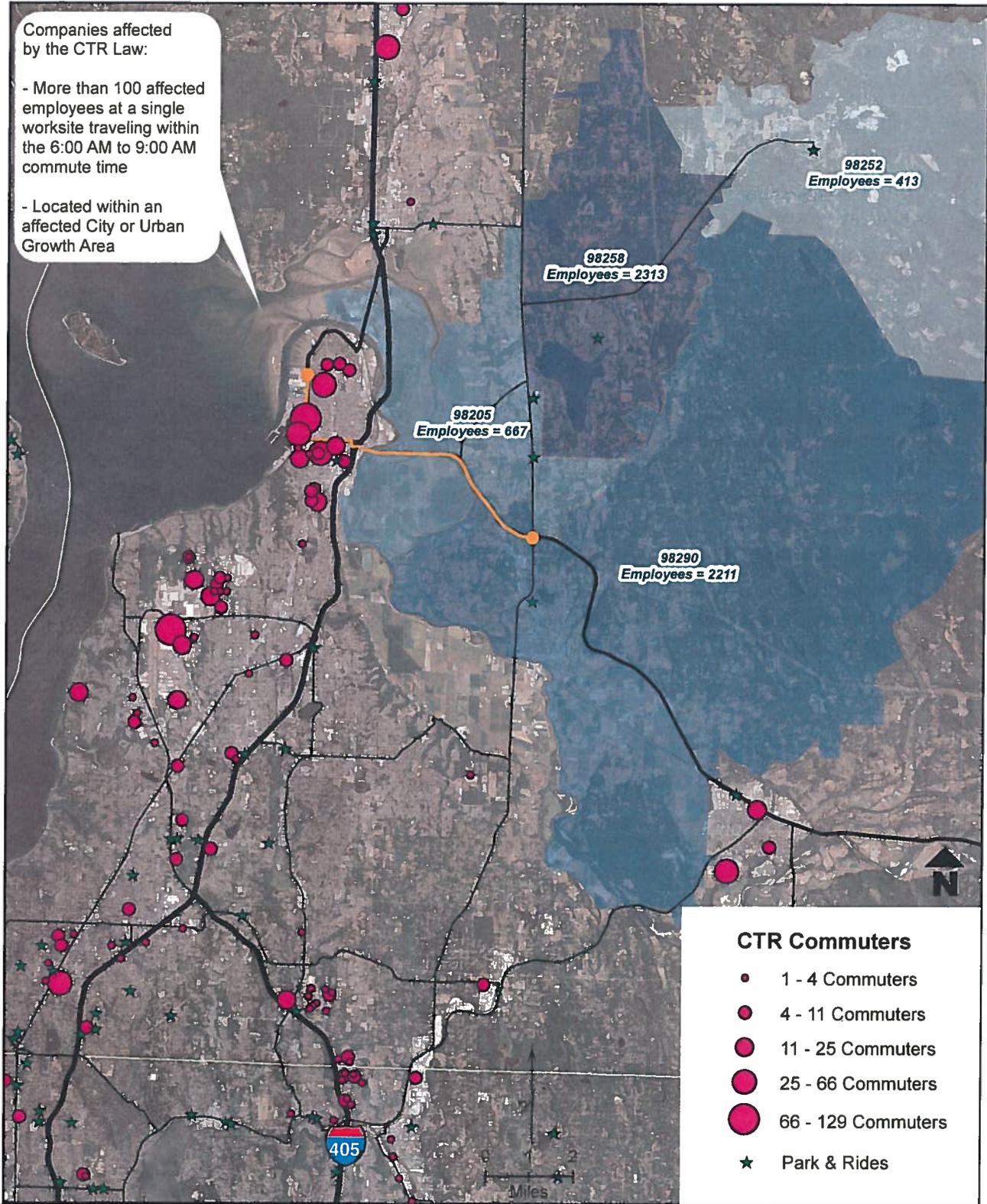


*Everett Station is the central multimodal transportation hub for Everett and surrounding communities.*

**Exhibit 2.7: CTR Commuter Destinations from Project Area**



**Exhibit 2.8: CTR Commuter Destinations from Project Area – Snohomish Only**



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## **Transit-Supportive Improvements**

The city of Everett has made recent improvements to the downtown planning area to accommodate and enhance public transit ridership. These improvements include:

- Designation of Downtown Transit-Oriented Streets on Hewitt and Wetmore Avenue.
- Unique wrought iron passenger shelter kiosks complementing the downtown street lamp posts.
- Numerous bus stops and shelters located throughout downtown on transit routes.
- In addition to arterial street infrastructure, specific transit-oriented infrastructure has been provided within downtown to improve transit access:
- Bike lockers are provided at two main storage areas downtown at Everett Station and within the Snohomish County Campus parking garage. Safe storage facilities for bicycles are essential to encourage bicycle trip making within the Everett downtown planning area and they complement bike racks on buses.
- Revisions to city zoning and design guidelines have led to significant investments in transit supportive infrastructure and amenities including wide sidewalks, bike lockers, enhanced streetscapes, and public art displays.

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## Safety

WSDOT is committed to improving highway safety, reducing collisions, and preventing risk to Washington's drivers. The commitment requires effort and vigilance, and the effort is paying off: the number of fatal collisions on Washington highways has been going steadily down since 2002, and the state highway fatality rate is now among the lowest in the nation.

WSDOT, along with partners in law enforcement and education, helped to write *Target Zero*, the Statewide Strategic Plan for Highway Safety. It was signed by Governor Gregoire in 2007 and updated in 2010. It directs WSDOT and other transportation partners to focus on fatal and serious injury collisions in order to attain the goal of zero by year 2030.

*Target Zero* was written to comply with a federal requirement under the previous surface transportation authorization, *SAFETEA-LU*,<sup>1</sup> which was replaced in 2012 by the *MAP-21* reauthorization. *Target Zero* follows the *Strategic Highway Safety Plan*, developed by the American Association of State Highway & Transportation Officials. *Target Zero* strategies were developed using national research, existing pilot programs, and input from many stakeholders statewide. These strategies focus on the Four "E's," as follows:

- **Education.** Give drivers the information to make good choices, such as not driving while impaired, wearing a seatbelt, and avoiding distraction while in their vehicles.
- **Enforcement.** Use data-driven analysis to help law enforcement officers pinpoint locations with a high number of fatal and serious injury collisions related to driver behaviors, such as speeding and impairment.

### MAP-21

Moving Ahead for Progress was signed into law by President Obama on July 6, 2012. MAP-21 is a streamlined, performance-based policy and programmatic framework for investments in the nation's surface transportation program. It funds surface transportation programs at over \$105B for fiscal years 2013 and 2014, and builds on many of the highway, transit, bike, and pedestrian programs and policies already in place. MAP-21 topics include safety, traffic congestion, freight movement, environment, infrastructure maintenance, efficiency, and reduction of project delays.

[www.fhwa.dot.gov/Map21](http://www.fhwa.dot.gov/Map21)

### AASHTO

The American Association of State Highway & Transportation Officials represents transportation departments in all 50 states, the District of Columbia, and Puerto Rico. The primary goal is development, operation, and maintenance of an integrated national transportation system including air, highways, public transportation, rail, and water.

[www.transportation.org](http://www.transportation.org)

<sup>1</sup> The "Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users" was signed into law in 2005. *SAFETEA-LU* is superseded by *MAP-21*.

- **Engineering.** Design roads and roadsides using best practices to reduce collisions, or reduce the severity of collisions if they do occur.
- **Emergency Medical Services.** Provide high quality and rapid medical and emergency response to injury collisions.

*Target Zero* directs WSDOT and other transportation safety partners to focus on fatal and serious injury collisions. To accomplish this goal, WSDOT re-evaluated all of its safety related project selection and prioritization criteria. The revised WSDOT procedure starts with the setting of a performance improvement target. Needs are identified via a statewide screening for locations which show the highest possibility for reduction of collision frequency and severity.

These locations are entered into safety priority array lists for intersections and corridor segments. Any locations on these lists which fall into a study corridor are then analyzed in more detail by looking at five years of collision data, identifying sites with potential for improvement, and analyzing them for potential cost effective Four-E solutions. The analysis is coordinated with the State Patrol and the Washington State Traffic Commission. More detail is provided on the safety priority array lists and how they relate to the study corridor in the *WSDOT Safety Priority Array Lists* section below.

### **Injury Categories**

When the Washington State Patrol responds to a collision on a state highway, the responding officer will classify the severity of the injury as one of the following:

1. No Injury: Applies when the officer at the scene has no reason to believe that, at the time of the collision, the person received any bodily harm due to the collision.
2. Dead at Scene: Pronounced dead at the collision scene.
3. Dead on Arrival: Pronounced dead upon arrival at hospital or medical facility.
4. Died at Hospital: Died in hospital after arrival.
5. Serious Injury: Any injury which prevents the injured person from walking, driving, or continuing normal activities at the time of the collision. Includes: severe lacerations, broken or distorted limbs, skull or chest injuries, abdominal injuries, etc. Excludes: momentary unconsciousness, etc.
6. Evident Injury: Any injury other than fatal or serious at the scene. Includes: broken fingers or toes, abrasions, etc. Excludes: limping, complaint of pain, nausea, momentary unconsciousness, etc.
7. Possible injury: Any injury reported to the officer or claimed by the individual such as momentary unconsciousness, limping, complaint of pain, nausea, hysteria, or claim of other non-evident injuries.

See PTCR Manual at [www.wsp.wa.gov/publications/collision.htm](http://www.wsp.wa.gov/publications/collision.htm).

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In keeping with the approach outlined above, the safety analysis is divided into the following subsections:

- Review of collision data for the past five years.
- Identification of programmed safety projects.
- Identification of study area locations on safety priority array lists.
- Identification of behavior-related factors that are contributing to collisions.

WSDOT is proactive in programming improvements that reduce fatal and serious injury collisions, and continues to find innovative programs which improve the safety and security of transportation customers and the transportation system. *Target Zero* is used to inform WSDOT investment decisions; detailed before and after collision data for highway safety improvement projects are available in the *Gray Notebook* at [www.wsdot.wa.gov/Accountability](http://www.wsdot.wa.gov/Accountability). For more information on the WSDOT safety program, visit the WSDOT safety website at [www.wsdot.wa.gov/safety](http://www.wsdot.wa.gov/safety).

Please note that for general liability and disclosure reasons, none of the collision or safety data presented in this report may be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Governments.<sup>2</sup>

<sup>2</sup> *US Code 23, Section 409: Highways - Discovery and Admission as Evidence of Certain Reports and Surveys.*

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## Collision Data Review

A review of collision history was performed on the US 2 mainline and ramps between mileposts 0.00 and 5.85 in the eastbound direction, and 0.00 and 5.78 in the westbound direction. This encompasses the corridor from I-5 in Everett to half a mile east of the SR 9 interchange ramps. Collision history was examined for the most recent five years of data available, March 2007 – February 2012.

The influence area for interchange-related collisions is considered to be one-half mile before and after each interchange, measured from the merge or diverge point of the last ramp in each direction at each interchange.<sup>3</sup> Collisions which occurred on the ramps connecting I-5 and US 2, while technically categorized as I-5 ramps, are included in this review under US 2 ramps in order to capture safety issues and operations at the western end of the corridor.<sup>4</sup>

For the purpose of presenting a complete corridor picture, the first section below, *Summary of All Collisions*, briefly discusses all the collisions which occurred on the study corridor. The following section, *Fatal & Serious Injury Collisions*, provides a more in-depth analysis of those two types of collisions. The in-depth analysis is limited to fatal and serious injury collisions in order to align with *Target Zero* directives.

<sup>3</sup> *If the distance between interchanges is less than 1/2 mile, the influence area is defined as ending at the half-way point between the two.*

<sup>4</sup> *61 collisions occurred on these ramps during the five year analysis period. The four ramps are: WB US 2 to NB I-5 (005Q119444); SB I-5 to EB US 2 (005R219438); NB I-5 to EB US 2 (005P119360); and WB US 2 to SB I-5 (005S119365).*

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## Summary of All Collisions, March 2007 – February 2012

### Collision Locations

All collisions on US 2 occurred at interchanges (on the mainline, shoulders, median, or ramps) or within intersection influence areas as previously defined. This is a typical pattern for freeway and highway collisions. Exhibit 2.9 presents the total number of study corridor collisions by interchange influence area.

**Exhibit 2.9: US 2 Collisions by Interchange Influence Area - Table**

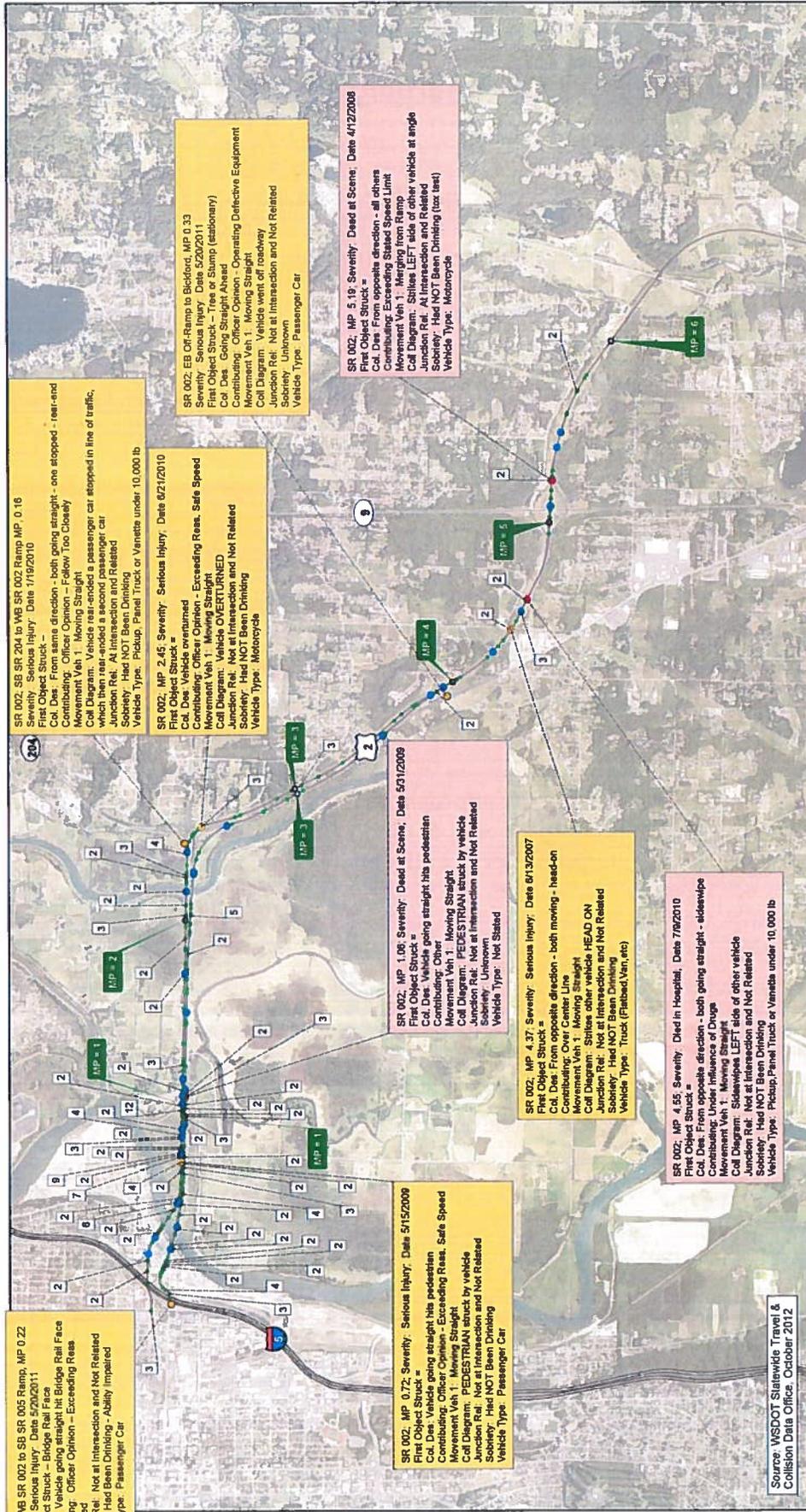
<b>US 2 Interchange Influence Area</b>	<b>Total Collisions</b>	
I-5	140	25%
Ebey Island	145	25%
SR 204	179	31%
Bickford Ave.	38	7%
SR 9	67	12%
<b>Total</b>	<b>569</b>	<b>100%</b>

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

Exhibit 2.10 presents a GIS-based map showing the approximate location of collisions along the US 2 mainline. Note that this tool does not yet include all ramp collisions but gives a good visual interpretation of collision locations on the mainline.

**Exhibit 2.10: Map of US 2 Collision Locations**



**Washington State Department of Transportation**  
 Capital Program Development & Management

## US 2 Collision Analysis

Milepost 0.00 to 5.85 EB and 5.78 WB  
 Date: 3/1/07 through 2/29/12

**Increasing and Decreasing directions are shown**  
 Note: Not all ramp collisions are shown.

"Under 23 U.S. Code, Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal or Local Government that involves the locations mentioned in this data."

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Legend:

- 0 Milepost
- 3 Collision Count
- Collision Events
- Most Severe Injury Type
- Fatality
- Serious Injury
- Evident Injury
- All Others

## Collision Severity

The most prevalent collision severity type on the study corridor was by far “no injury,” which means collisions that were limited to property damage only. “No injury” collisions accounted for 67% of all collisions on this corridor. Possible injury collisions accounted for 22%, and evident injury collisions accounted for 9%. Fatal and serious injury collisions accounted for 0.5% and 1.1% of total collisions, respectively. A breakdown of collision severity by interchange influence area is presented in Exhibit 2.11. See the green “Injury Categories” sidebar in the introduction to the safety section for severity definitions.

**Exhibit 2.11: US 2 Collisions by Severity**

US 2 Interchange Influence Area	Most Severe Injury Type						Total
	Fatality	Serious Injury	Evident Injury	Possible Injury	No Injury	Unknown	
I-5	0	1	13	27	96	3	<b>140</b>
Ebey Island	1	1	13	33	97	0	<b>145</b>
SR 204	0	2	15	42	120	0	<b>179</b>
Bickford Ave.	0	1	4	5	27	1	<b>38</b>
SR 9	2	1	6	16	42	0	<b>67</b>
<b>Total</b>	<b>3</b>	<b>6</b>	<b>51</b>	<b>123</b>	<b>382</b>	<b>4</b>	<b>569</b>
	<b>0.5%</b>	<b>1.1%</b>	<b>9%</b>	<b>22%</b>	<b>67%</b>	<b>0.7%</b>	<b>100%</b>

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

## Major Contributing Factors of Collisions

The major contributing factor of collisions on the study corridor was speeding (39%), followed by tailgating (19%), driver inattention (13%), and not yielding proper right-of-way (11%). Eight percent of collisions were caused by alcohol or drug related impaired driving. The category of “other” (10%) includes improper backing, passing, turning, operating defective equipment, and causes listed by the responding officer as “other” or left blank. Collisions are shown by major contributing factor and interchange influence area in Exhibit 2.12.

**Exhibit 2.12: US 2 Collisions by Major Contributing Factors**

US 2 Interchange Influence Area	Major Contributing Factor						Total
	Speeding	Tailgating	Driver Inattention	Did not yield ROW	Impaired Driving	Other	
I-5	51	23	21	20	15	10	<b>140</b>
Ebey Island	46	37	23	18	9	12	<b>145</b>
SR 204	90	37	18	11	13	10	<b>179</b>
Bickford Ave.	10	4	5	4	6	9	<b>38</b>
SR 9	23	8	5	10	4	17	<b>67</b>
<b>Total</b>	<b>220</b>	<b>109</b>	<b>72</b>	<b>63</b>	<b>47</b>	<b>58</b>	<b>569</b>
	<b>39%</b>	<b>19%</b>	<b>13%</b>	<b>11%</b>	<b>8%</b>	<b>10%</b>	<b>100%</b>

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

## Collision Types

The majority of collisions on the study corridor were rearend (43%), followed by hitting an object (31%), sideswipe (12%), and entering at an angle (3%). The category of “other” (11%) includes overturns, fire, driving into a ditch, hitting a pedestrian, a vehicle being struck by construction machinery or other items on the roadway, and types listed by the responding officer as “other” or left blank.

Of the 569 collisions, four collisions involved pedestrians; three of those occurred within the Ebey Island interchange area, and one in the SR 9 interchange area.

Collisions are shown by type and interchange influence area in Exhibit 2.13.

**Exhibit 2.13: US 2 Collisions by Type**

US 2 Interchange Influence Area	Collision Type					Total
	Rearend	Hit Object	Sideswipe	Entering at Angle	Other	
I-5	58	54	22	2	4	140
Ebey Island	77	30	26	2	10	145
SR 204	87	68	17	0	7	179
Bickford Ave.	8	9	2	5	14	38
SR 9	14	14	4	9	26	67
Total	244	175	71	18	61	569
	43%	31%	12%	3%	11%	100%

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

The rest of the chapter will focus on analysis of fatal and serious injury collisions on the study corridor.

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## Fatal & Serious Injury Collisions, March 2007 – February 2012

In keeping with the directives of *Target Zero*, this section will provide a more in-depth look at the fatal and serious injury collisions on the study corridor.

### Fatal & Serious Injury Collision Locations

All of the fatal and serious injury collisions occurred within interchange influence areas. One fatal collision occurred on the eastbound mainline at the Ebey Island interchange and two fatal collisions occurred on the eastbound mainline at the SR 9 interchange. The two SR 9 collisions were located 0.64 miles apart, near the diverge and merge points of the SR 9 ramps.

Fatal and serious injury collisions on US 2 are shown by interchange influence area in Exhibit 2.14. Exhibit 2.20 presents similar information in a format which makes it easy to compare the relative number of fatal and serious injury collisions at the different interchange areas along the corridor.

**Exhibit 2.14: US 2 Fatal & Serious Injury Collisions by Interchange Influence Area - Table**

US 2 Interchange Influence Area	Most Severe Injury Type	
	Fatal Collisions	Serious Injury Collisions
I-5	0	1
Ebey Island	1	1
SR 204	0	2
Bickford Ave.	0	1
SR 9	2	1
<b>Total</b>	<b>3</b>	<b>6</b>

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

## Major Contributing Factors of Fatal & Serious Injury Collisions

The major contributing factors of the three fatal collisions were speeding, impaired driving and unknown (due to a hit-and-run). For the serious injury collisions, two involved speeding, and one each were attributed to impaired driving, tailgating, operating a defective vehicle, and crossing over the centerline.

The major contributing factor of fatal and serious injury collisions on the study corridor are shown by interchange influence area in Exhibit 2.15.

**Exhibit 2.15: US 2 Fatal & Serious Injury Collisions by Major Contributing Factors**

US 2 Interchange Influence Area	Major Contributing Factor						Total
	Speeding	Impaired	Tailgating	Defective Vehicle	Driving Over Centerline	Unknown (Hit & Run)	
I-5	0	1	0	0	0	0	1
Ebey Island	1	0	0	0	0	1	2
SR 204	1	0	1	0	0	0	2
Bickford Ave.	0	0	0	1	0	0	1
SR 9	1	1	0	0	1	0	3
<b>Total</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>9</b>
	<b>33%</b>	<b>22%</b>	<b>11%</b>	<b>11%</b>	<b>11%</b>	<b>11%</b>	<b>100%</b>

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

## Fatal & Serious Injury Collision Types

The three fatal collision types were comprised of collision with a pedestrian, overturn, and sideswipe. The serious injury collision types were comprised of two occurrences of hitting an object, and one each of collision with a pedestrian, over-turn, rear-end, and head-on. Fatal and serious injury collision types on the study corridor are shown by interchange influence area in Exhibit 2.16.

**Exhibit 2.16: US 2 Fatal & Serious Injury Collisions by Type**

US 2 Interchange Influence Area	Collision Type						Total
	Hit Object	Pedestrian/ Cyclist	Rearend	Sideswipe	Overturn	Head-On	
I-5	1	0	0	0	0	0	1
Ebey Island	0	2	0	0	0	0	2
SR 204	0	0	1	0	1	0	2
Bickford Ave.	1	0	0	0	0	0	1
SR 9	0	0	0	1	1	1	3
Total	2	2	1	1	2	1	9
	22%	22%	11%	11%	22%	11%	100%

Source: WSDOT Statewide Travel & Collision Data Office, October 2012

Under U.S. Code 23 Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data.

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## Existing and Programmed Safety Projects

Another step of WSDOT corridor safety analysis is the identification of programmed safety-specific projects on the corridor. A “programmed” project means the project has been put on an agency list or into an agency plan to be considered for future funding by the state legislature. Projects that are not specifically identified and funded as safety projects, including maintenance, preservation, and mobility projects, also have safety benefits. Those projects are discussed in Chapter 6.

### Current and Upcoming Safety Projects

There is one current safety project intended to reduce the frequency and/or severity of collisions. The US 2 - Bickford Avenue Intersection Safety Improvements project is constructing a new overcrossing from Bickford Avenue to westbound US 2. It will also improve signs and pavement markings, and add lighting to the intersection. There have been 38 collisions at the existing at-grade intersection during the five year analysis period, one of which was a serious injury collision and nine evident or possible injury collisions. This project is expected to reduce the number and severity of collisions, as well as reduce congestion and increase visibility for drivers. Construction began July 2012 and is expected to be completed by fall 2013.

### Proposed Safety Projects

#### Capital Improvement and Preservation Program

WSDOT addresses identified safety needs on an on-going basis as part of the Capital Improvement and Preservation Program (CIPP) and the biennial program development process. The CIPP constitutes WSDOT’s annual request to the Governor for funding of transportation projects. It includes all preservation and improvement projects.

There were no safety-specific projects on the study corridor in the 2012 CIPP.

#### Regional Transportation Plans

There are no safety-specific projects on the study corridor listed in the state *Highway System Plan* or *Transportation 2040*, the regional transportation plan.

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## WSDOT Safety Priority Array Lists

Lists of highway segments and intersections are prioritized by WSDOT for potential improvements on state highways. These lists are composed of collision analysis segments (CASs) and intersection analysis locations (IALs). The two lists provide candidate segments for inclusion in the WSDOT safety program each biennium. WSDOT updates criteria for both priority lists on a biennial basis to ensure that emerging safety needs are met.

Inclusion on the safety priority array lists means that a location has been identified for potential improvements. These locations are then further analyzed to determine which combination of the *Target Zero* “4 E” strategies could achieve maximum reduction in numbers and severity of fatal and serious injury collisions.

Once a capital project is identified, it must still compete statewide with other safety projects for limited funding.

### Collision Analysis Segments

WSDOT formally adopted the AASHTO Highway Safety Manual (HSM) for statewide implementation in 2011. The HSM introduces a science-based technical approach to help identify sites with the highest potential for reduction of collision severity or frequency. The resulting CASs are composed of the top 221 statewide locations with the highest expected average crash frequency of fatal and serious injury collisions. The procedure also helps to identify potential countermeasures for addressing factors contributing to collisions. Note that the analysis does not include city streets or state highways in cities with a population over 25,000. This restriction is based on the Revised Code of Washington (RCW) 47.24.020.

There are no study corridor locations on the current CAS safety priority array list.

#### RCW 47.24.020

This Revised Code of Washington states that cities and towns with a population over 25,000 have total jurisdiction over traffic movement on state highways which pass within their jurisdiction, and are therefore responsible for improving the safety of these facilities. The only exception to this is state routes with “full access control,” i.e., highways with limited locations to get on or off the facility, such as freeways.

Revised Code of Washington  
47.24.020

### Intersection Analysis Locations

The intersection analysis location (IAL) array is composed of intersections that have experienced more than eight at-angle, left-turn opposite direction, or rear-end crashes between 2006 and 2010, and where the total societal cost is greater than or equal to \$900,000. Total societal cost is calculated based on collision type and posted speed limit of the major roadway at the intersection. Note that the analysis does not include city streets or state highways in cities with a population over 25,000, per RCW cited above.

There are no study corridor locations on the current IAL safety priority array list.

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## Behavior-Related Causes of Collisions

Collision data were also reviewed in order to identify behavior-related causes of fatal and serious injury collisions which may lend themselves to enforcement solutions.

Statewide data show impairment, run-off-the-road, and speeding as the most common causes of fatal collisions.<sup>11</sup> The three fatal collisions which occurred on the study corridor had impairment, speeding, and an unknown (due to hit-and-run) as the major contributing factors. The six serious injury collisions involved collisions related to impairment, speeding, tailgating, defective equipment, and crossing over the centerline.

*Target Zero* Community Traffic Safety Task Forces bring local police, health department, and transportation departments into alignment with the goals of *Target Zero*. They help to implement state and national mobilizations, lead local traffic safety projects, and utilize proven strategies to address the priorities of *Target Zero*.

### Does enforcement make a difference?

The Washington State Patrol saw an increase in speed-related fatal collisions in 2005 in King, Pierce and Snohomish Counties. Chief John Batiste ordered troopers to emphasize speed enforcement in appropriate areas. Deaths have dropped each year since.

[www.wsp.wa.gov/targetzero](http://www.wsp.wa.gov/targetzero)

## US 2 Safety Analysis Conclusion

Between March 2007 and February 2012, 569 collisions were reported on the mainline and ramps. Three of these collisions resulted in fatal injuries and six resulted in serious injuries. A detailed review of the probable contributing factors to collisions on the corridor revealed that the majority of the collisions were behavior-related. Based on this finding it is concluded that the safety performance of the corridor will most likely benefit from increased enforcement and activities by a Target Zero community task force.

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## Chapter 3:

# Population, Employment, and Land Use Assumptions

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This section provides a description of the population, employment, and major land use assumptions used to analyze and evaluate corridor improvement options. For land use assumptions and other inputs, WSDOT uses the growth projections from the PSRC regional travel demand model. The PSRC model assumes that Snohomish County and the jurisdictions within the study area will continue to grow.

## Growth Management Act (GMA)

Washington's GMA (36.70A RCW) requires that cities and counties produce long-range comprehensive plans that are reviewed and, if necessary, updated every seven years. Population and employment growth targets, based on the state's official growth projections allocated at the county level, determine the number of residents and jobs that a jurisdiction is expected to accommodate in the future. Growth targets are generally accommodated within designated Urban Growth Areas (UGA).

These growth targets and land use assumptions are incorporated into the PSRC's regional travel demand model to forecast future mobility and traffic trends. PSRC's travel forecast model is based on Office of Financial Management (OFM) population and employment projections. For the purposes of this study, the Corridor Study team refined the PSRC model with more detailed population, employment, and land use information taken from approved comprehensive plans provided by the communities within the study area. This detailed information provides a better understanding of how people travel along the corridor. The forecast results will help to determine the best improvement options to address future travel needs in this corridor area.

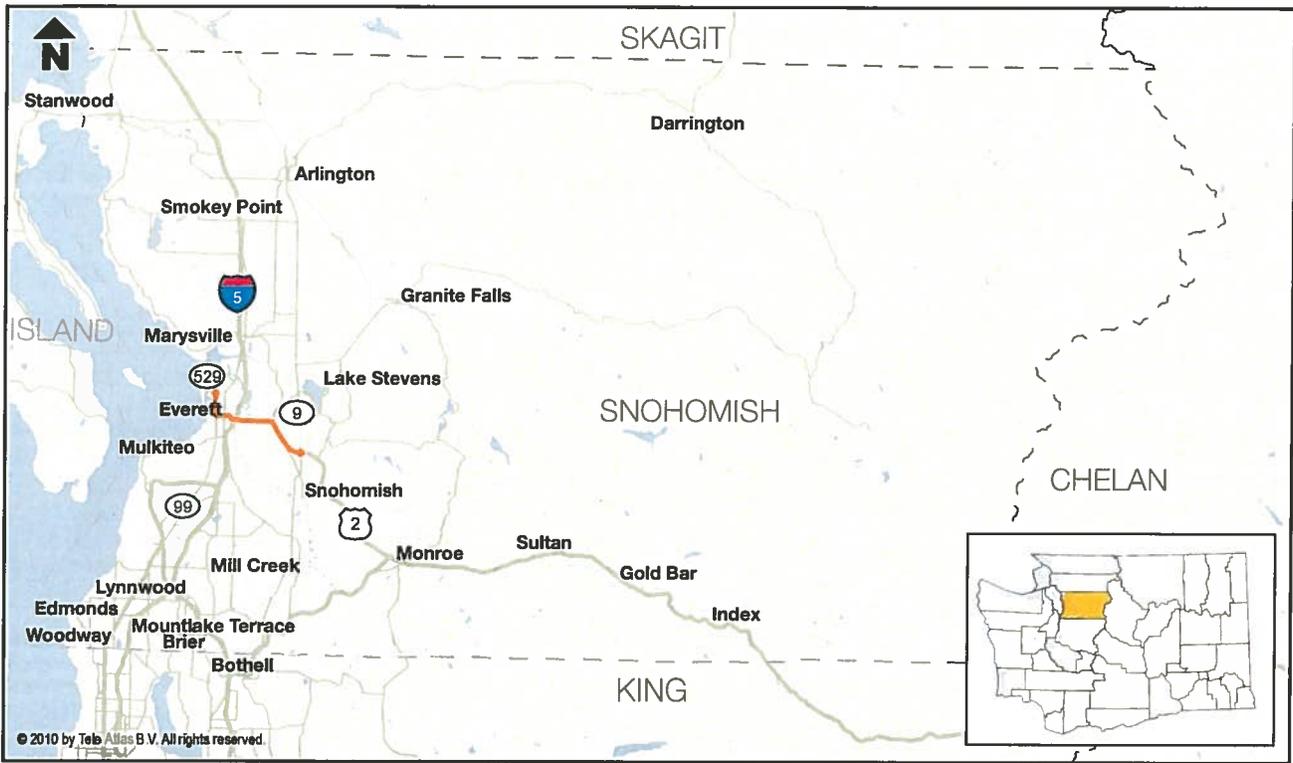
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## **What are the population, employment, and land use growth assumptions of the study area?**

The population, employment and land use growth assumptions for the communities in the vicinity of the US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study are summarized below. Communities within the study area include:

1. Snohomish County
2. Tulalip Indian Tribes
3. Everett
4. Lake Stevens
5. Marysville
6. Monroe
7. Snohomish
8. Ebey Island

# 1. Snohomish County



**Exhibit 3.1:** Snohomish County is shown in orange

Snohomish County is the third largest county in Washington State. Census information shows that Snohomish County has a population of 711,100, a population change of 17% since 2000 (Washington State grew 14% in the same time period).

Snohomish County is located on Puget Sound, between Skagit County to the north and King County (and Seattle) to the south. Snohomish County's varied topography ranges from saltwater beaches, rolling hills and rich river bottom farmlands in the west to dense forest and alpine wilderness in the mountainous east. Sixty-eight percent of the county land area is forest land, 18% is rural, 9% is urban/city and 5% is agricultural.

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The study area contains several waterways including:

- Puget Sound,
- the Snohomish River, and the
- Deadwater and Ebey Sloughs.

The city of Everett and the Tulalip Reservation are located between the Puget Sound and the Snohomish River. The communities of Snohomish, Lake Stevens, Marysville are located east of the Snohomish River. Ebey Island is located between Everett and the communities to the east and is located within a 100 year flood plain. The US 2 Trestle crosses Snohomish River to Ebey Island. Visit the Snohomish County website at the URL below:

[www1.co.snohomish.wa.us/County\\_Information/](http://www1.co.snohomish.wa.us/County_Information/)

## **2. Tulalip Indian Tribes**

The Tulalip Tribes is a federally recognized Indian tribe with a reservation located west of Marysville, established by the Point Elliott Treaty of January 22, 1855. The 22,000 acre Tulalip Tribe Reservation is located north of Everett and the Snohomish River adjacent to Port Susan and the western border of the city of Marysville. In the 2010 census, it had a population of 2,500 residing within its boundaries. The Tulalip Tribes include the tribes of Snohomish, Snoqualmie, Skykomish, and other bands and tribes of Indians who inhabited the shores of the rivers which now bear their names as well as parts of Whidbey and Camano Islands and the mainland shore from Mukilteo north to the mouth of the Stillaguamish River. At the time of European settlement, members of these tribes traveled throughout Puget Sound and as far north as the Fraser River in pursuit of fishing and trading opportunities. Today the adjudicated usual and accustomed fishing area of the Tulalip Tribes extends from the Canadian border 120 miles north to the southern end of Vashon Island.

The Tulalip Tribes operate the Bernie Kai-Kai Gobin Hatchery. The hatchery raises and releases three species of salmon, which provide fishing opportunity for Tulalip tribal members in terminal area fisheries on and near the Tulalip Reservation as well as contributing to other commercial and sport fisheries in Washington and British Columbia.

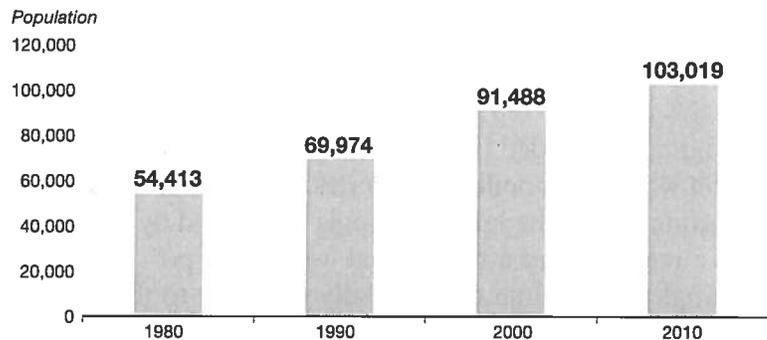
The reservation also has Quil Ceda Village, a business park and municipality which provides jobs and tax income for the reservation. Situated adjacent to I-5, it is home to the reservation's first casino, QuilCeda Creek Casino; the second casino, the massive \$72 million Tulalip Resort Casino, a 12-story hotel, and a popular 100-store outlet mall.

[www.tulaliptribes-nsn.gov/](http://www.tulaliptribes-nsn.gov/)

### 3. Everett

The city of Everett, the sixth most populated city in the state, is located on the Port Gardner Peninsula, with Port Gardner Bay on the west and the Snohomish River to the north and east. Everett is 30 miles north of Seattle. Census data indicate that the city covers an area of 47.7 square miles, of which, 32.5 square miles is land and 15.1 miles is water. The 2010 population of Everett is 103,019.

**Everett Population – 1980 - 2010**



**Exhibit 3.2: Everett Population Growth**

Local points of interest include

Paine Field and Everett Community College. Paine Field is home to the Boeing Corporation which in 2010 employed 37,000 people. Paine Field is also known as Snohomish County Airport, and is a public airport located in unincorporated Snohomish County, between Mukilteo and Everett. Everett Community College, with its main campus in North Everett, educates more than 20,000 students every year at seven learning centers throughout Snohomish County.

The city of Everett comprehensive plan predicts that Everett will remain the central city for Snohomish County. As the population of the area continues to grow and age, its role as the activity center for governmental, financial, professional, educational, medical and social services within the county will grow.

Land use amenities include the Port of Everett. Created in 1918, the Port of Everett is situated on Gardener Bay at the mouth of the Snohomish River. Within the next five years, the Port of Everett anticipates spending approximately \$90 million to redevelop the Everett waterfront. Redevelopment plans range from maintaining existing assets to planning for a new transportation hub on the site of the former Mukilteo Tank Farm. The Mukilteo Tank Farm is a decommissioned fuel tank site that sits along the Mukilteo waterfront just north of the existing ferry terminal. After it was decommissioned, the site underwent extensive environmental cleanup. In 2006 the Washington Department of Ecology issued a letter to the Air Force stating that cleanup of the site had achieved regulatory requirements. The U.S. Air Force is in the process of conveying 18.85 acres of the 19.95 acre site to the Port for use in the development and operation of a port facility and other public purposes. Some possible uses might include a multi-modal transportation facility, which could include the relocation and expansion of the Mukilteo Ferry Terminal, a Sounder commuter rail platform and a station for Community Transit. The remaining 1.1 acres of the Mukilteo Tank Farm site is currently leased by NMFS through NOAA, and will be transferred to the Secretary of Commerce for the continued use by NOAA as the Mukilteo Biological Field Facility.

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## History

Everett was historically home to Native Americans of the Snohomish tribe. Following the Indian Wars in the 1850s, the Snohomish and other local tribes restructured as the confederation known as Tulalip and were moved to a reservation established at Tulalip Bay. The city of Everett was incorporated in the spring of 1893, setting aside most of its waterfront for industry that originally included lumber and shingle mills, wood products manufacturers, iron works, shipbuilders, fisheries, and canneries. By World War I, Everett was dominated by the lumber-shingle trade, and by the 1920s, the city's importance as a regional and international waterfront port was well established. Lumber-shingle predominance eventually gave way to the papermaking era of Weyerhaeuser, Scott and the Lowell Paper Mill.

## Employment

Everett is the employment and industrial center of Snohomish County. As the timber economy began to wane regionally, the city welcomed Boeing in the 1960s. The arrival of electronics corporations such as John Fluke Manufacturing and Intermec spurred economic growth in the '80s. Other major employers in the Everett area include Kimble Clark and the Puget Sound Naval Complex (Naval Station Everett).

Approximately 40 percent of all jobs in the county are located within the Everett Planning Area and will continue to be in the future. Everett is the Snohomish County seat and is designated a regional center by the PSRC. Everett is the center of economic development in the county. It has a high-technology industrial base, a deep-water port, an established manufacturing and retail core, and a modern naval station. The five largest employers in Everett include:

- Boeing
- Esterline Control Systems (formerly Korry Electronics)
- Fluke Electronics
- Verizon Communications
- Providence Regional Medical Center Everett

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## Everett Boeing Plant

Boeing is the largest employer in Snohomish County and currently has one of its largest aerospace manufacturing facilities in Everett.

The Boeing Everett Plant has 3,880 employees who live east of the US 2 Trestle.

- Approximately 18 percent of the 3,880 employees either carpool/vanpool or use transit.
- Work shifts at Boeing influence freeway corridors of I-5 and SR 526. These corridors are currently operating near or at capacity (LOS E and F) in the afternoon peak hour. There are delays experienced in each corridor during the afternoon peak period which can range from about 2:00 p.m. to 6:00 p.m.
- The northbound direction of I-5 currently experiences congestion on a daily basis between the SR 526 and US-2 interchanges. The southbound lanes are operating with occasional congestion at near capacity (LOS E) conditions but generally do not experience the gridlock traffic flow of the northbound lanes.
- The US 2 trestle across the Snohomish River valley is also operating at capacity conditions in the westbound direction in the morning and eastbound direction near the I-5/US 2 ramps and the US 2/20th Street ramps during the afternoon peak hours on a daily basis.

## Employment at Port of Everett

The Port of Everett is a natural deep water port in the Puget Sound. It is one of two ports in Snohomish County; the other being the Port of Edmonds. The Port District encompasses most of Everett and portions of Mukilteo and Marysville. The Port of Everett supports the following lines of business:

1. **Shipping Terminals.** The Port of Everett has three shipping terminals: Hewitt, Pacific and South. The three terminals are comprised of eight berths situated on 95 acres.
2. **Marina.** The Port operates the largest marina on the West Coast and provides moorage to 2,000 recreational boats and space for boat repair and retail services.
3. **Properties.** The Port acquires sites to redevelop. It adds infrastructure, such as roads and utilities, to facilitate industrial and commercial development of the land. The Port of Everett owns nearly 3,000 acres of property, which includes 45 leases.

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A 2006 economic impact study found that the economic benefits of the Port include:

- Jobs: 3,670
- Related Aerospace Jobs: 2,912
- Income: \$170.5 million
- Revenue: \$152.5 million
- Local Purchases: \$218.6 million
- State & Local Taxes: \$16.8 million

### **Naval Station Everett and the Navy Support Complex**

Naval Station Everett (NAVSTA) is located in the city of Everett next to the marina. The Navy Support Complex is located between Marysville and Arlington, 11 miles north of the naval station, and is the homeport for a US Navy Battle Group. The 117-acre active military base provides facilities and services for a nuclear-powered Nimitz Class aircraft carrier along with two destroyers, three frigates, and a Coast Guard buoy tender. The naval station employs 835 civilian and 5,250 military personnel.

Housing for Everett Naval Station personnel and their families is largely provided off-base and east of the Snohomish River. The 1995 closure of Naval Station at Sand Point in Seattle required the reassignment of administrative and personnel support facilities to the Everett Naval Station and the need to provide new family housing. In 1997, Naval Station Everett was chosen as one of two test-pilot sites selected to conduct a Public/Private Venture partnership to provide housing for enlisted personnel and their families. This partnership resulted in a 52 acre development with 185 housing units at the Country Manor Housing Development in Smokey Point near Marysville. A second Public/Private Venture, Carroll's Creek Landing located in Arlington, was completed in 2002 and provides an additional 288 family housing units. Naval Station Everett constructed 143 additional PPV family housing units in Marysville in 2009.

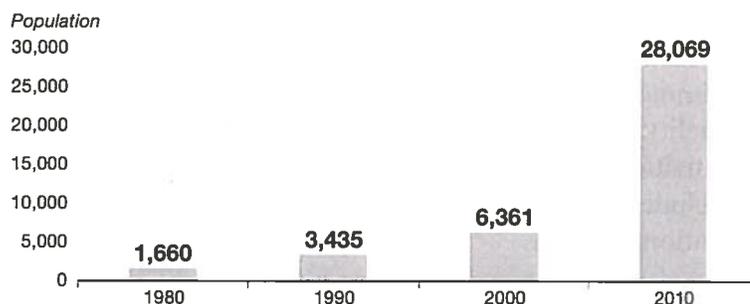
[www.ci.everett.wa.us/](http://www.ci.everett.wa.us/)

## 4. Lake Stevens

### Location and population:

The city of Lake Stevens is located southeast of Marysville, north of the city of Snohomish, and east of Everett. Since 2005, the population of the city of Lake Stevens has nearly quadrupled from 7,400 to 28,069. In 2010 the population was 28,069, compared to a population of 6,361 in 2000. Much of the population growth is due to annexation from Snohomish County in the designated Urban Growth Area (UGA). The annexation effort coalesced around a comprehensive plan vision called “One Community Around the Lake,” whose goal was to bring the unincorporated UGA area into the city limits.

**Lake Stevens Population – 1980 - 2010**



**Exhibit 3.3: Lake Stevens Population Growth**

The table shown below details the main annexations:

Area Annexed	Year	Acres / Square Miles	Population	New City Population	% Increase
Northlake	2006	855 / 1.34	2,300	9,700	31.1%
Frontier Village	2006	708 / 1.11	3,600	13,300	37.1%
Soper Hill	2007	292 / 0.46	1,200	14,500	9.0%
Southwest	2009	2,374 / 3.71	10,874	25,674	73.5%

Additionally, two small annexations have taken place during this time. The Fire District Annexation, a 1.02-acre property on the southwest corner of Chapel Hill Road and 99th Ave NE, occurred in October 2007. The Corniche Annexation, a 2.91-acre commercially-zoned vacant parcel on the southwest corner of Market Place and 91st Ave NE, occurred in March 2008. Neither of these annexations added to the city’s population.

Consistent with the GMA and supported by Countywide Planning Policies, the city of Lake Stevens is growing from a small to a large city. According to the Lake Stevens 2010 comprehensive plan, the population could be as much as 46,000 people by 2025.

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### **Land use and amenities:**

According to the United States Census Bureau, the city of Lake Stevens has a land area of 8.9 square miles. The lake itself is the largest and deepest lake in Snohomish County, with an area of 1,040 acres and an average depth of 64 feet. The small size of the surrounding watershed compared to the lake minimizes the effects of upstream pollution and contributes to good water quality. Much of the Lake Stevens shoreline is heavily developed. Recreational activities include boating, fishing, and swimming. Other points of interest include the nearby ghost town of Monte Cristo and Mt. Baker-Snoqualmie National Forest.

### **History**

Lake Stevens was officially incorporated on November 29, 1960. The city was first settled in 1886 on a 160-acre homestead along the east shore. By 1890 the first town in the area, "Ferry," was established (the name was later changed to Hartford). A railroad spur was built in 1905, linking Hartford with Lake Stevens. Two years later Rucker Mill was opened, located along and in the north cove of the lake (original pilings can still be seen in the old lake outflow area just south of the boat launch). In 1919, the mill, which became known as the "world's largest sawmill," burned and was partially rebuilt. When it burned a second time in 1925 the mill was dismantled and Lake Stevens lost the industry which caused its founding. However, by then a flourishing town was established and continued under its own momentum.

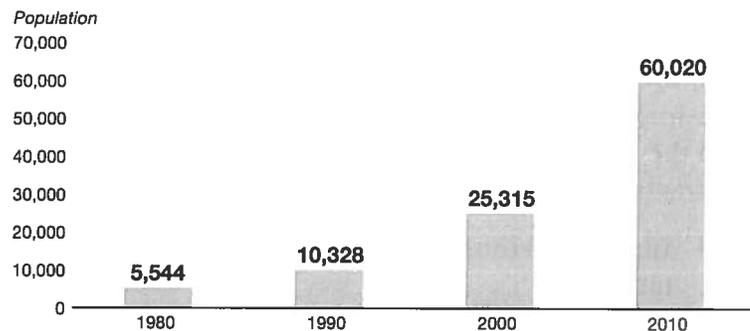
From the 1920s to the 1950s Lake Stevens was primarily a resort community, with many public and private resort beaches scattered around the shore. In 1960 Lake Stevens incorporated as a City with a population of 900. Soon, its popularity and natural beauty, combined with changing commuter habits, attracted more and more residents, changing its character to that of a suburban community. By 2000 the City had grown to a population of 6,361 in approximately 1.8 square miles.

[www.ci.lake-stevens.wa.us/](http://www.ci.lake-stevens.wa.us/)

## 5. Marysville

The city of Marysville is located north of the study corridor. The population was 60,020 at the 2010 census and is the second largest city in Snohomish County after Everett. Recent development and annexation of North Marysville from the Urban Growth Area has transformed this city into a bedroom community for workers travelling to employment in Everett and elsewhere in the region. Over the past decade, Marysville has seen growth in the residential, commercial, and industrial sectors.

**Marysville Population – 1980 - 2010**



**Exhibit 3.4: Marysville Population Growth**

### History

Marysville's history begins with the signing of the Point Elliott Treaty in 1855. After the treaty was signed, the local area opened for settlement and timber harvesting. Several land claims staked during the 1860s would later become the city of Marysville. In 1872, a small federal government trading post was established. Trade post operations included a post office and school. The first saw mill opened in 1887, followed by three additional mills over the next few years. The railroad came to town in 1889. Marysville was officially incorporated on March 20, 1891.

Marysville was historically home to Native Americans of the Snohomish tribe. Following the Indian Wars in the 1850s, the Snohomish and other local tribes restructured as the confederation known as Tulalip and were moved to a reservation established at Tulalip Bay.

### Geography and Land Use

The city has a total area of 9.8 square miles, of which, 9.6 square miles of it is land and 0.2 square miles of it (1.94%) is water.

There are four neighborhoods within the city of Marysville. They are North Lakewood, Sunnyside/Whiskey Ridge, Downtown Marysville, and North Marysville. In 2010, Marysville has significantly increased in size. With the annexation of North Marysville, the population is now close to 60,000. This makes Marysville the second largest city in Snohomish County (after Everett).

<http://marysvillewa.gov/>

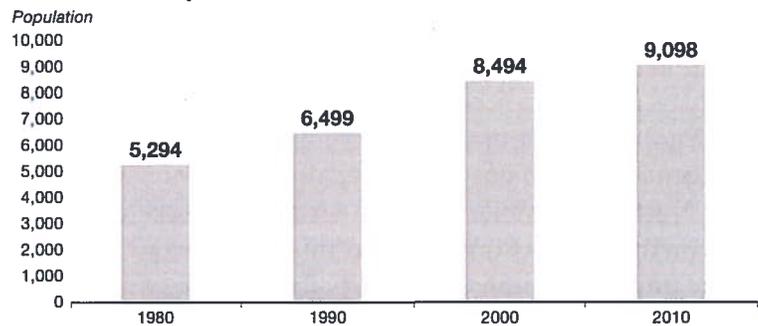
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## 6. Snohomish

The population of Snohomish was 9,098 at the 2010 census. The historic business and residential center of the town constitutes the Snohomish Historic District, which is listed on the National Register. Local attractions include:

- Blackman House, a year-round museum
- Harvey Airfield is one mile southwest of Snohomish

**Snohomish Population – 1980 - 2010**



**Exhibit 3.5: Snohomish Population Growth**

### History

The Village of Snohomish was founded in 1858, and it was one of the first inland cities in the Puget Sound region. Snohomish was built where a planned military road connecting Fort Steilacoom and Fort Bellingham was planned to cross the Snohomish River. Although the road was never completed, Snohomish quickly became a local center of commerce in the expanding region. In 1861 the Village of Snohomish was voted the county seat, which it remained until 1897 when the county seat was relocated to Everett.

The city of Snohomish was finally incorporated in 1890. By 1899 the city of Snohomish was a prosperous town with a population of 2,000, with 25 businesses and 80 homes.

1901 brought Snohomish the first motor car in the county. In 1903 First Street was paved with brick and when it was finished there was a three day celebration. The town continued to grow and by 1920 the population grew to a little over 3,000. The population would remain relatively stable for the next 40 years.

- The Alcazar Opera House, built in 1892, later became an agricultural supply store and is now one of Snohomish's many antiques stores.
- In 1973, the city adopted a Historic District Ordinance protecting historic buildings and structures from inappropriate alterations and demolitions and encouraging the design of new construction in keeping with the historic character of the district. In 1974, the Historic Business District, a 36-block area, was placed on the National Register of Historic Places.

In 1985, the US 2 bypass was completed, allowing the traffic which had until then been routed through the town to circumvent the city.

Today, Snohomish has continued to grow with much of the development spread out along the former route of SR 2 through the downtown, now known as Bickford Avenue.

[www.ci.snohomish.wa.us/](http://www.ci.snohomish.wa.us/)

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## 7. Ebey Island

### Ebey Island

Ebey Island is located in unincorporated Snohomish County, approximately two miles east of downtown Everett via I-5 to US 2. The island is named for Colonel Isaac Neff Ebey (1818–1857), one of the earliest settlers in the Pacific Northwest and the first permanent white resident of Whidbey Island. The US 2 trestle traverses Ebey Island.

### WDFW

The Washington Department of Fish and Wildlife (WDFW) manages 1,237 of 3,940 acres of land on Ebey Island. The WDFW land south of the trestle is referred to as the Ebey Island Unit and the WDFW land north of the trestle is referred to as the Spencer Island Unit.

The Ebey Island estuary subbasin is composed of several distinct islands: North Ebey Island, Qwulooit, North Spencer Island, Smith Island, Otter Island, Spencer Island, Ebey Island North of SR 2, Ebey Island South of SR 2, and Estuary Edge (1 and 2). What we call Ebey Island for the purposes of this study includes the entire area within the corridor footprint. See Exhibit 3.2 for a map of the estuary subbasin project areas.

WDFW land in the Ebey Island unit (south of US 2), consists of approximately 417 acres of forested swamp, and 820 acres of grassland that was purchased in 2008. The forested portion was logged in the 1890's and has become reforested naturally into one of the few remaining Sitka spruce swamps in the Snohomish River estuary. The grassland portion is vegetated largely by reed canary grass and Baltic rush, and is divided by the forks of Deadwater slough which span the properties length, north to south. Recreational access for this unit is in the planning phase. Ebey Island is located in Snohomish County and is zoned as agricultural land (A-10). See for example Ebey Island Berry Farm, at 1515 - 51st Avenue SE, The Farm at Swan's Trail, and the Johnson Farm. Livestock may be encountered on WDFW land between the months of April and October.

WDFW also manages significant land holdings in the project area north of the US2 trestle, referred to as the Spencer Island Unit. Since establishing a 1989 joint acquisition and co-management agreement, WDFW owns 175 acres and Snohomish County Parks and Recreation Department owns 240 acres of this island in the Snohomish River estuary just east of Everett. It is a flat, grassy marsh/scrub-shrub wetland complex ringed by mixed forest that provides waterfowl habitat. Fifty acres of tidally influenced estuary on the south end of Spencer Island have been restored for salmon species. In winter 2004, a dike was intentionally breached on the WDFW property, on the northeastern

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side of the island. Currently a proposal to restore 150 acres of the island to inter-tidal estuary for salmon, waterfowl and other estuary-dependent species is moving forward in partnership with Ducks Unlimited and funded by the state Salmon Recovery Funding Board. There is also a separate proposal to enhance public trails, hunting blinds and access for people with disabilities. Parking and access to the area are through the City of Everett's sewage treatment plant on 4th Avenue. This is an intertidal wetland popular with wildlife watchers and waterfowl hunters. The WDFW manages the north part of the island and Snohomish County manages the south. Hunting is allowed only on the north/WDFW portion of the island.

### **General Land Use and Environmental Description**

The Snohomish River Estuary is the second largest in Puget Sound region and includes the Snohomish River, three distributary sloughs (Ebey, Steamboat, and Union), and marshes between Possession Sound and the divergence of Ebey Slough from the main stem. The estuary, a highly productive and diverse environment, provides unique and critical habitat for Chinook and other salmon for rearing, migration, and transitioning between fresh- and saltwater (smoltification). Bull trout overwinter and forage in the estuary as well. Tidal circulation drives hydrologic processes in the estuary sub-basin. Vegetation, elevation, and salinity vary across the estuarine landscape. The quantity of estuarine tidal habitat, which is critical for juvenile salmon, has been severely diminished.

Three estuarine zones have been delineated based on habitat characteristics. The emergent marsh, located at the mouth of the delta, has the highest level of primary production, salinity, and density of blind tidal channels. Farther upstream, as elevation increases and salinity decreases, open marshes give way to scrub shrub vegetation and forested wetlands. A productive brackish (mixed salt- and freshwater) marsh fringe typically lies between the river channel and mud banks and adjacent scrub-shrub or forested habitats. Each zone in this complex ecosystem provides unique functions to Chinook and other salmon species.

The estuary was settled and logged in the late 1800s and early 1900s. Diking began in the 1860s and reached its maximum extent in the 1950s. Levees that have disconnected the Snohomish River from tidelands and marshes have dramatically altered the hydrology of the estuary, resulting in loss of tidal channels and marsh. Recent natural and intentional actions have restored several hundred acres of these habitats (City of Everett and Pentec, 2001). Extensive diking in conjunction with riparian clearing and wood removal has also reduced habitat complexity in the margins of distributary sloughs and the main stem (Snohomish Basin Salmon Recovery Forum, 2001). Other habitat

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problems in the estuary include tide-gates that restrict fish access to tributary creeks, altered sediment deposition patterns, and degraded water quality. Degraded water quality can be seen in late summer with high temperatures and high fecal coli form counts that do not meet State of Washington water quality standards. The U.S. Army Corps of Engineers performs dredging operations in the estuary every few years in the lower four miles of the Snohomish River.

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## Chapter 4:

# Environmental Resources

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WSDOT conducted a preliminary environmental review of the environmental resources in the US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study area, as detailed below. This section provides an overview of the natural and built environmental resources in the study area. Using GIS and other sources of information such as WDFW and Snohomish County, WSDOT determined the environmental elements most likely to require in depth analysis in future corridor planning and analysis. Further environmental review will be required during project scoping and design.

## Why did we study environmental resources for the US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study?

The Corridor Working Group reviewed the natural and built resources and land uses in the corridor to inform the corridor planning study recommendations and planning level cost estimates. This inventory portrays existing conditions and lists the environmental elements most likely to be included during environmental documentation for project design and construction. Planning studies are not required to meet the detailed analyses needed to comply with the National or State Environmental Policy Acts (NEPA/SEPA). However, identifying the environmental resources in the corridor during the planning process is helpful in understanding the potential environmental issues that may be encountered in future project development phases. Source material produced in support of the transportation planning process may be incorporated into subsequent SEPA/NEPA documents in accordance with RCW, WAC, FHWA and CEQ regulations. Environmental elements described in this corridor plan consist of general information collected to identify and document potential issues as part of the transportation study process. Specific impacts to environmental elements would be determined, and associated permits obtained, when a project has been funded for design and construction. As funding becomes available to move forward with the project list recommended in this corridor planning study, additional environmental analyses will be needed. If the project has a federal nexus (federal funds or federal permits), an environmental assessment or EIS may be required.

### **Environmental Analysis and the Federal Nexus**

What is a federal nexus? When transportation projects require a federal environmental permit or receive federal funds, then Federal Environmental laws like NEPA and ESA are triggered. This trigger (federal funds or federal permits) is called the federal nexus.

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## **Future Environmental Analysis: Environmental resources and elements**

Based on the preliminary review of environmental resources in the US 2 study area described below, more detailed future environmental analysis may be required to include the following environmental elements of the natural and built environments. Review of some or all of these elements may be combined to reduce paperwork and duplication, improve readability, and focus on the significant issues.

### **1. Natural Environment**

- a. Earth** (geology, soils, topography, unique physical features, erosion/enlargement of land area-accretion)
- b. Air** (air quality, odor, climate)
- c. Water** (surface water movement/quantity/quality, runoff/absorption, floods, groundwater movement/quantity/quality, public water supplies)
- d. Plants and animals** (habitat for and numbers or diversity of species of plants, fish, or other wildlife)
- e. Energy and natural resources** (amount required/rate of use/efficiency, source/availability, nonrenewable resources, conservation and renewable resources, scenic resources)

### **2. Built Environment**

- a. Environmental health** (noise, risk of explosion, releases or potential releases to the environment affecting public health, such as toxic or hazardous materials)
- b. Land and shoreline use** (relationship to existing land use plans and to estimated population, housing, light and glare, aesthetics, recreation, historic and cultural preservation, agricultural crops)
- c. Transportation** (transportation systems, vehicular traffic, waterborne, rail and air traffic, parking, movement/circulation of people or goods, traffic hazards)
- d. Public services and utilities** (fire, police, schools, parks or other recreational facilities, maintenance, communications, water/storm water, sewer/solid waste, other governmental services or utilities).

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## **What are the natural environmental resources in the corridor?**

For the purpose of the US 2: Everett Port/Naval Station to SR 9 Corridor Planning Study, WSDOT conducted a preliminary environmental review of the environmental resources in the study area. The environmental elements described below will most likely require detailed future study.

### **1. Natural Environment**

#### **a. Earth**

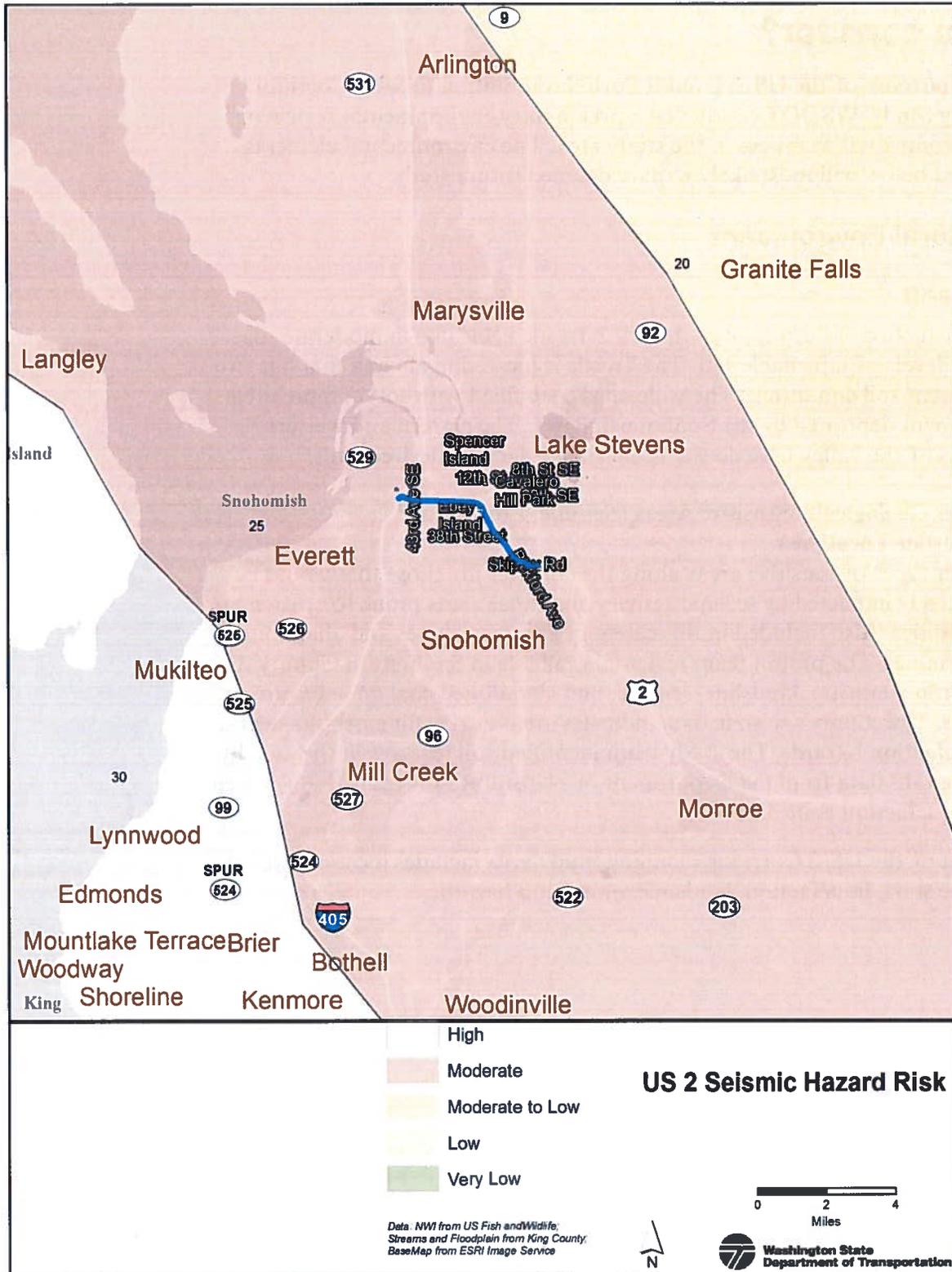
Liquefaction Susceptibility - the US 2 Trestle is located in moderate to high levels of liquefiable soil. The Trestle is located in an area that has two different soil conditions. The valley has been filled with soft compressible sediment deposited by the Snohomish River. The eastern and western edges of the valley have denser more stable glacially derived soils.

#### **Other Geologically Sensitive Areas (Seismic, Erosion, and Landslide Locations)**

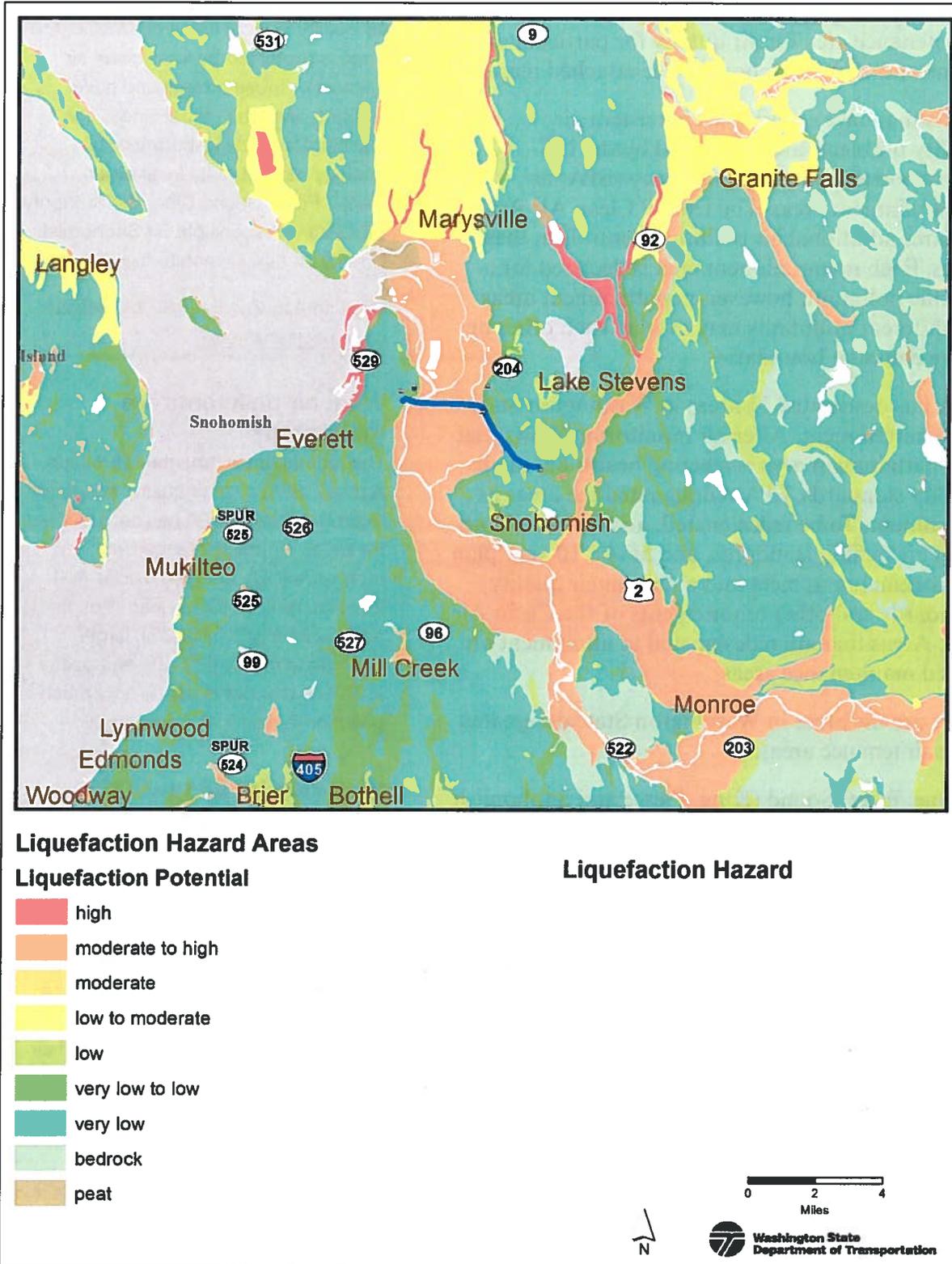
Other types of sensitive areas along the corridor are those that would be adversely impacted by seismic activity and those areas prone to erosion and landslides. Also included in this category are steep slopes and abandoned coal mines. The project team reviewed available in Snohomish County data regarding erosion, landslide, seismic, and abandoned coal mine hazard areas. The county's seismic data indicates areas at risk for earthquake and liquefaction hazards. The study team identified soil features in the area by using GIS data from the Department of Natural Resources (DNR) as well as liquefaction zone data.

Most of the US-2 Corridor Planning Study area includes locations at risk for seismic, liquefaction, landslide, or erosion hazards.

**Exhibit 4.1: US 2 Seismic Hazard Risk**



**Exhibit 4.2: US 2 Earth and Soils**



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## **b. Air**

The US 2 study area is in an attainment maintenance area for air quality for particulates, ozone and carbon monoxide. See attached map.

Areas that have experienced persistent air quality problems are designated by the U.S. Environmental Protection Agency (EPA) as nonattainment areas. The federal Clean Air Act requires additional air pollution controls in these areas. Each nonattainment area is declared for a specific pollutant; however, nonattainment areas for different pollutants may overlap each other or share common boundaries.

EPA has designated 13 areas in Washington State as nonattainment. After air monitoring shows that a nonattainment area is meeting health-based air quality standards, EPA redesignated the areas as attainment. To be redesignated, an area must both meet air quality standards, and have a 10-year plan for continuing to meet and maintain air quality standards and other requirements of the Clean Air Act. Areas that are redesignated to attainment are called maintenance areas.

Here are the areas in Washington State designated as maintenance areas:

**Ozone:** Puget Sound (King, Pierce and Snohomish Counties) and Vancouver (Clark County) are maintenance areas.

**Particulate Matter (PM10)** Thurston County, Tacoma Tideflats, Kent Valley, and Seattle Duwamish, Spokane, Yakima, and Wallula (Sept 26, 2005) are maintenance areas.

**Carbon Monoxide:** Puget Sound (King, Pierce and Snohomish Counties) Yakima, Vancouver (Clark County) and Spokane are maintenance areas.

### **Who monitors air quality?**

Air quality in most areas of Washington State is protected by local clean air agencies. Tribes protect and have authority over their tribal lands. The Washington State Department of Ecology has authority in all other areas. Puget Sound Clean Air Authority (PSCAA) is responsible for Snohomish County air quality monitoring.

Click here to visit the PSCAA website:  
[www.pscleanair.org/](http://www.pscleanair.org/)

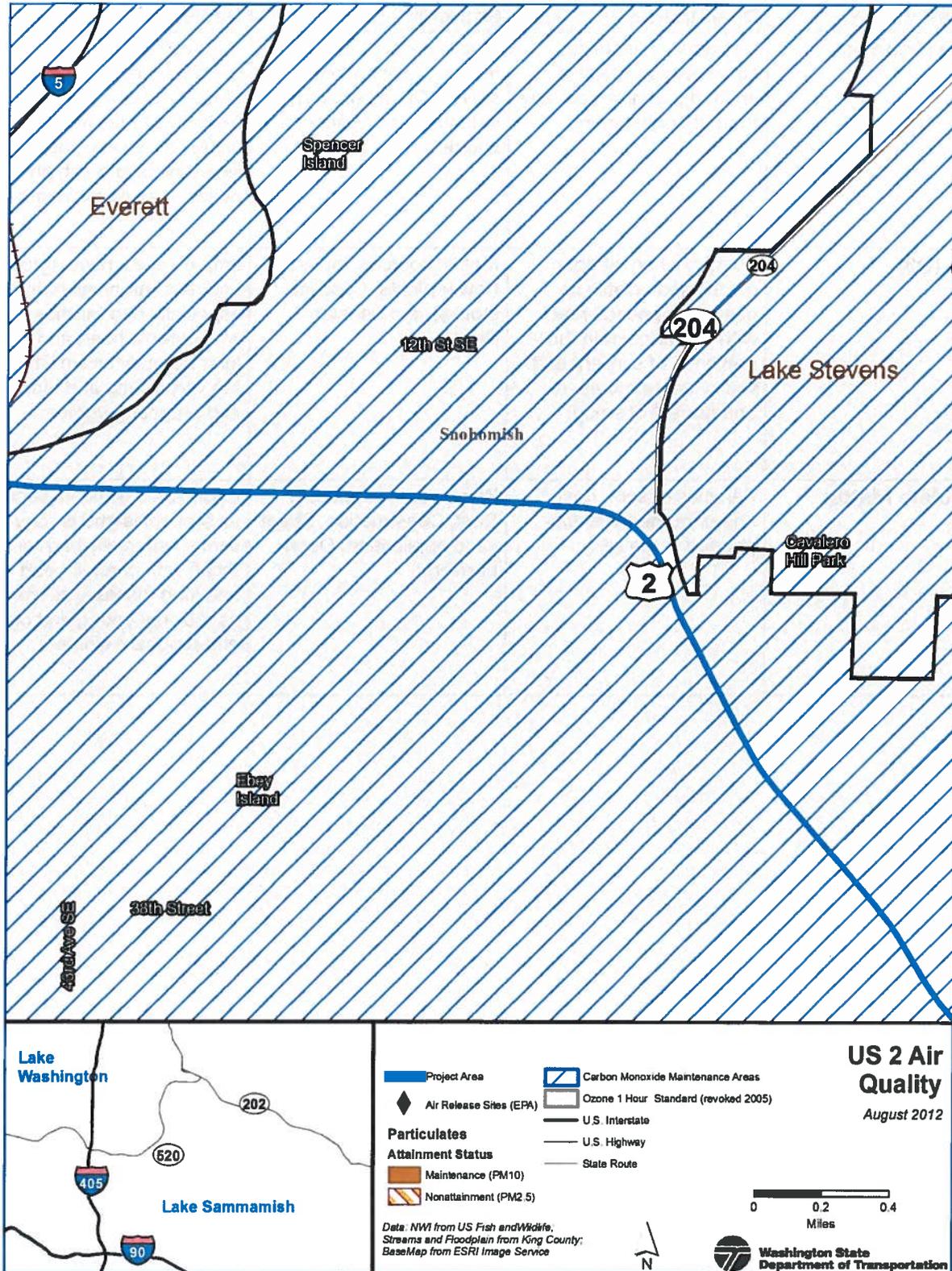
### **What air pollutants are monitored?**

The federal Environmental Protection Agency (EPA) sets air quality standards to protect health. EPA has set standards for seven air pollutants: carbon monoxide (CO), nitrogen oxides (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), lead (Pb), fine particulate matter (PM 2.5), larger particulate matter (PM 10), and ozone (O<sub>3</sub>). The standards define how much air pollution is safe in the outdoor air.

### **Why monitor air quality?**

States monitor air quality in different areas to find out how much pollution is in the air and make sure pollutant levels are meeting health-based federal air quality standards. Knowing how much pollution is in the air in a certain area helps air quality agencies know when and how to take action to protect public health. For more information about air quality, visit the Department of Ecology website: [www.ecy.wa.gov/programs/air/air\\_monitoring\\_data/WAQA\\_Intro\\_Page.html](http://www.ecy.wa.gov/programs/air/air_monitoring_data/WAQA_Intro_Page.html)

**Exhibit 4.3: US 2 Air Quality**



### Common sources of CO<sub>2</sub>, Ozone and Particulate Matter

Pollutant	Description	Sources	Health Effects
<b>Carbon Monoxide (CO)</b>	An odorless, tasteless, colorless gas which is emitted primarily from any form of combustion.	Mobile sources (autos, trucks, buses), Wood stoves, Open burning, Industrial combustion sources.	Deprives the body of oxygen by reducing the blood's capacity to carry oxygen; causes headaches, dizziness, nausea, listlessness and in high doses, may cause death.
<b>Ozone (O<sub>3</sub>)</b>	Formed when nitrogen oxides and volatile organic compounds react with one another in the presence of sunlight and warm temperatures. A component of smog.	Mobile sources, Industry, Power plants, Gasoline storage and transfer, Paint.	Irritates eyes, nose, throat and respiratory system; especially bad for those with chronic heart and lung disease, as well as the very young and old, and pregnant women.
<b>Particulate Matter PM<sub>10</sub></b>	Particles of soot, dust, and unburned fuel suspended in the air.	Wood stoves, Industry, Dust, Construction, Street sand application, Open burning.	Aggravates ailments such as bronchitis and emphysema; especially bad for those with chronic heart and lung disease, as well as the very young and old, and pregnant women.

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## **Washington Climate Change**

Executive Order 07-02, Governor Christine Gregoire's Washington Climate Change Challenge, established the state's commitment to address climate change by reducing greenhouse gas emissions through strategies that reduce the amount of driving and vehicle miles traveled. The recommendations in this corridor planning study address climate change by reinforcing CTR Programs, analysis of bicyclist and pedestrian needs to encourage nonmotorized travel, and inter-agency coordination with transit to encourage access to and use of transit.

In 2009, Governor Gregoire issued Executive Order 09-05, Washington's Leadership on Climate Change, which directs WSDOT to consult and collaborate with the Departments of Ecology and Commerce, local governments and other stakeholders in estimating current and future statewide levels of vehicle miles traveled (VMT); in evaluating potential changes to the VMT benchmarks established in RCW 47.01.440; and in developing additional strategies to reduce greenhouse gas (GHG) emissions from the transportation sector.

The Governor's Executive Order (EO) also directs the department to work cooperatively with the four largest metropolitan planning organizations to develop and adopt regional transportation plans that will provide people with additional transportation alternatives, reduce GHGs, and achieve the annual per capita VMT statutory benchmarks. The Washington Legislature passed laws in 2009 to encourage electric vehicles, create a sustainable energy trust, set goals for greenhouse gas emissions, improve energy efficiency, establish a climate change/land use work group, and support commute trip reduction for state agencies. Climate change is addressed at the following WSDOT website:

[www.wsdot.wa.gov/SustainableTransportation/](http://www.wsdot.wa.gov/SustainableTransportation/)

## **Climate Change and Greenhouse Gas Emissions (GHG)**

Global climate change refers to changes in average temperatures, wind patterns, precipitation, and storms. Gases that trap heat in the atmosphere are often called Greenhouse Gases (GHGs). GHGs are emitted by both natural processes and human activities.

The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of GHGs in the atmosphere, leading to higher ambient temperatures and global climate change. Carbon dioxide makes up the larger share of greenhouse gases. In Washington State, the largest single source of carbon emissions is motorized transportation, accounting for an estimated 47 percent of carbon dioxide equivalent emissions statewide. The average passenger vehicle emits about 423 grams of CO<sub>2</sub> per mile, or 423 grams per Vehicle Miles Travelled (VMT).

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## **GHG and VMT**

WSDOT calculates the statewide VMT based on roadway miles and traffic count data from WSDOT, counties, and cities. VMT is reported on a calendar year basis. Differences from one year to the next are not clear indicators of changes in driving behavior. Five-year periods are the minimum time period over which trends can be identified. At the state level, VMT is a good indicator of the actual miles traveled. This accuracy holds down to the county level. Below the county level, it is very difficult to accurately assess VMT. Because VMT reflects activity across the roadway network, it is not a useful measure at the project level. Reductions in greenhouse gases might be expected when project designs include significant investment in promoting and supporting the three basic ways to reduce VMT: shift modes from the private car to transit, walking, or biking; increase vehicle occupancy in private cars and vanpools; and, travel less through telecommuting, combining trips, reducing the number of discretionary vehicle trips, and employing tools such as a compressed work week, pricing, and more compact land development that enhances transit, biking, and walking.

## **Climate Change**

Pacific NW climate projections available from the Climate Impacts Group at the University of Washington show that over the next 50 years Washington State is likely to experience:

- increased temperature (extreme heat events, changes in air quality, glacial melting)
- changes in volume and timing of precipitation (reduced snow pack, increased erosion, flooding)
- ecological effects of a changing climate (spread of disease, altered plant and animal habitats, negative impacts on human health and well-being)
- sea-level rise, coastal erosion, salt water intrusion

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## Climate Change Vulnerability Assessment

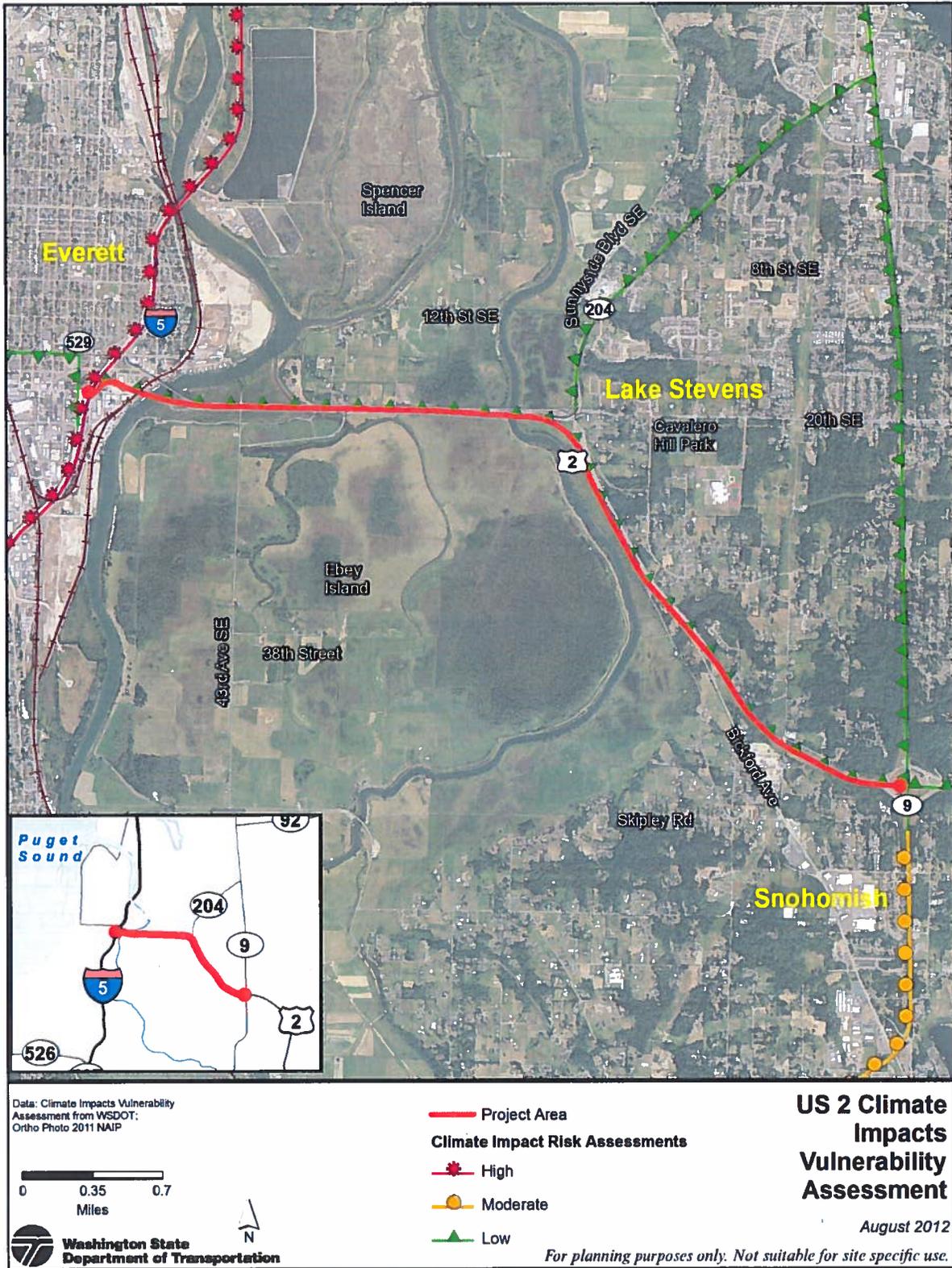
In 2011, WSDOT examined climate risks to state transportation assets using data from the University of Washington Climate Impacts Group. WSDOT convened 14 workshops across the state to inventory and assess the possible impact of extreme weather on WSDOT owned and operated facilities. The result was the Climate Impacts Vulnerability Assessment Report, published November, 2011. The report includes GIS level data and maps with linked notes about the possible effects of extreme weather on specific facilities. The planning team incorporated information from the 2011 Climate Change Vulnerability Assessment Report into this corridor planning study. See also Appendix D.

The US 2 Corridor Planning Study area is rated as low risk. However, the Climate Impacts Vulnerability Assessment (CIVA) Report notes that there is risk associated with sea level rise to WSDOT structures in the study area. It is anticipated that extreme precipitation events will increase with climate change and this raises the possibility of flooding. This flooding is likely to result in temporary operational failure (characterized by minor damage or disruption). Aggradation and storm events are issues on the Skykomish River in the vicinity of US2. With higher sea level rise, dikes will be overtopped and water will spread. The team identified that if sea level rises by two feet, the water could top the dikes on Ebey Island, where the US 2 Trestle is located. None of bridges are scour critical and the road is elevated. However, there are annual log jam issues behind the bridge. Logs from the Skykomish River and removal of them could cause disruption due to lane closures. See also the following map, Exhibit 4.4, US 2 Climate Impacts Vulnerability Assessment.

The CIVA report also notes that on SR 529 between MP 0.0 and 3.0 (I-5 to Port of Everett), there are city streets that can't handle large loads on trucks, limiting access to Naval Station Everett and the Port of Everett. The area from I-5 to Rucker Street is located on a plateau without streams or bridges. From Rucker to the RR bridge the report notes that the roadbed is sandy and would be affected by a four foot sea level rise. A six foot sea level rise would be considered high level impact.

Where US 2 meets I-5, approximately MP 194, the CIVA report notes that the I-5 vicinity is an area of high risk, due to low elevation. I-5 crosses the study area in a river delta with numerous diking districts. Tidal influence is present in conjunction with Union and Steamboat sloughs. Saturation of embankment has been noted. Also noted is the prediction that if the dikes were to rupture, there would be a major impact to I-5 in this area. The I-5 roadbed is good, but the security of bridge columns would be an issue. Scour to critical bridges noted at this location. I-5 Snohomish bridges are described as good, deep piers. Also noted is that Snohomish County is doing wetland mitigation bank on intertidal area and that aggradation is occurring at this location.

**Exhibit 4.4: US 2 Climate Impacts Vulnerability Assessment**



### c. Water

The study area is located in the flood plain of the Snohomish River. The US 2 Trestle crosses a designated 100-year floodplain. Located in Water Resource Inventory Area (WRIA) 7, there are high quality (likely Category I and II) wetlands in the study area, as well as numerous streams.

Floodplain - the US 2 Trestle crosses a designated 100-year floodplain.

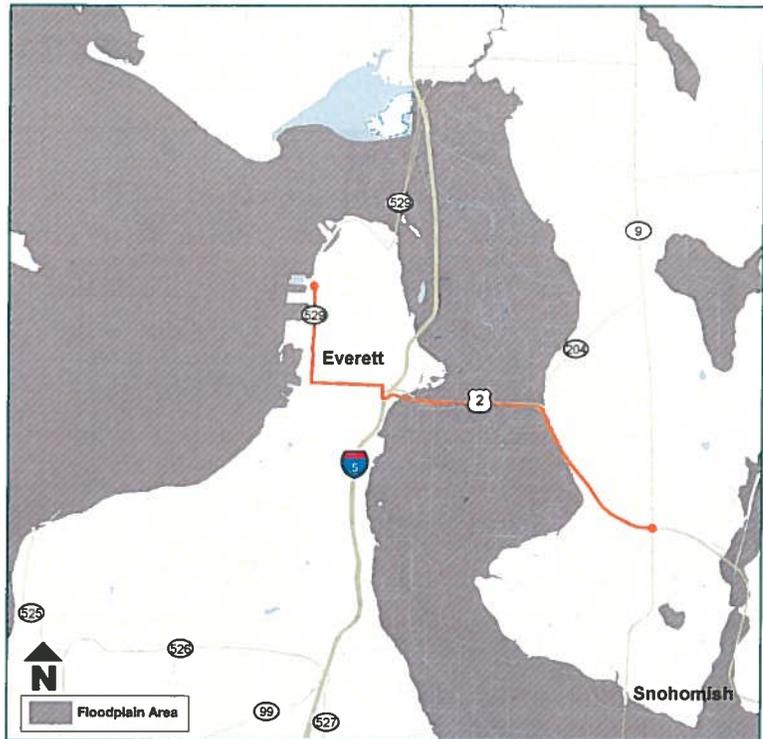
### d. Plants and animals

The Ebey Island area where the westbound trestle is located includes a complex of wetlands in an estuarine environment.

Prime habitat is commonly found adjacent to wetlands, and wetland areas can also support rare and endangered plant species communities. During project design more extensive environmental review will be needed to identify, avoid and minimize impacts to wetlands and to endangered and listed plant and animal species. Consultation may be required with state and federal agencies. For unavoidable impacts, mitigation may be necessary. The publication of the Department of Fish and Wildlife (WDFW) Wildlife Plan for Ebey Slough further details the environmental conditions in the area. The WDFW plan is available at the URL below:

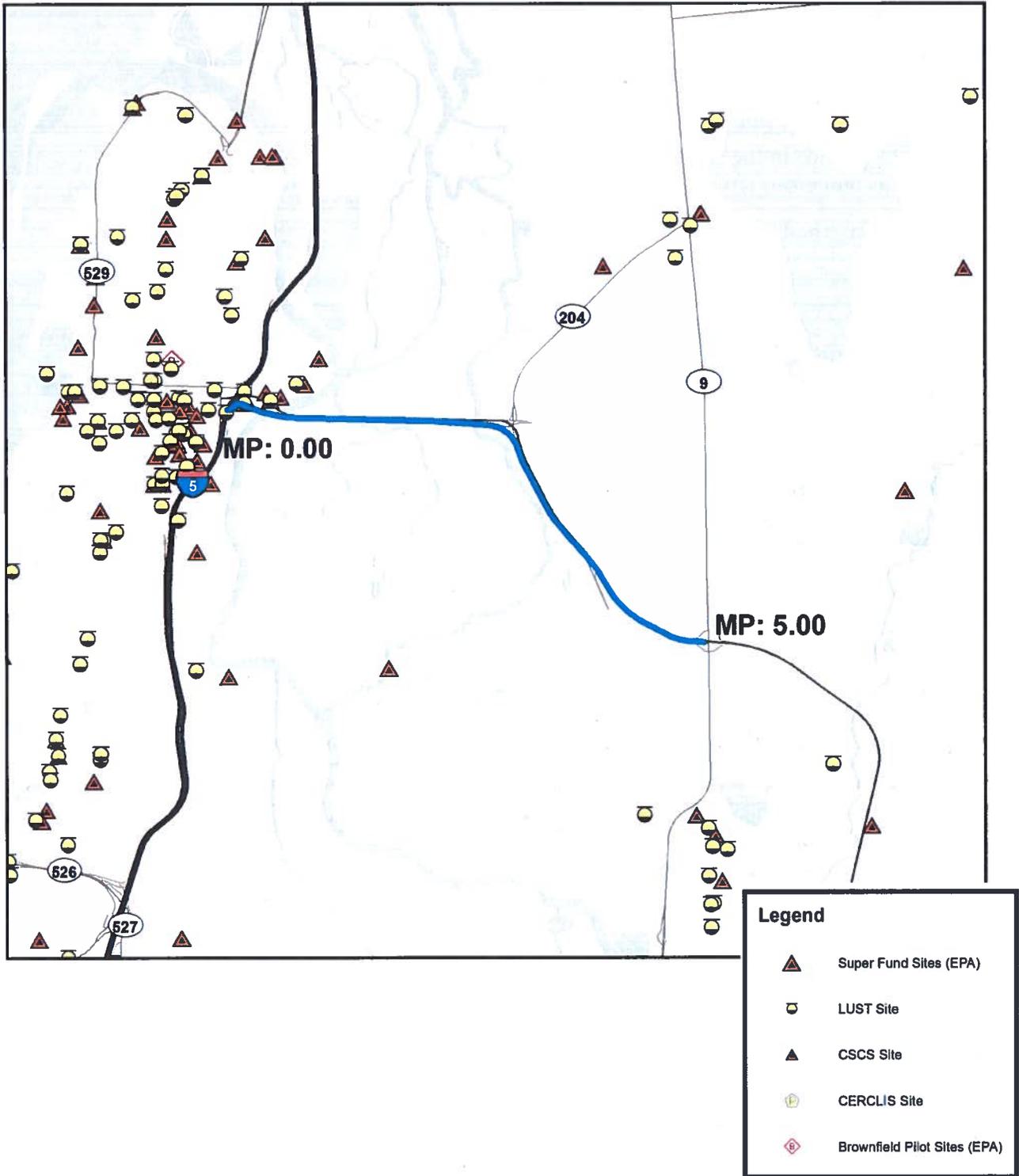
[http://wdfw.wa.gov/lands/wildlife\\_areas/snoqualmie/restoration\\_study.php](http://wdfw.wa.gov/lands/wildlife_areas/snoqualmie/restoration_study.php)

During the project design and environmental documentation phase, WSDOT engineering staff will work closely with the Northwest Region Environmental Office to determine if impacts to resources can be avoided. If not, then the appropriate measures need to be identified to minimize or mitigate the impacts.



*Floodplain of the Snohomish River and the project area*

**Exhibit 4.5: LUST and Toxic sites**  
US 2: Everett Port/Naval Station to SR 9 Corridor Planning  
Study Project Area



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## 2. Built Environment

### a. Environmental Health: Hazardous Materials

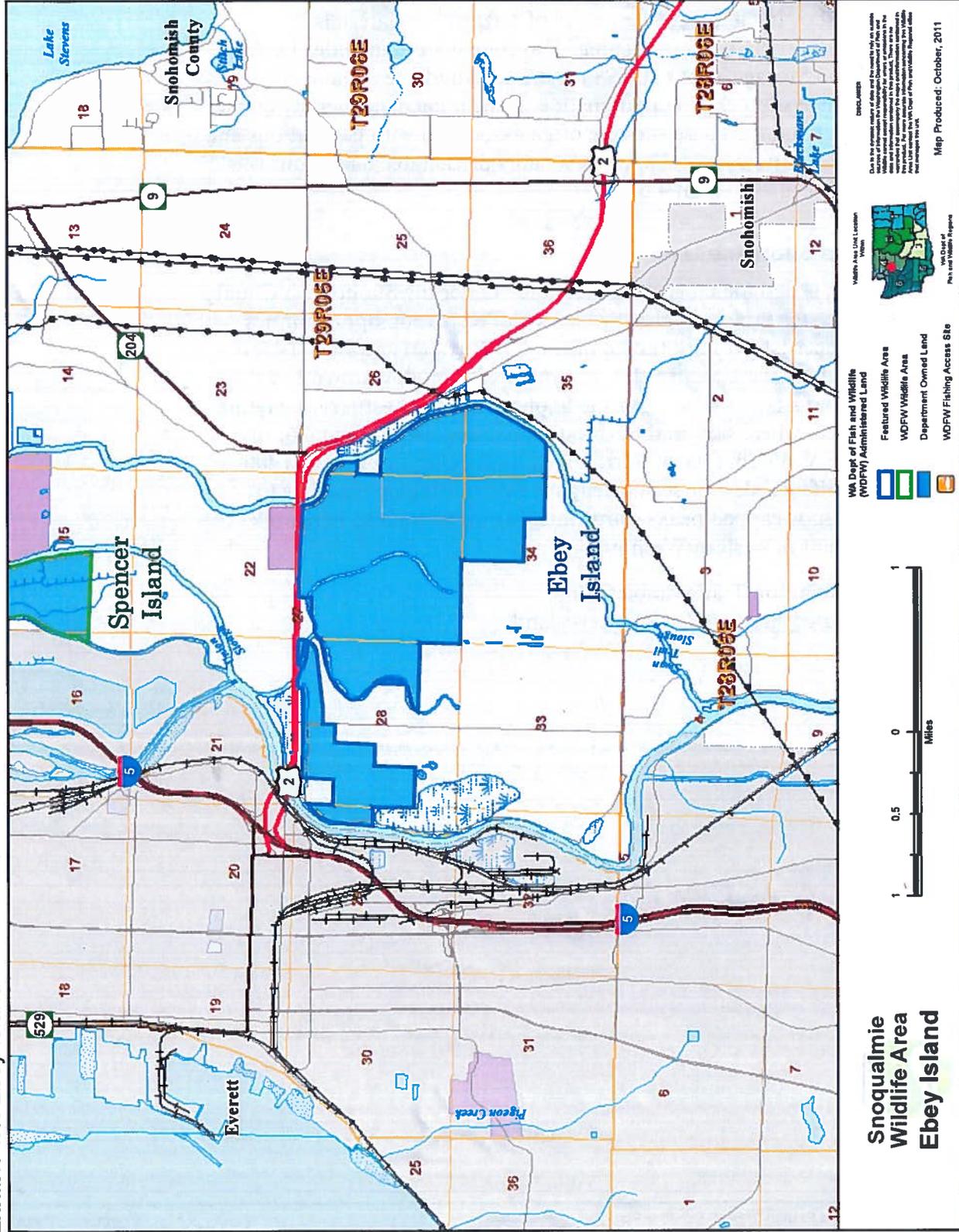
WSDOT reviewed GIS information sources from the Department of Ecology showing likely point sources of hazardous materials contamination in the US 2 study area. This information includes Leaking Underground Storage Tanks (LUST) and Superfund sites. There are several possible sources of contamination in the immediate vicinity of the I-5/US 2 interchange. These sites are often associated with gas stations and light industrial land uses and have reasonably predictable hazardous waste conditions. See also Exhibit 4.5.

### b. Land and Shoreline Use

Ebey Slough is designated rural conservancy under the Snohomish County Shoreline Master Program. Nearby parks and recreation opportunities include Spencer Island Park (north of the US 2 trestle) and Ebey Island Slough (south of the US 2 trestle). Just minutes from downtown Everett, Spencer Island sits in the heart of the Snohomish River estuary, a wildlife-rich ecosystem where salt- and freshwater mix. See also Exhibit 4.6, Ebey Island WDFW Wildlife Area. Surrounded by snaking sloughs, this 400-acre island offers a slew of scenic delights, from glistening mudflats to glimpses of snowcapped peaks. Bird-watching opportunities here rank among the best in western Washington.

Source: Washington Trails Association:  
[www.wta.org/go-hiking/hikes/spencer-island](http://www.wta.org/go-hiking/hikes/spencer-island)

**Exhibit 4.6: Ebey Island WDFW Wildlife Area**



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Chapter 5:

# Operations: Travel Demand Forecasts

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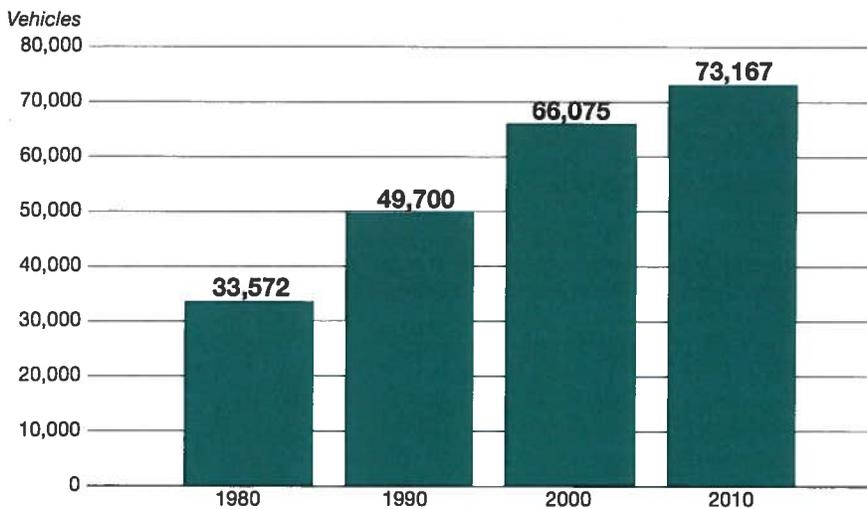
This section provides data about current and projected trip patterns and the results of the transportation modeling software that were used for this corridor study.

After reviewing the traffic characteristics of the study area, it was decided to focus on the major operational issues. Although SR 529 is in the study area, no operational issues were identified. Therefore, the key findings in this document concentrate on the current and projected congestion and operations that occur on:

- The westbound trestle in the morning peak hour
- US2/SR 204th/20th SE ramp/road
- US 2/I-5 ramps
- I-5/41st Street ramp and Marine View Drive  
I-5 between the 41st Street ramp and the Marine View Drive ramp is included to understand the operational relationship between US 2 and I-5.

The exhibit below provides the Annual Daily Volumes on the westbound and eastbound trestle between 1980 and 2010.

**Exhibit 5.1: US 2 Trestle Annual Daily Volumes (ADT)  
1980 – 2010 (westbound & eastbound)**



Data Source: WSDOT's Annual Traffic Reports 1980, 1990, 2000, 2010

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## Transportation Models

Two types of software models were used to help understand current and future trip demand, trip distribution and operations. The first step was to run the existing and future forecasts using the PSRC's Travel Demand Forecast model. In general, the model predicts travel demand for the corridor based on land use, population characteristics, employment, infrastructure, and multimodal alternatives.

The PRSC regional travel forecast model provides information about "demand" on the network in terms of:

- How many people want to travel at a given time;
- Where they want to travel;
- How they travel (bus vs. car);
- Which routes they will likely take; and
- Volumes, hours of delay, vehicle miles traveled, vehicle hours of travel and travel times/speeds.

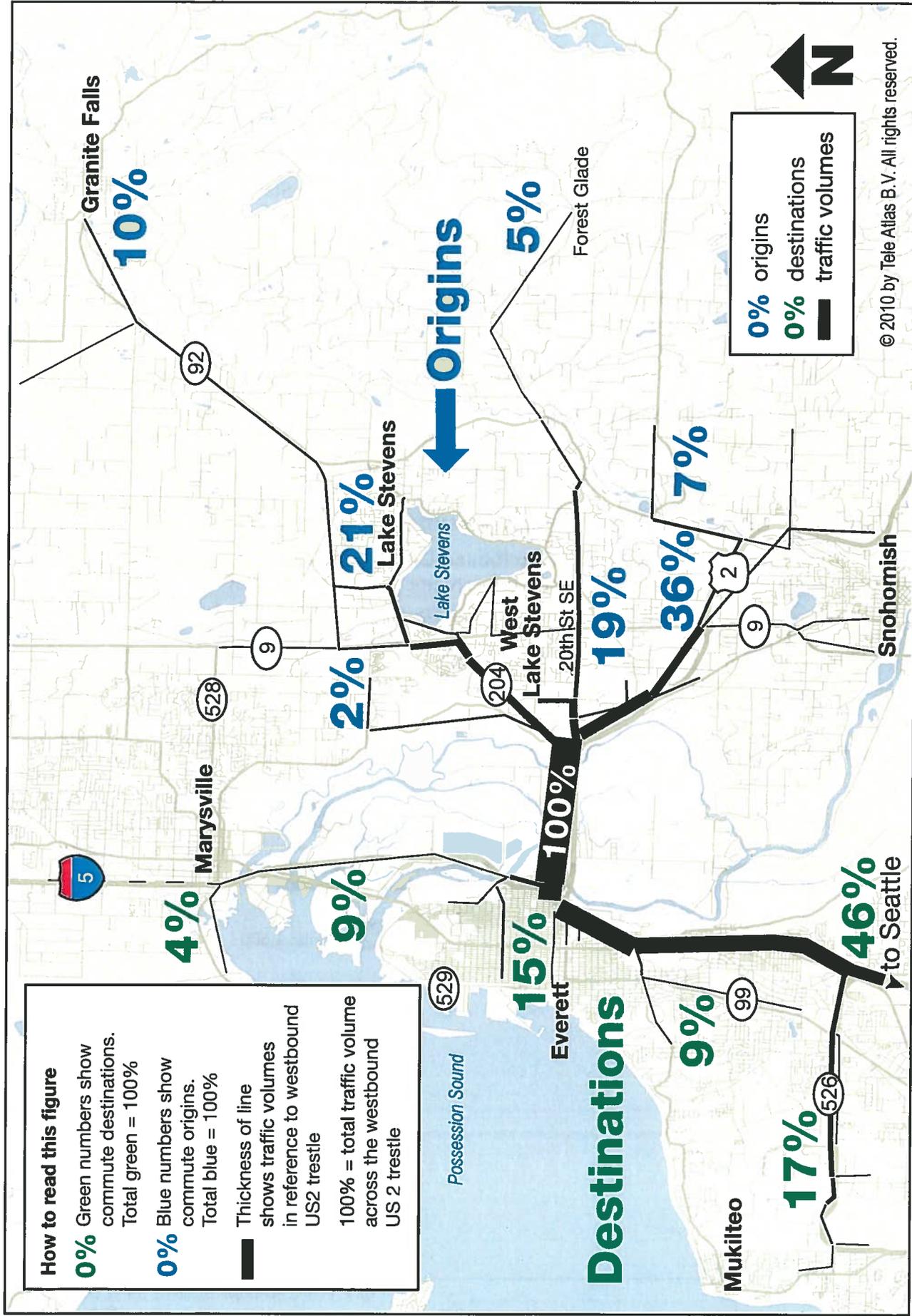
The results for the 2010, 2020 and 2040 travel demand forecast are presented in this chapter. The 2010 travel demand model was also used to produce an origins and destinations map that provides an indication of where people are traveling during the peak hour. See also Exhibit 5.2, Typical Trip Patterns on the following page.

The results of the PSRC's Travel Forecast Model were then used as inputs to a simulation model called VISSIM. The VISSIM traffic simulation model estimates how the facility will operate as measured by various performance indicators, such as:

- How many vehicles can pass a particular point of a facility for a given duration;
- Traffic queuing length;
- Traffic merge & diverge;
- Intersection delays;
- Speed;
- Traffic route diversion.

The VISSIM results for 2010 are presented in this chapter and the results for the 2020 and 2040 are presented in Chapter 6.

Exhibit 5.2: 2010 Typical Trip Patterns



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## Model Inputs

A corridor plan requires reasonable estimates of current and future operating conditions to identify the causes of operational issues and the effects of proposed improvements. In the spring of 2010, existing traffic data was collected from WSDOT, Snohomish County, and the cities of Lake Stevens and Snohomish. In addition, traffic counts were also collected for 29 intersections along 20th Street SE, SR 204 and US 2 between SR 9 and the trestle. The traffic information was used as input for both the Puget Sound Regional Travel Forecast model and the VISSIM simulation model. The travel forecast model was used to determine demand produced by population and employment in the study area. The simulation model was used to determine how specific facilities in the study area operated.

The simulation model was run for 2 hours for each peak period, to include 30 minutes on both sides of the peak hour. The a.m. peak hour is 6 a.m. to 7 a.m., and the p.m. peak hour is 4 p.m. to 5 p.m.

### 2010 US 2 Trestle Westbound A.M. Volumes

The 2010 AM peak hour volume on the westbound US 2 trestle is 3,640 vehicles. See the graphic below for actual traffic counts. Today's volume on SR 204 is 1,210 trips; 20th Street SE adds 930 vehicles, resulting in a total of 2,140 trips merging into one lane. US 2 traffic adds another 1,500 vehicles for a total volume of 3,640 that cross the westbound trestle during the a.m. peak hour.

**Exhibit 5.3: US 2 Traffic Counts Westbound**



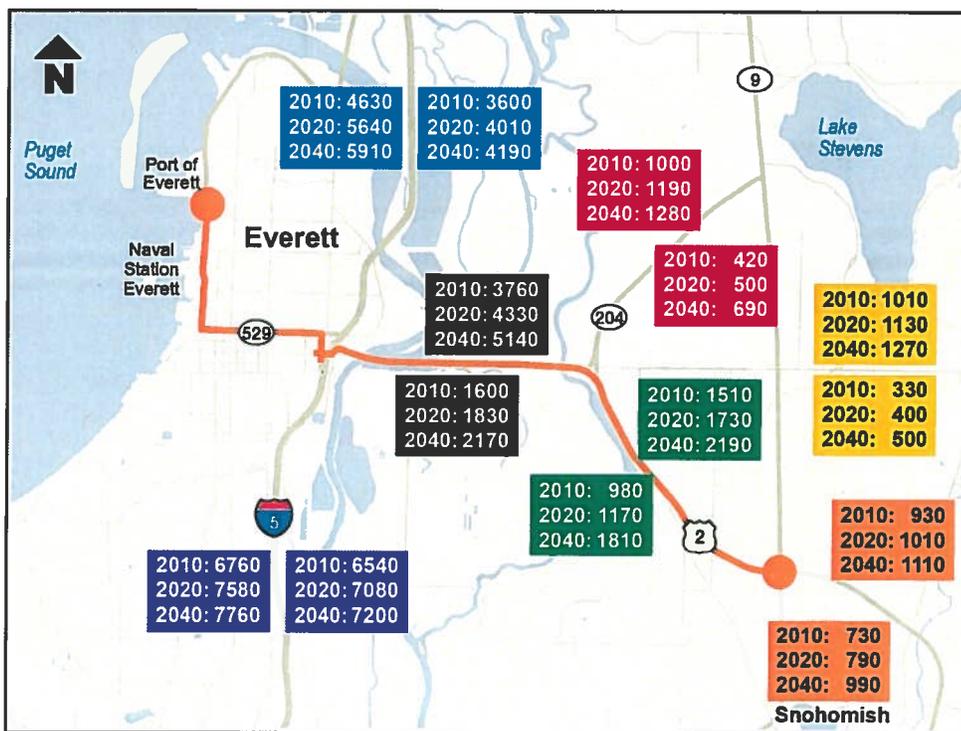
## Baseline A.M. Peak Hour Travel Demand Forecasts

Performance criteria used in this analysis include: delay, travel time, and LOS (delay for intersections, travel time and LOS for freeway segments).

In the a.m. Peak Hour (6 -7 a.m.), westbound demand for US 2 is already at or above capacity of the facility and its interchanges with I-5 and SR 204. Without improvements to US 2, the westbound direction will continue to operate in over-capacity conditions. Exhibit 5.4 highlights the a.m. Peak Hour demand in 2010, 2020, and 2040 for key mainline locations in the study area. A few key points about the forecast include:

1. WB US 2 is over capacity today and would be more so in the future. Approximately 3,800 vehicles per hour can cross the westbound trestle today and by 2020 the peak hour demand is estimated to be greater than 4,300. When peak demand is greater than capacity, then peak traffic spreads to other times of day.
2. SB I-5 south of 41st Street still shows some excess capacity as a result of the recently constructed HOV extension project on I-5 to US 2.
3. US 2 near Bickford Avenue would have significantly more traffic by 2040, but the improvements at Bickford Avenue and US 2 that are currently planned should be able to meet the future demand of the facility.
4. SB SR 204 traffic volumes are high enough in the future to cause further congestion issues at the SR 204/20th Street/US 2 interchange.

**Exhibit 5.4: A.M. Peak Hour Baseline Forecasts**



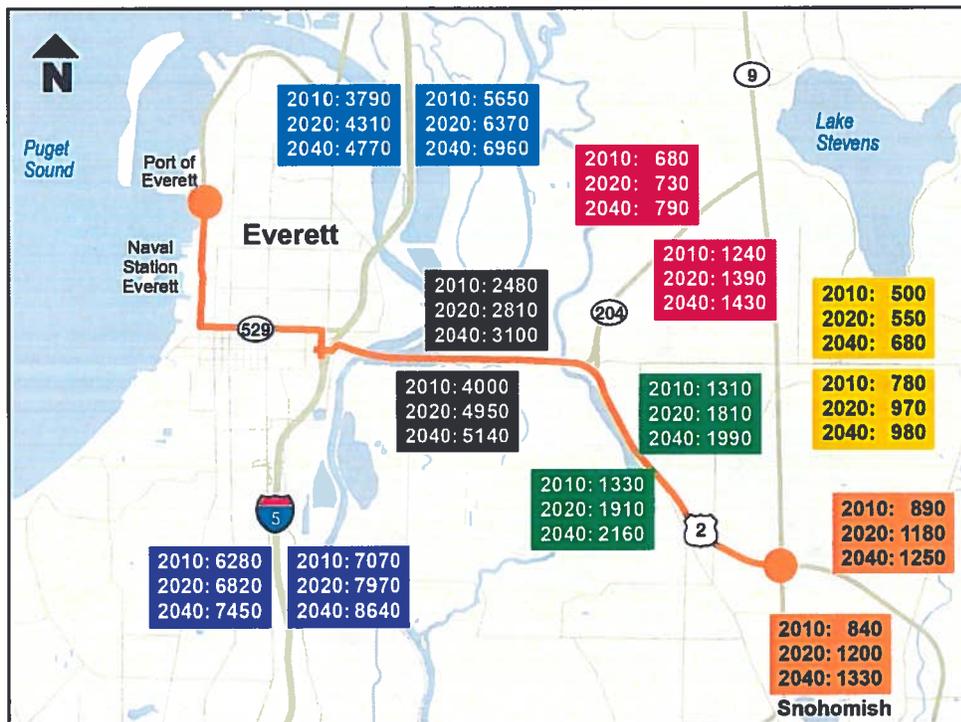
## Baseline P.M. Peak Hour Travel Demand Forecasts

In the p.m. Peak Hour (4 - 5 p.m.), eastbound demand for US 2 is already served through the use of the two mainline lanes and the use of the shoulder in the p.m. Peak period. Even with future growth on US 2, the eastbound direction will continue to operate below capacity conditions in 2040 as long as the shoulder lane remains available for use.

Exhibit 5.5 highlights the p.m. Peak Hour demand in 2010, 2020, and 2040 for key mainline locations in the study area. A few key points about the forecast include:

1. With the use of the eastbound shoulder, US 2 demand can be served with the existing infrastructure.
2. US 2 near Bickford Avenue would have significantly more traffic by 2040, but the improvements at Bickford Avenue and US 2 that are currently planned should be able to meet the future demand of the facility.
3. NB I-5 south of US 2 would likely exceed the capacity of the recently constructed HOV lane by 2040.

**Exhibit 5.5: P.M. Peak Hour Baseline Forecasts**



## Build: New Three Lane Westbound Trestle

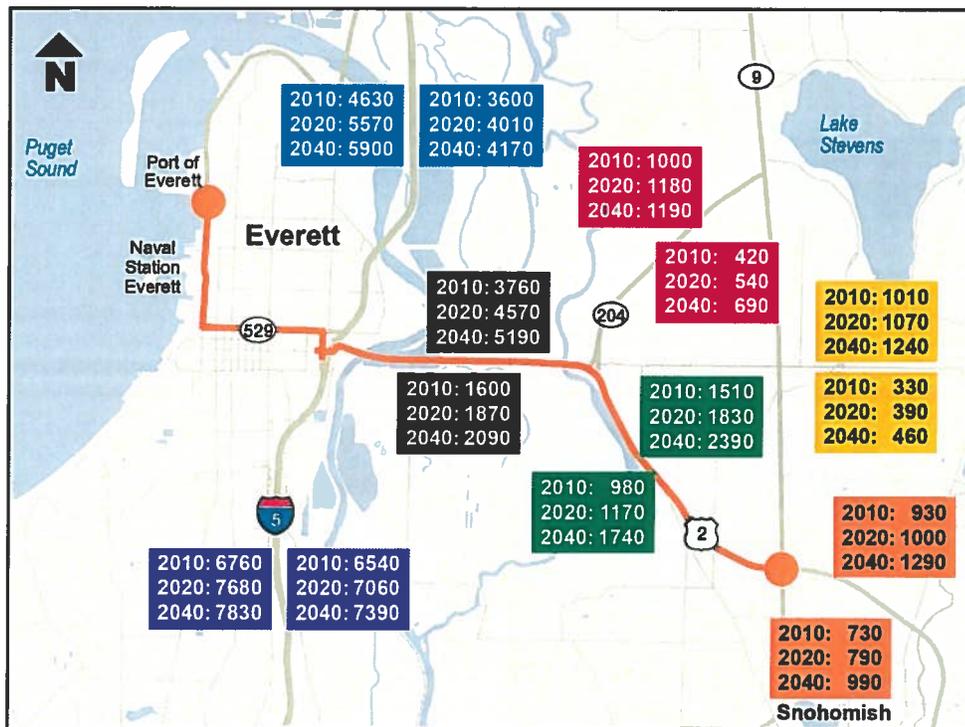
### A.M. Peak Hour Travel Demand Forecasts

With three lanes in each direction, the trestle could move approximately 6,000 vehicles per hour per direction. A third lane should be adequate to handle the forecasted growth in 2040.

Exhibit 5.6 highlights the a.m. Peak Hour demand in 2010, 2020, and 2040 for key mainline locations in the study area. A few key points about the forecast include:

1. SB I-5 south of 41st Street still shows some excess capacity as a result of the recently constructed HOV extension project on I-5 to US 2.
2. US 2 near Bickford Avenue would have significantly more traffic by 2040, but the improvements at Bickford Avenue and US 2 that are currently planned should be able to meet the future demand of the facility.
3. A third lane on US 2 westbound should allow SR 204, 20th Street, and US 2 to have their own lanes at the US 2/SR 204 interchange and allow smoother flow in the interchange area.

**Exhibit 5.6: A.M. Peak Hour Build Forecasts**



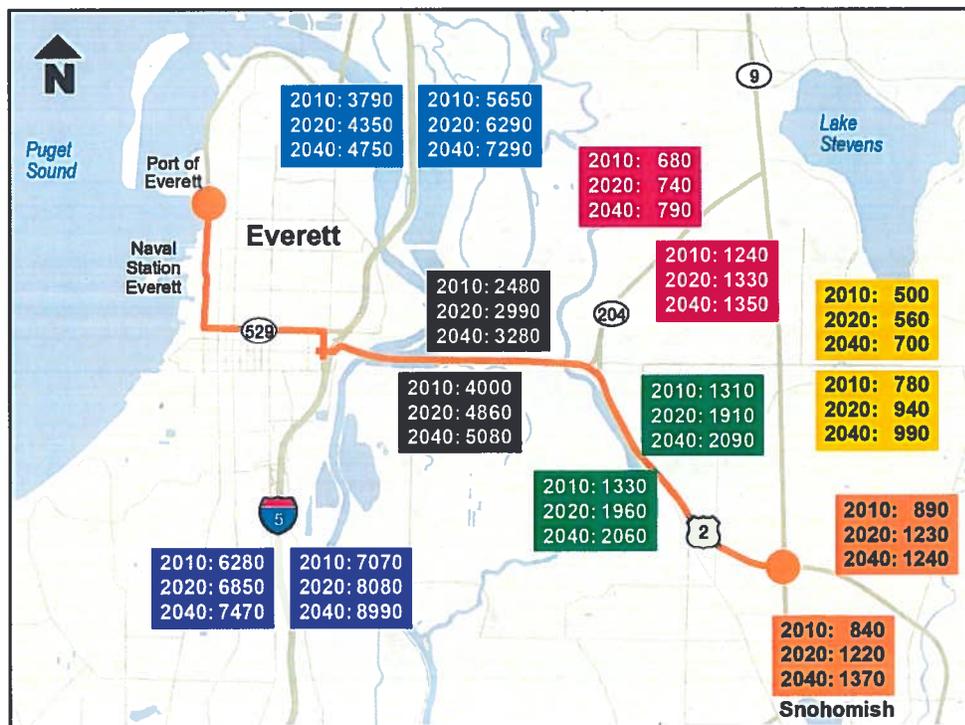
### P.M. Peak Hour Travel Demand Forecasts

In the p.m. Peak Hour, eastbound demand for US 2 is already served through the use of the two mainline lanes and the use of the shoulder in the p.m. Peak period. Even with future growth on US 2, the eastbound direction will continue to operate below capacity conditions in 2040 as long as the shoulder lane remains available for use. For this analysis, we assumed that the third eastbound lane via the shoulder would be open for use whenever traffic demand called for it.

Exhibit 5.7 highlights the p.m. Peak Hour demand in 2010, 2020, and 2040 for key mainline locations in the study area. A few key points about the forecast include:

1. With the use of the eastbound shoulder, US 2 demand can be served with the existing infrastructure.
2. US 2 near Bickford Avenue would have significantly more traffic by 2040, but the improvements at Bickford Avenue and US 2 that are currently planned should be able to meet the future demand of the facility.
3. NB I-5 south of US 2 would likely exceed the capacity of the recently constructed HOV lane by 2040.

**Exhibit 5.7: P.M. Peak Hour Build Forecasts**



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## **VISSIM Simulation Results of the 2010 Condition Analysis**

Below are the results for the 2010 conditions of freeway operations simulation model that reflect the impacts of merging, weaving, and queuing on the study area roadways. A description of the operational conditions depicting 2010 traffic conditions is provided below.

Freeway Level of Service (LOS) was determined by the density of traffic based on the passenger cars per lane per mile.

### **A.M. Peak Hour Analysis**

#### **A.M. Peak Direction**

##### **US 2 westbound a.m. peak hour analysis**

US 2 westbound traffic flows smoothly from SR 9 to the SR 204/20th Street merge point during the a.m. peak hour. However, congestion occurs west of where SR 204 and 20th Street SE traffic merges into one lane. Congestion is compounded where US 2 traffic joins and the westbound trestle becomes two lanes.

Average vehicle operating speeds decrease approaching I-5 because traffic from SR 204 and 20th Street SE, changes lanes to go to either Everett or southbound I-5, and because of US 2 traffic going to northbound I-5. The merge at the west end of US 2 is complicated by the Everett / I-5 SB on-ramp traffic.

##### **SR 204 southbound a.m. peak hour analysis**

The SR 204 traffic yields at the merge with 20th Street traffic, causing queues of 2,300 feet on SR 204 and extending to the Market Place intersection. In addition, Sunnyside Boulevard SE has a very long queue at SR 204 because of the stop sign at the SR 204 intersection.

##### **20th Street SE westbound a.m. peak hour analysis**

Three intersections on 20th Street SE at SR 9, 99th Avenue and Lake Stevens Road operate at LOS E. As a result, minor queues build along 20th Street SE due to the SR 204 merge. It should be noted that construction was underway to expand 20th Street to a 4/5 lane configuration between east of S Lake Stevens Road to 91st Avenue SE during the beginning of this study.

##### **I-5 southbound a.m. peak hour analysis**

Heavy flows occur in the a.m. peak period, but I-5 flows well on an average day. There are no noticeable delays due to weaving or merging in the study area.



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## **Off Peak Direction**

### **US 2 (I-5 to SR 9) eastbound a.m. peak hour analysis**

There are no congestion issues in this segment.

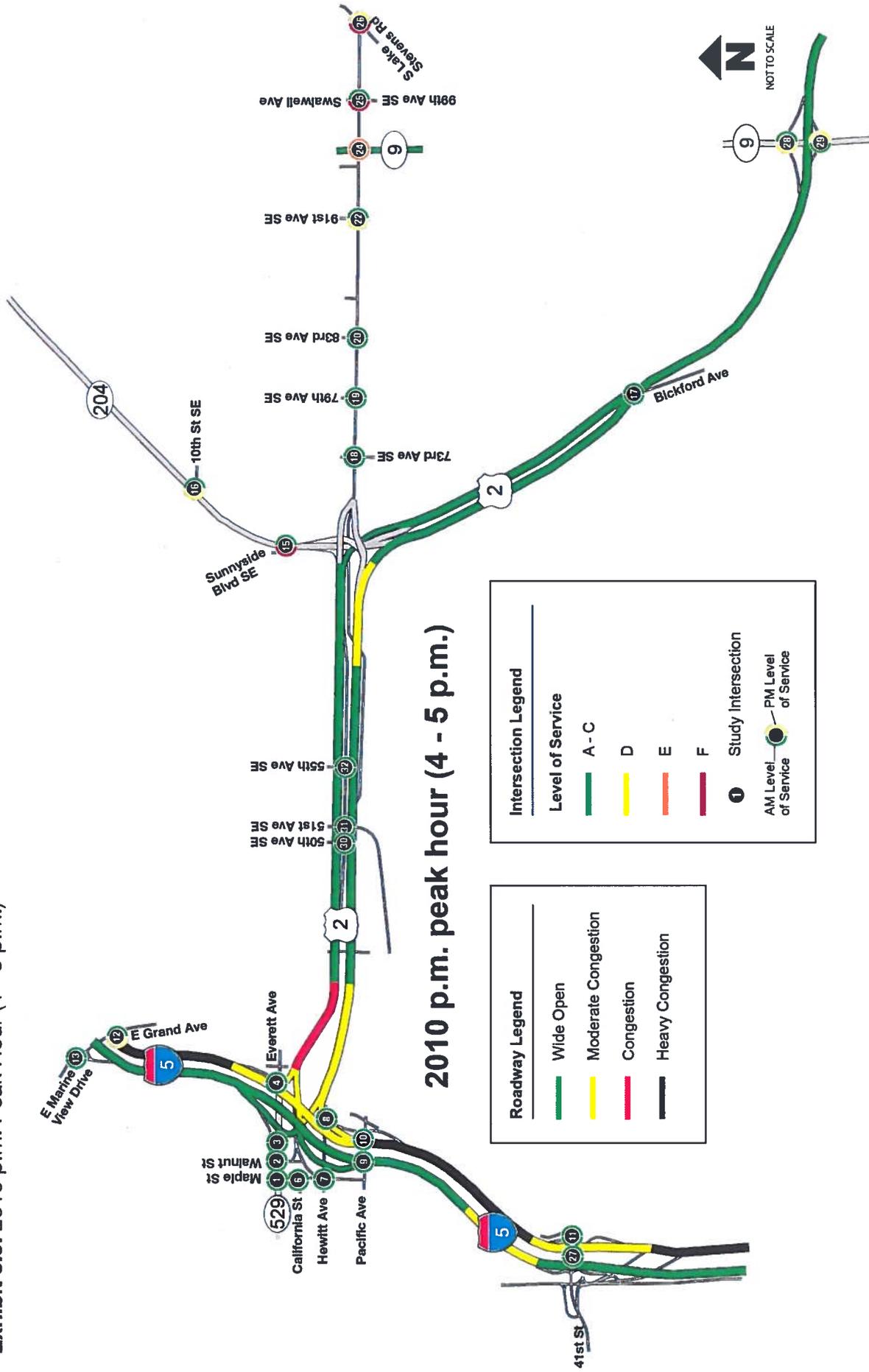
### **20th Street eastbound a.m. peak hour analysis**

There are no queuing issues in this segment.

### **I-5 northbound a.m. peak hour analysis**

Traffic is free flowing between 41st Street interchange to Marine View Drive.

**Exhibit 5.9: 2010 p.m. Peak Hour (4 - 5 p.m.)**



## Peak Direction

### P.M. peak hour analysis results:

#### US 2 (I-5 to SR 9) eastbound

There are minimal operational problems on the eastbound trestle because of the 'hard shoulder' running in the p.m. peak period from 4 p.m. to 7 p.m.

#### I-5 northbound p.m. peak hour analysis

There is a long queue on northbound I-5 between the 41st Street on-ramp and the US 2 eastbound exit. This queue is aggravated by the Pacific Avenue exit, which is located immediately before the US 2 exit (see Exhibit 5.10 below). Most of the traffic taking the Pacific Avenue exit uses the second right lane and tries to exit to Pacific Avenue Exit at the last minute. As a result, the second lane backs up Pacific Avenue exit and causes considerable weaving. The on-ramp traffic from 41st Street traveling beyond north must weave to avoid the queues in the right two lanes. Given the heavy traffic on I-5 northbound, this merge aggravates and slows down the traffic along the entire stretch of northbound I-5.

### Exhibit 5.10: Closely spaced Pacific Avenue and US 2 exits



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## **Off Peak Direction**

### **US 2 westbound p.m. peak hour analysis**

There are no problems on the westbound US 2 trestle at the east end. However, northbound I-5 congestion impacts the westbound US 2 operations during the p.m. peak hour.

Queues form on northbound I-5 where westbound US 2 merges with traffic from the Everett Avenue ramp, and then merges onto I-5. On an average day, the traffic is slower on I-5 because of loss of one lane at Marine View drive. This causes backups on I-5 northbound. The resulting congestion impacts the vehicles coming from the westbound US 2/ Everett Avenue ramps, and cause backups onto the ramp. At times, this queue extends onto the westbound US 2 right hand lane.

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Chapter 6:

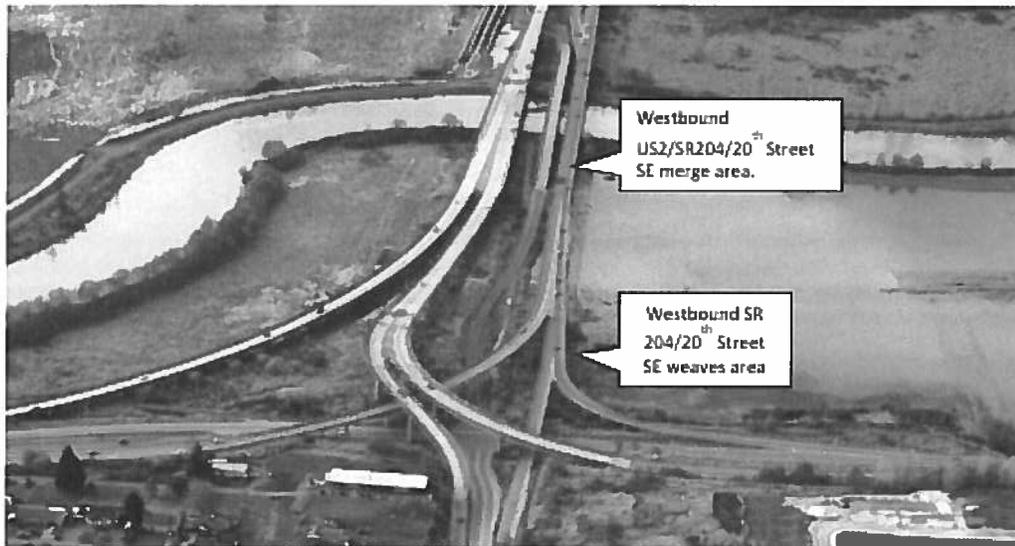
## Near and Long Term Improvements, Considered and Recommended

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This section describes the results of transportation software models used to simulate traffic operations to help identify and evaluate transportation improvements considered in this study. Planning level cost estimates, and benefit/cost ratios for the mobility concepts are also provided. The Benefit/Cost analysis was conducted (per RCW 47.06.130) to identify mobility projects in the state of Washington that provide the maximum value and justify program tradeoffs.

### What traffic issues were considered?

The average speed on the westbound trestle is 30 – 40 mph between 5:30 and 7:30 in the morning reflecting Boeing's early shifts at the Everett assembly plant. Reoccurring congestion occurs in two areas on the westbound trestle; the east end of the trestle where three facilities (SR 204, 20th Street SE & US 2) merge onto the two lane trestle, and at the west end of the trestle where it connects to I-5 and Everett.



*SR 204/20th/US 2 interchange area*

Traffic backs up on to the westbound trestle from the one-lane ramp connections to I-5 and the ramps to downtown Everett. The northbound I-5 on-ramp from US 2 is located about 350 feet from the Marine View Drive off-ramp; this causes traffic to slow down on I-5 as vehicles change lanes and to exit I-5. As a result, traffic backs up on the US 2 off-ramp and trestle today and in the model simulated future.



*I-5/US 2 interchange area*

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## Applying Moving Washington principles and building on existing investments

The improvements considered for this study applied the Moving Washington principles and built on existing programs, infrastructure, and traffic management systems. See Chapter 2 for description of existing programs, infrastructure and traffic management systems.



## Improvements Evaluated

For this corridor study, improvements were packaged, analyzed and evaluated to determine the most cost-effective near-term and long-term approaches to addressing safety and congestion issues.

The year 2020 was used as the analysis year for the near term, lower cost and easier to implement improvements. The year 2040 was used as the analysis year for the long range improvement of replacing the existing two lane westbound trestle with a three lane structure.

A VISSIM simulation model was used to identify and evaluate traffic operations of the improvements. The simulation model analyzed two hours during the morning and afternoon peak periods in order to capture traffic operations 30 minutes before and after the peak hour. The a.m. and p.m. peak hour results were used for the performance measures. Performance measure criteria included: delay, travel time, and Level Of Service (LOS).

## 1. ITS and Local Projects Package

The ITS Package consisted of relatively low cost and easy to implement strategies. The package emphasized ITS but also included other improvements such as the following:

1. US 2: Hard Shoulder Running on the eastbound trestle during the a.m. and p.m. peak periods. Currently the Hard Shoulder Running operates on east bound trestle from 3:00 p.m. to 7:00 p.m. Monday – Friday;
2. I-5: US 2 to SR 528 – HOV/ HOT lanes (unfunded WSDOT project);
3. 20th Street SE improvements (Lake Stevens project):
  - Five lane configuration between 91st Street and SR 204 Interchange;
  - 20th Street SE: westbound a.m. peak only; with and without the Business Access & Transit (BAT) lane
4. 20th Street SE to Ebey Island westbound bypass for transit/HOV2+ (see description of Ebey Island Bypass improvement below).

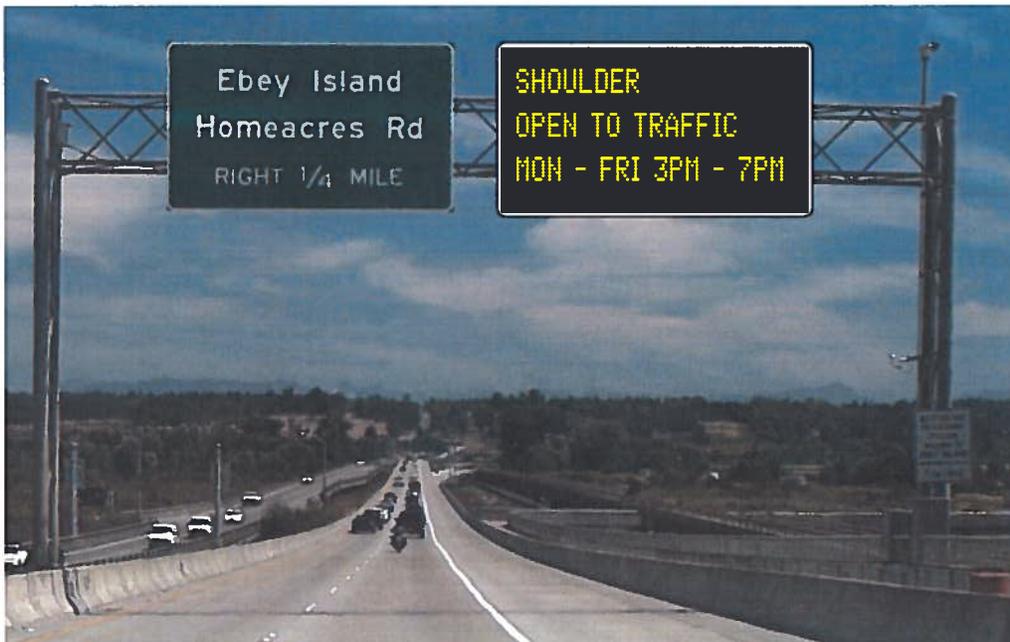
**Planning Level Cost Estimate:** \$3.1 million (in 2011\$)

A **BAT Lane** is a lane located on an arterial that is for transit/HOV 2+ and vehicles accessing businesses. BAT lanes typically operate during peak hours.

### Hard Shoulder Running

Hard Shoulder Running refers to the use of highway shoulder areas for peak use travel. Hard shoulder running is an active traffic management strategy that promotes smoother traffic flow, eases congestion and optimizes use of existing facilities.

Cars are allowed to use the shoulder as they would a normal lane during morning and evening rush hours. Special signage displaying variable speed limits often accompanies hard shoulder running implementation.



*Simulation of ITS and hard running shoulders on US 2*

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## **What is ITS?**

Intelligent Transportation Systems (ITS) are the application of computers, communications and sensor technology to surface transportation. Most transportation agencies began using technology to manage transportation problems long before the term ITS became popular. Many of these efforts were directed towards the relief of urban congestion. Freeway management systems and coordinated traffic signal systems were installed to improve the efficiency of urban freeways and arterial roadways. WSDOT was an early proponent of ITS particularly in the Seattle area, where it was, and continues to be, prohibitively expensive to add freeway lanes. Instead, WSDOT used freeway management techniques like ramp metering and operational strategies like High Occupancy Vehicle (HOV) lanes to try to squeeze the maximum efficiency from the freeway system.

Intelligent Transportation Systems, or ITS, improve transportation safety and mobility and enhance productivity through the use of advanced communications technologies and the integration of advanced communications technologies into the transportation infrastructure and vehicles. Intelligent transportation systems encompass a broad range of wireless and wire line communications-based information and electronics technologies.

ITS includes improvements such as radio, microwave, and fiber optics for communications; closed-circuit television to help detect congestion and accidents and be aware of traffic and road conditions; variable message signs used to provide motorists with important information; highway advisory radio to provide alerts and general information regarding traffic and travel; road/weather information systems to provide weather and road surface conditions; ramp meters to control the flow of vehicles entering the freeway mainline; traffic detectors to monitor operations and provide traffic conditions to the web and the WSDOT 511 traffic information hotline; and regional Traffic Management Centers, which are the nerve centers for WSDOT's operations activities.

[www.wsdot.wa.gov/operations/its](http://www.wsdot.wa.gov/operations/its)

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## Simulation Results of the ITS Package

### A.M. peak hour analysis in 2020

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#### US 2 westbound

The analysis showed that travel speed would remain at approximately 30 mph.

#### SR 204 southbound

The southbound SR 204 merge with 20th Street SE traffic causes queues of nearly two miles long on SR 204 and extending to SR 9. Sunnyside Boulevard SE also queues because of the stop sign and minimal available gaps at the Sunnyside/SR 204 intersection.

#### 20th Street SE westbound

20th Street SE was assumed to have two westbound general purpose lanes in 2020 as planned by Lake Stevens. Even with this widening, westbound 20th Street SE would have a queue extending 2,400 feet to 91st Avenue SE in the a.m. peak hour.

#### I-5 southbound

There is congestion during the a.m. peak periods, but the traffic flows well in the non-peak hours. No noticeable delays were evident because of US 2 traffic merging onto I-5.

#### US 2 eastbound

US 2 eastbound traffic is free-flowing.

### What is Level-of-Service?

Level-of-Service ratings, which range from A to F, indicate how well traffic functions on a given roadway or intersection.

- A: Free flow, low traffic volumes, no delays.
- B: Stable traffic flow, restricted speeds, minor delays.
- C: Stable traffic flow, speeds and maneuverability limited by higher volumes of traffic.
- D: Unstable traffic flow, low speeds, noticeable delay, traffic volumes near capacity.
- E: Unstable traffic flow, low speeds with "stop and go" traffic, considerable delay, traffic volumes at capacity.
- F: Forced traffic flow, very low speeds, traffic volumes exceed capacity, long delays.

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## P.M. peak hour analysis

### US 2 eastbound

Traffic is nearly free flowing because of the extended hours of operation of the Hard Shoulder Running.

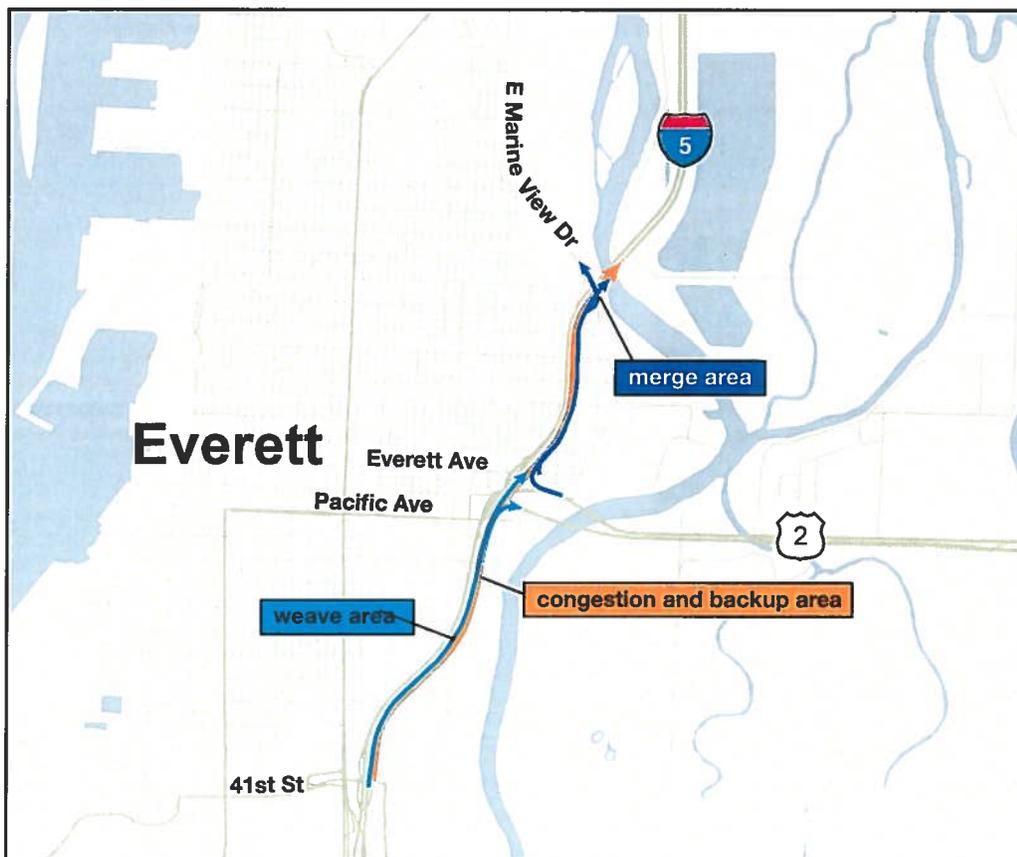
### US 2 westbound

Westbound US 2 operates close to free flow on the trestle although there would be some slowdowns approaching I-5.

### I-5 northbound

The right two lanes would back up on northbound I-5, between the 41st Street interchange and the Marine View Drive exit. The adjacent lanes would be congested because of higher volumes and the merge between the 41st street on-ramp traffic and the traffic exiting to Pacific Avenue and US 2.

The analysis also showed congestion on the I-5 segment between the US 2 off-ramp to northbound I-5 and the Marine View Drive off-ramp because of reduction of a lane, and the merging of on-ramp traffic from US 2 and Everett Avenue, as well as the traffic exiting at Marine View Drive.



**Exhibit 6.1:** US 2 peak hour

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## 2. Ramp Metering (SR 204 & 20th Street SE westbound on-ramps)

Traffic and constructability analyses were completed to determine if metering the SR 204 and 20th Street SE westbound on-ramps would improve traffic flow and be feasible to construct.

The results indicated that although there would be operational benefits to metering the SR 204 and 20th Street SE westbound on-ramps, construction costs and challenges outweigh the benefit.

The current and projected volumes on the SR 204 and 20th Street SE on-ramps would require two metered lanes. Providing additional width for a second metered lane on SR 204 would require a wall between a wetland and a steep hill. Also, the 20th Street SE on-ramp starts on a downhill grade for a short distance located between 20th Street SE and a steep hill. The short ramp meter lane would cause queuing on 20th Street SE.

**Planning Level Cost Estimate:** Meters & Electrical: \$400,000 (in 2011\$)

Does not include cost for a wall or a second lane.

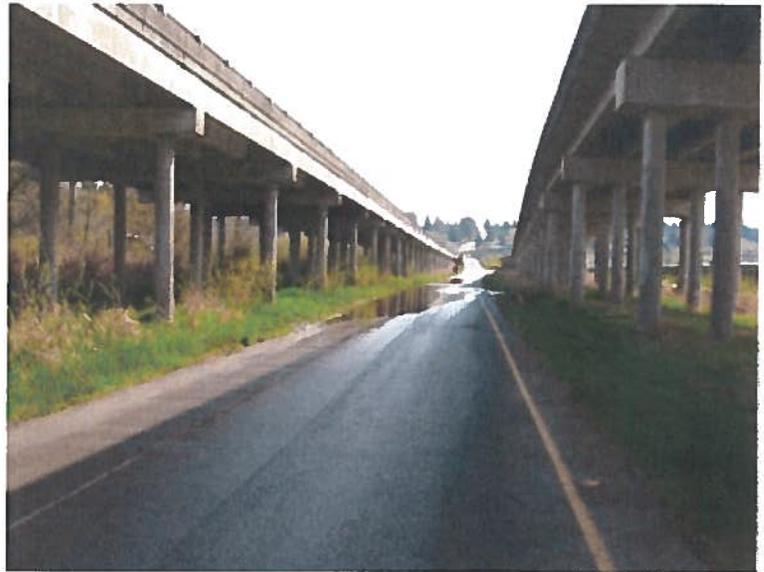


**Exhibit 6.2:** Ramp metering

### 3. Ebey Island Bypass Options

#### Description

WSDOT and the CWG explored the possibility of using the roadway under the trestle as a bypass for westbound 20th Street SE traffic as an option to avoid the congestion caused by the merge of westbound SR 204 and 20th Street SE traffic. Two model runs of the bypass concept were conducted; one assumed that westbound 20th Street SE transit/HOV 2+ traffic could use the bypass, and the second model run assumed that the bypass would be available for all westbound 20th Street SE traffic. In both model runs, bypass traffic would get onto the trestle using the 51st Avenue SE on-ramp located on the left side of the trestle approximately 4,600 feet from I-5.



*Roadway under the trestle*

Modifications to the existing network assumed in the model include the following:

- Reconfiguration of the west leg of the SR 204/20th Street SE intersection to operate in the westbound direction only (currently runs east and west);
- The speed limit on the westbound 20th Street SE on Ebey Island would increase to from 25 mph to 30 mph.

**Cost Estimate:** \$11 million (in 2011\$)

*Note: Because there are numerous wetlands next to the lower roadway, the soil is saturated and water often ponds on the existing road. If this option is pursued, the lower roadway would have to be rebuilt on fill. The cost estimate does not include any modifications to the US 2/51st Avenue SE on-ramp.*

**Benefit Cost Ratio:** .67

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### **Transit/2+ HOV Ebey Island Bypass 2020 Model Results**

The initial simulation model run assumed the construction of the Lake Stevens 20th Street Corridor Project and that the roadway under the trestle would be converted into a westbound bypass for transit and 2+ HOV.

The results showed that in 2020 the demand from westbound 20th Street SE during the a.m. peak hour is about 1,125 vehicles of which roughly 15% (170 - 200 vehicles) are 2+ HOVs. Almost all HOVs would stay on the trestle instead of using the Ebey Island Bypass. The westbound BAT lane on 20th Street SE would increase delay for general traffic approaching the trestle resulting in a 1.5 mile long queue extending past SR 9.

### **General Purpose Traffic Ebey Island Bypass 2020 Model Results**

An additional VISSIM simulation model run was conducted that removed the transit/2+ requirement on 20th Street SE, so that all westbound 20th Street SE vehicles have the opportunity to use the Ebey Island Bypass. The simulation results showed that:

- 375 westbound vehicles (33% of the westbound traffic) from 20th Street SE would use the Ebey Island roadway bypass.
- Speeds on the westbound trestle decreased to 21 mph from 32 mph because of the 20th Street SE bypass traffic merge from the 51st Avenue SE on-ramp from Ebey Island on-ramp.
- The 20th Street SE queue would decrease to 300 feet.
- An additional 100 vehicles from SR 204 would be served because of the reduced merge from 20th Street SE.

This scenario was not recommended because the merge at the 51st Avenue SE on-ramp decreased speeds on the trestle from 32 mph to 21 mph.

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#### **4. Long Range Strategic Capacity Improvement Concept**

WSDOT, with input from the Corridor Work Group, identified a concept to replace the westbound US 2 trestle in order to analyze future traffic operations and to produce an order of magnitude cost estimate. Given that projects of this magnitude are often constructed in phases, WSDOT, with input from the Corridor Planning Group, identified potential construction phases and produced planning level cost estimates. The final configuration of the trestle replacement would be determined during the design and environmental process where the project details, including possible construction phasing and mitigation strategies would be developed.

##### **New Three Lane Westbound Trestle (SR 204/20th Street SE to I-5)**

Based on the travel demand model forecasts and operational issues, it was assumed that the new trestle would have three lanes. Each facility that ties into the trestle (SR 204, 20th Street SE and US 2), would have its own dedicated approach lane to address the merge issue that occurs on both ends of the trestle.

It should be noted that the model also included the following unfunded improvements:

- a new 41st Street northbound braided ramp to I-5 to address the projected weaving issue
- a northbound auxiliary lane between US 2 and Pacific Avenue ramps
- the extension of the I-5 HOV lane, possibly as a northbound Hard Shoulder Running lane to SR 528 in Marysville

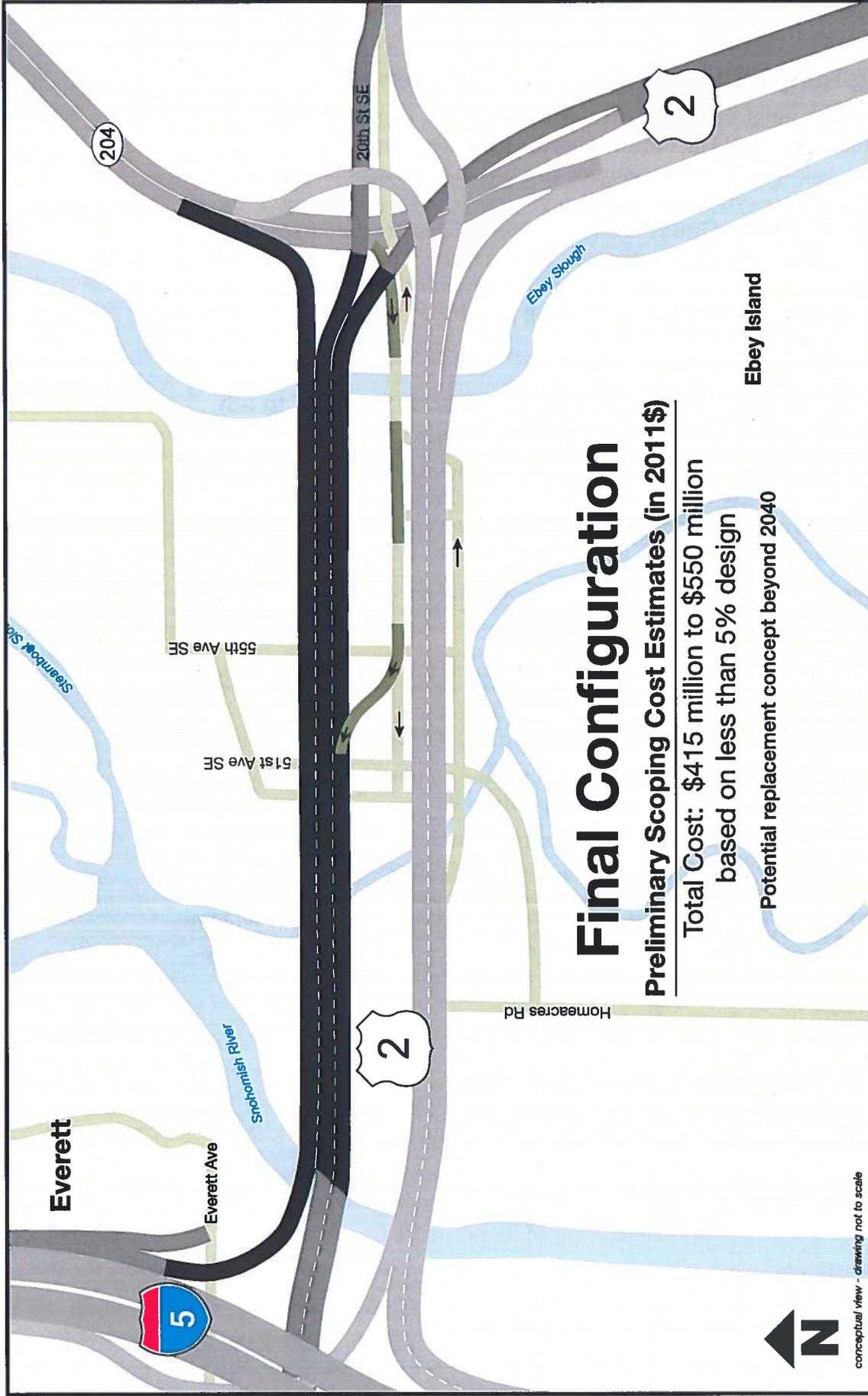
Two variations of a three lane westbound trestle were modeled: one with tolls and one without tolls. The traffic simulation results showed that travel demand with tolls and without tolls would be virtually the same. This result is likely because there are a limited number of alternative routes for traffic to avoid the tolls; the only routes that cross the Snohomish River in Snohomish County (SR 529, I-5, SR 9), are congested during peak periods and require out of direction travel.

##### **Planning Level Cost Estimate:**

\$415 million to \$550 million (in 2011\$)

**Benefit/Cost Ratio:** 0.22

**Exhibit 6.3: Three lane concept**



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## **2020 A.M. Peak Hour Analysis Results Key Results (Tolled and Untolled)**

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### **US 2 Trestle A.M. Westbound**

The analysis showed that a new three lane westbound trestle meets most of the projected travel demand, and improves the merge and queuing at the SR 204, 20th Street SE and US 2 Interchange. However, queuing remains at the ramps with I-5 because of congestion on I-5.

### **SR 204 A.M. Southbound**

With a new three lane trestle, SR 204 would have its own approach lane. As a result, the queuing on SR 204 would be reduced. However, long queues on Sunnyside Boulevard would continue because of the stop sign condition at the Sunnyside/ SR 204 intersection, and higher volumes on SR 204 would reduce the opportunities for traffic from Sunnyside to merge onto SR 204.

### **20th Street SE A.M. Westbound**

Queues on 20th Street SE would extend nearly a half mile from the US2/SR204/20th Street SE interchange because two lanes traffic would have to merge into the one lane that approaches the westbound US 2 trestle. As a result, nearly 80% of the projected traffic demand would reach the trestle during the peak hour. The queue would extend to 73rd Avenue SE (about 1,200 feet from the 20th Street lane merge point). The traffic merges into one lane approaching the trestle, and has a dedicated lane entering the trestle.

### **I-5 A.M. Southbound**

Southbound I-5 would operate with no noticeable delays.

## **2020 P.M. Peak Hour Analysis Key Results**

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Note: a new northbound I-5 braided ramp between 41st Street and US 2 was assumed in the model for traffic bound for Pacific Ave and US 2 in order to relieve the congestion caused by the weaving on I-5.

### **US 2 Westbound P.M. Peak Hour**

At the east end of the trestle, westbound traffic would flow freely until the I-5 northbound ramp where traffic backs up on the trestle approximately 360 feet from the ramp meter point on the approach to northbound I-5.

### **US 2 Eastbound P.M. Peak Hour**

Model results did not show a significant change in speed. The Hard Shoulder Running substantially improves traffic flow on most of the eastbound trestle. In 2020, there would be higher volumes going eastbound on trestle due to assumed growth and development in the study area.

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### **I-5 Northbound P.M. Peak Hour**

The results of the model showed that congestion causes queues on the westbound US 2 off-ramps because traffic from US 2 and Everett Avenue merge with northbound I-5 traffic, and the right lane on I-5 is an exit only lane to Marine View Drive. Drivers that do not take the Marine View Drive must merge to the left to continue on northbound I-5.

### **2040 Build Analysis**

For the traffic analysis it was assumed that the westbound trestle would be replaced by 2040 with a three lane structure.

### **US 2 Westbound**

The merge issues are resolved on the east end of the trestle. However, some weaving remains near I-5 which slows traffic on the westbound trestle.

### **SR 204 Southbound**

Southbound SR 204 would operate with minimal queues.

### **20th Street SE Westbound**

Queues on 20th Street SE would extend to 73rd Avenue SE.

### **P.M. Peak Hour Analysis**

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#### **US 2 Westbound**

At the east end of the trestle, westbound traffic would flow freely. However, at the west end of the trestle, traffic would back up 1,300 feet from the ramp meter that approaches northbound I-5.

#### **US 2 Eastbound**

Although the hard shoulder operation significantly helps traffic flow, the merge reduces speed on the western portion of US 2.

#### **I-5 Northbound**

The analysis showed that because of the projected increase in demand on I-5 by 2040, there would be congestion on I-5 between US 2 and Marine View Drive resulting in long queues on the US 2 westbound trestle.

## Possible Phase 1A of Westbound Trestle Replacement, East End Improvements

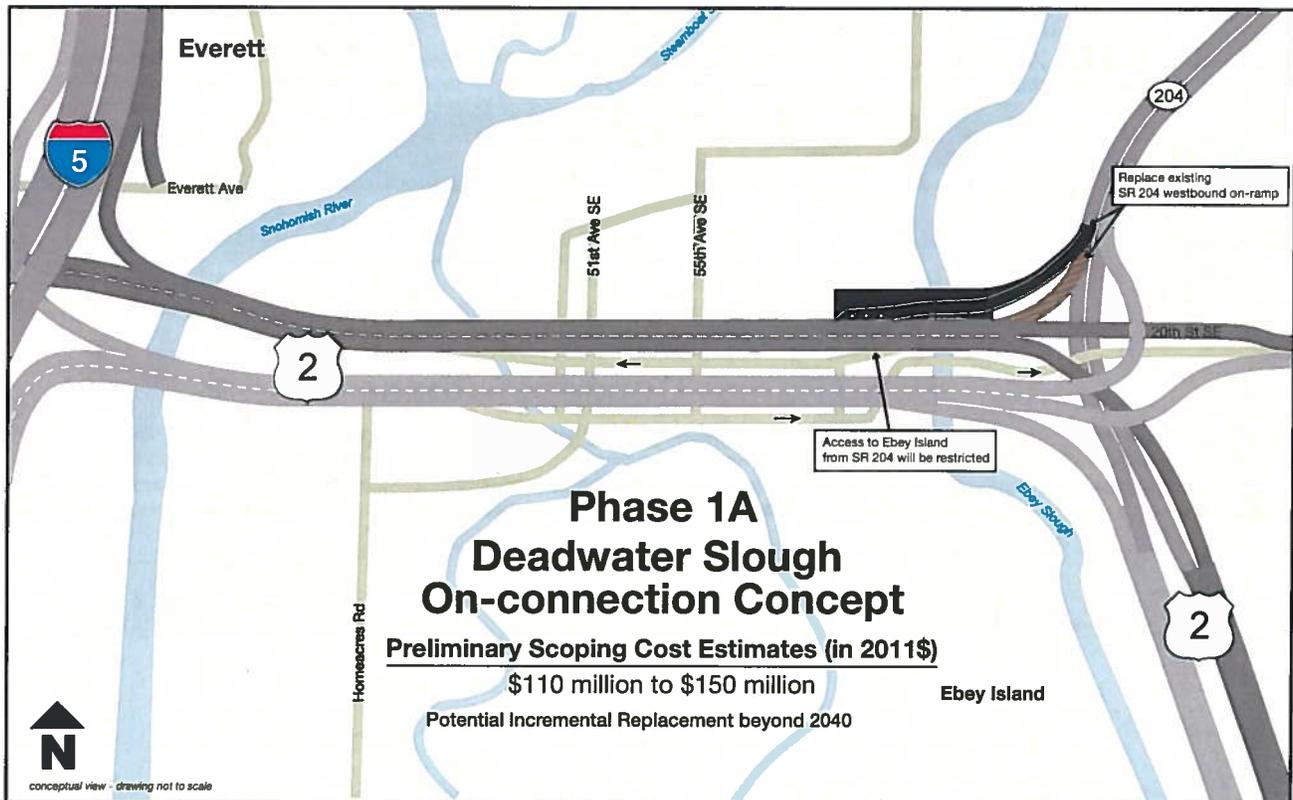
WSDOT and the CWG identified a concept that would provide a new 3,000 foot structure adjacent to the existing westbound trestle as a possible first phase to replacing the westbound trestle. The new structure would tie into the existing trestle until additional segments could be constructed. The first phase would provide SR 204, 20th Street SE and US 2 their own lanes onto the trestle before it ties back into the existing structure to address the current congestion caused by weaving/merging at the east end of the trestle.

The analysis showed that although congestion from the merge movement would improve, queuing on SR 204 and 20th Street SE would still exist. Queues on SR 204 would be about 200 feet long and 1,000 feet long on 20th Street SE during the a.m. peak hour.

**Planning Level Cost Estimate:** \$110 million to \$150 million (in 2011\$)

**Benefit/Cost Ratio:** 0.18

### Exhibit 6.4: Phase 1A



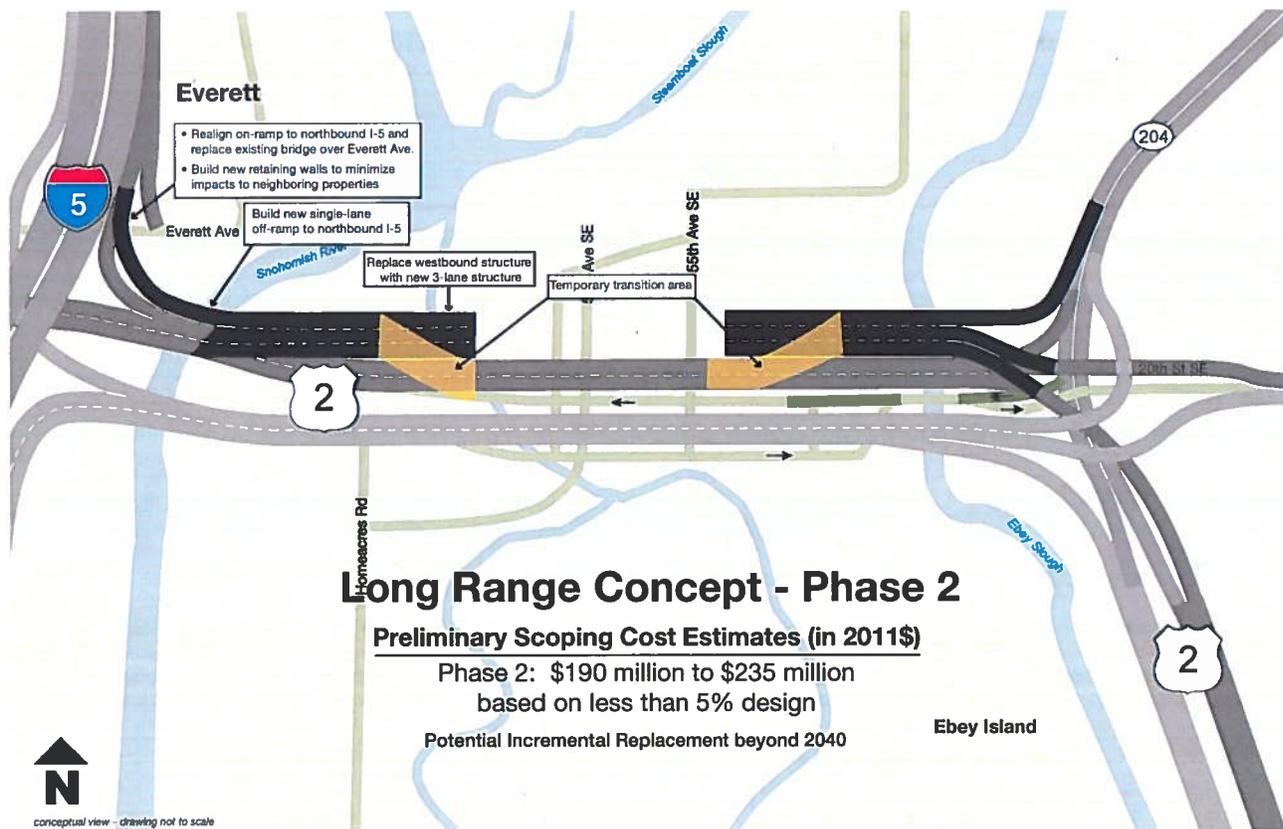
## Phase 2 of Westbound Trestle Replacement

The second possible phase would:

- provide a new three lane structure adjacent to the existing trestle between Deadwater Slough and the Snohomish River;
- construct a new single-lane off-ramp to northbound I-5;
- realign the on-ramp to northbound I-5 and replace the existing bridge over Everett Ave.

**Planning Level Cost Estimate:** \$190 million to \$235 million (in 2011\$)

### Exhibit 6.5: Phase 2



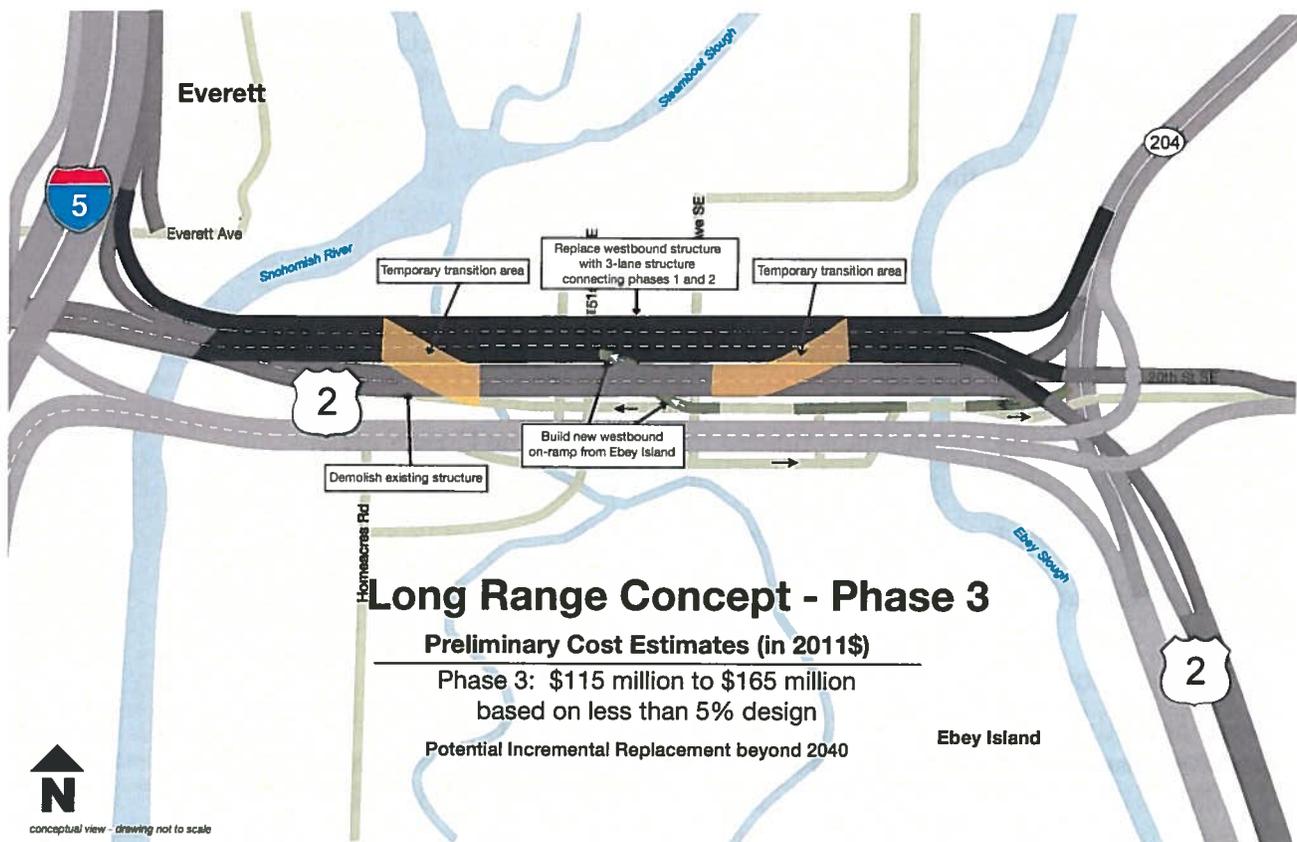
## Phase 3 of Westbound Trestle Replacement

The third phase would:

- Connect phases 1 and 2 with a new three lane structure
- Build a new westbound on-ramp from Ebey Island
- Demolish the existing structure

**Planning Level Cost Estimate: \$115 million to \$165 million (in 2011\$)**

### Exhibit 6.6: Phase 3



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## Evaluation and Recommendations

### Near Term Recommendations

The corridor study recommends the following low cost, easy to implement improvements for the near term:

#### **ITS Investment: I-5 to SR 204 both directions (traffic cameras, variable message signs)**

**Rationale:** Additional traffic cameras would improve WSDOT's ability to detect congestion during peak periods and respond faster to incidents. Variable message signs would also provide motorist with information about traffic congestion, incidents, roadwork, or travel times.

**Planning Level Cost Estimate:** \$1.2 million (in 2011\$)

**Benefit/Cost Ratio:** NA

#### **Incident Response Team: Dedicated to the US 2 Trestle**

**Rationale:** Currently US 2 does not have dedicated Incident Respond Team staff or equipment for the US 2 Trestle. When an incident occurs on the trestle, the Incident Response Team that is funded to serve I-5 in the Everett area responds if staff and equipment is available at the time of the incident.

**Planning Level Cost Estimate:** \$100,000/year (in 2011\$)

**Benefit/Cost Ratio:** NA

#### **Transportation Demand Management (TDM) Program**

Build upon the Snohomish County and Community Transit's existing "Curb The Congestion" program by adding a residential based TDM and non-CTR employers outreach programs in order to spread the peak demand by time of day and to increase the occupancy rate of vehicles using the trestle. Develop TDM programs with targeted incentives for employers who improve commute efficiency by offering telework/compressed work week technical assistance; transit, carpool and vanpool subsidies; priority parking for carpools and vanpools; increasing SOV parking fees at worksites; etc.

**Planning Level Cost Estimate:** \$200,000/year for staff, incentives and postage.

**Benefit/Cost Ratio:** NA

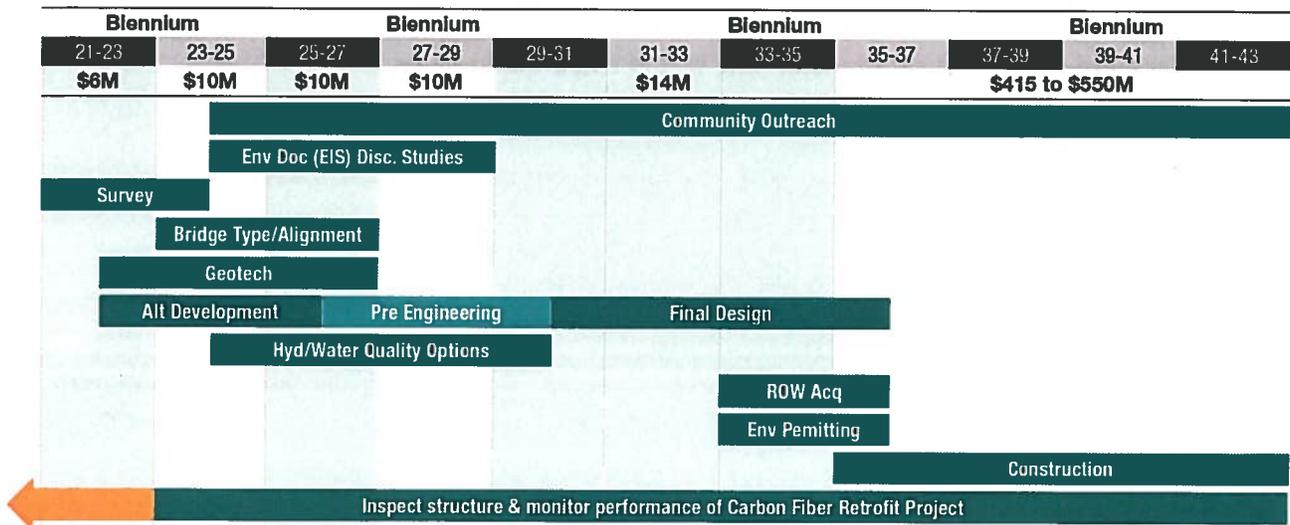
# Long Range Westbound Trestle Replacement Approach

The future replacement of the westbound trestle would be driven by traffic congestion and the useful life of the existing structure. Traffic congestion currently lasts for 1 to 2 hours during the morning at two locations on the trestle: the SR 204 and 20th Street SE merge area, and near I-5/US 2 ramps. The rehabilitation projects (completed in 2011) and continued maintenance on the trestle will extend the useful life of the westbound trestle to approximately 2045.

The trestle will eventually need to be replaced, and will require significant lead time given the complexity of environmental and constructability issues involved.

Given the time needed to construct a complex project like the trestle replacement, the project development steps will require a timeline similar to the one shown in the graphic below.

**Exhibit 6.7: Trestle Replacement Steps**



Dedicated project funding triggers the start of the formal environmental review process. The shelf life of environmental documentation is limited to 3 to 5 years. Therefore, the environmental review and documentation phase should not be completed too far in advance of actual construction. There are some preliminary activities that could be completed in advance of construction, such as survey, geotech, and identifying project funding strategies.

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## Improvements Considered and Eliminated

### Improvement 1: Ebey Island Bypass

Recommend Advancing: No

#### Reasons for not advancing

This improvement is not recommended because model results show no improvement in trestle traffic. Traffic merging onto the trestle from Ebey Island would decrease travel speed on the west end of the trestle.

### Ramp Metering (SR 204 & 20th Street SE westbound on-ramps)

Recommend Advancing: No

#### Reasons for not advancing

This improvement is not recommended because the constructability issues of providing a two-lane ramp meter outweigh the traffic benefits.

Providing additional width for a second metered lane on SR 204 would require a wall between a wetland and a steep hill. The 20th Street SE on-ramp is a short distance that begins on a downhill grade located between 20th Street SE and a steep hill. The short ramp meter lane would cause queuing on 20th Street SE.

# Plan Implementation

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## 7.1 Plan Implementation

The section provides an overview of the next steps towards obtaining funding and implementation of improvements within the US 2 corridor study area.

The US 2 Corridor Planning Study identified three recommended improvements within the next 6 to 20 years. In addition, continue to inspect and maintain the westbound trestle to determine when the westbound trestle needs to be replaced. There is one existing safety and preservation project in the study area. With prevailing economic conditions, the available revenue needed to implement these improvements is very limited and cannot fund all of the projects in the near term.

To assist with the implementation of the improvements, a proposed programming matrix based on the guidelines outlined in WSDOT's 2007 Planning Studies Guidelines and Criteria Report is shown presented in Table 7.1, lists the projects by their priority and classifies them in terms of the Washington Transportation Guidelines and the Highway System Plan implementation strategies.

The proposed programming matrix lists the proposed improvements for US 2. The matrix shows when the proposed projects should logically be implemented in the first six years, the second six years, the last eight years, and those beyond twenty years.

**Exhibit 7.I: US 2 Improvements Proposed Programming Matrix, 20+ years**

US 2 Improvements Proposed Programming Matrix						
	Project Number		w/in 6 years	w/in 12 years	w/in 20 years	20+ years
<b>Proposed Improvements Recommended by US 2 Corridor Planning Study</b>						
 <b>Operate Efficiently and Manage Demand</b>	<b>B</b>	Travel Demand Management (TDM)	✓			
	<b>C</b>	US 2/ West Abutment Snohomish River (Sign Bridge) and US 2/I-5 to SR 204 – ITS Improvements		✓		
<b>Proposed Improvements Not Recommended by US 2 Corridor Planning Study</b>						
 <b>Operate Efficiently</b>	<b>A</b>	Incident Response Team		✓		

## 7.2 Next Steps

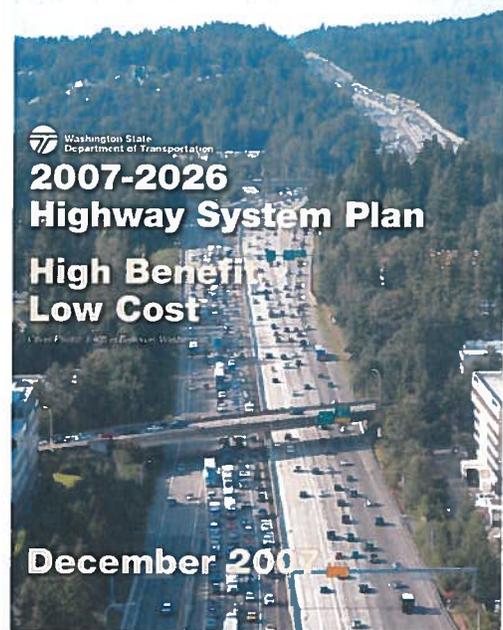
The US 2 Corridor Planning Study identifies corridor recommended improvement based on adopted WSDOT thresholds. While this study alone does not guarantee funding, the plan allows future consideration for funding requests to be focused on areas of greatest need in this corridor. These identified areas will compete with other similar locations around the state for future funding based on performance outcome.

Because available revenue to implement the identified improvements is limited, specific actions should be taken to position the US 2 proposed improvements for future implementation. These actions include incorporating the recommendations into the following documents:

- State Highway System Plan (HSP)
- PSRC’s regional transportation plan (Transportation 2040)
- County and city comprehensive plans
- Transit agency plans

## 7.3 Highway System Plan

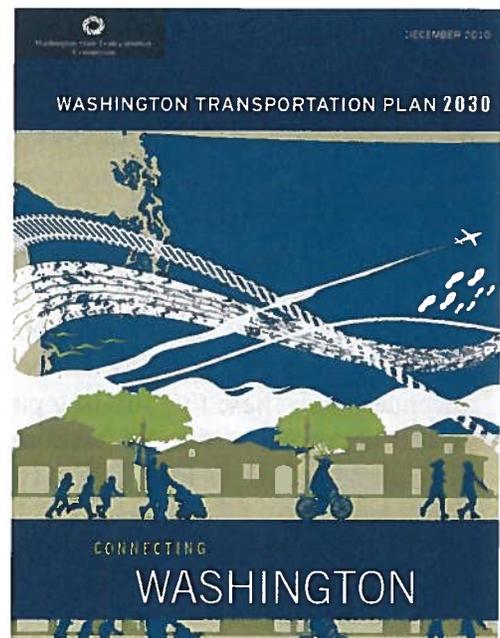
The Washington State Highway System Plan (HSP) is the state highway component of the Washington State Multimodal Transportation Plan (SMTP). The SMTP is the state's overall transportation plan that includes an analysis of facilities the state owns and those in which the state has an interest. The HSP is updated every two years and serves as the basis for the six-year highway program and the two-year biennial budget request to the Washington State Legislature. The current HSP was completed in 2007 and updated in 2008. It is currently being revised: 2007-2026 Highway System Plan Technical Update December 2008 is the most current published plan. See also: [www.wsdot.wa.gov/planning/hsp](http://www.wsdot.wa.gov/planning/hsp) The HSP is also aligned to the WTP, which outlines the policies adopted by the Washington State Transportation Commission.



## 7.4 Washington State Transportation Plan

In 2007, the Washington State Legislature and the Governor created five investment policies for planning, operations, performance, and investment in the state's transportation system as outlined in RCW 47.04.280 (derived from Senate Bill 5412). This overarching transportation plan for the state is known as the Washington Transportation Plan (WTP). It is developed by the Washington State Transportation Commission and provides a 20-year blueprint for transportation programs and investments. The WTP 2030 covers various modes in the transportation system and is required by state and federal law. The current plan was produced in December 2010 and covers the period from 2010 – 2030.

<http://wtp2030.wordpress.com/2010/12/30/commission-adopts-wtp-2030/>



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A sixth investment policy goal was added by the legislature in 2010. Investment in the state transportation system must support one or more of the following six policy goals:

1. **Economic Vitality:** To promote and develop transportation systems that stimulate, support, and enhance the movement of people and goods to ensure a prosperous economy.
2. **Preservation:** To maintain, preserve, and extend the life and utility of prior investments in transportation systems and services.
3. **Safety:** To provide for and improve the safety and security of transportation customers and the transportation system.
4. **Mobility:** To improve the predictable movement of goods and people throughout Washington state.
5. **Environment:** To enhance Washington's quality of life through transportation investments that promote energy conservation, enhance healthy communities, and protect the environment.
6. **Stewardship:** To continuously improve the quality, effectiveness, and efficiency of the transportation system.

## 7.5 WTP 2030 Funding Analysis

The most recent statewide transportation revenue packages were enacted by the Legislature in 2003 and 2005. The state raised the motor vehicle fuel tax and other fees and charges to support two WSDOT capital programs: the 2003 Nickel Funding Package and the 2005 Transportation Partnership Act Funding Package. Together, these funding packages invested \$15.5 billion in highway, rail, ferry, transit, and freight projects across the state. By the end of 2010, 347 of 421 projects will be complete or under construction. Future revenues from these two funding packages have been bonded and committed to the 421 projects. WSDOT estimates that basic preservation, safety, and environmental needs for the next twenty years will require an additional \$14.8 billion.

Washington has made significant investments in the state transportation system since 2003, investing \$15.5 billion in state funding, however, we know that much more is needed. Washington State faces tremendous transportation needs statewide; it is estimated that at least \$175 billion to \$200 billion is needed to meet statewide needs over the next 20 years. To meet these challenges effectively an integrated, systems view of the state's transportation network is required. This systems view recognizes the central role that transportation plays in our economic and social well-being and establishes a policy framework against which projects and investments can be assessed

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and prioritized. At a minimum, the statewide transportation needs of transit providers and state, county, and city governments for the 2011–2030 time frame of WTP 2030 is in the range of \$175 to \$200 billion.

Although an estimate, this range is consistent with a constrained 30 year need (\$189 billion) identified in Transportation 2040 adopted by the Puget Sound Regional Council and the 2008 constrained plan developed by the Spokane Regional Transportation Council (\$7.5 billion). Due to the difficulty of identifying needs so far in the future, the Commission asked WSDOT, the Association of Washington Cities, the Washington State Association of Counties, and the Washington State Transit Association to help estimate the statewide 20 year transportation needs. WSDOT estimates the 20 year need for the state transportation system alone is \$63.8 billion.

## **7.6 Regional Plans**

Metropolitan Planning Organizations (MPO) and Regional Transportation Planning Organizations (RTPO) have specific responsibilities under both federal and state law relating to transportation and growth management planning. The organization that performs these planning functions within the study area is the Puget Sound Regional Council (PSRC), which is the MPO for Kitsap, King, Pierce, and Snohomish Counties.

Destination 2030 was the transportation plan adopted by PSRC in 2001 and updated in 2007. Transportation 2040, the region's new 30-year transportation plan, was adopted in spring 2010 and replaced Destination 2030. The current regional plan focuses on transportation system investments needed to provide an integrated, multimodal transportation system in Central Puget Sound. For transportation projects to receive federal funding, they must be consistent with and included in these regional transportation plans. Transportation 2040 assumes full highway system tolls by 2030.

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## **7.7 Plan Agreement: Local Comprehensive Plans and Long Range Transit Plans**

Local jurisdictions and transit agencies act as partners with WSDOT for the purpose and execution of transportation corridor planning. Local partners help strengthen the corridor plan by incorporating corridor plan recommendations into local comprehensive plans and long range transit plans in the corridor planning study area. Agreement between corridor plans and long range transit plans demonstrates to funding agencies that the corridor plan has support at state, regional, and local levels. Agreement between plans also addresses a critical requirement under the Growth Management Act, requiring plans to be consistent between and among jurisdictions.

## **7.8 Funding**

### **How will we pay for the projects identified in the US 2 Study?**

The US 2 corridor study identifies three near term improvements ranging in total cost between \$100 thousand/year and \$3.1 million (2011\$ planning level cost estimates). None of these projects has been identified for funding under current budgets (state, local, transit). The planning level cost estimate for long-range plan to replace the west bound trestle is \$415 million to \$550 million (in 2011\$).

### **What funding sources are available for these projects?**

Federal, state, and local governments offer a variety of funding sources that can be used to fund individual projects along the US 2 corridor. Tolling could be considered as part of the funding package for the long-range replacement of the west bound trestle. Partner agencies can use the list of recommendations in this corridor plan to solicit funding from local, state, and federal sources and the private sector to fund project design, environmental review, right-of-way acquisition, and construction. All potential sources of funding will need to be used to meet the transportation priorities identified in the US 2 Corridor Planning Study. As a result of total corridor needs, all sources will be needed to meet the identified transportation needs identified in the US 2 Corridor Planning Study.

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**Federal Funds** – On July 6, 2012, the President signed into law the Moving Ahead for Progress in the 21st Century Act (MAP-21) which funds surface transportation programs at over \$105 billion for fiscal years (FY) 2013 and 2014. The funding levels and programs are about the same as before, with some inflation adjustments added. Some of the changes from SAFETY-LU to MAP-21 include fewer formula programs, most discretionary programs eliminated, and no earmarks. For Washington State in fiscal year 2013, the surface Transportation program is funded at \$175M and the CMAQ program has \$35M. The Highway Safety Improvement Program for Washington State is funded at \$42M.

**State Funding** – The state of Washington also administers a number of funding programs that may be used for transportation projects. The most common source of state grant funds for transportation projects is the Transportation Improvement Board (TIB). The Washington State Legislature created the TIB to foster state investment in quality local transportation projects.

The TIB distributes grant funding, which comes from the revenue generated by three cents of the statewide gas tax, to cities and counties for funding transportation projects. For the US 2 improvements, TIB funds can be used by the incorporated cities to lead selected improvement projects within their jurisdictions, such as intersection improvements or parallel street improvements than can divert traffic from the state highway along the corridor.

**County Road Administration Board** – The County Road Administration Board (CRAB) manages grant programs to help counties meet their transportation needs. The programs are administered with maximum flexibility and minimum overhead.

**Rural Arterial Program (RAP)** – The RAP is a road and bridge reconstruction funding program that counties compete for every two years within their respective regions. Taken from fuel tax revenues, the account generates approximately \$40 million per biennium.

**County Arterial Preservation Program (CAPP)** – The CAPP program is designed to help counties preserve their existing paved arterial road networks. The program generates approximately \$30 million per biennium.

**Local Agency Funding** – To be eligible for and competitive in most grant programs, local matching dollars are required. The more local participants are involved in and support a project, the more competitive a grant application can become. Private funding through developer mitigation payments for impacts to the highway could also be a source of matching funds.

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**Development Impact Fees** – The use of development impact fees to fund public facilities that are necessary to provide services for new development and maintain acceptable level-of-service has been widely used in Washington and across the country. Development Impact Fees are one-time charges applied to new developments. Their goal is to raise revenue for the construction or expansion of capital facilities.

Impact fees are assessed and dedicated principally for the provision of additional water and sewer systems, roads, schools, libraries, parks, and recreational facilities made necessary by the presence of new residents in the area. As new developments are approved, consideration should be given to their impact on the operation of local, county, and state highways within the proximity of the new development.

Jurisdictions along the US 2 corridor could, and probably should, enter into effective interlocal agreements that to more efficiently assign the costs of traffic mitigation to local development projects.

**Tolling** – Tolling could be considered as an option to fund a portion westbound trestle replacement, manage travel demand and improve safety. Tolling requires legislative approval, and extensive public input including detailed traffic and financial studies.

The Corridor Working Group requested that a preliminary tolling and financial feasibility study for tolling the trestle be conducted to provide information for policy makers regarding the possible traffic effects and potential toll funding contribution toward the future replacement of westbound trestle. The findings of the tolling study can be found in the next section.

The recommendations in this study emphasize lower-cost options that can be implemented faster while still showing some benefit to traffic and safety in the US 2 study area. The next steps for this corridor plan process after the identification of funding sources are to partner with agencies to pursue various funding from local, state, federal, and private sources for improvements recommended in this corridor plan.

The recommendations also reflect WSDOT’s commitment to the “triple bottom-line” approach to sustainability by promoting robust economic growth, supporting an integrated multimodal transportation system and environmental stewardship. The recommendations include such sustainability practices as incident response, Intelligent Traffic Systems (ITS) and Traffic Demand Management to optimize resource use. Moving Washington and the US 2 Corridor Planning Study place the highest priority on maintaining and preserving the safe and long-lasting performance of existing infrastructure, facilities and services.

For more information on the WSDOT sustainable transportation program visit the website:

[www.wsdot.wa.gov/SustainableTransportation/](http://www.wsdot.wa.gov/SustainableTransportation/)

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## Preliminary Toll and Financial Feasibility Study

Determining whether or not a facility is a good candidate for tolling is an iterative process with many decision points and steps. Each step requires more detailed information and refined assumptions based on the findings of the previous step.

A key decision is to determine why tolling may be a viable option for a particular project or corridor. It's important to determine if the objective for tolling is to generate revenue for construction of the project and/or manage traffic. Knowing the objective of tolling determines what type of toll rate structure and concept of operations will meet the objective(s). For example, if raising revenue is the goal, a flat toll rate might achieve the objective. If managing traffic is the objective, then a toll rate that varies by time of day or level of congestion should be considered.

Tolling is a user fee that reduces the funding that must be financed and therefore saves money. It can also be used to help traffic flow since some drivers will choose to travel at off-peak hours, consolidate trips, use transit, carpool or vanpool, or take alternative routes rather than pay a toll.

The Preliminary Toll and Financial Feasibility analysis assumed tolling of a new three westbound trestle as well as the existing eastbound trestle. Horizon years of 2020 and 2030 were model with and without tolls so that a comparison in the effects of tolling on traffic. The analysis also assumed:

- HOV 2+
- SR 9 widening from SR 522 to SR 92 to 4-lanes (two lanes in each direction)
- SR 522 widening from Paradise Lake Road to the Snohomish River
- Toll rates were set to vary by time of day and by direction of travel. Peak travel occurs westbound in the morning and eastbound in the evening.

### Toll Rate Schedule (2020 Dollars)

Time Period	Eastbound	Westbound
AM Peak (6 AM-9 AM)	\$2.25	\$2.75
Mid-day (9 AM-3 PM)	\$2.25	\$2.25
PM Peak (3 PM-6PM)	\$3.25	\$2.50
Evening (6 PM-10PM)	\$2.25	\$2.00
Night (10 PM-6AM)	\$1.50	\$1.50

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### Initial Findings

The model results indicate that there would be a 20-25% reduction in daily volumes on the trestle. With most of the reduction vehicles is because of drivers diverting to alternative routes to avoid the toll. This diversion rate is considered fairly modest, due in part to the lack of attractive alternative routes.

The traffic volumes estimated from the travel demand model are shown below.

### Weekday Toll-Free and Toll Traffic Volumes by Time Period and Travel Direction (2020 and 2030 Model Forecast Years)

Time Period	Direction	2020		2030	
		Toll-Free	Tolled	Toll-Free	Tolled
AM Peak Period (6 - 9 AM)	Eastbound	3,060	2,050	3,360	2,340
	Westbound	15,380	14,290	15,640	14,620
Midday Period (9 AM – 3 PM)	Eastbound	18,230	12,470	19,070	13,400
	Westbound	17,540	11,850	18,370	12,660
PM Peak Period (3 PM – 6 PM)	Eastbound	14,220	12,180	14,520	12,420
	Westbound	6,800	4,450	7,110	4,900
Evening Period (6 PM – 10 PM)	Eastbound	9,080	6,260	9,550	6,710
	Westbound	8,510	6,010	8,900	6,340
Night Period (10 PM – 6 AM)	Eastbound	3,560	2,780	3,900	3,050
	Westbound	3,350	2,670	3,670	2,930
Average Weekday	Eastbound	48,150	35,740	50,400	37,920
	Westbound	51,580	39,270	53,690	41,450

Preliminary findings indicate that toll bonds backed by future toll revenues could generate between \$200 and \$300 million over 30 years. It should be noted, that there is a high degree of uncertainty in toll revenue projections. Actual toll funding contribution are a function of the type of debt used, market conditions and interest rates at the time the debt is issued, as well as policy decisions regarding how the debt is structured.

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## 7.9 Initiate Project Development Process

As funding becomes available, WSDOT and/or its partner agencies will need to complete necessary project development steps. The lead agency will determine the appropriate level of state and federal documentation for each proposed project and conduct public involvement throughout the project development process. Any change in access to US 2 will require an Interchange Justification Report (IJR). Some key elements required during the project development process are:

**Project Scoping Phase** – A scoping document is prepared that includes a scope of work, justification for the project, identifies risks, operational and environmental issues, key schedule milestones, a capital cost summary cash flow, and financial plan.

**Design Phase** – Preliminary engineering to determine and refine project plans.

**Right-of-Way Studies Phase** – Records are reviewed to determine property ownership and boundaries surrounding the proposed project. The findings are then assessed to determine if property needs to be secured to construct the project.

**Environmental Phase** – The purpose of the environmental review process is to meet federal and state regulations by evaluating project alternatives and identifying ways to avoid and minimize negative effects to the community and the environment. The review process evaluates project alternatives against some or all of the following environmental topics: earth, air, water, plants and animals, energy and natural resources, environmental health, land and shoreline, human elements, use, transportation, and public services and utilities.

**Public Involvement and Outreach Phase** – The public is informed and engaged during project development to review project plans and provide feedback on potential impacts and/or benefits.

**Construction Phase** – The project is constructed.

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## **WSDOT & Sustainable Transportation**

**Sustainable transportation** is a system that preserves the environment, is durable and takes into account how we build and the materials we use. It's a system that uses strategies to meet society's present needs without compromising the ability of future generations to meet their needs.

### **Consider sustainability in all we do**

Emissions from transportation-related activities account for nearly half of the total greenhouse gas (GHG) emissions in Washington. This is one reason why WSDOT considers sustainability in all that we do. Our practices make good environmental sense and good economic sense for Washington. Our agency uses a strategic and balanced approach to conserve energy and fuels while reducing greenhouse gas emission from the transportation sector.

### **Making transportation sustainable**

WSDOT is making transportation more sustainable in a multitude of ways - from long-range plans to our day-to-day operations. This includes designing highways that work best for communities, integrating transit, bicycling and walking into projects and employing techniques that reduce storm water pollutants. Our maintenance crews use precision snow and ice removal techniques that keep drivers safe while using the minimum amount of salt necessary.

### **Technology**

WSDOT is using new technology and innovative methods in our efforts to provide a more reliable, responsible and sustainable transportation system. We are taking steps to conserve fuel and energy, reduce carbon emissions, and protect our natural environment while keeping people and goods moving.

### **Efficiency**

WSDOT is making highways more efficient by smoothing traffic flow through our busiest choke points. We're using fewer building materials by recycling and extending the lifespan of roads, bridges and other structures.

### **Reducing the carbon footprint**

WSDOT is helping citizens and businesses reduce their carbon footprint in new ways, from expanding transit services and ridesharing opportunities to partnering to build support infrastructure along I-5 for electric and other alternative-fuel vehicles.

**For more information visit the WSDOT Sustainable Transportation homepage::**

**[www.wsdot.wa.gov/SustainableTransportation/](http://www.wsdot.wa.gov/SustainableTransportation/)**

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Appendix A:

# **Carbon Fiber Wrap**

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June 11, 2013

TO: Carol Hunter/TB-55  
Urban Planning Office  
DW

FROM: DeWayne Wilson/47340  
Bridge Management Engineer

SUBJECT: US 2 WB Trestle Carbon Fiber Wrap Rehab Projects

The westbound US 2 trestle was constructed in 1968. When it started to show signs of aging and needing repair, the Bridge Division considered a number of approaches to address the cracking concrete and corrosion of the steel frame. After conducting a national research and evaluating options, WSDOT decided to conduct a pilot project on a small section of trestle to test the performance of a relatively new technology called carbon fiber wrap.

The pilot project involved removing cracked concrete and corrosion from the steel rebar in the precast concrete tub girders, then applying treatment to the rebar to prevent corrosion and strengthen the girders. High strength carbon fiber was applied longitudinally to the bottom of the girders. During the pilot project, which began in 1999, WSDOT monitored the test section to ensure that the carbon fiber retrofit could be used on the remaining precast concrete units.

Based on the results of the pilot project, WSDOT concluded that the most cost effective approach to extending the life of the structure was to apply the carbon fiber wrap to the remaining portions of the structure.

**Stage 1**  
**US 2 WB Ebey Island Viaduct and Ebey Slough Bridge Rehabilitation**  
**Complete: September 2007**  
**Cost: \$10.8 million**

**Description:** Repaired 136, 40 foot-long girders by chipping away old cracking concrete and removing corrosion from the steel frame. The steel was treated to prevent additional corrosion and was strengthened. The structure was re-sealed by applying carbon fiber mesh and new concrete over the exposed steel.

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Carol Hunter  
July 11, 2013  
Page 2

prevent additional corrosion and was strengthened. The structure was re-sealed by applying carbon fiber mesh and new concrete over the exposed steel.

**Stage 2**  
**US 2 Trestle Ebey Island Bridge Rehabilitation**  
**Complete: October 2011**  
**Cost: \$5.1 million**

**Description:** Repaired and reinforced 844, girders by chipping away old cracking concrete and removing corrosion from the steel frame. The steel was treated to prevent additional corrosion and was strengthened. The structure was re-sealed by applying carbon fiber mesh and new concrete over the exposed steel.

With regular maintenance, the structure will not need to be replaced because of structural deficiencies until approximately 2045.

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Appendix B:

# **GHG Emissions (How the Recommended Projects Address Climate Change)**

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## How the Recommended Projects Address Climate Change

Washington State's transportation system contributes close to half of the state's greenhouse gas (GHG) emissions. WSDOT recognizes that transportation is directly connected to the climate change in two ways:

1. Transportation infrastructure is affected by climate change and,
2. Transportation contributes to climate change by producing greenhouse gases (GHG).

The transportation system needs to be able to adapt to changing climate as well as reduce its contribution to increased greenhouse gas emissions. However, addressing climate change effectively is challenging; GHG emissions from a single project are usually very small and difficult to measure. Therefore, WSDOT believes that transportation GHG emissions are better addressed at a broader region, state or national level where multiple projects can be analyzed in aggregate. At the project level, there are four types of GHG emissions that can be considered: operational, construction, embodied and lifecycle emissions.

### GHG Emissions

**Operational GHG emissions** are released by vehicles using project roadways. The quantity of emissions released depends on the fuel type, vehicle fuel efficiency, speed of the vehicle, distance traveled, and the number of vehicles on a roadway. In general, operational emissions are the largest category of GHG emissions released by the transportation sector: Approximately 72 percent of the transportation sector's emissions are generated from on-road transport, including both passenger and freight travel.

**Constructions emissions** are released during project construction and primarily come from fuel burned in the equipment used to build a project, such as bulldozers, pavers, and rollers. Construction emissions can also result from increased traffic congestion caused by construction activities.

**Embodied emissions** are the emissions generated in producing the materials that are used in the construction process and include emissions from sourcing the raw materials from the earth and their conversion into a usable form, including the energy used in processing. Embodied emissions can be thought of as "cradle to site" emissions. For example, the emissions released while mining the coal used to manufacture the steel girders for a bridge would be considered embodied emissions.

**Lifecycle emissions** include emissions released during material production (embodied) and emissions released throughout a facility's lifetime, including demolition and disposal. Unlike embodied emissions, lifecycle emissions account for the durability of a product. Lifecycle emissions are often referred to as "cradle to grave" emissions.

## Exhibit B.1: GHG Emissions

Moving Washington	Project Number	Recommended Project	Operational GHG emissions	Construction Emissions change	Embodied Emissions	Lifecycle emission
<b>Improvements</b>						
 Operate Efficiently and Manage Demand	<b>B</b>	Travel Demand Management (TDM)	Small decrease	No change	No change	No change
	<b>C</b>	US 2/ West Abutment Snohomish River (Sign Bridge) and US 2/1-5 to SR 204 – ITS Improvements	Small decrease	No change	No change	No change
<b>Operate Efficiently</b>						
 Operate Efficiently	<b>A</b>	Incident Response Team	Small decrease	No change	No change	Small decrease

\* Where a small decrease in operational emissions is indicated in the table, this qualitative evaluation is based on the assumption that fewer vehicles will be idling after construction of the proposed improvement. Fewer idling vehicles equals a decrease in operational GHG emissions.